Abstract

Arvicoline rodents play a key role in vegetation regulation in Iowa’s wooded grasslands and prairies. Three of these rodents with remaining potential habitats in Iowa are the meadow vole (Microtus pennsylvanicus), prairie vole (Microtus ochrogaster) and southern bog lemming (Synaptomys cooperi). As a result of increased habitat fragmentation across the state, suitable arvicoline habitat has diminished, and in response, the abundance and diversity of arvicoline has decreased. This study combines trapping data from nine sites in Northeast Iowa to present a current picture of arvicoline rodent distribution. Data suggests that meadow voles now occupy areas once inhabited by southern bog lemmings and prairie voles, while the two displaced species appear to be absent from the area. There is a need for green-space corridors between habitat patches, or expansion of existing fragments, in order to construct habitats that are conducive to larger and more diverse arvicoline populations.

Introduction

Arvicoline rodents are characterized by periodic, density dependent fluctuations in population levels (Allaby, 1998). Arvicoline rodents aid in nutrient cycling in ecosystems, are a source of prey for larger predators, and regulate the growth of tree saplings and other vegetation (Franklin, 1979). As a result, they are vital components of Midwest ecological systems. Due to the key role arvicoline rodents play in ecosystems, Oostdijk and Canham (1993) suggest that cyclic fluctuations of their population be classified as a keystone process. Iowa’s rodent habitat has become increasingly fragmented, which is a cause for concern regarding population viability. Once more common in Northeast Iowa (Bowles, 1981, 1975), the prairie vole and the southern bog lemming (Synaptomys cooperi) were targeted for inclusion in this study to determine habitat presence for a specific section of Northeast Iowa. Local County Conservation Boards, Iowa Department of Natural Resources, and Iowa college/university collections were searched for historic records. Geographic Information System (GIS) software (ArcGIS version 9) was used to compare layers of data, and to visualize any patterns in arvicoline presence in comparison to historic records and predicted ranges. Data was combined from multiple studies which surveyed natural areas in Northeast Iowa (Bremner and surrounding counties) with differing patterns of vegetation, fragmentation, rodent presence, and histories of land-use, for the presence of arvicoline rodents. Geographic Information System (GIS) software (ArcGIS version 9) was used to compare layers of data, and to visualize any patterns in arvicoline presence in comparison to historic records and predicted ranges. Based on studies by Lin and Batzli (2001, 2004) and Brady and Slade (2004), it was hypothesized that meadow voles would be found most frequently, prairie voles secondly, and southern bog lemmings the least of the three species.

Materials and Methods

The three arvicoline species studied have preferred habitat ranges that include the entire state of Iowa (Franklin, 1979, Polsier, 1953). This study focused on Bremner and surrounding counties of Black Hawk, Butler, Chilikaas, Floyd, and Grundy in order to determine rodent presence for a specific section of Northeast Iowa. Local County Conservation Boards, Iowa Department of Natural Resources, and Iowa college/university collections were searched for records of arvicoline presence. Sites with records indicating previous presence of prairie voles or southern bog lemmings were targeted for inclusion in this study; meadow vole presence was also considered.

Traps were set and assessed in accordance with the procedure followed by McCullough (2003). Appropriate placement of Sherman live traps was determined by a walking survey of the local. Traps were baited with rolled oats, and all capture records were compared. Permanent marker was used to identify any potential recaptures. Information on the recent presence of arvicoline organisms for this study relies on trapping done specifically for this study, as well as data collected by McCullough (2002, 2004, 2005, 2006) and Andreassen and Harken (2006). The number of organisms trapped for each site is expressed as a fraction of total trap nights. Organisms were located by trapping with 49 Sherman live traps represents 49 trap nights; for comparison purposes, one drift fence is also considered equal to 49 trap nights.

Results

Two studies examining rodents in Bremner and surrounding counties (Stoan, 1964; Bowles, 1975) found meadow voles commonly present. Southern bog lemming and prairie vole records with specific location information were not as abundant. With the information available, nine sites were selected for inclusion in this study’s analysis. These sites were New Hampton, Hay-Buhr, Mink Creek, 60 meadow voles, 2 meadow voles, 1 meadow voleWartburg Prairie; Babcock Prairie, 940 meadow voles; Wartburg Prairie, 480 meadow voles; and Sweets Marsh, 40 ground voles were targeted for inclusion in this study; meadow vole presence was also considered.

Figures utilize GIS layered data. Figure 2a illustrates past and present meadow vole records in Northeast Iowa. Each yellow dot represents one recorded capture, unless marked. Figure 2b illustrates past and present prairie vole records in Northeast Iowa. Each red dot represents one recorded capture. Figure 2c illustrates past and present southern bog lemming records in Northeast Iowa. Each red dot represents one recorded capture. Figure 1 illustrates past and present prairie vole records in Northeast Iowa. Each yellow dot represents one recorded capture. Figure 2c illustrates past and present southern bog lemming records in Northeast Iowa. Each red dot represents one recorded capture. Figure 2a illustrates past and present meadow vole records in Northeast Iowa. Each yellow dot represents one recorded capture.

Conclusion

• Data indicates there is decreased presence of arvicoline rodents in available habitat in Northeast Iowa, and meadow voles appear to dominate the existing environment. This study suggests that the prairie vole and southern bog lemming are rarely found in, or absent from, the Northeast Iowa area.

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