NEON Macrosystems - Using LIDAR to Calculate Biomass

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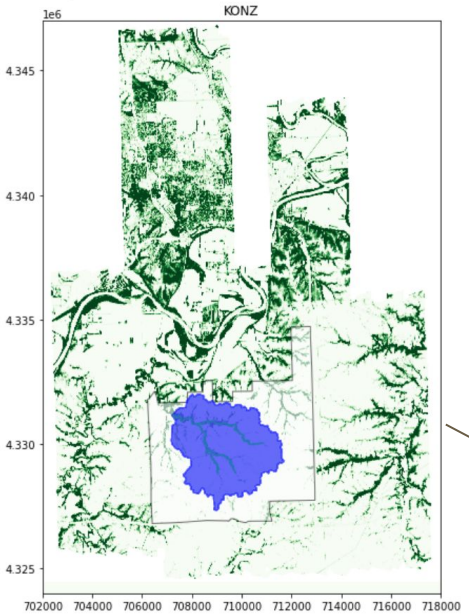
NSF | neon Operated by Battelle

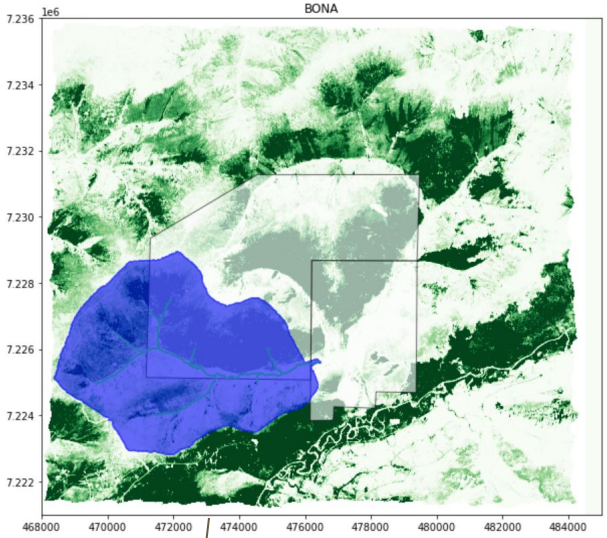
Background

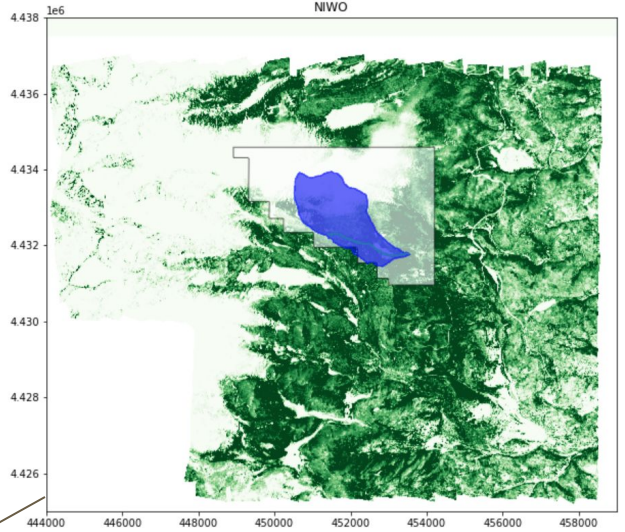
Steps

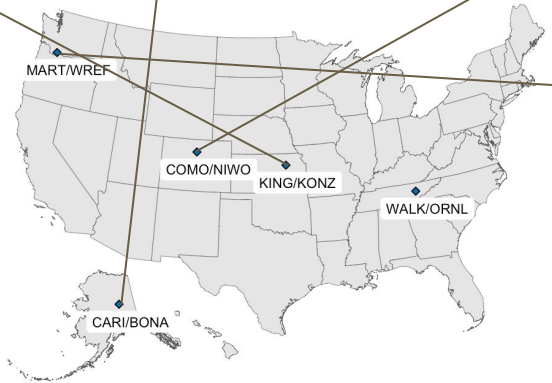
1. Downloaded data using ryp2 package to use R packages - neonUtilities
2. Mapped each site - Canopy Height Model discrete LiDAR data , watershed, and drainage line
3. Calculate biomass for each raster data file and add together for total biomass

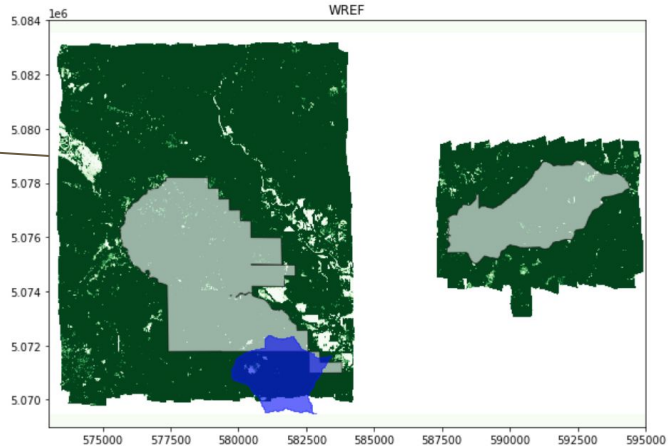
Site Canopy Data











Biomass Calculation

- Derived from NEON tutorials.
- Steps:
  a. Determine local maximums from the Canopy Height Model discrete LiDAR data to detect each tree.
  b. Create a mask layer of the vegetation and delineate the watershed using skimage.segmentation.watershed
  c. Define predictor variables - area, diameter, maximum, and minimum tree height
  d. Used “training data” - biomass formulas from predictor variables defined by Jenkins et al. (2003). to calculate biomass.
  e. Loop through this function for each raster segment at the site to calculate total biomass.

Biomass at each site (2019)

Site	Biomass (10^{-6} kg)	Biomass/Area (10^{-6} kg/km^2)
MART/WREF	2674.64	8.10
COMO/NIWO	935.53	4.80
KING/KONZ	670.55	1.82
CARI/BONA	1787.57	7.01

Sources

Jenkins et al. 2003. “Comprehensive Database of Diameter-based Biomass Regressions for North American Tree Species.” Forest Science.

Gader, P. , 2020. “Calculate Vegetation Biomass from LiDAR Data in Python” https://www.neonscience.org/resources/learning-hub/tutorials/calc-biomass-py

NEON (National Ecological Observatory Network). Ecosystem structure (DP3.30015.001). https://data.neonscience.org (accessed March 12, 2021)