

Cinnamon Teal: A Case of Adaptive Nest Site Selection



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Objectives

- The Migratory Bird Program of the US Fish and Wildlife Service initiated a nesting study in 2015 to inform breeding habitat management and population dynamics for the cinnamon teal (*Spatula cyanoptera*).
- Main Objectives:** Estimating nest survival and the driving factors behind nest site selection.
- Secondary Objectives:** Evaluating whether cinnamon teal select certain traits adaptively.
 - Adaptive habitat selection theory predicts that individuals should use habitats that maximize their fitness
 - Nests surrounded by habitat characteristics predictive of nest site selection should have higher probabilities of hatching.

Methods

- Monitored Cinnamon Teal nests on Monte Vista National Wildlife Refuge in the San Luis Valley of Colorado in 2015 (n=30), 2016 (n=23), and 2017 (n=32).
- Determined nest fate and measured environmental covariates for nests.
- Assessed competing nest survival models in a multistate framework to determine which covariates affected the mortality transitions (ψ^{13} and ψ^{24}) during laying and incubation.
- Developed generalized linear models to assess nest site selection and compared coefficient estimates from both analyses to determine which covariates teal selected adaptively.

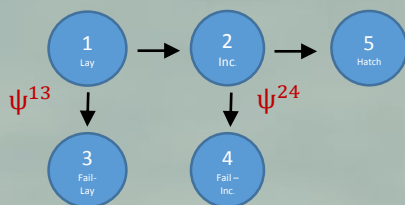


Figure 1: Life history diagram for cinnamon teal nest survival analysis in a multistate framework.

Results

- Overall Nest Survival (2015-2017) = 0.189**
- Daily Survival Rate (Lay.) = 0.884 (SE=0.035)**
- Daily Survival Rate (Inc.) = 0.981 (SE=0.006)**

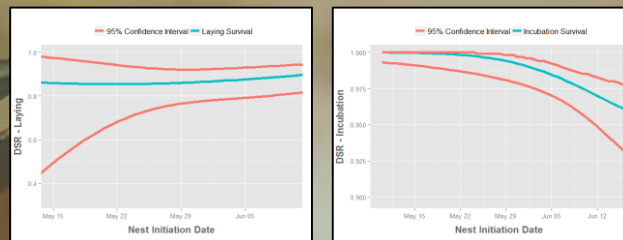


Figure 2: Nesting later in the season resulted in higher laying survival (left figure) but lower incubation survival (right figure). This implies there might be a tradeoff in when to nest due to the resources available on the landscape.

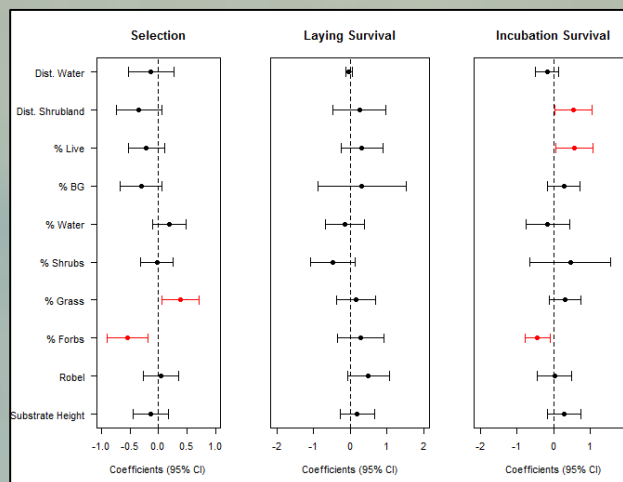


Figure 3: Coefficient estimates and 95% confidence intervals corresponding to covariates in the nest survival and nest site selection analyses. Red points indicate significant estimates. For example, teal selected sites with a lower proportion of forbs, whereas sites with a lower proportion of forbs were associated with higher incubation survival, indicating teal are selecting those sites adaptively.

Discussion

- This study represents one of the only cinnamon-teal-specific estimates of nest survival using modern, unbiased methodology.
- Daily survival rate of nests were lower during the laying stage than the incubation stage. Hens lay one egg a day, and typically do not attend the nest regularly during the laying period. Their eggs are therefore more exposed and less protected from nest predators.
- Although we did not identify forbs or grasses down to species, a majority of the forb species consisted of invasive plants, most commonly perennial pepperweed (*Lepidium latifolium*). This species can drastically change the composition of wetland plant communities (Young et al. 1995, USFWS 2014). It is a tall plant that grows densely and may break up the structure of the vegetation enough to prevent teal from tunneling to and from their nests (Gammonley 2012).
- Teal may be selecting sites that have yet to be invaded by pepperweed, leading to higher nest survival.
- Teal selected sites that were adaptive in terms of some traits but not others, indicating they might be selecting at different scales than the one measured here or are limited by the amount of habitat.

