NESTING WOOD DUCK STUDY (35 Years)

Preliminary to my study in my own yard, I was introduced in 1938 to the subject by having 50 nesting boxes turned over to me by my friends Arthur S. Hawkins and Frank Bellrose of the Illinois Natural History Survey, a branch of the University of Illinois. They had been assigned the task of seeing what could be done to assist the wood duck to rebuild its population, which had been reduced in the early years of the century to a point where extinction was a definite possibility.

Wood ducks suffered their great drop in population before other species met the same fate because the nesting region for wood ducks was largely in what became the farm belt as settlers moved in from the east and the south. Most other species nested further north in what remained wilderness for several generations after the farm belt was well occupied. Therefore, these northern nesters were free from hunting except during their autumn, winter and spring migrations.

In the late nineteenth century and the early twentieth there were no laws restricting the killing of waterfowl. Game birds were a legal source of income for market hunters who shot and delivered them to food merchants for the wholesale and retail trade.

Farmers who tired of eating chicken could take down their shot guns at any season and kill a mess of woodies for their table. The woodies were using every river, creek and pond in those days and therefore were available. This hunting pressure, plus the destruction of forests, where the ducks nested, had a lethal effect on the wood duck population.

But help was on the way. Public recognition in the plight of waterfowl in general and the wood duck in particular resulted in the Migratory Bird Treaty between Canada, Mexico and the United States. This prohibited spring shooting and market hunting and gave complete year around protection to the wood duck. The beneficial effect of this protection was evident almost immediately. By the 1930's the wood duck population had made a significant recovery. So there was no danger of extinction but it was recognized that there was a shortage of natural cavities for nesting.

These 50 boxes were to be erected on the 1300 acre grounds of the New Crystal Lake Club lying along the Illinois shore of the Mississippi River. The area had historically been a nesting ground and summer residence for large numbers of woodies. The nest boxes were hung during the early spring of 1938, scattered through what we hoped would be favorable areas.

The areas where most boxes were hung consisted of mature and over ripe bottom land timber which contained natural cavities used by the ducks for their nests.

As the season for nesting progressed two inspections of the new boxes were made. I have brief written records of the results observed. While the ducks did find and use some of the boxes the results in terms of ducklings hatched was meager. Most nests suffered from predation by a mixed bag of native predators. Raccoons headed the list, and fox squirrels and snakes took their toll and only a few nests brought off a hatch.

By the next spring the number of acceptable nest boxes had decreased. Honey bees moved into a few, others had lost

the litter which is essential for the duck to bury her first half dozen eggs laid prior to the picking of down from the breast of the hen and which later covers her eggs during her rest flights.

Over the course of the next four or five years history seemed to repeat itself and the production of ducklings in the 50 box project was minimal. Certainly not enough to create any optimism for the future of the project.

Then one day in 1943 when Art Hawkins was spending an early spring weekend with me we were enjoying breakfast in my mother's bay window when lo and behold a pair of wood ducks alighted in one of the fine old larch trees where they were in plain sight. They sat there for perhaps five or ten minutes just scanning the area before they flew off toward the river bluff at the front of mother's yard.

Art and I looked at each other and though no word had passed between us it was clear we had the same thought; these birds were looking for a nesting site! This was a complete surprise to us because the yard just didn't look to us like a place for wild ducks to nest. The lawn covers about two and a half acres with scattered large trees planted when my grandfather bought the place in 1870. There are a few shrubs and flower beds but certainly there is nothing "wild" about the yard except the 120' high bluff on the river side. At the bluff bottom a single track railroad line follows the river edge. This bluff is very steep, in part precipitous, and a heavy growth of shrubs, wild vines and a few trees cover most of the steep slopes.

I lost no time in moving three of the Crystal Lake nest boxes to my yard. One was hung in the larch tree in which the pair had alighted, the other two in nearby trees. In the normal course of my daily schedule I could see these three boxes as I went to and from my car, enroute to work. During the next few weeks I watched for signs of ducks but saw nothing. I had expected that if ducks were using any of the boxes I would see them in trees nearby. Nothing.

About three weeks later I grew curious to see whether there was any sort of activity I might have missed. My surprise was complete when I found each of the three boxes had duck nests at various stages of development. One hen was incubating. And none of us had seen a duck.

I decided to find out just what was going on so I began to watch early morning and late afternoon and at once I made contact with the nesting birds. I found the hens who were still laying arrived soon after sunrise accompanied by their drakes who awaited the hens in a nearby tree while she produced her daily egg. Then the pair would depart together for the day, usually not returning until next morning when the next egg was produced.

The incubating hen took a very early morning rest flight usually leaving before sunrise and returning an hour or more later accompanied by the drake who did not stop but swerved away to return across the river where he awaited his mate until she took her next rest flight. A second daily rest flight was usually made in late afternoon and again the drake accompanied the hen on her return but did not stop.

There is a marked difference in the length of time the drake continues to attend the female during second nesting attempts. In these later season nests the drake ceases to appear with the hen as she returns from a rest flight, quite a bit earlier. Sometimes late in the second week of incubation, instead of into the fourth week as in first attempts. The behavior of the pair may be affected by the fact that my area offers only nesting facilities. No food, no water, and no loafing areas. In any case it becomes clear that each pair has its own "territory" where the two birds get together to mate and to join one another after a separation.

So by the end of the 1943 season I had begun to learn a little about what to look for in observing my nesting ducks. Thirty-five ducklings had been hatched, though I hadn't seen any of the baby birds. But my interest was aroused and I resolved to try to find out more the next spring. I brought over more boxes from Crystal Lake and constructed some new boxes in preparation for the coming season.

Wood Duck Nesting Boxes

My boxes were copies from the pattern originated by Hawkins and Bellrose. These were built of rough, cypress one inch thick. The C. C. C. had built their boxes of which they had several hundred scattered along the Illinois River near Havana and also along other river bottoms such as the Mississippi - usually close to back roads that ran along swampy areas or sloughs that were adapted to woodie activities.

I still have several of these old original cypress boxes now forty years old but serviceable by dint of a little upkeep such as renailing or perhaps a new bottom to replace a piece of decayed wood. The litter, about four inches deep, must be checked annually to be sure it is available for the hen to use to cover her first half dozen eggs. At that stage the hen starts plucking down from between her breast feathers. By the time a full clutch of 13 or 14 eggs is laid she will have produced enough down to cover her eggs with a blanket nearly two inches thick. During incubation this down covers her eggs while she is off on rest flights then while she is on her eggs, the down is pushed aside to form a ring around her while the eggs are exposed to the heat of her breast.

Getting back to the nest box and its construction. The overall size is 12" x 12" x 24" in height, outside measure. The front and back are best made of one piece slabs 12" wide. The two sides measure 10" wide. The bottom is nailed inside the four vertical side pieces. The front slab is 23" long with an entrance hole about 2" below the top. This hole originally was specified to be round and 4" in diameter but it was later found that an oval hole 3" high by 4" wide would permit the duck to enter but would exclude a yearling raccoon. A very important protection for the duck resulting in greatly reduced predation losses.

Another improvement which I made in the nest box consists of 1/8" deep kerfs across the inner face of the front slab below the entrance hole at intervals of approximately one

inch. These grooves serve as an assist to the baby ducklings in climbing up to the entrance hole in preparation for their jump out at the time of their exodus.

The ducklings have needle sharp toe nails to enable them to climb to the exit but in a box made of lumber, though the boards are rough from the saw, when the box is constructed, over the course of years the surface sometimes becomes quite smooth by the action of the hen climbing to leave her nest. This can cause too long a delay in the success of the young to gain access to the exit hole. Sometimes the weaker ducklings are left in the box after the mother has departed with the ducklings who have been able to leave the box.

The back of the box is 24" long and extends 1" above the front board. Thus giving the lid a slope of 1" from the rear toward the front. The lid is comprised of two pieces, an inner board size of 10" x 10" fits inside the four walls and the main lid is a piece 13" long x 12" wide extending an inch in front of the box and flush with the back board.

The lid is easily held in place by two screen door hooks and eyes which prevent predators from raising or removing it and also prevents strong winds from blowing it away thus exposing the inside.

The assembly should be made with zinc coated eight penny or ten penny nails. Using enough nails to make the box rigid and to close the cracks to hold them tight.

The bottom board shall be bored with four to six small holes approximately $\frac{1}{4}$" diameter to allow for drainage if excess rains should penetrate but not large enough to permit litter to sift through too easily.

For means of fastening the box on a tree securely, I bore a ½" diameter hole through the back board directly behind the entrance hole. My fastener is a 3/8" diameter hanger bolt 5" long. After determining the box location on a tree, selecting a smooth trunk area long enough to accommodate the box, I strip off any loose dead bark. Then bore a lead hole to receive the hanger bolt. This I screw into the tree trunk a good two inches to get a firm hold on the tree. Then hang the box by running the extending bolt through the hole in the back of the box. This will leave usually a 1½" of bolt inside the nest box. The attachment is completed by slipping on an extra large and heavy washer followed by a wing nut which should be drawn up "hand tight" only. The box is now firmly fastened yet can be easily taken down for repair or moved to a new location.

This method of fastening also allows one to prevent a fast growing young tree from drawing the fastening nut right through the back of the box after a few years. When this situation develops I watch for it at my annual maintenance inspection and relieve the pressure by loosening the wing nut and its washer a few turns as needed. The application of a bit of grease or heavy oil to the threads keepsthe wing nut from rusting tight.

Now as to general instruction on selecting the most practical spot to locate the nest box. Of course the general area should be acceptable. That is, a suitable rearing area should be reasonably close. This means a sizable swampy area of several acres or more provided with shallow water with much emergent vegetation. Ungrazed, or at least only lightly grazed.

This is the minimal requirement so the young ducklings can find their needed food and also find escape cover so they have a chance to evade their enemies from land, sky and water. At best many young are lost to predation. Their food for the first few weeks is comprised largely of tiny water insects, eggs of such insects and the small vegetation which grows in profusion suspended in the water of swamp areas. The ducklings will eat small grain but cannot digest it and will starve after a short time on a grain diet.

The mother duck will often lead her young a half mile or more to reach a suitable rearing area. Passing through and over great obstacles such as streets full of traffic, railroad tracks and yards full of people and small children and natural barriers like rough ground, heavy brush, steep banks and even bodies of unsuitable water such as the main channel of the Mississippi River with its boat traffic. This water is undesirable because it offers none of the needed food nor the escape cover that the baby birds need in order to have a chance to grow.

Mortality in young ducklings is most severe at the very beginning of their existence. In my colony predation of nests is at a minimum due to comparative scarcity of predators and to the construction of my nest box entrance hole. The departure from the nest including the jump to the ground causes practically no fatalities. Among the hundreds of ducklings I have observed making the twenty foot jump I have seen only one bird killed. Often the birds are momentarily stunned, especially if they strike the ground on their backs or heads. In a moment they are fully recovered.

Weaker ducklings are sometimes unable to climb to the exit hole to jump and then are left behind to perish. But this is just the normal action of the law of survival of the fittest.

Often young are lost enroute to the river. The rough steep bluff they must traverse eliminates some. Also I have seen cats - semi-ferral - and dogs hunting along the bluff and should the brood encounter such animals there will be losses. I have had well meaning neighbors capture the young enroute to the river and deliver them to me hoping they were saving their lives. While in reality they were signing a death warrant when they separated the young from their mother.

Getting back to the individual tree on which the box will be hung. The hen should be able to fly to the box without excessive obstruction from small branches or twigs. But beyond that the location should be determined by your own convenience. Find an opening where your ladder is easy to erect and take down. Height is also unimportant to the duck. Enough height only to put the box out of reach of children and curious passersby. Ten feet is ample. Even less is often satisfactory. One of the principal considerations should be your own view, i. e., put the entrance hole so you can see it easily from your best vantage point for watching the exodus of the young, this being the culmination of all previous activities. Sometimes your vantage point may be a porch or even a house window if it is near enough to the nest box. Keep in mind the watcher of the exodus should be concealed from the mother duck, she will not behave normally if she knows she is being watched! She has sharp eyes!

At times I am faced with the problem of how to successfully rejoin deserted ducklings with the departed brood. This cannot be done by main strength and awkwardness but must be accomplished by strategy. When I am going to watch a brood leave their nest I carry with me a samll cotton cloth sack, such as might have contained a five pound amount of granulated sugar. This forms an ideal carrier for any left over ducklings that might have failed to leave the nest in time to remain with their mother.

Immediately after the hen and brood depart, I pick up such left over young and carrying them in my sack I drive via car to the nearest crossing of the tracks which the brood must corss before they arrive at the Mississippi. From experience I know where the brood will attempt to cross the track. I hustle to a point about 100 yards from the crossing point and hide there to await the hen and brood which are coming down the steep bluff. If I am in time I will soon see the hen emerge from cover along the track. She spends some time getting her brood across the two tracks, after which she simply needs to giude them to the river bank below.

Once she starts down toward the river I crouch low and run along the ditch at the base of the bluff to the exact point where I saw her cross moments before. Here I take out one of my ducklings and hold it in my hand. The duckling immediately begins loud peeping. The hen wich is still near answers with her kuk-kuk-kuk call and communication between the two is established. I release my captive ducklings and they hurry to join their mother and their brood.

If pictures of the ducklings jumping from the box are part of your program, then probably a portable canvas blind will be necessary so you can be really close to the action. My blind, which has served me for twenty-five years or more, is made of green water resistant canvas stapled on a light wooden framework consisting of only two parts or sections, a front and a back frame. These two sections are joined by only four cross pieces which are joined to the front and back plates by small hanger bolts imbedded at the corners of the front and back sections and passing through small holes in the ends of the cross pieces and held in place by wing nuts.

The two ends and the top of the blind are covered by one piece of green canvas which can be laid over the frame work in a continous piece. To keep the canvas on the top from sagging I lay two cross bars which need not be bolted or fastened in order to function.

Peep holes for camera lenses and for observation can be cut to meet your needs. An extra hole or two in back and ends can come in handy to enable the observer to keep track of what is going on.

My blind will accommodate three folding camp chairs with back rests. Sometimes you may have hours of waiting for action and a back rest will help.

While watching, remember to keep your face several inches back from the peep hole so the hen cannot see you through the hole. The interior of your blind must be very dark so you can see out but nothing can see you from outside.

The blind being in separate flat sections plus the roll

of canvas which covers ends and top, plus four cross pieces, can be stored between seasons flat against a basement or shed wall thus taking a minimum of space when not in use. When set up one person can easily carry it from place to place as may be required.

Each season my nest study begins in March. As soon as the ice in the smaller lakes and swamps thaws, the ducks arrive from the south where they have wintered. Some stay south to nest, others stop in this upper Mississippi River valley and a few nest further north near the Canadian, U. S. boundary.

When they arrive here they are already in pairs. That selection of mates for the season took place before the northward migrations. The mating is for one season only, not for life as is the case with some waterfowl such as the Canada geese and whistling swans. With wood ducks, as with most species of duck, the hen is the leader in the activities of the pair. In flight the hen is ahead of her mate. In decisions such as the selection of a nest site the hen has full control. The handsome drake sits around aimlessly while the hen is engaged in looking over the potential nesting cavities or boxes.

The homing instinct in waterfowl has been subject to much study. What does bring them back to the area where they have previously nested, and stranger still, what brings the yearling birds back to the very area where they grew up a year earlier?

It has been found that this return to old habitat in waterfowl rests in the female of the species. David Trauger studying nesting of lesser scaup at Yellowknife N. W. Territories discovered that he had recaptured a good many

females which he had banded in previous years but practically never recaptured a banded male.

It follows that in species like scaup and wood ducks which mate for one season that if both male and female had this gift of returning to their fledging area there would be immediate confict on destination on the northward spring migration. There could be no success in such a situation so it just does not occur. In nature only that which succeeds perpetuates itself.

On first arrival, the ducks are not ready for nesting. They may spend a week or more feeding and loafing in the Illinois swamp lands across the river from my yard before they are ready to start nesting. This activity follows a spell of bright warm days. Then all of a sudden the urge to nest brings the pairs to my yard in the early part of the morning. Often several pairs may be seen sitting in the bare trees. The fact that they are in pairs is quite evident by their location and behavior. They always arrive in twos, which alight side by side.

Much neck stretching is in evidence, indicating that they are looking things over with searching eyes. Then the hen alone will fly to the lid of a nest box or to a nearby limb and then to the box lid. They do not immediately enter the box but crane their necks to take a peek into the entrance hole. Probably a wise precaution because of the possibility of a raccoon, squirrel or other predator may have prior possession of the box. After a few peeks she will flutter to the entrance hole which she grasps with her toes and if the coast is clear, she enters. In a natural cavity the floor of the cavity may be deep down in the trunk but

in my boxes the floor is just far enough down to enable the hen to hide and also later on in case a raccoon tries to raid the nest she is below the reach of the raccoon's arms and the eggs are also out of reach.

The hen spends several minutes in the box then returns to sit beside her mate who is waiting for her. After an interval she may return to the same box or more likely she may go to a different box where she repeats the procedure. This goes on for several hours at a leisurely pace. Other pairs are behaving in a like manner and a given nest box may well be looked at by several different hens. Their activity continues each morning for a period of up to a week. Eventually the hen will hollow out a saucer shaped depression in the litter you have placed in the box. Perhaps this hollowing out of litter is to assure her that she will have enough to cover her eggs when needed.

If you will consider what she could normally expect to find at the floor of a natural tree cavity, you will agree that an accumulation of bits of rotted wood will be found there. Your litter in your nest box should similate reasonably this supply of decayed wood. Sawdust is a handy substitute but the real thing can be supplied with a bit of extra effort. I find my decayed wood by locating a standing tree with a decayed heart and with an opening in the trunk at ground level. With a shovel and a hoe I pull out the supply of decayed wood and load it into empty feed sacks. At home I run this product thru a coarse screen shaker, about ½" mesh. The coarser product not passing thru the screen I put on my wild fern bed. The screened product is exactly what I

need for my nest boxes. A good way to spend a few enjoyable hours between seasons.

Returning to my duck's activities. All my nest boxes are nearly identical but the hen still seems to go thru the procedure of selection. That is most hens do, but I suspect that if a hen has nested with me in a prior year she will probably go directly to the box previously used. But the life expectancy of ducks is short and a high percentage of hens each year are nesting for the first time.

With the advent of warmer days the biological processes of the ducks starts the development of eggs. The eggs are relatively large, perhaps seventy percent of the size of a chicken egg and when the egg is ready to lay the duck must lay each egg promptly. The eggs develop usually at the rate of one per day and are laid on that schedule about ninety percent of the time.

The pair of ducks usually arrives together soon after sunrise. The drake, resting on a limb nearby while the hen enters the box at once and deposits her egg. I have timed the period required and found it to be as short as five minutes at the beginning of the egg laying phase when all she has to do is deposit and bury her egg in the litter provided. Later when she is pulling out down she spends a much longer time in the box.

There is no territorial conflict between nesting wood ducks in so far as close proximity of nests is concerned. I have had two boxes hung in the same tree used simultaneously although only a few feet apart. Also I have one group of nine nest boxes hung on trees in a radius of forty feet and frequently four or five of the group will be occupied at one time.

The daily egg laying routine having been established the pair comes to my boxes regularly, usually at about the same hour. Having laid her egg she departs followed by her mate, probably going to their territory where they will mate, feed, loaf and just while away the balance of the day.

As previously mentioned after about the sixth egg the hen will start plucking down from between her breast feathers. The first day's crop of down is usually very small even as little as one or two cubic inches in volume. After three or four days the daily down production increase rapidly so that by the time the egg clutch of 13 or 14 is complete there is normally enough down to cover the eggs with a blanket about two inches thick. The texture of the down is delightful, so soft and so warm with scarcely a tiny breast feather in the lot. While the hen is away from her nest the down is spread evenly over the eggs filling the entire 10" by 10" space to about a two inch depth. By being careful one can lift the blanket from an edge. The intertwining texture allows the whole to be raised to expose the clean eggs beneath.

The housekeeping of the hen is meticulously clean. She never dirties her nest unless she is frightened off by an intruder, then she may do a thorough job of squirting feces pretty well over everything. This she never does if not disturbed.

The habits of individual hens does vary during the time the last few eggs are being laid. Most often she will start right in with her incubation routine. She remains on her eggs around the clock except for rest periods twice a day, usually very early in the morning, often so early that

only a streak of light has appeared in the east. Too early to see her fly away, but you know she gone because you hear her screaming as she flies away. She makes this loud scream only on departing, never on her return flight because when returning she does not wish to call attention to herself or her nest location because that might attract predators.

Her second rest flight is usually near sundown. During each flight she carefully covers her eggs with her down blanket. The duration of each flight may average about an hour, often a longer period. On her return her drake will accompany her until fairly close to the nest when he will swing away and return to their territory to await her next visit.

The first nesting attempt the drake continues his attendance on the hen until a few days before the time for hatching. Never in my experience until the actual hatch and the exodus of the brood. During my years of observation I have not seen the drake bird enter the nest box at any time.

The biological reason for his attendance probably is that in nature many nesting attempts are lost to predation and in that situation the hen will need a drake to fertilize her second clutch of eggs. If predation has not destroyed the clutch by the third or fourth week of incubation chances are strong that the eggs will hatch and he will not be needed again.

The drake takes no part in the exodus of the ducklings nor in their upbringing. Picture postcards of beautiful drakes tending ducklings not withstanding.

The non-breeding drakes plus those no longer attending their mates join forces and form batchelor flocks early in the summer. Soon they commence their summer moult and become flightless for a few weeks. The hen's summer moult is delayed until she has raised her brood.

The incubation period of this species averages at thirty days. For reasons not clearly understood some broods appear to hatch in as little as twenty-eight days. Others take as long as thirty-two days. I have noted that the large clutches usually take longer than normal. Perhaps because the hen cannot keep the outer eggs quite as warm as if there were a smaller number. Really large clutches of over twenty eggs occur when several hens have contributed to the clutch.

I find no correlation between the number and extent of rest flights with the length of incubation. Some hens take only one rest flight per day for part of the incubation period. The length of time off the nest is a variable and I have been unable to find a relationship to the length of incubation.

Some hens take extra rest periods over and above the normal twice daily.

The beginning of the incubation is sometimes hard to define. Some hens take a day off between the last egg and the beginning of incubation. Some hens spend a full night on the nest and then lay an egg the next day. I have found by candling eggs that the development in the egg is not noticeable until the hen has been on the eggs for a full twenty-fours hours. I presume it takes that long for the center of the egg to reach temperatures where development begins.

By checking the contents of unhatched eggs I have found a very small percentage of infertile eggs. This is especially true early in the season. In second nesting attempts the percentage of infertile eggs rises rapidly. On two very late nests starting around mid June I have found hens that incubated for over sixty days before giving up. On investigating I found all eggs infertile. Probably she laid her eggs without the benefit of a drake to fertilize them.

In checking remains in the nest box after the hatched brood has departed I have found extra eggs that have been added after incubation had been initiated. This is caused by an outside hen depositing one or more extra eggs during the incubation period of the original clutch. Often such eggs by outsiders are laid in the box when the incubating hen is away on a rest flight. The eggs are usually fertile and start to develop but on account of this late start they have no chance of hatching. They are wasted.

Other wasted eggs result from what I call a "dump nest." This situation arises when a hen is developing eggs in her body but she is not yet ready to incubate a nest. So the eggs must be laid. She finds a convenient nest and lays her egg but fails to cover it with the litter as she normally would. Next day another egg, etc. Sometimes several hens use the same nest box to deposit premature eggs. I have had such "dump nests" receive as many as four eggs in one day.

Another characteristic of such a nest is that no down is developed. Many eggs may be laid in such nests, my top figure has been 38 eggs in one nest. These eggs are all

wasted except that now and then one hen will adopt the nest as hers and will start pulling down to cover the eggs and eventually she will incubate the accumulated eggs. On one such nest a hen incubated 37 eggs of which 27 hatched and departed with the proud and no doubt confused mother. I wish I could have had a picture to cover this group.

The reason for the formation of the dump nests is in no way due to a simple shortage of nesting sites. As evidenced by repeated occurances of dump nests when I still had many unoccupied nest boxes. For instance in my 1978 season I had 21 nest boxes available in my yard. On April 1st the first eggs were laid in five boxes. One of these nests developed into a dump nest which contained 30 eggs on April 8th. Twenty-nine eggs had been added in 7 days. Meaning that a minimum of four or five hens had been depositing their daily eggs in this one box, despite the availability of at least sixteen other boxes in my own yard plus other vacant boxes in neighbor's yards.

In order to get the greatest enjoyment and the most information out of a wood duck nesting project one should make frequent inspection of the nest boxes. People fail to make such inspections out of fear that the duck will desert her nest if she is disturbed on the nest.

The time when this might happen is at the inception of the activity. Once the hen is well along with her program there is little chance of her desertion. Therefore time your inspections, early in the season, to the hours when the hen will not be in her nest. That is, since most eggs are laid in the morning, do your looking in late afternoon.

When the hen starts her incubation she may be on the

nest then, but by that stage she will not desert. She may flush if you disturb her too much but should she flush there is nothing to worry about. She will soon return after you have gone. The chances of her flushing are very slight if you quietly raise the lid enough to peek in, then close the lid if she is on.

When she is away you can do all the looking you wish. Count the eggs, even take the eggs as I have done to process then thru a candling to determine the stage of development. The old tale about birds in general deserting a nest if one touches the eggs is stricly a myth designed to keep little boys from getting too curious about bird nests.

Different hens react differently to my inspections. Some sit quietly hoping they are hiding. Other reach up their heads and hiss at me hoping the bluff will discourage me.

On two occasions I had hens who were near hatching time and I wanted to see if the eggs were pipped. Thinking the hen might flush I slowly reached a hand down the edge of the box, the hen remaining quiet. I reached under her and holding two eggs slowly withdrew to inspect the eggs, then carefully replaced the eggs under her. All without her becoming excited or leaving the nest. I do not recommend trying this on hens in general but I had noticed these hens seemed unafraid. Perhaps they had been nesting with me over a period of years and had become accustomed to me.

It is a well known and accepted fact that when a hen loses her first clutch of eggs she will find a new nest site to her liking and after a short delay she starts laying eggs for a second attempt to bring off a brood. Such nests are recognized

by several factors. First they are late in starting. Second only about half the normal crop of down is available and lastly the number of eggs is reduced to perhaps eight or ten from the normal thirteen average.

I have been told by other students that sometimes a hen having brought off a hatch will nest again, especially if she loses her babies very soon after they hatch. This I feel is exceptional and the general rule of one successful hatch per year is a safe generalization.

The single most exciting event in a season of wood duck nest watching is of course to be on hand to watch the ducklings jump out of the box and join their mother on the ground. To succeed in attaining this objective it is important to know when the eggs will hatch.

Since the usual period of incubation is 30 days and since the incubation usually starts on the day the last egg is laid you have some helpful clues. Eggs are usually deposited at the rate of one per day. So if you will record the progress of the egg accumulation you can determine when the last egg arrived.

Then 30 days thereafter should be close to the critical date. Another useful tool in dating the hatch is that the beginning pip or cracking of the egg preceeds the actual hatching by two days. So about two days ahead of your estimated date try to get an inspection of the nest while the hen is off on a rest flight. If the eggs are pipped you will soon learn to tell if the pip is small enough to be the first day or large enough to represent the second day. In this way you have your definite date of hatch and knowing that the young

will spend one night in the nest after hatching you can be prepared for the big event!

Hens which start their nesting activities for a given season by laying eggs in a dump nest I feel sure soon switch their attention by finding an unoccupied nest site and laying their own clutch of eggs in a normal manner including depositing their down on a normal sized clutch, which is then incubated.

In attempting to salvage some of the potential loss from the eggs deposited in dump nests I have had some success by distributing such eggs among other normal nests for incubation. Of course one must be sure that the nest receiving the eggs is still in the egg laying stage, not yet starting incubation. In order to be meaningful all eggs must hatch on the same day so incubation must start simultaneously.

When inspecting a nest where a hatch is taking place or where the young are hatched but it is not yet time for them to leave the nest some interesting observations have been recorded. While the eggs are actually in the process of hatching the hen is very defensive and will remain on her nest even though severely intimidated. This must be a critical period when the hatching ducklings are almost helpless and in need of her warmth and protection.

If an inspection is made while the hen is brooding her young, she gives them a signal to "freeze" which means they remain motionless with eyes closed. A few heads may be visible around her perimeter and she is very alert, ready to protect her babies if need be.

If the hen is away on a rest flight, she takes such a flight in the evening of the day of the hatch, and again

the following morning before calling her brood to depart. The ducklings have heard you approach and will "freeze" even though their mother is not present to instruct them. This results in a quiescent situation. Most of the little heads, which show a light yellow line thru the eyes, will be buried beneath a neighboring duckling. So the impression you get in peering into the deep box is a very dark interior. If you didn't know better, you could easily think the box was empty. Place your hand gently on the ducklings and you can feel a definite vibration from the backs of the babies. They are really vibrant with life.

On two occasions I unfortunately caused the release of the "freeze" reaction of the young. The first time I had decided to tack a strip of carpet on the inside front of the box to enable the young to climb easily to reach the exit hole. The red oak lumber from which the box was made had become quite smooth, making it difficult for the young to exit. I drove only two small tacks thru the carpet, then immediately replaced the box lid and descended the ladder. Before I reached the ground ducklings were jumping from the box and alighting in the lilly of the valley leaves on the ground. The hen of course was off on her flight and I fear she never rejoined her brood which was scattered widely.

On another occasion I happened to make a couple of sharp bangs in replacing the box lid. Again the young were released from "freeze" and poured out of the box with disasterous results.

In a normal situation on the morning of the exodus the hen returns from her early rest flight and settles down

to brood her young. If the sky is bright and seasonably warm she may be ready to move in less than an hour. In bad weather she often delays several hours awaiting more favorable conditions.

When she feels that the time is right she clambers up with her head and neck protruding from the hole. She scans the area with her sharp eyes. Noises do not disturb her. Such noises as passing trains or steam boats on the river or the rumble of cars a little distance away will not delay her. But the presence of moving people, dogs or cats will cause her to drop back into the box to await a more favorable situation. If you are watching from a blind nearby be sure to keep your face back away from the peep hole. A slight movement of the tip of a camera lens does no damage. However I usually have my camera mounted on a tripod in the blind so little movement is necessary.

If nothing occurs to frighten the hen she will be ready to call her brood out after only a couple of looks around the area from her hole.

When the critical moment arrives, you see her bill open a few times to make her first call which to me sounds like kuk-kuk, audible for only a few yards. Then having called, she drops to the ground near the base of her nest tree still calling. Almost at once the reply from her ducklings comes from the box, peep-peep-peep, staccato, high pitched and penetrating. If the box is properly prepared for easy climbing, the first ducklings will be poised in the hole and after a few loud peeps they will launch into the air, not just dropping but jumping outward so as to strike the ground three of four feet from the base of the tree. He tumbles and even bounces as he alights but almost at once is erect on his feet

calling loudly. The mother is very close and the baby, on seeing her, runs to join her. By now added young are in the process of jumping and joining the group on the ground. Meantime the hen continues calling until all the young are out.

Often one or more ducklings have trouble reaching the exit hole. In this case the hen delays her departure and will hide with her ducklings in the nearest bit of cover. When she moves from place to place the young follow in a sort of snake dance formation.

When a delayed jumper finally makes his exit he alights with a loud series of peeps and his mother, followed by the brood, will leave cover to go to meet the tardy one.

If a dangerous and serious interruption occurs, during the time the young are evacuating, the hen will usually try to depart with what ducklings she has around her rather than gambling on the chance of waiting for more babies to join her.

When the last duckling has jumped and no more "peep-peep" signals come down from the nest, the hen immediately moves off toward the bluff and the big river. Her brood trail along behind her in a snake dance formation. As she progresses she will take advantage of every bit of cover available along her route. When she must cross open lawn areas she crouches low to offer the lowest profile she can. As she proceeds she calls with her low "kuk-kuk-kuk" call to encourage her babies to hurry!

Once she reaches the edge of the bluff where the lawn stops she will have heavy cover in which to hide. However

the bluff is very steep and I am sure the young must be rolling topsy-turvy at least part of the time. She will avoid the perpendicular cliff portion of the bluff but the best route is still hazardous.

On several occasions I have been in a blind at the foot of the bluff to enable me to watch her lead the young ones across the two railroad rails. She seems to doubt their ability to jump over the big rails and often she will lead the group alongside the tracks seeking a better place for them to cross. Eventually they cross the two rails and then there is the steep drop down to the river level. No problem. Her next move depends on the stage of the river. If there is high water extending back into the weeds along the bank she will be content to linger there for the brood to rest. But should the stage of the water be low so that only open mud banks follow the edge of the water, there will be no delay. She gathers her brood around her and starts them off for the Illinois shore a half a mile away. Usually she will head directly for the far shore which means that due to drift with the current her trip will be a bit longer. The little flotilla really looks tiny out there in mid river but they make rapid progress. I have watched thru binoculars until they reach the far shore where by crossing a narrow strip of dry land they successfully reach great areas of swamp water which will provide them with both food and escape cover. So the season ends with each brood so far as my contact with them is concerned. Perhaps next year some of these young, then grown, will seek nest sites in my yard.

Another incident confronting some broods occurs when a railroad train may come chugging along just as the brood is at the tracks. I have been watching on two such occasions. No young were caught between the rails. In the first instance the hen took wing and alighted some two hundred yards out in the river.

She waited for the train to pass. Meantime the young were hiding in the weeds near the track. After the train had passed the hen swam ashore, walked across the tracks and found her brood. From here she proceeded normally to get the crossing of the tracks behind her.

The second time a train came along to delay the crossing the hen reacted differently. As the engine drew near she with her brood hid themselves in the weed cover near the rails. They waited for the long freight train to pass them. Minutes later they emerged and crossed the rails with no further interference. And again the ducks passed out of my circle of activities unless perhaps to return to my yard the following spring. Students who are professional in waterfowl studies tell us that less than one-half of the birds hatched in a given year are still living to become members of the breeding group a year later.

On inspecting the box after an exodus it is a bit surprising to find that practically no down remains. This is due to the fact that when the down comes in contact with the newly hatched, wet ducklings, the down is solidified, and is no longer recognizable as down.

When the occasion arises where one is in doubt as to how many ducklings have hatched in a given nest, a quite accurate count is obtainable by checking the debris remaining in the nest box. All the loose contents should be gathered in a small cardboard box or a small basket and brought to a clear area where the remains of the egg sacs can be separated from the down and other debris. You will find the egg sac remains can be easily divided into two classes, that is, large and small sections.

When the duckling pipps its way thru the shell the tiny pipp cracks are developed in a circle around the egg perimeter quite near to the larger end of the egg so that when the duckling emerges he comes out thru the larger end of the egg. The membrane sac has been divided into two sections, the larger section being about three times the size of the smaller. When you have divided the remains in this manner you should find you have about equal numbers of the two sizes of membrane remains and those pairs give you a count on the number of eggs hatched.

Any unhatched eggs should also be examined to determine the number of fertile versus infertile eggs. The infertile can be described as containing a viscous liquid, greenish yellow in color and resembling a thinned out cottage cheese in texture. The fertile eggs will contain partly developed ducklings. Some of which will have died at some point during incubation, and others may have lived until deserted by the hen. These eggs are eggs introduced into the nest by an outside hen at some time after incubation began.

After a hatch I usually throw out the leftovers and loosen up the litter in preparation for the next year.

One of my problems in maintaining my nest boxes for the ducks is caused by honey bees which like to use the boxes as their hives. They reduce the size of the entrance hole by filling most of the hole with comb. Then they hang large slabs of comb inside the box. This of course makes the box unuseable for the ducks. Fortunately the bees don't move in until after the ducks are thru nesting for the year. So by detecting the presence of bees before winter I can get a bee man to remove the bees for me. I am allergic to bee stings so must call in outside help.

After the bees and the comb have been removed a layer of wax covers much of the interior. This wax is a wonderful wood preservative and will prevent decay.

It probably seems strange to most of us that ducks seem to insist on attempting to hatch a brood in areas closely occupied by people. First of all it is probably true that a shortage of nesting sites exists and that is a valid reason for the duck's behavior. But to my thinking ducks will use town areas for nesting because their predecessors have been using that same area for centuries, even before man-made towns existed. Putting it another way, we have established towns in the duck nesting area established long before civilized man appeared on the scene.

Then there is still another reason why ducks often nest close to man's habitation and that is that the presence of man reduces the danger of losses to wild predators. Certainly my own nesting area has developed a use by these wild birds because of their great success in bringing off a hatch here, over their lack of success under wild conditions where predators cause heavier losses than in my yard.

Raccoons do live in suburban areas and certainly squirrels do also. But I have interceded in favor of the ducks by live trapping gray squirrels when they build up populations that interfere with duck's success in nesting.

The broods which are hatched and are brought off in a town area are subject to especially heavy losses during their travel to water areas where they are reared. People see them as the hen and brood move along. They must cross a street, pass through people's yards where children are playing, as well as dogs and cats which contribute to the hazard.

The curiosity of children attract them to the scene, thus frightening the hen and perhaps forcing her to fly away in self-protection. Then the children feel sorry for the deserted babies and the next step is to capture the ducklings. If people of all ages would retire out of sight, taking dogs, cats and kids along, the brood would likely get along safely to their destination.

During the hatching season I often receive telephone calls from mothers asking advice as to how best dispose of orphan ducklings. I always advise them not to attempt to rear the young because of the difficulty in providing proper food for them.

Sometimes if I have a nest about to hatch in my own yard I take the ducklings and hold them until evening when I put up my ladder at the box with the hatching ducklings in it and drop the orphans on top of the hen and brood. Next morning the orphans join the brood in jumping out of the box. A newly hatched duckling has enough food in its body from the egg to take care of it for several days.

Lacking the availability of a foster nest I recommend that the orphaned captured ducklings be released in an area where they might be picked up by a passing brood. This of course is a very unlikely development but does offer some small hope of success.

In winter I keep bird food of mixed grain available on the ground in addition to hanging feeders which are not accessible to squirrels. When I find excessive numbers of squirrels using my bird food I bait my Havaheart live trap with peanuts and start catching squirrels and an occasional rabbit in my trap. I transfer these animals about two miles to a City Park where I release them. In the 1977-78 winter I took away 26 squirrels and one rabbit so that by late winter very few squirrels are using my bird food.

One reason for reducing my area's squirrel population is that the gray squirrel competes with the wood ducks for the use of the nesting boxes. Only occasionally do gray squirrels eat duck eggs or destroy the duck nests, but they often move their nesting efforts into my duck boxes filling them with leaves and twigs so that the ducks are prevented from using them. On one occasion a duck had been incubating her eggs for a week or longer and on a routine inspection I

found the box filled with leaves. I wear heavy horse hide gloves just for such occasions. As I removed the leaves a few at a time I would expose a furry tail of a hiding squirrel.

With a quick grab I pick up the tail and hurl the squirrel out into the air. My dog who accompanies me on my inspection rounds is just waiting for this opportunity. He tries to catch the falling squirrel but nearly always fails. The squirrel is too quick for the dog on the ground and scampers up the nearest tree to escape.

When I thin down my neighborhood squirrel population the squirrels seldom interfere with an established duck nesting effort. They do however stuff empty boxes with leaves which I remove so the ducks can find a situation to their liking.

During the off season I leave my boxes open and available to any wildlife users including squirrels. The squirrels occupy many of my boxes in wintertime as a refuge from cold weather and storms. Usually they stuff the boxes they use with leaves - oak leaves preferred - and these nests must be removed in early spring. This nest removal usually comes before the earliest squirrel litter and by repeated removal of leaves I avoid the unpleasant necessity of destroying the young squirrels.

Other winter users of my duck boxes are some of our winter birds who roost in them overnight, getting a little protection from cold and storms.

Some winters I am fortunate enough to have screech owls

occupy a box. These interesting little predators need these boxes as daytime refuges from annoyance by birds which fear the little owls because of their nighttime predations, but pick on any owl they discover during daylight hours. The owls are quite able to see well enough to move about in daytime but seem to confine their predatory activities to dark hours when they see well and hear well but their victims do not.

In my youth we had a huge barn for carriage horses. The stables were below and the upper level served for loose hay storage, called a haymow in those days. There was a large wide door through which the loose hay was pitched in to the haymow. Father always left this door open in winter so that screech owls could fly in to pursue the mice which made a living on the timothy seed from the hay. We boys would watch at dusk and occasionally see an owl enter the open door.

With this background I felt that mice comprized the principal diet of the screech owls. But since my duck nesting investigation began I found that small birds form a major portion of the little owl's food in winter.

The owls often carry their dead prey to my boxes where they can devour them at their leisure. The carcasses of their victims are carried away after being picked clean and are dropped elsewhere. Remaining in the box are many of the primary and tail feathers plus tiny bones of mice plus lower mandibles of larger bird victims. To my amazement I found many cardinal feathers, also cardinal lower mandibles, far

in excess of what would be a normal percentage of the winter bird population. The body weight of a cardinal is probably well over one half the weight of a screech owl! No doubt the cardinals killed represent aged or otherwise deficient specimens but even so, the little owl is tackling pretty big prey.

There are of course feathers of English sparrows, starlings, juncoes and other bird victims easily recognizable.

In two season, more than a decade ago, I was fortunate enough to have nesting screech owls in duck boxes. Each brought off a successful hatch. The second nest was close to my house entrance and I inspected it frequently. Four eggs were laid and three hatched. During incubation the male spent much of the day in the nest with the female. No nesting material was brought in by the owls. They tried to hide in corners of the box when inspected.

The young were covered in gray down until feathers started to form. They hid under mother when inspected. Among food identified was one mouse, many bird feathers and two unbroken bird eggs of small birds.

As the young grew up close to fledging they glared at me when inspected, snapped at straws or twigs, advanced toward them. Then they were all gone out into the world and lost to me. I consider a screech owl as a beneficial predator as is true of most predators which provide a useful and beneficial service to the victims of their predations, thru the natural operation of selection of the fittest to survive.

Starting in the season of 1966 or 1967 a pair of barred

owls adopted a cavity in the crown of an over ripe soft maple tree near the center of my yard as a nesting site. For nine consecutive years the owls nested in the same hollow before they vanished for reasons unknown to me.

Their nesting activities coincided with those of my ducks and I watched carefully to try to determine whether there was a conflict between the two species. I found none.

On several days I saw the hen woodies take off their broods as one of the owls sat above where he had every opportunity to raid the ducklings on the ground. The mother duck made no move indicating that she feared the owl and the owl seemed oblivious of what was going on below.

The largest brood of owls was four and the smallest two young. The owl babies are slow to attain their independence. After they could fly a bit they often spent their days in my big trees where they could hide from the small birds who tormented them in the daytime. It was easy to find where the owls were by listening for the cries of the song birds as they scolded the helpless owls.

As mentioned earlier raccoons constitute one of the most deadly predators of nesting wood ducks. This must be especially true on nests incubated in natural cavities which are usually easy for the raccoon to enter. If a raccoon enters a nest where there is a hen present he will at once kill and devour the hen either in or near the nest. Then he will return at leisure to consume any eggs in the nest, often throwing the shells of broken eggs on the ground.

So far the small 3" by 4" oval hole in my nest boxes has excluded all raccoons from entering the box. But some

of my boxes have tooth marks around the entrance where a raccoon has tried to chew his way into the box.

I have had a recent development where during the night a marauding raccoon had evidently so frightened an incubating duck by his growls and scratching on the top of the box that she has felt forced to evacuate the box, whereupon the raccoon on the lid has caught the hen as she was part way out of the hole, killing her and eating her right on the box lid, but still being unable to reach the eggs in the box.

One reason the box is made as deep as it is, is to prevent the long arms of the raccoon from reaching down into the box far enough to touch the hen or her eggs.

When this newest attack by raccoons developed two years ago, I countered by nailing on an extra lid extending about five inches beyond the front of the box on one half of my nest boxes. I hoped this would give the hens room to escape the reach of the raccoon if she decided to try to leave the nest. Thus far no more casualties on boxes with this feature. One hen has been killed in an unprotected box.

Another annoying but not deadly enemy of the nesting wood duck is the common starling, which has learned that he can use the duck box for his nest although the box is much larger than his needs. The pesky starlings often steal a newly made nest hole from woodpeckers, such as the red bellied, the red headed and the yellow shafted flicker. In fact I have repeatedly seen the starlings stand by waiting for a hole to be completed, then stepping boldly in and taking over the premises from the woodpecker. Several times

I have shot one of the starling pair trying to enable the woodpecker to return. All to no avail for the starling immediately has a new mate and proceeds with housekeeping. It would seem the starlings social organization is sort of a commune with available spare spouses as needed.

When starlings nest in a duck box they carry in large amounts of grass or straw and often twigs. Their egg recepticle is located in a corner of the big box in a deep depression an inch and a half deep, just large enough for the four or five blue eggs. I have found that just throwing out the big nest is ineffective, but if I allow the bird to deposit the clutch of eggs and incubate them for a few days and then throw them out they get discouraged after about the second loss and move their activities elsewhere.

Occasionally I have had a duck lay her eggs over a starling nest, which she is big and strong enough to do, and thus force the starling out that way. Arthur Hawkins is trying out erecting a smaller version of a duck box alongside each duck box to see if that keeps the starling from using the duck box. I do not think it will, I think he will end up with two starling nests instead of just one.

On two occasions yellow shafted flickers have nested in my duck boxes but that happens so rarely as not to constitute a problem.

Then there is the rat snake who is not a predator on the adult duck but who is an expert on stealing bird eggs from nests. How the snake knows where to seek his eggs I have no idea. Does he watch the bird's activities or does he smell the eggs or nest or does he just keep climbing trees

until he gets his reward?

My first experience with a rat snake occurred years ago, as I was I was making a routine inspection of all my boxes in late afternoon. This particular duck nest had been progressing for several weeks and was about two weeks into incubation. On lifting the lid the hen who should have been on the nest was not, but in her stead was a big brown mottled rat snake. I closed the lid and retreated to consider "what now?"

I procured a wire coat hanger. I pulled the center of the lower wire bar straight out which gave me about a two foot long double wire strand with a stout hook on one end. With this hook engaging the snake's body near the center of gravity I lifted the snake out bodily and carried him helpless to the ground. In his body were five large lumps each representing a swallowed, unbroken duck egg.

A bit later on checking the nest which had contained thirteen eggs I found there were eight eggs remaining undamaged. I reordered and tidied up the nest. Later in the evening the hen returned and proceeded to continue her incubating duties. In due course the eight remaining eggs all hatched.

My next snake encounter was again with a rat snake. This time the nest had hatched a day earlier and the ducklings had fortunately departed earlier in the day leaving two unhatched eggs in the box. When I came on the scene the snake was in the box and had swallowed one of the two unhatched eggs. I prepared to take flash pictures down into the box, when there appeared the face and head of snake number two, coldly

staring at me from a range of less than a foot from my face. The second snake had climbed the white oak tree as I made my preparations, unseen by my wife who stood as assistant near the foot of the twenty foot high ladder.

As I was recovering from my surprise and shock from the discovery of the second snake, he or she dropped into the box where I took my flash pictures of the two long creatures. Later I picked up each snake with my coat hanger hook and placed them in a 25 gallon galvanized iron can in which I carried them out into the country for release.

Predators all have their function in nature's scheme and should not be destroyed as a general habit. Who are we to determine what species are good and which are bad. We are far from being competent judges in such a decision.

There is much evidence that snakes travel in pairs with a substantial interval between the two. Perhaps smell enables them to keep track of one another.

In intervening years I have noted that eggs disappeared mysteriously from my nests. I feel now that this was the result of snakes robbing the eggs and leaving no trace excepting that eggs are missing. There seems to be little actual conflict between the nesting ducks and the snake, certainly in the case of a rat snake.

Several years ago I witnessed a clear case in point. I was watching from my patio late one afternoon. Several incubating nests were within my observation area. I saw a hen sitting in the entrance hole of her box. Instead of leaving immediately for her evening rest flight, she

dropped back into her nest for a few moments. Ten minutes later she was again in her hole, but did not leave and again dropped back into the nest. This kept up for about forty minutes and I watched because it was clearly abnormal behavior.

Then to my amazement the head and neck of a large snake appeared in the entrance. The duck was also in the box. The snake wanted to get out, that was clear, but he had the problem of how to attach himself to the tree trunk before he dared to have his center of gravity pass outside of the box. He waved his body further and further out of the entrance toward the tree trunk alongside of the box. Finally he had enough of a grip on the rough red oak bark of the tree to allow his tail end to drop out of the box.

By this time I had my camera ready to take pictures. Several neighbors sensing something unusual taking place had gathered behind me to watch.

I wanted the snake to come down the tree rather than to have him climb up, perhaps out of view so we all stepped back a bit. The snake was very much at home on the tree. He could climb straight up or head first down with equal security.

We could see two lumps in the snake's body indicating eggs had been swallowed. I knew he had been in the box at least forty minutes, probably longer but the duck had been fighting him off so he only had been able to swallow two eggs. From this I judge the duck had no fear for her own safety but had been putting up quite a battle to save her eggs and she certainly had been partially successful in her effort.

The hen had remained in her box while all the excitement went on outside and she brought off a brood right on schedule. This persistance in effort to bring off a brood is an important factor favoring the future of duck populations. The ducks in general and certainly the wood ducks will do their part in providing ducks for the future.

Despite the loss of suitable swamp and water areas for ducks to use the year around I feel that our loss of duck population is even greater than the loss of suitable areas for ducks to use. This is especially true so far as nesting ground is concerned. While large marsh areas have been drained in our nothern states as well as in southern Canada there remain huge areas suitable for nesting ducks which are largely devoid of nesting ducks because there are not enough ducks go north in the spring to populate the existing areas.

I have done considerable flying over central Canada and further up in Saskatchewan and Northwest Territories