

# Standard vegetation surveys underrepresent ecologically & culturally important forbs

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## Background

- Pacific Northwest Bunchgrass Prairie is highly endangered; about **1% of its original extent remains**.
- Forbs provide valuable ecological services; they can make up **>80% of plant species richness**; roots and bulbs are **consumed by many mammals**; numerous pollinators rely on flowers as an early-season **nectar source**.
- Many forbs are fundamentally important to the **diet, health, well-being & cultural identity** of Plateau Tribes.
- Most forbs are **summer-dormant geophytes**; they emerge early in spring and senesce at the onset of summer drought; **but most vegetation surveys occur mid-summer**.

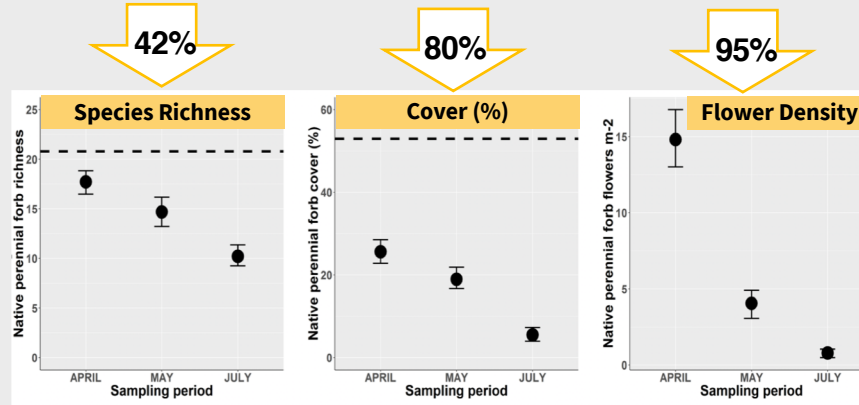
## Objectives

- Test how the timing of vegetation sampling affects estimates of forb richness, abundance and flower density.
- Explore the degree to which sampling during the traditional sampling period (mid-summer) affects abundance and density estimates of culturally important plants.

## Methods

Research was conducted at Starkey Experimental Forest and Range, Union County, Oregon, USA. Sampling occurred during three sampling periods (April, May, July) in 29 (154 m<sup>2</sup>) plots. Plots were circular (r=7m) and the following data was collected in 12 systematically located quadrats within each plot: plant species abundance (frequency and percent canopy cover), density of *Camassia quamash* (common camas) and *Lomatium cous*, (biscuit root) and perennial forb flower/inflorescence abundance. Linear mixed effects models with sampling period as a fixed effect and plot as a random effect were used to test for differences in mean richness, mean abundance (cover), and floral unit density. To test for change in density of *C. quamash* and *L. cous* over time, bootstrapped 95% confidence intervals were generated (10,000 replicates) using the percentile method (CI limits were the 2.5 and 97.5 percentiles of the bootstrapped sample distributions) to compare change in density (mean of paired differences; quadrats were sample units) between sampling periods. Strong evidence of density change was indicated when the confidence intervals did not cross zero. Forbs were classified by functional group and cultural use. We graphically displayed the percentage of perennial forbs by cultural use and relationships between cultural use, functional group and season of dominance.

# Sampling vegetation mid-summer underestimates forb richness, abundance & floral density



## And effects disproportionately impact indigenous communities

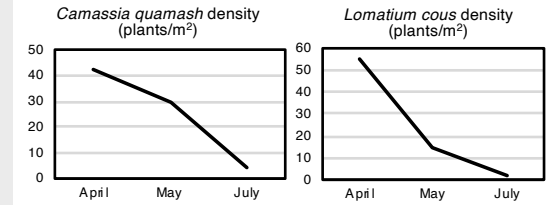
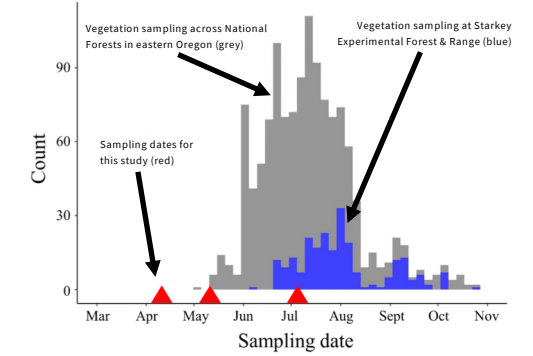
**81%** of culturally important forbs were most abundant in April or May including **86% of medicinal plants & 82% of food plants**

**>90% decline** in density estimates of *L. cous* & *C. quamash* from April to July



A. & B.: harvest of pyral *Lewisia rediviva*, C. digging bag and cupin, D. harvested xivá (*Lomatium cous*) & xmiás (*Camassia quamash*) Photos: Benjamin Drummond

Vegetation sampling efforts by the USDA Forest Service by time in grassland and shrubland ecosystems of the Matheur, Umatilla and Willowa-Whitman National Forests of eastern Oregon



## Implications

- Under-sampling forbs limits our understanding of grassland ecology, including fundamental ecological processes & interactions.
- Under-sampling forbs hinders effective conservation, restoration & sustainable management efforts.
- Land managers need to better align plant community sampling with forb phenology to equitably represent ecologically important forbs and cultural food plants critical to plateau tribal culture and treaty rights.

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