Name(s)
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Project Number
J1103

Project Title
Project CO2: Simulating Roadside Fires and Their Production of Carbon Dioxide

Abstract

Objectives/Goals
The objective is to determine which plants, native to Northwestern California, are least likely to start roadside fires and will produce the least amount of carbon dioxide when burnt.

Methods/Materials
I used program R to conduct a bootstrap simulation to find which plants, specifically native to Northwestern California, produced the least amount of carbon dioxide, taking into consideration local fire ecology, the probability of each plant igniting, the biomass and the carbon content of the plant. The data used to define the parameters of the model came from my data synthesis. Data sources included the ECN Phyllis2 database of plant composition, the NOAA Storm Prediction Center, InciWeb, journal articles, and government reports.

Results
Lupine produce the least amount of carbon dioxide at 1.51 kg per kg burnt and Douglas fir produced the greatest amount of carbon dioxide at 2.03 kg per kg burnt. My analysis indicated that although trees burn less frequently than grasses, over multiple years, trees would produce a greater amount of carbon dioxide than grasses.

Conclusions/Discussion
When applying analysis results to the needs of roadside replanting, I would recommend a grass for a quick growing root system to hold the soil. Later, as a more permanent plant, Lupine would be the most advisable. These plants would produce the least amount of carbon dioxide if burnt and they are short enough not to be in contact with electrical lines. If humans take into consideration which plants are used when re-vegetating our public areas we can help prevent large amounts of carbon dioxide from being emitted into the atmosphere. These actions can do even more to fight global warming by sequestering large quantities of carbon dioxide from the atmosphere.

Summary Statement
My project investigates which plants would be best for re-vegetating roadsides to prevent fires and reduce carbon dioxide production.

Help Received
I was advised on where to find carbon content data by Mark Severy, a Research Engineer at the Schatz Energy Research Center, Humboldt State. Nick Nauslar a NOAA contractor in the Storm Prediction Center provided fire prediction information. I coded my simulation and my father reviewed my code.