Native Tree Snails on Maui: A Snapshot of Current Population

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Introduction

Historically, Hawai`i was home to a tremendous variety of endemic land snail species, variously referred to as "slugs" or "snails". These often brightly colored terrestrial and arboreal snails once inhabited nearly every ecosystem across the islands, from the driest desert to the highest mountains. According to Kenneth Hayes and Norine Yeung of the University of Hawai`i Pacific Biosciences Research Center, there were more than 150 species of Hawaiian land snails prior to Human contact. Since then, the number of endemic snail species has dropped precipitously in the face of threats from introduced species, shell collectors, habitat loss, and introduced predators. On Maui in particular, the arrival of the Polynesian rat (Rattus exulans) has precipitated a loss of over 90% of native snail species within the past century. Other introduced species, such as the Norway rat (Rattus norvegicus) and the European rabbit (Oryctolagus cuniculus), have also had disastrous impacts on native snail populations. In addition, introduced predatory species such as the Brown Tree Snake have decimated snail populations on many islands.

Problem Statement

Given the alarming decline of Hawaiian land snail species, I wanted to use GIS technology to aid researchers and conservation organizations in saving or reintroducing snail extinction on Maui. Because many native snail species are small in size and inconspicuous, they are easy targets for observation, research or collection. Their often cryptic nature is likely responsible for a significant number of undescribed species. I decided that GIS mapping could be used to gain a better understanding of snail distribution and habitat. The goal is to create a series of maps showing locations of various snail populations on East and West Maui, as well as areas suitable for snail surveying and research.

Methodology

I obtained my initial data by taking GPS points during my routine duties as a Field Technician at Pu`u Kukui. I was able to locate twenty snails in a two month period, but it soon became clear that I needed more data for the project. Contributed by Norine Yeung of the University of Hawai`i, who provided me with a larger data set from both East and West Maui. These waypoints were in GeoTIFF format, so I converted them to a usable format and imported into ArcGIS. I imported Dr. Yeung with her own data to create a series of topographic layers showing native snails on Maui as well as a fine (1024 x 1024 grid) land cover layer produced at the University of Hawaii. This layer was symbology"solutioning" with color coding to create a series of polygons showing concentrations of threatened or endangered native plants. The final map uses the same landcover type, but with shown in yellow polygons showing geographic areas of Maui that have potential for future land use research and conservation efforts.

Results & Discussion

The maps indicate that native snail populations occur in wet forests with high concentrations of threatened and endangered plants. The majority of the snails located were found at elevations above 2,500 feet. Though this distribution is not surprising, it does confirm many of the management practices that conservation agencies have in place. Building fences at lower elevation and removing vegetation from inside will help to maintain habitat for native snails as well as endangered plants. The areas outlined in yellow were chosen as potential sites for future snail research based on elevation, size, and landcover data. Though the information could fall into the hands of unscrupulous shell collectors. For the West Maui map, I incorporated both the snail waypoints and a series of polygons showing concentration levels of threatened or endangered native plants. The final map uses the same landcover type, but with shown in yellow polygons showing geographic areas of Maui that have potential for future land use research and conservation efforts.

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References


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Potential Native Snail Habitat for Future Survey

East Maui Snail populations with land cover type

Native land snails on Maui with a topographic map to show elevation range

Potential Native Snail Habitat for Future Survey

East Maui land snail populations shown with threatened and endangered plant densities

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