

The Affects of Climate Change on Phenology and Migrating Birds

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Introduction

Phenology refers to the timing of events between organisms in a variety of ecosystems. Understanding the relationship between climate change and phenology is important because it can affect food availability for birds that are migrating to their wintering grounds. We are concerned that there is a mismatch between when birds are migrating and what plants are flowering and fruiting, as well as what insects are available, causing there to be a food shortage during vital months of migration. Previous studies have shown that plants are flowering and fruiting earlier in the season (Cleland et al. 2007). If this trend continues to show that there is a mismatch between food availability and when birds are migrating, there could be serious consequences for birds that have not yet adapted to these environmental changes.



Figure 1: Map of the study sites, Sundew and Alder trail, on Schoodic peninsula, Acadia National Park, ME.

Methods

- Survey 2 sites within 7 days of each other
- Ten 12 meter mist-net lanes at each site with 10 subplots per net lane
- Count unripe, ripe, and past-ripe fruit of any of the 8 target species in each 2mx1m subplots
- Open 4 insect traps on each net lane by adding soapy water, and collected them 48 hours later for them to be dried in the oven and weighed
- Randomly cover 4 of the 8 target species per net lane with a mesh bag to prevent birds from eating the fruit, allowing us to determine when fruit is falling off the plant rather than being consumed by the birds

2015

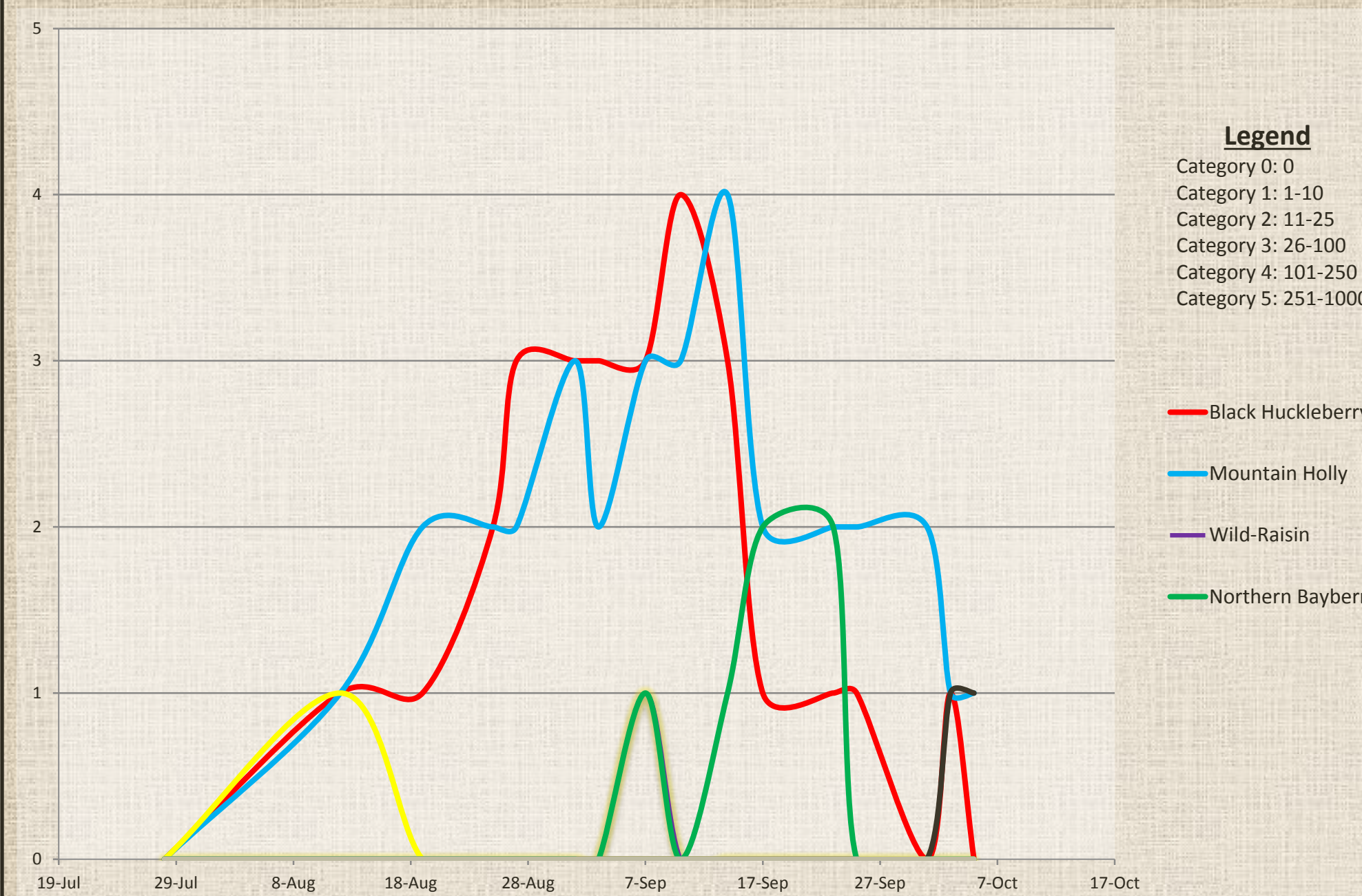


Figure 2: Abundance of 4 most common fruiting species when ripe at Sundew between the months of July-October in fall of 2015.

2015

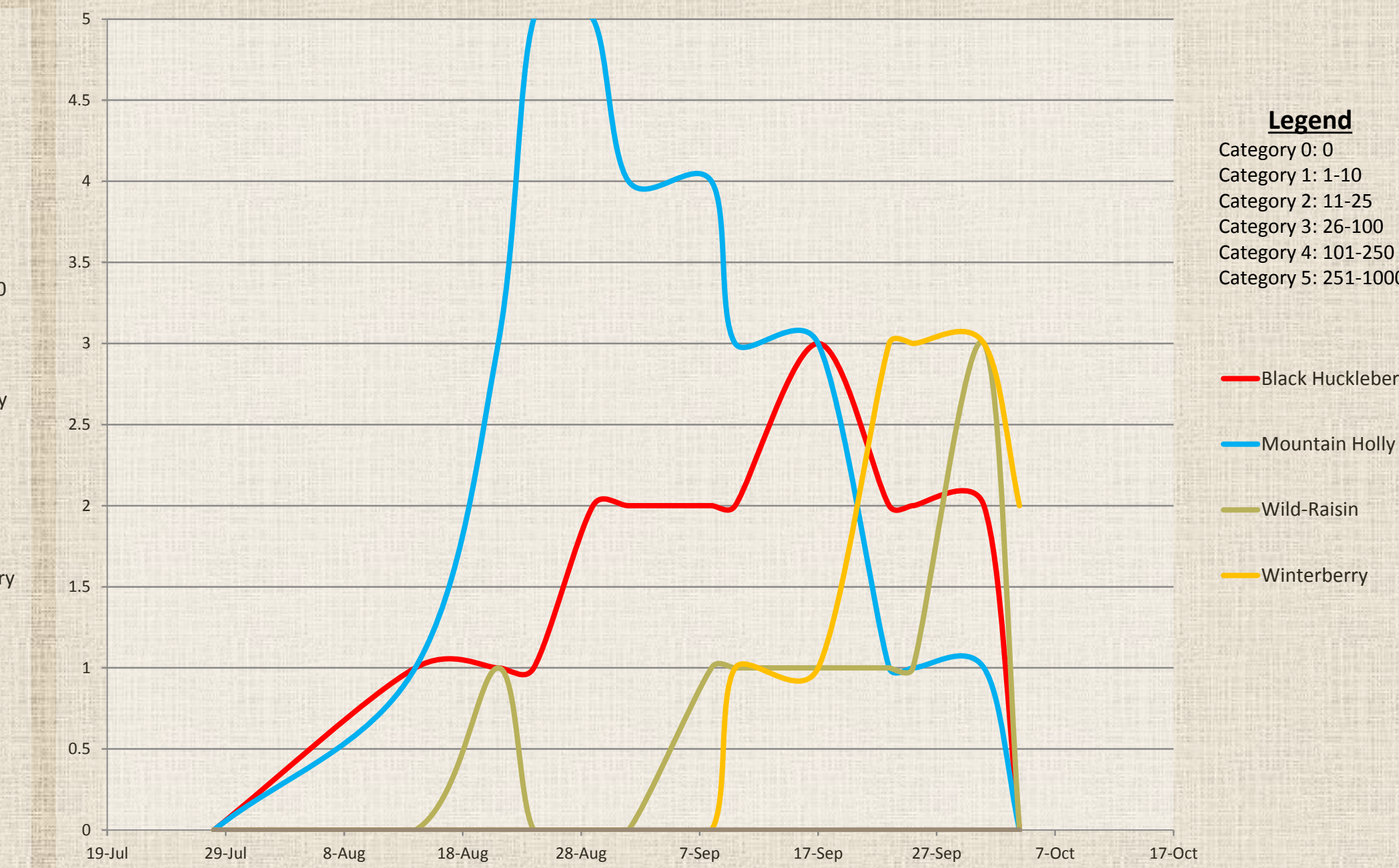


Figure 3: Abundance of 4 most common fruiting species when ripe at Alder between the months of July-October in fall of 2015.

2016



Figure 4: Abundance of 4 most common fruiting species when ripe at Sundew between the months of July-October in fall of 2016.

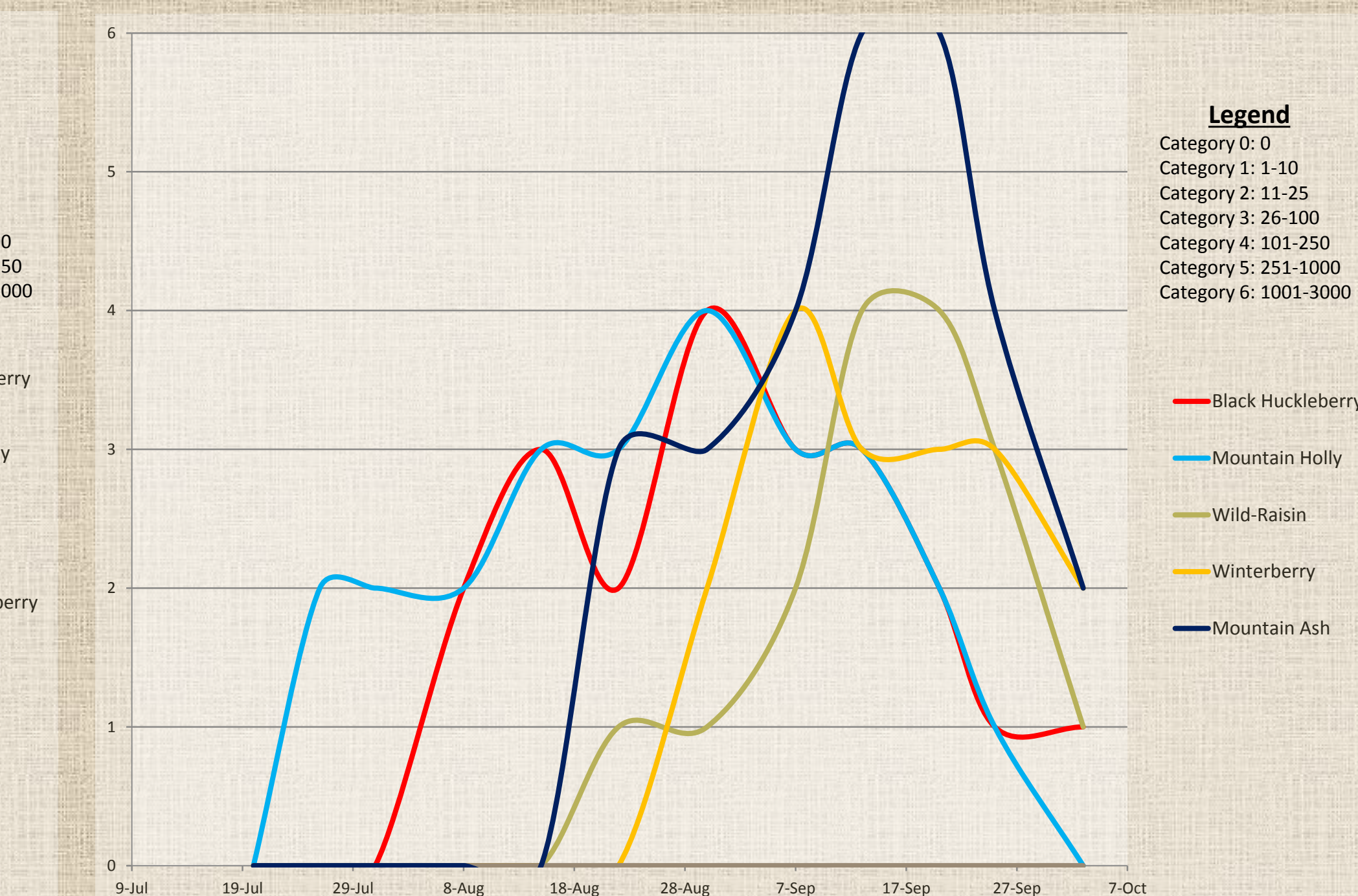


Figure 5: Abundance of 5 most common fruiting species when ripe at Alder between the months of July-October in fall of 2016.

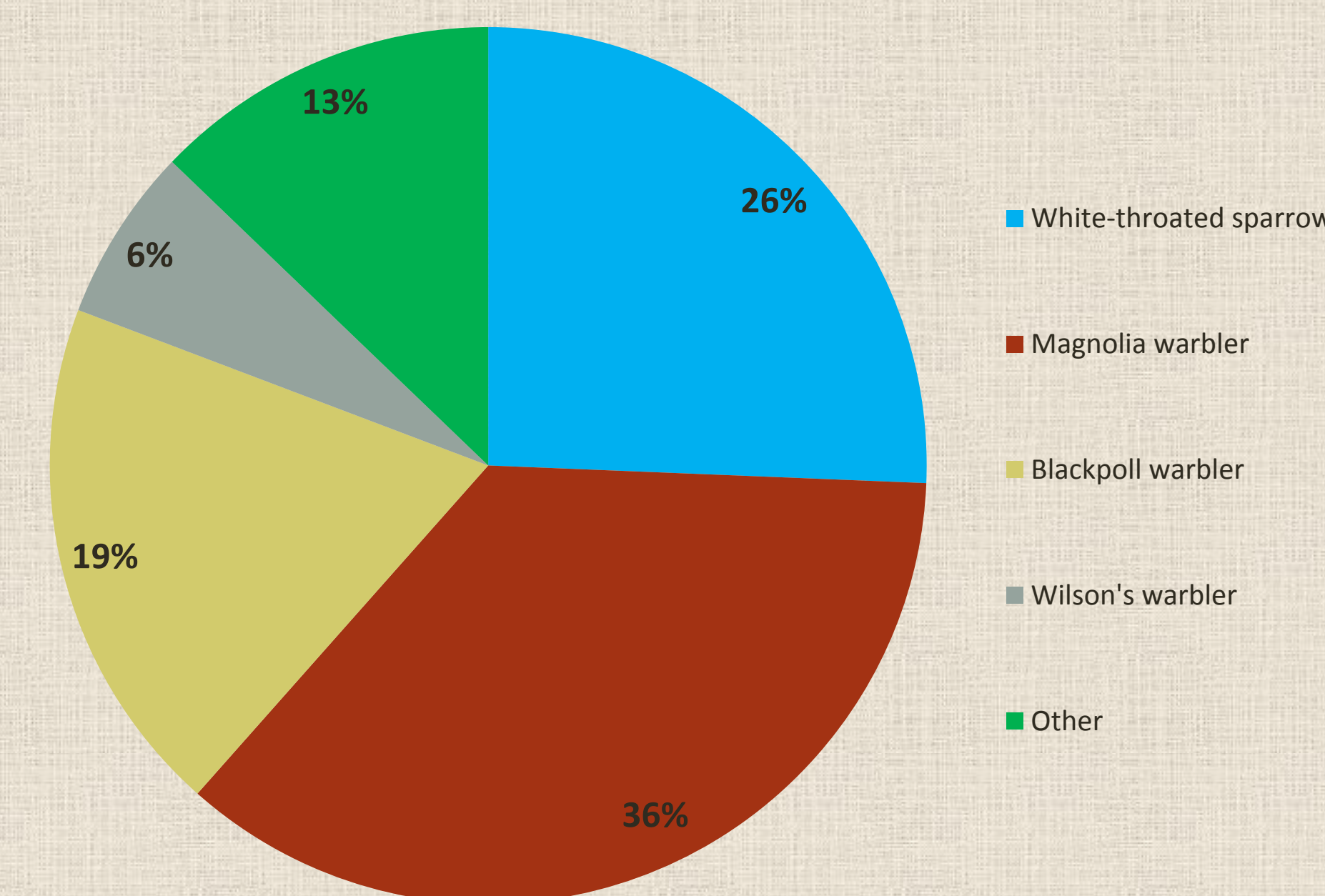


Figure 6: Diversity of 4 most abundant species of migrating birds caught in mist-nets in both Sundew and Alder in September 2016.



Figure 7: A male magnolia warbler (*Setophaga magnolia*) caught at Sundew on 31 August 2016.

Results

There are some similarities between when fruit became ripe in 2015 versus 2016. Black huckleberry (*Gaylussacia baccata*) and mountain holly (*Ilex mucronata*) both had ripe fruit around the same time of year in both 2015 and 2016. Winterberry (*Ilex verticillata*), mountain ash (*Sorbus americanus*) and wild-raisin (*Viburnum cassinoides*) began to fruit later than mountain holly and black huckleberry in 2016 (figures 4 and 5), providing food for those species of birds who migrate later in the season. In mid-September, a high abundance of blackpoll warbler (*Setophaga striata*) were caught in the mist-nets (figure 6). Other species who were caught in high numbers were the magnolia warbler (*Setophaga magnolia*) and the black-throated green warbler (*Setophaga virens*) during the middle of September.



Figure 8: Black huckleberry (*Gaylussacia baccata*)

Discussion

Though the surveys are conducted until mid October, there is a similarity between the data in 2015 and 2016. Both black huckleberry and mountain holly were the most abundant species in September in 2015 and 2016, and mountain ash was also highly available for migrants in September and early October in 2016. Species of birds that rely on these fruit to survive their migration may have to alter their flight pattern or preferred food choices if climate change does prove to mismatch these two factors. If the environment and climate changes too quickly for birds to adapt, there could be a crash in the population that species might not be able to recover from.

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