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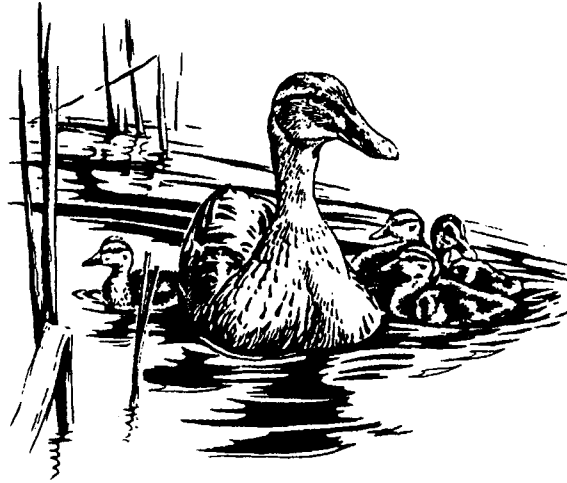
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# ILLINOIS NATURAL HISTORY SURVEY

CENTER FOR WILDLIFE ECOLOGY



Mallard Investigations

W-130-R-2

Quarterly Federal Aid Performance Report

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22 December 1998



QUARTERLY FEDERAL AID PERFORMANCE REPORT

Mallard Investigations

W-130-R-2

Stephen P. Havera--Illinois Natural History Survey, Havana

1 October through 31 December 1998

STUDY I: NESTING BIOLOGY OF MALLARDS IN ILLINOIS

JOB NO. I.1. Nesting History and Reproductive Success of  
Mallards in Illinois

During this quarter, Kaplan-Meier survival estimates were generated for mallard (Anas platyrhynchos) hens equipped with radio transmitters, their broods, and ducklings during spring 1998. Plans were made to erect a 30 ft. antenna at the Metropolitan Sanitary District of Greater Chicago (MSD) to assist the daily location of hen mallards during spring 1999. Radio transmitters needed for spring 1999 field work were ordered from Advanced Telemetry Systems, Inc.

Methods

Female mallard survival rates were calculated for hens monitored at the Banner Marsh State Fish and Wildlife Area (Banner) and MSD study sites from 23 March to 1 July using the Kaplan-Meier product-limit estimator modified for the staggered entry of animals (Kaplan and Meier 1958, Pollock et al. 1989,

White and Garrott 1990). Females either survived the period of study, died, or were censored. Hens were censored the day following the last radio contact due to emigration from the study area and the day following transmitter loss. Survival rates were estimated to 1 July because hens appeared to have completed nesting, most were located in mixed-sex flocks, and transmitter batteries were failing by this date. Mallard brood and duckling survival was estimated to 20 days posthatch using the Kaplan-Meier procedure. A brood was considered to have survived if  $\geq 1$  duckling lived to 20 days posthatch. Ducklings were censored when their brood hen's transmitter failed. Duckling survival may not have been independent among brood mates which is one of the assumptions for using the Kaplan-Meier survival estimate. However, Pollock et al. (1989) stated that violation of this assumption does not bias the survival estimate but does decrease the variance, thereby, decreasing the 95% confidence interval.

Differences in survival rates of mallard hens were tested using log-rank tests. The most conservative of the three  $\chi^2$  tests was used to detect differences in hen survival between the study sites (White and Garrott 1990:241). Brood and duckling survival rates were not compared between the study sites due to the limited number of broods monitored at Banner. Significance levels were set at  $p \leq 0.05$ .

## Results

Thirty-seven mallard hens were radio-tracked for 8 to 91 days during spring 1998. Five hens (13.5%) were killed while incubating nests. The survival rate of mallard hens at Banner ( $n = 11$ ) was 0.750 (SE = 0.153) and survival at MSD ( $n = 26$ ) was 0.777 (SE = 0.099) (Fig. 1). No differences were detected in the survival rates between the study sites ( $\chi^2 = 3.102$ , 1 df,  $P = 0.078$ ); therefore, the pooled hen ( $n = 37$ ) survival rate was 0.767 (SE = 0.084) (Fig. 2).

Ten mallard broods were monitored during spring 1998. Two broods died within three days posthatch and four broods survived to 20 days posthatch. The remaining four broods were from hens whose radios failed prior to 20 days posthatch. The brood survival rate was 0.788 (SE = 0.134) (Fig. 3).

Eighty-two mallard ducklings were produced from 10 successful nests at Banner and MSD. Nine ducklings were censored on the second day posthatch because of radio failure. Thirty-four ducklings died, and the remaining 39 lived to 10-20 days posthatch. Radio transmitters that failed prior to 20 days posthatch precluded us from following all ducklings to day 20. The duckling survival rate during spring 1998 was 0.539 (SE = 0.058) (Fig. 4).

LITERATURE CITED

- Kaplan, E.L., and P. Meier. 1958. Nonparametric estimation from incomplete observations. *J. Am. Stat. Assoc.* 53:457-481.
- Pollock, K.H., S.R. Winterstein, C.M. Bunck, and P.D. Curtis. 1989. Survival analysis in telemetry studies: the staggered entry design. *J. Wildl. Manage.* 53:7-15.
- White, G.C., and R.A. Garrott. 1990. Analysis of wildlife radio-tracking data. Academic Press, Inc., San Diego, CA. 383pp.



# Kaplan-Meier Survival Estimates for Mallard Hens

## March - June 1998

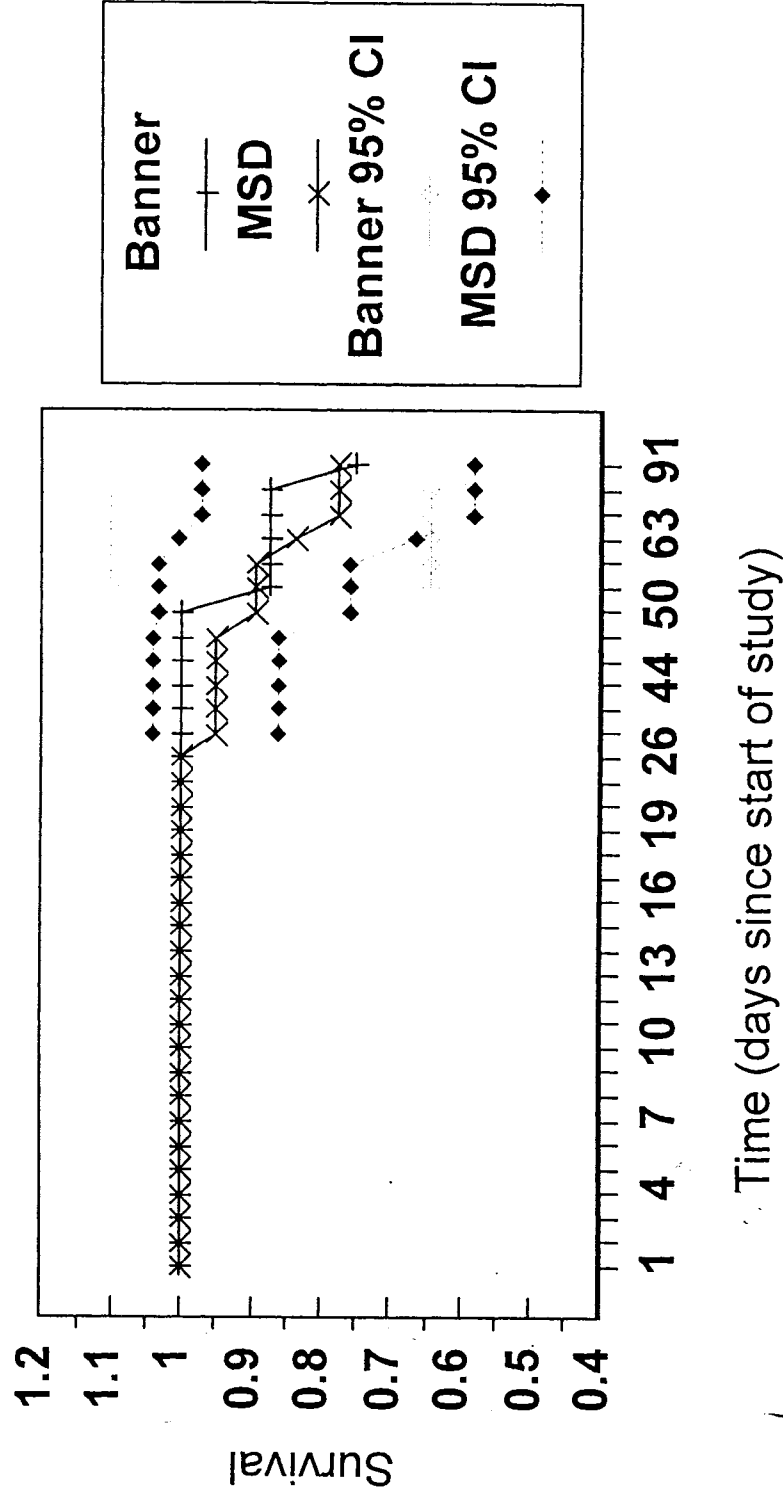


Figure 1. Kaplan-Meier survival estimates of mallard hens at the Banner Marsh State Fish and Wildlife Area and the Metropolitan Sanitary District of Greater Chicago in westcentral Illinois during spring 1998.

# Kaplan-Meier Survival Estimate for Mallard Hens

## March-June 1998

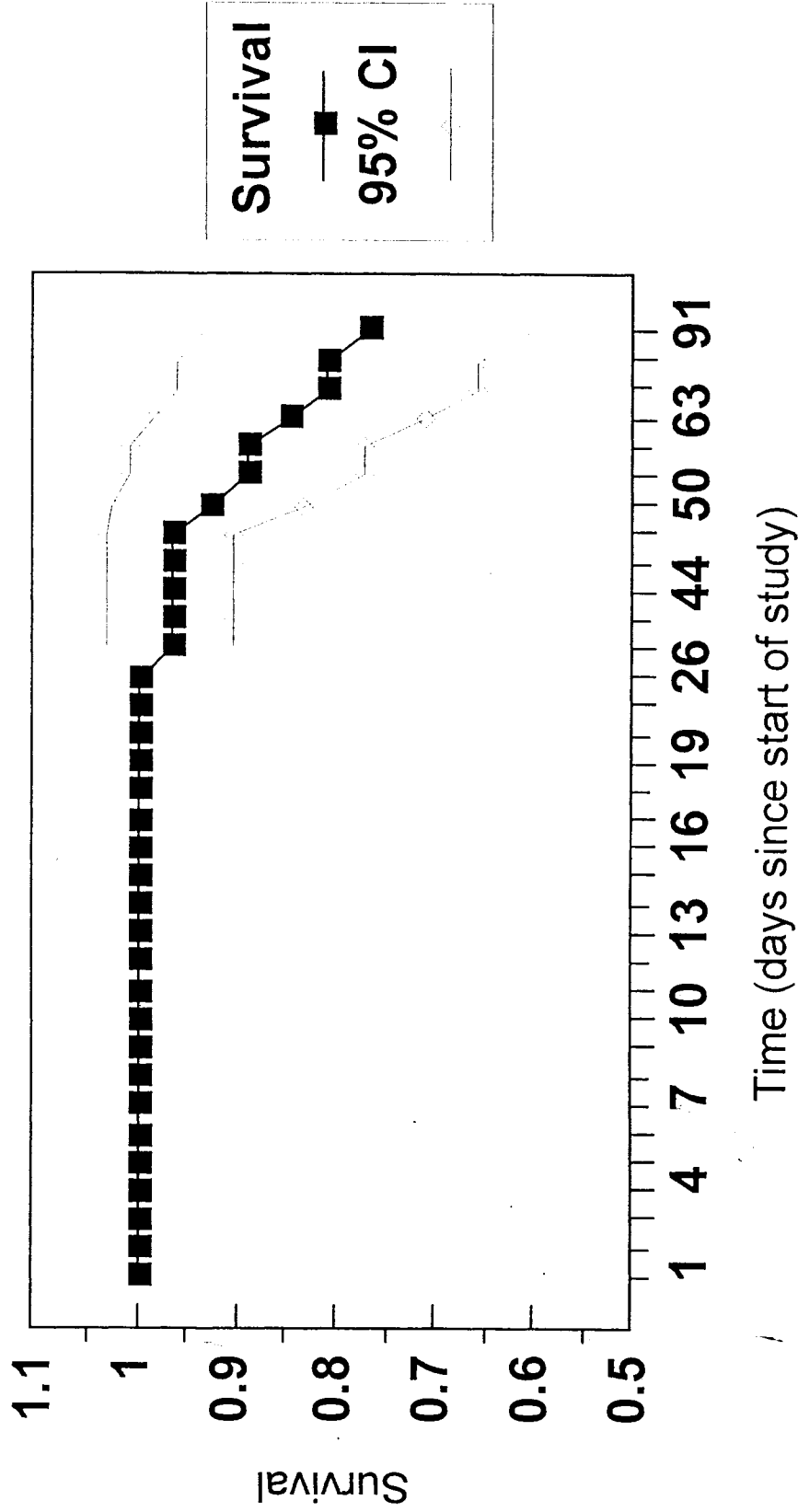


Figure 2. Kaplan-Meier survival estimate of mallard hens in westcentral Illinois during spring 1998.

# Kaplan-Meier Survival Estimate for Mallard Broods during Spring 1998

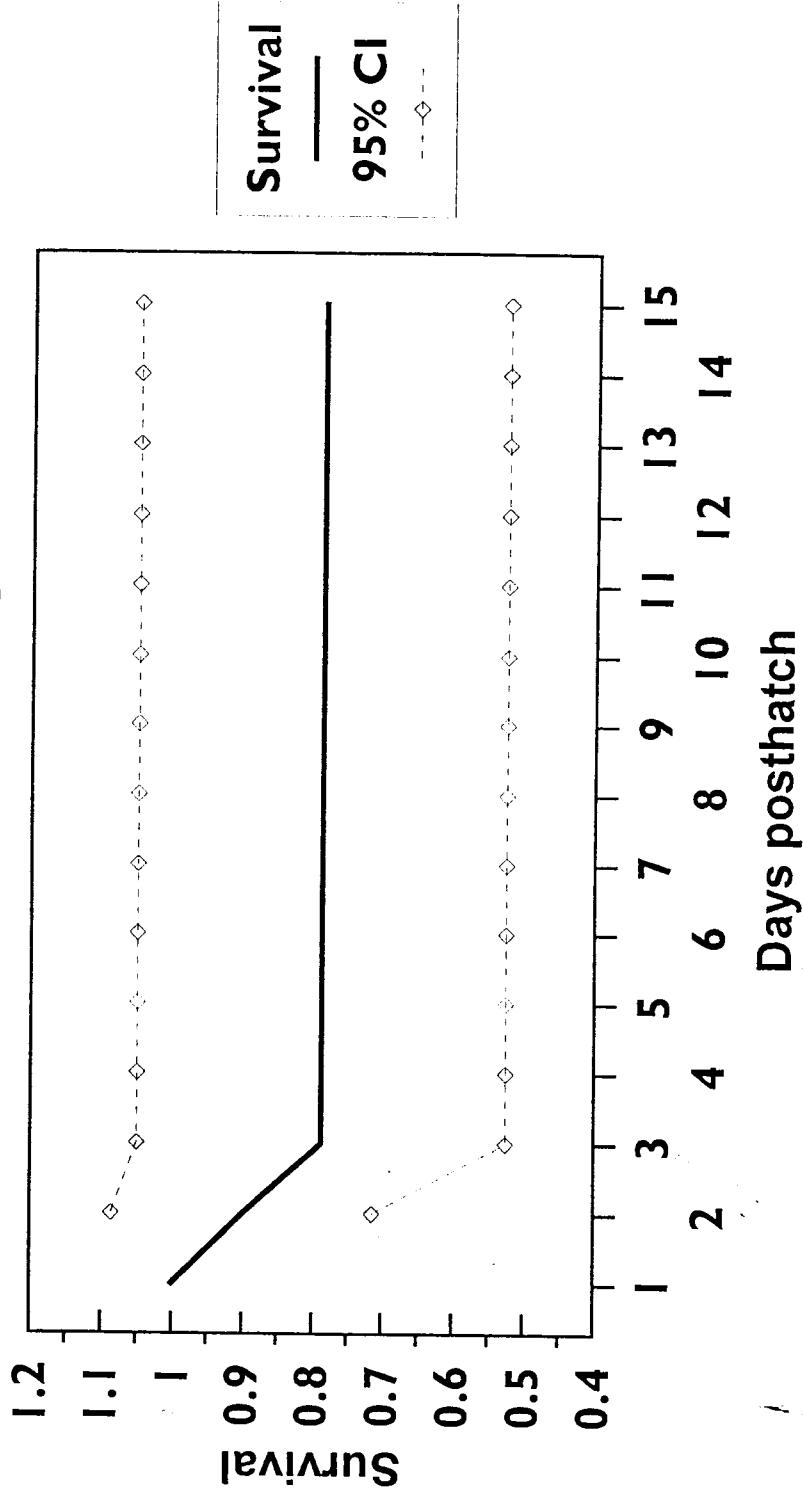


Figure 3. Kaplan-Meier survival estimate of mallard broods at the Banner Marsh State Fish and Wildlife Area and the Metropolitan Sanitary District of Greater Chicago in westcentral Illinois during spring 1998.

# Kaplan-Meier Survival Estimate for Mallard Ducklings during Spring 1998

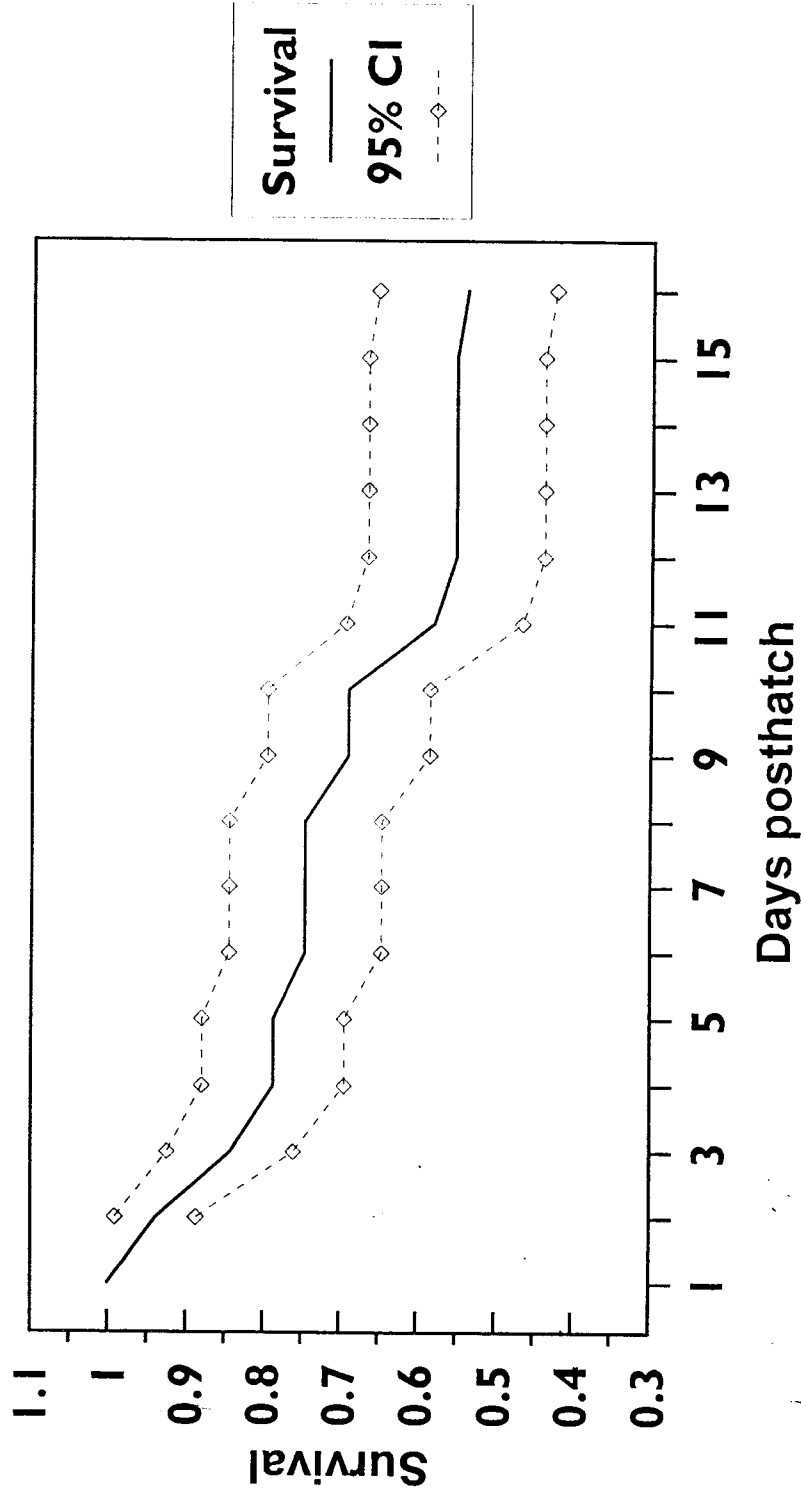
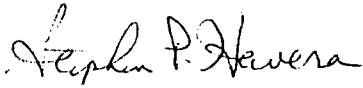


Figure 4. Kaplan-Meier survival estimate of mallard ducklings at the Banner Marsh State Fish and Wildlife Area and the Metropolitan Sanitary District of Greater Chicago in westcentral Illinois during spring 1998.

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DATE: 22 December 1998

