

## ***What do western spotted skunks eat and does their diet vary with season or forest harvest history?***

Multi-locus DNA metabarcoding reveals seasonality of foraging ecology of western spotted skunks in the Pacific Northwest

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**What is the dietary ecology of western spotted skunks? How does their diet change seasonally, and does it differ with land use?** In this study, researchers identified prey species in scat using mechanical sorting and DNA metabarcoding. They aimed to comprehensively analyze diet both seasonally and in relation to land use category. By more fully understanding western spotted skunk diet, the researchers sought to illuminate the ecological role the skunks play in Pacific Northwest forests.

### **What types of foods do western spotted skunks eat and what is their relative importance?**

- Invertebrates were the most commonly occurring diet category, found in 85.2% of scats, with wasps and millipedes the most common invertebrates.
- Vertebrates were the second most common diet category and were identified in 58.6% of the scats. Of the vertebrates, mammals were detected in 46.9% of scats, birds in 14.1% and amphibians in 13.3%.
- Plants were the least commonly occurring diet category, and were detected in 28.9% of all scats.

### **Did diet vary seasonally?**

- Western spotted skunk diet varied seasonally. This variation was driven by invertebrates, which were a main component of this diet category during the dry season.
- The plant material category did not vary with season. However, in the dry season plants that produce fruit were more common among plant items eaten.
- The vertebrate diet category did not differ with season. However, in the wet season small mammals and amphibians were more common among vertebrate prey.

### **Did diet differ between sites with old forest and sites that had been logged?**

- Diet did not differ among sites with different logging histories. However, the presence of insects in the scat decreased with increase in percentage of logged area within a 1-km radius of the scat location.

### **What are the bigger picture take aways from this research?**

- Western spotted skunk diet included items from terrestrial, aquatic, and arboreal habitats, which may provide important linkages among these systems within Pacific Northwest forests.
- The dietary evidence presented here, combined with other data, indicates that skunks may be important seed dispersers and scavengers. Additionally, their diets provide direct and indirect pathways for nematode transmission.

## Can these findings be used as a research tool in the design of future studies?

- The researchers posit that analysis of skunk scats could be a tool for investigating biodiversity in Pacific Northwest forests because skunks are broadly opportunistic generalists in their diets.

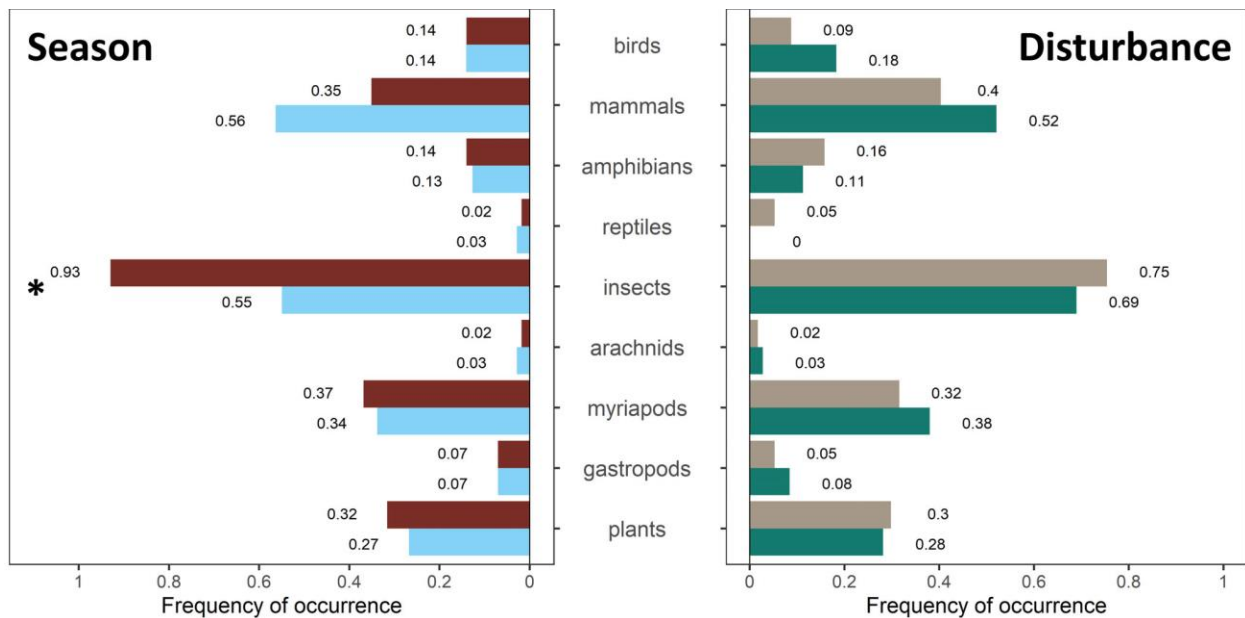
## Research Approach/Methods

- Researchers used trail cameras, radio tracking of collared individuals, and detection dogs to assist in collecting scat of western spotted skunks. Scats were frozen for later processing and then dried for storage.
- Diet items were categorized using visual/mechanical sorting and DNA metabarcoding using primers for plants, vertebrates, and arthropods. They assigned taxonomy by comparing the amplified region to both a local database and GenBank. They only included species whose distributions overlap the study area.
- The authors calculated the frequency of occurrence for the broad taxonomic groups and for individual species within the groups, and calculated the relative read abundance in DNA analysis as a measure of prey importance.
- They used a binomial linear model for multivariate data to determine the effects of season and disturbance history on skunk diet.

**Keywords** diet, DNA metabarcoding, generalist predator, land-use change, small carnivore, *Spilogale gracilis*

## Images

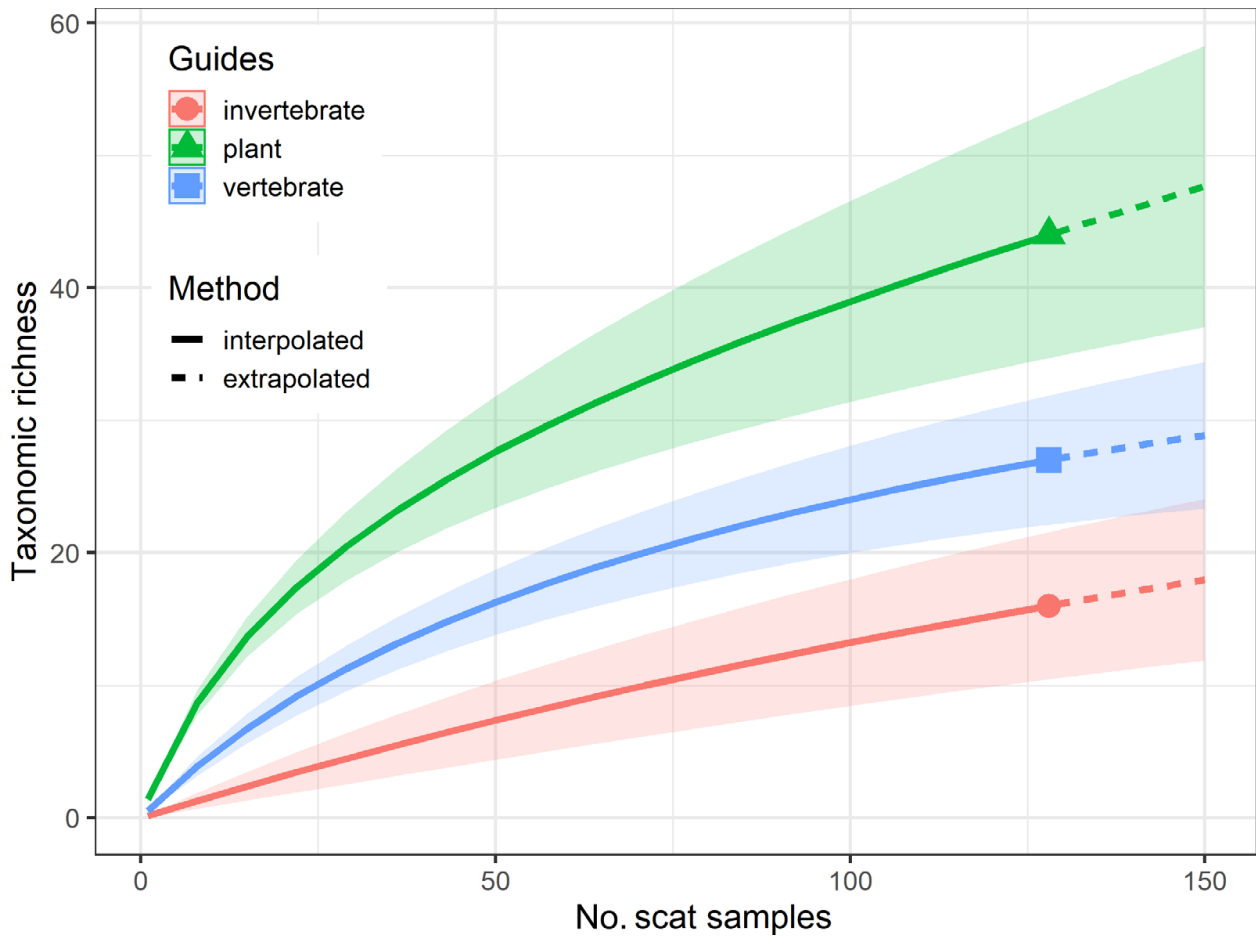
### RANK 1



**FIGURE 6 in Tosa et al. 2023.** Frequency of occurrence (FOO) of taxonomic groups by season and disturbance in western spotted skunk (*Spilogale gracilis*) scats (n = 128) collected from 2017 to 2019 in

the Willamette National Forest. Contents are determined by DNA metabarcoding and mechanical sorting. Left panel shows FOO by season (dry in red, wet in blue), and the right panel shows FOO by amount of disturbance in the location we collected the scat (previously logged in tan, no record of logging in green). The asterisk represents significant differences in FOO by taxonomic group ( $\alpha = 0.05$ ).

**RANK 2**



**FIGURE 2 in Tosa et al. 2023.** Estimation of prey taxonomic richness for western spotted skunks (*Spilogale gracilis*) in the Willamette National Forest. Vertebrate taxonomic richness (blue line) represents species richness. Invertebrate (red line) and plant (green line) richness represent genus richness.