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A Survey of Shrew (Soricidae) and Mole (Talpidae) Mortality in Arcata, CA

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Abstract

•Study investigated insectivore deaths in the Arcata Community Forest.

•I investigated starvation, cold temperatures, age and toxin exposure as possible causes for these mortalities.

•Results did not find a cause for the deaths.

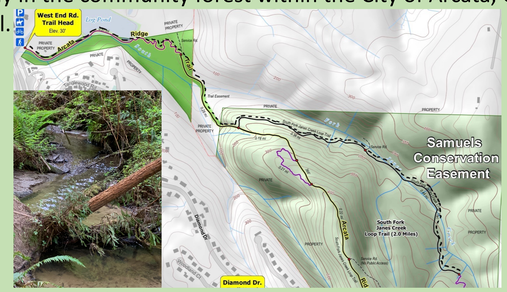
Introduction

•Smaller species may often be the first indicators of an ailing ecosystem. In the Arcata Community Forest many moles (Talpidae) and shrews (Soricidae) have been found dead along walkways.

•Further investigations into these mortality occurrences is important to determine if they have a natural cause or an anthropogenic cause, such as a toxic component that can affect the wildlife and human community as a whole.

Study Area

I conducted my study in the community forest within the City of Arcata, CA, along the Jane's Creek trail.



(City of Arcata 2024. <https://www.cityofarcata.org/DocumentCenter/View/8754/Arcata-Ridge- Trail-PDF.>.)

Methods

•I walked the ~3.5 mile path along Jane's Creek 46 times from May 2022 until April 2024, and found 25 dead small insectivores on the path and collected 20 of them, including Trowbridge's shrew (*Sorex trowbridgii*), shrew mole (*Neurotrichus gibbsii*) and coast mole (*Scapanus orarius*).

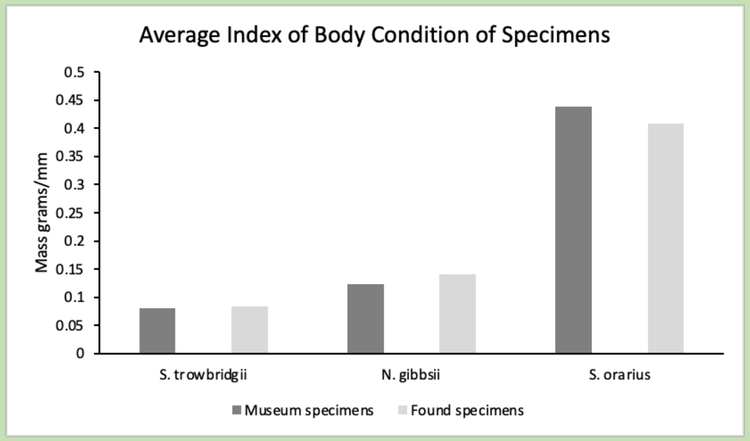
•I compared found specimens' index of body condition to that of CPH Vertebrate Museum specimens.

•I compared low temperatures on days specimens were found and days they were not.

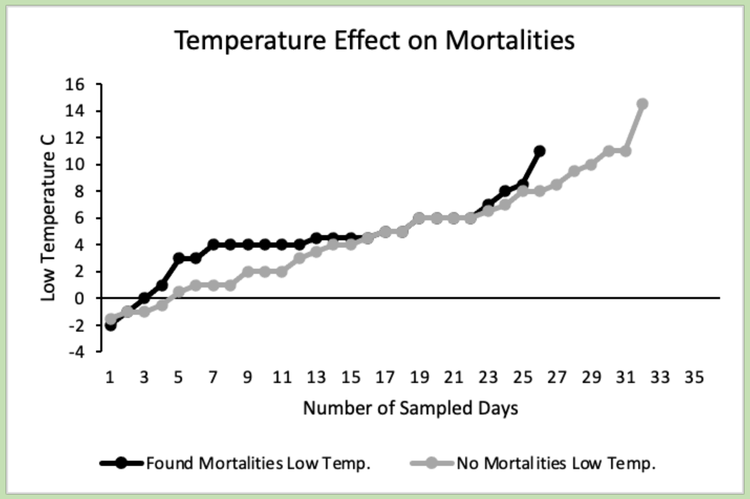
•I used teeth to estimate specimens' ages.

•I performed necropsies on 17 specimens and sent tissues for toxicology testing. 3 additional specimens were sent to UC Davis for necropsies and toxicology.

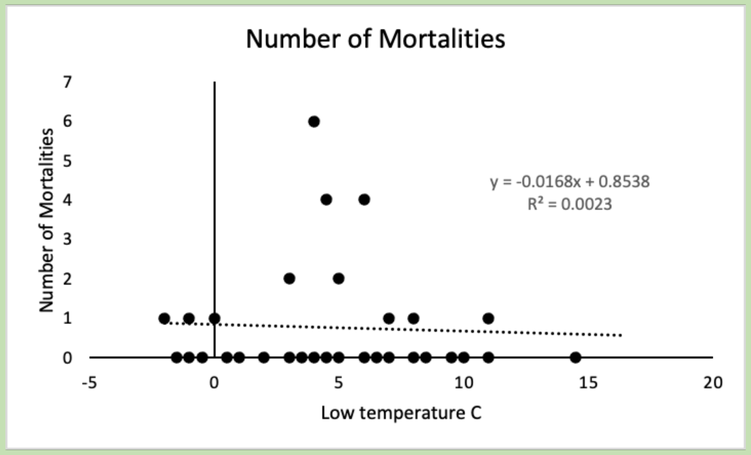
Results



The average index of body condition, as well as weights for the found specimens of all three species, was above that of those in the vertebrate museum collection, with the exception of the average index of body condition for the coast moles which was slightly lower for the found specimens.



Low temperatures were not associated with finding more shrew and mole mortalities ($t=-0.40$, $df=55$, $P=0.69$).



There was no relationship between the number of mortalities found and low temperature ($R^2=0.0023$).

Results

•Tooth wear on the specimens showed a variety of age categories from young to more mature specimens (Rudd 1955, Godfrey and Crowcroft 1960, Usuki 1966).

•The California Animal Health and Food Safety lab at UC Davis tested the first three specimens for a wide variety of organic compounds including pesticides and environmental contaminants. The anticoagulant, GC/MS and LC/MS screen results detected no suspicious compounds. Results are still pending for the second set of tissue samples sent for toxicology screening.

Discussion

The manner in which only insectivores died in the middle of the path, flat, with their legs splayed out with no visible signs of predation caused me to suspect poisoning or toxin contamination.

The comparison of the average index of body condition of the found specimens with the vertebrate museum specimens does not show a body condition problem or a problem obtaining food resources. Additionally, during necropsies, most of the specimens showed full stomachs and intestines, demonstrating food availability.

More mortalities were not found on days with colder temperatures, indicating cold was not a factor in the mortalities.

Tooth wear showed a variety of age groups, but natal dispersal mortality and old age mortality could still be independent causes.

Preliminary toxicology screening did not find pesticide or environmental contaminants, however the toxicology screenings were not comprehensive and the small quantity of tissues sampled could have deterred the discovery of chemical contaminants.

Management Implications

Although none of my hypotheses had positive results, further investigations including a larger sample size and more comprehensive toxicological testing could help to answer why these animals are dying and if the cause can negatively impact the forest ecosystem.

Acknowledgements

Thank you to Dr. Richard Brown who provided guidance and technical support for the necropsies and toxicological testing of the specimens. Thank you to Dr. Silvia Pavan who provided support in investigating the phenomena of the dead shrews and moles, as well as support in the lab for necropsies on the specimens that were not sent out to an outside lab. Thank you to Alyssa Semerdjian who assisted with photographing and documenting necropsies and tissue collection at necropsies. Joe Szewszak and Per Norelle provided found specimens and Kino Crow provided a photographic specimen from the Arcata Community Forest. California Animal Health and Food Safety Laboratory at UC Davis performed toxicological screening on a set of three specimens, and later on the tissues I collected during necropsies. Dr. Jonathan Montgomery gave statistical advice.

Citations

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