1988 Duck Nesting Study
Stillwater Wildlife Management Area


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#### Abstract

Summary During the summer, 1988 , we conducted a duck nesting study to determine nest success for ducks at Stillwater Wildlife Management Area (WMA). We calculated nest success as the proportion of all nests that were successful, and 2) Bart Nest success for 31 dabbling duck nests was $39 \%$. The most common nesting ducks were Cinnamon Teal', Mallard, and Gadwall. Most nests were located at Lead Lake. Comparisons to past studies of nesting success cannot be made without greater sample sizes, and the study should be continued over the nest 2-3 years.

\section*{Introduction}

Nesting studies are common in investigations of waterfowl and other birds. Most are undertaken to assess the production of breeding birds and to evaluate nesting habitats and the techniques of managing such habitats. The objectives are to determine hatch rates and density of nests in selected habitats. The procedures commonly used are searching selected areas to find nests and subsequently checking those nests to ascertain whether or not the eggs were hatched.

At Stillwater Wildlife Management Area (WMA), nesting studies have been conducted by Napier $(1968,1969,1970)$, and Evans (1982). Stillwater has recently undergone drastic changes in vegetation and habitat quality as a result of severe flooding, decreasing water receipts, poor water quality, and natural drought. Because no recent (not since 1982) information is available for duck nesting at Stillwater, we initiated a duck nesting study in 1988 to obtain current information on nest success. Nesting studies will be incorporated into the revised wildlife inventory plan for Stillwater WMA and conducted annually. The objectives of these studies are to 1) obtain data on nest success rates for ducks that can be compared to historical estimates, 2) document changes in nest success and densities as a result of different management practices and changes in water quality, and 3) document nesting chronology.


## Methods

Duck nests were located by flushing hens from their nests using an airboat (shoreline surveys), by walking through nest habitat and "beating the brush", or opportunistically while driving along refuge roads. Most searching was done by 1-2 persons working together; sometimes with a dog. We searched any vegetation that appeared to be good duck nesting habitat. This year however, nesting habitat was limited because of drought, and the best upland nesting habitat was at Lead Lake. We examined nest success only for dabbling ducks because diving duck nests (and overwater nesting habitat) were so limited. We searched for nests between May 31 and June 20. Each nest was marked by placing a marker (e.g., stake or flagging) at some distant point to avoid attracting predators to nests. The nest number, direction and distance to the nes.t was noted on the marker. Nest information was recorded on nest cards (Appendix III). For each nest, we recorded the species, number of eggs, stage of incubation (by flotation method [Westerkov 1950], Appendix II), and whether eggs were warm or cold. Species identification was made by observing the female as it flushed from the nest. If the hen was not present when the nest was discovered, we used egg characteristics as a guide to species. Eggs were re-covered with down and the nest was not revisited until after the calculated hatch date. Nest locations were plotted on maps of the pond. Nest success was calculated as the percentage of observed nesting attempts that were successful. The fate of each nest was recorded as successful (at least one egg hatched) or unsuccessful (abandoned or destroyed). We used the following criteria (presented by Napier [1968]) to determine a nest's history:

1. If the nest and down were intact, and whether or not eggshell was present, but at least one egg membrane was present with only an end missing, the nesting attempt was considered to be successful.
2. When a nest was intact with the down undisturbed but no sign of eggshell or membrane present, the nest was considered unsuccessful. The predator may have been a gopher snake (Pituophis melanoleucus) or a coyote (Canis latrans).
3. When a nest was intact with eggs present but with the side of an egg broken in, it was decided that the predator was probably a bird (usually Raven or Magpie).
4. Most unhatched nests were destroyed in similar fashion. The nest was torn apart and down was scattered about three feet from the nest. No sign of eggs remained. This was likely coyote predation.
5. When a nest was relocated with down undisturbed and all eggs cold after the expected hatch date, the nest was considered abandoned and unsuccessful.

Dates of nest initiation (i.e., first egg laid) were calculated using the following equation: .

Date of Nest initiation $=$ (Date found) - [ (非 days incubation when found) + (非 eggs in nest)]

We assumed that incubation periods for ducks are as listed in Appendix $I$, and that the number of days of incubation corresponding to each stage are as listed in Appendix II.

Nesting studies at Stillwater WMA were conducted concurrently in 1988 by 2 other researchers (Dr. Chuck Henny, Patuxent Wildiife Research Center, and Dr. Bob Hallock, USFWS - Reno). Data on nest success from the 2 other studies were not used to calculate nest success because their nests were visited about weekly and thus were not consistent with the frequency of visitation used in this, and other nesting studies at Stillwater. However, we combined data for nesting chronology from all 3 studies to determine the chronology of duck nesting (i.e., nest initiation) at Stillwater. Nesting chronology was illustrated only for 3 species (i.e., Cinnamon Teal, Mallard, Gadwall) for which we had adequate sample sizes.

## Results and Discussion

We marked 34 dabbling duck nests and were able to determine the fate of 31 of those nests（Table 1）．

Table 1．Summary of Duck Nesting Success at Stillwater WMA， 1988.

| Species | 非 Nests | Successful | Unsuccessful | Unknown | $\begin{gathered} \text { Nest } \\ \text { Success }^{1}(\%) \end{gathered}$ |
| :---: | :---: | :---: | :---: | :---: | :---: |
| Cinnamon Teal | 15 | 4 | 8 | 3 | 33 |
| Mallard | 6 | － 3 | 3 |  | 50 |
| Gadwall ： | 5 ． | 2 | 3 | ， | 40 |
| Pintail | 3 | 1 | 2 |  | 33 |
| Shoveler | 5 | 2 | 3 |  | 40 |
| TOTALS | 34 | 12 | 19 | 3 | mean $=39$ |

非 Successful＇nests／非 nests of known fate

Most nests were found in upland vegetation（e．g．，saltgrass（Distichlis stricta），greasewood（Sarcobatus spp．））around Lead Lake（Figs 1 to 4）．Nest success and sample sizes for the 5 species monitored was：Cinnamon Tea1，33\％ （15）；Mallard，50\％（6）；Gadwall，40\％（5）；Pintail，33\％（3）；Northern Shoveler， $40 \%$（5）．Nest success for all species combined was $39 \%$ ．Most nests that were destroyed appeared to have been destroyed by corvids．

Napier（1970）determined a nesting success of $47.3 \%$ for all dabbling suck species，including $51.3 \%$ for Cinnamon Teal， $36.4 \%$ for Mallard，and $37.1 \%$ for Gadwa11，from 1968－1970．Evans（1983）determined a nest success rate in 1983 of $26.1 \%$ for all dabbling ducks combined，including a $28 \%$ success rate for Cinnamon Teal， $57.1 \%$ for Mallard，and $13 \%$ for Gadwall．Our estimate of nesting success for Cinnamon Teal is intermediate between the other 2 studies， and slightly higher than nesting success for all dabblers as estimated by Evans（1983）．For other species，a larger sample size is needed to better


Figure 1. Location of duck nests at Lead Lake, 1989


Figure 2. Location of duck nests at Tule Lake and Swan Lake Check, 1989.


Figure 3. Location of one duck nest at Likes Lake, 1989.


Figure 4. Location of one duck nest at Duck Hospital Pond, 1989.
compare our estimates of nest success to historical estimates, and conclusions regarding trends in duck nest success are not possible without additional nesting studies to increase sample size.

The earliest nest initatiation at Stillwater was a Mallard which began laying on April 11. All species were fairly uniform in nesting chronology, with a peak of nest initiation that occurred in mid- to late May (Figs. 5 to 8). Sixty-six percent of all duck nests were initiated by May 26 (Fig. 9).

## Recommendations

1. The study should be continued over the next 2-3 years to increase sample size and obtain a current rate of nest success. This is especially important given the existence of elevated levels of trace elements at Stillwater WMA that may affect reproductive success of ducks.
2. An effort should be made to locate $10 \%$ of the nests of breeding duck pairs at Stillwater, based on breeding pair counts conducted by Stillwater WMA biologists. We currently do not conduct breeding pair counts, and they should be included in the wildlife inventory plan when revised.

## Literature Cited

Evans, C. 1983. Waterfowl nesting at Stillwater Marsh in relation to predation and habitat factors affecting nest site selection. Unpublished report, in files at Stillwater WMA. 52 pp.
Napier, L. D. 1968. Progress report of wildife management study. Duck nesting success on the Stillwater Marsh. In Stillwater WMA files. 16 pp.
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Figure 5.

Nesting Chronology of Cinnamon Teal
Stillwater Wildife Management Area, 1988


WEEK

Figure 6.

Nesting Chronology of Mallards
Stillwater Wildlife Monagement Area, 1988


Figure 7.

## Nesting Chronology of Gadwalls

Stillwater Wildlife Management Area, 1988


Figure 8.

## Nesting Chronology of All. Species

Stillwater Wildlife Monagement Area, 1988


Figure 9.

## Nesting Chronology of All Species

Cumulative percentage of nests started Stillwater Wildlife Management Area, 1988


WEEK

Westerkov, K. 1950. Methods for determining the age of game bird eggs. J. Wild1. Manage. 14:56-57.

Appendix I. Egg sizes and incubation periods for certain waterfowl.

Species
Mallard
Cinnamon teal
Redhead
Ruddy Duck
Gadwall
Pintail
Shoveler
American Coot
Canada Goose
Wood Duck
Black-necked Stilt
American Avocet
Eared Grebe

Abbrev. Size Incubation Period

| M | $58 \times 41$ | $26-29$ days |
| ---: | ---: | ---: |
| CT | $48 \times 35$ | $24-25$ |
| RH | $61 \times 43$ | 24 |
| RD | $64 \times 42$ | 24 |
| G | $54 \times 39$ | $25-27$ |
| P | $54 \times 37$ | $25-26$ |
| SH | $52 \times 37$ | 26 |
| AC | $49 \times 34$ | $21-24$ |
| CG | $80 \times 53$ | $25-30$ |
| WD | $52 \times 40$ | $28-32$ |
| BS | $44 \times 31$ | $25-26$ |
| AA | $50 \times 35$ | $22-24$ |
| EG | $44 \times 30$ | $20-22$ |

Appendix II. Stage of incubation determined by Flotation Method.
(adapted from Westerkov, K. 1950. Methods for determining the age of game bird eggs. J. Wildl. Manage. 14:56-57.


Recrut Liment Study Neest Card


> Note: Ducks eggs--collect 1 egy for analyses plus 2 aggs for incubator.
> Coot eggs-collect 1 egg fresh for analyese plus 1 egg just prior to hatching for cleformity check. Stilt andeared grebe eggs--collect 1 egg fresh for allalyses.

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