Carbon Sequestration in Wetlands of Sonoma Mountain

Eric Riordan - Geography, Environment, and Planning

Faculty Mentor: Dr. Michelle Goman

Sonoma State University Center for Environmental Inquiry

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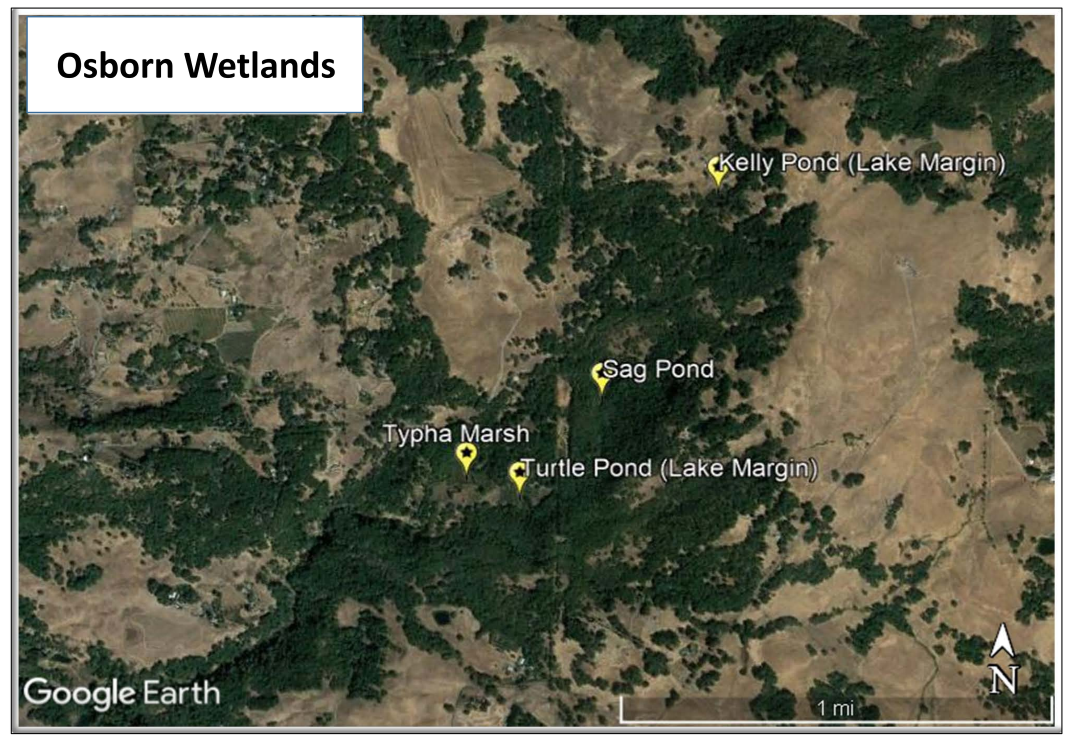
Introduction

- Freshwater wetlands have the capacity to store more carbon in soil than other terrestrial habitats in the U.S. (Nahlick & Fennesy, 2016)
- Understanding variability among wetlands informs management efforts for ecosystem services to local communities
- This project explores surficial and historic storage of carbon in wetland settings at Fairfield Osborn Preserve



Methods

- Sediment cores extracted with a Livingston corer and auger, divided into 2 cm (by depth) samples
  61 total samples processed
- Magnetic susceptibility (MS) measured using a Bartington MS meter
- Geochemistry:
  i. Samples sieved to remove large organics (< 200 um) sieve
  ii. 10% HCl added to decalcify inorganic carbon
  iii. Returned to neutral pH
  iv. Dried at 60 °C and ground to fine powder
  v. Mass spectrometer (UNC Wilmington) to quantify isotopic values of Total Organic Carbon (TOC), δ13C, δ15N, C/N

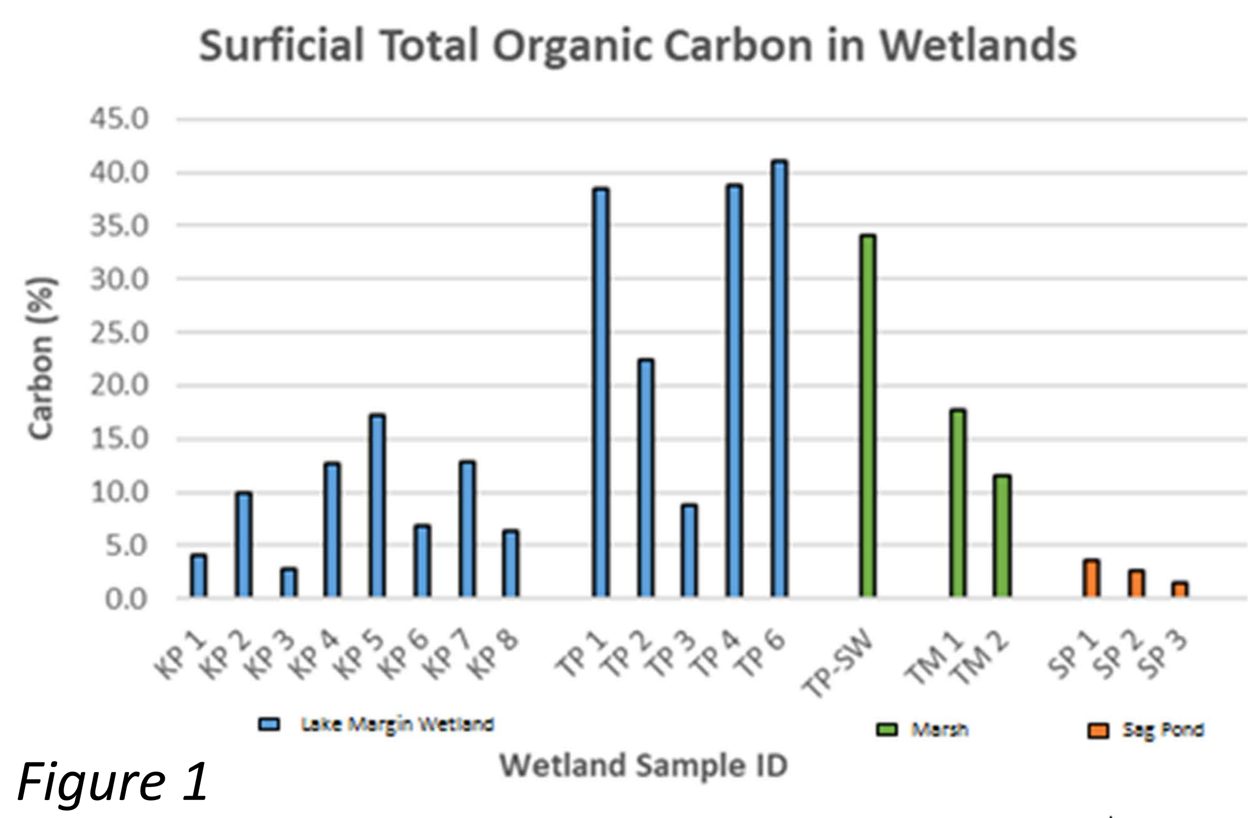


Figure 1

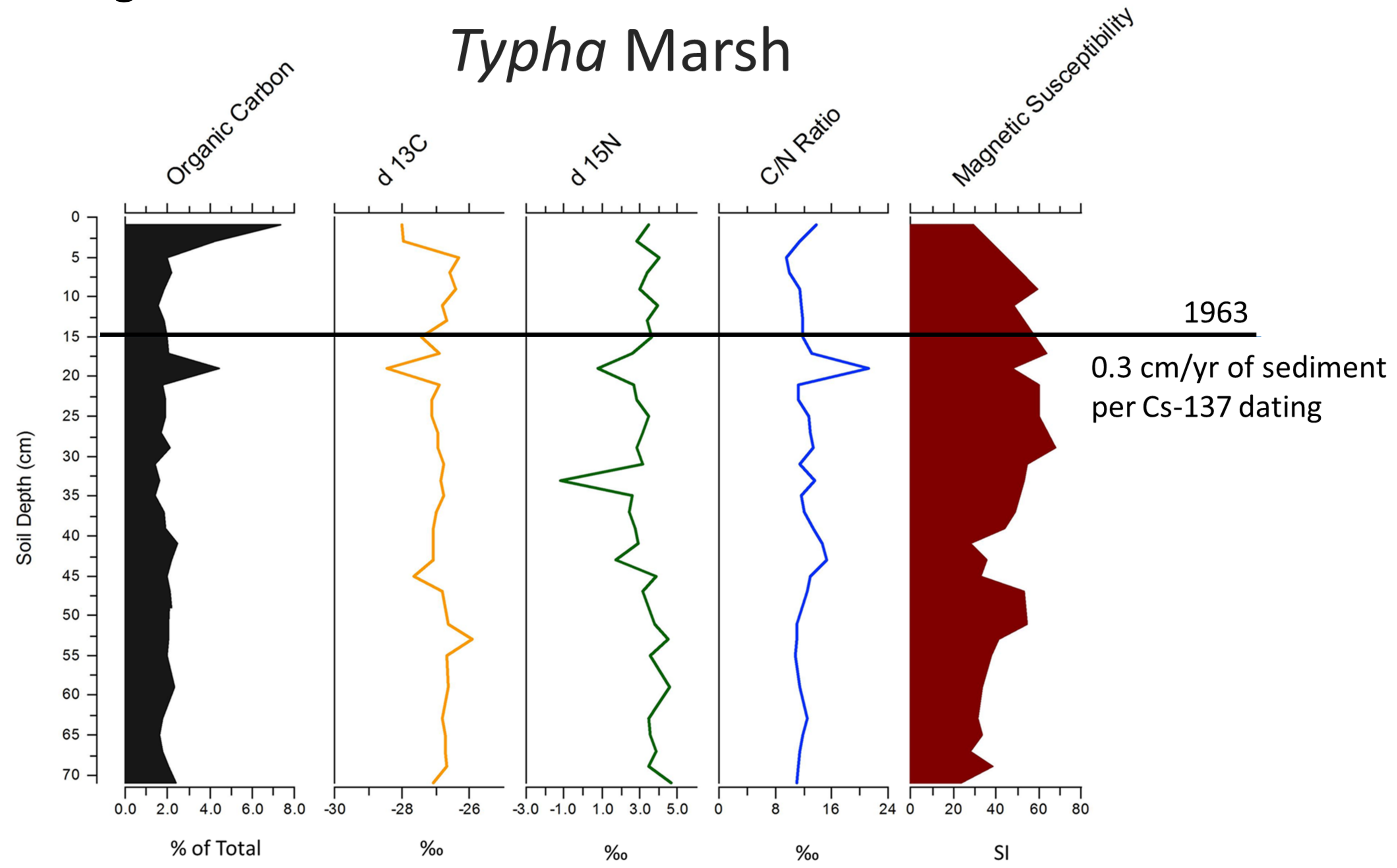


Figure 2

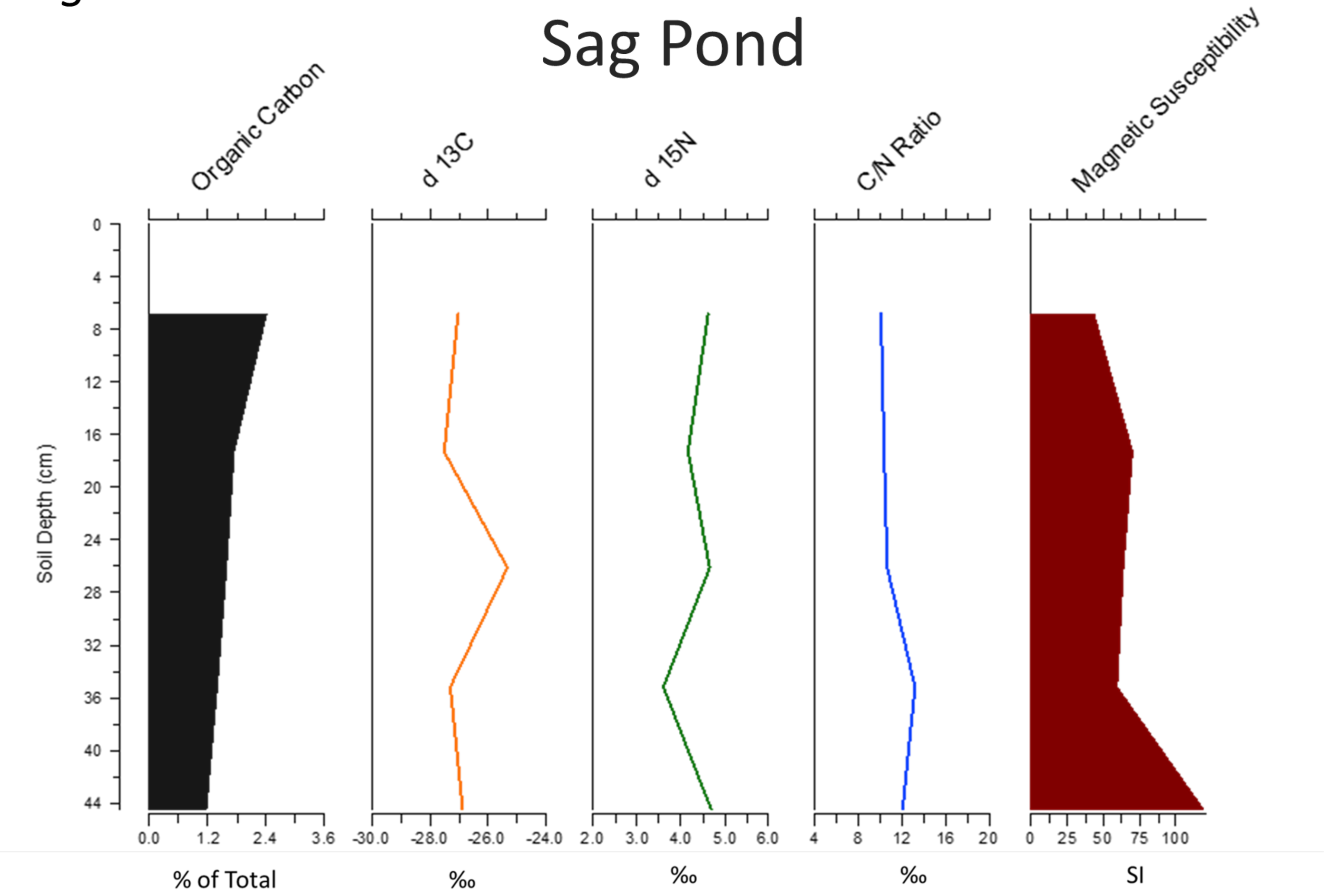


Figure 3

Results

Surface (modern) samples:

- Lake margin wetlands (KP, TP, and SW in Fig. 1) greatest amount of TOC and inferred ability to sequester carbon, followed by marsh.
- Lowest sequestration in sag pond samples (SP).

Temporal (historic) analysis of Typha Marsh (Fig. 2) and the Sag Pond (Fig. 3)

- Greater amounts sequestered within top 20 cm equates to 1950's in Typha marsh (Goman, 2012)
- MS corroborates decline in inorganic content

Future Work

Explore historic successional changes

- Microscopic analysis of macrofossils in process
- Seek further insights into changes in plant dominance over time, and fluctuations in carbon intake through photosynthesis

Additional wetland/lacustrine sites needed

- Increase historic analysis of differing lacustrine ecosystems and sequestration rates

Dating SP pond deposits using Cs-137 & Pb-210

- Establish sedimentation rates for temporal analysis

References: Nahlik, A. M., and M. S. Fennessy. 2016. Carbon storage in US wetlands. *Nature Communications* 7: 13835.
Goman, M., ed. 2012. Soil and Sediment Analysis at Fairfield Osborn Preserve. Sonoma State University.

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Contact: Eric Riordan
riordane@sonoma.edu