New Trend Analysis

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library(tidyverse)

## Warning: package 'tidyverse' was built under R version 3.3.3

## -- Attaching packages -------------------------------------------------------------------------------------------- tidyverse 1.2.1 --

## v ggplot2 2.2.1 v purrr 0.2.4  
## v tibble 1.4.2 v dplyr 0.7.4  
## v tidyr 0.8.0 v stringr 1.2.0  
## v readr 1.1.1 v forcats 0.3.0

## Warning: package 'ggplot2' was built under R version 3.3.3

## Warning: package 'tibble' was built under R version 3.3.3

## Warning: package 'tidyr' was built under R version 3.3.3

## Warning: package 'readr' was built under R version 3.3.3

## Warning: package 'purrr' was built under R version 3.3.3

## Warning: package 'dplyr' was built under R version 3.3.3

## Warning: package 'forcats' was built under R version 3.3.3

## -- Conflicts ----------------------------------------------------------------------------------------------- tidyverse\_conflicts() --  
## x dplyr::filter() masks stats::filter()  
## x dplyr::lag() masks stats::lag()

library(PVA)

## Loading required package: shiny

## Warning: package 'shiny' was built under R version 3.3.3

library(reshape2)

## Warning: package 'reshape2' was built under R version 3.3.3

##   
## Attaching package: 'reshape2'

## The following object is masked from 'package:tidyr':  
##   
## smiths

## Get the Data

KnappsYLFData <- read\_csv("KnappsYLFData.csv") #original Dataset

## Parsed with column specification:  
## cols(  
## survey = col\_integer(),  
## site = col\_integer(),  
## cell = col\_integer(),  
## adult = col\_integer(),  
## tadpole = col\_integer(),  
## subadult = col\_integer(),  
## water = col\_double(),  
## year = col\_integer(),  
## date = col\_integer(),  
## fish = col\_character(),  
## depth = col\_double(),  
## elev = col\_double(),  
## basin = col\_integer()  
## )

Lakes\_Adult <- aggregate(adult~site, KnappsYLFData, sum) %>%   
 subset(adult != 0)  
  
Adult\_vec <- Lakes\_Adult$site #List of sites with at least 1 frog found  
  
#SFLAdult <- KnappsYLFData %>%   
 #subset(select(site == Adult\_vec))  
  
FrogLake <- KnappsYLFData[KnappsYLFData$site %in% Lakes\_Adult$site,]  
  
FrogLake\_agg <- aggregate(adult~ year+site, data = FrogLake, mean) # Aggregate the surveys to account for multiple surveys for the same lake in the same year. We are taking the average counts for adults when this occurs.  
  
Fish\_Status <- KnappsYLFData %>%   
 select(site, fish) %>%   
 subset(!duplicated(site))

## Calculated Mu using SEG

R\_Adults <- FrogLake\_agg %>% #Select the FrogLake\_Agg  
 subset(adult != 0) %>% #Remove any datapoints where no frogs were found  
 group\_by(site) %>% #group by the site (lake)  
 filter(n() > 2) %>% #Remove any sites which were surveyed for 2 or less years times during the 20 years  
 summarise(mu = estimate\_SEG\_params(adult, year)$mu, #calculate the mu for adults  
 SE = sqrt(estimate\_SEG\_params(adult, year)$sigma2/(n()-1))) #calculate the standard error for adults for each site

## Warning: package 'bindrcpp' was built under R version 3.3.3

R\_Adult\_Lake <- merge.data.frame(KnappsYLFData, R\_Adults, by = "site") #Remerge dataframe so I can get the other lake qualities  
  
  
Adult\_LakeSummary <- R\_Adult\_Lake %>% #Group and summarize per lake  
 mutate(Weight = 1/(SE^2)) %>%   
 group\_by(site) %>%   
 summarise(mu = mean(mu),  
 depth = mean(depth),  
 elev = mean(elev),  
 basin = mean(basin),  
 SE = mean(SE),  
 cell= mean(cell),  
 Weight = mean(Weight))  
  
Adult\_LakeSummary <- merge.data.frame(Fish\_Status, Adult\_LakeSummary, by = "site") #Add back in the fish status for each lake  
  
Adult\_LakeSummary$basin <- as.factor(Adult\_LakeSummary$basin) #set basin to factor  
Adult\_LakeSummary$cell <- as.factor(Adult\_LakeSummary$cell) #set cell to factor  
Adult\_LakeSummary$site <- as.factor(Adult\_LakeSummary$site) #set cell to factor  
  
Adult\_LakeSummary <- Adult\_LakeSummary %>%   
 subset(Weight != "Inf") #remove inf weights

## Linear Regression Characteristics to Mu

R1 <- lm(data = Adult\_LakeSummary, mu ~ depth + fish + cell, weights=Weight) #LM on the growth rate of frogs based on lake characteristics, weight is 1/SE^2 as suggested by Bruce. This is th  
  
summary(R1)

##   
## Call:  
## lm(formula = mu ~ depth + fish + cell, data = Adult\_LakeSummary,   
## weights = Weight)  
##   
## Weighted Residuals:  
## Min 1Q Median 3Q Max   
## -1.8906 -0.1048 0.0000 0.1951 0.8608   
##   
## Coefficients:  
## Estimate Std. Error t value Pr(>|t|)   
## (Intercept) -0.030521 0.057733 -0.529 0.5982   
## depth 0.007676 0.011971 0.641 0.5229   
## fishSF -0.180945 0.140932 -1.284 0.2021   
## fishSFL 0.059713 0.034320 1.740 0.0850 .   
## cell32 -0.041931 0.079056 -0.530 0.5970   
## cell36 -0.066090 0.162625 -0.406 0.6853   
## cell37 -0.019024 0.062632 -0.304 0.7619   
## cell38 0.096993 0.061569 1.575 0.1183   
## cell41 0.039173 0.078305 0.500 0.6180   
## cell43 -0.113761 0.110366 -1.031 0.3051   
## cell47 -0.143259 0.085551 -1.675 0.0971 .   
## cell54 0.132420 0.142408 0.930 0.3547   
## cell55 0.103389 0.082066 1.260 0.2107   
## cell60 -0.343667 0.061044 -5.630 1.66e-07 \*\*\*  
## cell66 0.167369 0.064828 2.582 0.0113 \*   
## cell72 0.164549 0.103662 1.587 0.1156   
## cell76 0.234038 0.108567 2.156 0.0335 \*   
## cell83 0.093965 0.154705 0.607 0.5450   
## cell104 0.117273 0.081496 1.439 0.1533   
## cell107 -0.015148 0.177116 -0.086 0.9320   
## cell108 0.111301 0.341223 0.326 0.7450   
## cell112 0.030073 0.145827 0.206 0.8370   
## cell113 0.155752 0.092534 1.683 0.0955 .   
## cell114 -0.095159 0.080894 -1.176 0.2423   
## cell117 -0.108697 0.062967 -1.726 0.0874 .   
## cell118 0.041098 0.074486 0.552 0.5823   
## cell119 0.030645 0.187663 0.163 0.8706   
## cell123 0.017155 0.079078 0.217 0.8287   
## cell124 0.086478 0.058928 1.468 0.1454   
## cell125 -0.009580 0.081946 -0.117 0.9072   
## cell129 -0.039472 0.058032 -0.680 0.4980   
## cell130 0.039247 0.097002 0.405 0.6866   
## cell135 0.278751 0.162471 1.716 0.0893 .   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1  
##   
## Residual standard error: 0.4683 on 100 degrees of freedom  
## Multiple R-squared: 0.8552, Adjusted R-squared: 0.8089   
## F-statistic: 18.46 on 32 and 100 DF, p-value: < 2.2e-16