

Temporal Variability in Survival of Non-Breeding Northern Bobwhites in Ohio

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Introduction

- Survival important vital rate in declining bobwhite populations (Sandercock et al. 2008)
 - Seasonal variation important determinant of population growth rates (Folk et al. 2007, Sandercock et al. 2008)
 - Non-breeding season survival is important vital rate in northern populations
 - Guthery 2000, Folk et al. 2007, Sandercock et al. 2008, Gates et al. *This Session*

Introduction

- Intra-seasonal variation may additionally be important (Moynahan et al. 2006 – GRSG)
 - Target limiting periods
- Investigated non-breeding season (October – March) survival on private lands in Ohio – 2008-2011



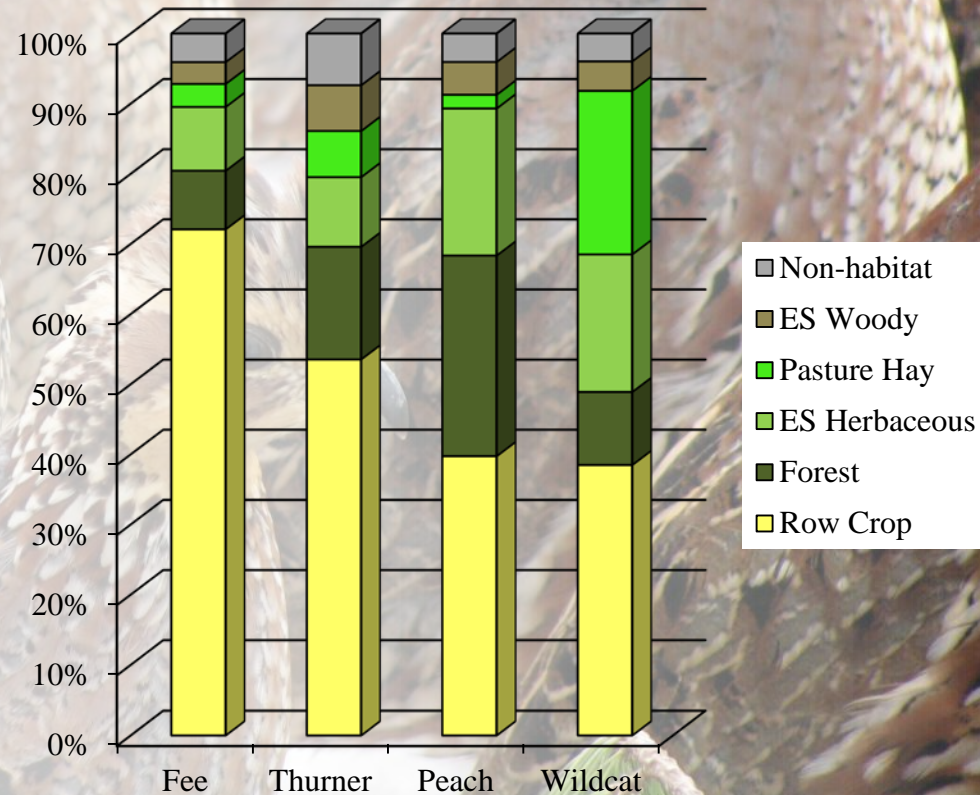
Study Area

- Private land in core of bobwhite range in Ohio



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- Private land in core of bobwhite range in Ohio
- Habitat composition representative of land-use in region
- Primarily used woody cover along fencerows and ditches



Methods

- Located coveys
- Captured and radiomarked 2-5 individuals/ covey
- Located individuals daily to record habitat use and cause-specific mortality



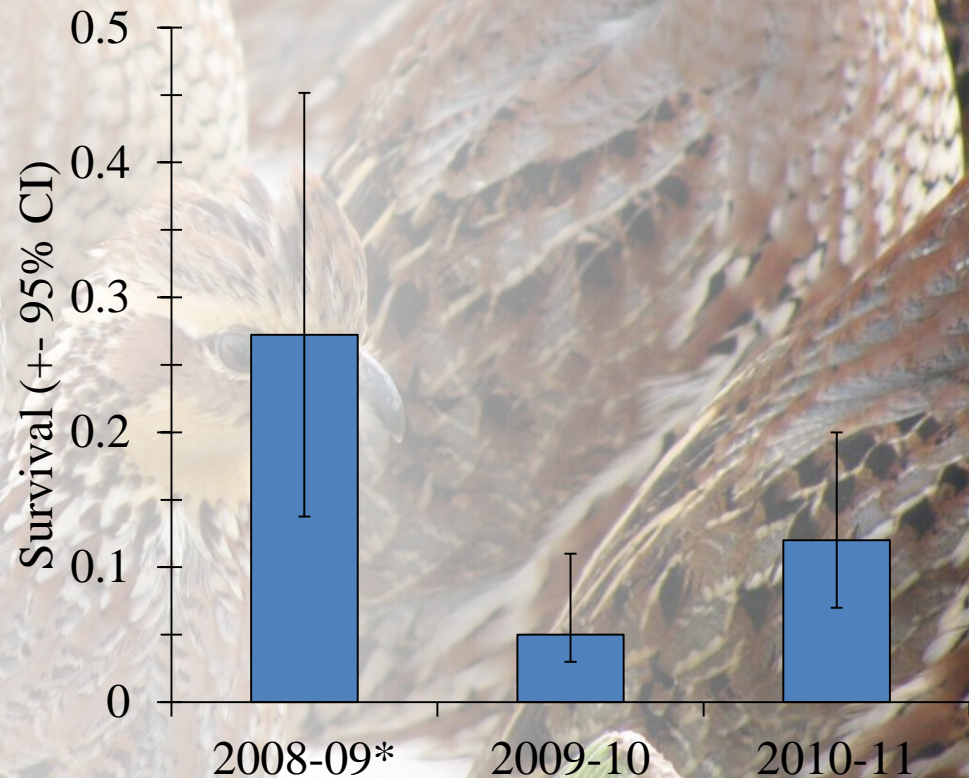
Survival analysis



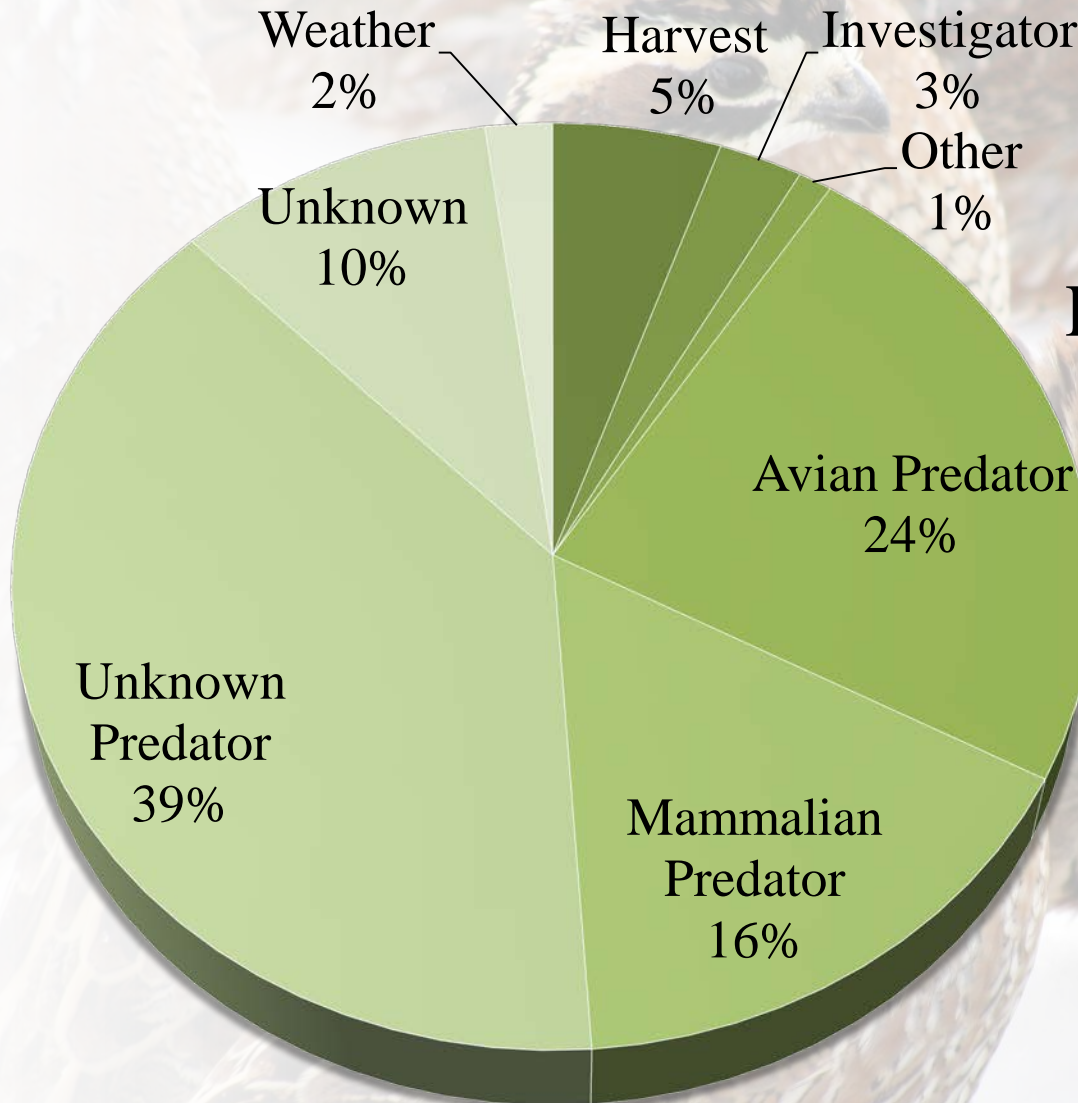
- **Known-fates model in Program MARK**
 - Daily intervals for 1 October – 31 March
 - 2008-09 Season 10 December – 31 March, extrapolated to entire interval following Sandercock et al. 2008
 - 7 day exclusion period (Guthery and Lusk 2004, Holt et al. 2009)
- **Temporal models ($n = 17$)**
 - constant, weekly, bi-weekly, monthly
 - Additive effects and interactions with year
 - e.g. Week, Week + Year, Week + Year + Week x Year
 - Selected most parsimonious model with AICc
- **Data bootstrapping procedure to improve variance estimate with \hat{c} (Bishop et al. 2008)**
 - Resampled based on covey affiliation (Williams et al. 2003)
- **Cumulative incidence function (CIF) for harvest mortality (Heisey and Patterson 2006)**

Results

- Low survival in each non-breeding season (Oct. – Mar)
- 311 individuals from 73 coveys
 - (08-09 $n=55$, 09-10 $n=130$, 10-11 $n=126$)



Mortality causes

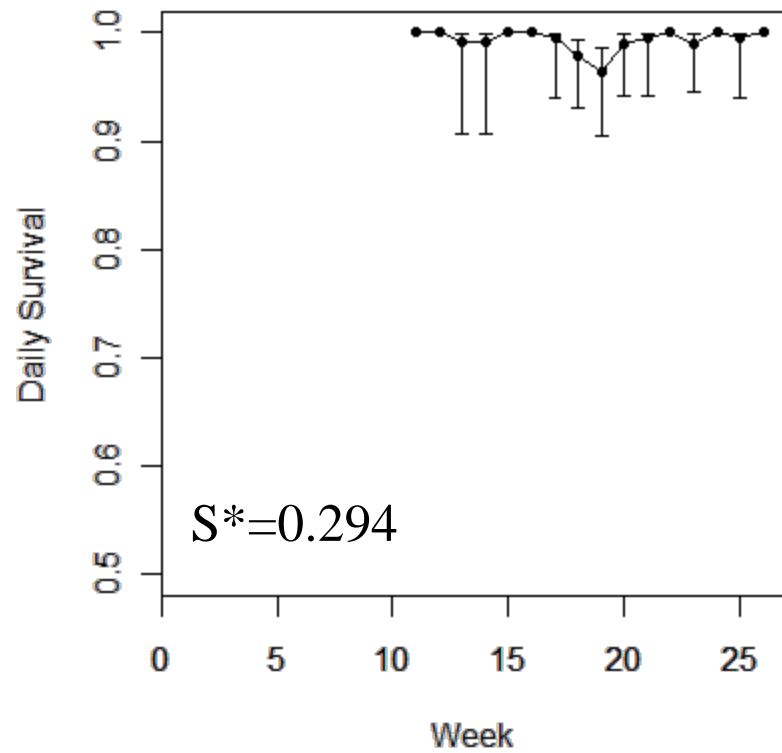


Harvest CIF = 0.068
(0.012, 0.123)

Results

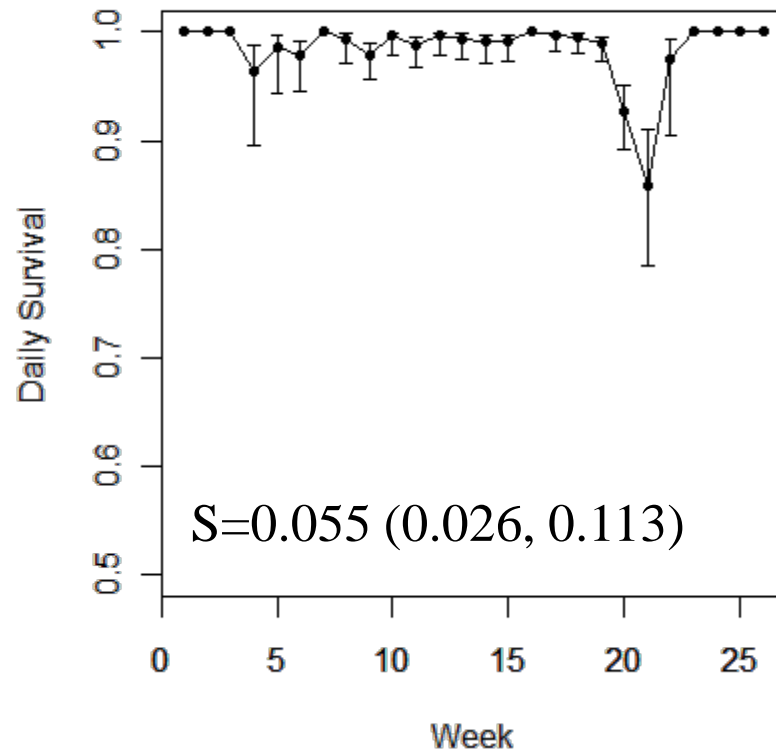
- Heterogeneous temporal models within and among years
- Slight dependency among covey members
– $\hat{c} = 1.54$

Model	AIC _c	ΔAIC _c	w _i	K
S(Week)Year+Week*Year	1585.479	0.000	0.935	52
S(BiWeek) Year+BiWeek*Year	1590.822	5.343	0.065	26
S(Month) Year+Month*Year	1617.168	31.689	0.000	12

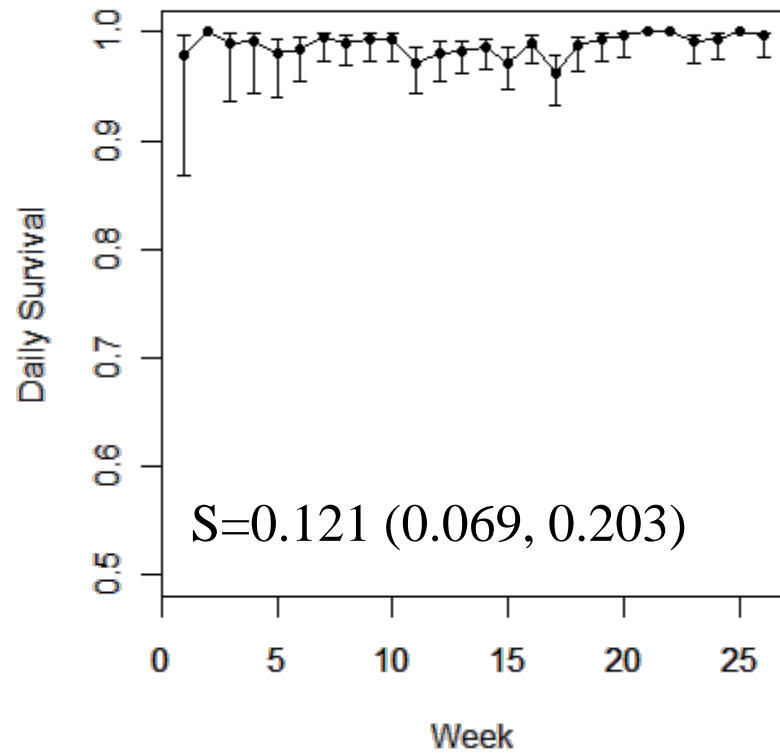


2008-09

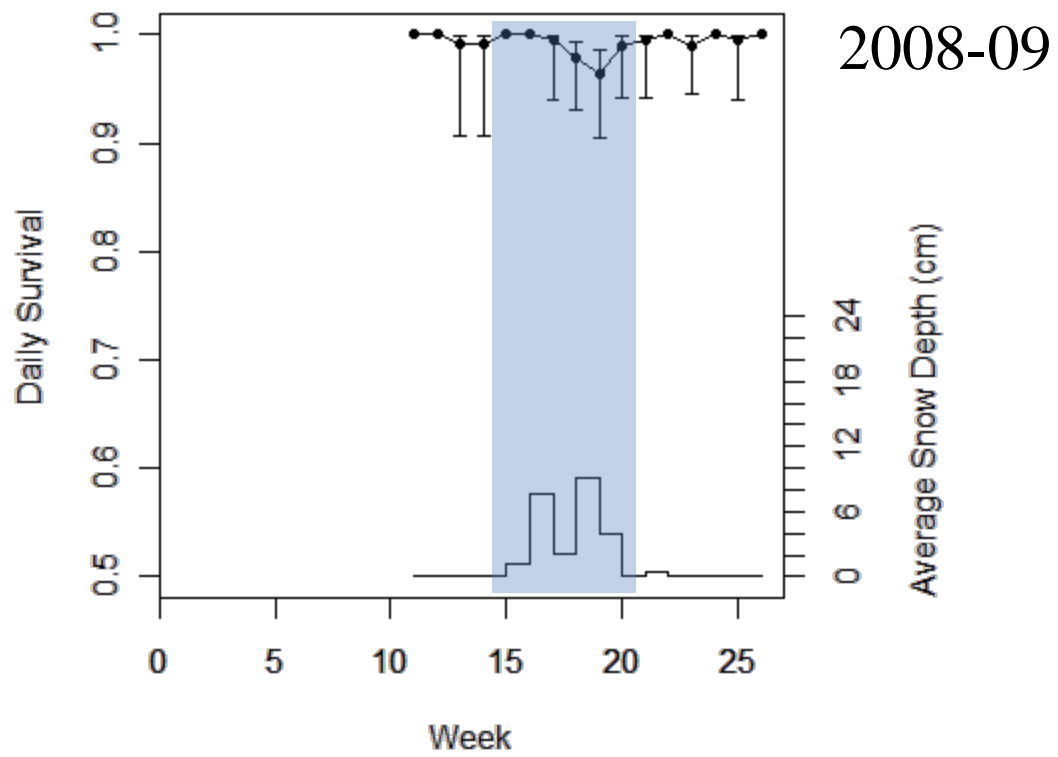
*extrapolated to 182 d. interval

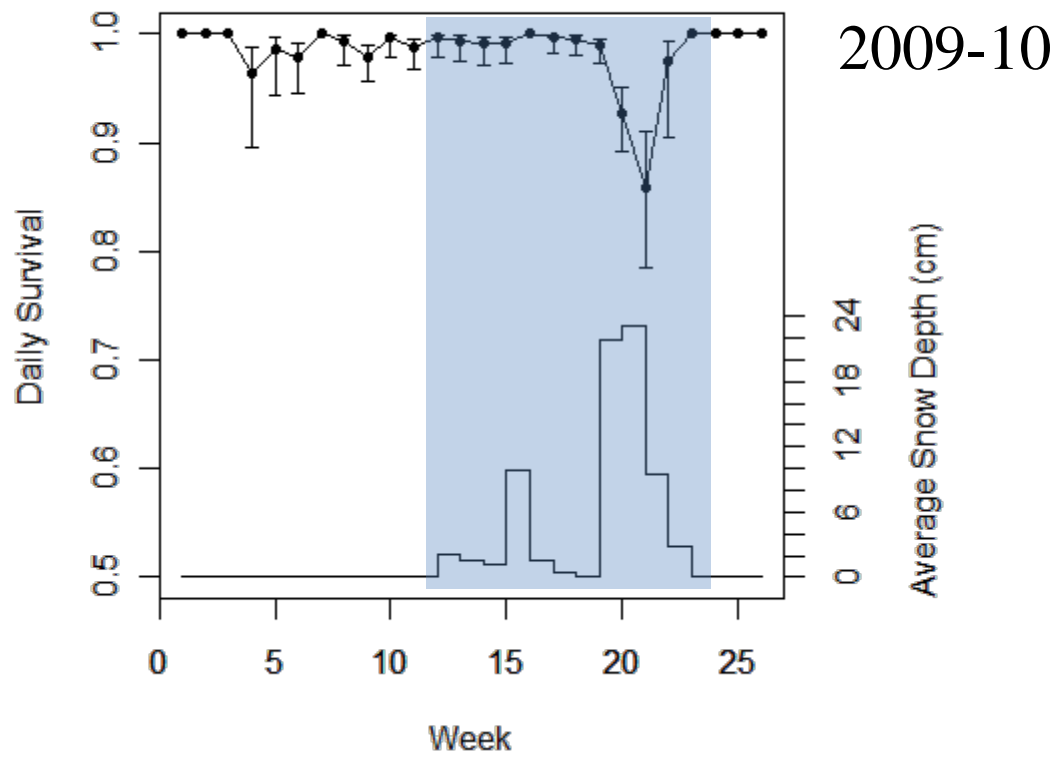


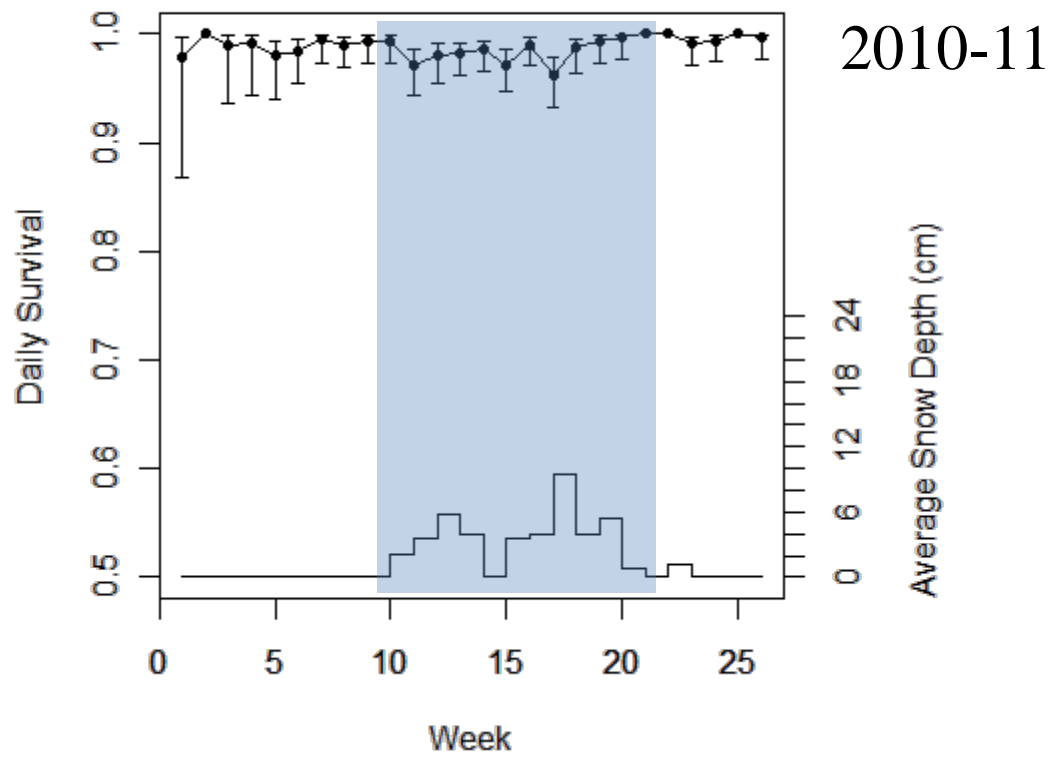
2009-10



2010-11

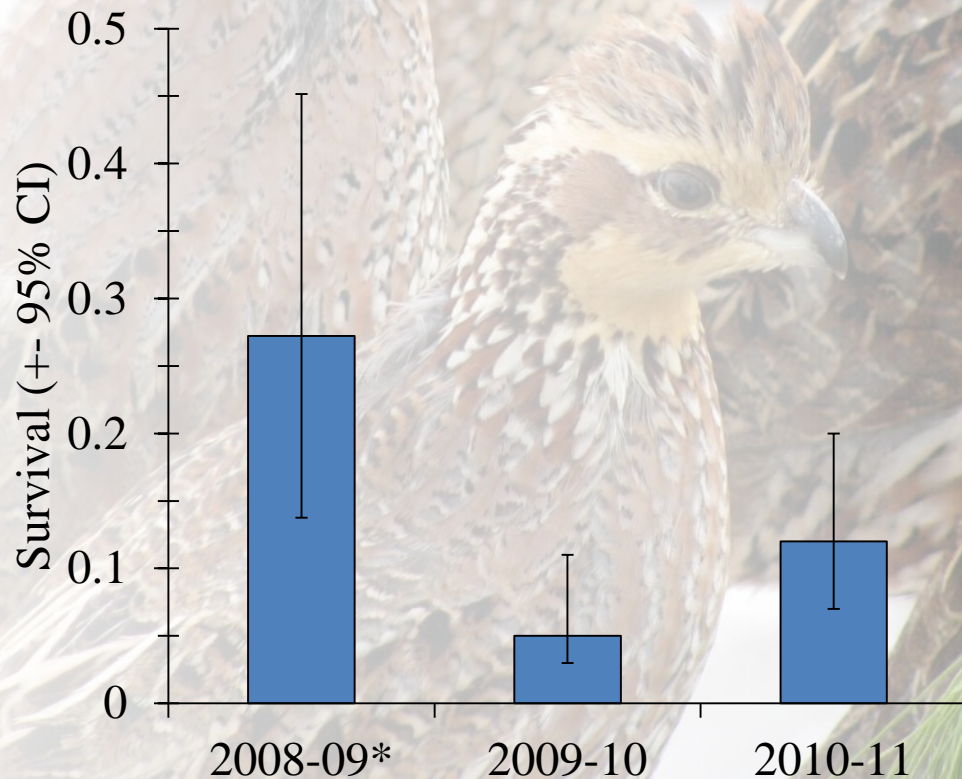






Discussion

- Variable survival among years consistent with previous long-term studies



Discussion

- Highly variable survival among years consistent with previous long-term studies
- Survival influenced primarily by predation
 - Harvest not highly influential
 - Covey-level Allee Effects
- Survival during periods of snow cover most variable
 - Predation, rather than freezing or starvation (e.g. Leopold 1937, Trautman et al. 1939)



Cover

Food

Management Implications



- Improve survival (decrease predation) during periods with snow accumulation to improve non-breeding season survival, population growth rates
- Providing suitable woody cover close to food resources may reduce vulnerability to avian predators

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Questions

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