NEON breeding bird & small mammal abundance & diversity sampling

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National Ecological Observatory Network

Sampling goals: Abundance and Diversity

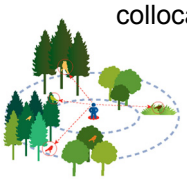
Small mammals and breeding landbirds are important components of virtually all ecosystems in North America. Sampling will provide consistent, comparable measures of **species diversity, composition, and abundance, and density, as they relate to climate, productivity, & insect abundance.** The small mammal sampling will also include the **population dynamics of species that are competent reservoirs for infectious disease**, such as Hantavirus Pulmonary Syndrome and Lyme Disease.

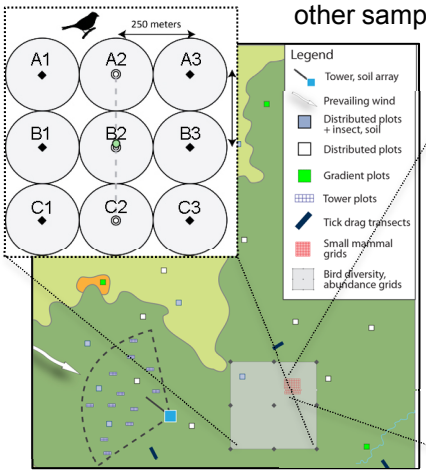
NEON's contribution

NEON vertebrate sampling will occur at **~60 sites** for up to 30 years, and will be a significant increase in the number and diversity of **standardized, long-term datasets**, particularly involving small mammals. The free availability of the data, along with existing datasets such as the USGS Breeding Bird Survey, will allow NEON and the scientific community to address a diversity of important questions. The **associated vouchering of small mammal specimens and tissue samples** will provide critical resources for external PI-driven research to address an even wider range of questions.

Breeding Bird Sampling Design Highlights

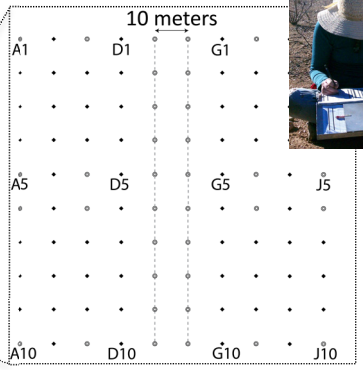
- NEON will use the passive, observational sampling technique of point counting
- Sampling will occur in the early morning, within a 5 – 20 day window in the breeding season - dates will be informed by local experts and by eBird data (ebird.org)
- Density of sampling is site-specific, based on the number of habitats (NLCD classification) and available area.
  - At large sites: 5 – 15 grids of 9 point counts will be distributed proportionally to habitat availability and collocated with other sampling
  - At small sites: individual point counts will be collocated & distributed in stratified, random fashion
  - Counts will last 6 minutes, with each minute tracked, & the species, sex, and distance to all individuals seen or heard within a 125-meter radius
  - 1 – 2 counts per breeding season per point

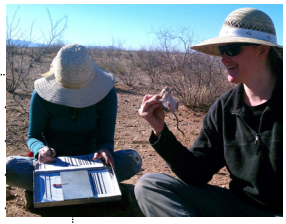




Small Mammal Sampling Design Highlights

- NEON will employ a mark-recapture approach to studying small mammals and mammal-borne disease
- Sampling will occur monthly at core sites (≥6 times per year) and every other month at relocatables (≥4 times per year). Each sampling period consists of 1-3 nights of trapping at each grid.
- Density of sampling is site-specific, based on the number of habitats (NLCD classification) and available area. 3 – 8 grids of 100 Sherman traps will be distributed proportionally to habitat availability and collocated with other sampling.





The National Ecological Observatory Network is a project sponsored by the National Science Foundation and managed under cooperative agreement by NEON, Inc.. This material is based in part upon work supported by the National Science Foundation under Grant No. DBI-0752017. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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NEON Target Taxa

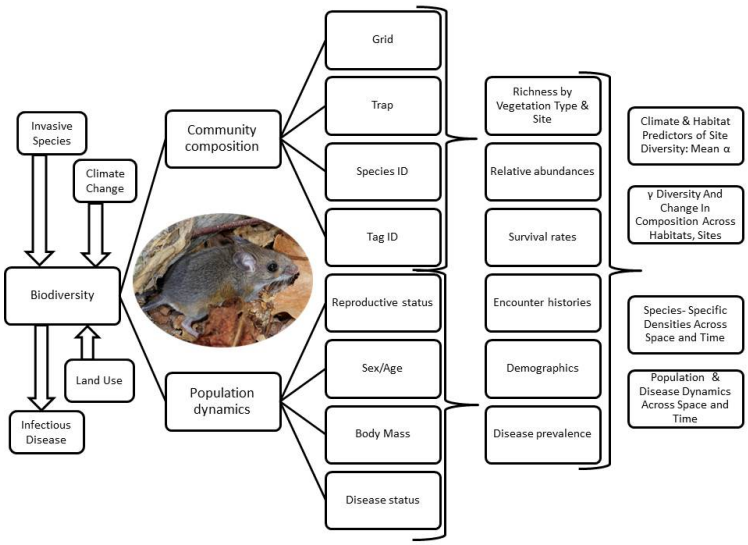
- **Small mammals** include any mammal that is (1) nonvolant; (2) nocturnally active; (3) forages predominantly aboveground; and (4) is greater than 5 grams but less than approximately 500 g. In North America, this includes cricetids, heteromyids, small sciurids, and introduced murids. It does not include shrews, large squirrels, rabbits, or weasels, despite the fact that individuals of these species may be incidentally captured.

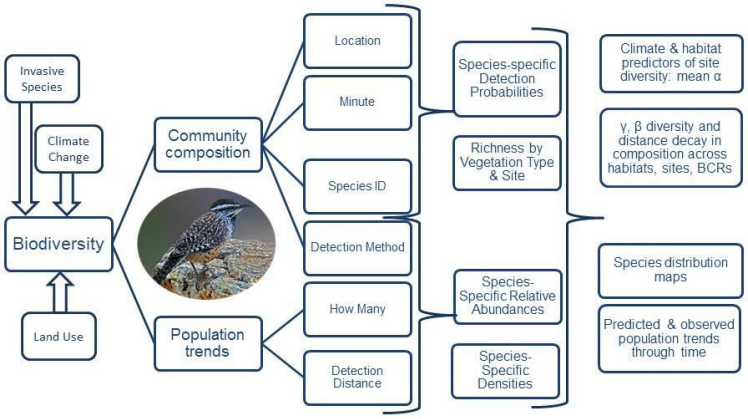
- **Breeding landbirds** are the generally smaller birds (exclusive of raptors and upland game birds) not usually associated with aquatic habitats…typically censused during the first half of the breeding season, when birds are most active, paired, on territories, and vocal (Ralph et al. 1993)

Additional Small Mammal Sampling Details

- Traps will be set and baited at or near sunset.
- Traps are checked each morning, data on the captures (e.g. species ID, reproductive condition, body mass) are recorded. Additionally, a blood sample may be collected for laboratory disease testing; ear tissue sample for species ID verification; and hair and fecal samples for archiving.
- Individuals are promptly marked and released at the site of capture and the traps are either closed or removed for the day. Traps will be opened or reset that evening before sunset, and the trapping cycle will occur over a four day period at each trapping site.

How NEON Sampling Can Enable Advances in Breeding Landbird and Small Mammal Ecology



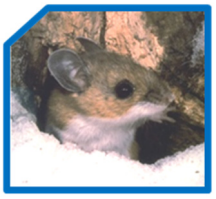


Examples of science questions that could be addressed with NEON data

How do small mammal and breeding landbird communities vary both within core sites and across land use types and ecoregions?
Which bioclimatic and habitat factors best predict the species composition of small mammal and breeding landbird communities?
How do climate-driven plant and insect resources determine the population growth, fecundity, and density of small mammal populations?
How do changes in biodiversity affect resource use and infectious disease dynamics?
What are the specific local habitat traits (e.g., vegetation, slope, soil moisture, insect abundance etc.) favored by Peromyscus spp. that constitute refugia for hantavirus dynamics?
How do changes in bird community composition alter the dynamics of West Nile Virus?

Learn More

- ✓ The full science designs and sampling protocols will be available through the NEON website at **www.neoninc.org**



Credit: National Park Service -- Wikimedia Commons