Outstanding Oaks: *Quercus* Phenology at NEON Sites

Target Audience: Introductory Biology or Ecology

Overview

Oaks (trees within the genus *Quercus*) live within a broad range of ecosystems in the United States, including semi-arid savannas in California, temperate deciduous forests in the northeast, and coastal scrublands in the southeast. Within these diverse ecosystems, different species within *Quercus* have adapted traits that are suited for each environment. One example of these adaptations are differences in the phenological timing of *Quercus* events, including leaf formation and growth, flowering, and leaf-fall.

This exercise is designed to visualize repeated phenology observations from the National Ecological Observatory Network (NEON) to examine similarities and differences among *Quercus* phenology at different sites. This exercise uses NEON site data from the San Joaquin Experimental Range (SJER) in California, the Ordway Swisher Biological Station (OSBS) in Florida, and the Harvard Forest (HARV) in Massachusetts.

Learning Objectives

1. Describe how differences in environmental conditions might lead to adaptations in *Quercus* phenology across a diverse set of ecosystems.
2. Construct hypotheses about how the timing of phenological events might vary across ecosystems in semi-arid California, the temperate Northeast, and Florida.
3. Illustrate patterns in *Quercus* phenology with long-term observations at three different field sites.
4. Compare similarities and differences among phenological timing within an individual site across many years, and among sites.

Data Source

This module uses data from the NEON phenology observations data product:

- Plant Phenology Observations (NEON DP1.10055.001): http://data.neonscience.org/data-product-view?dpCode=DP1.10055.001

Description:

This module was developed to be available as either a Shiny app hosted by QUBES at: https://qubeshub.org/resources/neonoakpheno or as a data processing exercise with cleaned data in oak_phenology_sites.csv.

Questions leading students through the Shiny app version are available in the NEON_OakPhenology_AppLesson document.