Fluoroproj: Title to be decided later

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This is our abstract. Just seeing how it looks.

## Introduction

Possible Journals: Lake and Reservoir Management, PLOS One, PLOS Water, Ecosphere, F1000Research,

The goal of this paper is to compare accuracy and precision of a variety of fluorometers with respect to chlorophyll and phycocyanin across a variety of waterbodies as well as with lab grown cultures of green algae and cyanobacteria (Nojavan A. et al. 2019; Hollister and Kreakie 2016).

This worked well until the fluorometer gave us problems (Hollister and Kreakie 2016; Walsh et al. 2017)

With culture, first look not very linear, but split out but green, cyan, and mixed each grouping shows linear relationship between extracted and in situ turner. Might not matter that different waterbodies would be in different green/cyano/mix classes. But the pattern between extracted and in situ/handheld flouros should be similar Hodges et al. (2017). Different pattern with any handheld/in situ would suggest it not perfomring well.

library(readr)  
library(dplyr)

Warning: package 'dplyr' was built under R version 4.2.3

Attaching package: 'dplyr'

The following objects are masked from 'package:stats':  
  
 filter, lag

The following objects are masked from 'package:base':  
  
 intersect, setdiff, setequal, union

library(ggplot2)  
  
prelim\_ext\_chl <- read\_csv(here::here("data/raw/extracted chl/extracted\_chl\_fluororproj\_prelimanary\_test\_2023\_3\_29.csv")) |>  
 group\_by(waterbody) |>  
 summarize(extracted = mean(value, na.rm = TRUE)) |>  
 arrange(waterbody)

Rows: 18 Columns: 10

── Column specification ────────────────────────────────────────────────────────  
Delimiter: ","  
chr (4): units, waterbody, variable, fluorometer  
dbl (6): value, reps, day, month, year, filter\_vol  
  
ℹ Use `spec()` to retrieve the full column specification for this data.  
ℹ Specify the column types or set `show\_col\_types = FALSE` to quiet this message.

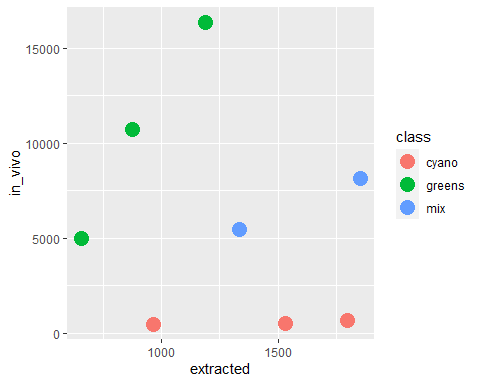
prelim\_in\_viv <- read\_csv(here::here("data/raw/trilogy in vivo/trilogy in vivo 2023\_03\_28\_fresh.csv")) |>  
 mutate(waterbody = case\_when(waterbody == "culture\_aba" ~  
 "culture\_ana",  
 TRUE ~ waterbody))|>  
 group\_by(waterbody) |>  
 summarize(in\_vivo = mean(value, na.rm = TRUE)) |>  
 arrange(waterbody)

Rows: 25 Columns: 11  
── Column specification ────────────────────────────────────────────────────────  
Delimiter: ","  
chr (4): waterbody, variable, fresh/frozen, fluorometer  
dbl (7): value, site, dup, reps, day, month, year  
  
ℹ Use `spec()` to retrieve the full column specification for this data.  
ℹ Specify the column types or set `show\_col\_types = FALSE` to quiet this message.

all <- bind\_cols (prelim\_ext\_chl, prelim\_in\_viv) |>  
 select(culture = waterbody...1, extracted, in\_vivo) |>  
 filter(!is.na(culture)) |>  
 mutate(class = case\_when(culture == "culture\_ana" ~  
 "cyano",  
 culture == "culture\_ana\_pando" ~  
 "mix",  
 culture == "culture\_mic" ~  
 "cyano",  
 culture == "culture\_mic\_ana" ~  
 "cyano",  
 culture == "culture\_mic\_pando" ~  
 "mix",  
 culture == "culture\_pando" ~  
 "greens",  
 culture == "culture\_pedia" ~  
 "greens",  
 culture == "culture\_pedia\_pando" ~  
 "greens",  
 culture == "culture\_mic\_ana\_pando\_pedia" ~  
 "mix",  
 TRUE ~ culture))

New names:  
• `waterbody` -> `waterbody...1`  
• `waterbody` -> `waterbody...3`

ggplot(all, aes(x = extracted, y = in\_vivo, color = class)) +  
 geom\_point(size = 5)



## Methods

When you click the **Render** button a document will be generated that includes both content and the output of embedded code . You can embed code like this:

1 + 1

[1] 2

library(dplyr)  
library(readr)  
read\_csv("../data/cleaned\_fluoroproj\_data.csv")

Rows: 5271 Columns: 9  
── Column specification ────────────────────────────────────────────────────────  
Delimiter: ","  
chr (5): waterbody, instrument, method, variable, units  
dbl (3): field\_dups, lab\_reps, value  
date (1): date  
  
ℹ Use `spec()` to retrieve the full column specification for this data.  
ℹ Specify the column types or set `show\_col\_types = FALSE` to quiet this message.

# A tibble: 5,271 × 9  
 date waterbody field\_dups lab\_reps instrument method variable units  
 <date> <chr> <dbl> <dbl> <chr> <chr> <chr> <chr>  
 1 2021-10-06 yawgoo 1 1 cyanofluor fresh pc:chl ratio  
 2 2021-10-06 yawgoo 1 2 cyanofluor fresh pc:chl ratio  
 3 2021-10-06 yawgoo 1 3 cyanofluor fresh pc:chl ratio  
 4 2021-10-06 yawgoo 2 1 cyanofluor fresh pc:chl ratio  
 5 2021-10-06 yawgoo 2 2 cyanofluor fresh pc:chl ratio  
 6 2021-10-06 yawgoo 2 3 cyanofluor fresh pc:chl ratio  
 7 2021-10-06 yawgoo 3 1 cyanofluor fresh pc:chl ratio  
 8 2021-10-06 yawgoo 3 2 cyanofluor fresh pc:chl ratio  
 9 2021-10-06 yawgoo 3 3 cyanofluor fresh pc:chl ratio  
10 2021-10-06 yawgoo 1 1 cyanofluor fresh phyco rfu   
# ℹ 5,261 more rows  
# ℹ 1 more variable: value <dbl>

You can add options to executable code like this

[1] 4

The echo: false option disables the printing of code (only output is displayed).

|  |
| --- |
| Figure 1: Instrument comparison for Chlorophyll |

## Results

Here are our results. Fear us.

Figure ideas:

scatterplots: ext chl/phyco on y, chl/phyco from each insturment on x, colors/shapes for each waterbody/culture

boxplots (need to be same units): first boxplot is extracted, compare to all others.

## Discussion

Discuss amongst yourselves. [Figure 1](#fig-chla-comparison)

## References

Hodges, Caroline M., Susanna A. Wood, Jonathan Puddick, Christopher G. McBride, and David P. Hamilton. 2017. “Sensor Manufacturer, Temperature, and Cyanobacteria Morphology Affect Phycocyanin Fluorescence Measurements.” *Environmental Science and Pollution Research* 25 (2): 1079–88. <https://doi.org/10.1007/s11356-017-0473-5>.

Hollister, Jeffrey W., and Betty J. Kreakie. 2016. “Associations Between Chlorophyll a and Various Microcystin Health Advisory Concentrations.” *F1000Research* 5 (June): 151. <https://doi.org/10.12688/f1000research.7955.2>.

Nojavan A., Farnaz, Betty J. Kreakie, Jeffrey W. Hollister, and Song S. Qian. 2019. “Rethinking the Lake Trophic State Index.” *PeerJ* 7 (November): e7936. <https://doi.org/10.7717/peerj.7936>.

Walsh, Eric S., Betty J. Kreakie, Mark G. Cantwell, and Diane Nacci. 2017. “A Random Forest Approach to Predict the Spatial Distribution of Sediment Pollution in an Estuarine System.” Edited by João Miguel Dias. *PLOS ONE* 12 (7): e0179473. <https://doi.org/10.1371/journal.pone.0179473>.