Tropical rainfall drives survival of both resident and over-wintering migratory songbirds  
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# Abstract

# Introduction

Global environmental change is impacting populations in nearly all ecosystems across the planet. In Tropical regions temperature changes have been moderate while the change in precipitation gradients has been much more rapid. Many populations of tropical and temperate species rely on precipitation for cues to initate breeding or to fuel their migratory journeys.

Climate models predict an increase in temperatures within the Caribbean Basin but more importantly a significant decline the amount of annual precipitation, particularly during the northern vernal period. Because precipitation is integral for arthropod populations and resources that fuel migration and reproduction for songbirds, the projected drying trend will impact songbird populations either directly or indirectly through delayed migration leading to reduced fitness.

Here, using a long-term mark-recapture data set of both resident and migratory songbirds residing in Jamaica we test the hypothesis that animal populations are affected by environmental conditions experienced during the period prior to breeding and spring migration for residents and migrants, respectively. We predicted that survival of both resident and migratory songbirds will be negatively impacted by the drying trends currenlty being observed in the Caribbean Basin.

# Methods

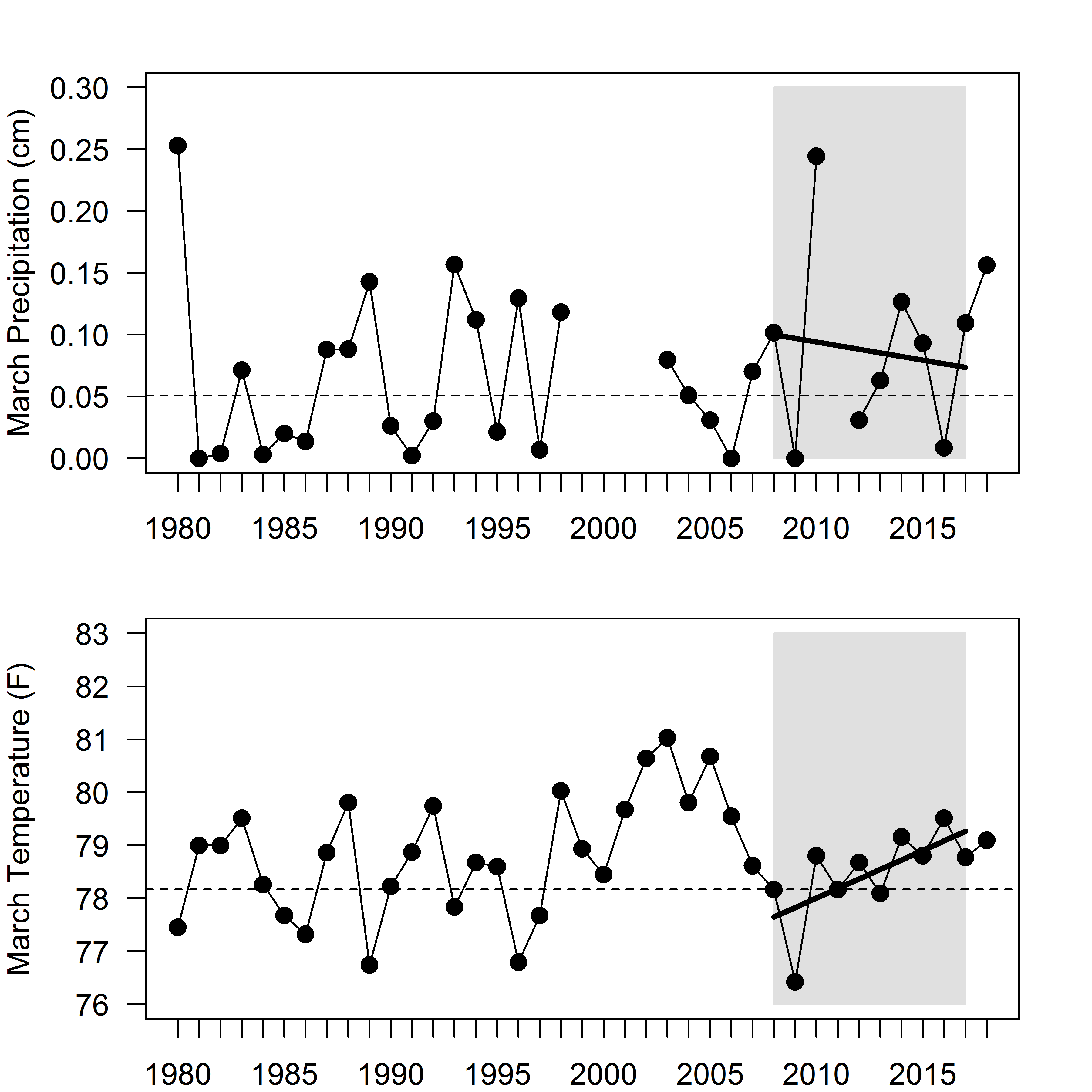
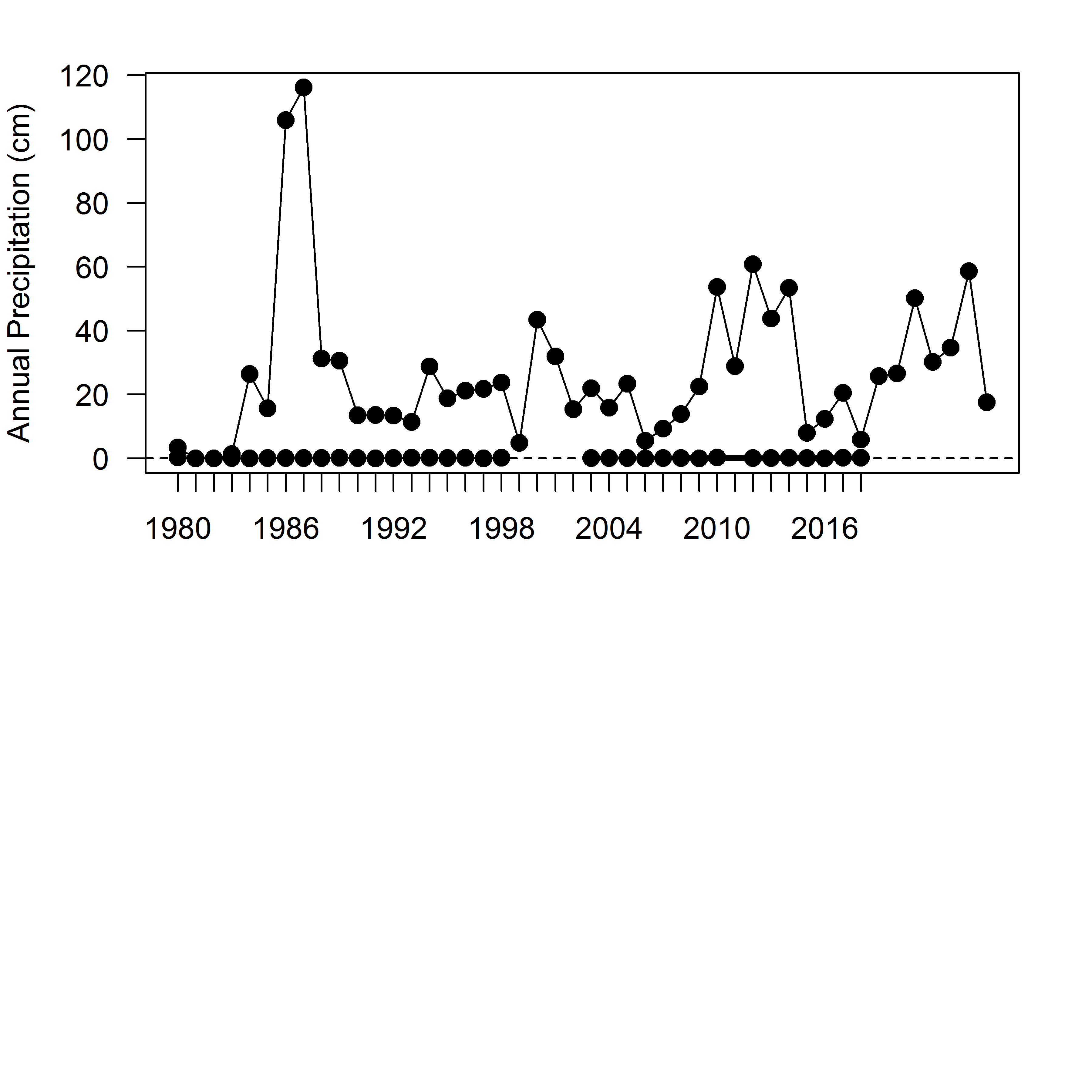
We used a spatially explicit open-population Jolly-Seber model to estimate survival and density using 10 years of constant effort capture-mark-re-capture data. While in the field, the specific net an individual was captured in was recorded enabling us to re-create spatially explicit capture histories for each individual. Analyses were run in JAGS accessed through the jagsUI package on the Smithsonian Institution’s High Performance Cluster (SI/HPC).

Daily temperature and precipitation data observed at Montego Bay, Jamaica (18.5 N, 77.917 W) were obtained from <https://www.ncdc.noaa.gov/>.

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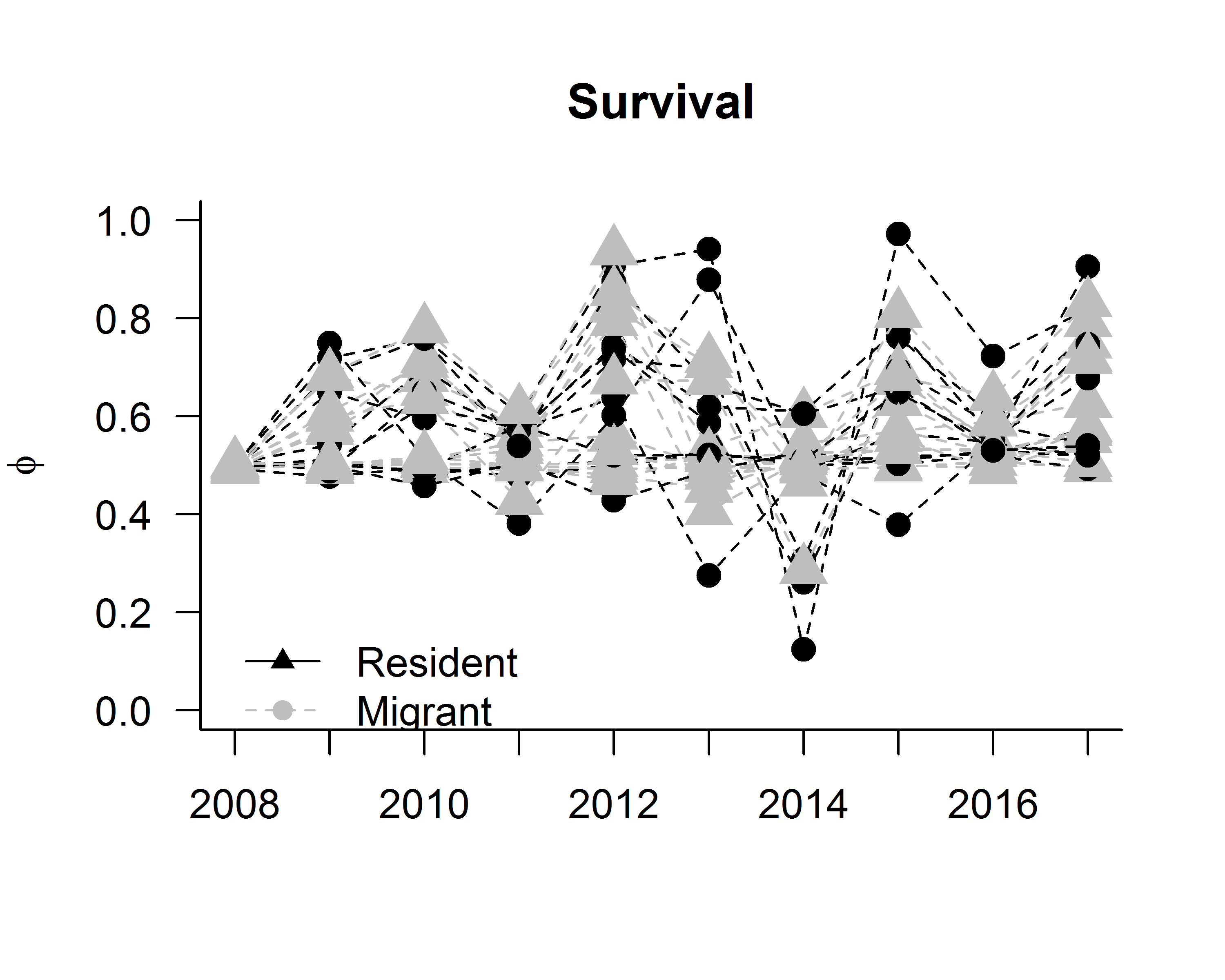
# Results

Figure 1. Yearly precipitation decreased significantly between 2007 and 2017. Dashed line indcates mean from 1980-2018. Study period highlighted with gray polygon.



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Survival estimates for resident and migratory songbirds wintering in Jamaica.

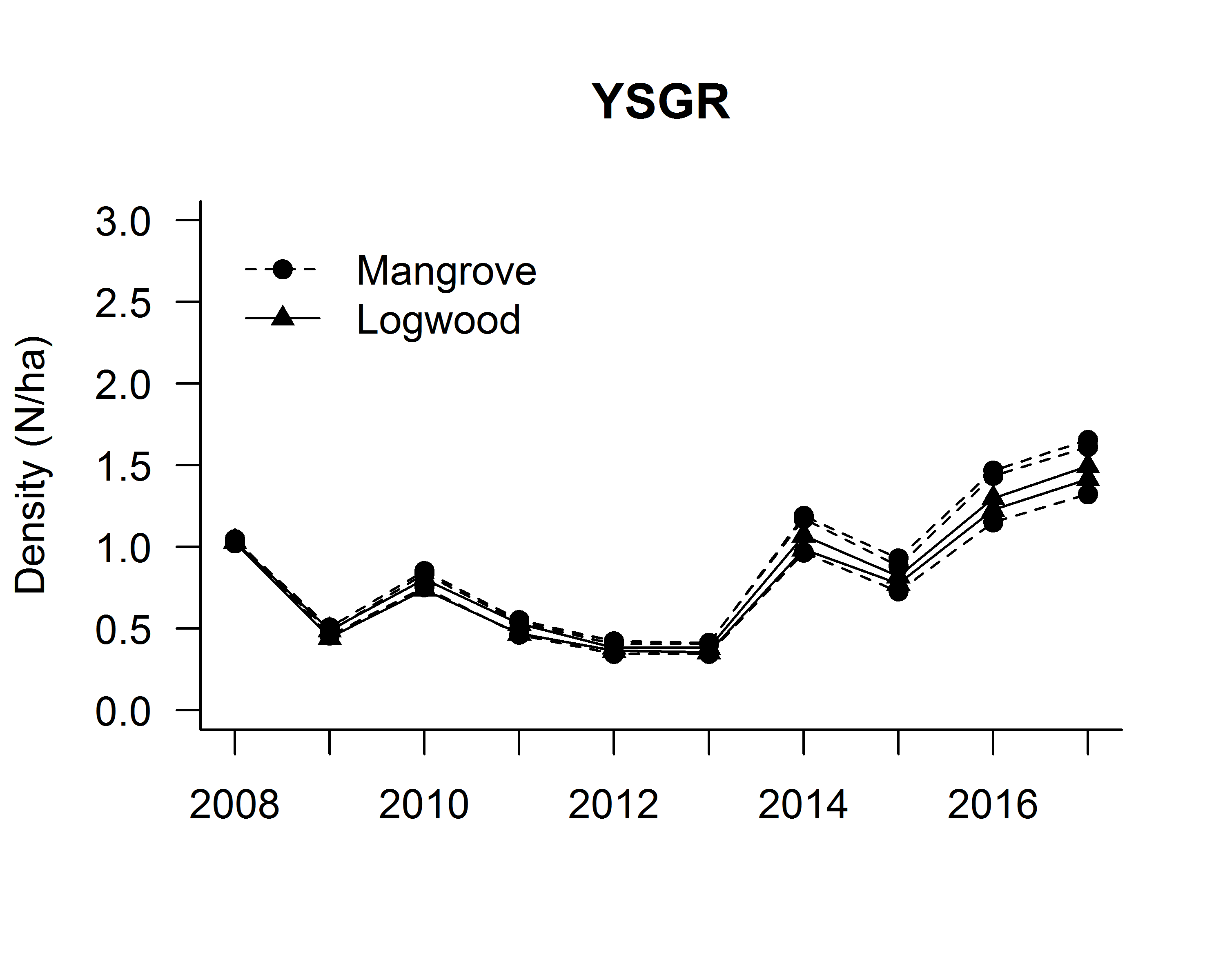
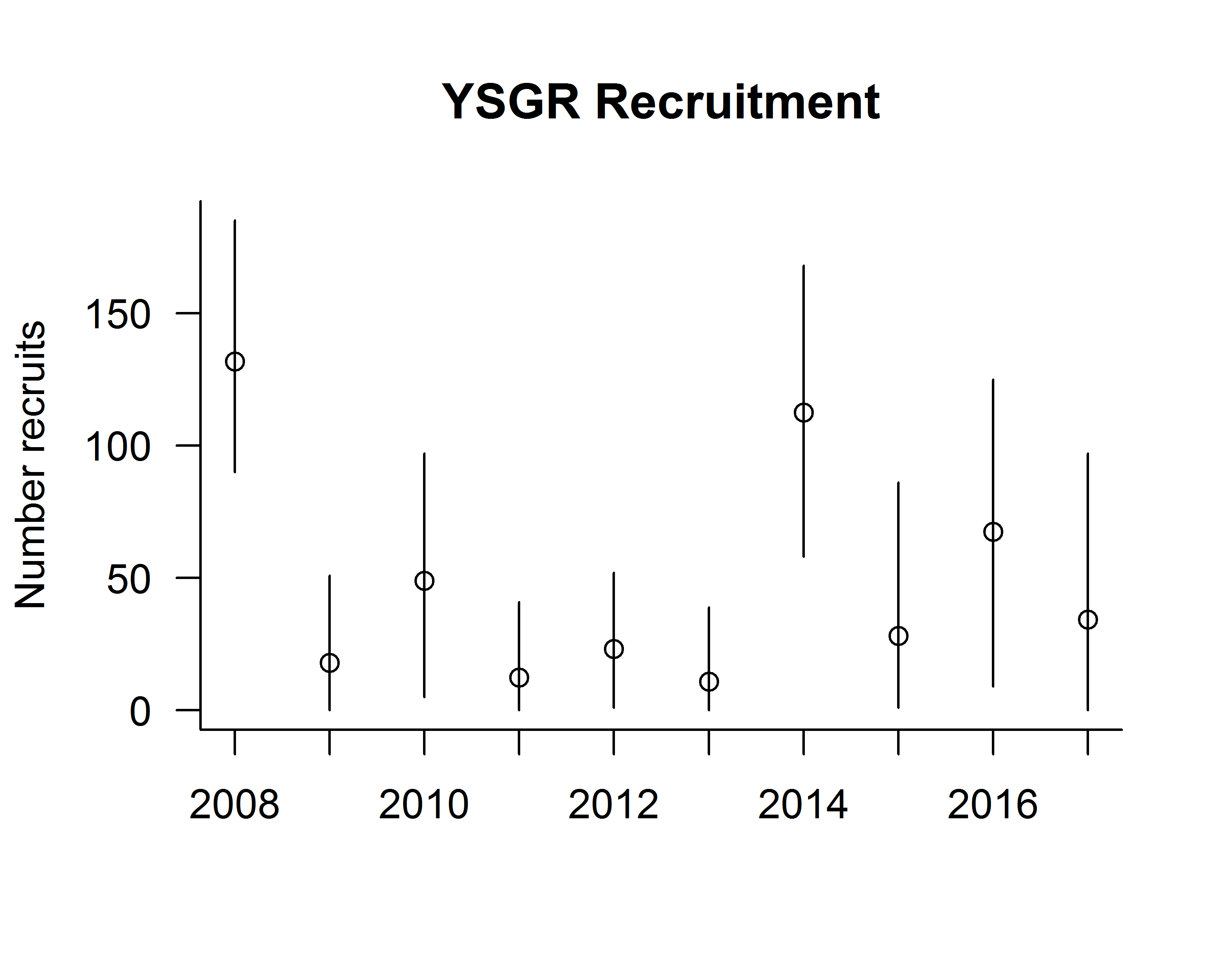
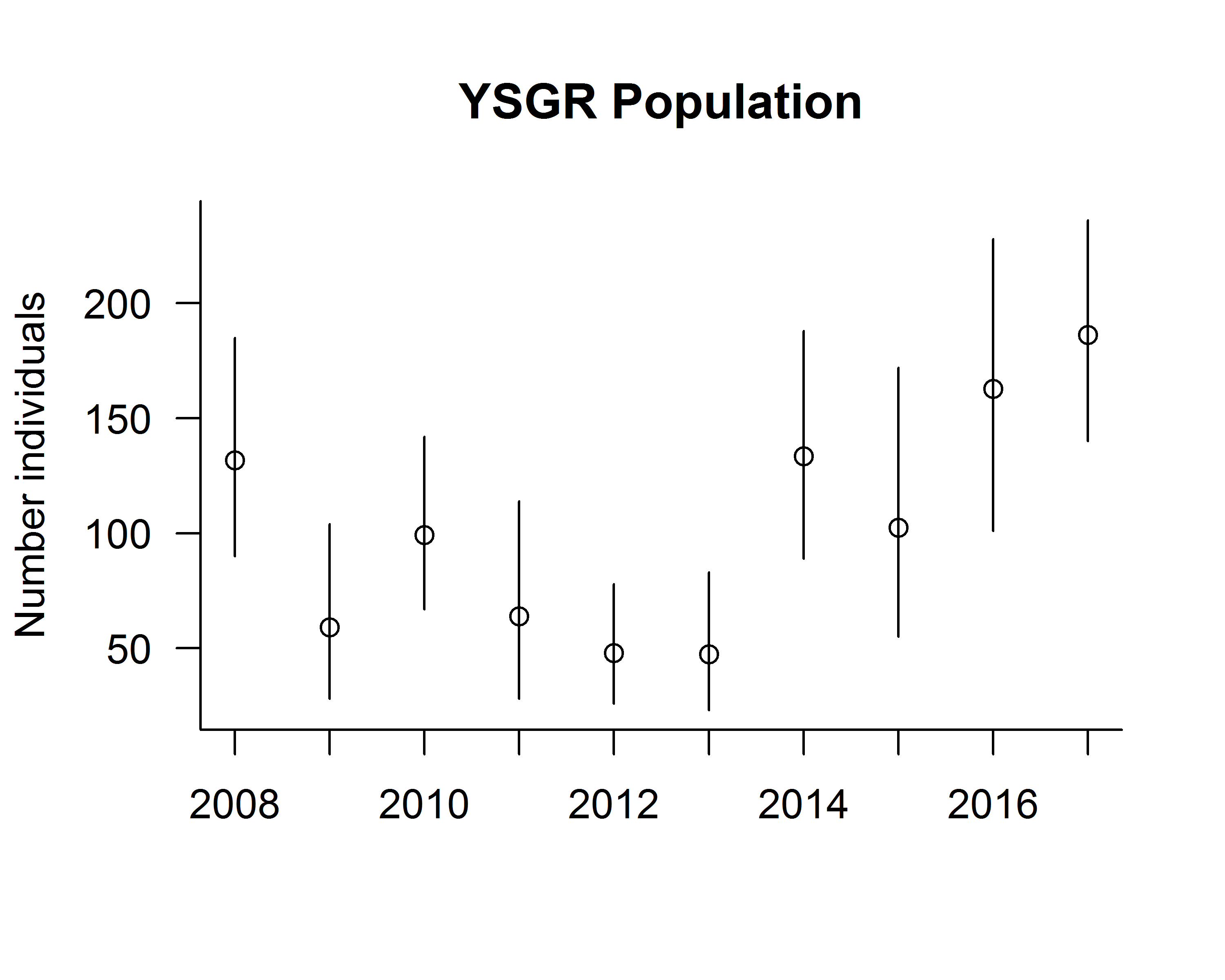
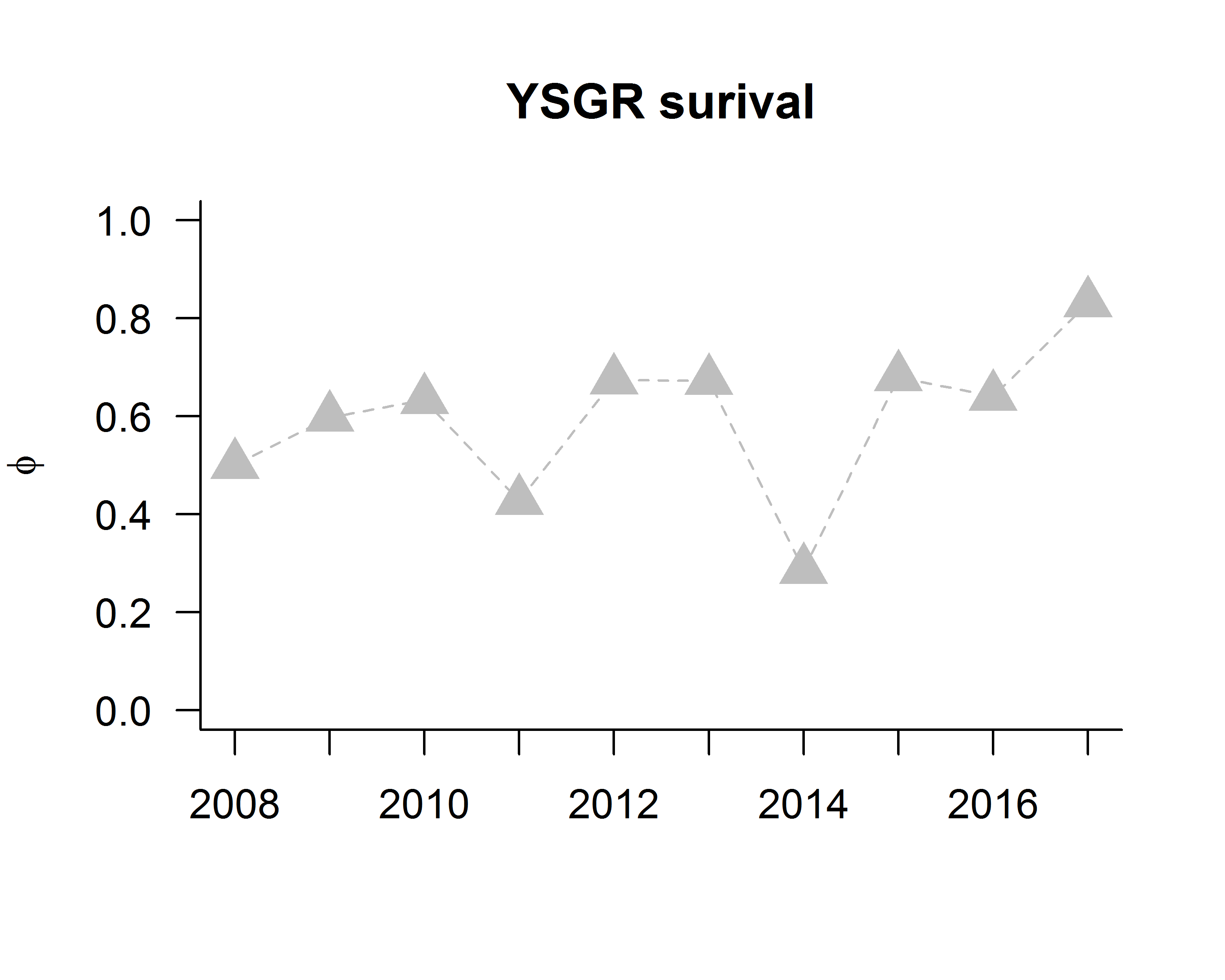
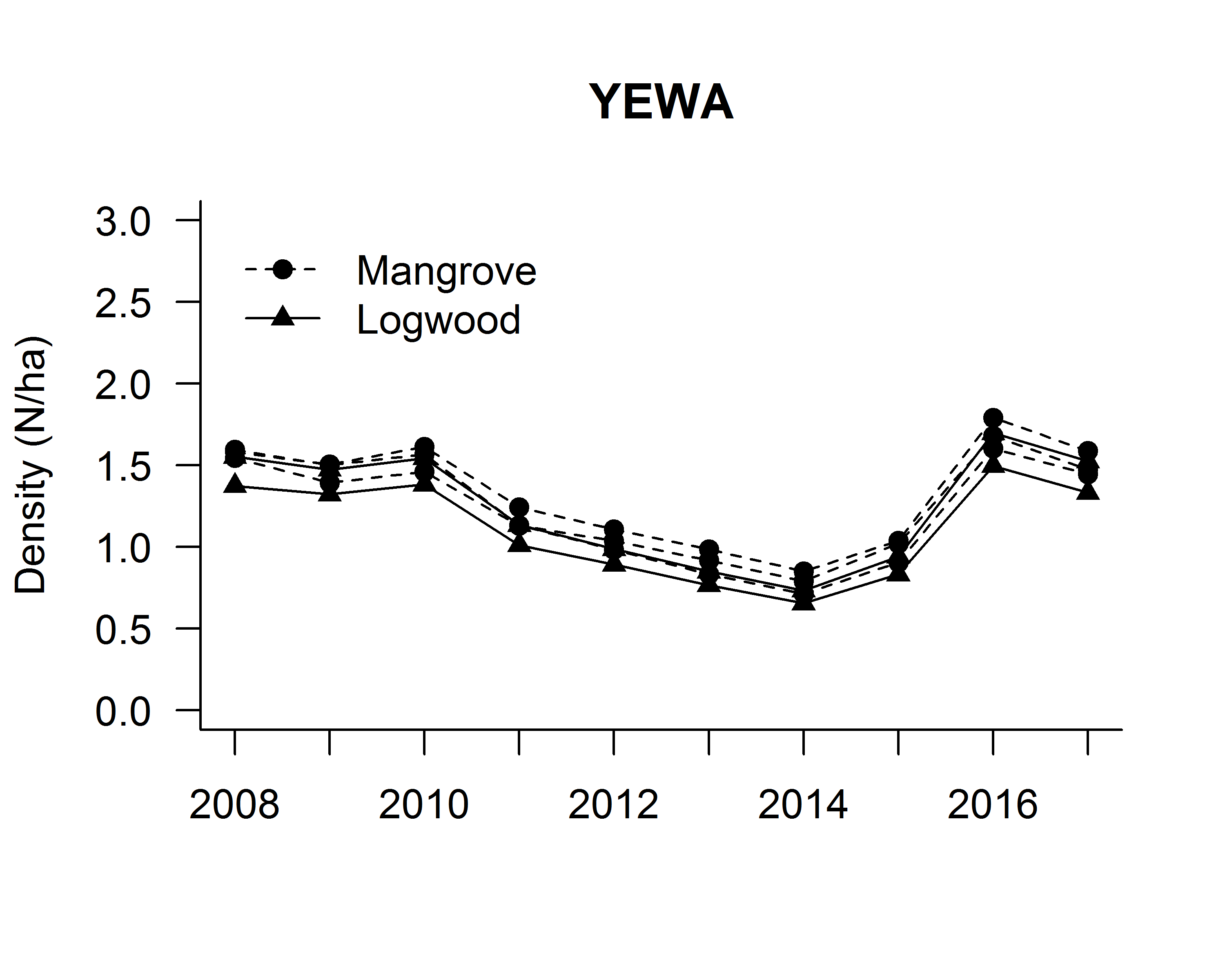
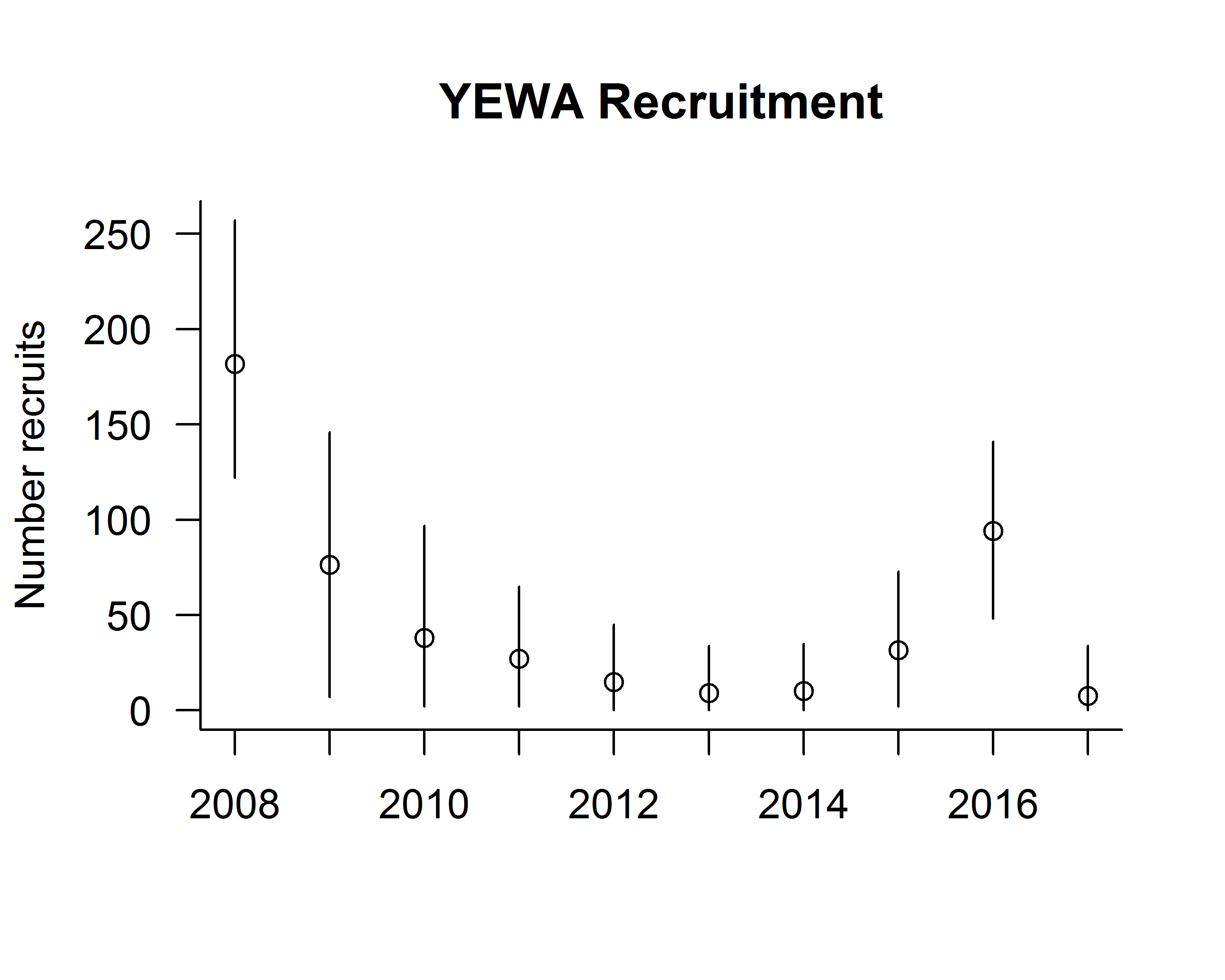
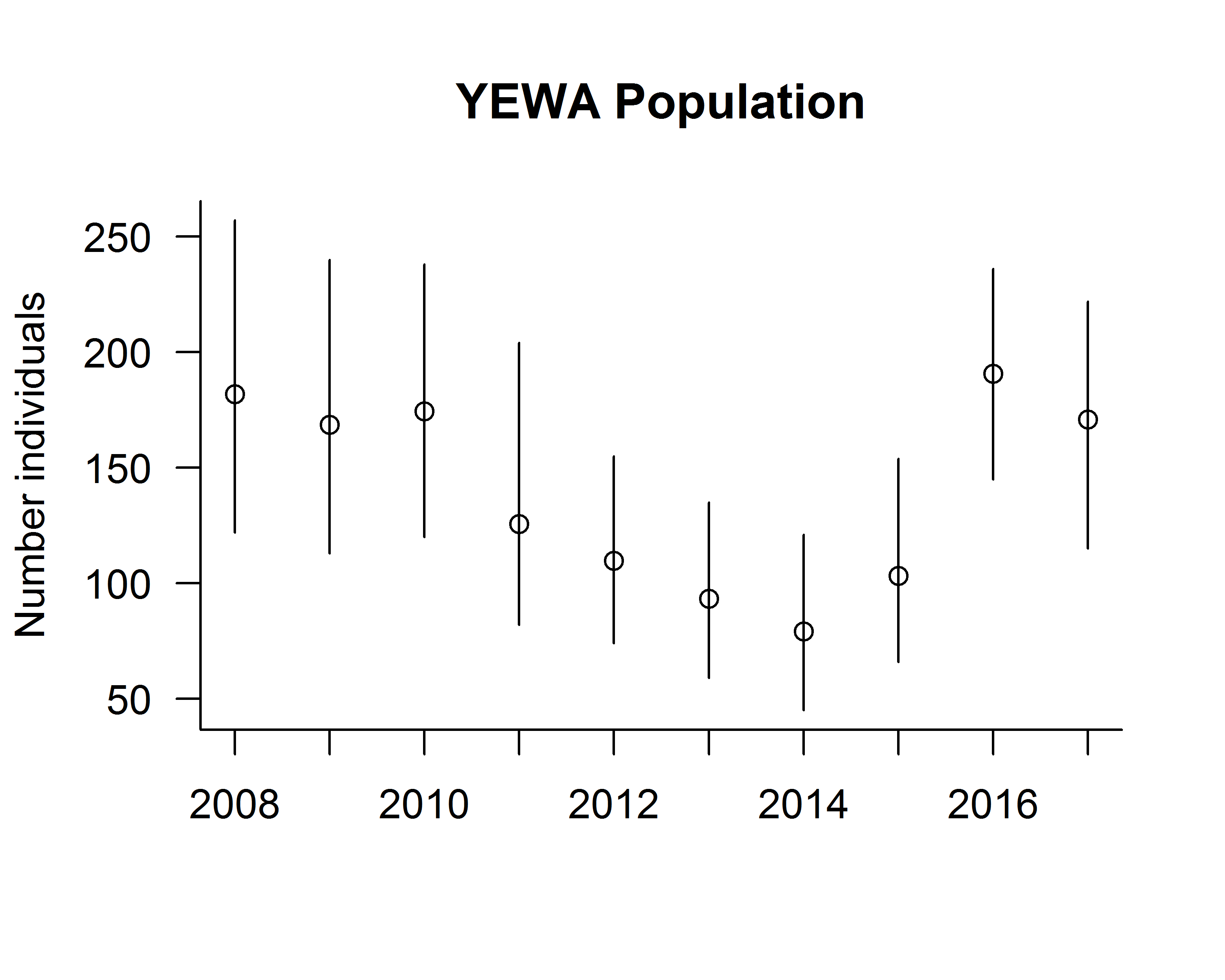
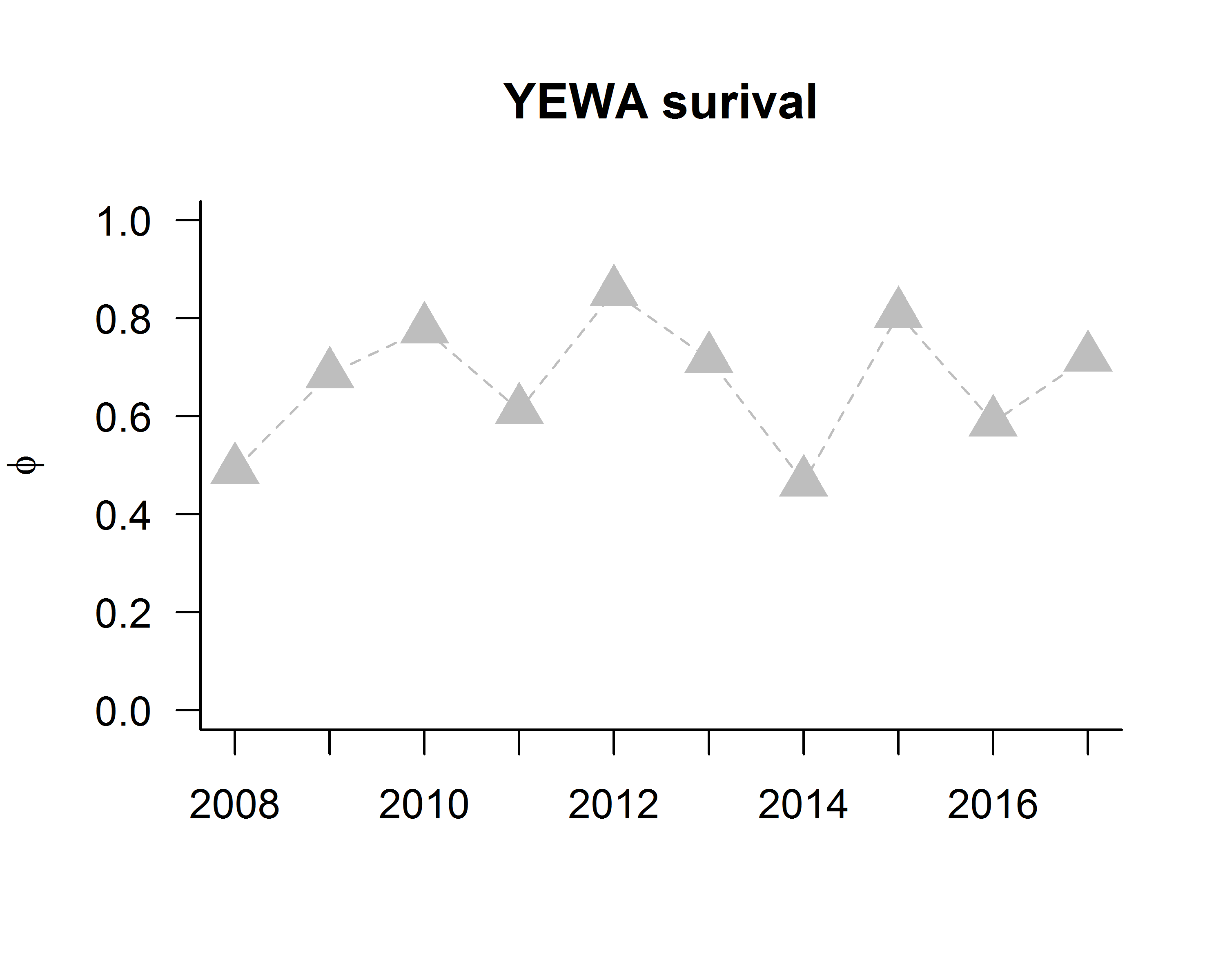
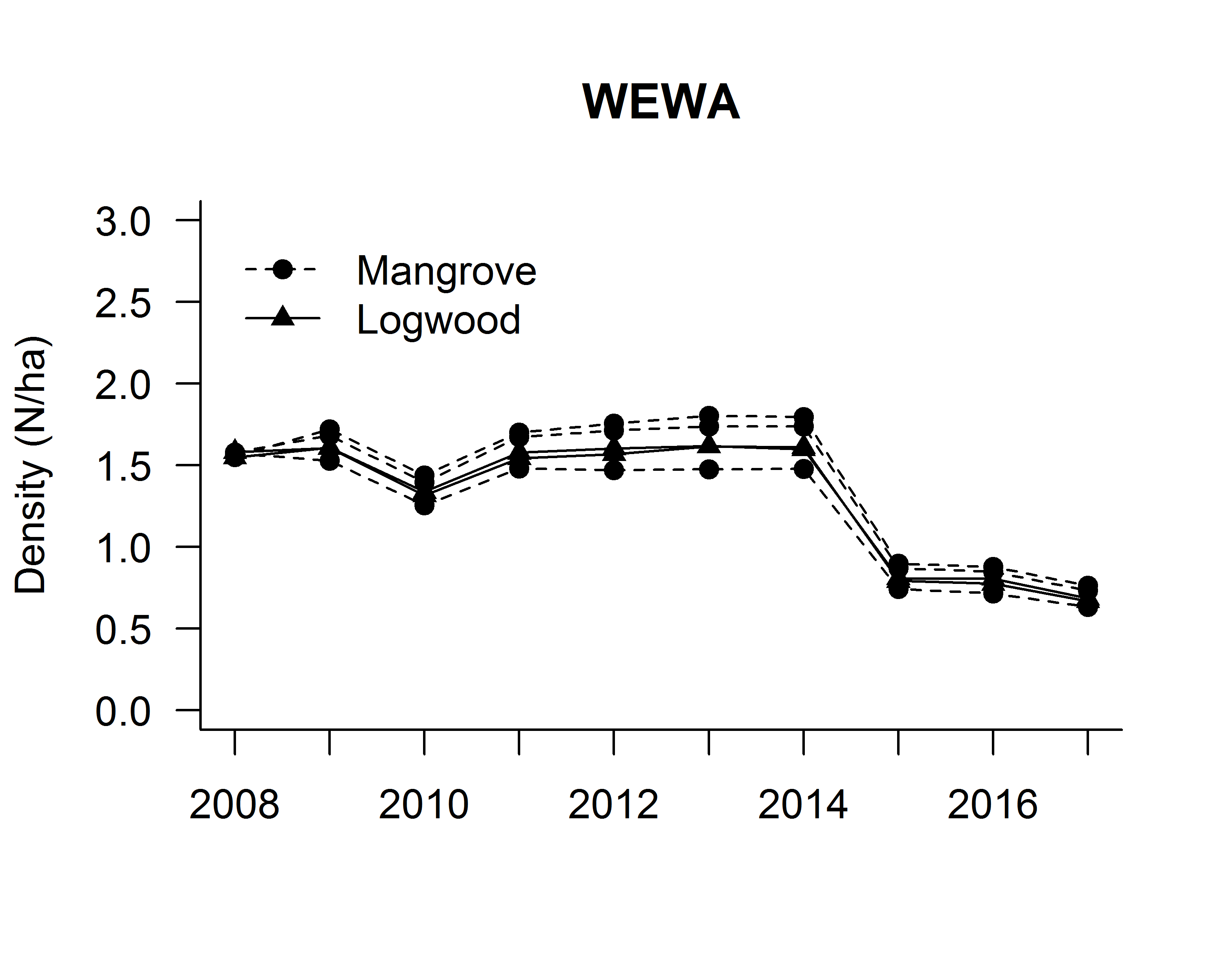
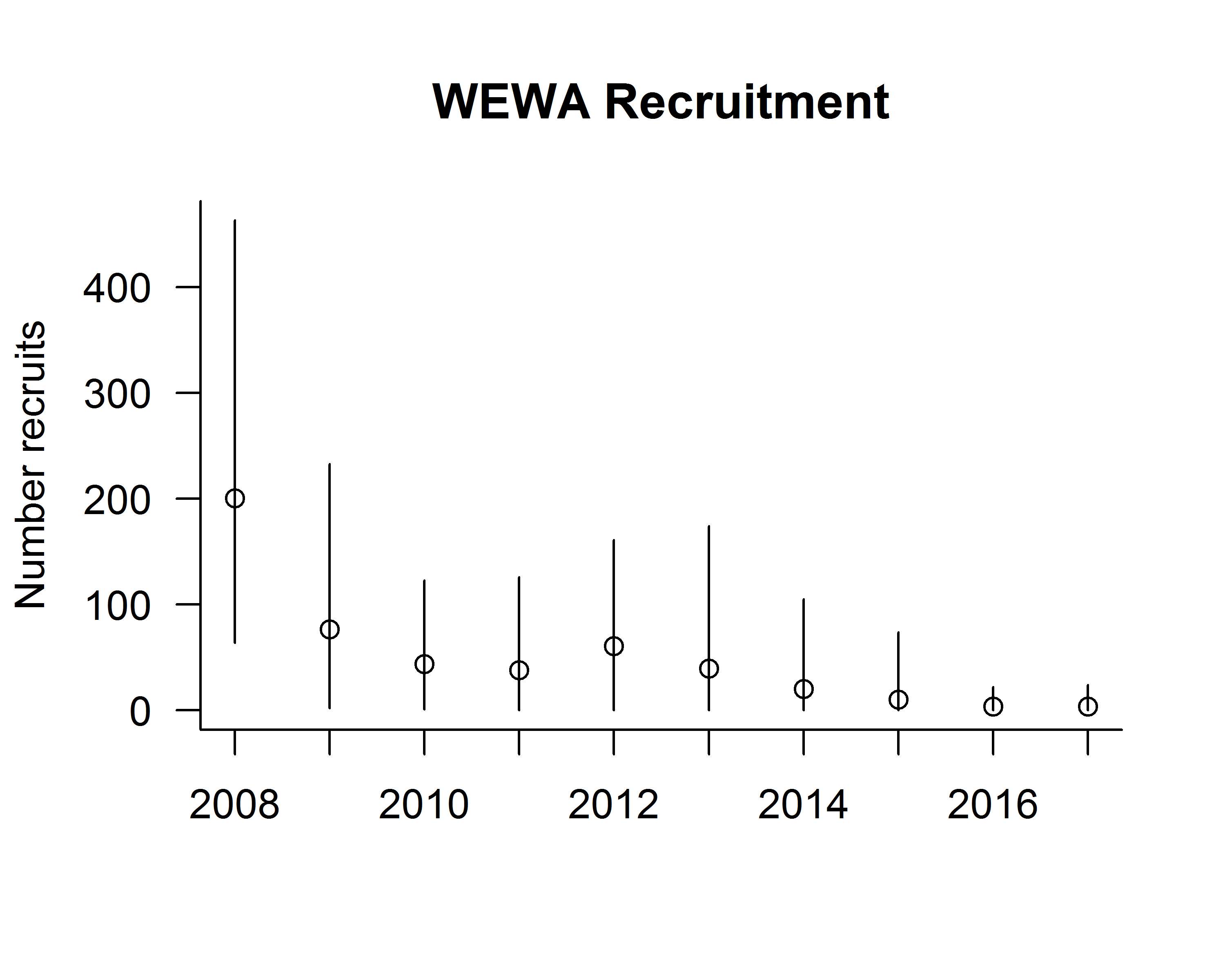
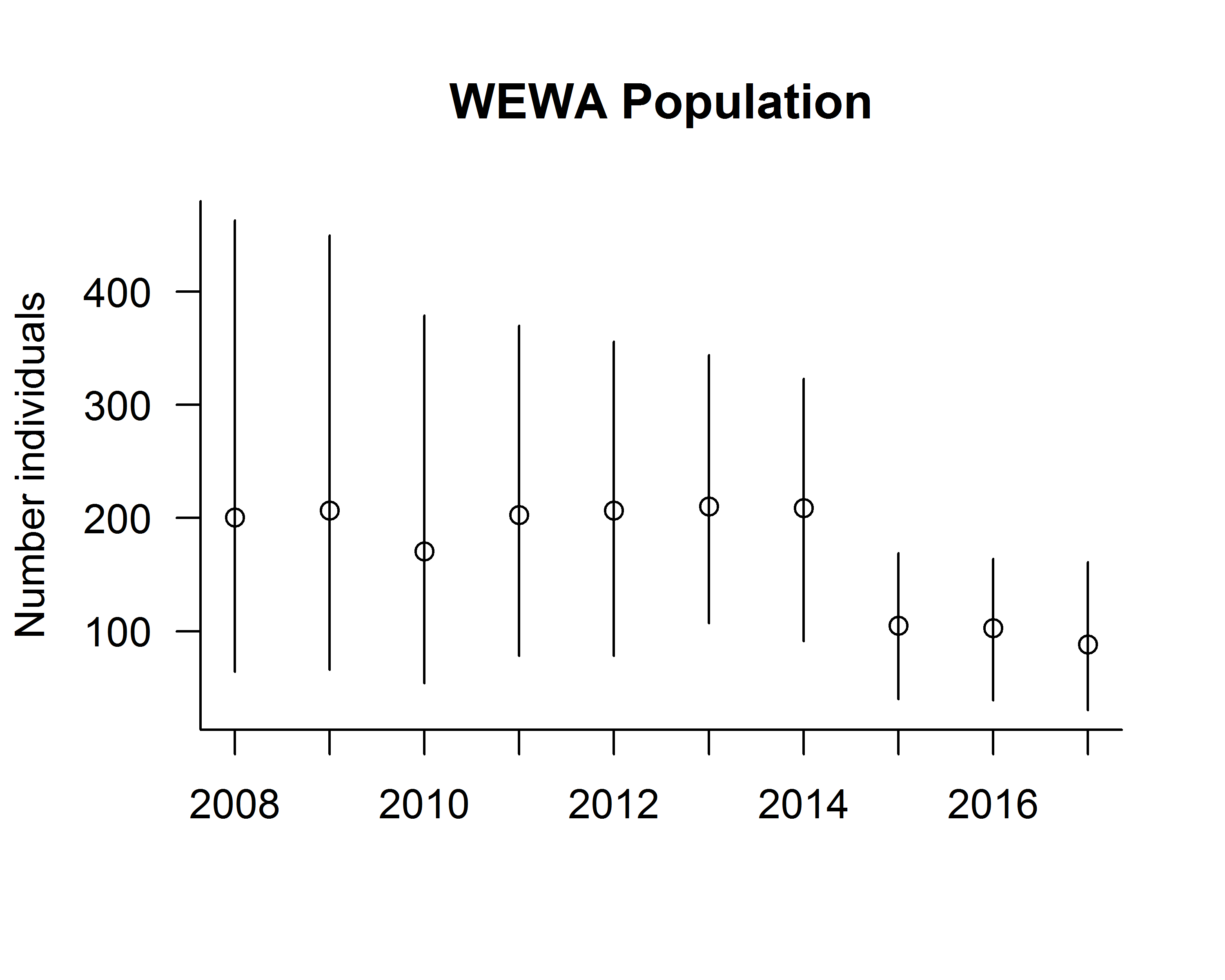
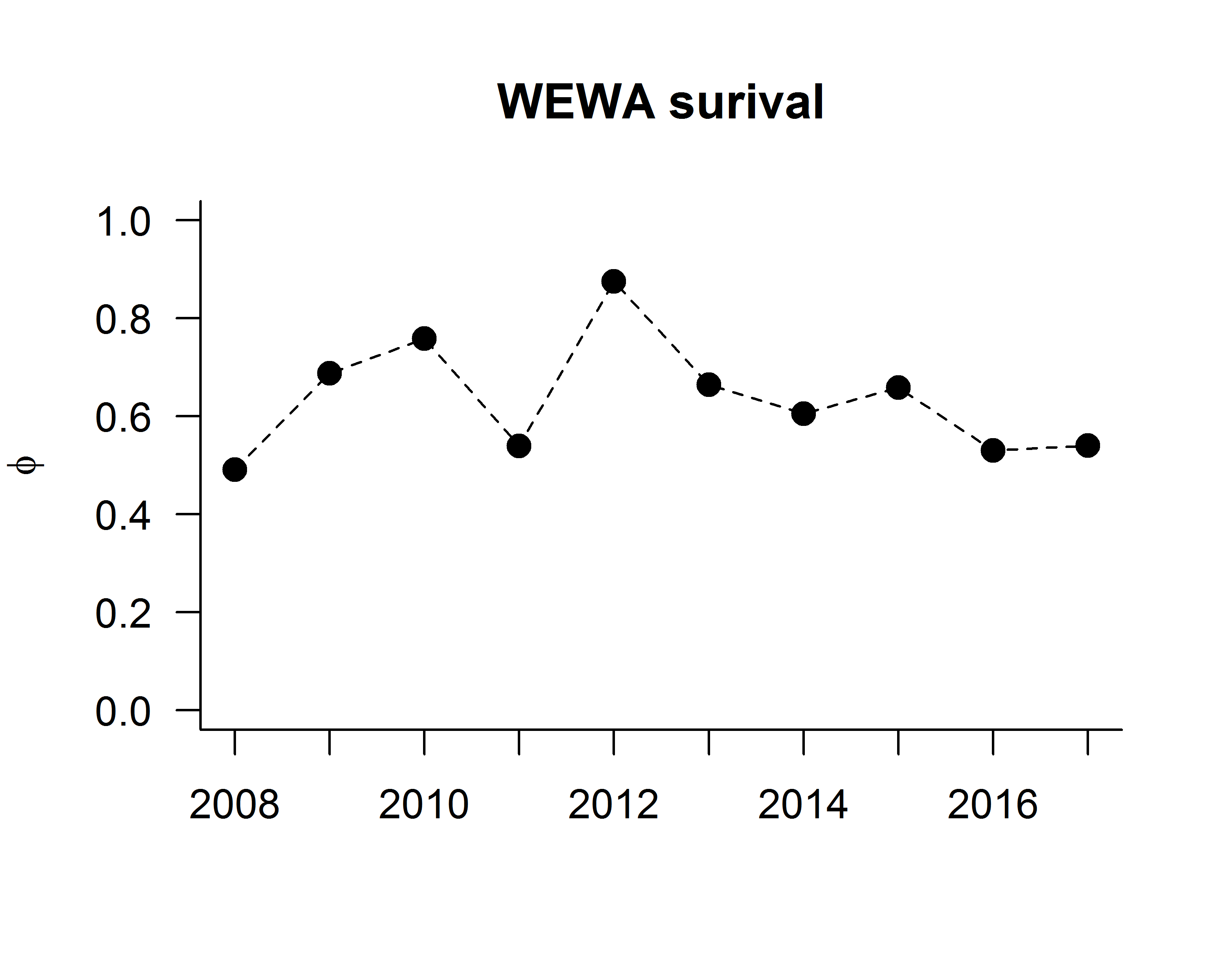
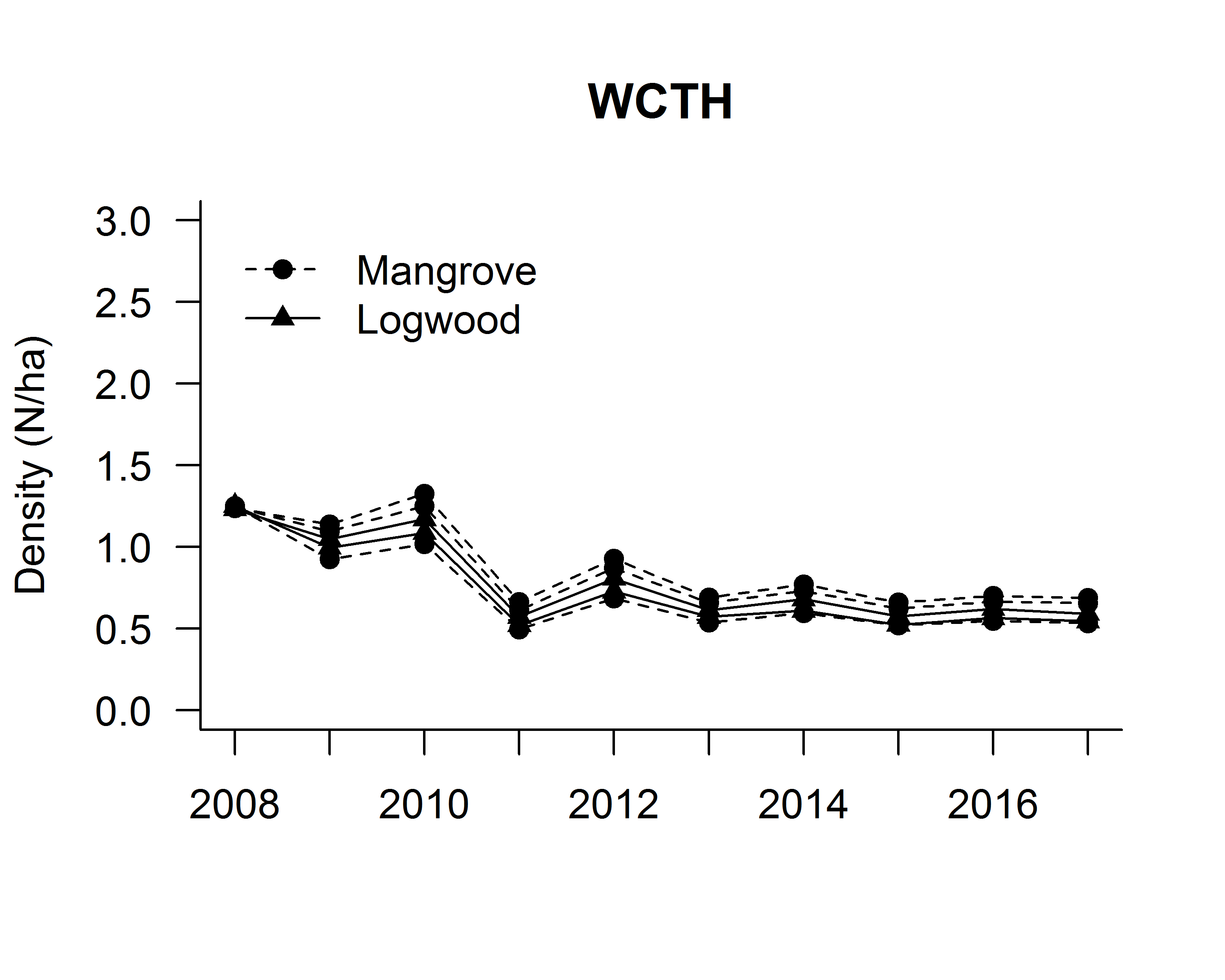
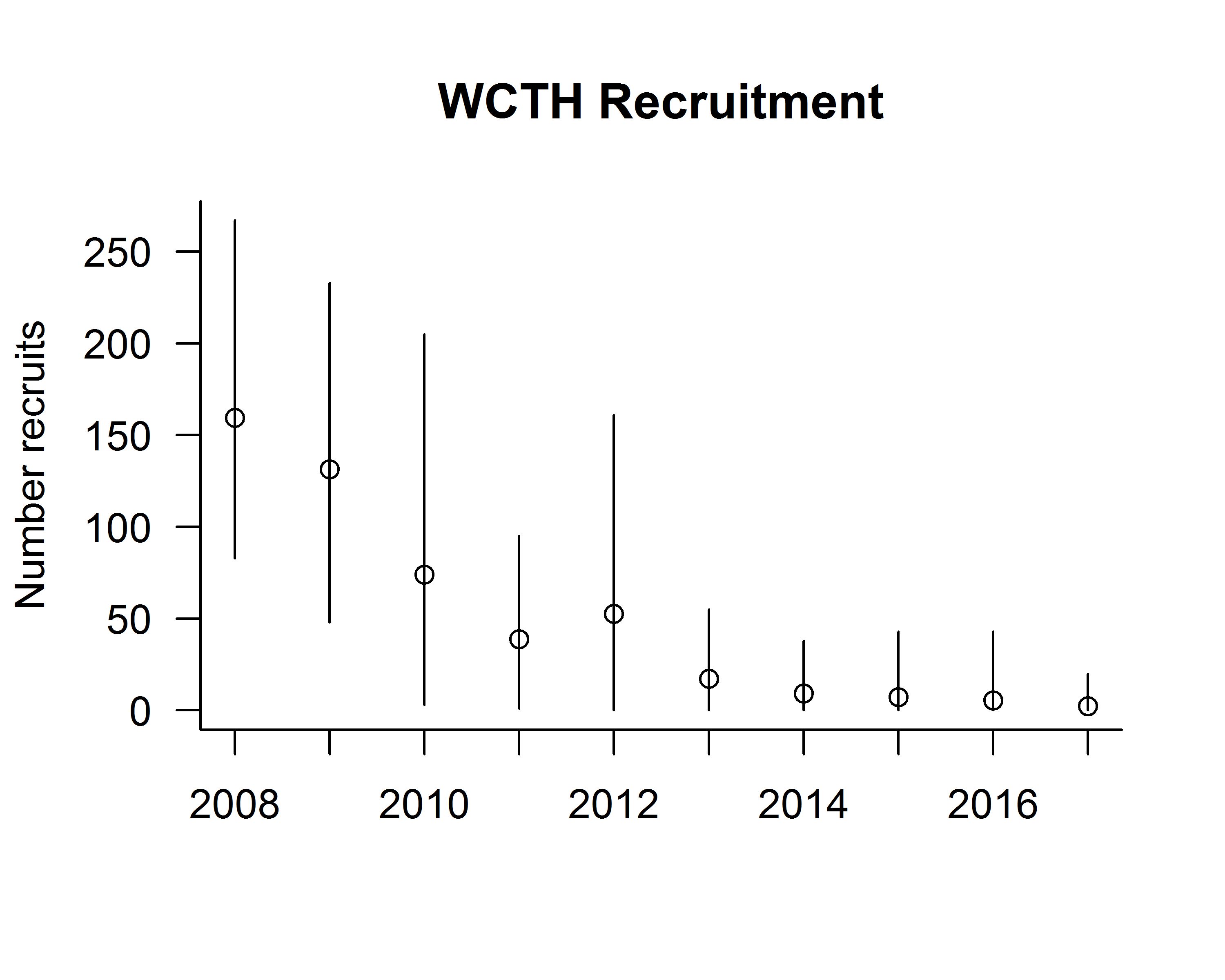
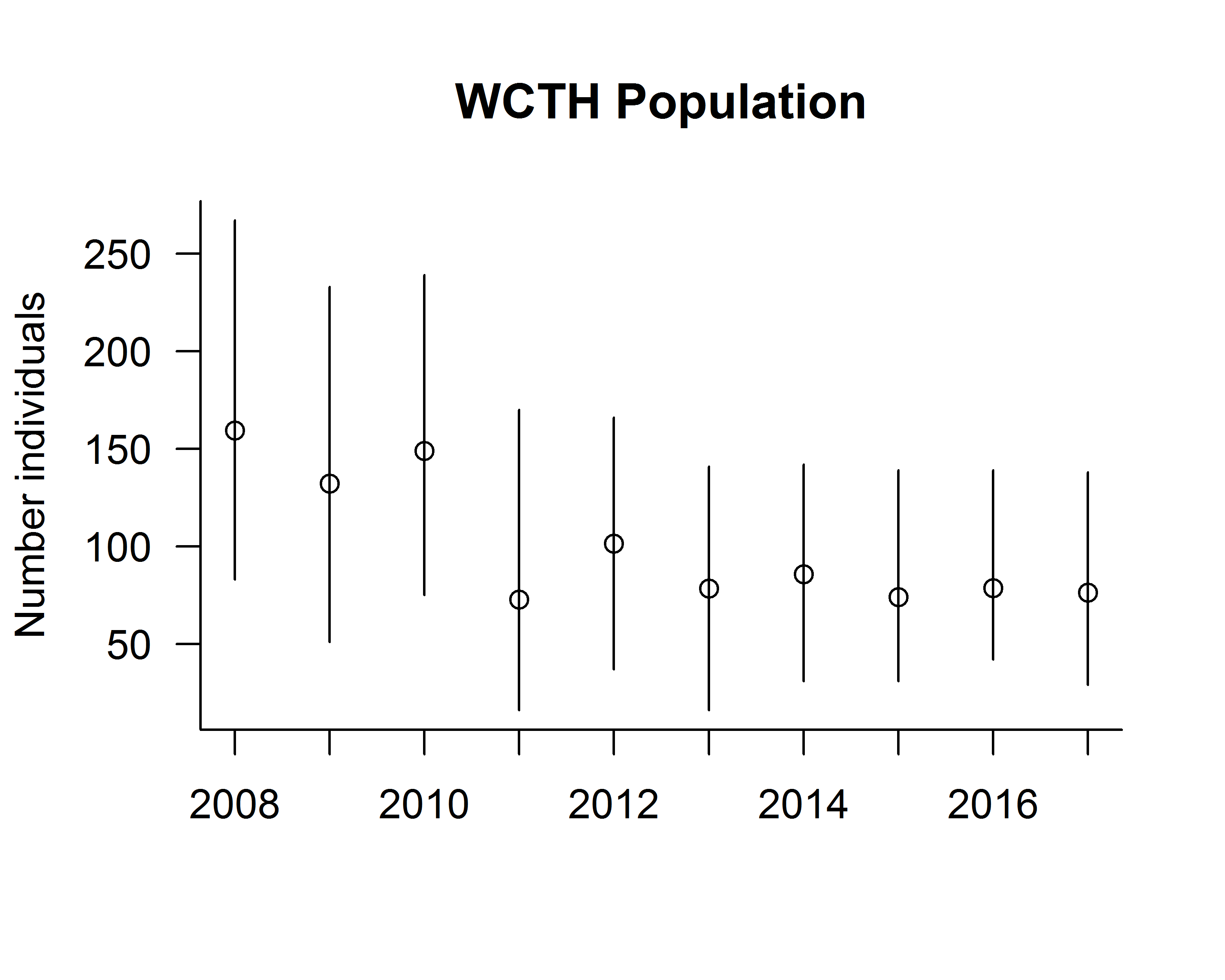
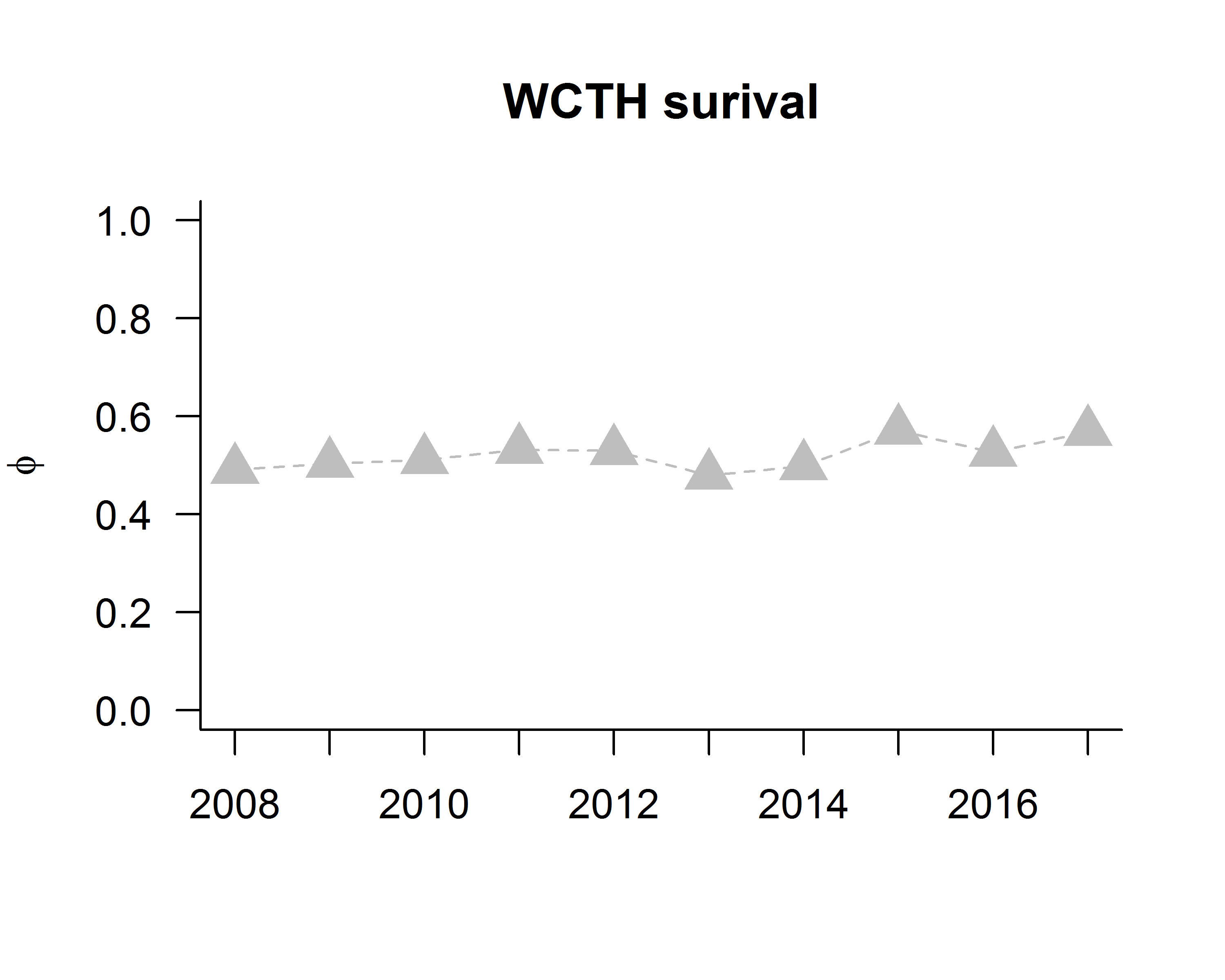
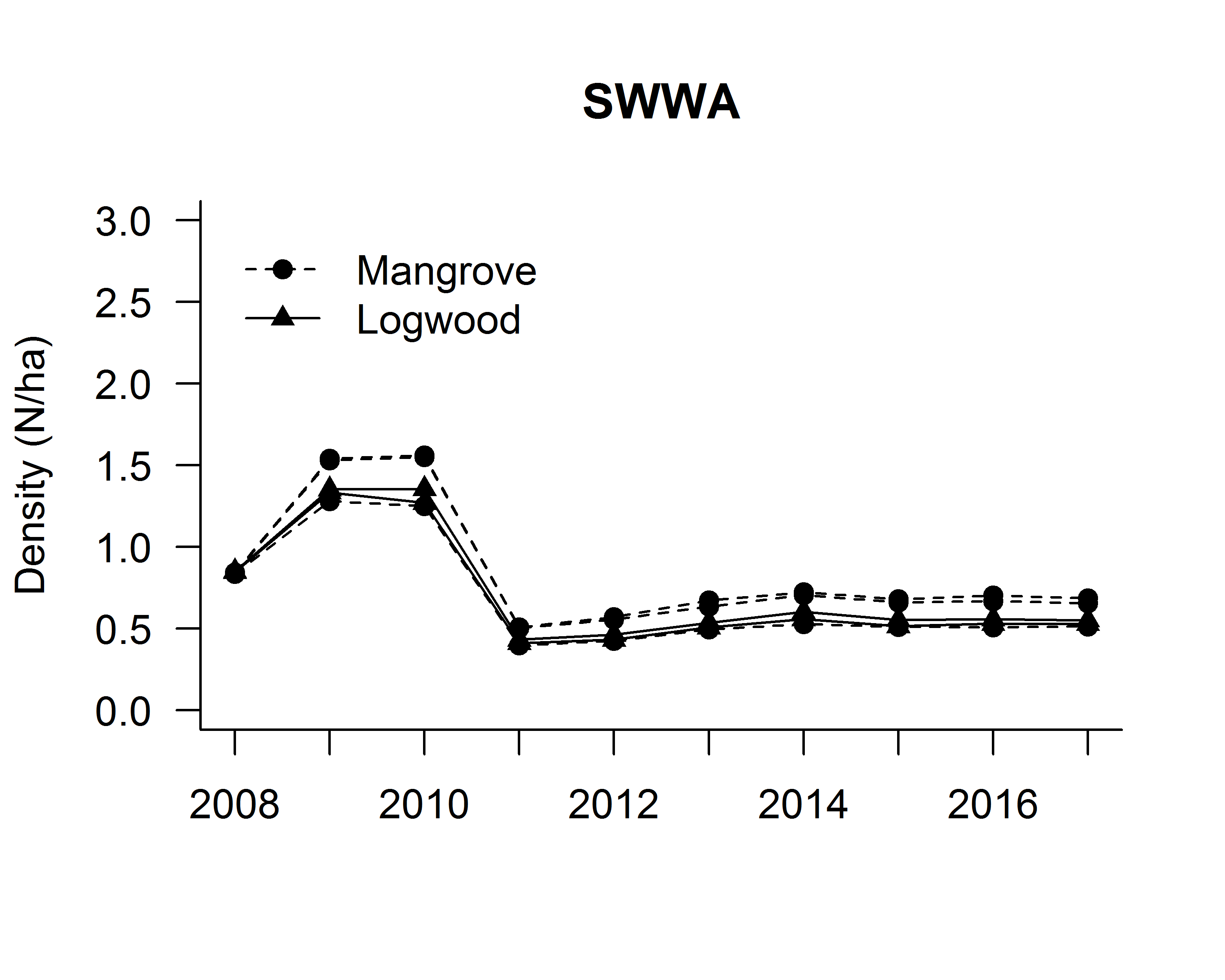
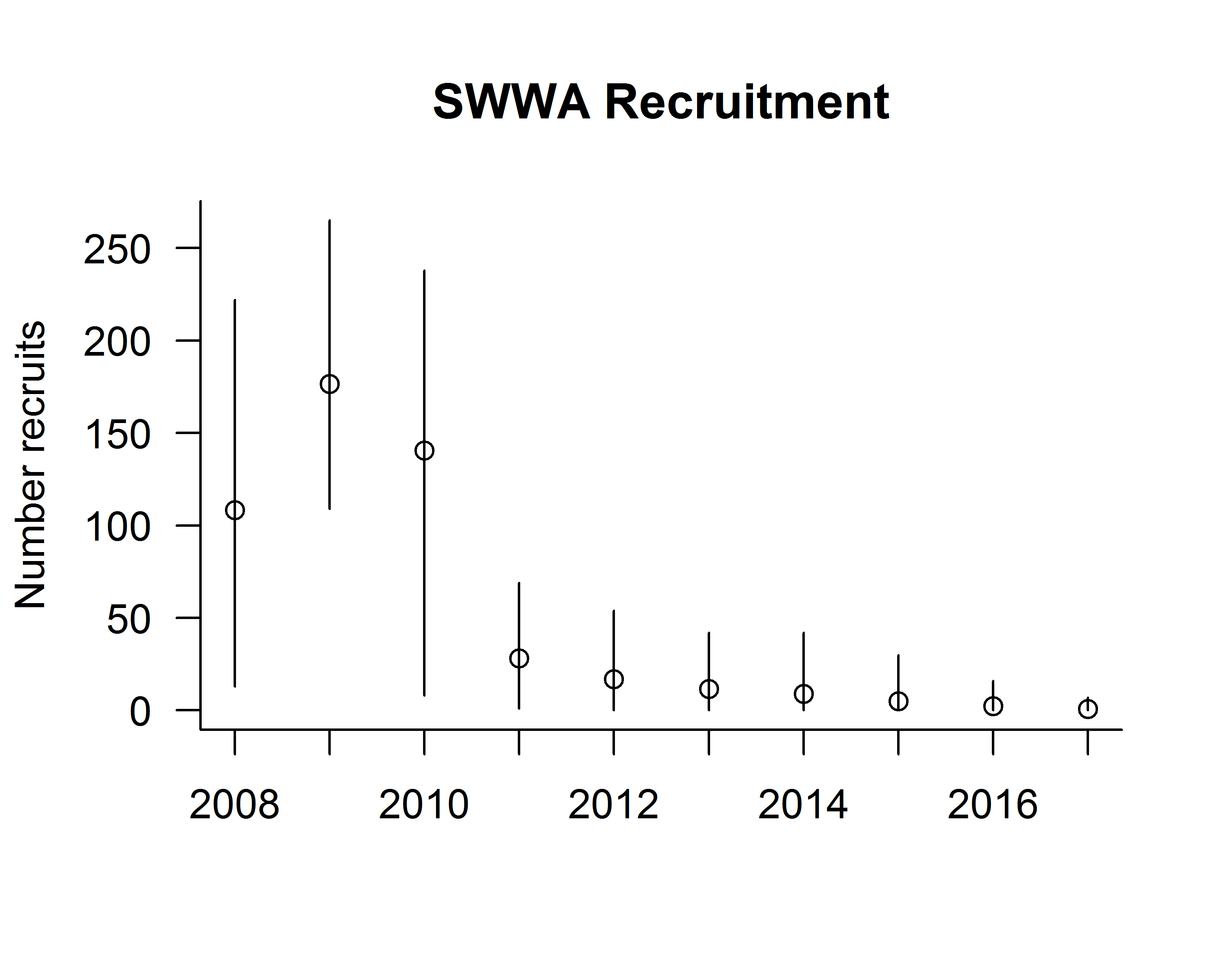
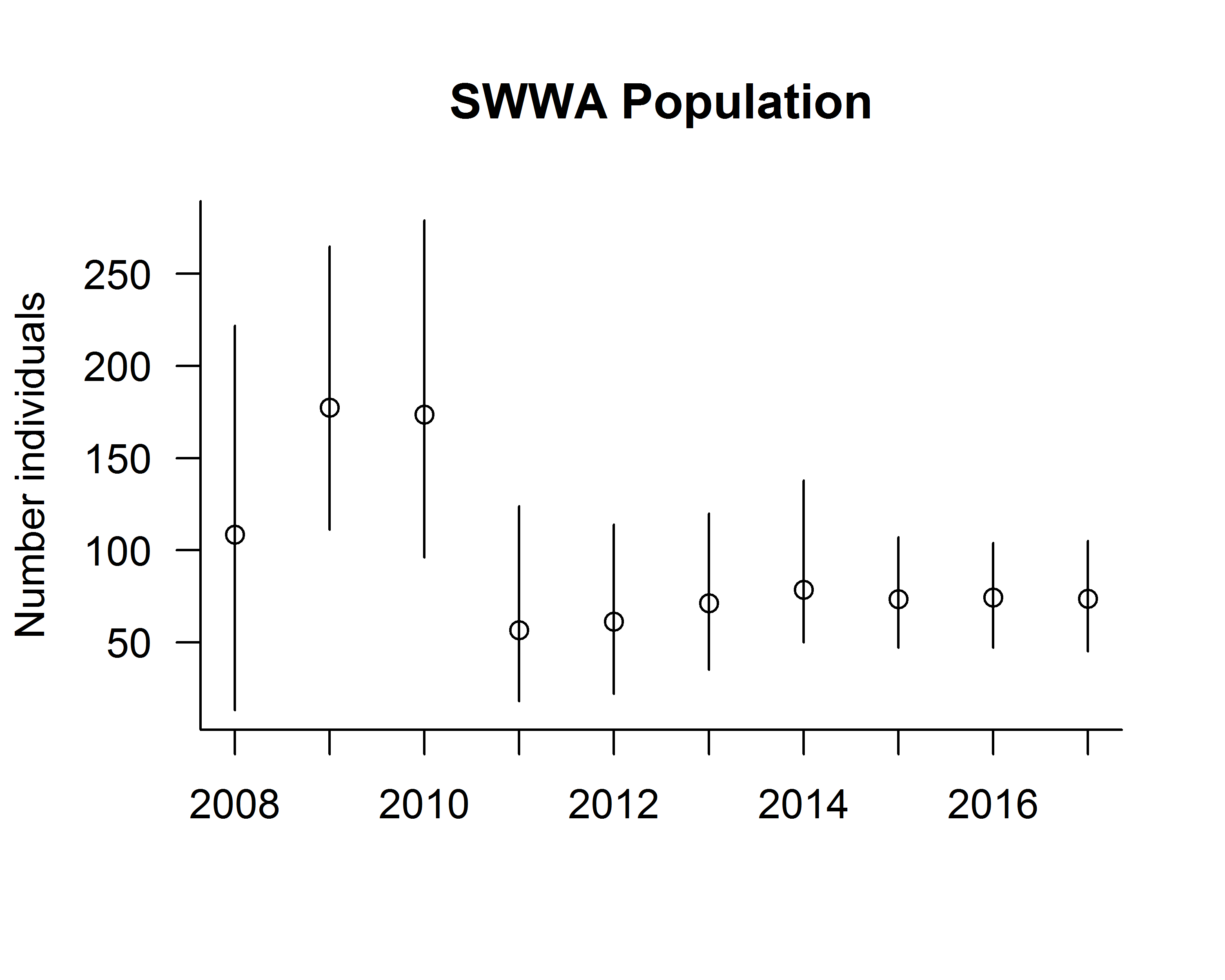
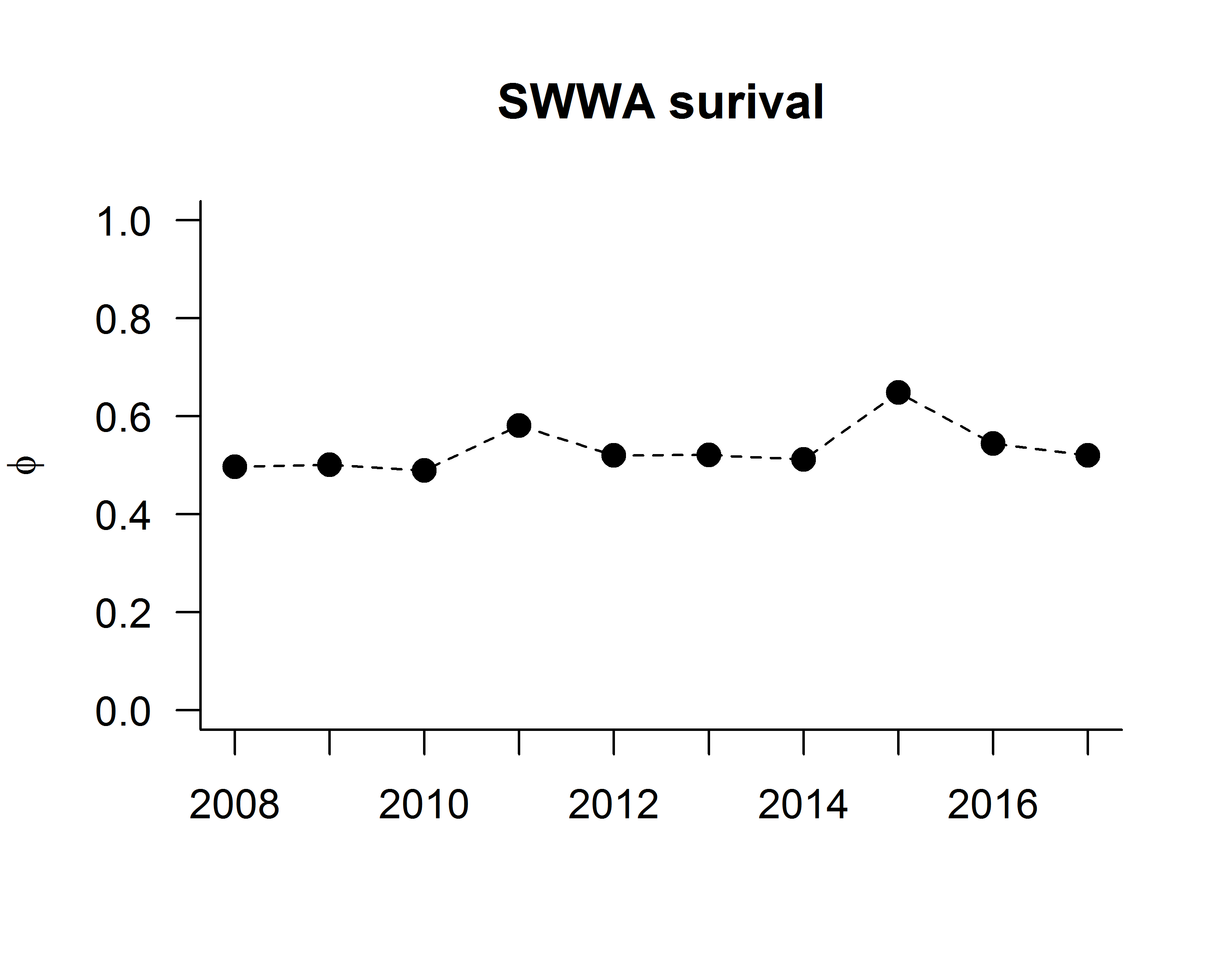
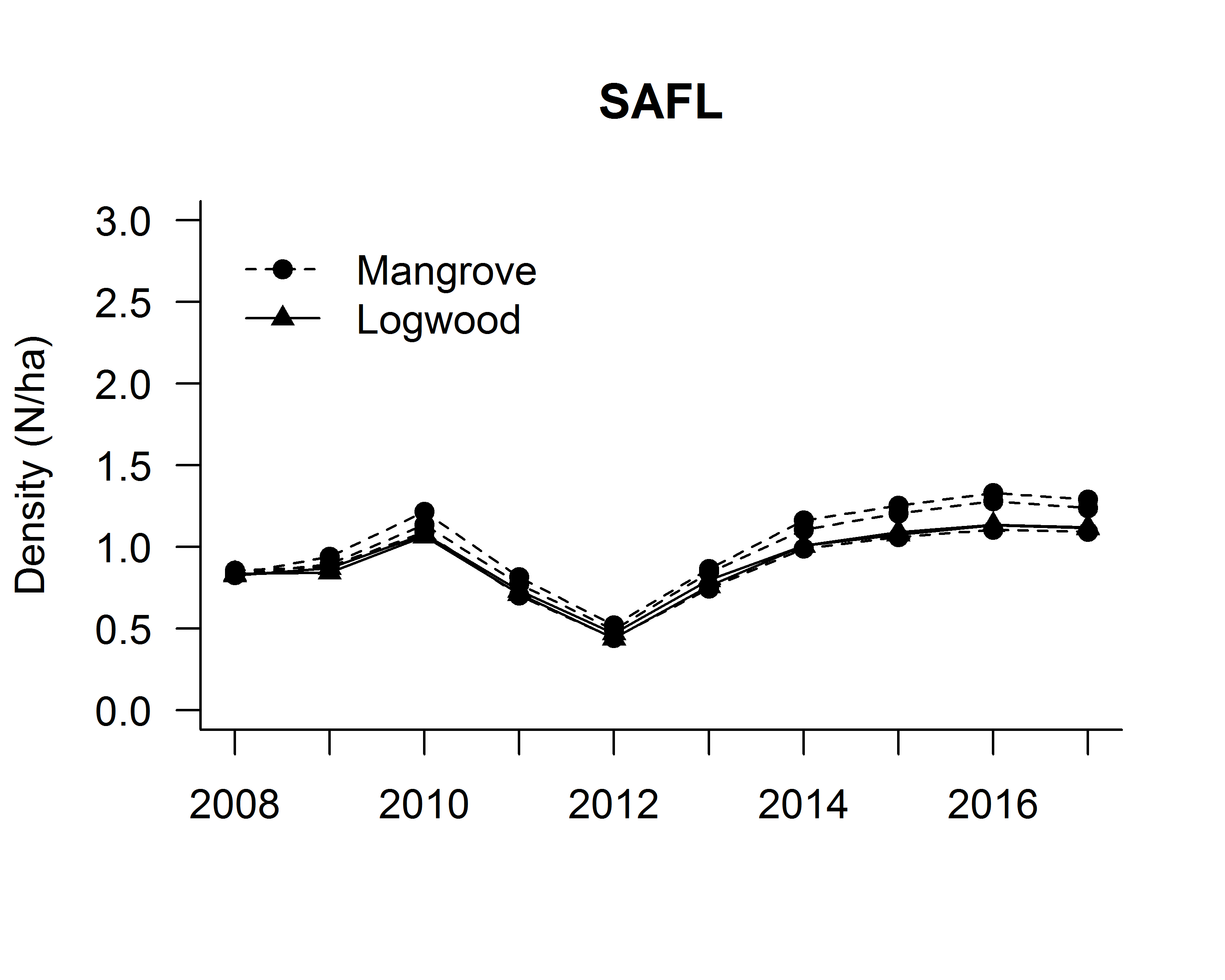
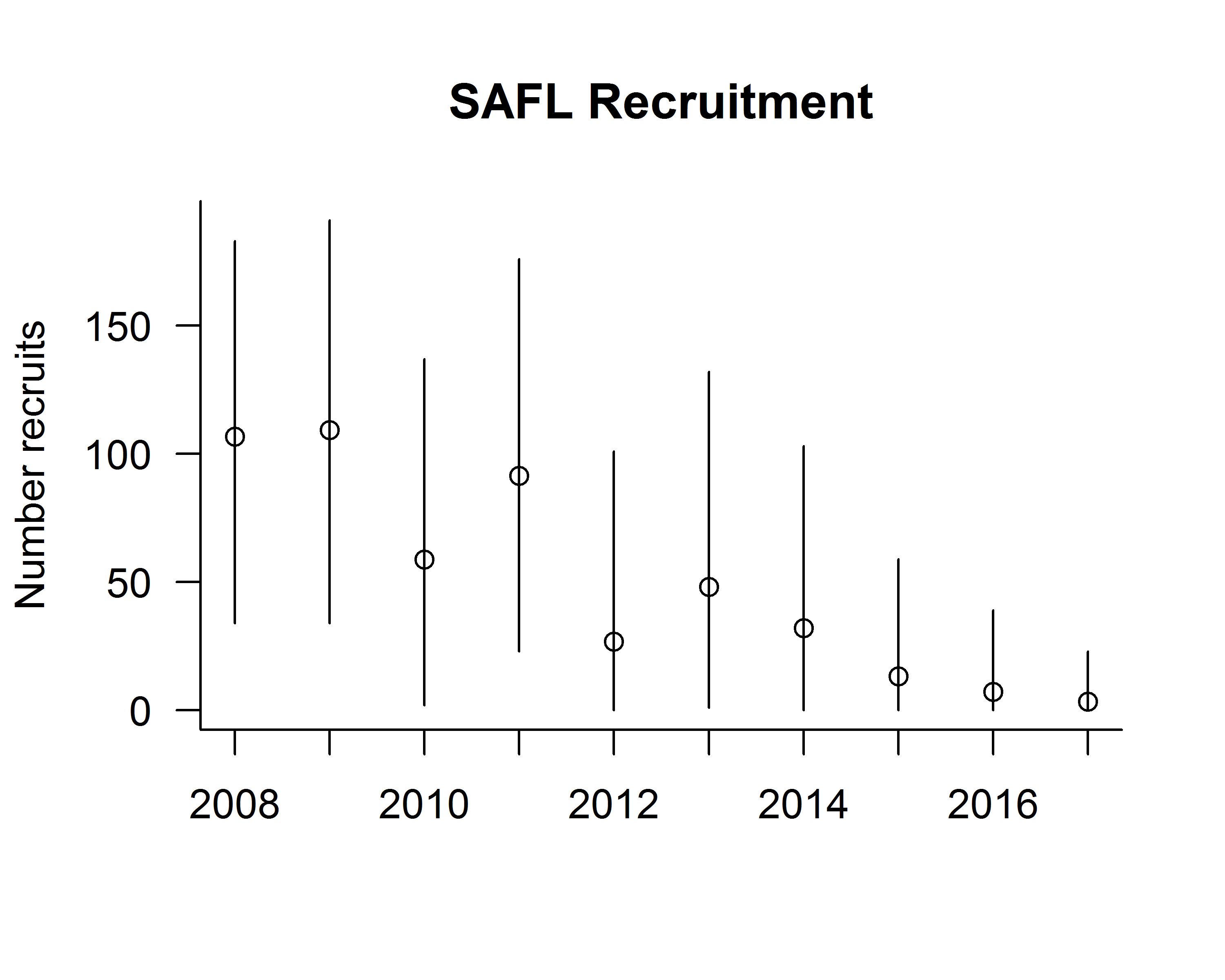
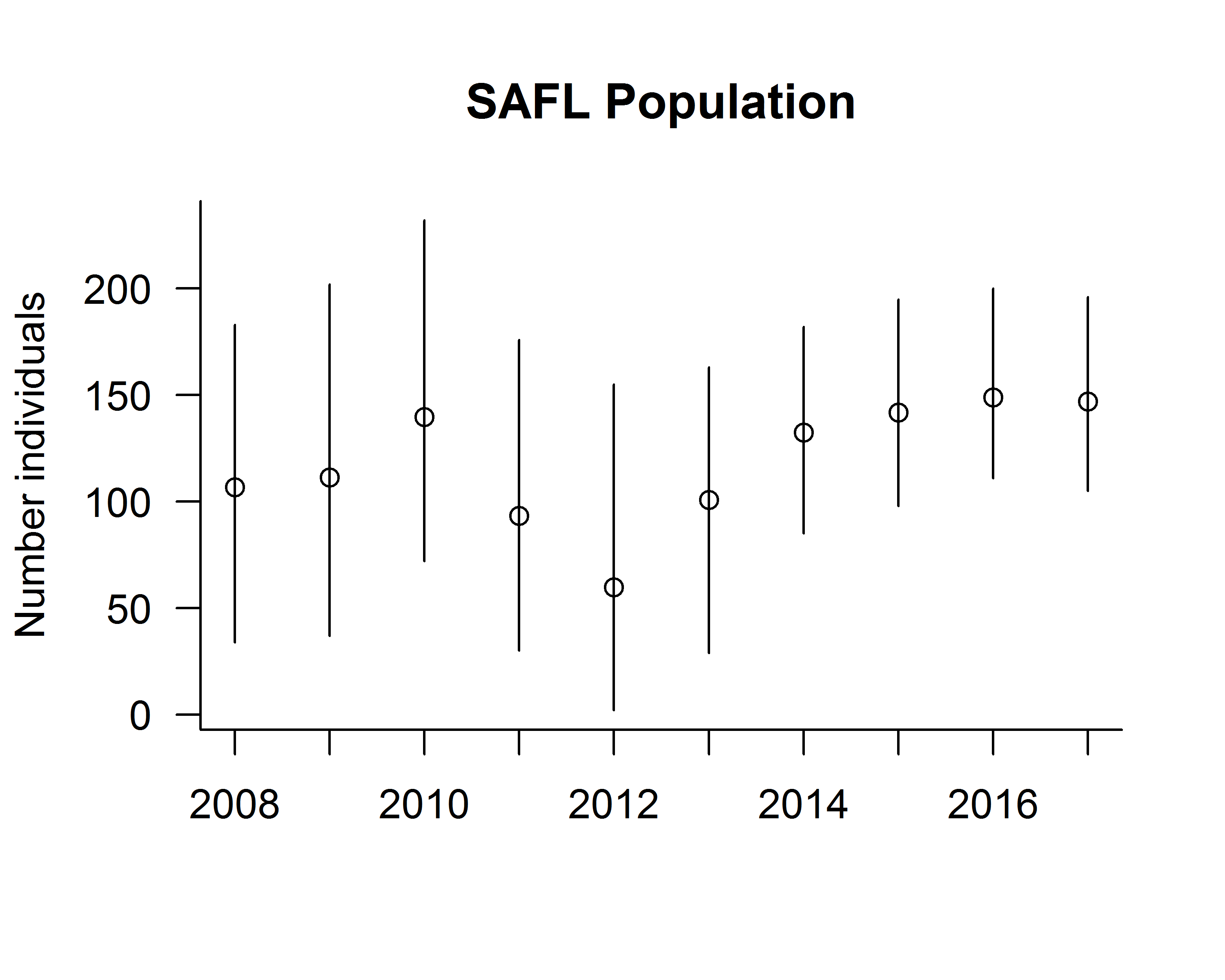
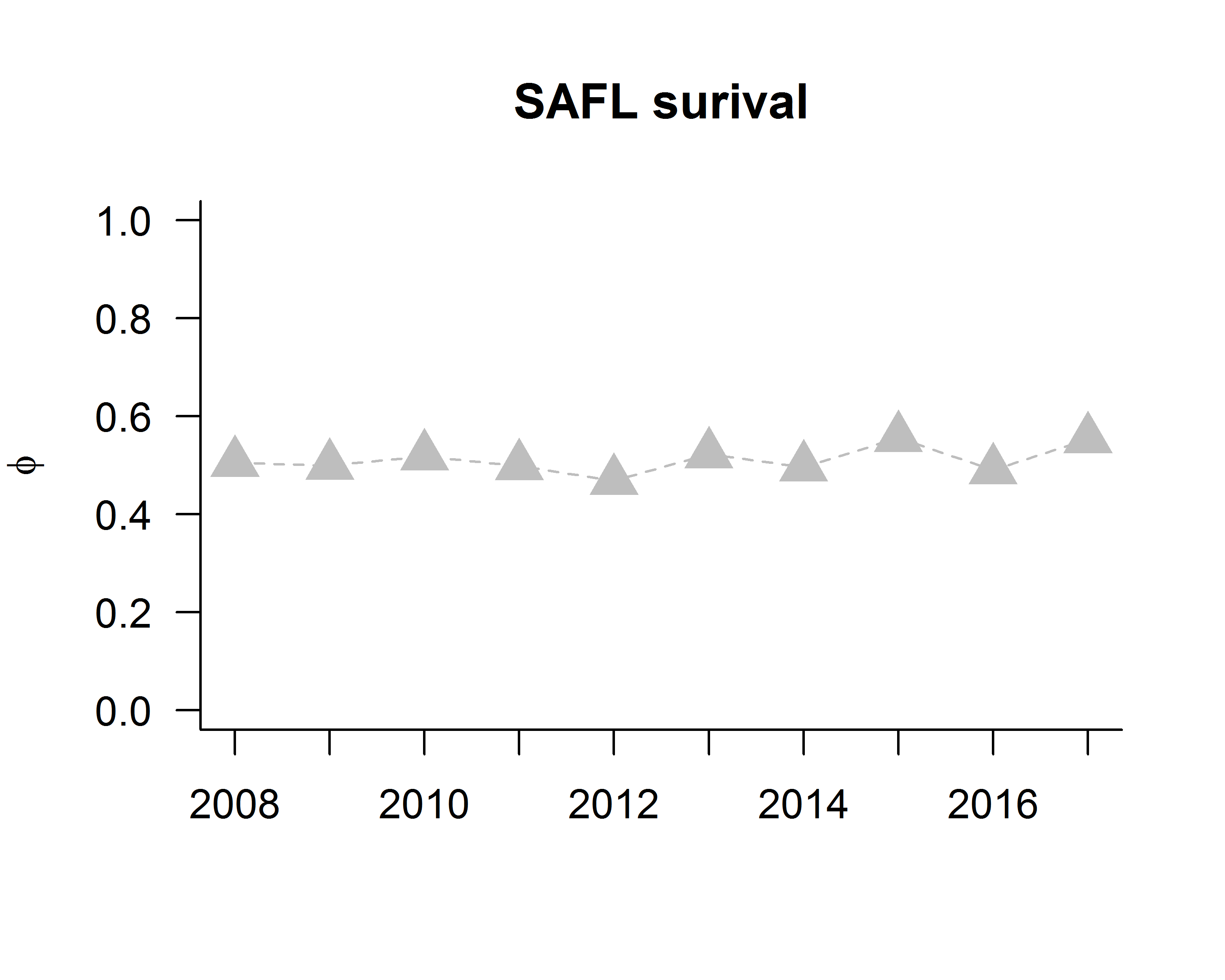
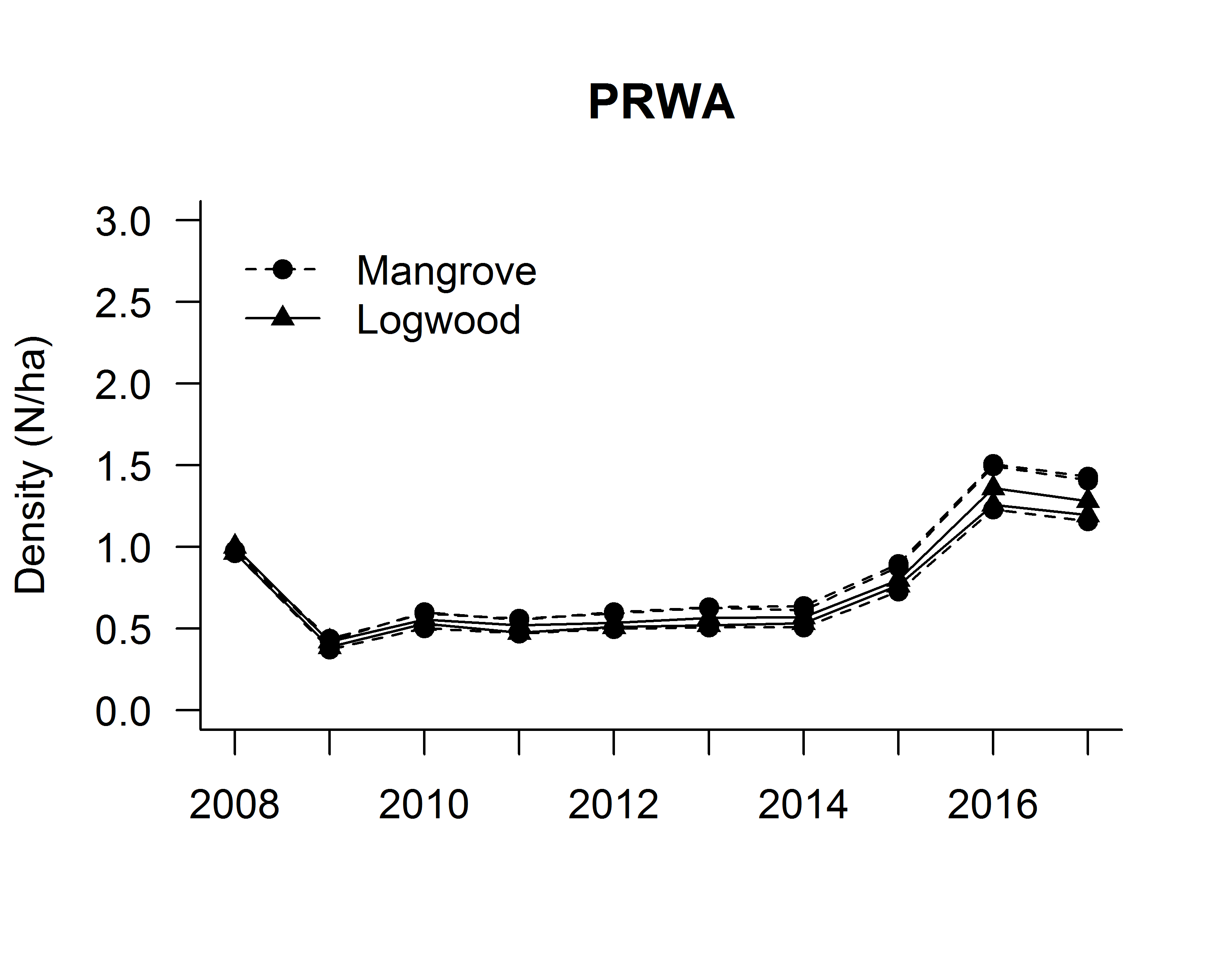
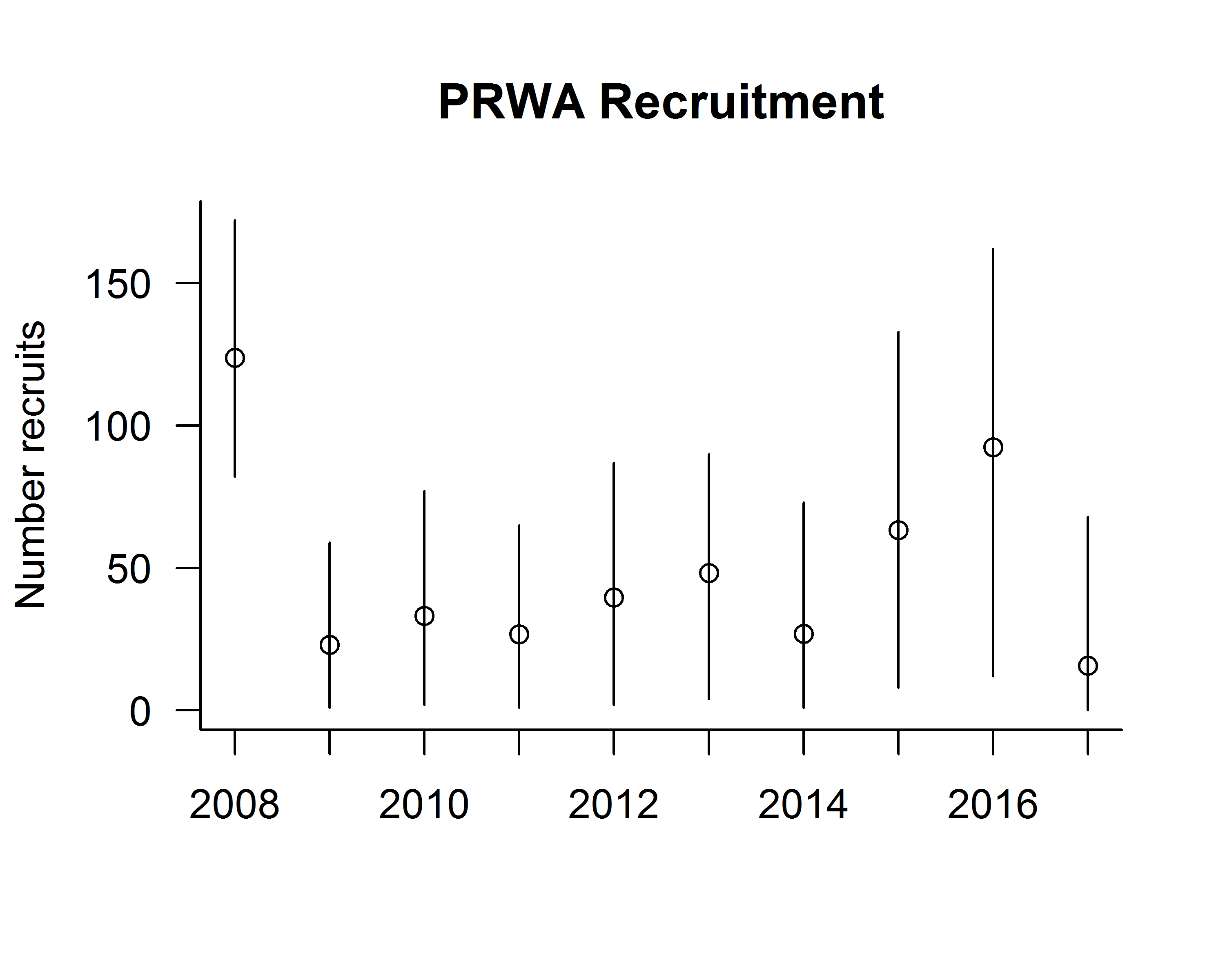
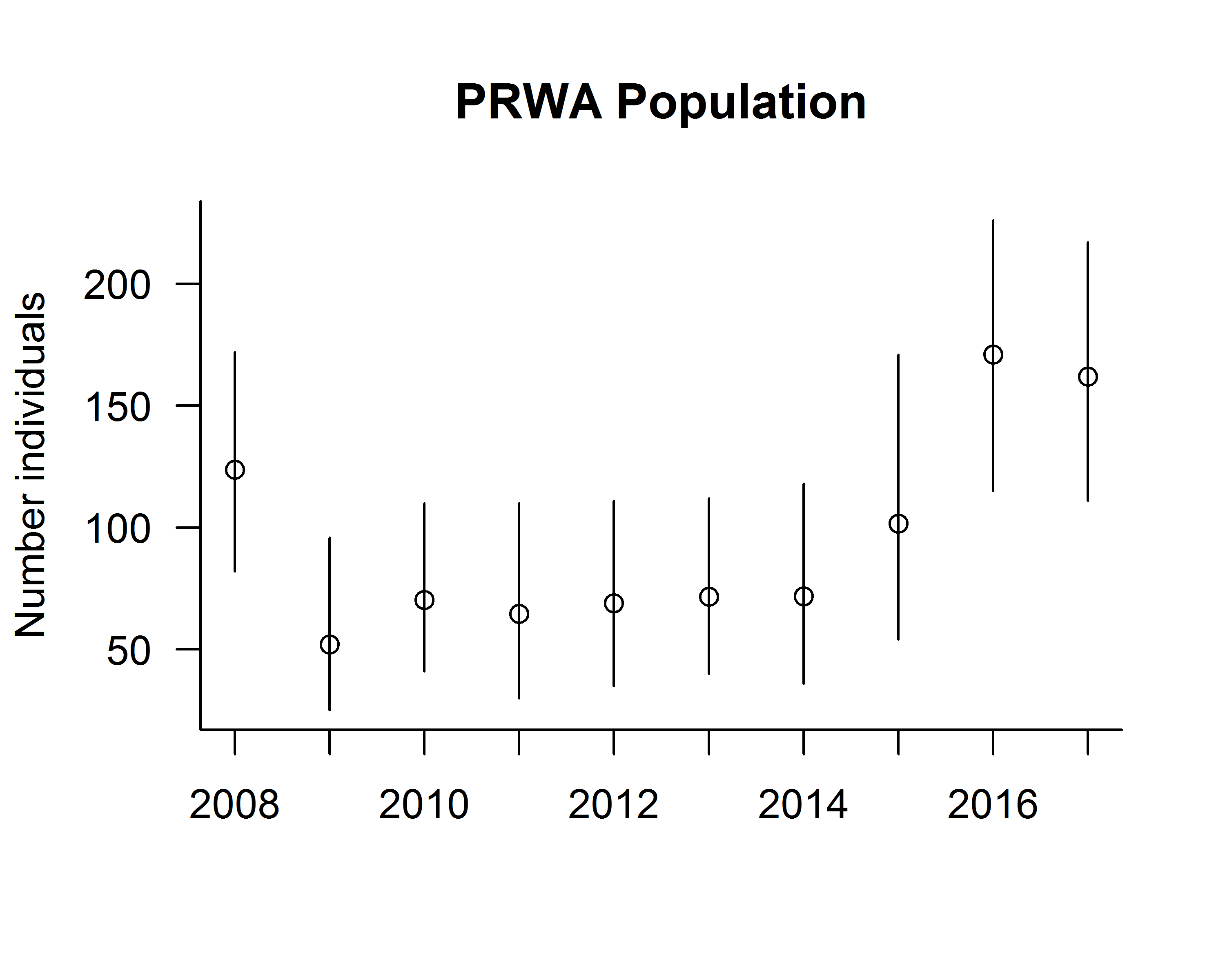
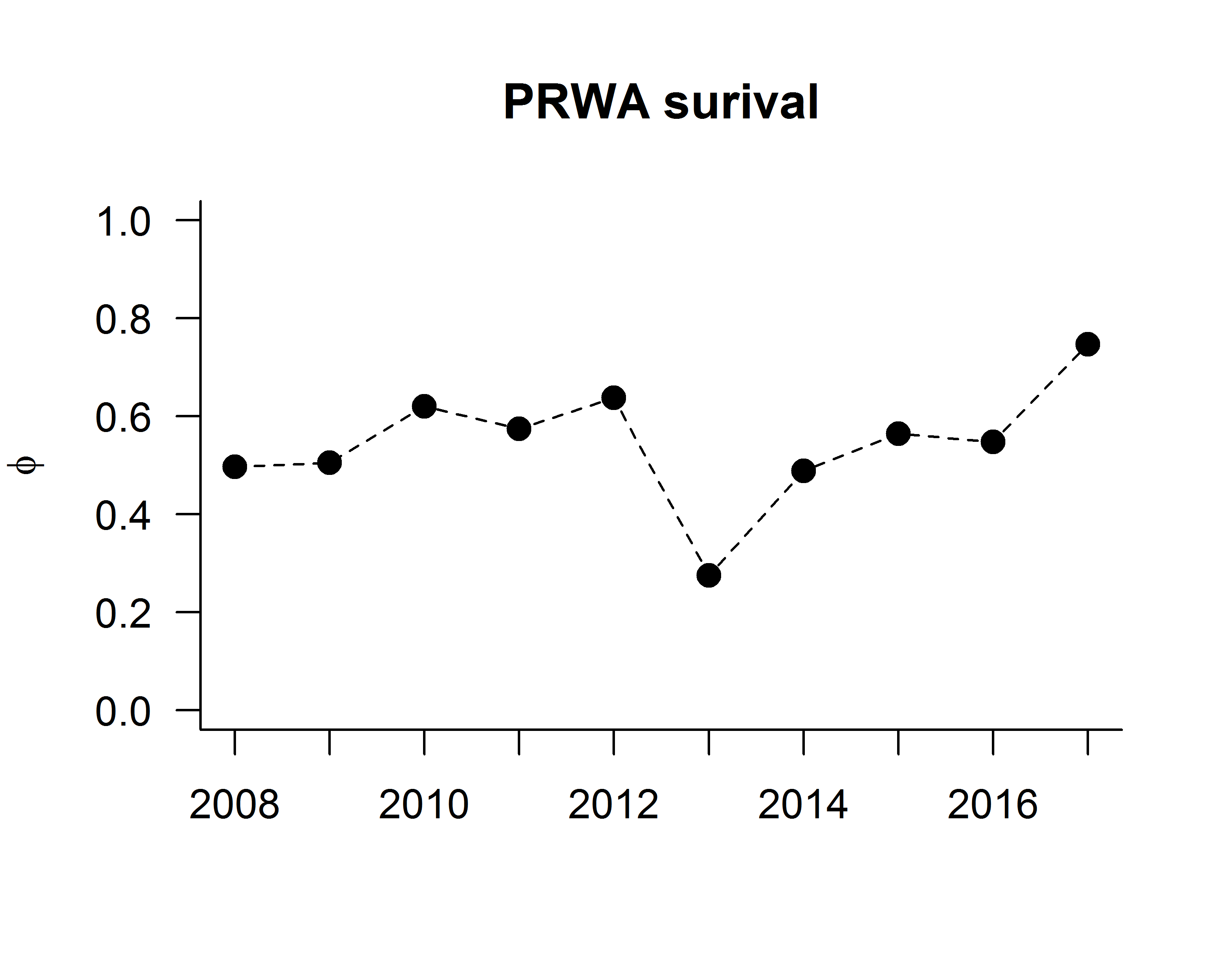
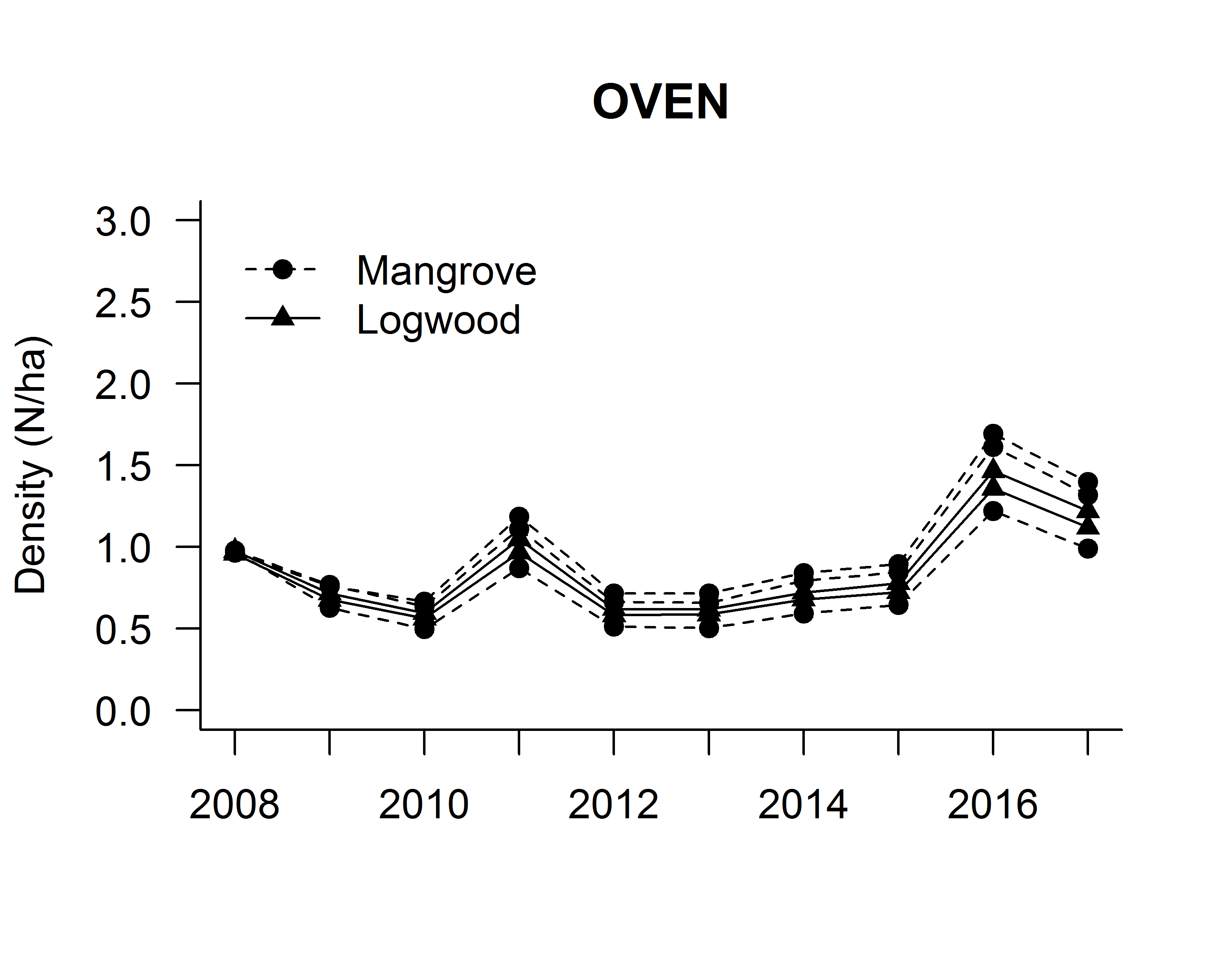
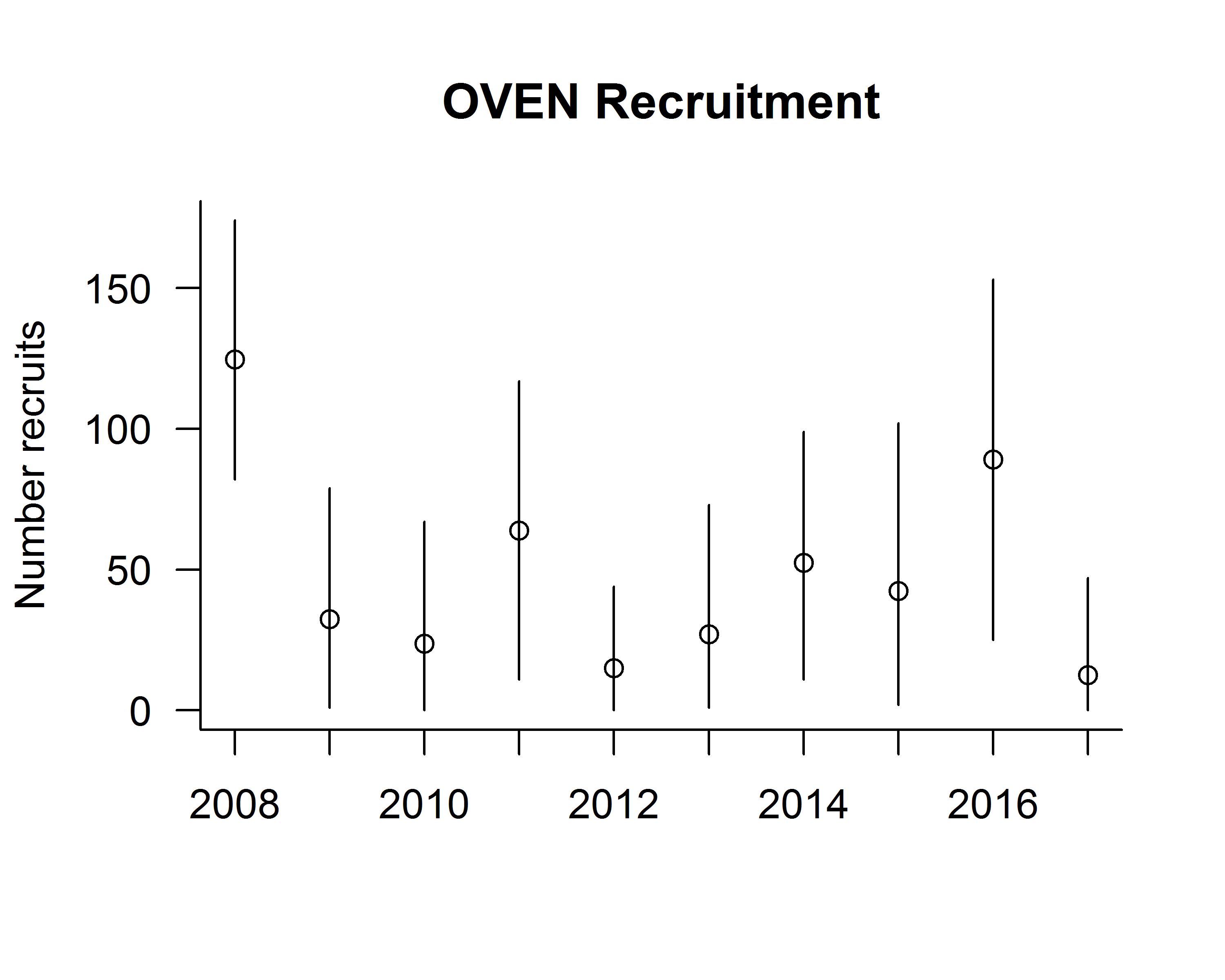
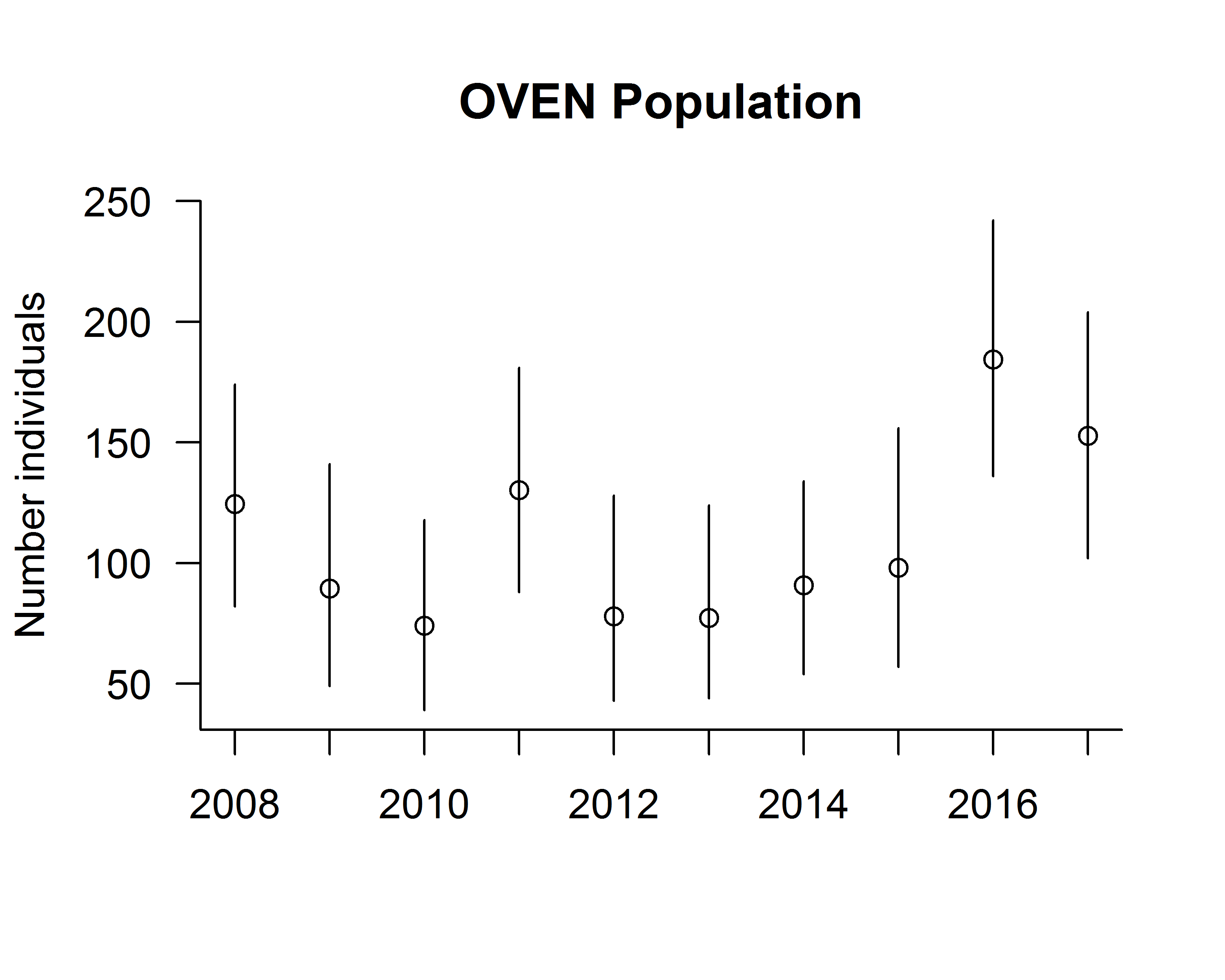
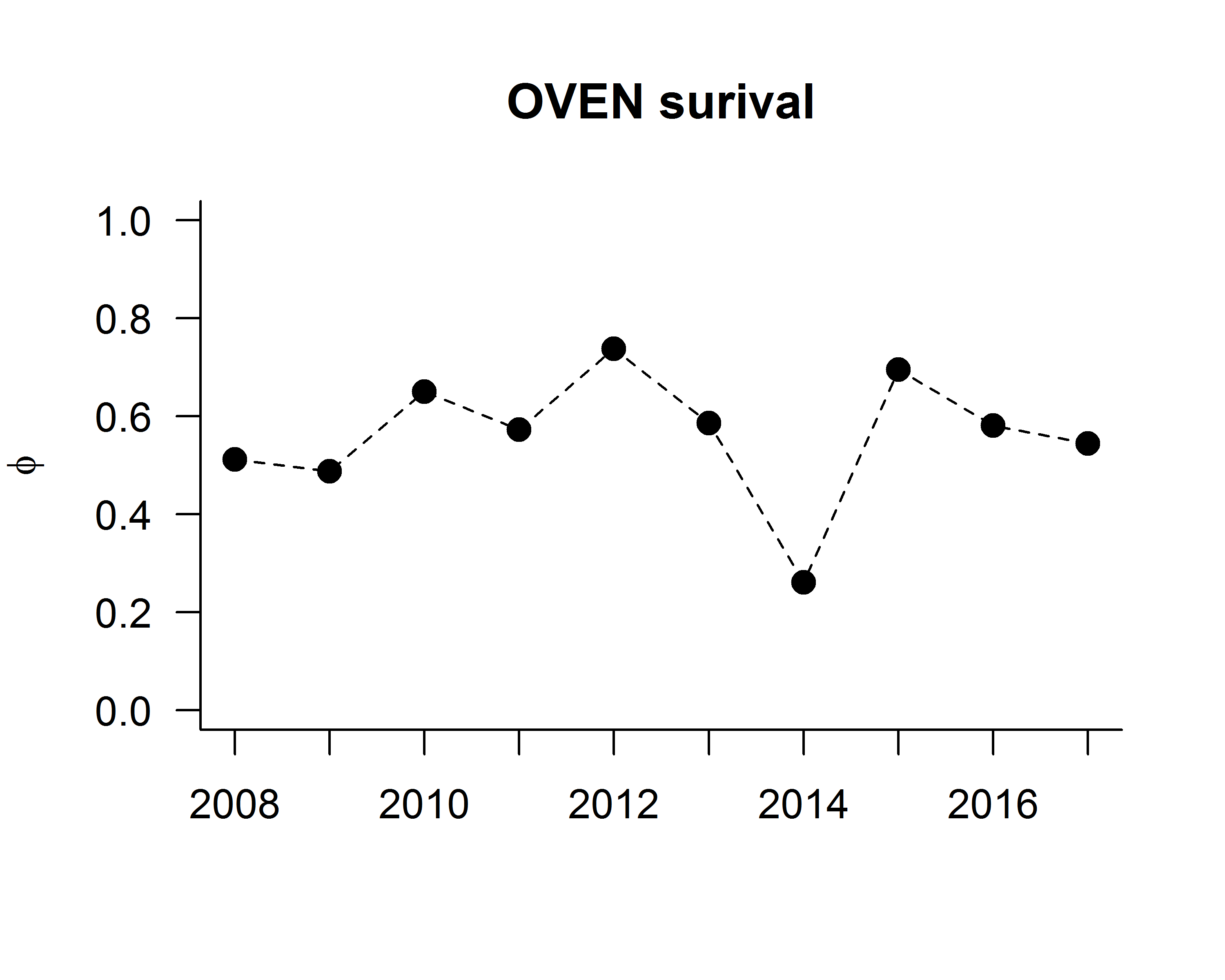
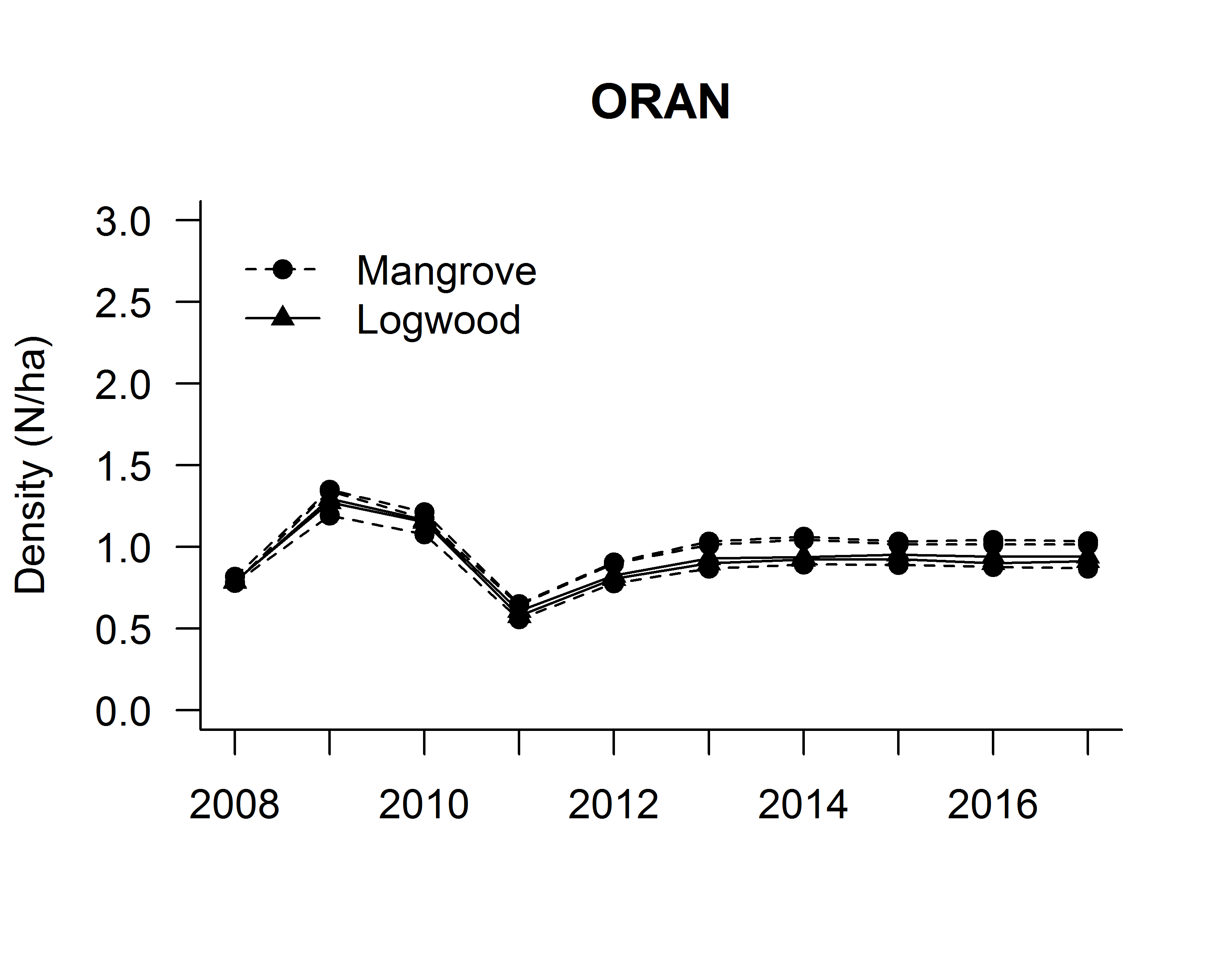
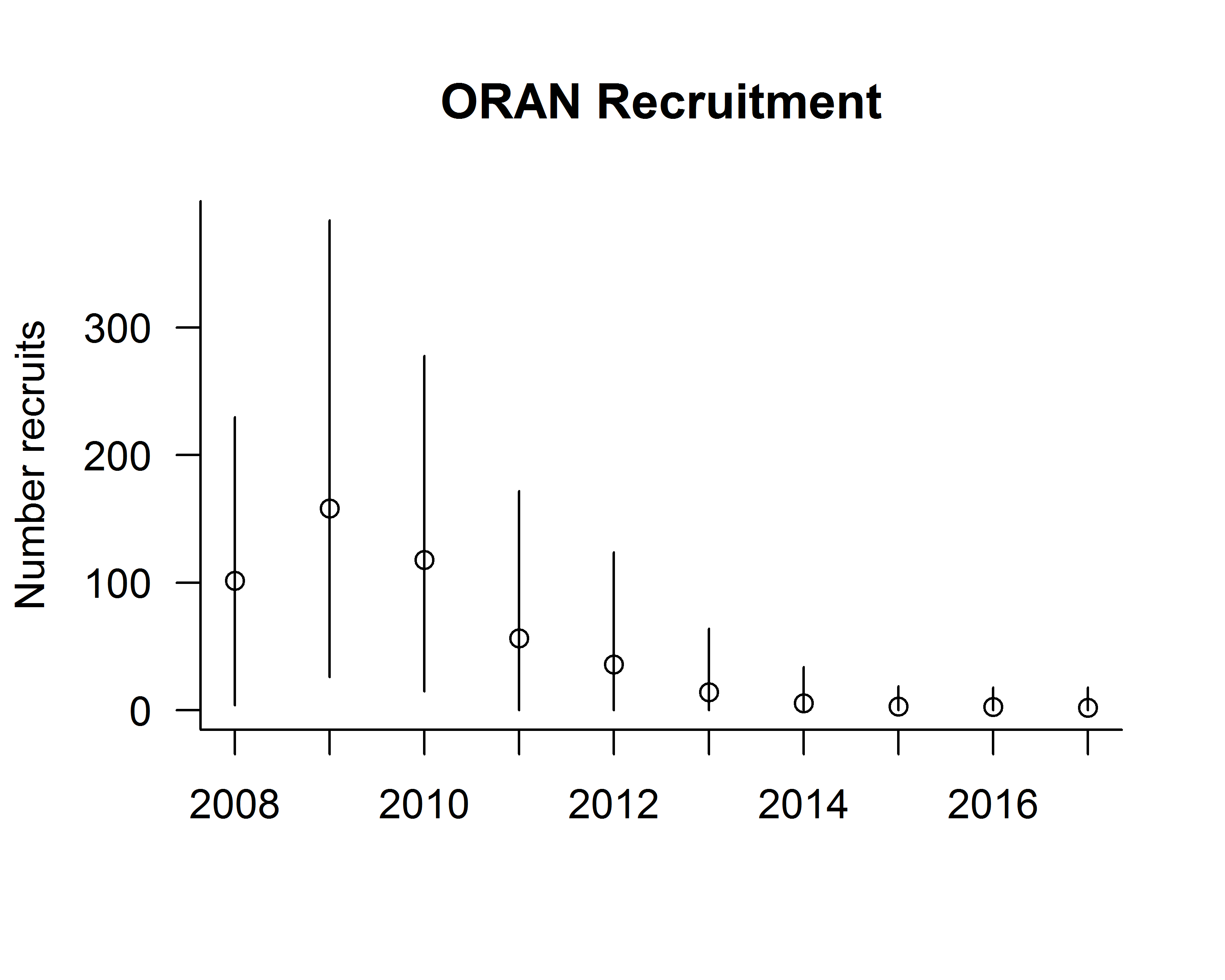
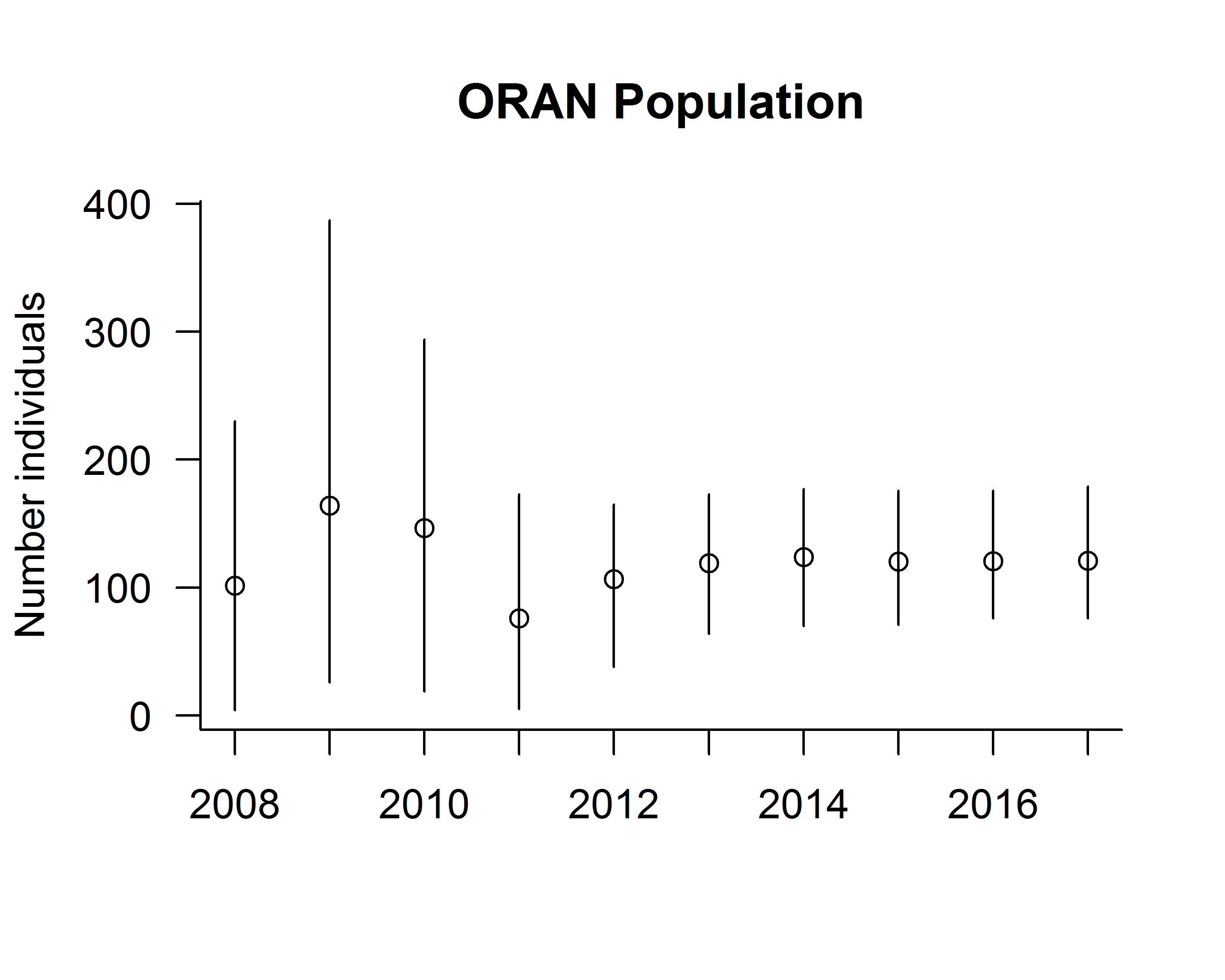
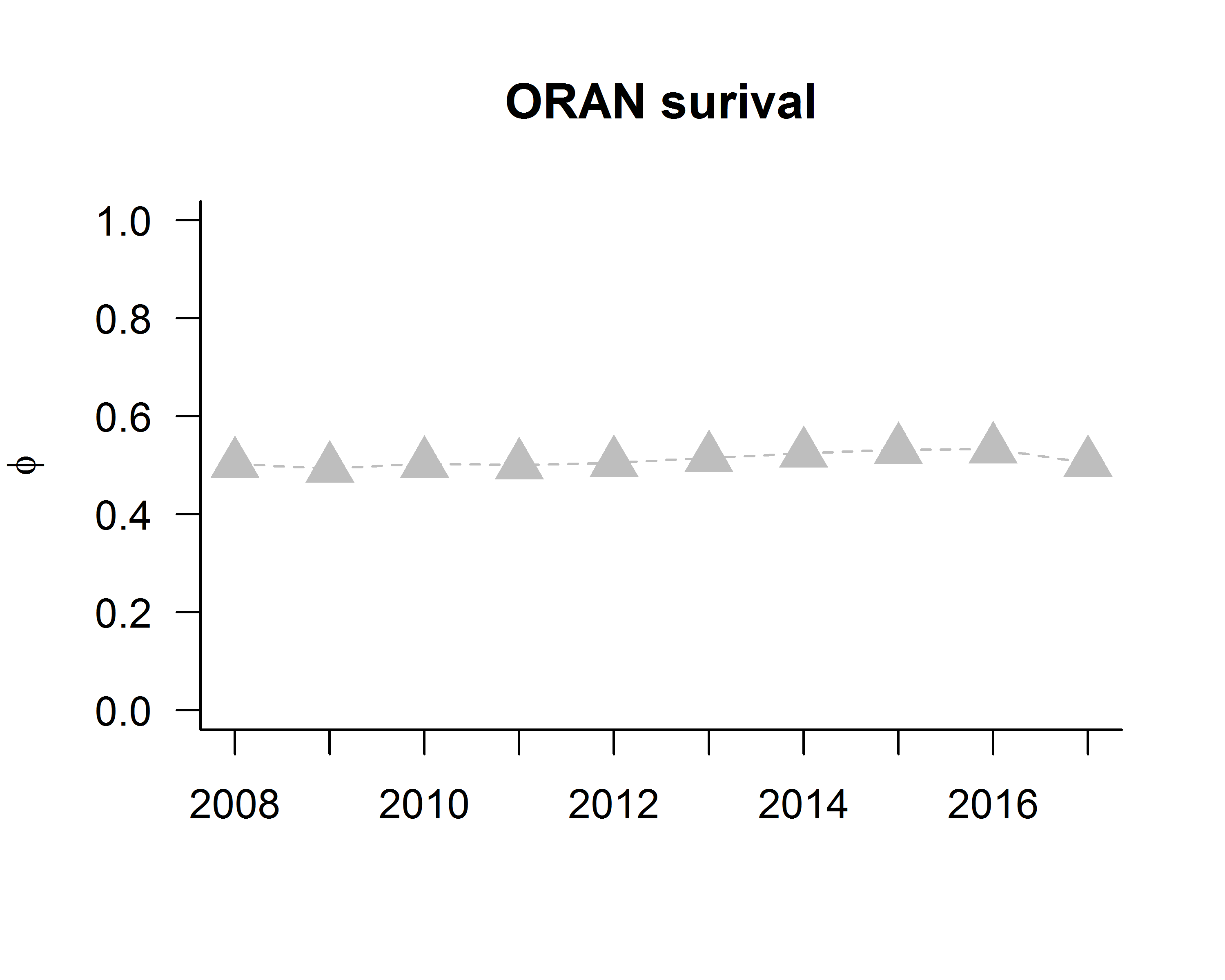
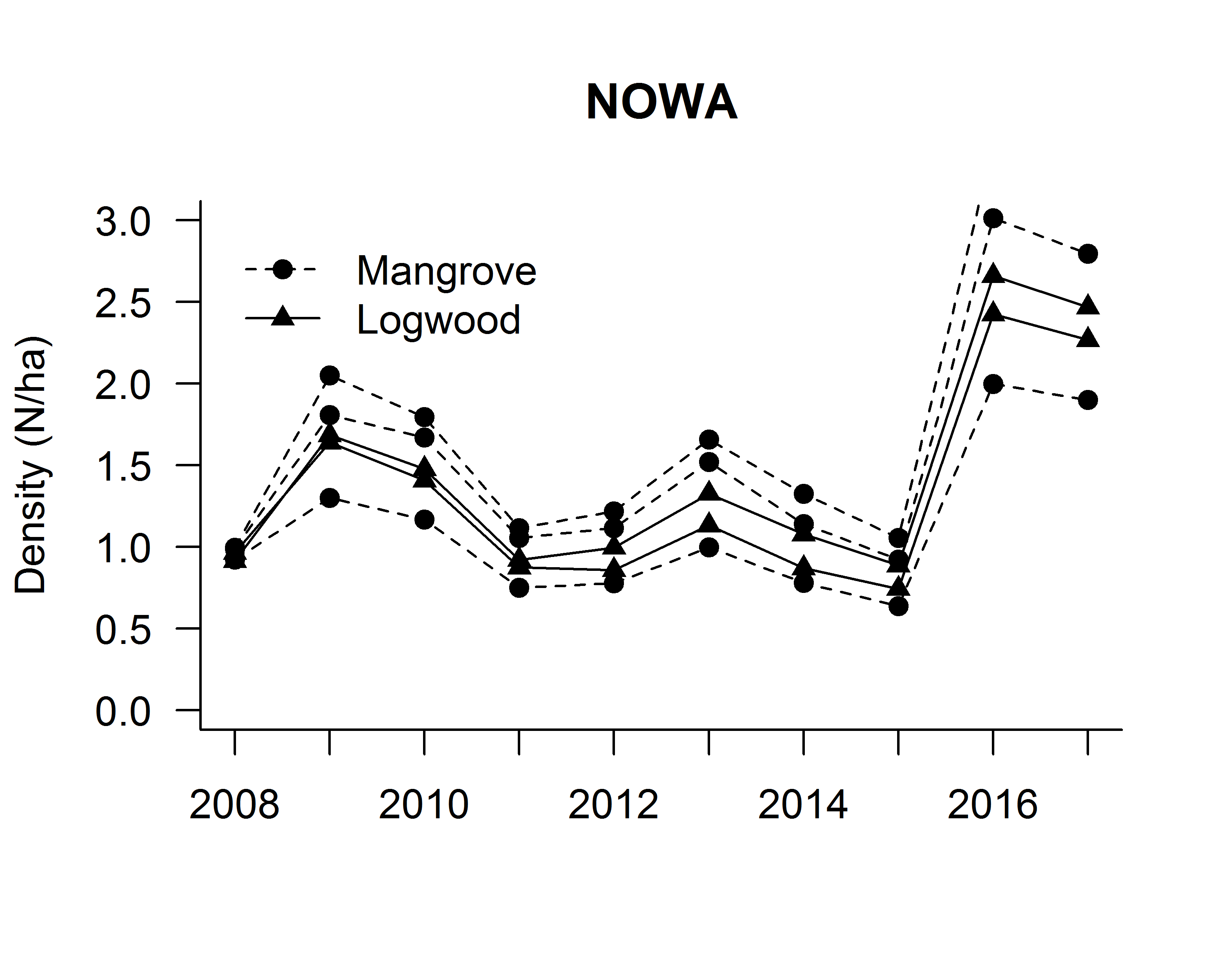
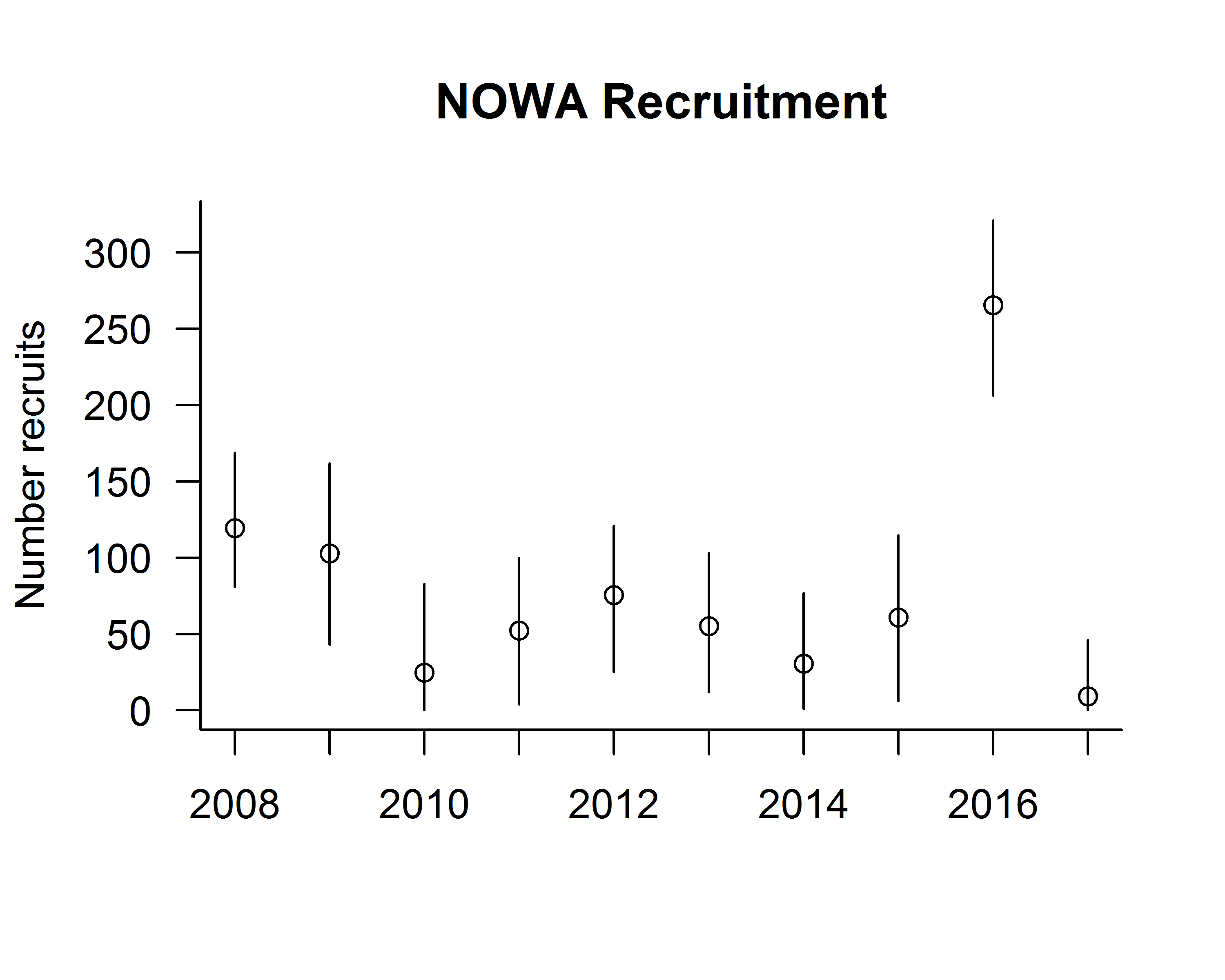
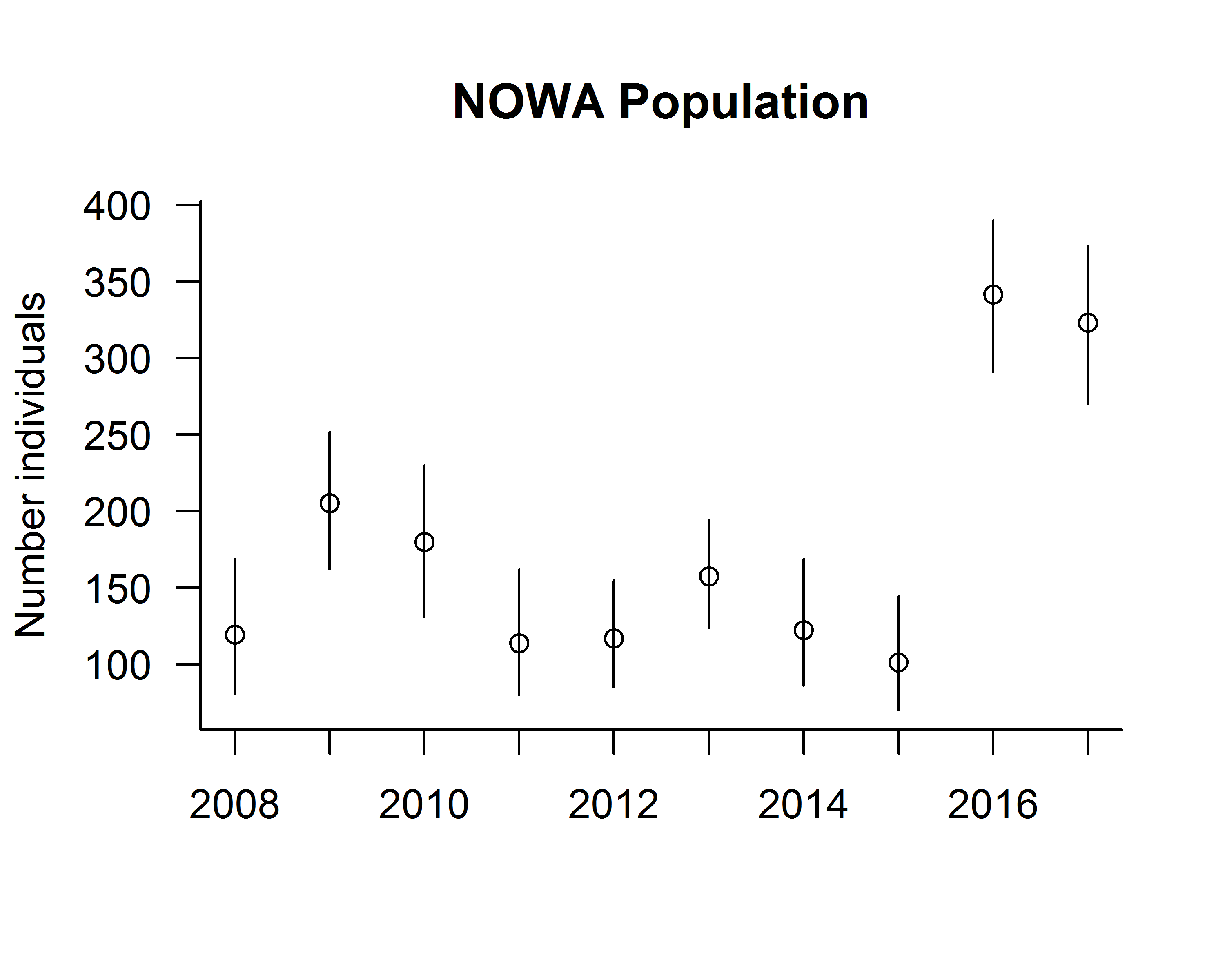
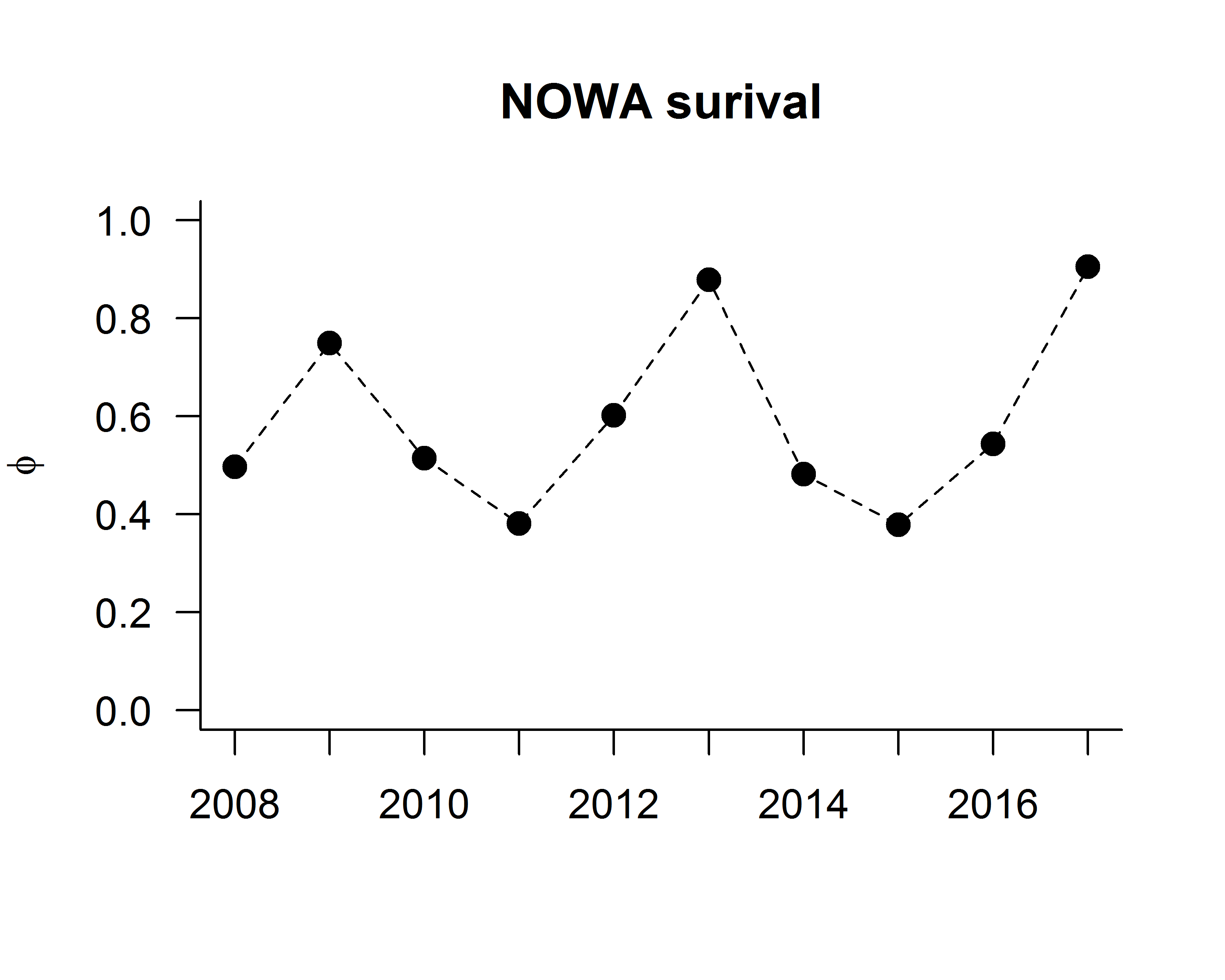
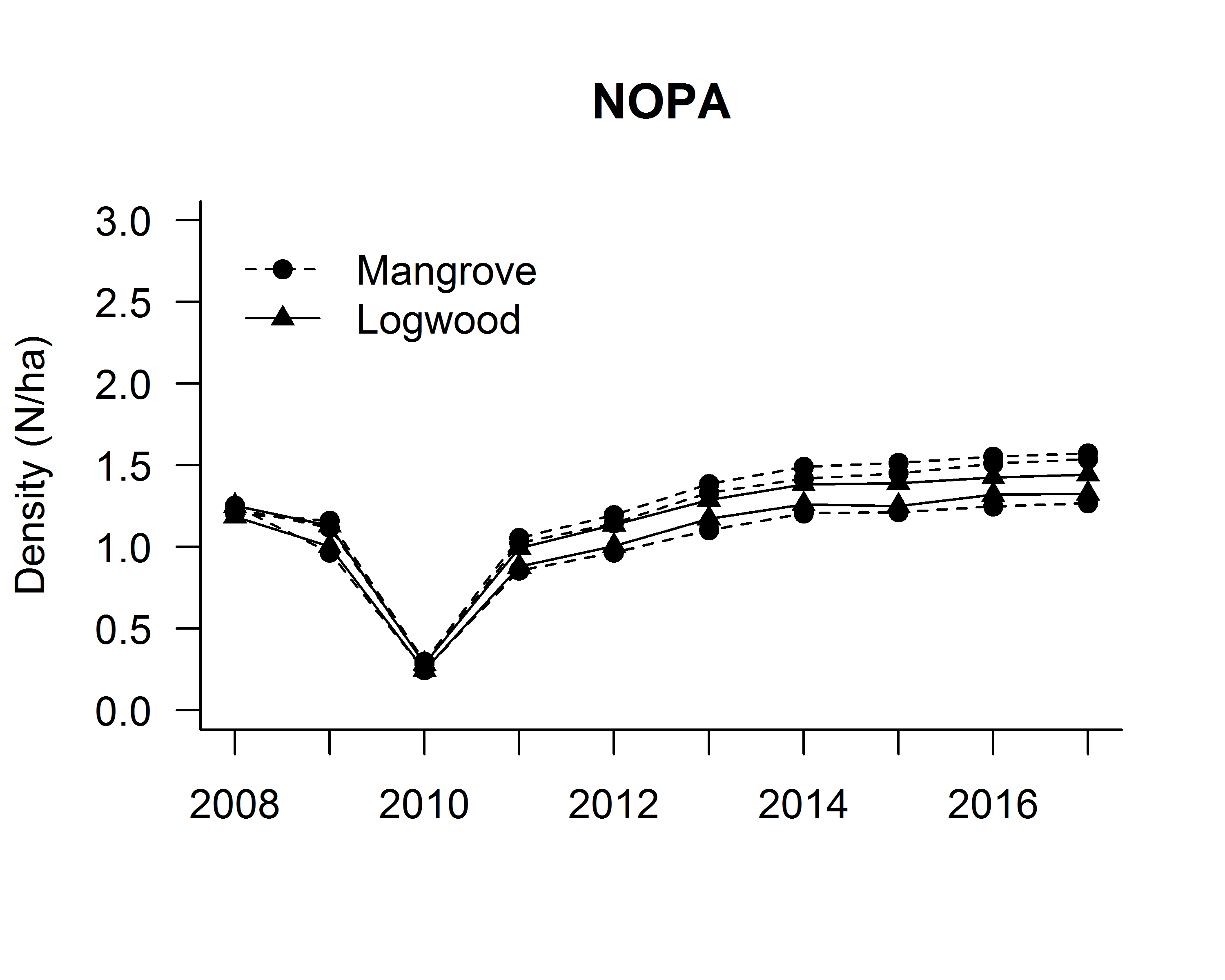
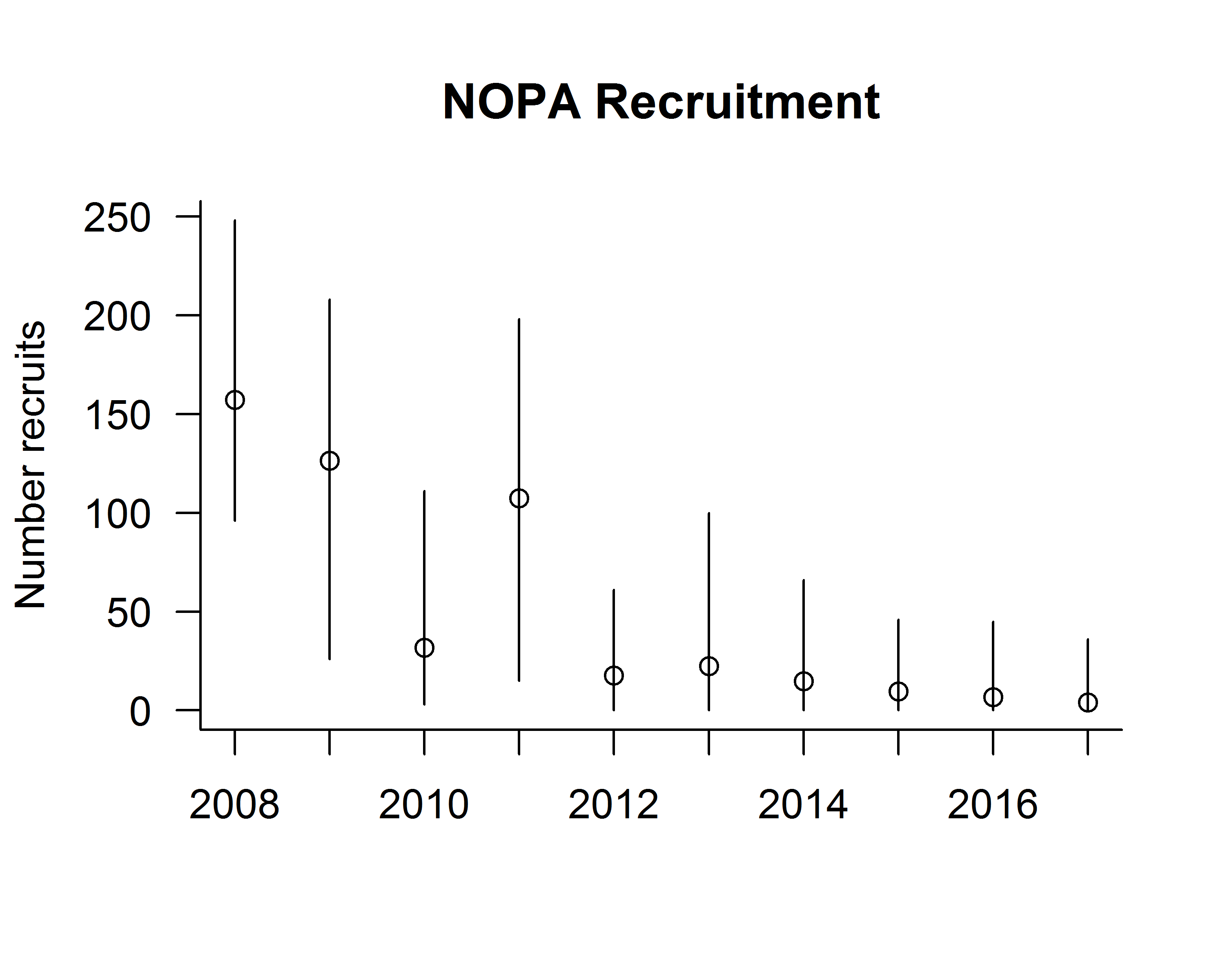
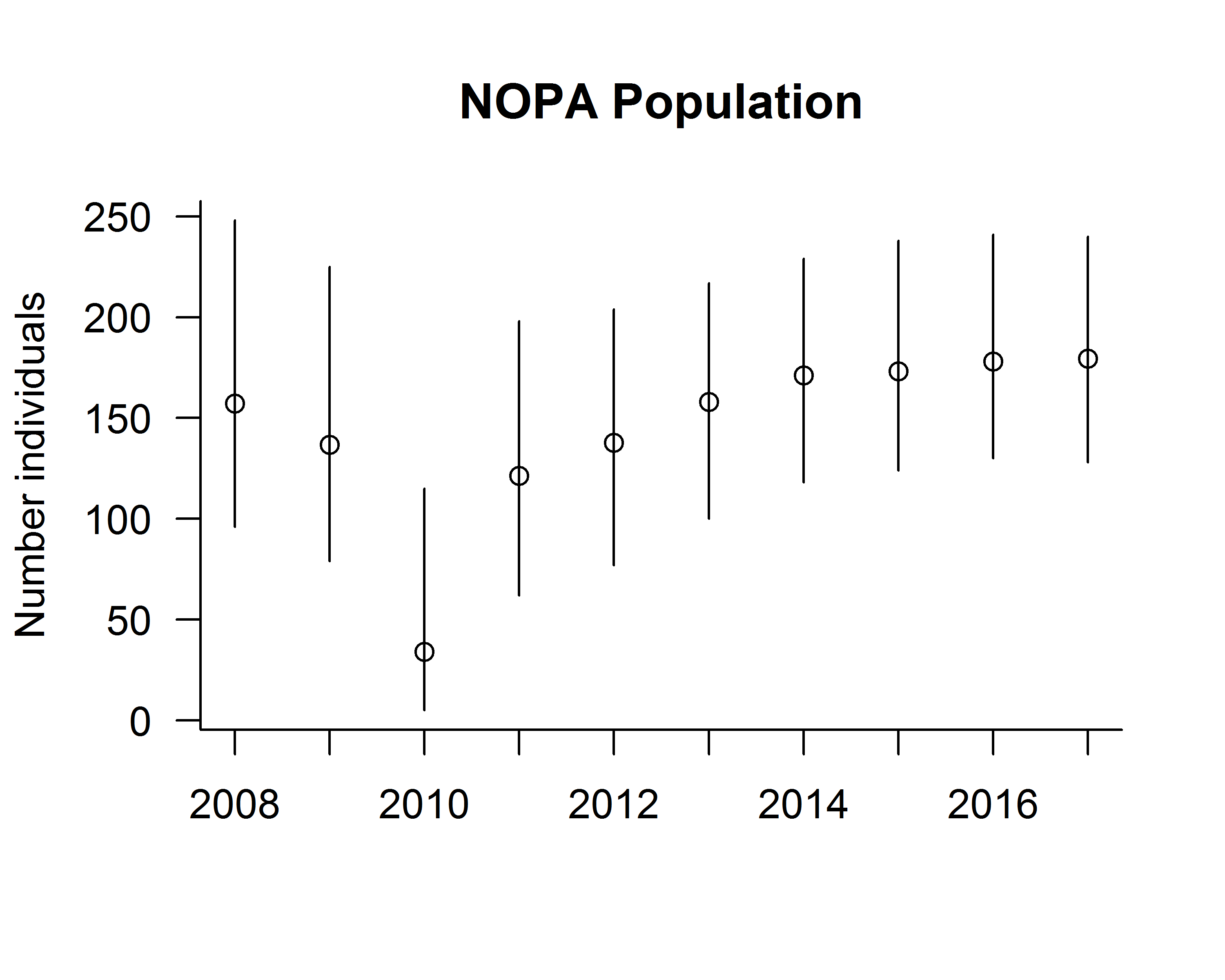
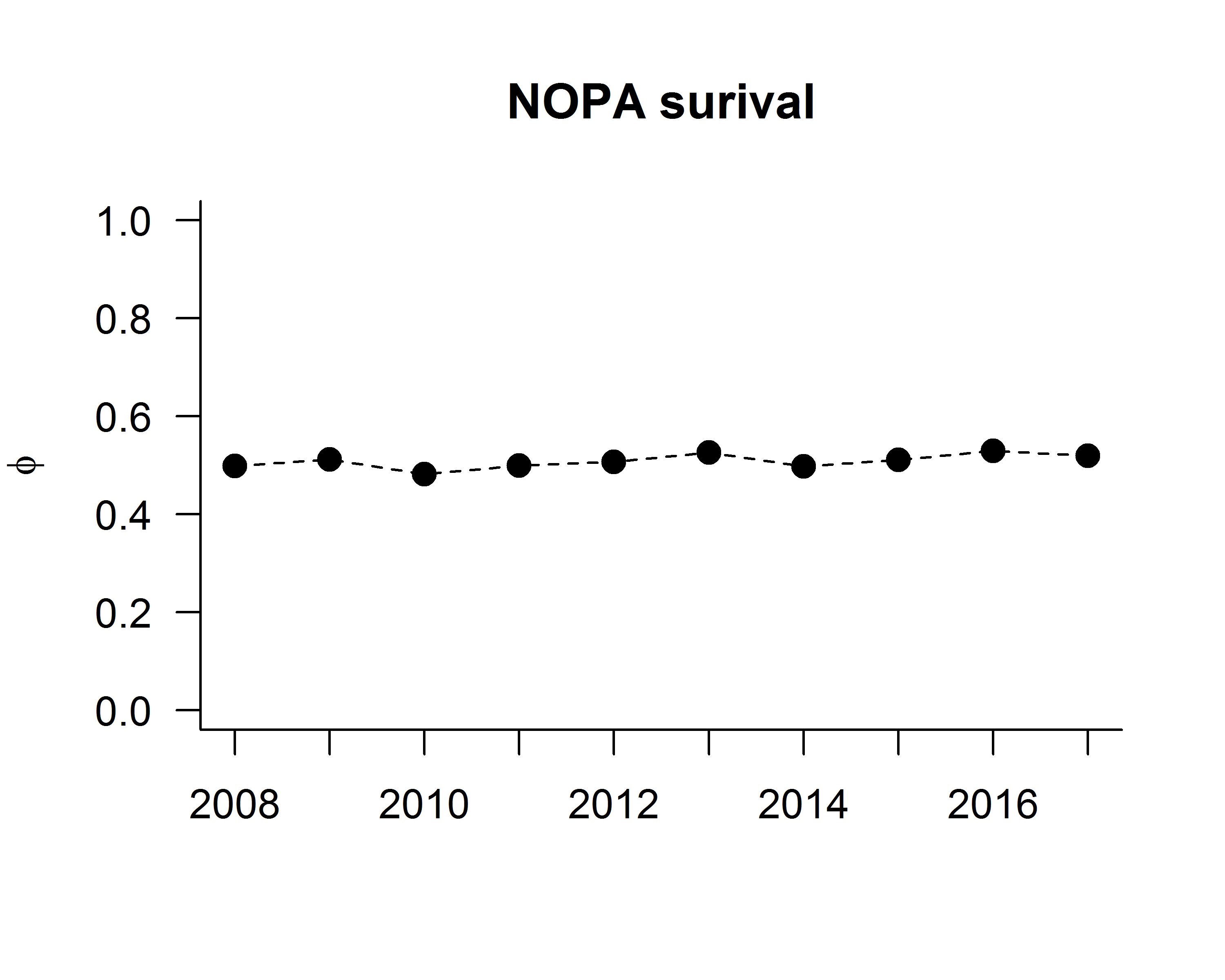
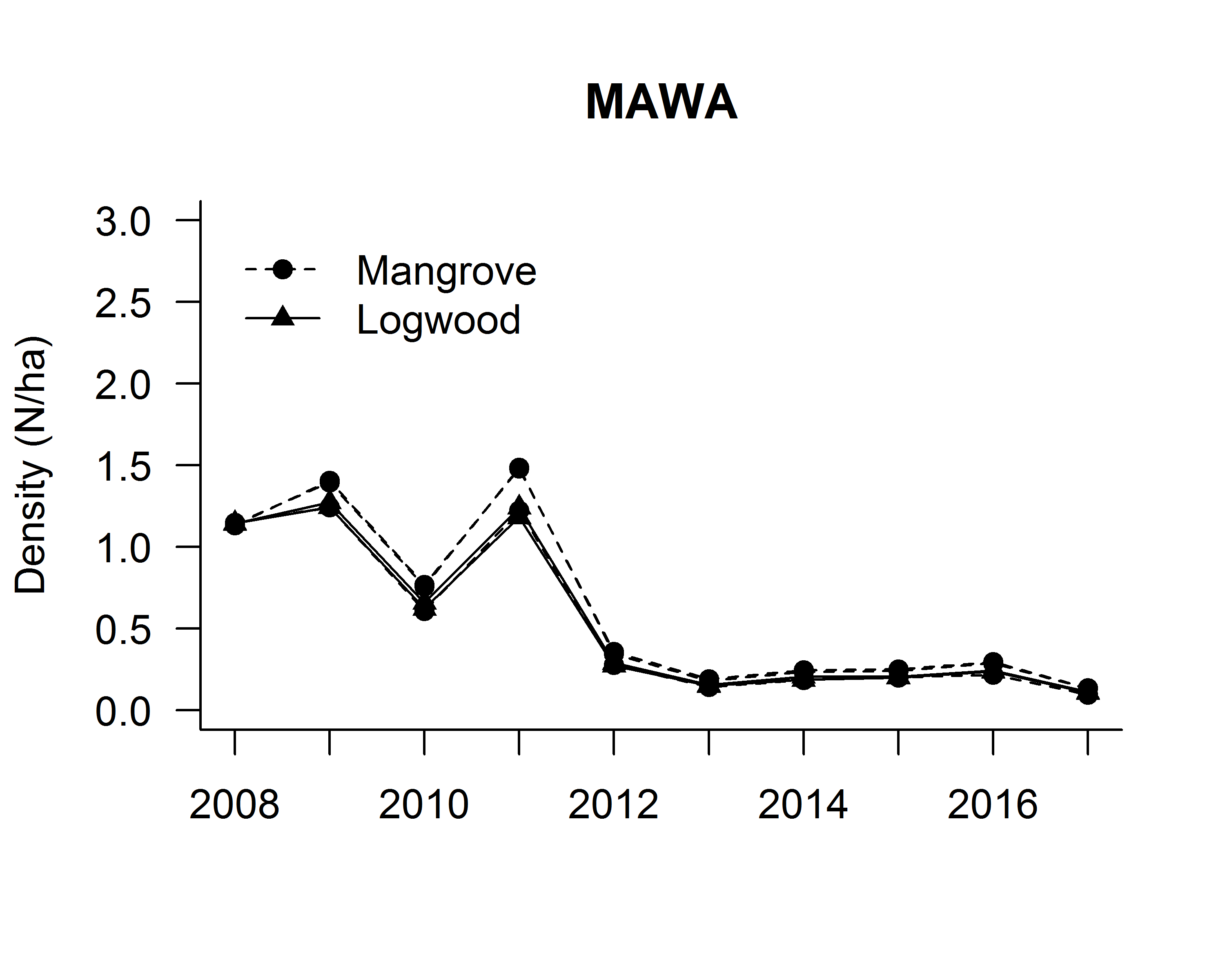
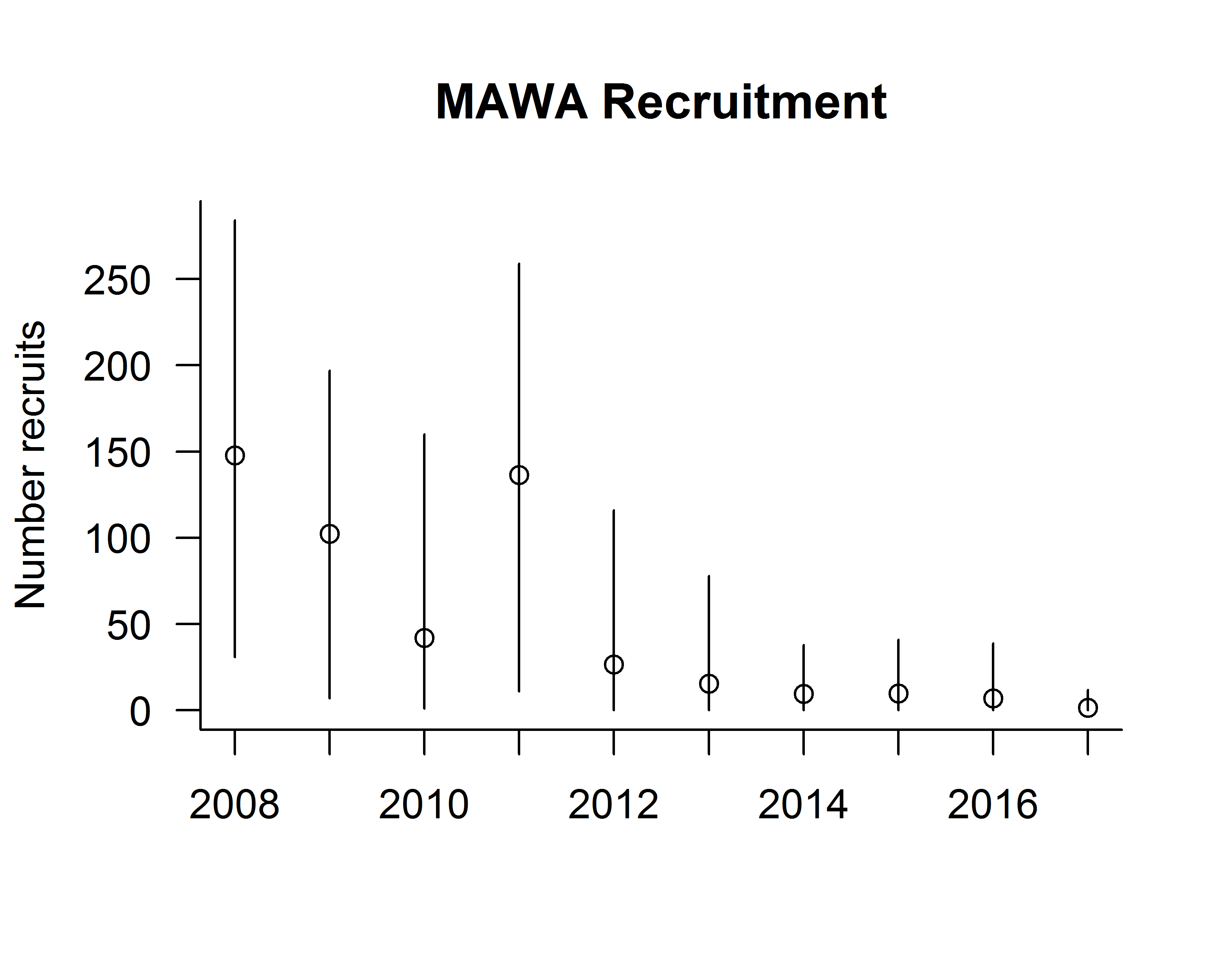
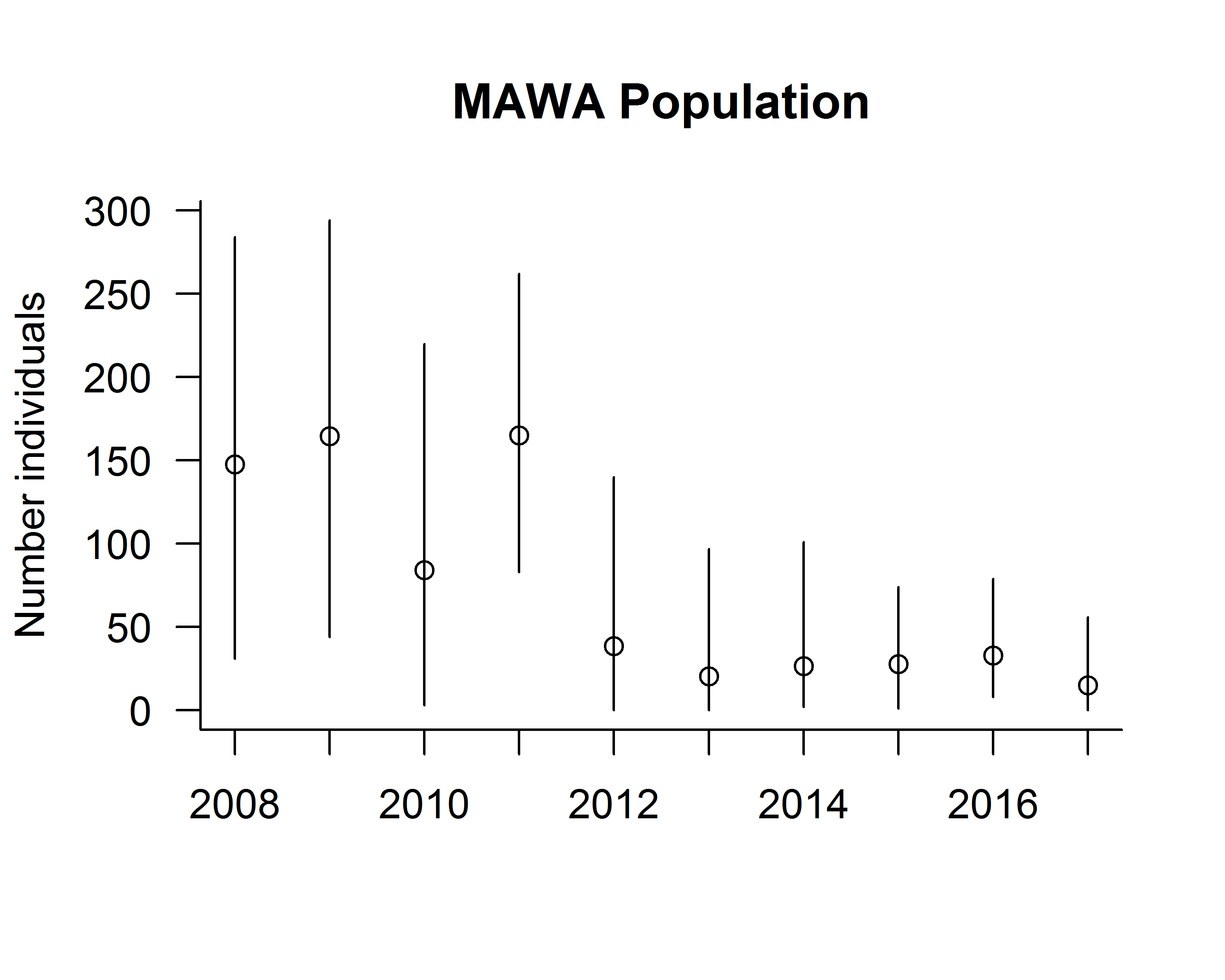
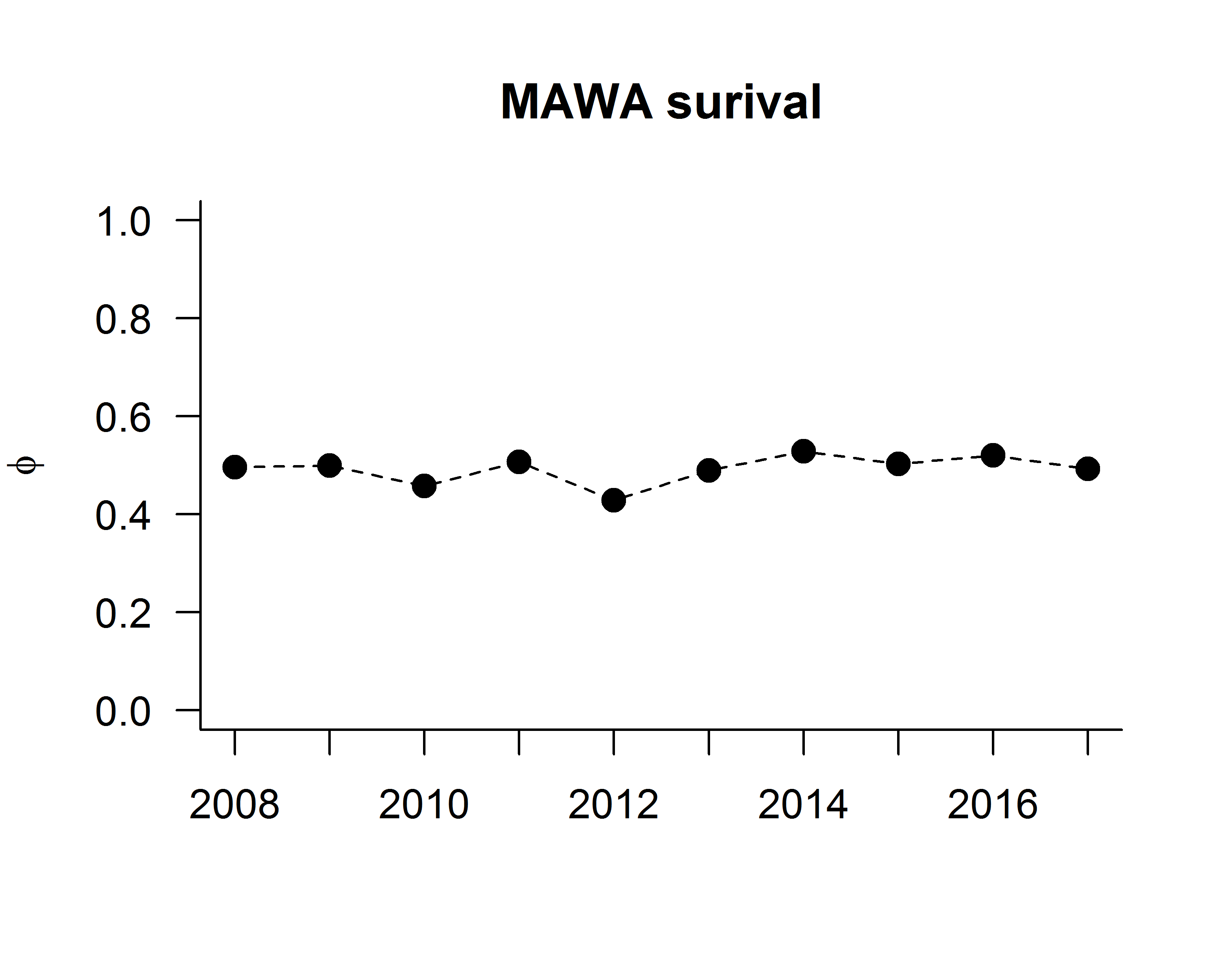
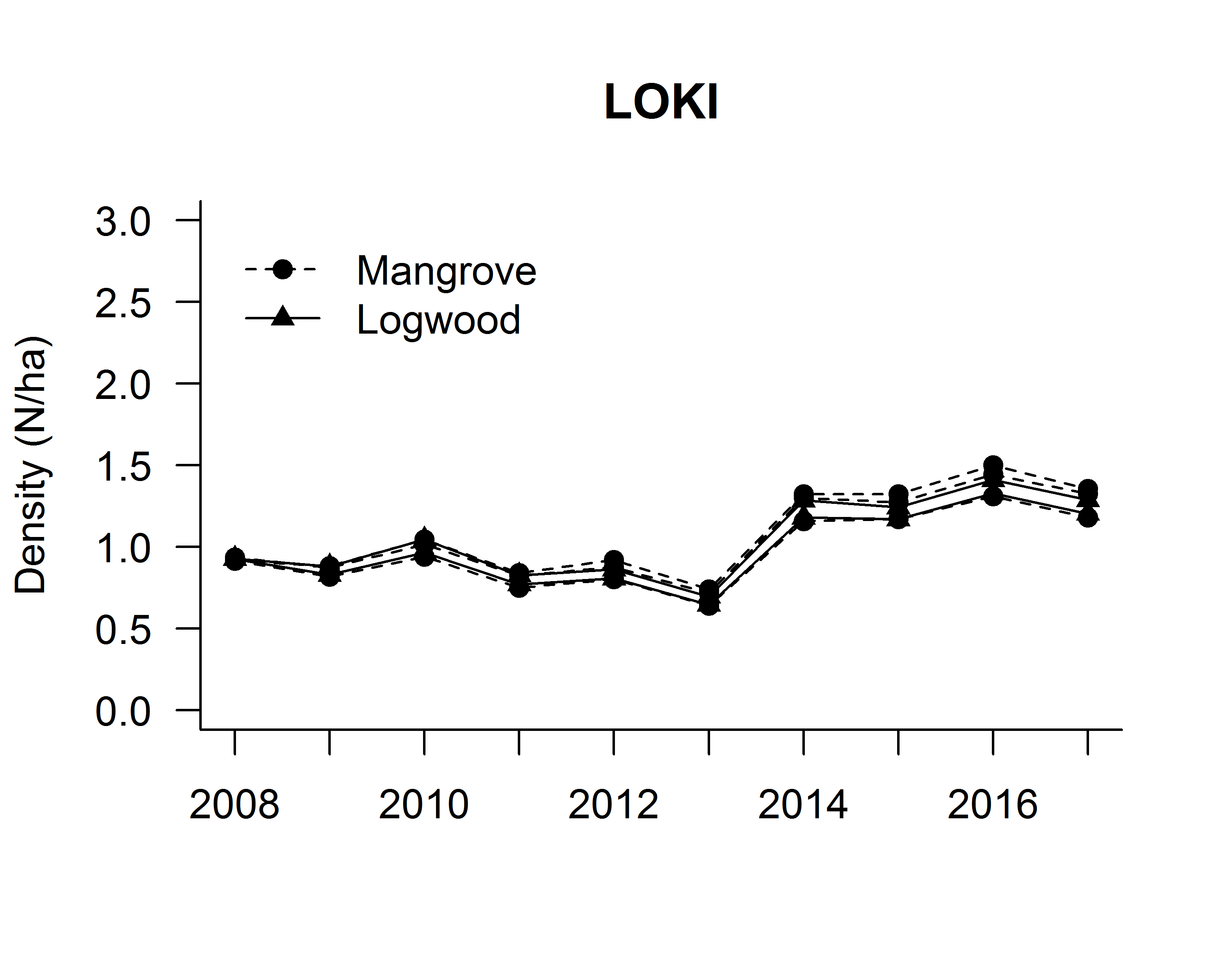
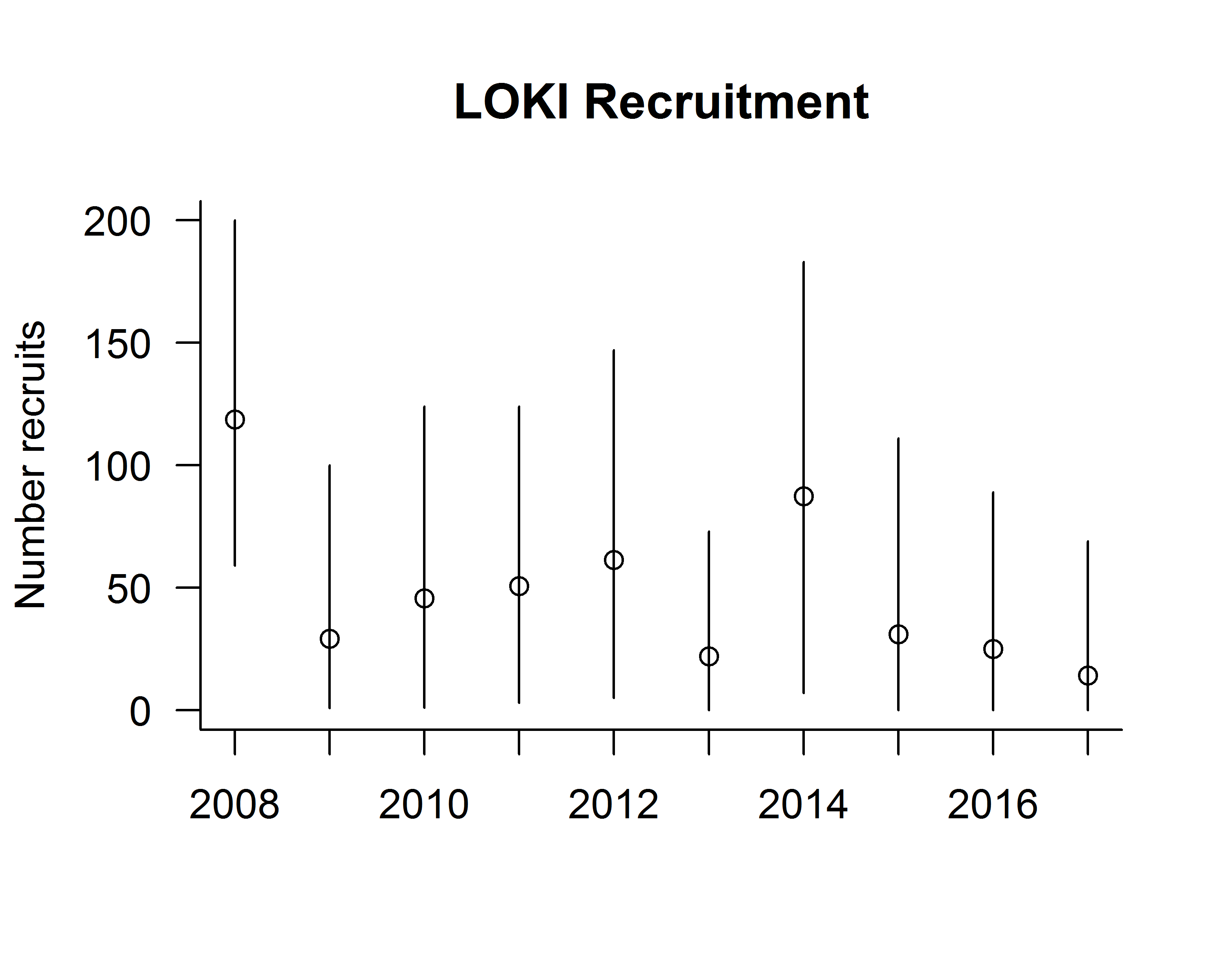
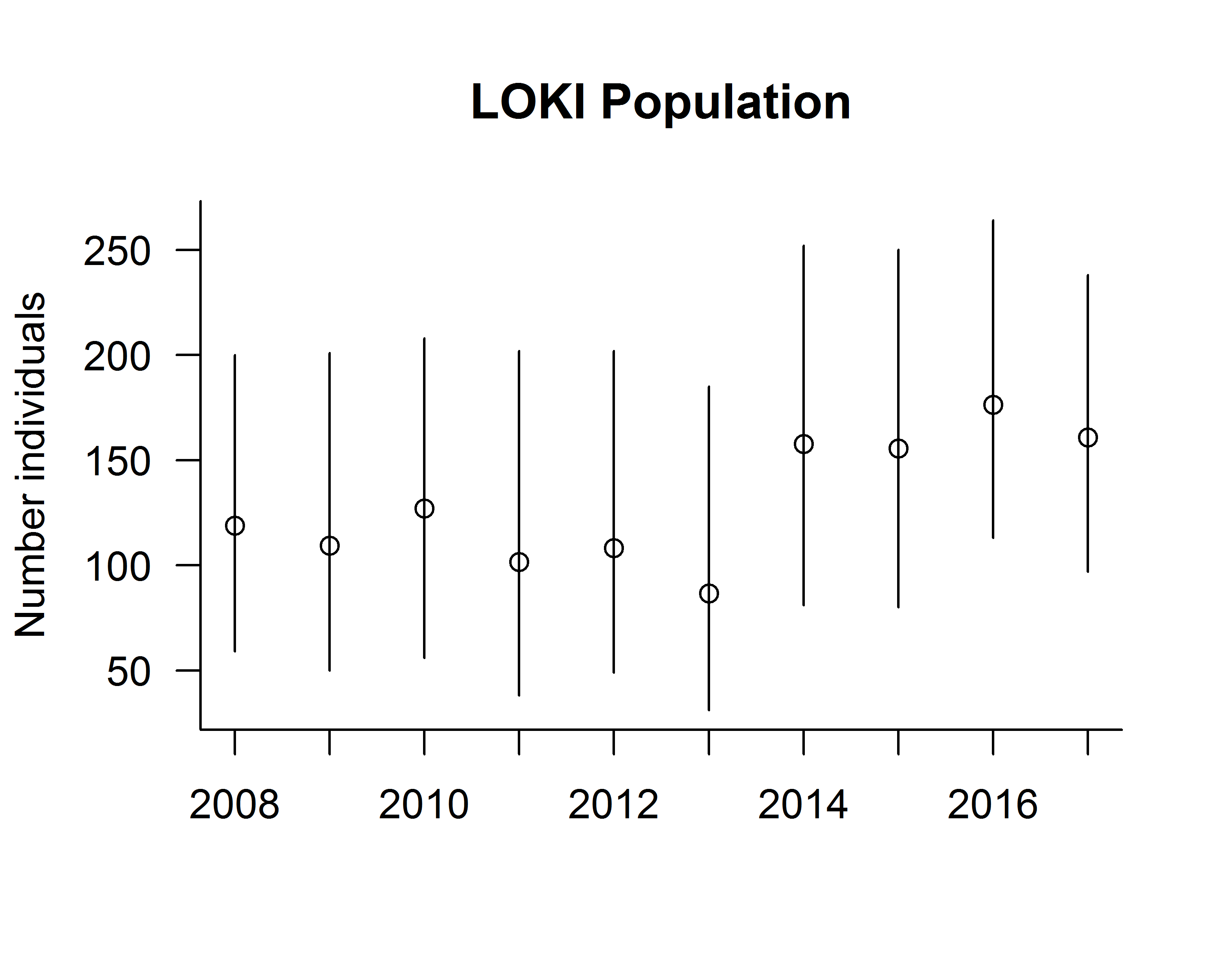
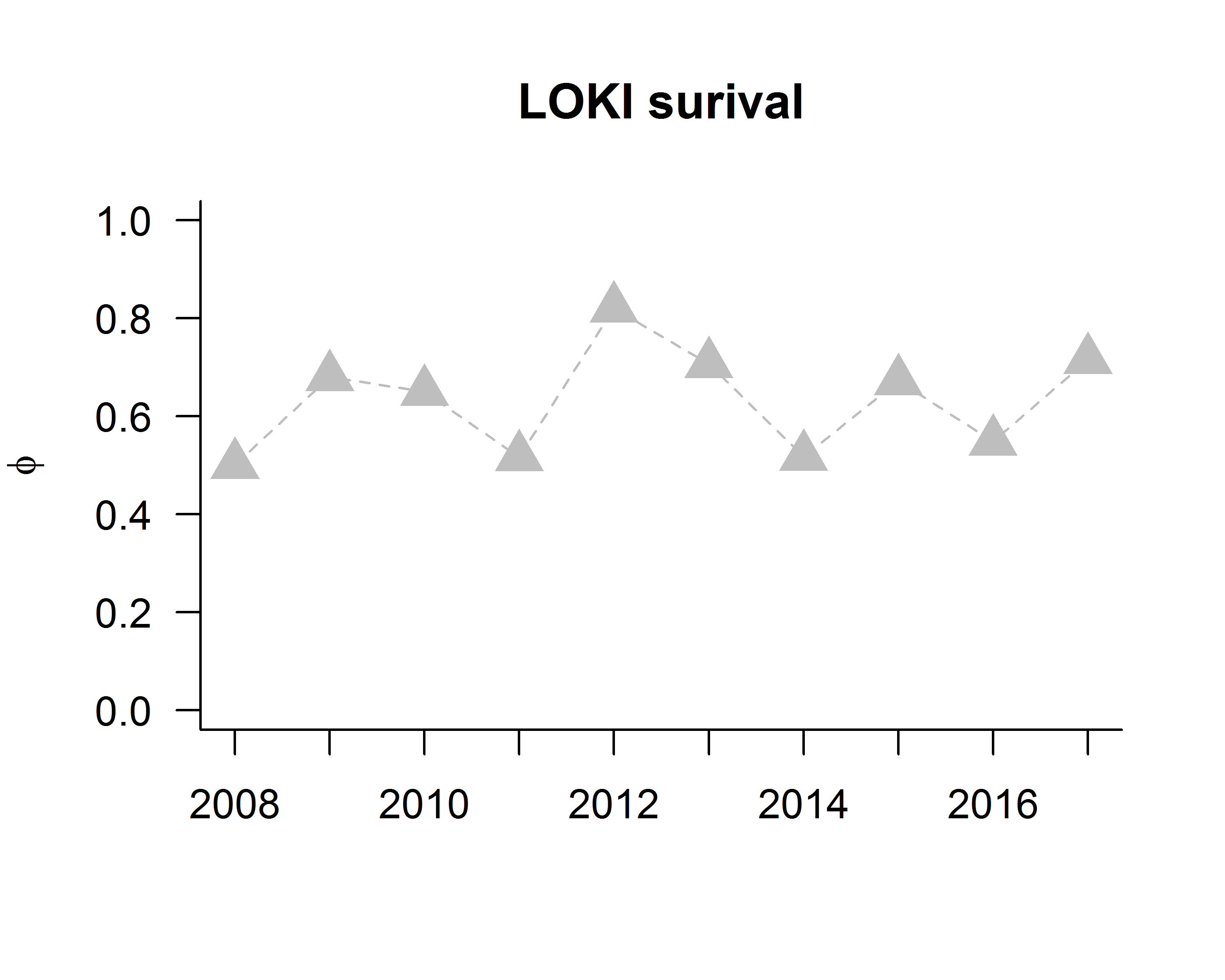
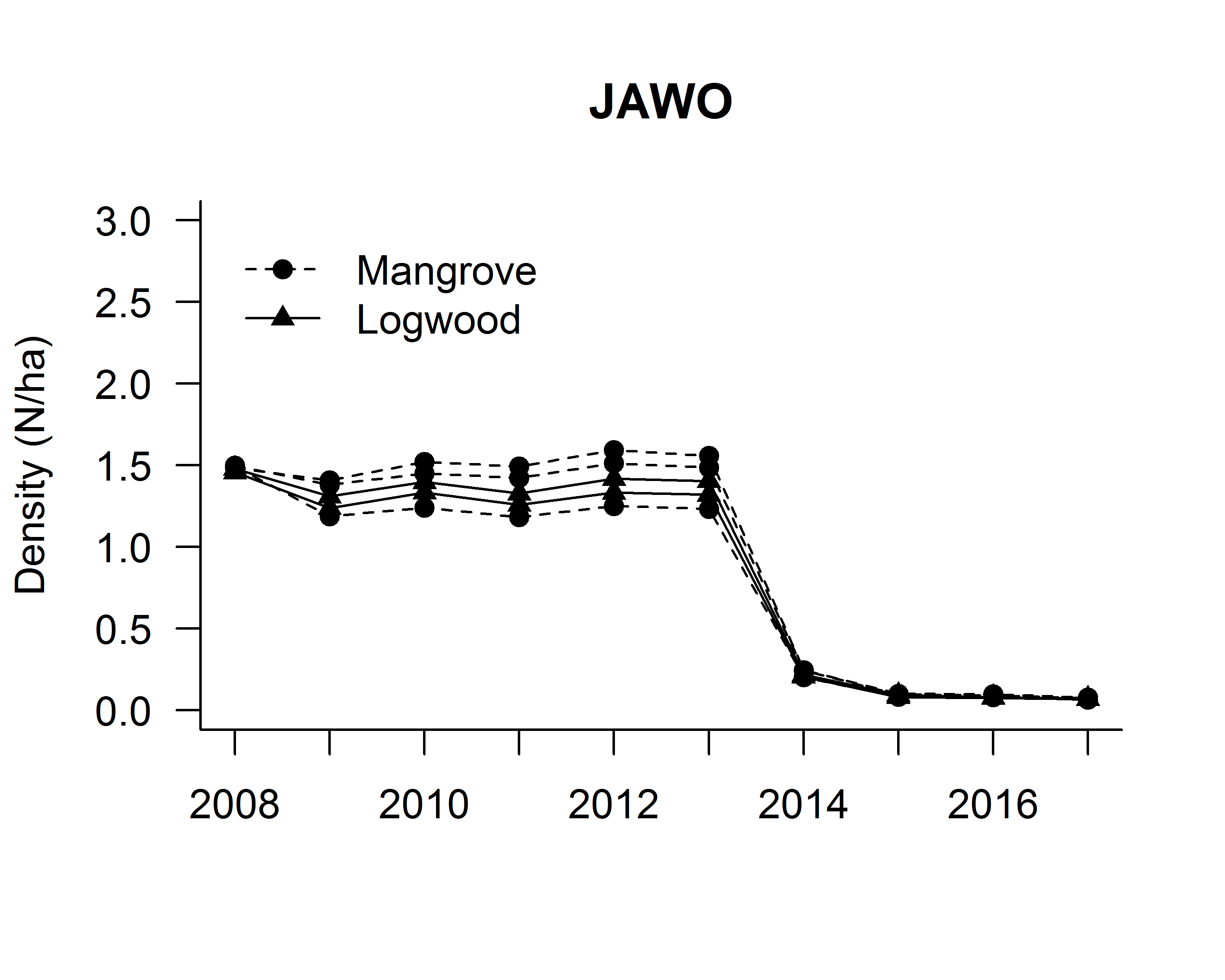
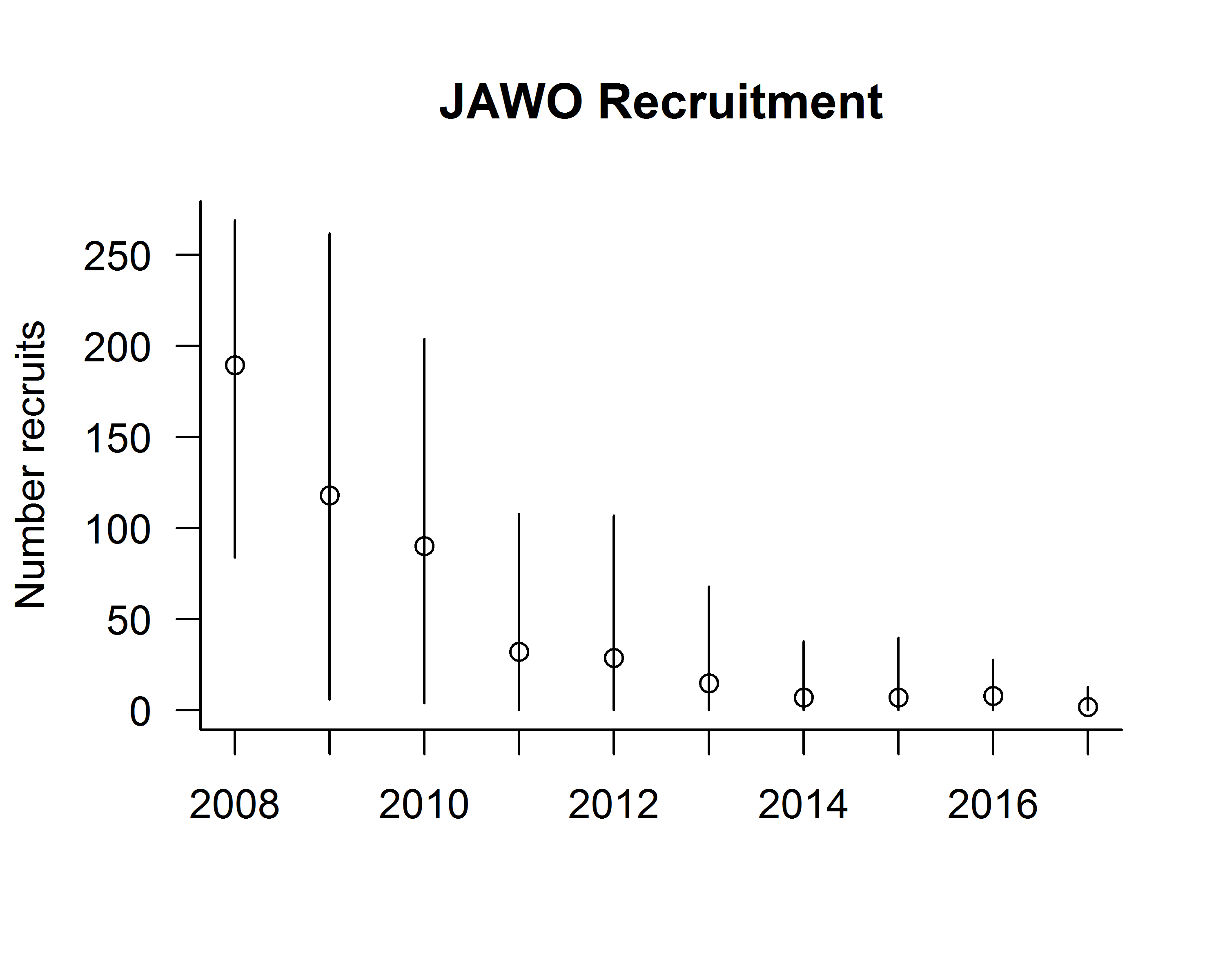
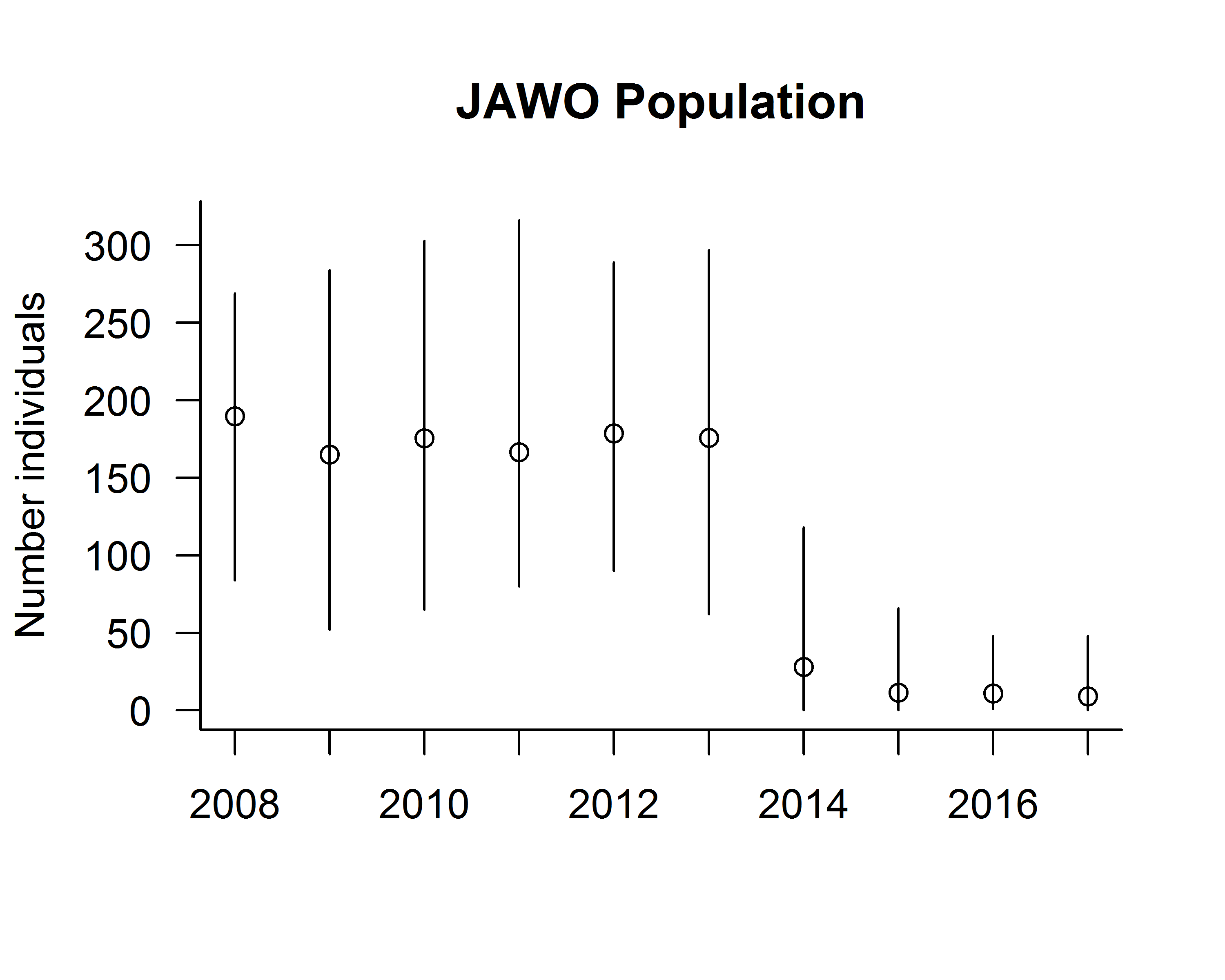
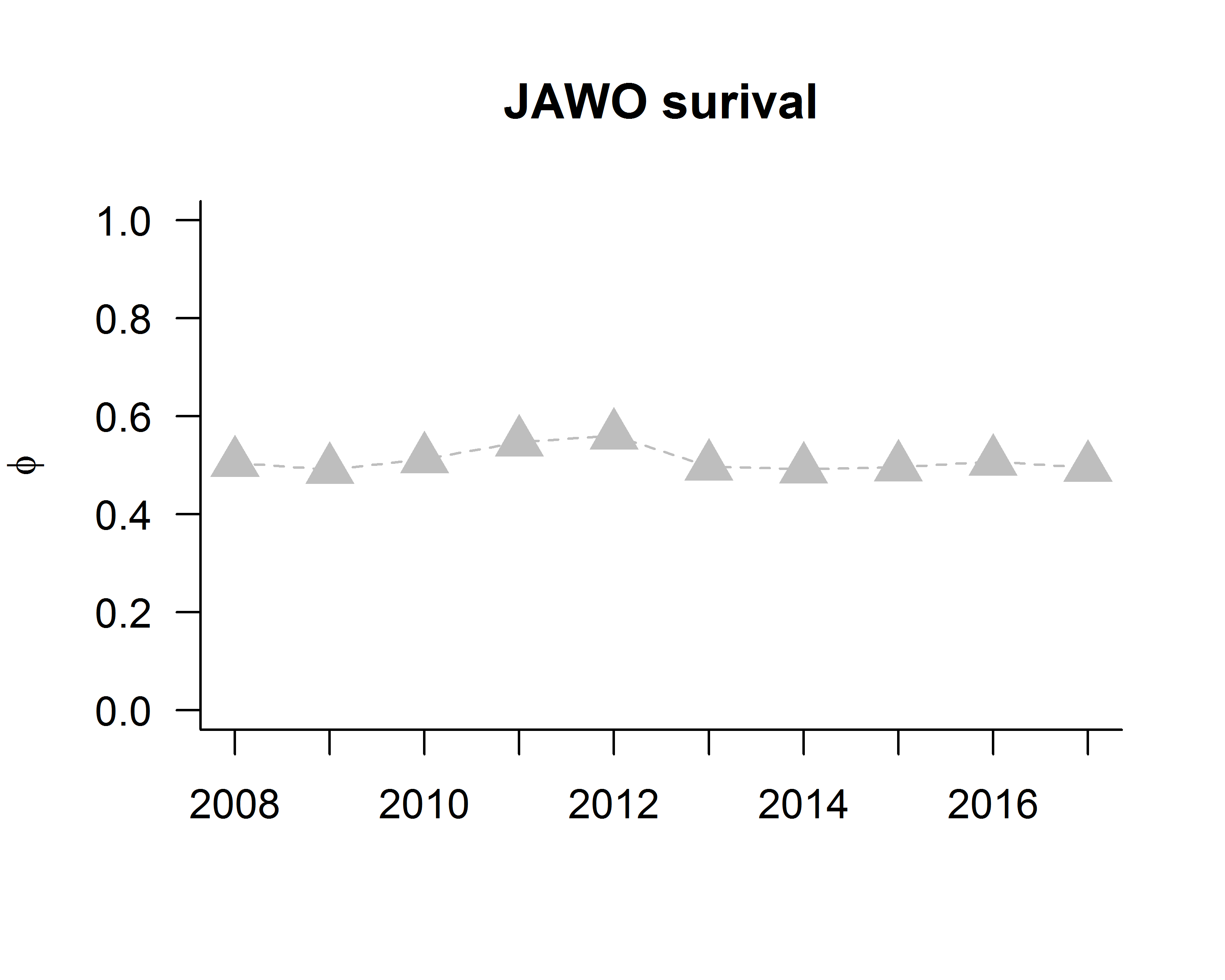
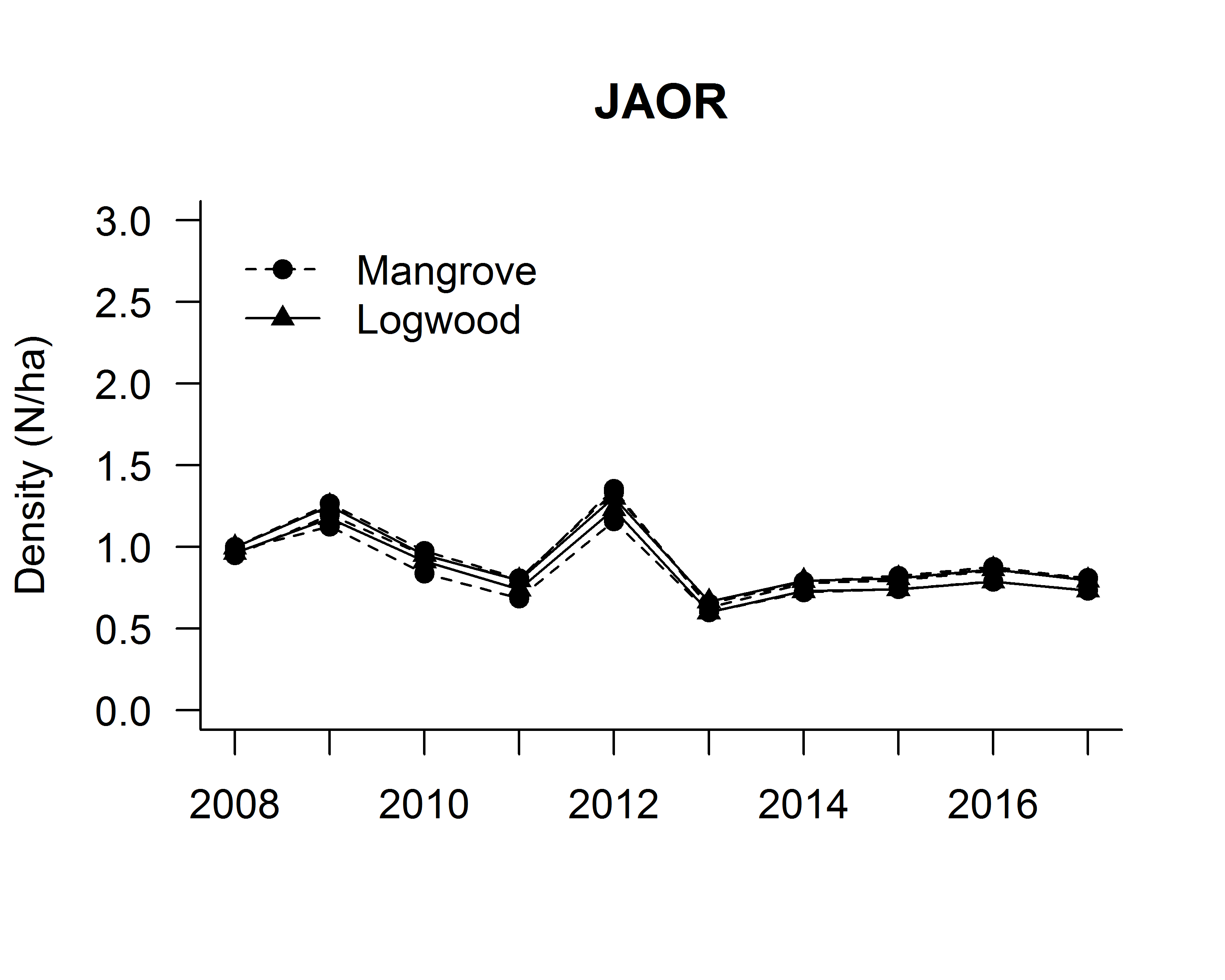
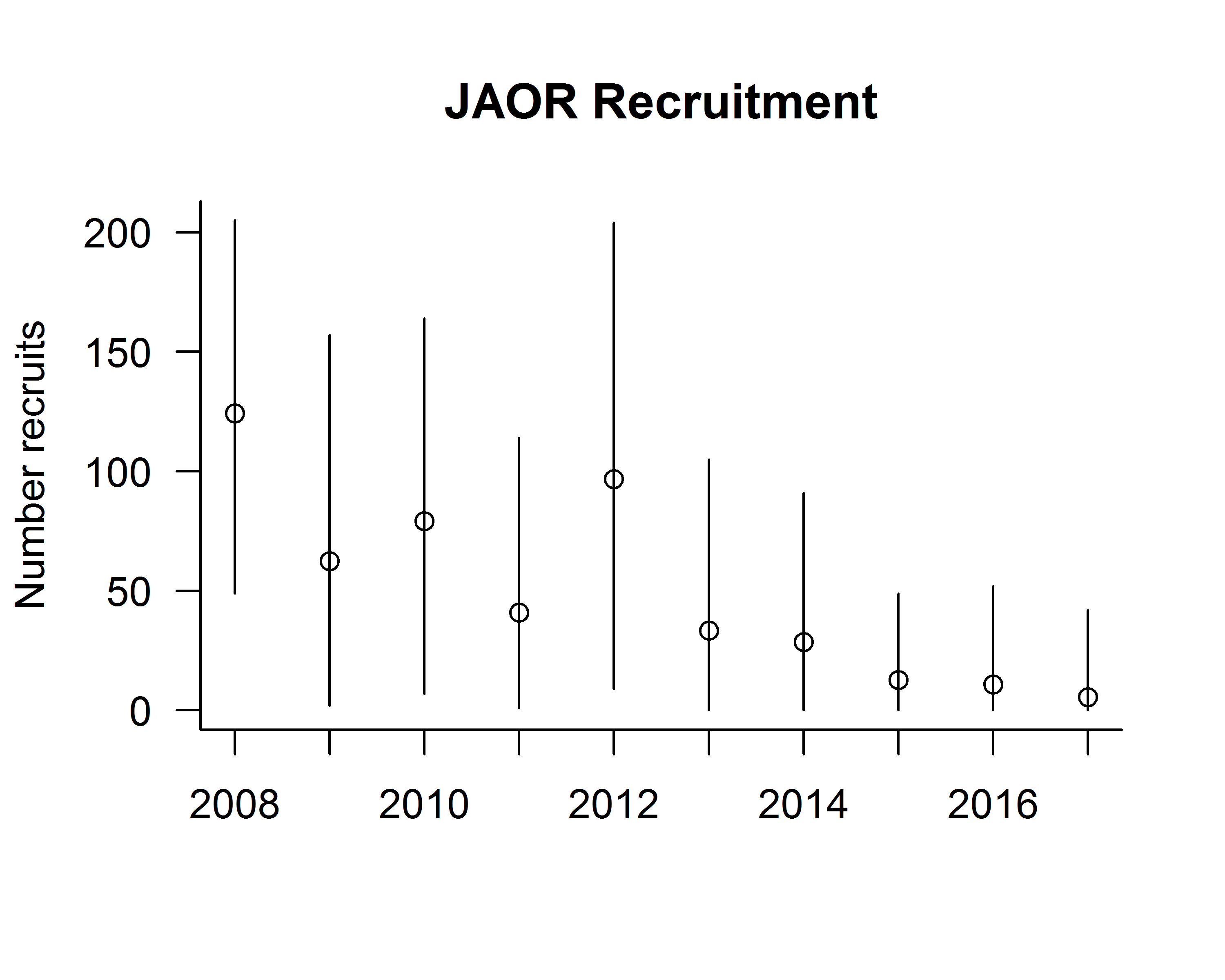
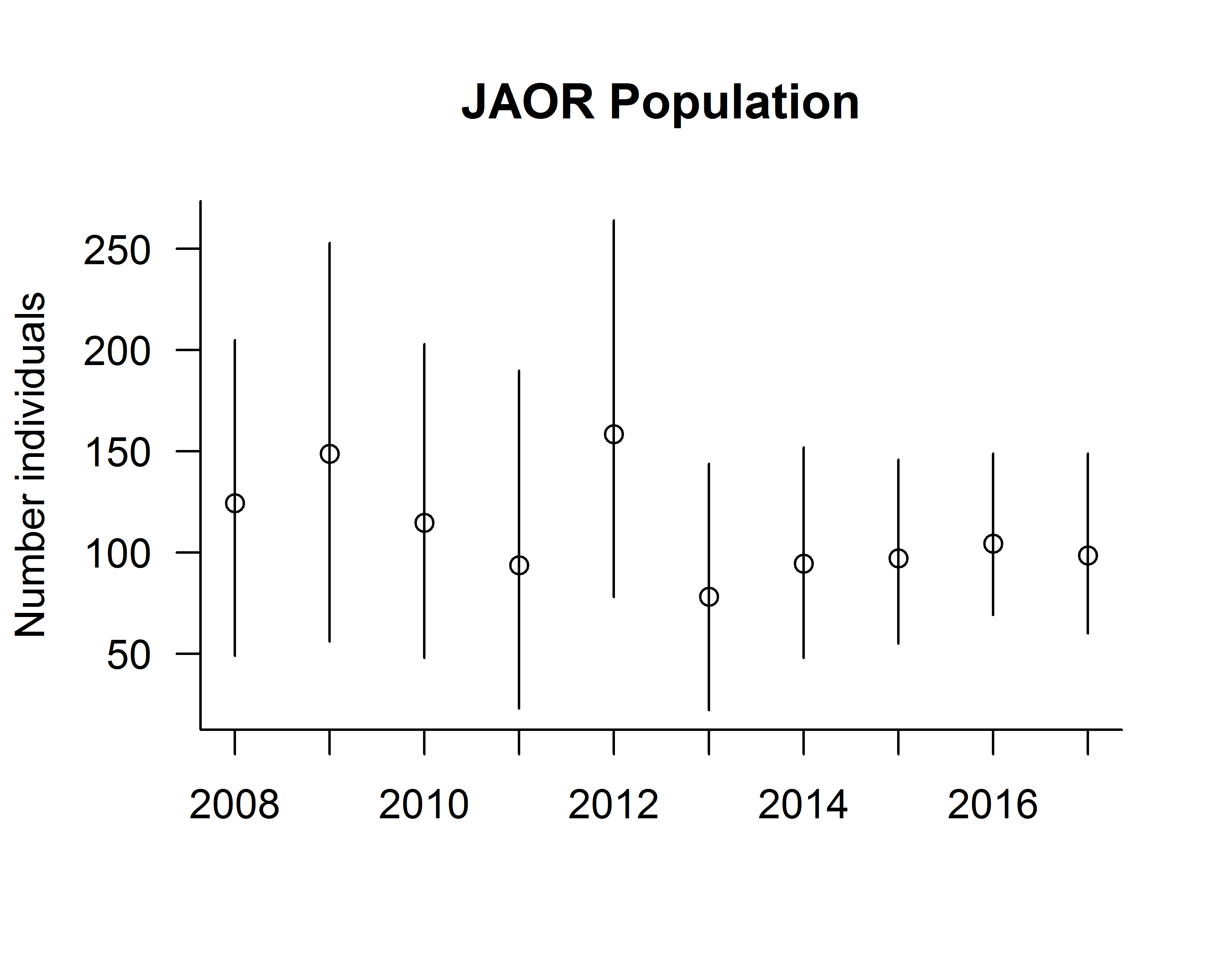
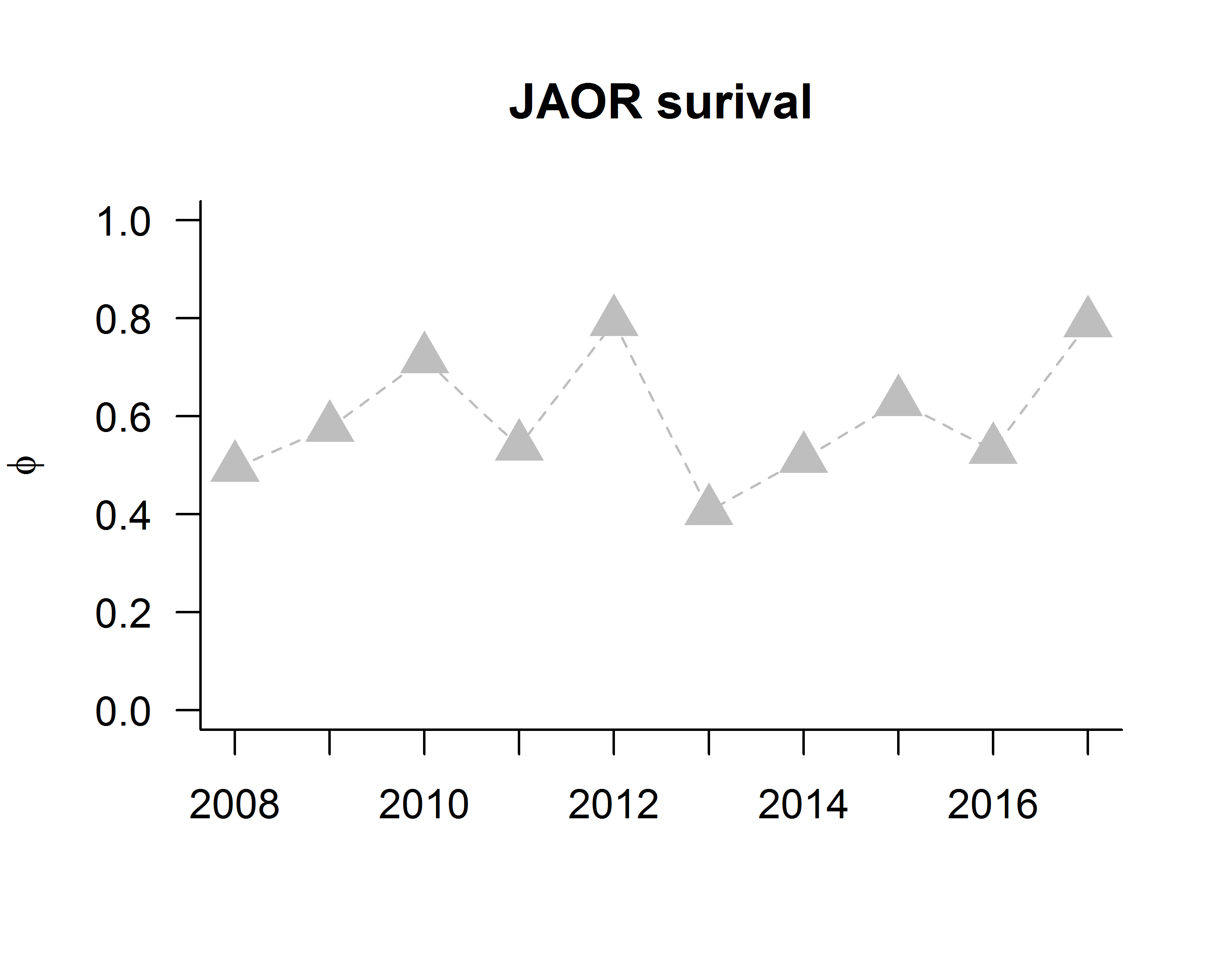
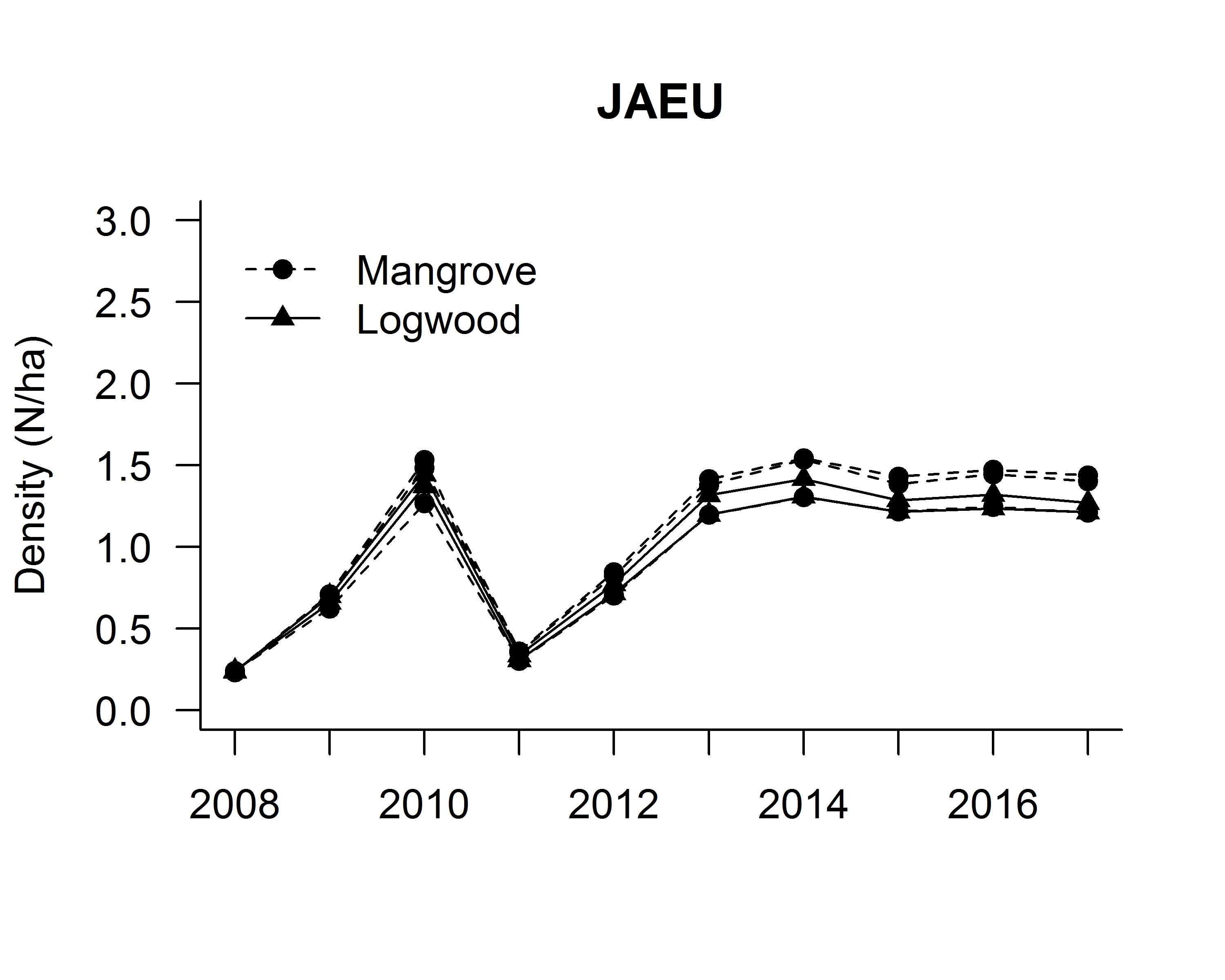
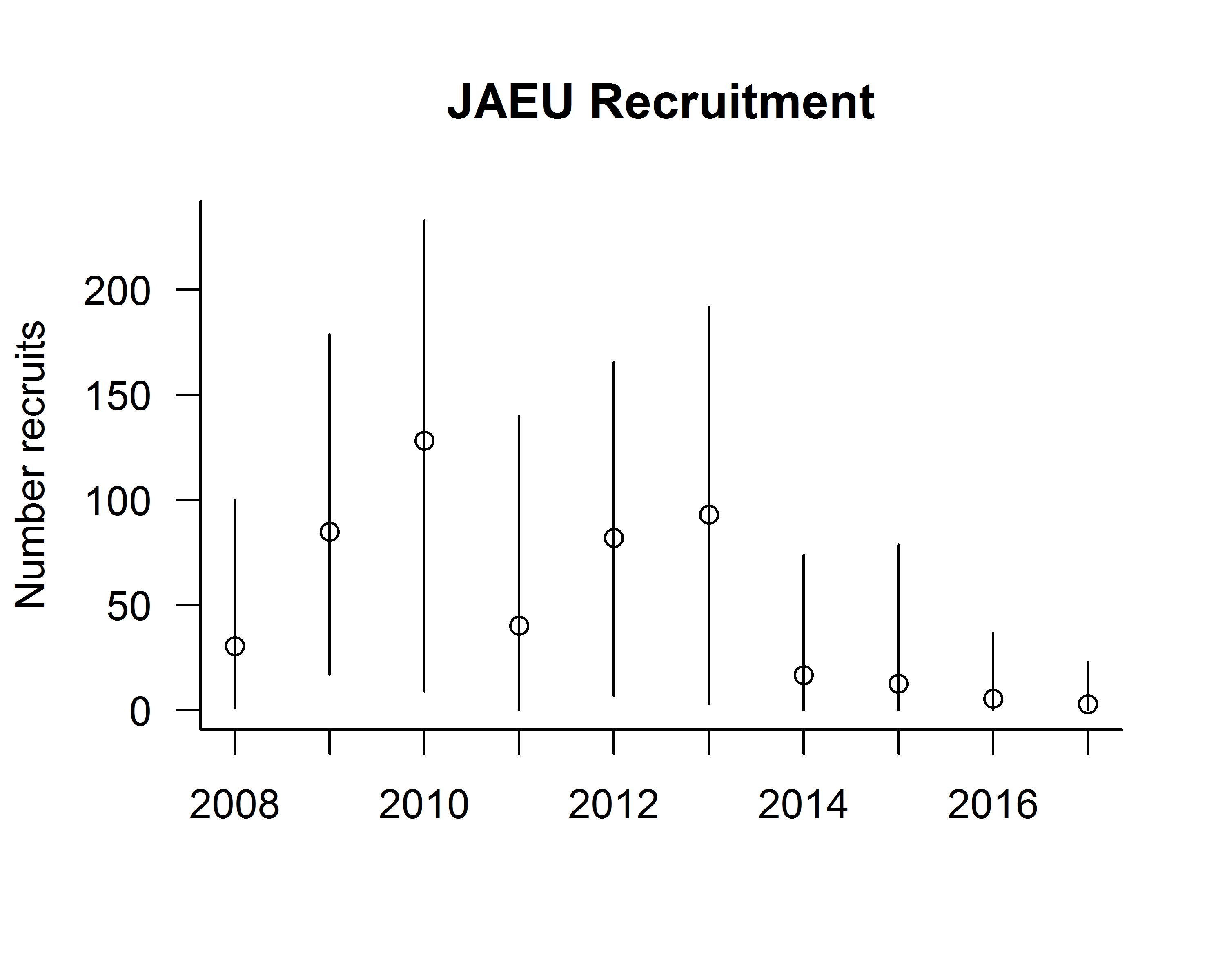
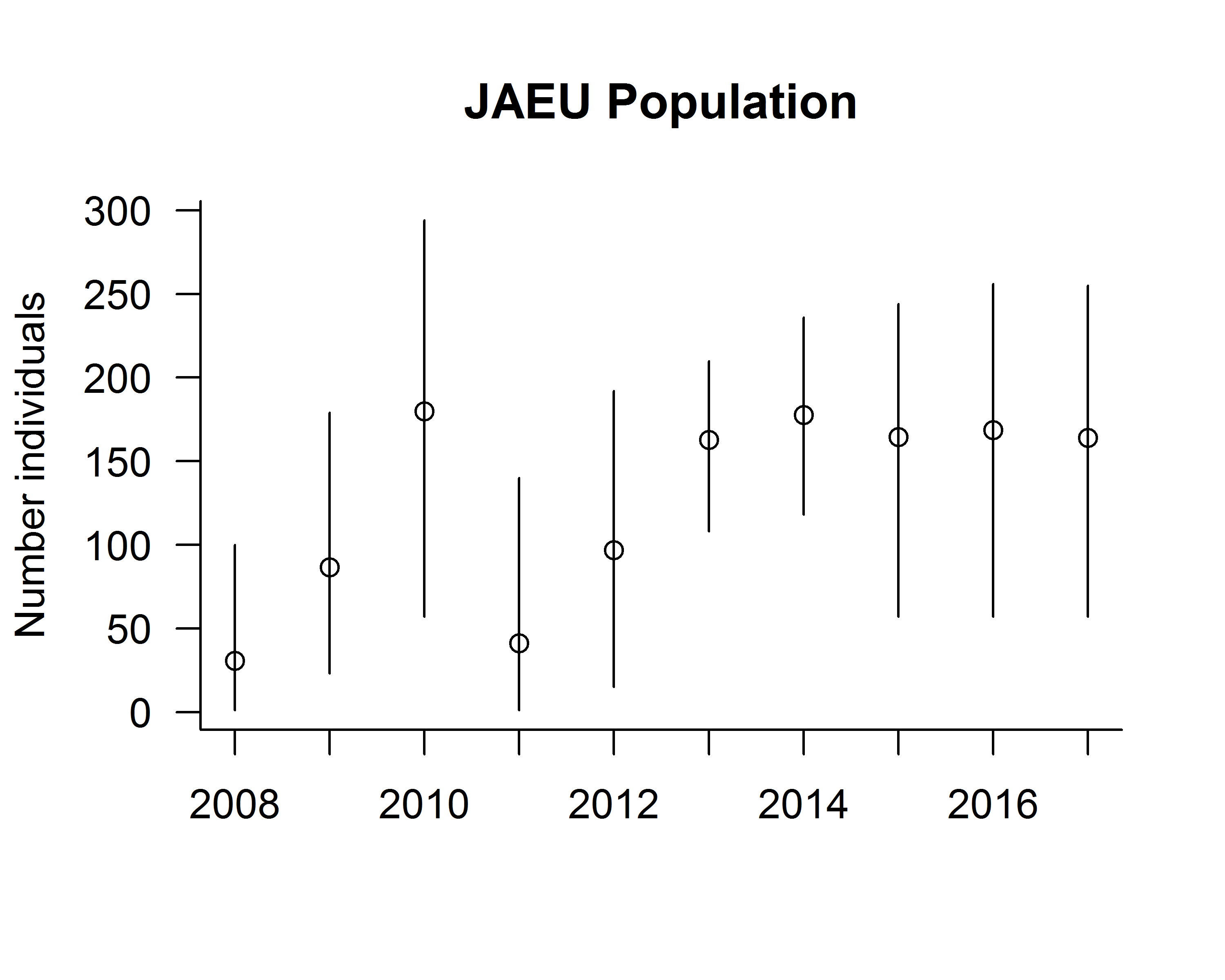
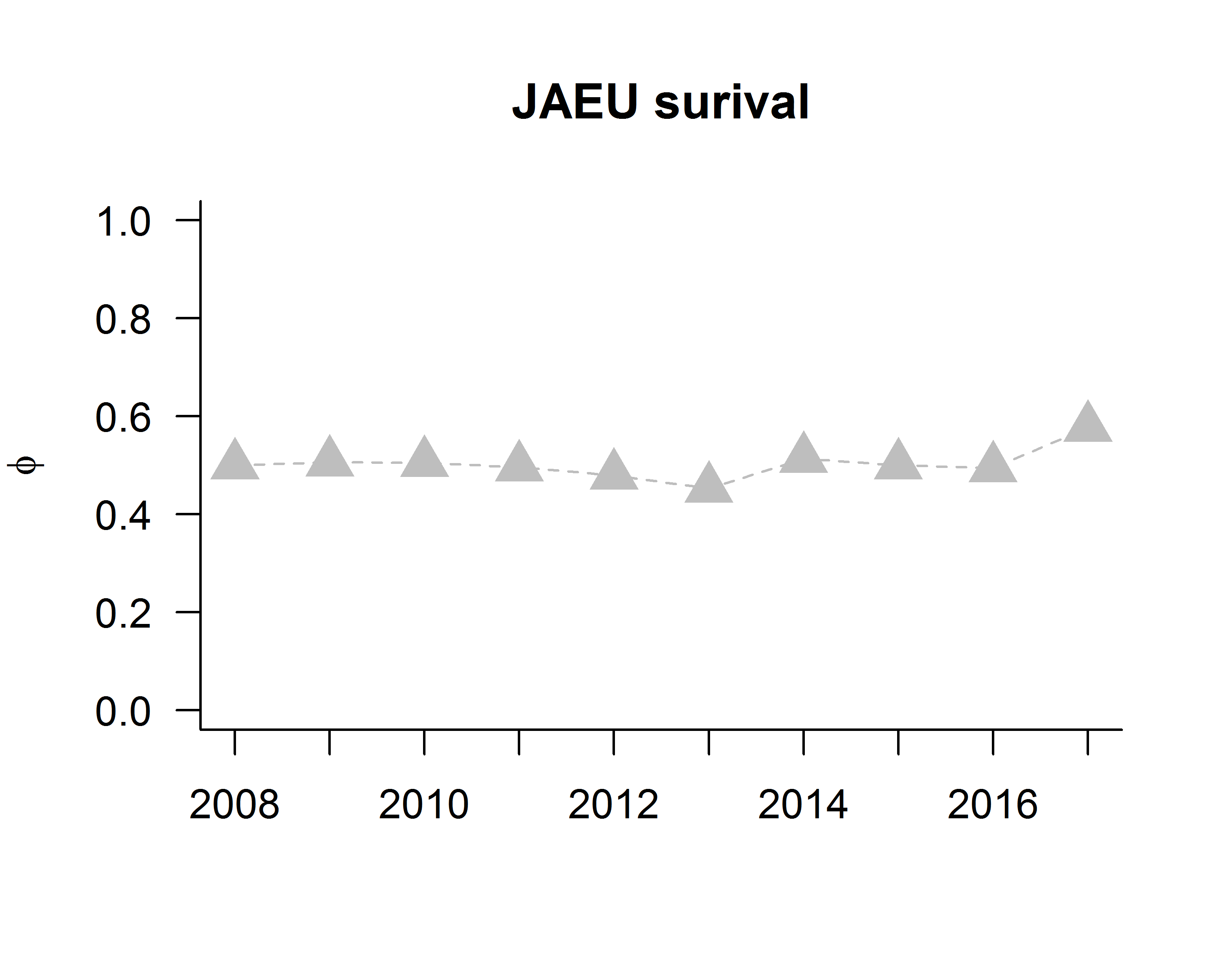
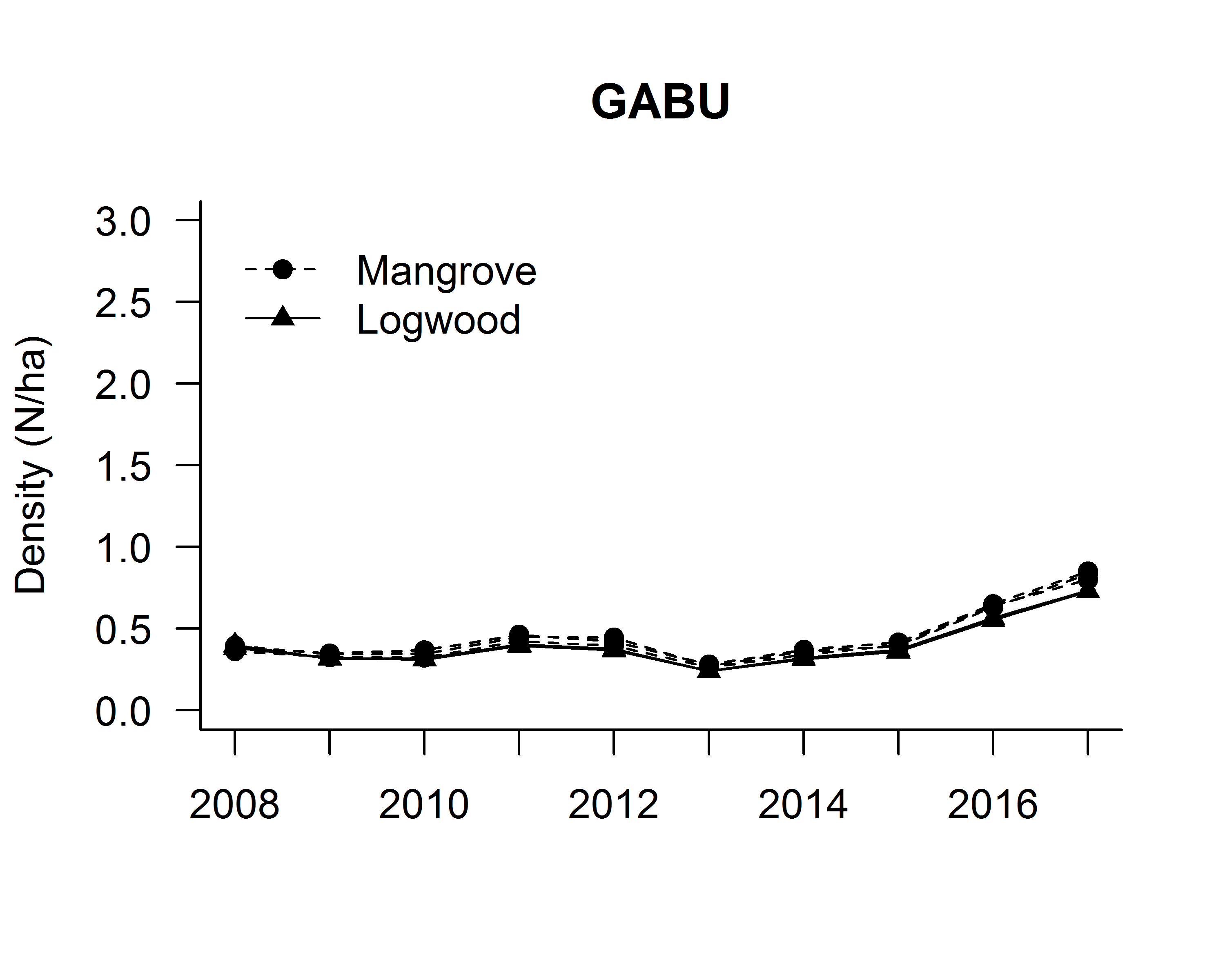
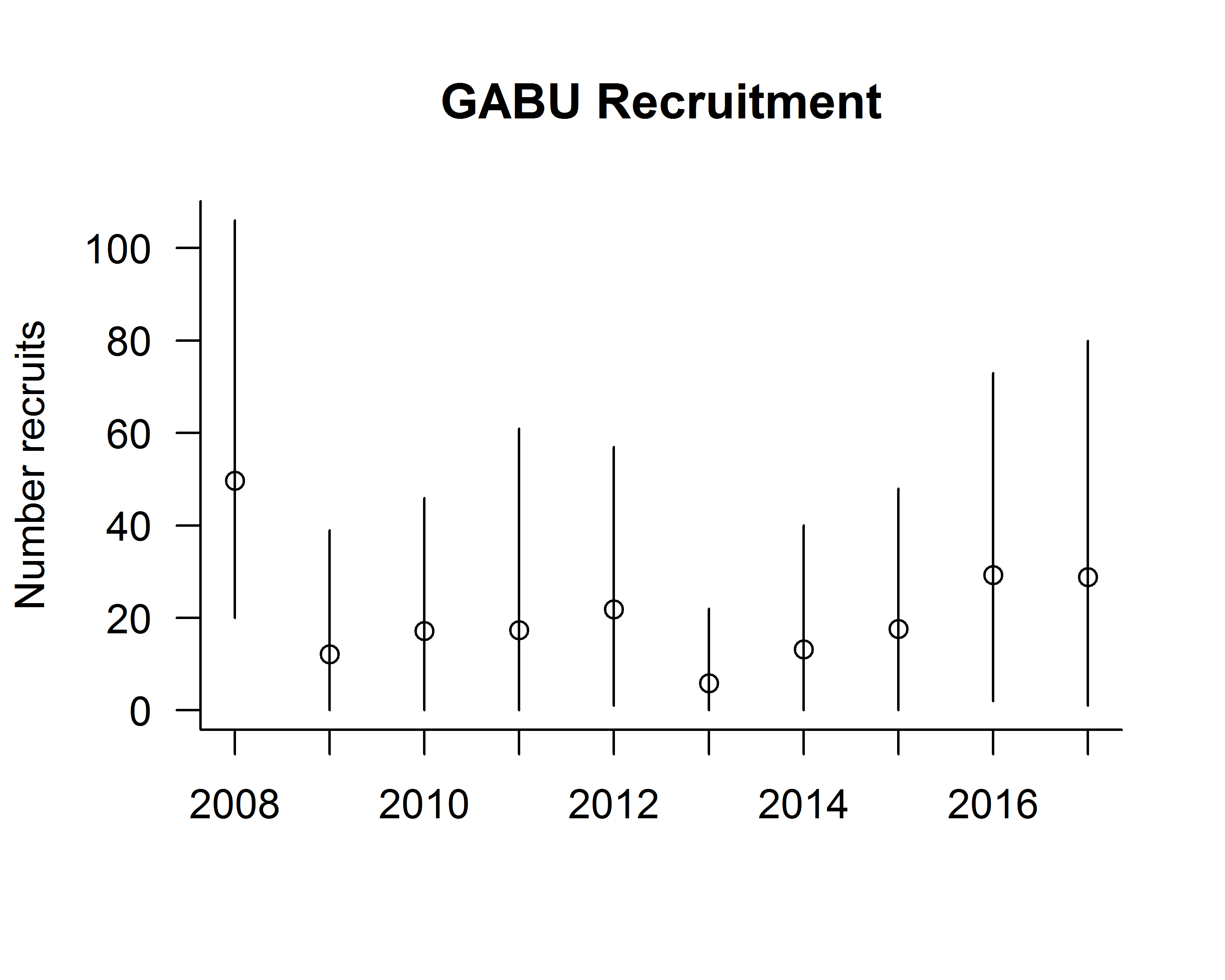
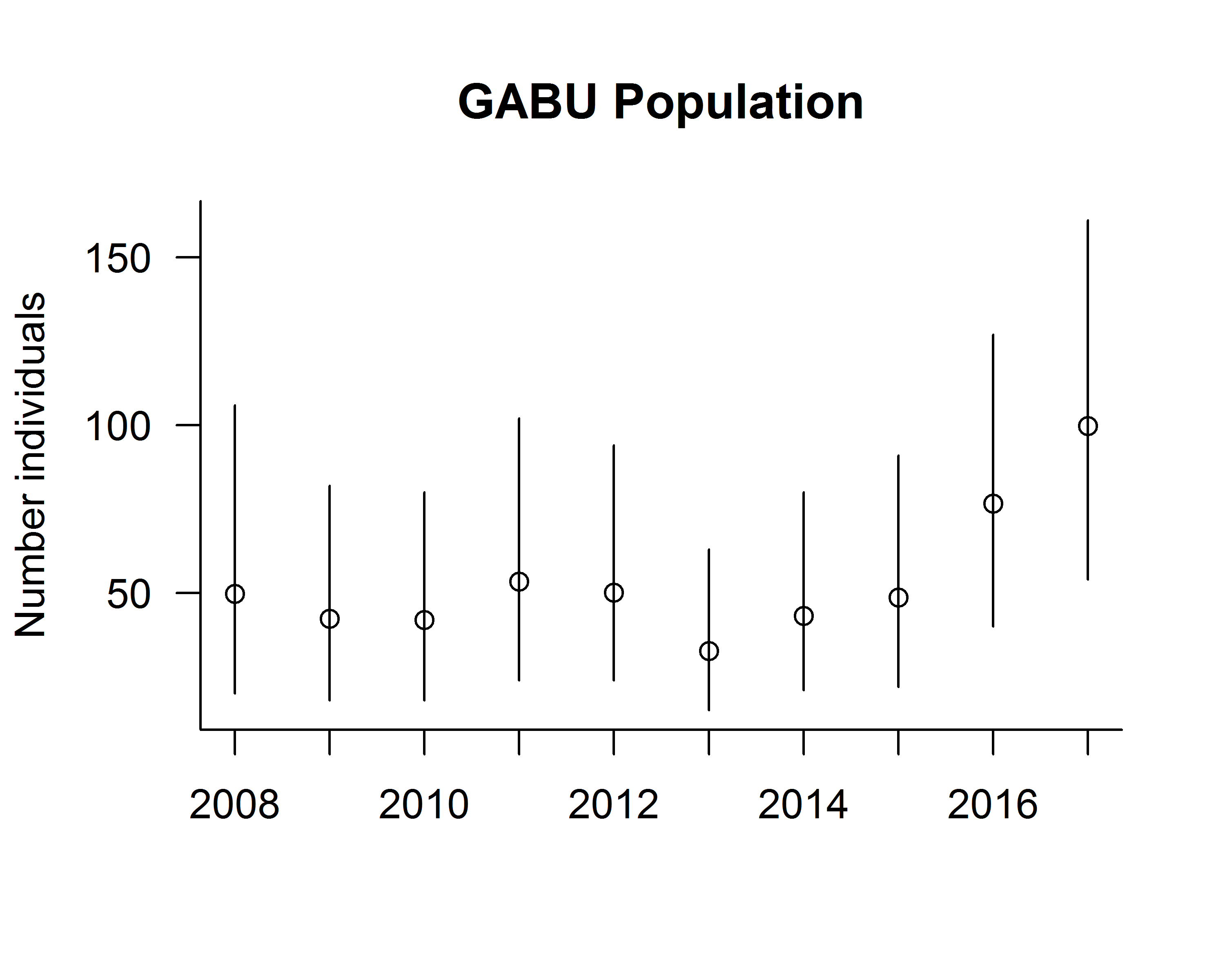
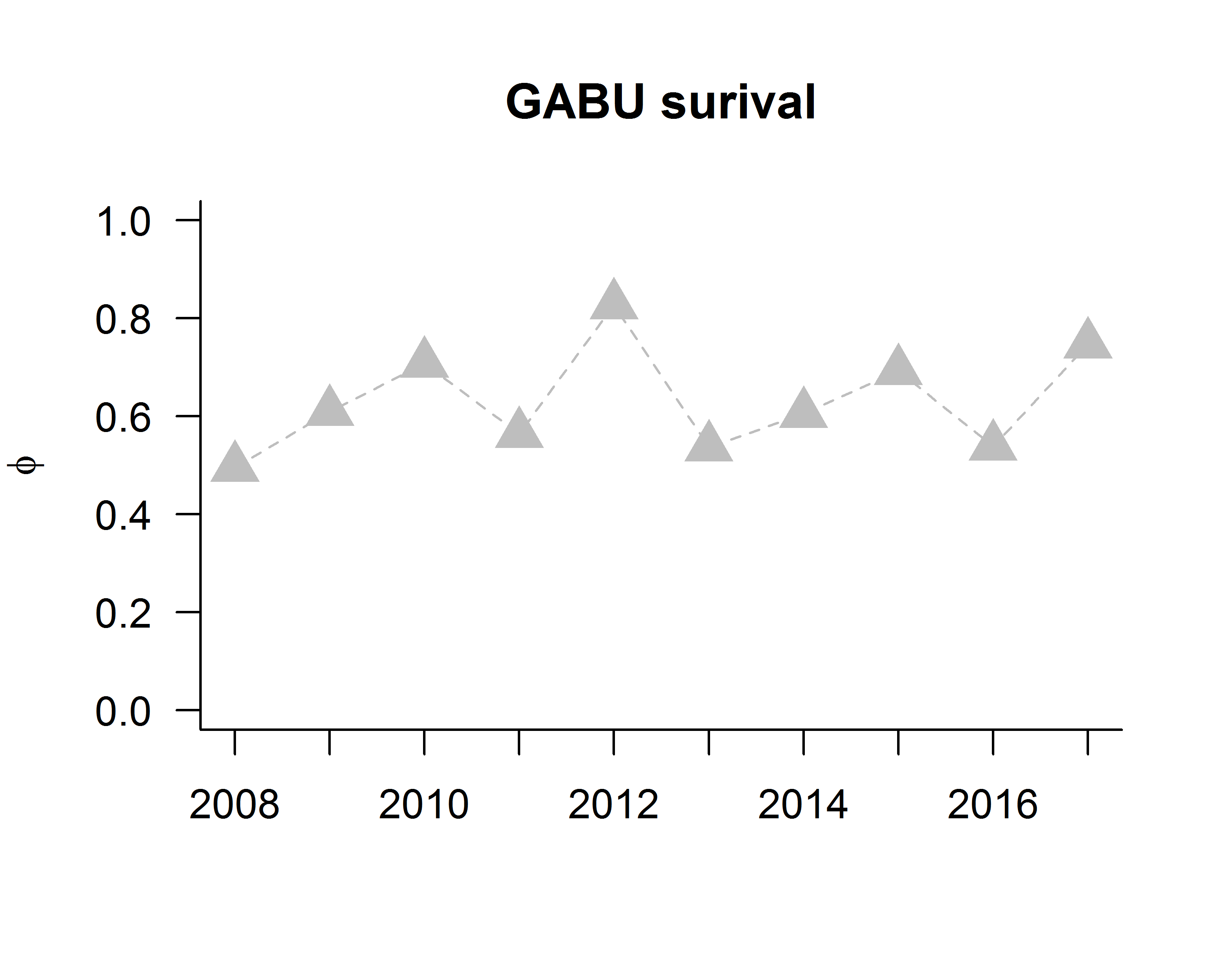
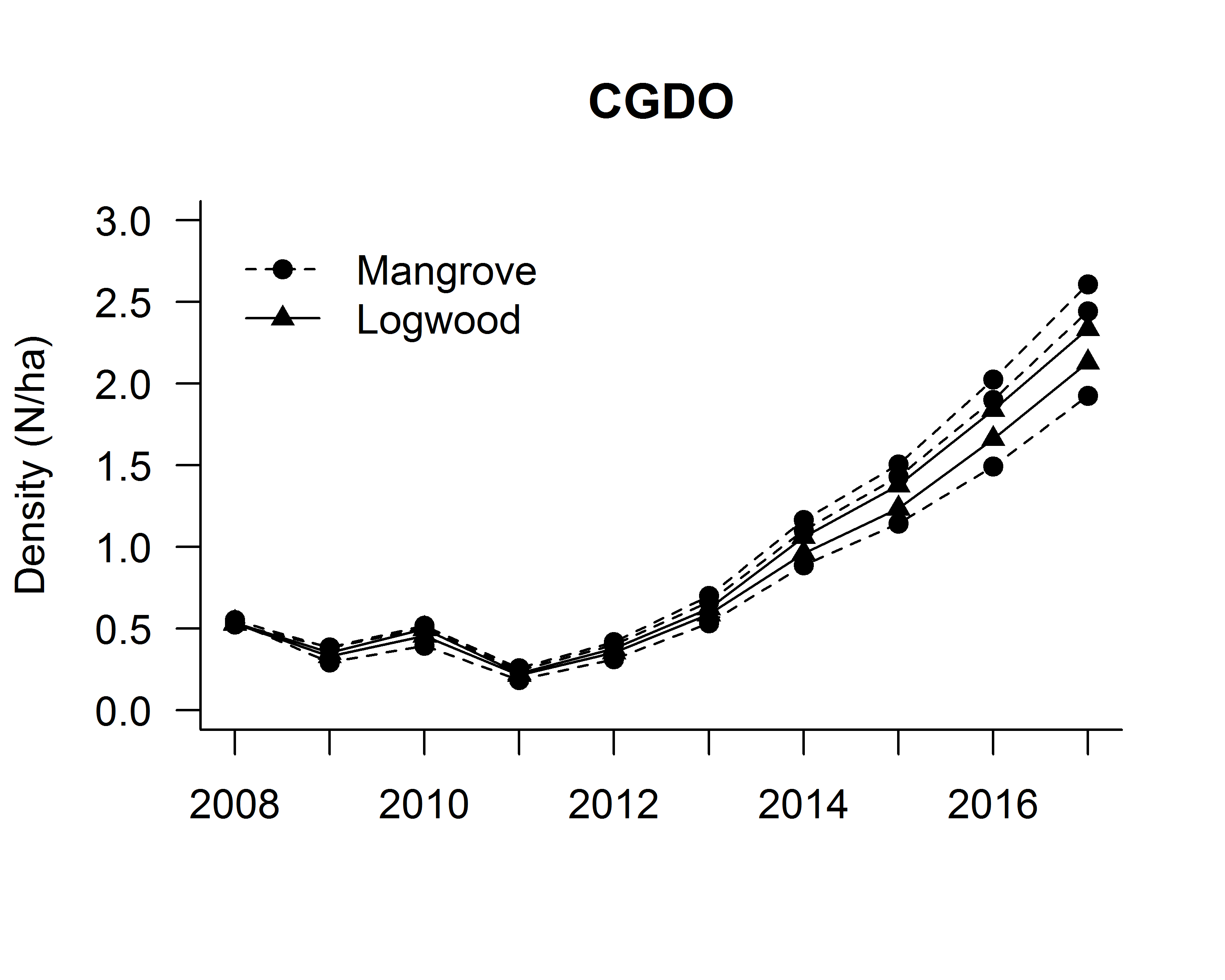
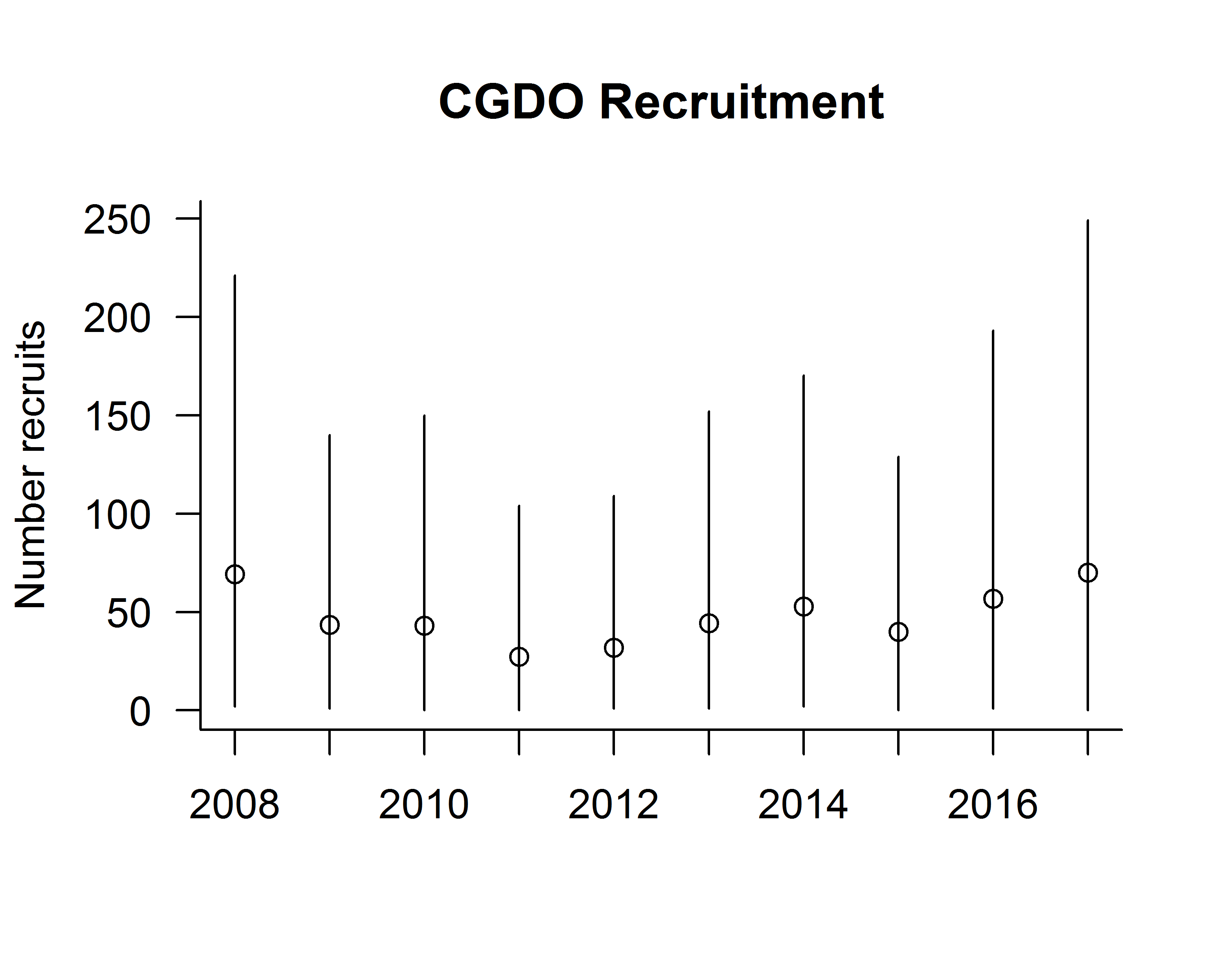
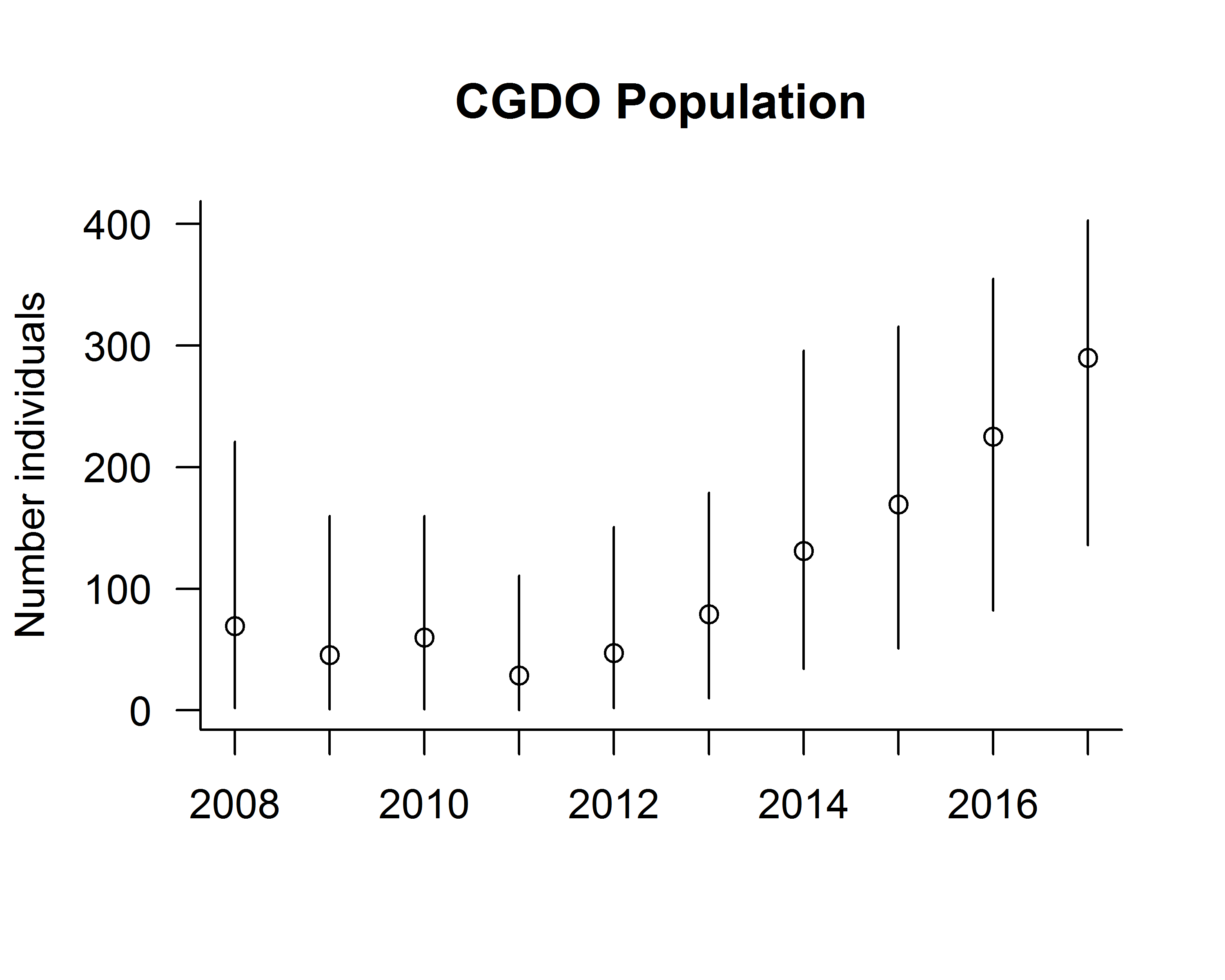
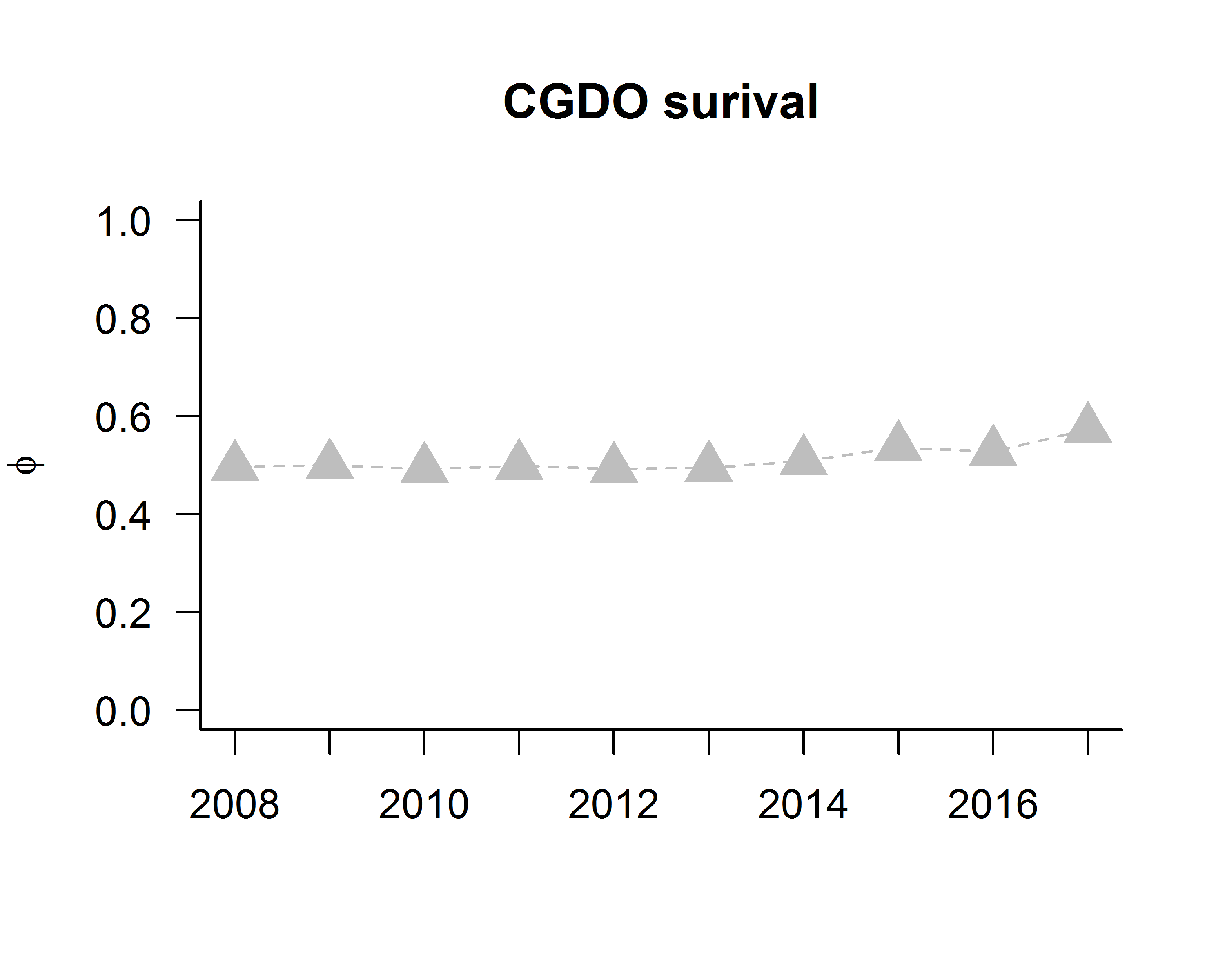
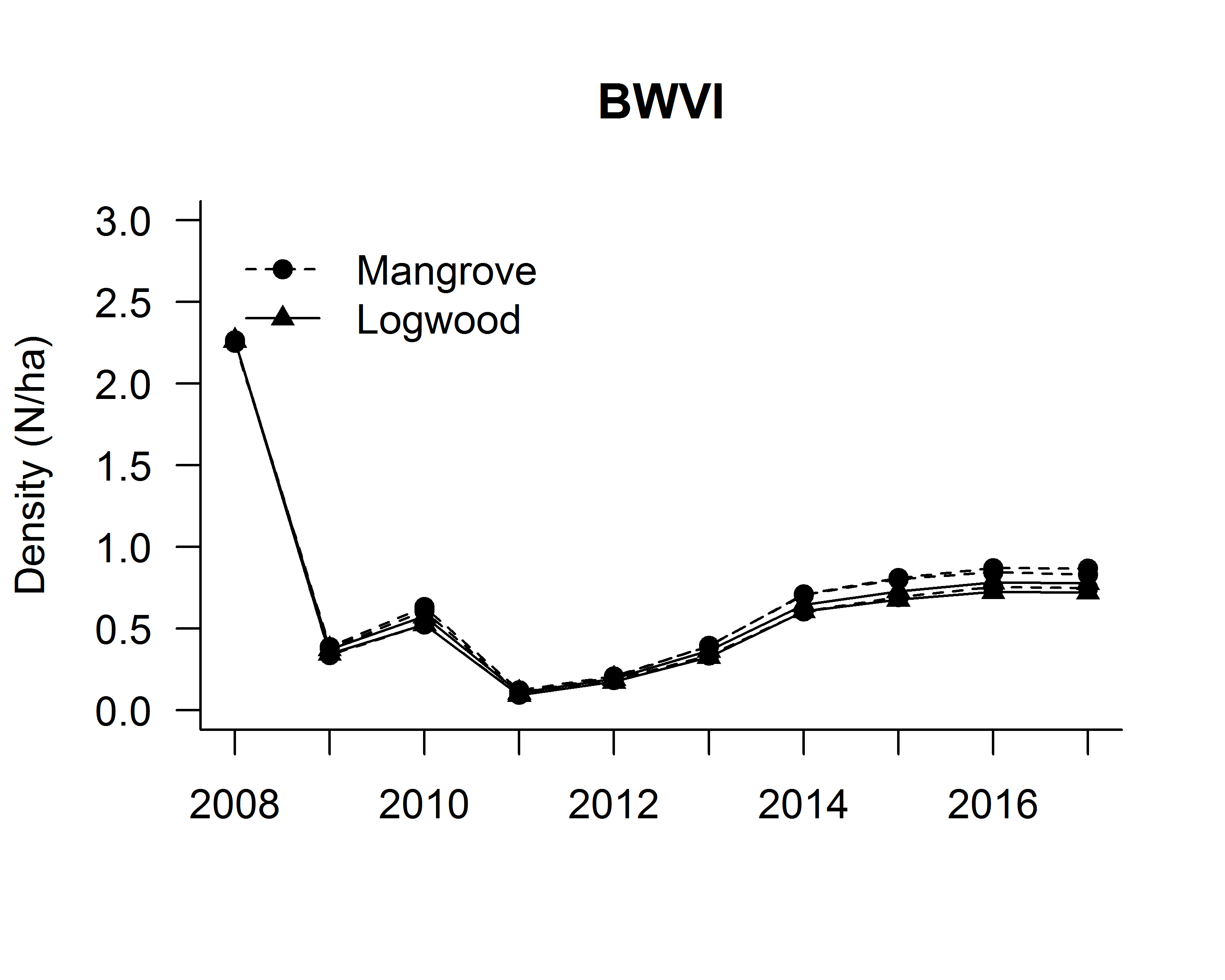
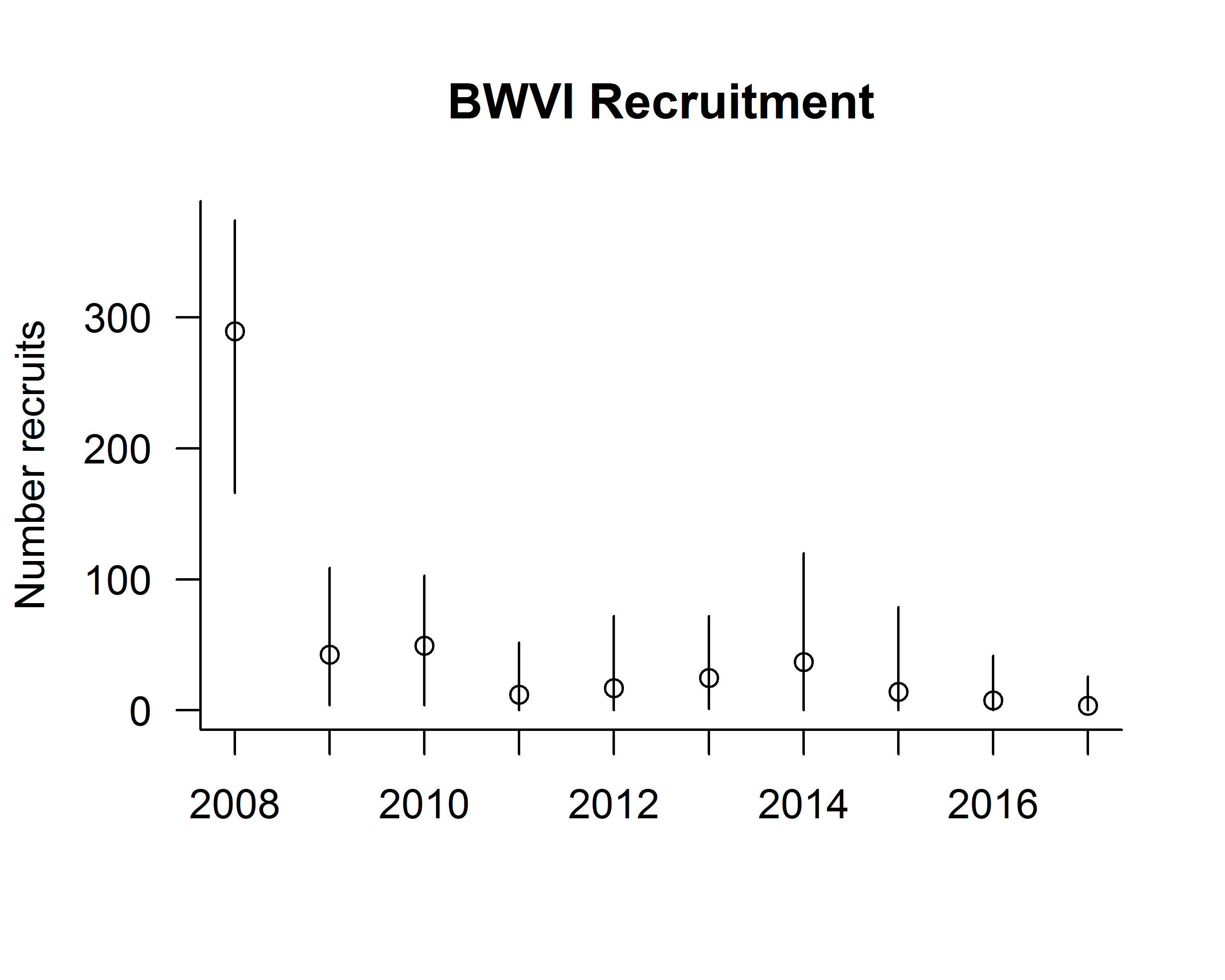
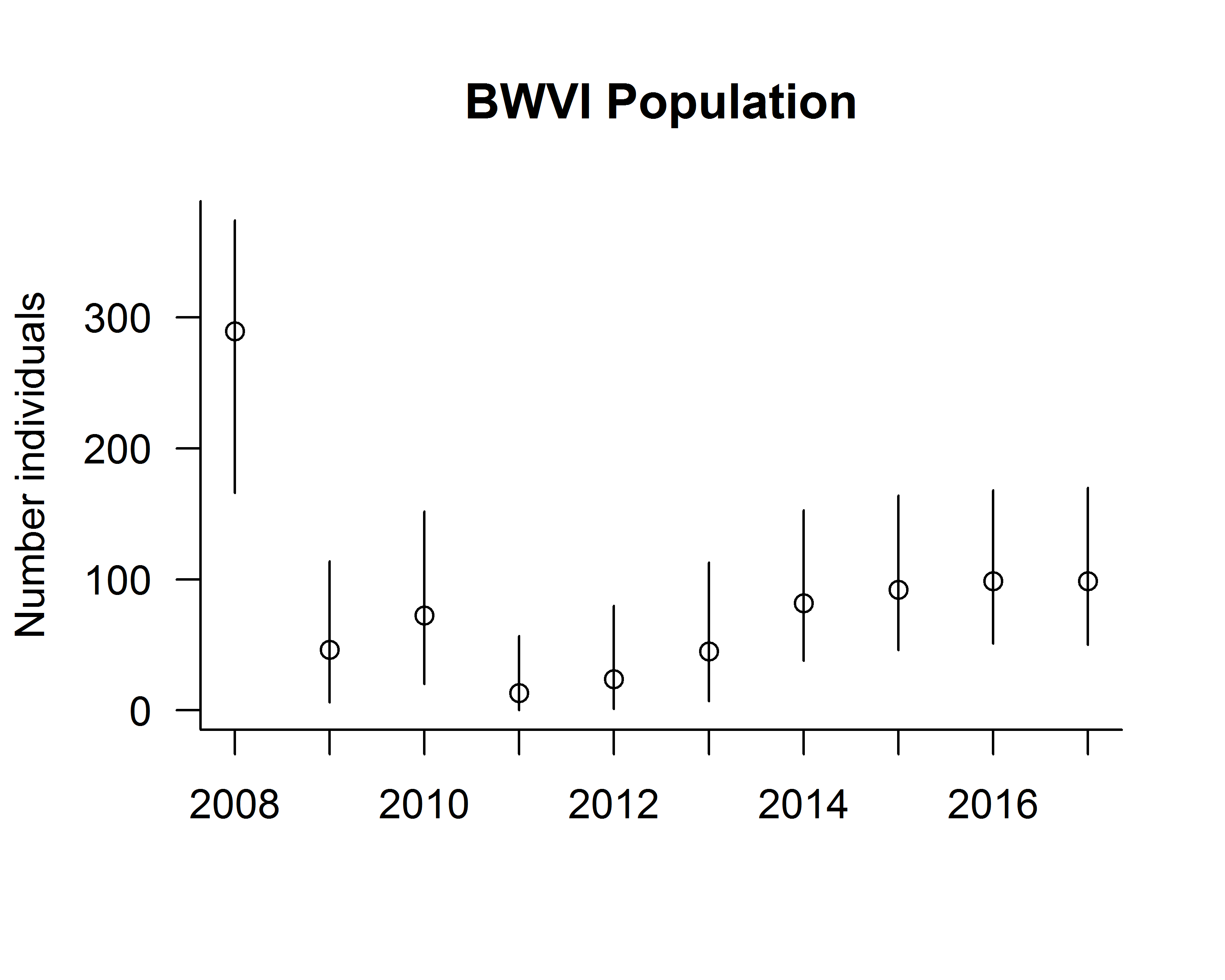
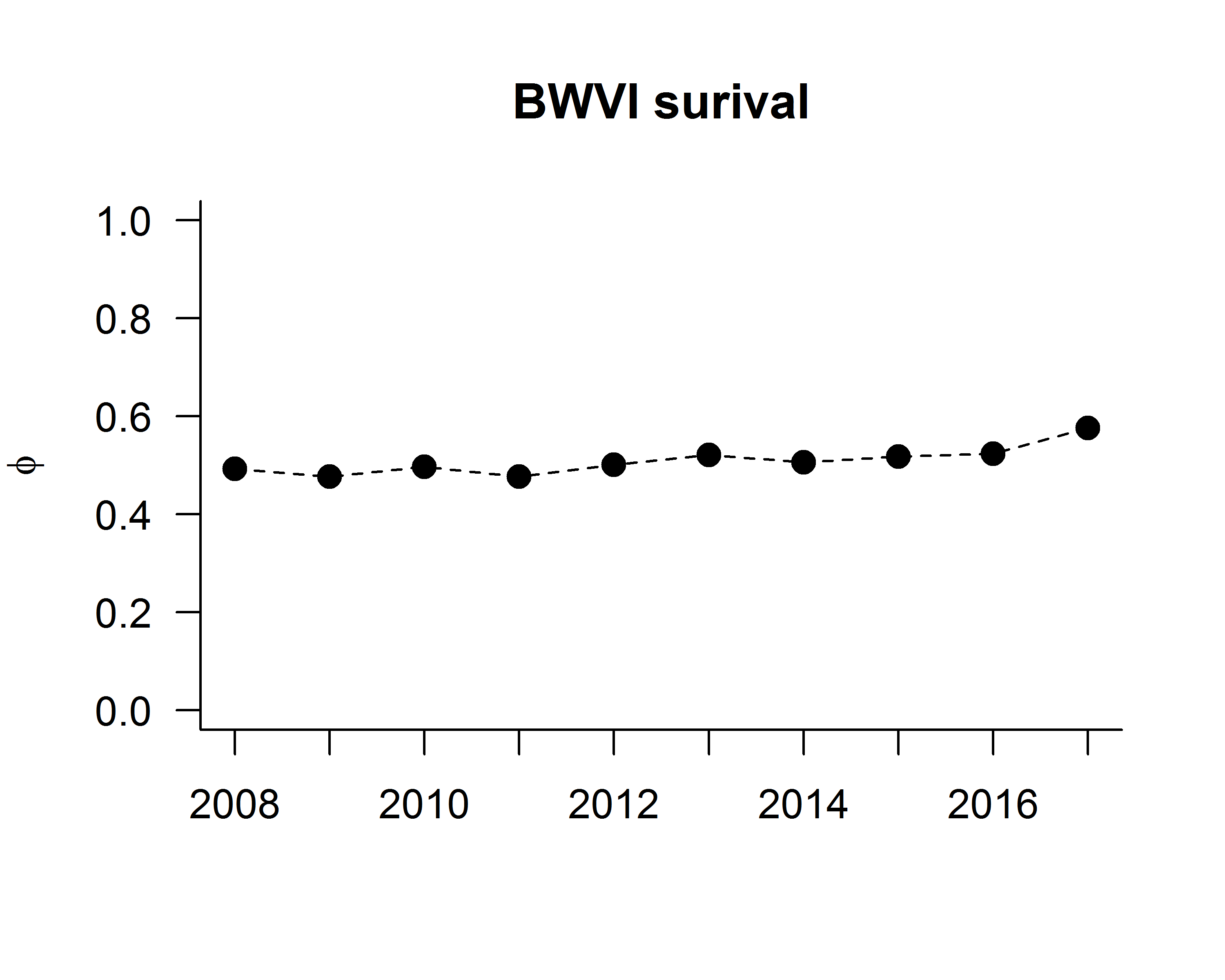
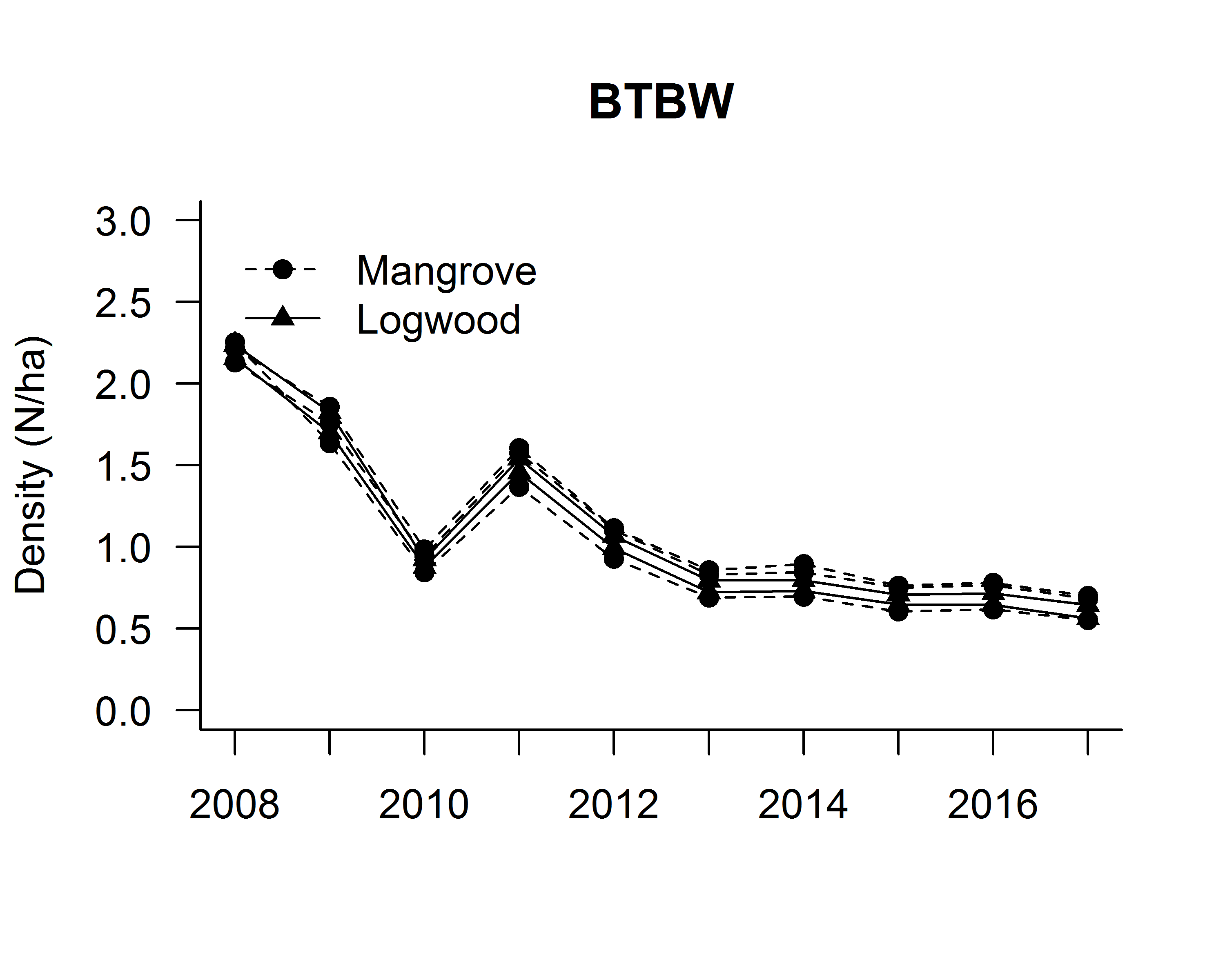
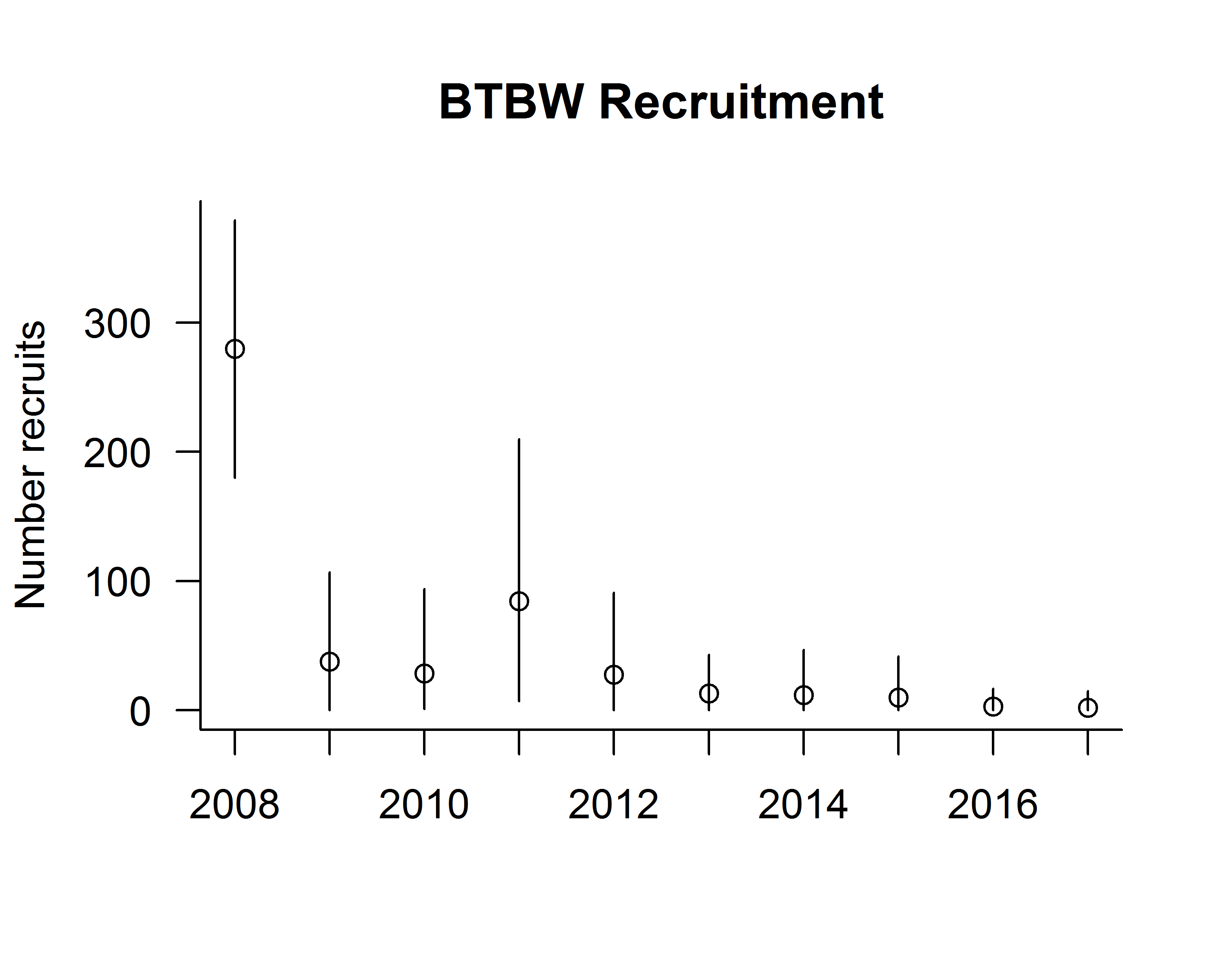
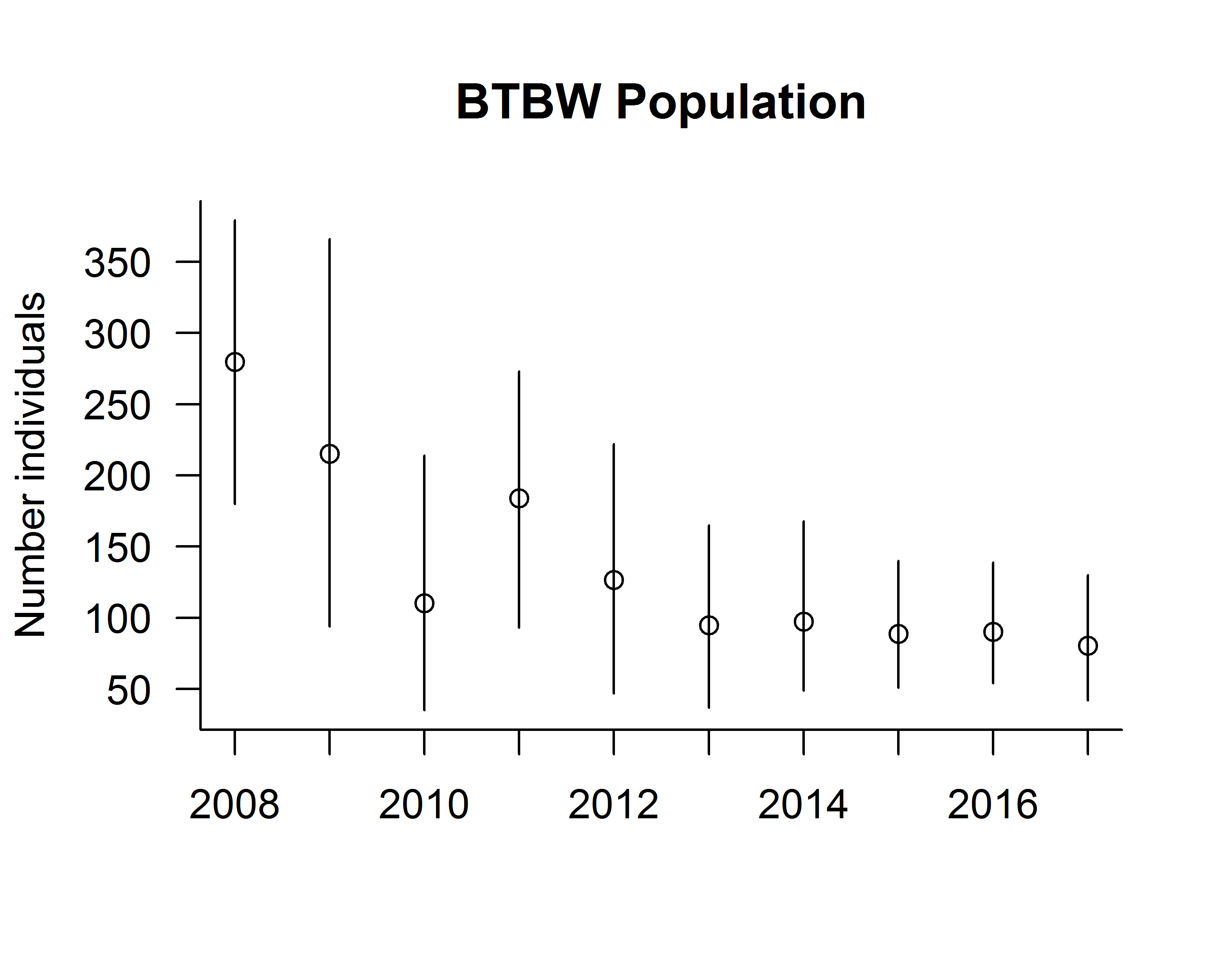
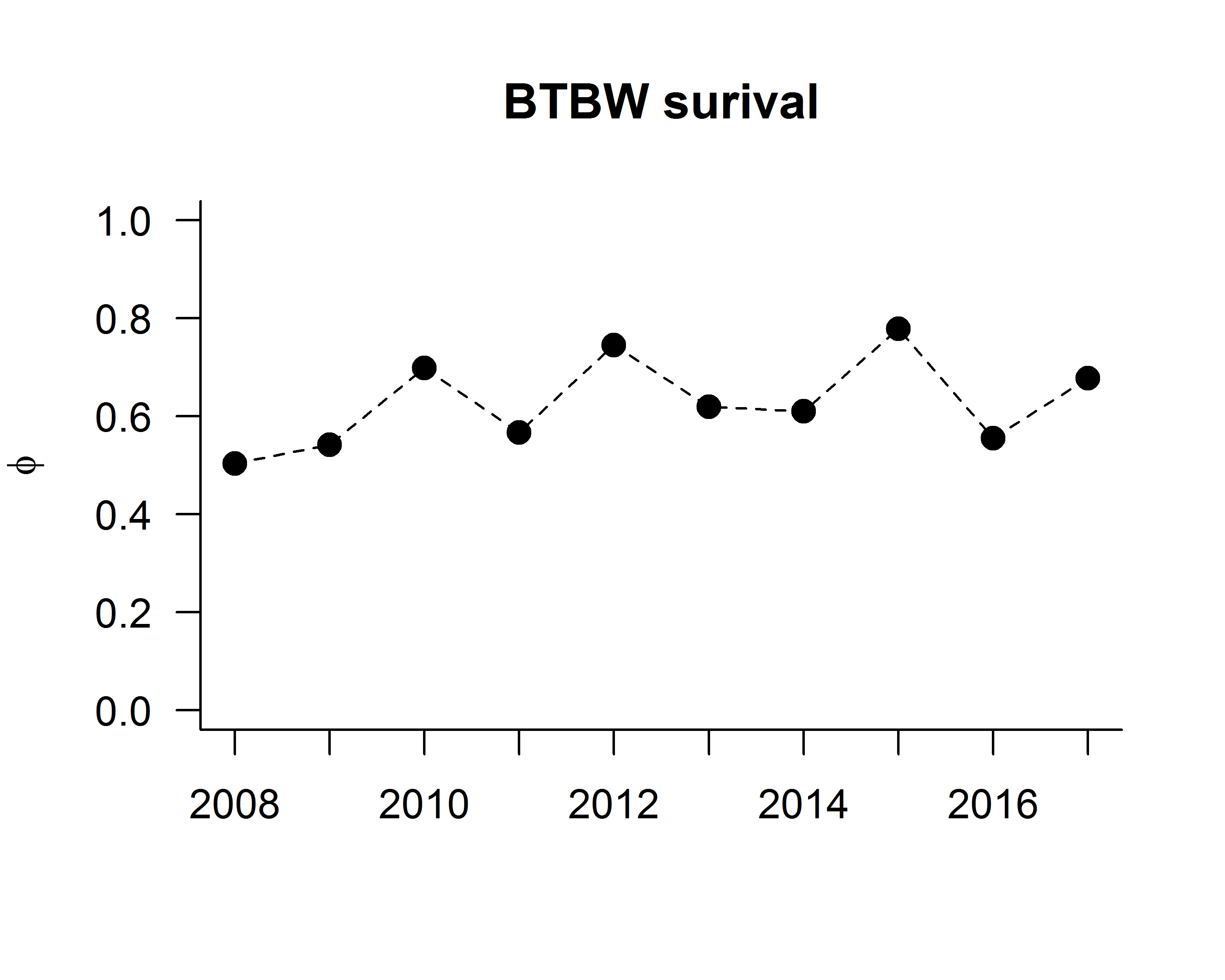
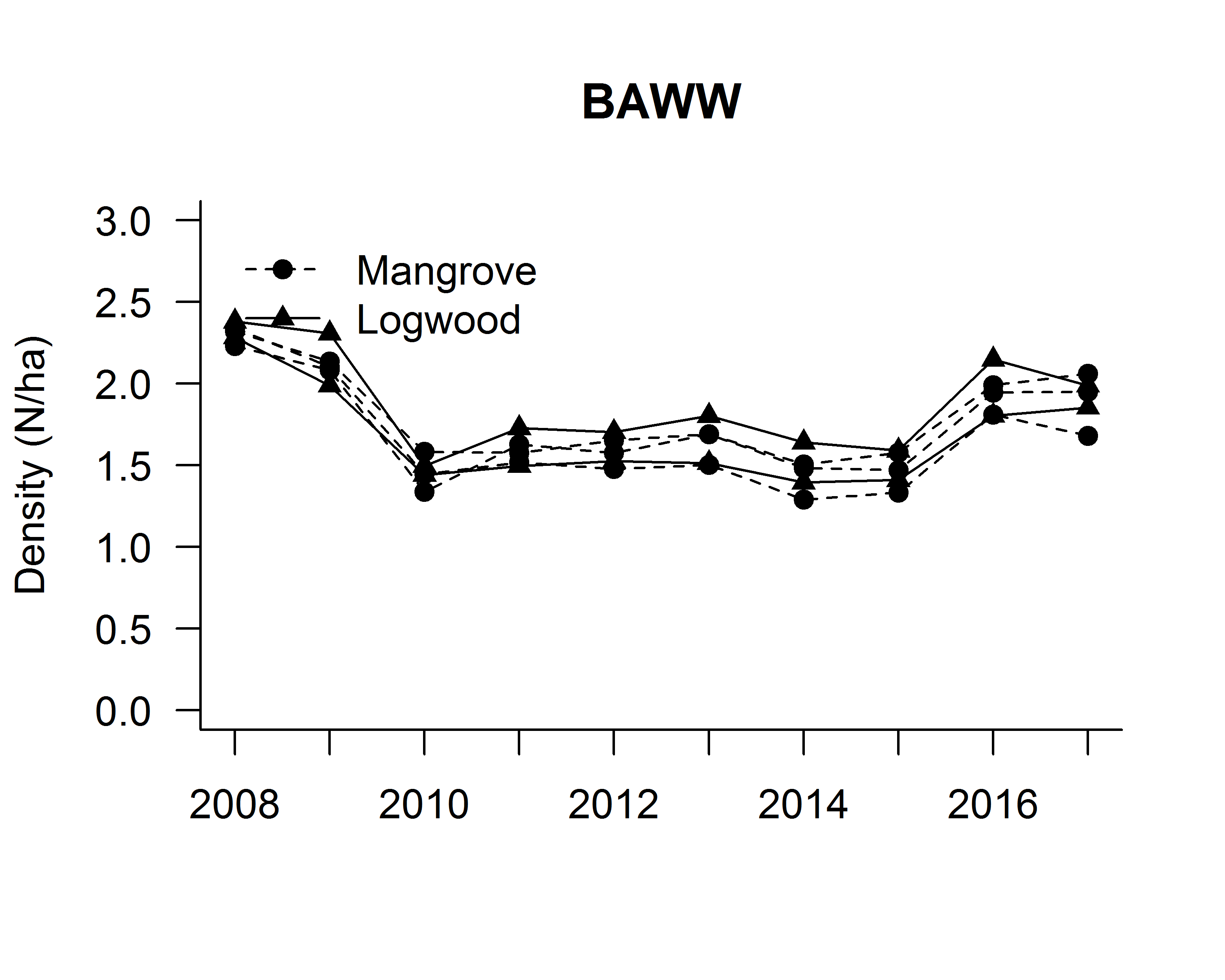
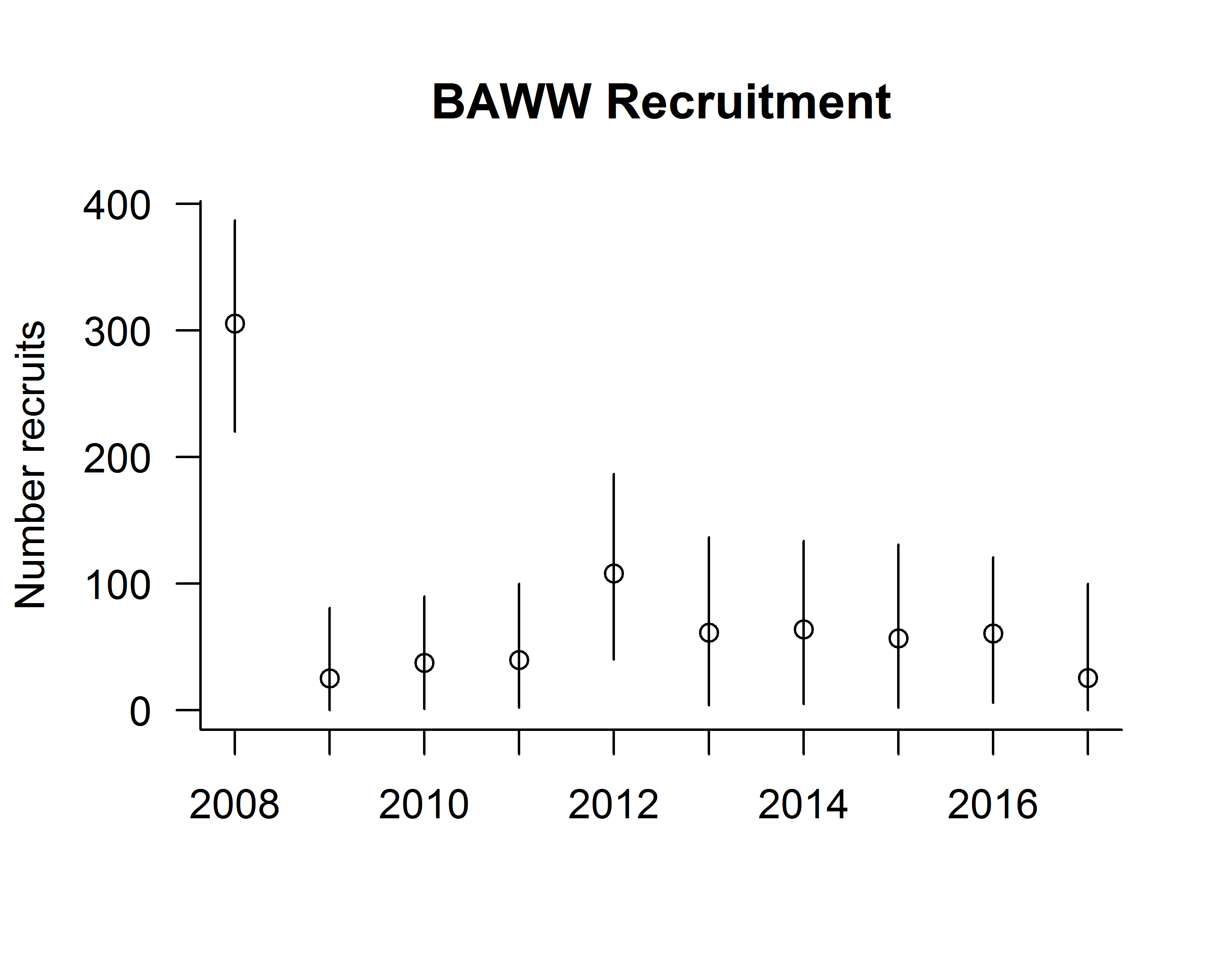
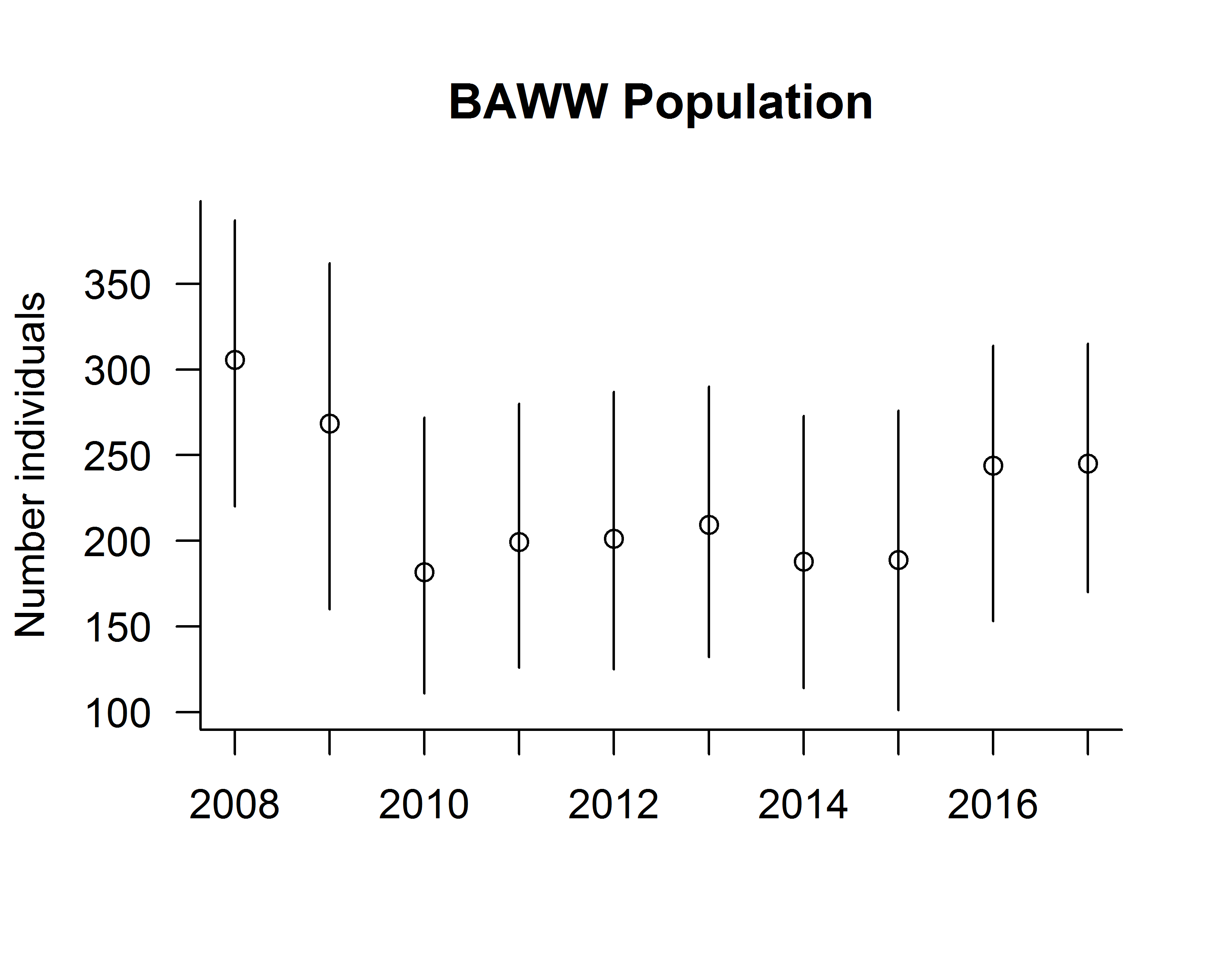
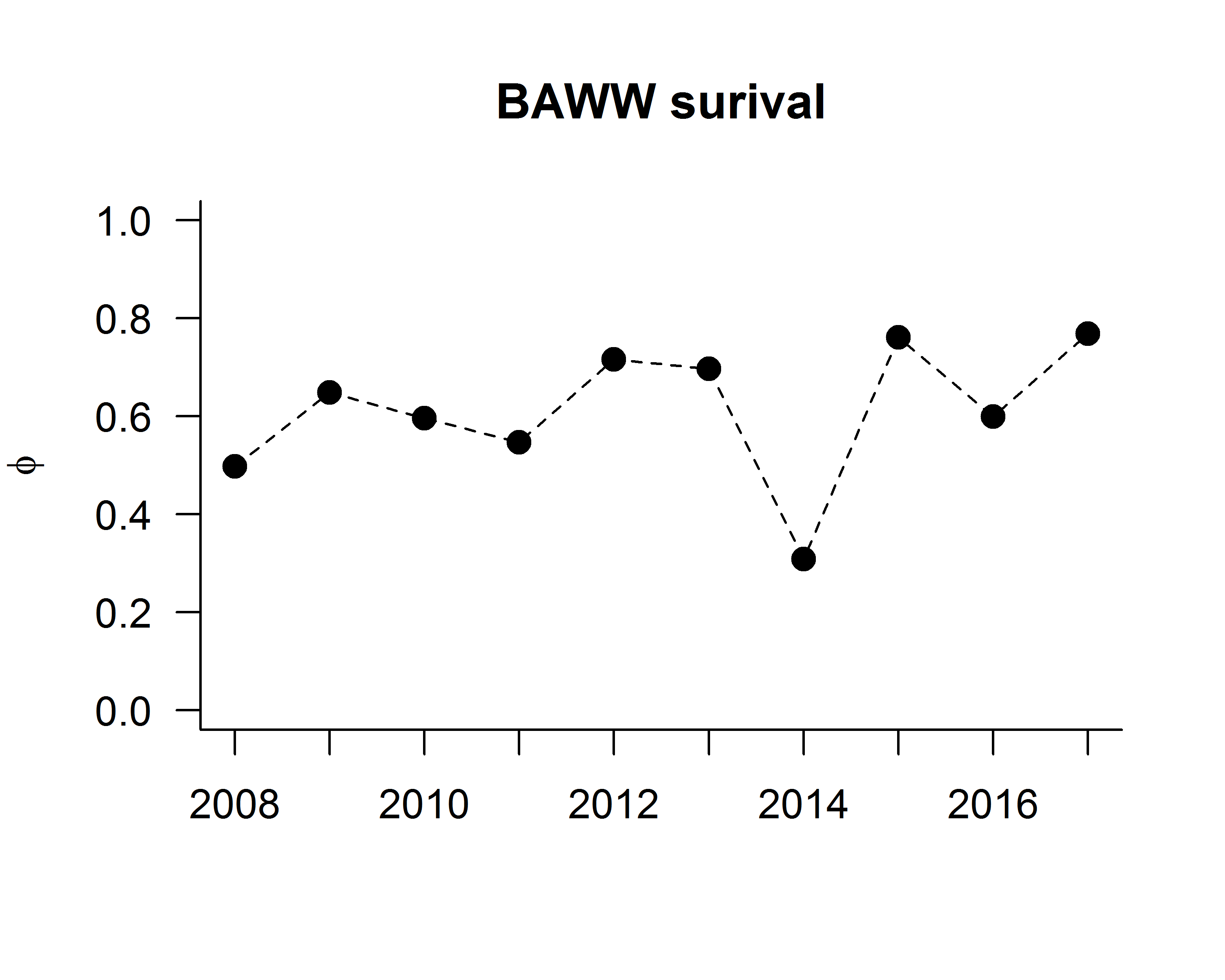
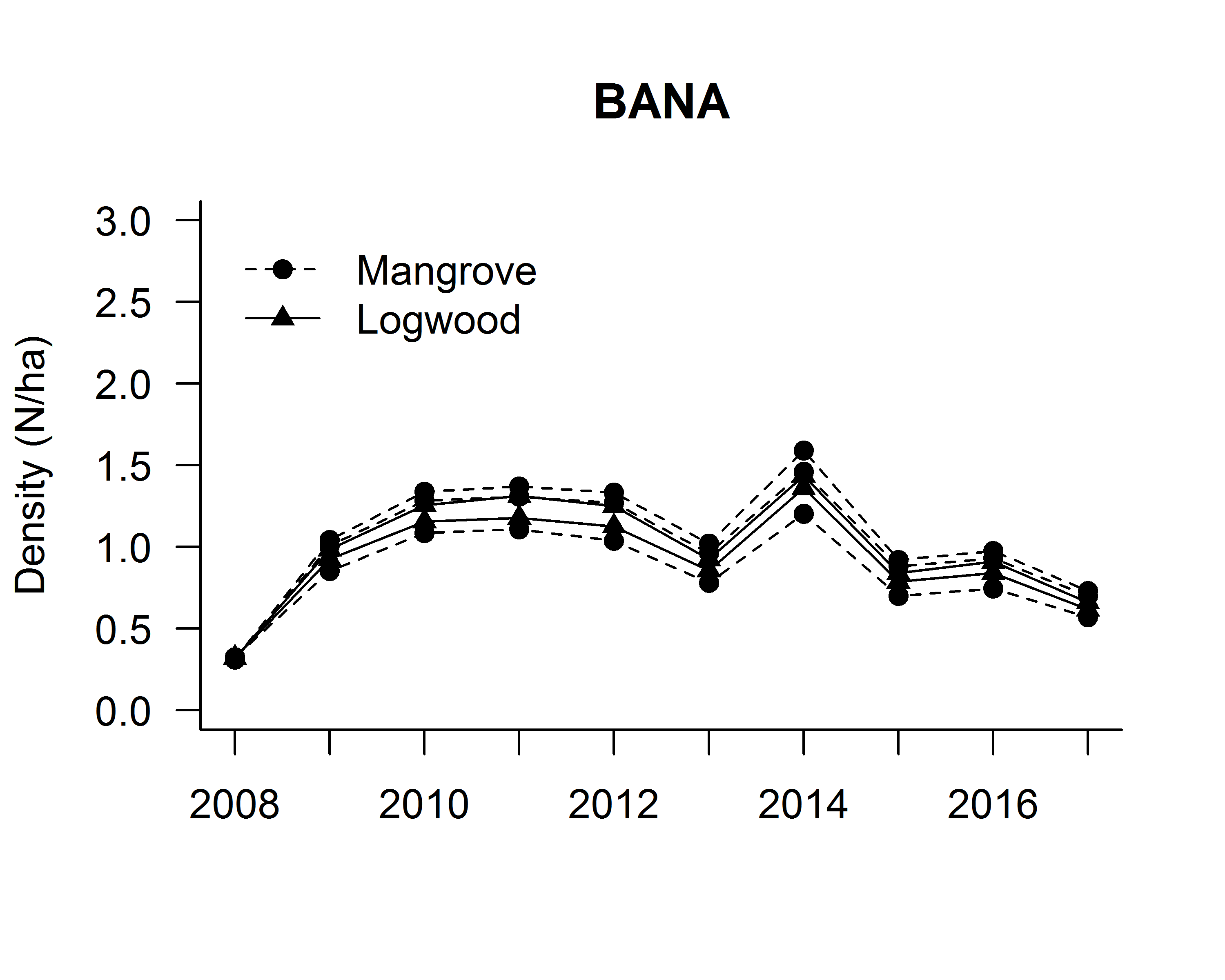
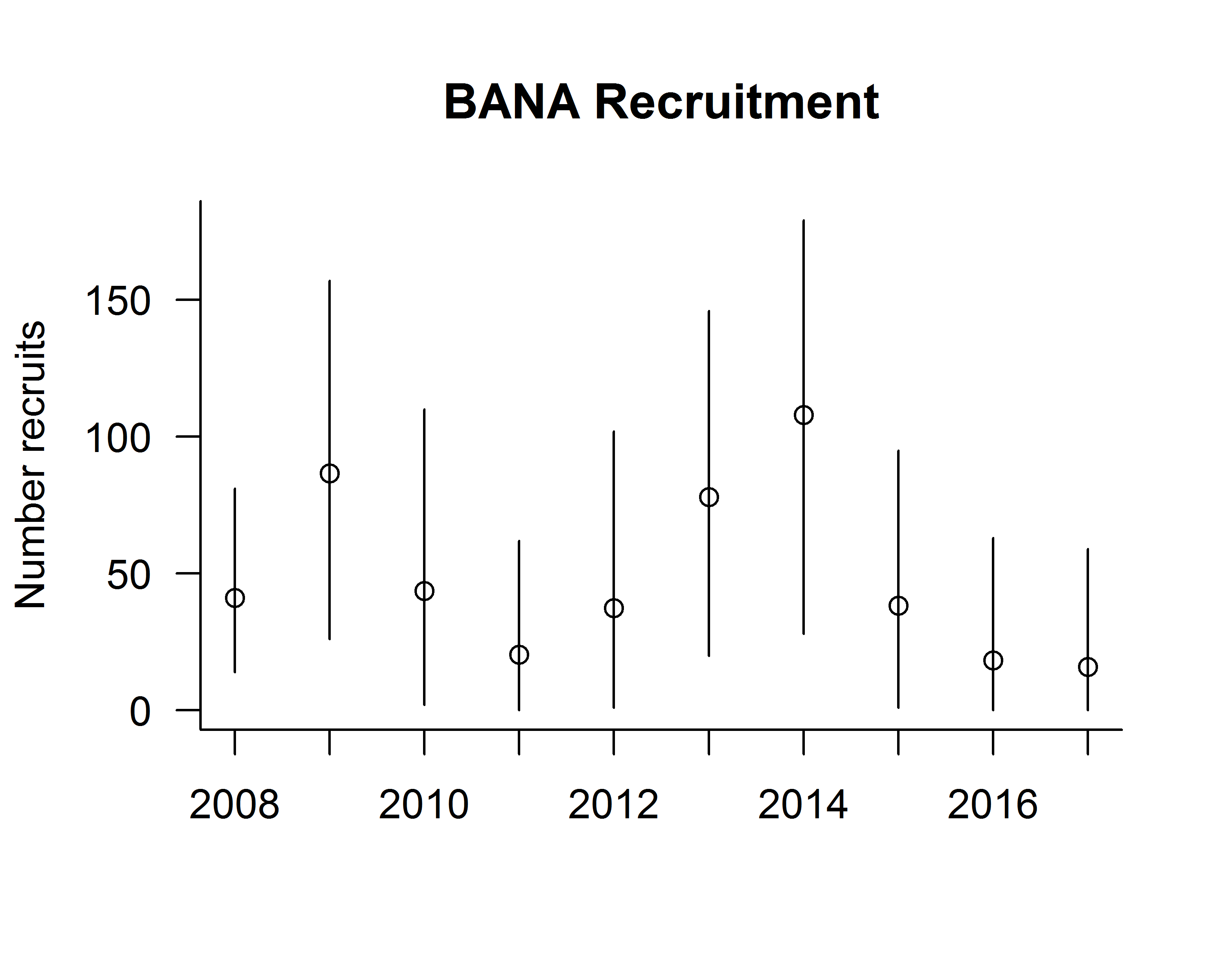
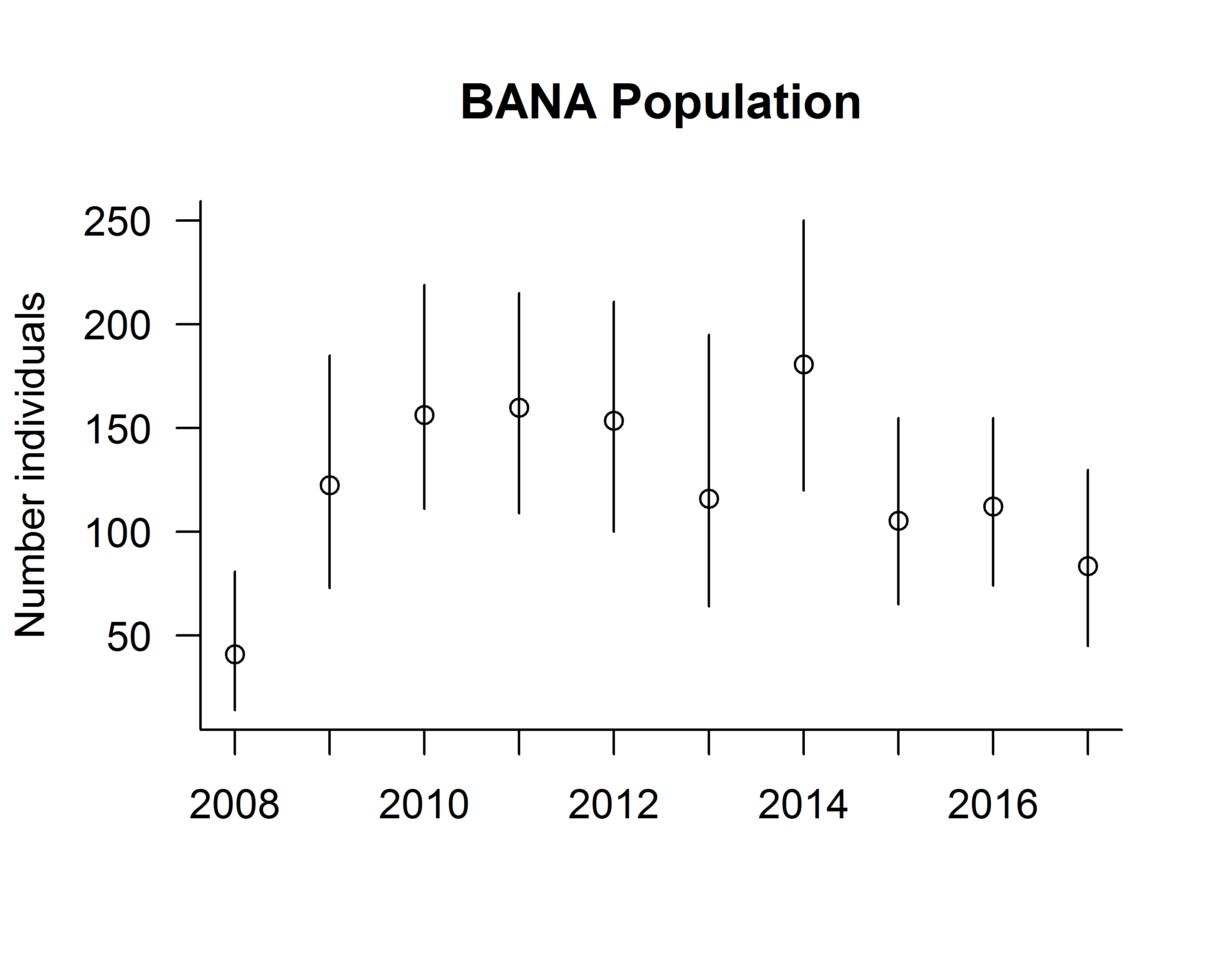
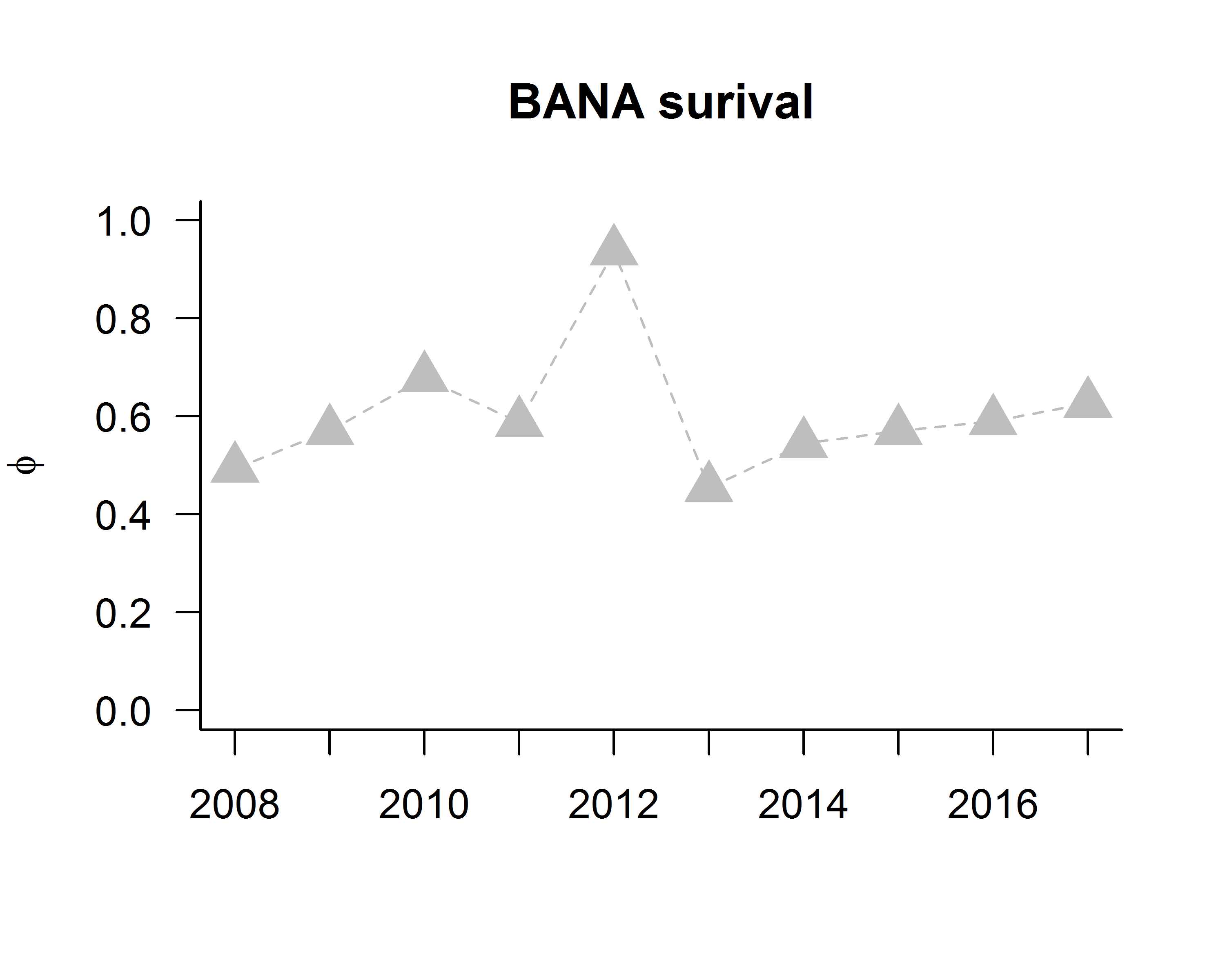
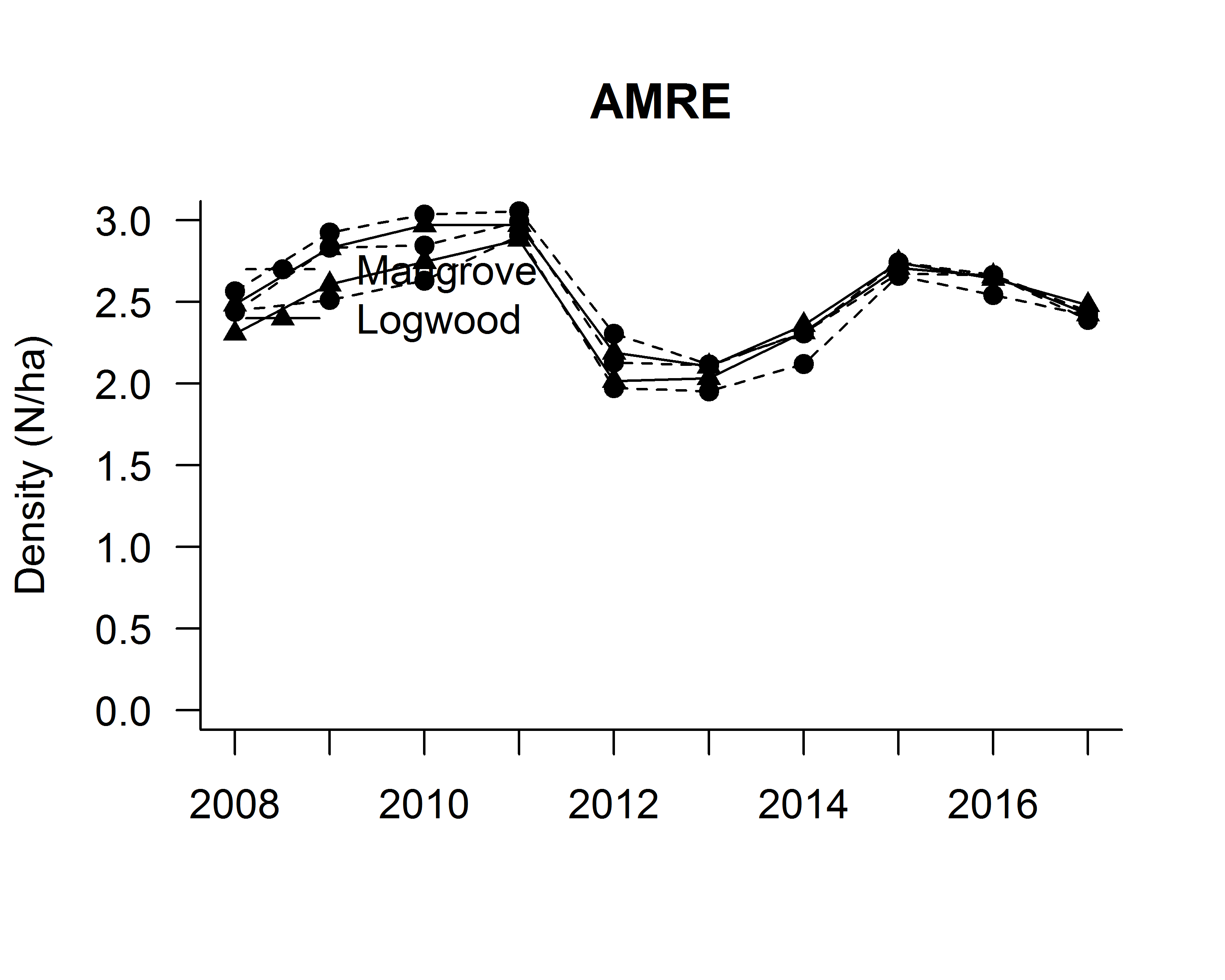
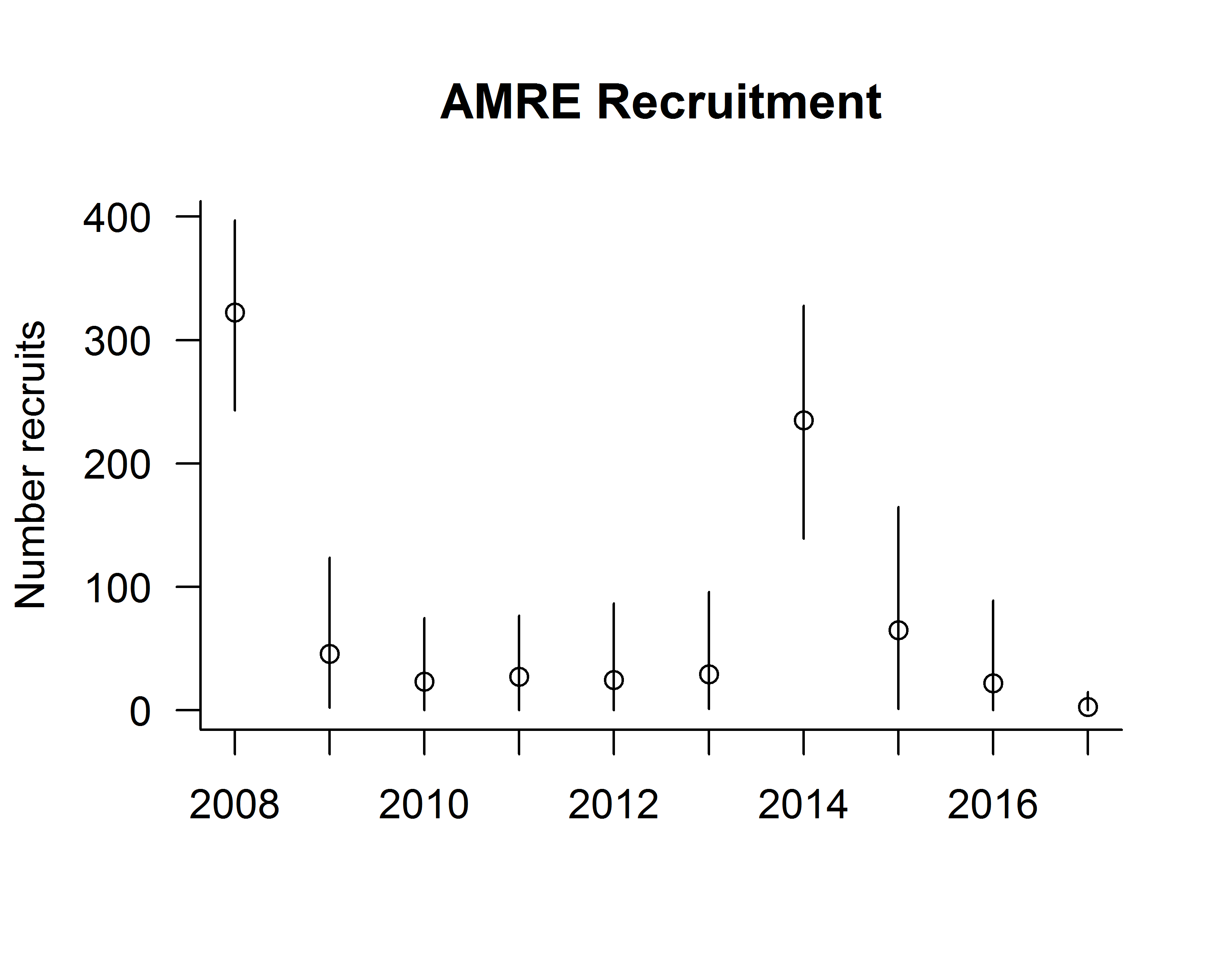
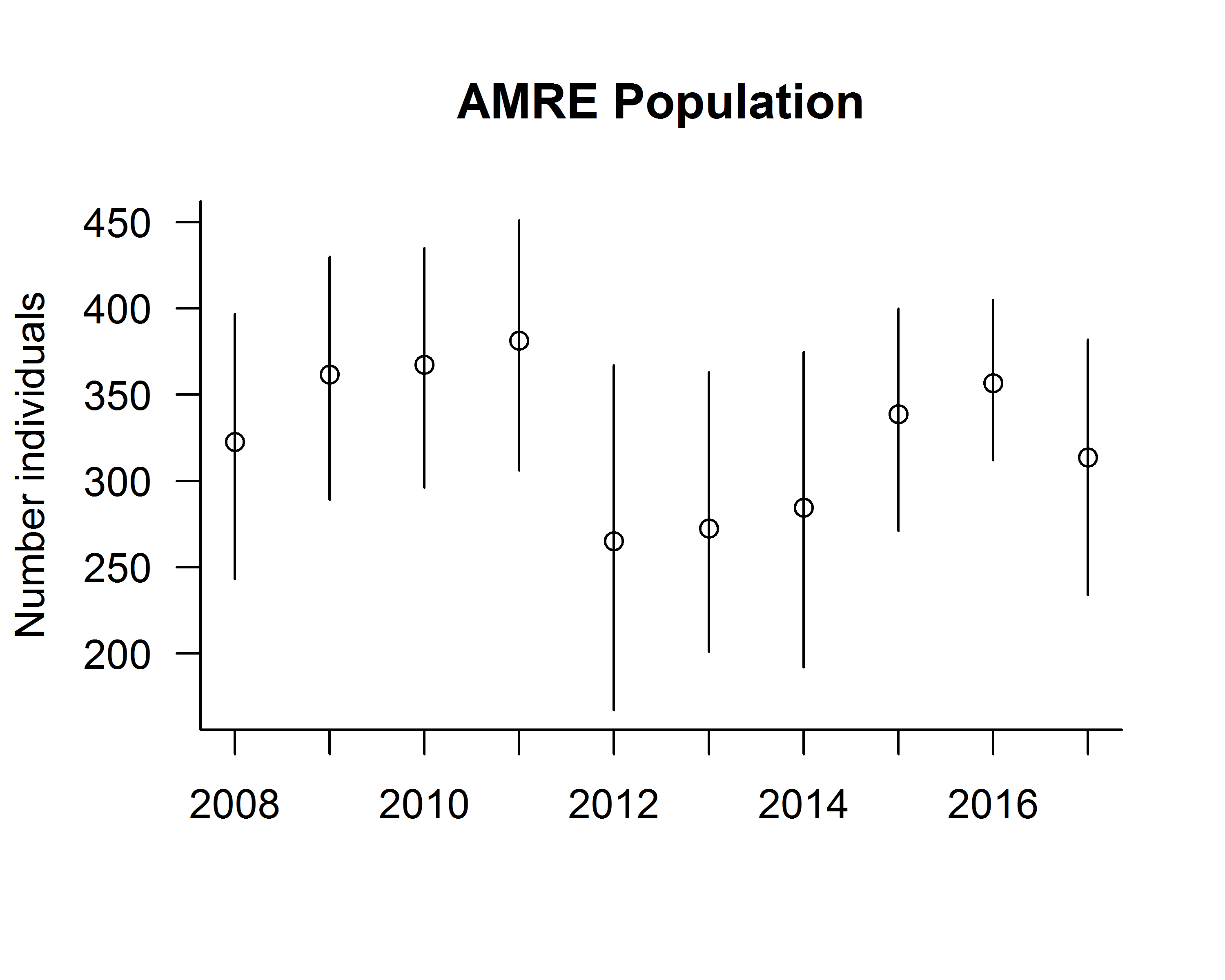
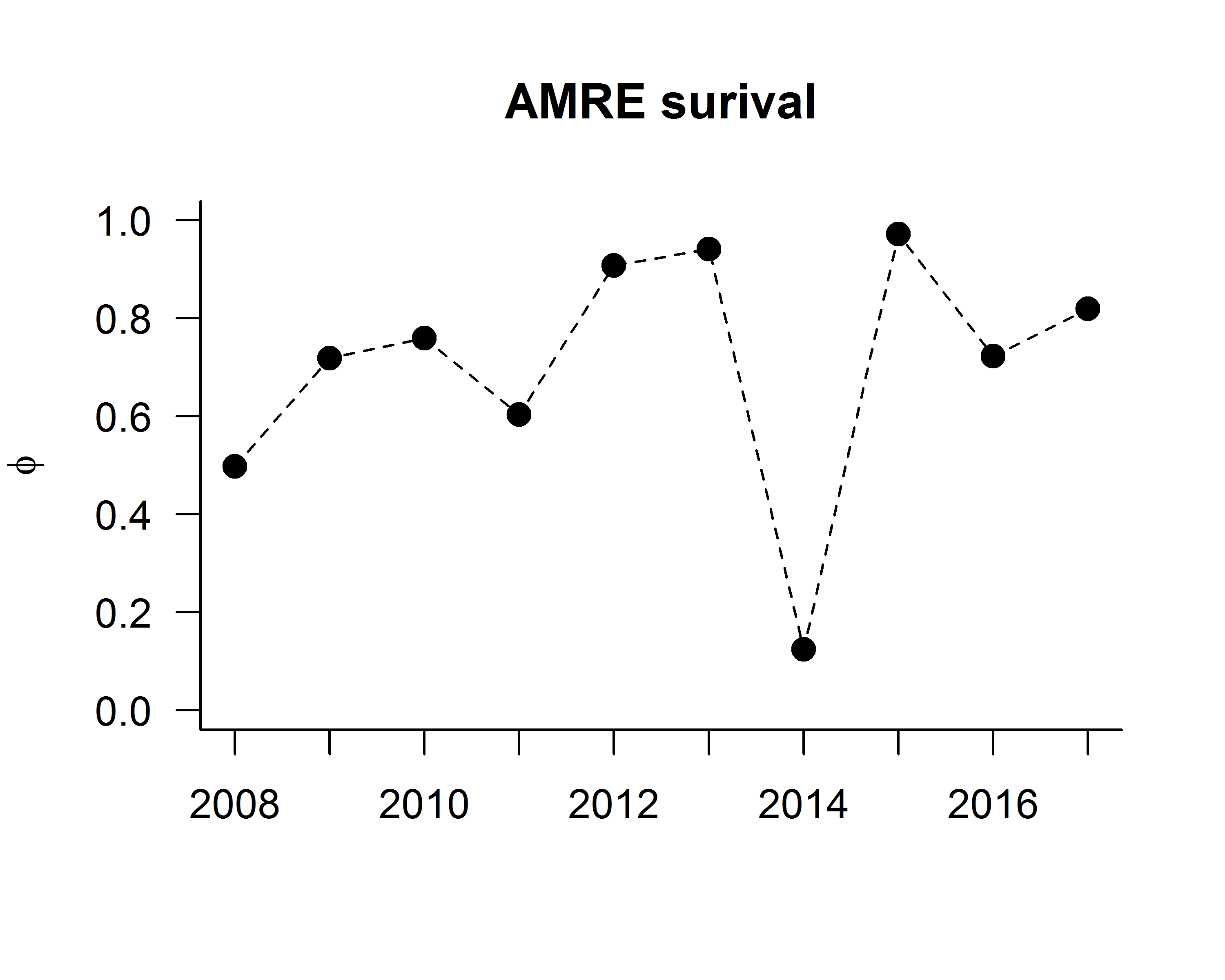


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Beta estimates for the effect of Precip, Temperature, Precip x Temperature and S.O.I index on survival. *Results are preliminary and based on 10,000 iterations. More iterations needed.*

###### PageBreak

Densities per plot



# Discussion

# Acknowledgements

# References

# Tables

# Figures

# Supplemental Information