SporeConcentrationStationarity

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# Initial stuff, including loading packages and importing data

##loading packages

library(here)  
library(forecast)  
library(ggplot2)  
library(tseries)  
library(tidyverse)  
library(dplyr)

## loading files

# Tell R where files are stored  
here::i\_am("scripts/SporeConcentrationStationarity.Rmd")  
  
# Load Files  
a <- readr::read\_csv(here("data/SporeConcentrationsByDepthAll.csv"))

# Stationarity

## Augmented Dickey-Fuller Test  
## H0 is that the time series is non-stationary  
  
## if p > 0.05, then the time series has some time-dependent structure and does not exhibit constant variance  
  
metsch.w1 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Metschnikowia",  
 Depth=="1")  
  
metsch.w1.x <- metsch.w1$Concentration  
  
adf.test(x = metsch.w1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.w1.x  
## Dickey-Fuller = 6.5971, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
metsch.w2 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Metschnikowia",  
 Depth=="2")  
  
metsch.w2.x <- metsch.w2$Concentration  
  
adf.test(x = metsch.w2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.w2.x  
## Dickey-Fuller = -0.068418, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
metsch.w3 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Metschnikowia",  
 Depth=="3")  
  
metsch.w3.x <- metsch.w3$Concentration  
  
adf.test(x = metsch.w3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.w3.x  
## Dickey-Fuller = -2.0483, Lag order = 2, p-value = 0.554  
## alternative hypothesis: stationary

## p = 0.554, nonstationary  
  
metsch.w4 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Metschnikowia",  
 Depth=="4")  
  
metsch.w4.x <- metsch.w4$Concentration  
  
adf.test(x = metsch.w4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.w4.x  
## Dickey-Fuller = 0.082843, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
metsch.w5 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Metschnikowia",  
 Depth=="5")  
  
metsch.w5.x <- metsch.w5$Concentration  
  
adf.test(x = metsch.w5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.w5.x  
## Dickey-Fuller = -0.74833, Lag order = 2, p-value = 0.9543  
## alternative hypothesis: stationary

## p = 0.954, nonstationary  
  
metsch.w6 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Metschnikowia",  
 Depth=="6")  
  
metsch.w6.x <- metsch.w6$Concentration  
  
adf.test(x = metsch.w6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.w6.x  
## Dickey-Fuller = -1.137, Lag order = 1, p-value = 0.9004  
## alternative hypothesis: stationary

## p = 0.9004, nonstationary  
  
metsch.w0 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Metschnikowia",  
 Depth=="0")  
  
metsch.w0.x <- metsch.w0$Concentration  
  
adf.test(x = metsch.w0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.w0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
### MicG Walsh  
  
mg.w1 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Ordospora",  
 Depth=="1")  
  
mg.w1.x <- mg.w1$Concentration  
  
adf.test(x = mg.w1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.w1.x  
## Dickey-Fuller = -1.2659, Lag order = 2, p-value = 0.852  
## alternative hypothesis: stationary

## p = 0.852, nonstationary  
  
mg.w2 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Ordospora",  
 Depth=="2")  
  
mg.w2.x <- mg.w2$Concentration  
  
adf.test(x = mg.w2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.w2.x  
## Dickey-Fuller = -2.0751, Lag order = 2, p-value = 0.5438  
## alternative hypothesis: stationary

## p > 0.544, nonstationary  
  
mg.w3 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Ordospora",  
 Depth=="3")  
  
mg.w3.x <- mg.w3$Concentration  
  
adf.test(x = mg.w3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.w3.x  
## Dickey-Fuller = -1.8284, Lag order = 2, p-value = 0.6377  
## alternative hypothesis: stationary

## p = 0.638, nonstationary  
  
mg.w4 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Ordospora",  
 Depth=="4")  
  
mg.w4.x <- mg.w4$Concentration  
  
adf.test(x = mg.w4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.w4.x  
## Dickey-Fuller = -1.224, Lag order = 2, p-value = 0.868  
## alternative hypothesis: stationary

## p > 0.868, nonstationary  
  
mg.w5 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Ordospora",  
 Depth=="5")  
  
mg.w5.x <- mg.w5$Concentration  
  
adf.test(x = mg.w5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.w5.x  
## Dickey-Fuller = -1.7154, Lag order = 2, p-value = 0.6808  
## alternative hypothesis: stationary

## p = 0.681, nonstationary  
  
mg.w6 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Ordospora",  
 Depth=="6")  
  
mg.w6.x <- mg.w6$Concentration  
  
adf.test(x = mg.w6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.w6.x  
## Dickey-Fuller = -1.2108, Lag order = 1, p-value = 0.873  
## alternative hypothesis: stationary

## p = 0.873, nonstationary  
  
mg.w0 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Ordospora",  
 Depth=="0")  
  
mg.w0.x <- mg.w0$Concentration  
  
adf.test(x = mg.w0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.w0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
### Pasteuria Walsh  
  
p.w1 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Pasteuria",  
 Depth=="1")  
  
p.w1.x <- p.w1$Concentration  
  
adf.test(x = p.w1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.w1.x  
## Dickey-Fuller = -1.3224, Lag order = 2, p-value = 0.8305  
## alternative hypothesis: stationary

## p = 0.831, nonstationary  
  
p.w2 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Pasteuria",  
 Depth=="2")  
  
p.w2.x <- p.w2$Concentration  
  
adf.test(x = p.w2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.w2.x  
## Dickey-Fuller = -0.049772, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
p.w3 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Pasteuria",  
 Depth=="3")  
  
p.w3.x <- p.w3$Concentration  
  
adf.test(x = p.w3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.w3.x  
## Dickey-Fuller = -1.3833, Lag order = 2, p-value = 0.8073  
## alternative hypothesis: stationary

## p = 0.807, nonstationary  
  
p.w4 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Pasteuria",  
 Depth=="4")  
  
p.w4.x <- p.w4$Concentration  
  
adf.test(x = p.w4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.w4.x  
## Dickey-Fuller = -1.4792, Lag order = 2, p-value = 0.7708  
## alternative hypothesis: stationary

## p = 0.771, nonstationary  
  
p.w5 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Pasteuria",  
 Depth=="5")  
  
p.w5.x <- p.w5$Concentration  
  
adf.test(x = p.w5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.w5.x  
## Dickey-Fuller = -2.0781, Lag order = 2, p-value = 0.5426  
## alternative hypothesis: stationary

## p = 0.543, nonstationary  
  
p.w6 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Pasteuria",  
 Depth=="6")  
  
p.w6.x <- p.w6$Concentration  
  
adf.test(x = p.w6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.w6.x  
## Dickey-Fuller = -1.3734, Lag order = 1, p-value = 0.8111  
## alternative hypothesis: stationary

## p = 0.811, nonstationary  
  
p.w0 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Pasteuria",  
 Depth=="0")  
  
p.w0.x <- p.w0$Concentration  
  
adf.test(x = p.w0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.w0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
### Blastulidium Walsh  
  
b.w1 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Blastulidium",  
 Depth=="1")  
  
b.w1.x <- b.w1$Concentration  
  
adf.test(x = b.w1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.w1.x  
## Dickey-Fuller = -1.186, Lag order = 2, p-value = 0.8825  
## alternative hypothesis: stationary

## p = 0.883, nonstationary  
  
b.w2 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Blastulidium",  
 Depth=="2")  
  
b.w2.x <- b.w2$Concentration  
  
adf.test(x = b.w2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.w2.x  
## Dickey-Fuller = -1.0888, Lag order = 2, p-value = 0.9075  
## alternative hypothesis: stationary

## p = 0.908, nonstationary  
  
b.w3 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Blastulidium",  
 Depth=="3")  
  
b.w3.x <- b.w3$Concentration  
  
adf.test(x = b.w3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.w3.x  
## Dickey-Fuller = -1.2233, Lag order = 2, p-value = 0.8682  
## alternative hypothesis: stationary

## p = 0.868, nonstationary  
  
b.w4 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Blastulidium",  
 Depth=="4")  
  
b.w4.x <- b.w4$Concentration  
  
adf.test(x = b.w4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.w4.x  
## Dickey-Fuller = -1.2033, Lag order = 2, p-value = 0.8759  
## alternative hypothesis: stationary

## p = 0.876, nonstationary  
  
b.w5 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Blastulidium",  
 Depth=="5")  
  
b.w5.x <- b.w5$Concentration  
  
adf.test(x = b.w5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.w5.x  
## Dickey-Fuller = -1.3111, Lag order = 2, p-value = 0.8348  
## alternative hypothesis: stationary

## p = 0.835, nonstationary  
  
b.w6 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Blastulidium",  
 Depth=="6")  
  
b.w6.x <- b.w6$Concentration  
  
adf.test(x = b.w6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.w6.x  
## Dickey-Fuller = -1.8785, Lag order = 1, p-value = 0.6187  
## alternative hypothesis: stationary

## p = 0.619, nonstationary  
  
b.w0 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Blastulidium",  
 Depth=="0")  
  
b.w0.x <- b.w0$Concentration  
  
adf.test(x = b.w0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.w0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
  
### Spirobacillus Walsh  
  
s.w1 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Spirobacillus",  
 Depth=="1")  
  
s.w1.x <- s.w1$Concentration  
  
adf.test(x = s.w1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.w1.x  
## Dickey-Fuller = -2.2107, Lag order = 2, p-value = 0.4921  
## alternative hypothesis: stationary

## p = 0.492, nonstationary  
  
s.w2 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Spirobacillus",  
 Depth=="2")  
  
s.w2.x <- s.w2$Concentration  
  
adf.test(x = s.w2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.w2.x  
## Dickey-Fuller = -2.5925, Lag order = 2, p-value = 0.3467  
## alternative hypothesis: stationary

## p = 0.347, nonstationary  
  
s.w3 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Spirobacillus",  
 Depth=="3")  
  
s.w3.x <- s.w3$Concentration  
  
adf.test(x = s.w3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.w3.x  
## Dickey-Fuller = -2.3834, Lag order = 2, p-value = 0.4263  
## alternative hypothesis: stationary

## p = 0.4263, nonstationary  
  
s.w4 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Spirobacillus",  
 Depth=="4")  
  
s.w4.x <- s.w4$Concentration  
  
adf.test(x = s.w4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.w4.x  
## Dickey-Fuller = -2.1306, Lag order = 2, p-value = 0.5226  
## alternative hypothesis: stationary

## p = 0.523, nonstationary  
  
s.w5 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Spirobacillus",  
 Depth=="5")  
  
s.w5.x <- s.w5$Concentration  
  
adf.test(x = s.w5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.w5.x  
## Dickey-Fuller = -1.7291, Lag order = 2, p-value = 0.6756  
## alternative hypothesis: stationary

## p = 0.676, nonstationary  
  
s.w6 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Spirobacillus",  
 Depth=="6")  
  
s.w6.x <- s.w6$Concentration  
  
adf.test(x = s.w6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.w6.x  
## Dickey-Fuller = -1.22, Lag order = 1, p-value = 0.8695  
## alternative hypothesis: stationary

## p = 0.869, nonstationary  
  
s.w0 = a %>%  
 filter(Lake== "Walsh",  
 Parasite=="Spirobacillus",  
 Depth=="0")  
  
s.w0.x <- s.w0$Concentration  
  
adf.test(x = s.w0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.w0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
#### Bishop ##############  
  
metsch.b1 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="1")  
  
metsch.b1.x <- metsch.b1$Concentration  
  
adf.test(x = metsch.b1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b1.x  
## Dickey-Fuller = -4.3931, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p = 0.01, stationary  
  
metsch.b2 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="2")  
  
metsch.b2.x <- metsch.b2$Concentration  
  
adf.test(x = metsch.b2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b2.x  
## Dickey-Fuller = -2.105, Lag order = 2, p-value = 0.5324  
## alternative hypothesis: stationary

## p = 0.5324, nonstationary  
  
metsch.b3 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="3")  
  
metsch.b3.x <- metsch.b3$Concentration  
  
adf.test(x = metsch.b3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b3.x  
## Dickey-Fuller = -Inf, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p = 0.01, stationary  
  
metsch.b4 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="4")  
  
metsch.b4.x <- metsch.b4$Concentration  
  
adf.test(x = metsch.b4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b4.x  
## Dickey-Fuller = -5.3693e+31, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p = 0.01, stationary  
  
metsch.b5 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="5")  
  
metsch.b5.x <- metsch.b5$Concentration  
  
adf.test(x = metsch.b5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b5.x  
## Dickey-Fuller = -2.7537, Lag order = 2, p-value = 0.2852  
## alternative hypothesis: stationary

## p = 0.2852, nonstationary  
  
metsch.b6 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="6")  
  
metsch.b6.x <- metsch.b6$Concentration  
  
adf.test(x = metsch.b6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b6.x  
## Dickey-Fuller = -Inf, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p = 0.01, stationary  
  
metsch.b7 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="7")  
  
metsch.b7.x <- metsch.b7$Concentration  
  
adf.test(x = metsch.b7.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b7.x  
## Dickey-Fuller = -2.1852, Lag order = 2, p-value = 0.5018  
## alternative hypothesis: stationary

## p = 0.5018, nonstationary  
  
metsch.b8 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="8")  
  
metsch.b8.x <- metsch.b8$Concentration  
  
adf.test(x = metsch.b8.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b8.x  
## Dickey-Fuller = -Inf, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p = 0.01, stationary  
  
metsch.b9 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="9")  
  
metsch.b9.x <- metsch.b9$Concentration  
  
adf.test(x = metsch.b9.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b9.x  
## Dickey-Fuller = -3.9592, Lag order = 2, p-value = 0.02468  
## alternative hypothesis: stationary

## p = 0.02468, stationary  
  
metsch.b10 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="10")  
  
metsch.b10.x <- metsch.b10$Concentration  
  
adf.test(x = metsch.b10.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b10.x  
## Dickey-Fuller = -3.4204, Lag order = 2, p-value = 0.07495  
## alternative hypothesis: stationary

## p = 0.07, nonstationary  
  
metsch.b11 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="11")  
  
metsch.b11.x <- metsch.b11$Concentration  
  
adf.test(x = metsch.b11.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b11.x  
## Dickey-Fuller = -3.2929, Lag order = 2, p-value = 0.09266  
## alternative hypothesis: stationary

## p = 0.09, nonstationary  
  
metsch.b12 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="12")  
  
metsch.b12.x <- metsch.b12$Concentration  
  
adf.test(x = metsch.b12.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b12.x  
## Dickey-Fuller = -3.1583, Lag order = 2, p-value = 0.1311  
## alternative hypothesis: stationary

## p = 0.13, nonstationary  
  
metsch.b13 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="13")  
  
metsch.b13.x <- metsch.b13$Concentration  
  
adf.test(x = metsch.b13.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b13.x  
## Dickey-Fuller = -1.2376, Lag order = 2, p-value = 0.8628  
## alternative hypothesis: stationary

## p = 0.86, nonstationary  
  
metsch.b14 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="14")  
  
metsch.b14.x <- metsch.b14$Concentration  
  
adf.test(x = metsch.b14.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b14.x  
## Dickey-Fuller = -1.2372, Lag order = 2, p-value = 0.863  
## alternative hypothesis: stationary

## p = 0.86, nonstationary  
  
metsch.b15 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="15")  
  
metsch.b15.x <- metsch.b15$Concentration  
  
adf.test(x = metsch.b15.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b15.x  
## Dickey-Fuller = -8.6855, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p = 0.01, stationary  
  
metsch.b16 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="16")  
  
metsch.b16.x <- metsch.b16$Concentration  
  
adf.test(x = metsch.b16.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b16.x  
## Dickey-Fuller = -3.3807, Lag order = 2, p-value = 0.08046  
## alternative hypothesis: stationary

## p = 0.08, nonstationary  
  
metsch.b0 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Metschnikowia",  
 Depth=="0")  
  
metsch.b0.x <- metsch.b0$Concentration  
  
adf.test(x = metsch.b0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.b0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
### MicG Bishop  
  
mg.b1 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="1")  
  
mg.b1.x <- mg.b1$Concentration  
  
adf.test(x = mg.b1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b1.x  
## Dickey-Fuller = -1.4473, Lag order = 2, p-value = 0.7829  
## alternative hypothesis: stationary

## p = 0.78, nonstationary  
  
mg.b2 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="2")  
  
mg.b2.x <- mg.b2$Concentration  
  
adf.test(x = mg.b2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b2.x  
## Dickey-Fuller = -0.5449, Lag order = 2, p-value = 0.9713  
## alternative hypothesis: stationary

## p = 0.97, nonstationary  
  
mg.b3 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="3")  
  
mg.b3.x <- mg.b3$Concentration  
  
adf.test(x = mg.b3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b3.x  
## Dickey-Fuller = -1.4821, Lag order = 2, p-value = 0.7697  
## alternative hypothesis: stationary

## p = 0.77, nonstationary  
  
mg.b4 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="4")  
  
mg.b4.x <- mg.b4$Concentration  
  
adf.test(x = mg.b4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b4.x  
## Dickey-Fuller = -3.1497, Lag order = 2, p-value = 0.1344  
## alternative hypothesis: stationary

## p = 0.13, nonstationary  
  
mg.b5 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="5")  
  
mg.b5.x <- mg.b5$Concentration  
  
adf.test(x = mg.b5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b5.x  
## Dickey-Fuller = -1.1385, Lag order = 2, p-value = 0.9002  
## alternative hypothesis: stationary

## p = 0.9, nonstationary  
  
mg.b6 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="6")  
  
mg.b6.x <- mg.b6$Concentration  
  
adf.test(x = mg.b6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b6.x  
## Dickey-Fuller = -0.19861, Lag order = 2, p-value = 0.9879  
## alternative hypothesis: stationary

## p = 0.98, nonstationary  
  
mg.b7 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="7")  
  
mg.b7.x <- mg.b7$Concentration  
  
adf.test(x = mg.b7.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b7.x  
## Dickey-Fuller = -0.83795, Lag order = 2, p-value = 0.9444  
## alternative hypothesis: stationary

## p = 0.94, nonstationary  
  
mg.b8 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="8")  
  
mg.b8.x <- mg.b8$Concentration  
  
adf.test(x = mg.b8.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b8.x  
## Dickey-Fuller = -0.64942, Lag order = 2, p-value = 0.9625  
## alternative hypothesis: stationary

## p = 0.96, nonstationary  
  
mg.b9 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="9")  
  
mg.b9.x <- mg.b9$Concentration  
  
adf.test(x = mg.b9.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b9.x  
## Dickey-Fuller = -2.4773, Lag order = 2, p-value = 0.3906  
## alternative hypothesis: stationary

## p = 0.39, nonstationary  
  
mg.b10 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="10")  
  
mg.b10.x <- mg.b10$Concentration  
  
adf.test(x = mg.b10.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b10.x  
## Dickey-Fuller = -2.7418, Lag order = 2, p-value = 0.2898  
## alternative hypothesis: stationary

## p = 0.28, nonstationary  
  
mg.b11 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="11")  
  
mg.b11.x <- mg.b11$Concentration  
  
adf.test(x = mg.b11.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b11.x  
## Dickey-Fuller = -2.2807, Lag order = 2, p-value = 0.4655  
## alternative hypothesis: stationary

## p = 0.47, nonstationary  
  
mg.b12 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="12")  
  
mg.b12.x <- mg.b12$Concentration  
  
adf.test(x = mg.b12.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b12.x  
## Dickey-Fuller = -4.912, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
mg.b13 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="13")  
  
mg.b13.x <- mg.b13$Concentration  
  
adf.test(x = mg.b13.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b13.x  
## Dickey-Fuller = -2.3396, Lag order = 2, p-value = 0.443  
## alternative hypothesis: stationary

## p = 0.44, nonstationary  
  
mg.b14 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="14")  
  
mg.b14.x <- mg.b14$Concentration  
  
adf.test(x = mg.b14.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b14.x  
## Dickey-Fuller = -1.2472, Lag order = 2, p-value = 0.8592  
## alternative hypothesis: stationary

## p = 0.85, nonstationary  
  
mg.b15 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="15")  
  
mg.b15.x <- mg.b15$Concentration  
  
adf.test(x = mg.b15.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b15.x  
## Dickey-Fuller = -1.5262, Lag order = 2, p-value = 0.7529  
## alternative hypothesis: stationary

## p = 0.75, nonstationary  
  
mg.b16 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="16")  
  
mg.b16.x <- mg.b16$Concentration  
  
adf.test(x = mg.b16.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b16.x  
## Dickey-Fuller = -8.4934, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
mg.b0 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Ordospora",  
 Depth=="0")  
  
mg.b0.x <- mg.b0$Concentration  
  
adf.test(x = mg.b0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.b0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
### Pasteuria Bishop  
  
p.b1 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="1")  
  
p.b1.x <- p.b1$Concentration  
  
adf.test(x = p.b1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b1.x  
## Dickey-Fuller = -2.3133, Lag order = 2, p-value = 0.453  
## alternative hypothesis: stationary

## p = 0.45, nonstationary  
  
p.b2 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="2")  
  
p.b2.x <- p.b2$Concentration  
  
adf.test(x = p.b2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b2.x  
## Dickey-Fuller = -1.052, Lag order = 2, p-value = 0.9129  
## alternative hypothesis: stationary

## p = 0.91, nonstationary  
  
p.b3 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="3")  
  
p.b3.x <- p.b3$Concentration  
  
adf.test(x = p.b3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b3.x  
## Dickey-Fuller = -0.75604, Lag order = 2, p-value = 0.9537  
## alternative hypothesis: stationary

## p = 0.95, nonstationary  
  
p.b4 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="4")  
  
p.b4.x <- p.b4$Concentration  
  
adf.test(x = p.b4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b4.x  
## Dickey-Fuller = -0.79333, Lag order = 2, p-value = 0.9506  
## alternative hypothesis: stationary

## p = 0.95, nonstationary  
  
p.b5 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="5")  
  
p.b5.x <- p.b5$Concentration  
  
adf.test(x = p.b5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b5.x  
## Dickey-Fuller = -0.83898, Lag order = 2, p-value = 0.9443  
## alternative hypothesis: stationary

## p = 0.94, nonstationary  
  
p.b6 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="6")  
  
p.b6.x <- p.b6$Concentration  
  
adf.test(x = p.b6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b6.x  
## Dickey-Fuller = -2.353, Lag order = 2, p-value = 0.4379  
## alternative hypothesis: stationary

## p = 0.43, nonstationary  
  
p.b7 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="7")  
  
p.b7.x <- p.b7$Concentration  
  
adf.test(x = p.b7.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b7.x  
## Dickey-Fuller = 0.55446, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
p.b8 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="8")  
  
p.b8.x <- p.b8$Concentration  
  
adf.test(x = p.b8.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b8.x  
## Dickey-Fuller = -0.85776, Lag order = 2, p-value = 0.9415  
## alternative hypothesis: stationary

## p = 0.94, nonstationary  
  
p.b9 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="9")  
  
p.b9.x <- p.b9$Concentration  
  
adf.test(x = p.b9.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b9.x  
## Dickey-Fuller = -1.4845, Lag order = 2, p-value = 0.7688  
## alternative hypothesis: stationary

## p = 0.76, nonstationary  
  
p.b10 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="10")  
  
p.b10.x <- p.b10$Concentration  
  
adf.test(x = p.b10.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b10.x  
## Dickey-Fuller = -0.98761, Lag order = 2, p-value = 0.9224  
## alternative hypothesis: stationary

## p = 0.92, nonstationary  
  
p.b11 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="11")  
  
p.b11.x <- p.b11$Concentration  
  
adf.test(x = p.b11.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b11.x  
## Dickey-Fuller = -1.5176, Lag order = 2, p-value = 0.7562  
## alternative hypothesis: stationary

## p = 0.75, nonstationary  
  
p.b12 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="12")  
  
p.b12.x <- p.b12$Concentration  
  
adf.test(x = p.b12.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b12.x  
## Dickey-Fuller = -1.6584, Lag order = 2, p-value = 0.7025  
## alternative hypothesis: stationary

## p = 0.70, nonstationary  
  
p.b13 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="13")  
  
p.b13.x <- p.b13$Concentration  
  
adf.test(x = p.b13.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b13.x  
## Dickey-Fuller = -0.62189, Lag order = 2, p-value = 0.9648  
## alternative hypothesis: stationary

## p = 0.96, nonstationary  
  
p.b14 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="14")  
  
p.b14.x <- p.b14$Concentration  
  
adf.test(x = p.b14.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b14.x  
## Dickey-Fuller = -2.3414, Lag order = 2, p-value = 0.4423  
## alternative hypothesis: stationary

## p = 0.44, nonstationary  
  
p.b15 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="15")  
  
p.b15.x <- p.b15$Concentration  
  
adf.test(x = p.b15.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b15.x  
## Dickey-Fuller = -3.2931, Lag order = 2, p-value = 0.09263  
## alternative hypothesis: stationary

## p = 0.09, nonstationary  
  
p.b16 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="16")  
  
p.b16.x <- p.b16$Concentration  
  
adf.test(x = p.b16.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b16.x  
## Dickey-Fuller = -1.5575, Lag order = 2, p-value = 0.741  
## alternative hypothesis: stationary

## p = 0.74, nonstationary  
  
p.b0 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Pasteuria",  
 Depth=="0")  
  
p.b0.x <- p.b0$Concentration  
  
adf.test(x = p.b0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.b0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
### Blastulidium Bishop  
  
b.b1 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="1")  
  
b.b1.x <- b.b1$Concentration  
  
adf.test(x = b.b1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b1.x  
## Dickey-Fuller = -1.6355, Lag order = 2, p-value = 0.7112  
## alternative hypothesis: stationary

## p = 0.71, nonstationary  
  
b.b2 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="2")  
  
b.b2.x <- b.b2$Concentration  
  
adf.test(x = b.b2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b2.x  
## Dickey-Fuller = -1.6792, Lag order = 2, p-value = 0.6946  
## alternative hypothesis: stationary

## p = 0.69, nonstationary  
  
b.b3 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="3")  
  
b.b3.x <- b.b3$Concentration  
  
adf.test(x = b.b3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b3.x  
## Dickey-Fuller = -1.6627, Lag order = 2, p-value = 0.7009  
## alternative hypothesis: stationary

## p = 0.7, nonstationary  
  
b.b4 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="4")  
  
b.b4.x <- b.b4$Concentration  
  
adf.test(x = b.b4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b4.x  
## Dickey-Fuller = -2.1035, Lag order = 2, p-value = 0.533  
## alternative hypothesis: stationary

## p = 0.53, nonstationary  
  
b.b5 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="5")  
  
b.b5.x <- b.b5$Concentration  
  
adf.test(x = b.b5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b5.x  
## Dickey-Fuller = -1.6777, Lag order = 2, p-value = 0.6952  
## alternative hypothesis: stationary

## p = 0.69, nonstationary  
  
b.b6 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="6")  
  
b.b6.x <- b.b6$Concentration  
  
adf.test(x = b.b6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b6.x  
## Dickey-Fuller = -2.4849, Lag order = 2, p-value = 0.3877  
## alternative hypothesis: stationary

## p = 0.38, nonstationary  
  
b.b7 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="7")  
  
b.b7.x <- b.b7$Concentration  
  
adf.test(x = b.b7.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b7.x  
## Dickey-Fuller = -2.1532, Lag order = 2, p-value = 0.514  
## alternative hypothesis: stationary

## p = 0.51, nonstationary  
  
b.b8 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="8")  
  
b.b8.x <- b.b8$Concentration  
  
adf.test(x = b.b8.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b8.x  
## Dickey-Fuller = -1.6906, Lag order = 2, p-value = 0.6902  
## alternative hypothesis: stationary

## p = 0.69, nonstationary  
  
b.b9 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="9")  
  
b.b9.x <- b.b9$Concentration  
  
adf.test(x = b.b9.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b9.x  
## Dickey-Fuller = 76.455, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
b.b10 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="10")  
  
b.b10.x <- b.b10$Concentration  
  
adf.test(x = b.b10.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b10.x  
## Dickey-Fuller = -1.8066, Lag order = 2, p-value = 0.6461  
## alternative hypothesis: stationary

## p = 0.64, nonstationary  
  
b.b11 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="11")  
  
b.b11.x <- b.b11$Concentration  
  
adf.test(x = b.b11.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b11.x  
## Dickey-Fuller = -3.0472, Lag order = 2, p-value = 0.1734  
## alternative hypothesis: stationary

## p = 0.17, nonstationary  
  
b.b12 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="12")  
  
b.b12.x <- b.b12$Concentration  
  
adf.test(x = b.b12.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b12.x  
## Dickey-Fuller = -1.1215, Lag order = 2, p-value = 0.9027  
## alternative hypothesis: stationary

## p = 0.90, nonstationary  
  
b.b13 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="13")  
  
b.b13.x <- b.b13$Concentration  
  
adf.test(x = b.b13.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b13.x  
## Dickey-Fuller = -1.2814, Lag order = 2, p-value = 0.8461  
## alternative hypothesis: stationary

## p = 0.84, nonstationary  
  
b.b14 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="14")  
  
b.b14.x <- b.b14$Concentration  
  
adf.test(x = b.b14.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b14.x  
## Dickey-Fuller = -1.5905, Lag order = 2, p-value = 0.7284  
## alternative hypothesis: stationary

## p = 0.72, nonstationary  
  
b.b15 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="15")  
  
b.b15.x <- b.b15$Concentration  
  
adf.test(x = b.b15.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b15.x  
## Dickey-Fuller = -1.073, Lag order = 2, p-value = 0.9099  
## alternative hypothesis: stationary

## p = 0.90, nonstationary  
  
b.b16 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="16")  
  
b.b16.x <- b.b16$Concentration  
  
adf.test(x = b.b16.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b16.x  
## Dickey-Fuller = -2.3532, Lag order = 2, p-value = 0.4378  
## alternative hypothesis: stationary

## p = 0.43, nonstationary  
  
b.b0 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Blastulidium",  
 Depth=="0")  
  
b.b0.x <- b.b0$Concentration  
  
adf.test(x = b.b0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.b0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
  
### Spirobacillus Bishop  
  
s.b1 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="1")  
  
s.b1.x <- s.b1$Concentration  
  
adf.test(x = s.b1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b1.x  
## Dickey-Fuller = -1.1975, Lag order = 2, p-value = 0.8781  
## alternative hypothesis: stationary

## p = 0.87, nonstationary  
  
s.b2 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="2")  
  
s.b2.x <- s.b2$Concentration  
  
adf.test(x = s.b2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b2.x  
## Dickey-Fuller = -1.4289, Lag order = 2, p-value = 0.79  
## alternative hypothesis: stationary

## p = 0.79, nonstationary  
  
s.b3 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="3")  
  
s.b3.x <- s.b3$Concentration  
  
adf.test(x = s.b3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b3.x  
## Dickey-Fuller = -1.3647, Lag order = 2, p-value = 0.8144  
## alternative hypothesis: stationary

## p = 0.81, nonstationary  
  
s.b4 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="4")  
  
s.b4.x <- s.b4$Concentration  
  
adf.test(x = s.b4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b4.x  
## Dickey-Fuller = -1.4321, Lag order = 2, p-value = 0.7887  
## alternative hypothesis: stationary

## p = 0.78, nonstationary  
  
s.b5 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="5")  
  
s.b5.x <- s.b5$Concentration  
  
adf.test(x = s.b5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b5.x  
## Dickey-Fuller = -1.4026, Lag order = 2, p-value = 0.8  
## alternative hypothesis: stationary

## p = 0.8, nonstationary  
  
s.b6 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="6")  
  
s.b6.x <- s.b6$Concentration  
  
adf.test(x = s.b6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b6.x  
## Dickey-Fuller = -0.84983, Lag order = 2, p-value = 0.9427  
## alternative hypothesis: stationary

## p = 0.94, nonstationary  
  
s.b7 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="7")  
  
s.b7.x <- s.b7$Concentration  
  
adf.test(x = s.b7.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b7.x  
## Dickey-Fuller = -6.8006, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
s.b8 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="8")  
  
s.b8.x <- s.b8$Concentration  
  
adf.test(x = s.b8.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b8.x  
## Dickey-Fuller = -0.16894, Lag order = 2, p-value = 0.9892  
## alternative hypothesis: stationary

## p = 0.98, nonstationary  
  
s.b9 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="9")  
  
s.b9.x <- s.b9$Concentration  
  
adf.test(x = s.b9.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b9.x  
## Dickey-Fuller = -0.22243, Lag order = 2, p-value = 0.9869  
## alternative hypothesis: stationary

## p = 0.98, nonstationary  
  
s.b10 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="10")  
  
s.b10.x <- s.b10$Concentration  
  
adf.test(x = s.b10.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b10.x  
## Dickey-Fuller = 0.31481, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
s.b11 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="11")  
  
s.b11.x <- s.b11$Concentration  
  
adf.test(x = s.b11.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b11.x  
## Dickey-Fuller = -0.34495, Lag order = 2, p-value = 0.9816  
## alternative hypothesis: stationary

## p = 0.98, nonstationary  
  
s.b12 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="12")  
  
s.b12.x <- s.b12$Concentration  
  
adf.test(x = s.b12.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b12.x  
## Dickey-Fuller = -1.416, Lag order = 2, p-value = 0.7949  
## alternative hypothesis: stationary

## p = 0.79, nonstationary  
  
s.b13 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="13")  
  
s.b13.x <- s.b13$Concentration  
  
adf.test(x = s.b13.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b13.x  
## Dickey-Fuller = -0.74328, Lag order = 2, p-value = 0.9547  
## alternative hypothesis: stationary

## p = 0.95, nonstationary  
  
s.b14 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="14")  
  
s.b14.x <- s.b14$Concentration  
  
adf.test(x = s.b14.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b14.x  
## Dickey-Fuller = -1.9025, Lag order = 2, p-value = 0.6095  
## alternative hypothesis: stationary

## p = 0.60, nonstationary  
  
s.b15 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="15")  
  
s.b15.x <- s.b15$Concentration  
  
adf.test(x = s.b15.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b15.x  
## Dickey-Fuller = -0.92461, Lag order = 2, p-value = 0.9317  
## alternative hypothesis: stationary

## p = 0.93, nonstationary  
  
s.b16 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="16")  
  
s.b16.x <- s.b16$Concentration  
  
adf.test(x = s.b16.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b16.x  
## Dickey-Fuller = -1.4279, Lag order = 2, p-value = 0.7903  
## alternative hypothesis: stationary

## p = 0.79, nonstationary  
  
s.b0 = a %>%  
 filter(Lake== "Bishop",  
 Parasite=="Spirobacillus",  
 Depth=="0")  
  
s.b0.x <- s.b0$Concentration  
  
adf.test(x = s.b0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.b0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
############### Mill Metschnikowia ##########################  
  
metsch.m1 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Metschnikowia",  
 Depth=="1")  
  
metsch.m1.x <- metsch.m1$Concentration  
  
adf.test(x = metsch.m1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.m1.x  
## Dickey-Fuller = -1.5232, Lag order = 2, p-value = 0.754  
## alternative hypothesis: stationary

## p = 0.75, nonstationary  
  
metsch.m2 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Metschnikowia",  
 Depth=="2")  
  
metsch.m2.x <- metsch.m2$Concentration  
  
adf.test(x = metsch.m2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.m2.x  
## Dickey-Fuller = -1.3026, Lag order = 2, p-value = 0.8381  
## alternative hypothesis: stationary

## p = 0.83, nonstationary  
  
metsch.m3 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Metschnikowia",  
 Depth=="3")  
  
metsch.m3.x <- metsch.m3$Concentration  
  
adf.test(x = metsch.m3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.m3.x  
## Dickey-Fuller = -1.1772, Lag order = 2, p-value = 0.8858  
## alternative hypothesis: stationary

## p = 0.88, nonstationary  
  
metsch.m4 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Metschnikowia",  
 Depth=="4")  
  
metsch.m4.x <- metsch.m4$Concentration  
  
adf.test(x = metsch.m4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.m4.x  
## Dickey-Fuller = -0.97821, Lag order = 2, p-value = 0.9238  
## alternative hypothesis: stationary

## p = 0.92, nonstationary  
  
metsch.m5 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Metschnikowia",  
 Depth=="5")  
  
metsch.m5.x <- metsch.m5$Concentration  
  
adf.test(x = metsch.m5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.m5.x  
## Dickey-Fuller = -1.2969, Lag order = 2, p-value = 0.8402  
## alternative hypothesis: stationary

## p = 0.84, nonstationary  
  
metsch.m6 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Metschnikowia",  
 Depth=="6")  
  
metsch.m6.x <- metsch.m6$Concentration  
  
adf.test(x = metsch.m6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.m6.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
metsch.m0 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Metschnikowia",  
 Depth=="0")  
  
metsch.m0.x <- metsch.m0$Concentration  
  
adf.test(x = metsch.m0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.m0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
######## Mill MicG #####################  
  
mg.m1 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Ordospora",  
 Depth=="1")  
  
mg.m1.x <- mg.m1$Concentration  
  
adf.test(x = mg.m1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.m1.x  
## Dickey-Fuller = -1.5951, Lag order = 2, p-value = 0.7266  
## alternative hypothesis: stationary

## p = 0.72, nonstationary  
  
mg.m2 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Ordospora",  
 Depth=="2")  
  
mg.m2.x <- mg.m2$Concentration  
  
adf.test(x = mg.m2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.m2.x  
## Dickey-Fuller = -2.2316, Lag order = 2, p-value = 0.4842  
## alternative hypothesis: stationary

## p = 0.48, nonstationary  
  
mg.m3 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Ordospora",  
 Depth=="3")  
  
mg.m3.x <- mg.m3$Concentration  
  
adf.test(x = mg.m3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.m3.x  
## Dickey-Fuller = -0.77843, Lag order = 2, p-value = 0.9518  
## alternative hypothesis: stationary

## p = 0.95, nonstationary  
  
mg.m4 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Ordospora",  
 Depth=="4")  
  
mg.m4.x <- mg.m4$Concentration  
  
adf.test(x = mg.m4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.m4.x  
## Dickey-Fuller = -0.83455, Lag order = 2, p-value = 0.9449  
## alternative hypothesis: stationary

## p = 0.95, nonstationary  
  
mg.m5 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Ordospora",  
 Depth=="5")  
  
mg.m5.x <- mg.m5$Concentration  
  
adf.test(x = mg.m5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.m5.x  
## Dickey-Fuller = -1.0281, Lag order = 2, p-value = 0.9165  
## alternative hypothesis: stationary

## p = 0.91, nonstationary  
  
mg.m6 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Ordospora",  
 Depth=="6")  
  
mg.m6.x <- mg.m6$Concentration  
  
adf.test(x = mg.m6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.m6.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
mg.m0 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Ordospora",  
 Depth=="0")  
  
mg.m0.x <- mg.m0$Concentration  
  
adf.test(x = mg.m0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.m0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
########## Mill Pasteuria #############################  
  
p.m1 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Pasteuria",  
 Depth=="1")  
  
p.m1.x <- p.m1$Concentration  
  
adf.test(x = p.m1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.m1.x  
## Dickey-Fuller = -2.139, Lag order = 2, p-value = 0.5194  
## alternative hypothesis: stationary

## p = 0.51, nonstationary  
  
p.m2 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Pasteuria",  
 Depth=="2")  
  
p.m2.x <- p.m2$Concentration  
  
adf.test(x = p.m2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.m2.x  
## Dickey-Fuller = NaN, Lag order = 2, p-value = NA  
## alternative hypothesis: stationary

## NA  
  
p.m3 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Pasteuria",  
 Depth=="3")  
  
p.m3.x <- p.m3$Concentration  
  
adf.test(x = p.m3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.m3.x  
## Dickey-Fuller = -2.341, Lag order = 2, p-value = 0.4425  
## alternative hypothesis: stationary

## p = 0.44, nonstationary  
  
p.m4 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Pasteuria",  
 Depth=="4")  
  
p.m4.x <- p.m4$Concentration  
  
adf.test(x = p.m4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.m4.x  
## Dickey-Fuller = -1.7929, Lag order = 2, p-value = 0.6513  
## alternative hypothesis: stationary

## p = 0.65, nonstationary  
  
p.m5 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Pasteuria",  
 Depth=="5")  
  
p.m5.x <- p.m5$Concentration  
  
adf.test(x = p.m5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.m5.x  
## Dickey-Fuller = -1.3763, Lag order = 2, p-value = 0.81  
## alternative hypothesis: stationary

## p = 0.81, nonstationary  
  
p.m6 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Pasteuria",  
 Depth=="6")  
  
p.m6.x <- p.m6$Concentration  
  
adf.test(x = p.m6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.m6.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
p.m0 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Pasteuria",  
 Depth=="0")  
  
p.m0.x <- p.m0$Concentration  
  
adf.test(x = p.m0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.m0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
############# Mill Blastulidium #####################  
  
b.m1 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Blastulidium",  
 Depth=="1")  
  
b.m1.x <- b.m1$Concentration  
  
adf.test(x = b.m1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.m1.x  
## Dickey-Fuller = -1.2707, Lag order = 2, p-value = 0.8502  
## alternative hypothesis: stationary

## p = 0.85, nonstationary  
  
b.m2 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Blastulidium",  
 Depth=="2")  
  
b.m2.x <- b.m2$Concentration  
  
adf.test(x = b.m2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.m2.x  
## Dickey-Fuller = -1.7532, Lag order = 2, p-value = 0.6664  
## alternative hypothesis: stationary

## p = 0.66, nonstationary  
  
b.m3 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Blastulidium",  
 Depth=="3")  
  
b.m3.x <- b.m3$Concentration  
  
adf.test(x = b.m3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.m3.x  
## Dickey-Fuller = -1.5934, Lag order = 2, p-value = 0.7273  
## alternative hypothesis: stationary

## p = 0.72, nonstationary  
  
b.m4 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Blastulidium",  
 Depth=="4")  
  
b.m4.x <- b.m4$Concentration  
  
adf.test(x = b.m4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.m4.x  
## Dickey-Fuller = -1.229, Lag order = 2, p-value = 0.8661  
## alternative hypothesis: stationary

## p = 0.86, nonstationary  
  
b.m5 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Blastulidium",  
 Depth=="5")  
  
b.m5.x <- b.m5$Concentration  
  
adf.test(x = b.m5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.m5.x  
## Dickey-Fuller = -1.326, Lag order = 2, p-value = 0.8291  
## alternative hypothesis: stationary

## p = 0.82, nonstationary  
  
b.m6 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Blastulidium",  
 Depth=="6")  
  
b.m6.x <- b.m6$Concentration  
  
adf.test(x = b.m6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.m6.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
b.m0 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Blastulidium",  
 Depth=="0")  
  
b.m0.x <- b.m0$Concentration  
  
adf.test(x = b.m0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.m0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
  
###### Mill Spirobacillus #####################  
  
s.m1 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Spirobacillus",  
 Depth=="1")  
  
s.m1.x <- s.m1$Concentration  
  
adf.test(x = s.m1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.m1.x  
## Dickey-Fuller = -2.1955, Lag order = 2, p-value = 0.4979  
## alternative hypothesis: stationary

## p = 0.49, nonstationary  
  
s.m2 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Spirobacillus",  
 Depth=="2")  
  
s.m2.x <- s.m2$Concentration  
  
adf.test(x = s.m2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.m2.x  
## Dickey-Fuller = -3.8039, Lag order = 2, p-value = 0.03544  
## alternative hypothesis: stationary

## p = 0.03, stationary  
  
s.m3 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Spirobacillus",  
 Depth=="3")  
  
s.m3.x <- s.m3$Concentration  
  
adf.test(x = s.m3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.m3.x  
## Dickey-Fuller = -2.8369, Lag order = 2, p-value = 0.2535  
## alternative hypothesis: stationary

## p = 0.25, nonstationary  
  
s.m4 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Spirobacillus",  
 Depth=="4")  
  
s.m4.x <- s.m4$Concentration  
  
adf.test(x = s.m4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.m4.x  
## Dickey-Fuller = -1.5285, Lag order = 2, p-value = 0.752  
## alternative hypothesis: stationary

## p = 0.75, nonstationary  
  
s.m5 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Spirobacillus",  
 Depth=="5")  
  
s.m5.x <- s.m5$Concentration  
  
adf.test(x = s.m5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.m5.x  
## Dickey-Fuller = -2.073, Lag order = 2, p-value = 0.5446  
## alternative hypothesis: stationary

## p = 0.54, nonstationary  
  
s.m6 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Spirobacillus",  
 Depth=="6")  
  
s.m6.x <- s.m6$Concentration  
  
adf.test(x = s.m6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.m6.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
s.m0 = a %>%  
 filter(Lake== "Mill",  
 Parasite=="Spirobacillus",  
 Depth=="0")  
  
s.m0.x <- s.m0$Concentration  
  
adf.test(x = s.m0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.m0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
############### Cedar Metschnikowia ##########################  
  
metsch.c1 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Metschnikowia",  
 Depth=="1")  
  
metsch.c1.x <- metsch.c1$Concentration  
  
adf.test(x = metsch.c1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.c1.x  
## Dickey-Fuller = -2.0493, Lag order = 2, p-value = 0.5536  
## alternative hypothesis: stationary

## p = 0.55, nonstationary  
  
metsch.c2 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Metschnikowia",  
 Depth=="2")  
  
metsch.c2.x <- metsch.c2$Concentration  
  
adf.test(x = metsch.c2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.c2.x  
## Dickey-Fuller = -2.4309, Lag order = 2, p-value = 0.4082  
## alternative hypothesis: stationary

## p = 0.4, nonstationary  
  
metsch.c3 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Metschnikowia",  
 Depth=="3")  
  
metsch.c3.x <- metsch.c3$Concentration  
  
adf.test(x = metsch.c3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.c3.x  
## Dickey-Fuller = NaN, Lag order = 2, p-value = NA  
## alternative hypothesis: stationary

## NA  
  
metsch.c4 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Metschnikowia",  
 Depth=="4")  
  
metsch.c4.x <- metsch.c4$Concentration  
  
adf.test(x = metsch.c4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.c4.x  
## Dickey-Fuller = -4.1123, Lag order = 2, p-value = 0.01934  
## alternative hypothesis: stationary

## p = 0.019, stationary  
  
metsch.c5 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Metschnikowia",  
 Depth=="5")  
  
metsch.c5.x <- metsch.c5$Concentration  
  
adf.test(x = metsch.c5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.c5.x  
## Dickey-Fuller = -2.6432, Lag order = 2, p-value = 0.3273  
## alternative hypothesis: stationary

## p = 0.32, nonstationary  
  
metsch.c6 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Metschnikowia",  
 Depth=="6")  
  
metsch.c6.x <- metsch.c6$Concentration  
  
adf.test(x = metsch.c6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.c6.x  
## Dickey-Fuller = -0.55734, Lag order = 2, p-value = 0.9702  
## alternative hypothesis: stationary

## p = 0.97, nonstationary  
  
metsch.c7 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Metschnikowia",  
 Depth=="7")  
  
metsch.c7.x <- metsch.c7$Concentration  
  
adf.test(x = metsch.c7.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.c7.x  
## Dickey-Fuller = -2.3114, Lag order = 2, p-value = 0.4538  
## alternative hypothesis: stationary

## p = 0.45, nonstationary  
  
metsch.c0 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Metschnikowia",  
 Depth=="0")  
  
metsch.c0.x <- metsch.c0$Concentration  
  
adf.test(x = metsch.c0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.c0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
######## Cedar MicG #####################  
  
mg.c1 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Ordospora",  
 Depth=="1")  
  
mg.c1.x <- mg.c1$Concentration  
  
adf.test(x = mg.c1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.c1.x  
## Dickey-Fuller = -7.9409, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
mg.c2 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Ordospora",  
 Depth=="2")  
  
mg.c2.x <- mg.c2$Concentration  
  
adf.test(x = mg.c2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.c2.x  
## Dickey-Fuller = -2.2584, Lag order = 2, p-value = 0.4739  
## alternative hypothesis: stationary

## p = 0.47, nonstationary  
  
mg.c3 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Ordospora",  
 Depth=="3")  
  
mg.c3.x <- mg.c3$Concentration  
  
adf.test(x = mg.c3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.c3.x  
## Dickey-Fuller = -2.8579, Lag order = 2, p-value = 0.2456  
## alternative hypothesis: stationary

## p = 0.24, nonstationary  
  
mg.c4 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Ordospora",  
 Depth=="4")  
  
mg.c4.x <- mg.c4$Concentration  
  
adf.test(x = mg.c4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.c4.x  
## Dickey-Fuller = -7.2152, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p = 0.01, stationary  
  
mg.c5 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Ordospora",  
 Depth=="5")  
  
mg.c5.x <- mg.c5$Concentration  
  
adf.test(x = mg.c5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.c5.x  
## Dickey-Fuller = -1.7513, Lag order = 2, p-value = 0.6671  
## alternative hypothesis: stationary

## p = 0.66, nonstationary  
  
mg.c6 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Ordospora",  
 Depth=="6")  
  
mg.c6.x <- mg.c6$Concentration  
  
adf.test(x = mg.c6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.c6.x  
## Dickey-Fuller = 0.76091, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
mg.c7 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Ordospora",  
 Depth=="7")  
  
mg.c7.x <- mg.c7$Concentration  
  
adf.test(x = mg.c7.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.c7.x  
## Dickey-Fuller = -1.2464, Lag order = 2, p-value = 0.8595  
## alternative hypothesis: stationary

## p - 0.85, nonstationary  
  
mg.c0 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Ordospora",  
 Depth=="0")  
  
mg.c0.x <- mg.c0$Concentration  
  
adf.test(x = mg.c0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.c0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
########## Cedar Pasteuria #############################  
  
p.c1 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Pasteuria",  
 Depth=="1")  
  
p.c1.x <- p.c1$Concentration  
  
adf.test(x = p.c1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.c1.x  
## Dickey-Fuller = -1.7143, Lag order = 2, p-value = 0.6812  
## alternative hypothesis: stationary

## p = 0.68, nonstationary  
  
p.c2 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Pasteuria",  
 Depth=="2")  
  
p.c2.x <- p.c2$Concentration  
  
adf.test(x = p.c2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.c2.x  
## Dickey-Fuller = -2.1469, Lag order = 2, p-value = 0.5164  
## alternative hypothesis: stationary

## p = 0.51, nonstationary  
  
p.c3 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Pasteuria",  
 Depth=="3")  
  
p.c3.x <- p.c3$Concentration  
  
adf.test(x = p.c3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.c3.x  
## Dickey-Fuller = -4.5835, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
p.c4 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Pasteuria",  
 Depth=="4")  
  
p.c4.x <- p.c4$Concentration  
  
adf.test(x = p.c4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.c4.x  
## Dickey-Fuller = -1.9126, Lag order = 2, p-value = 0.6057  
## alternative hypothesis: stationary

## p = 0.60, nonstationary  
  
p.c5 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Pasteuria",  
 Depth=="5")  
  
p.c5.x <- p.c5$Concentration  
  
adf.test(x = p.c5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.c5.x  
## Dickey-Fuller = -4.0686, Lag order = 2, p-value = 0.02086  
## alternative hypothesis: stationary

## p = 0.02, stationary  
  
p.c6 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Pasteuria",  
 Depth=="6")  
  
p.c6.x <- p.c6$Concentration  
  
adf.test(x = p.c6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.c6.x  
## Dickey-Fuller = -0.62163, Lag order = 2, p-value = 0.9649  
## alternative hypothesis: stationary

## p = 0.96, nonstationary  
  
p.c7 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Pasteuria",  
 Depth=="7")  
  
p.c7.x <- p.c7$Concentration  
  
adf.test(x = p.c7.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.c7.x  
## Dickey-Fuller = -1.8185, Lag order = 2, p-value = 0.6415  
## alternative hypothesis: stationary

## p = 0.64, nonstationary  
  
p.c0 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Pasteuria",  
 Depth=="0")  
  
p.c0.x <- p.c0$Concentration  
  
adf.test(x = p.c0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.c0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
############# Cedar Blastulidium #####################  
  
b.c1 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Blastulidium",  
 Depth=="1")  
  
b.c1.x <- b.c1$Concentration  
  
adf.test(x = b.c1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.c1.x  
## Dickey-Fuller = -2.8105, Lag order = 2, p-value = 0.2636  
## alternative hypothesis: stationary

## p = 0.26, nonstationary  
  
b.c2 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Blastulidium",  
 Depth=="2")  
  
b.c2.x <- b.c2$Concentration  
  
adf.test(x = b.c2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.c2.x  
## Dickey-Fuller = -2.2206, Lag order = 2, p-value = 0.4883  
## alternative hypothesis: stationary

## p = 0.48, nonstationary  
  
b.c3 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Blastulidium",  
 Depth=="3")  
  
b.c3.x <- b.c3$Concentration  
  
adf.test(x = b.c3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.c3.x  
## Dickey-Fuller = -1.6195, Lag order = 2, p-value = 0.7173  
## alternative hypothesis: stationary

## p = 0.71, nonstationary  
  
b.c4 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Blastulidium",  
 Depth=="4")  
  
b.c4.x <- b.c4$Concentration  
  
adf.test(x = b.c4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.c4.x  
## Dickey-Fuller = -2.9447, Lag order = 2, p-value = 0.2125  
## alternative hypothesis: stationary

## p = 0.21, nonstationary  
  
b.c5 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Blastulidium",  
 Depth=="5")  
  
b.c5.x <- b.c5$Concentration  
  
adf.test(x = b.c5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.c5.x  
## Dickey-Fuller = -2.0075, Lag order = 2, p-value = 0.5695  
## alternative hypothesis: stationary

## p = 0.57, nonstationary  
  
b.c6 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Blastulidium",  
 Depth=="6")  
  
b.c6.x <- b.c6$Concentration  
  
adf.test(x = b.c6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.c6.x  
## Dickey-Fuller = -0.89887, Lag order = 2, p-value = 0.9355  
## alternative hypothesis: stationary

## p = 0.93, nonstationary  
  
b.c7 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Blastulidium",  
 Depth=="7")  
  
b.c7.x <- b.c7$Concentration  
  
adf.test(x = b.c7.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.c7.x  
## Dickey-Fuller = -1.1667, Lag order = 2, p-value = 0.8898  
## alternative hypothesis: stationary

## p = 0.88, nonstationary  
  
b.c0 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Blastulidium",  
 Depth=="0")  
  
b.c0.x <- b.c0$Concentration  
  
adf.test(x = b.c0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.c0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
  
###### Cedar Spirobacillus #####################  
  
s.c1 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Spirobacillus",  
 Depth=="1")  
  
s.c1.x <- s.c1$Concentration  
  
adf.test(x = s.c1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.c1.x  
## Dickey-Fuller = -6.0876, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
s.c2 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Spirobacillus",  
 Depth=="2")  
  
s.c2.x <- s.c2$Concentration  
  
adf.test(x = s.c2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.c2.x  
## Dickey-Fuller = -9.5942, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
s.c3 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Spirobacillus",  
 Depth=="3")  
  
s.c3.x <- s.c3$Concentration  
  
adf.test(x = s.c3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.c3.x  
## Dickey-Fuller = -9.1768, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
s.c4 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Spirobacillus",  
 Depth=="4")  
  
s.c4.x <- s.c4$Concentration  
  
adf.test(x = s.c4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.c4.x  
## Dickey-Fuller = -2.0694, Lag order = 2, p-value = 0.5459  
## alternative hypothesis: stationary

## p = 0.54, nonstationary  
  
s.c5 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Spirobacillus",  
 Depth=="5")  
  
s.c5.x <- s.c5$Concentration  
  
adf.test(x = s.c5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.c5.x  
## Dickey-Fuller = -3.3652, Lag order = 2, p-value = 0.0826  
## alternative hypothesis: stationary

## p = 0.08, nonstationary  
  
s.c6 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Spirobacillus",  
 Depth=="6")  
  
s.c6.x <- s.c6$Concentration  
  
adf.test(x = s.c6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.c6.x  
## Dickey-Fuller = -9.5852, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
s.c7 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Spirobacillus",  
 Depth=="7")  
  
s.c7.x <- s.c7$Concentration  
  
adf.test(x = s.c7.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.c7.x  
## Dickey-Fuller = -1.5482, Lag order = 2, p-value = 0.7445  
## alternative hypothesis: stationary

## p = 0.74, stationary  
  
s.c0 = a %>%  
 filter(Lake== "Cedar",  
 Parasite=="Spirobacillus",  
 Depth=="0")  
  
s.c0.x <- s.c0$Concentration  
  
adf.test(x = s.c0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.c0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
  
############### CrookedW Metschnikowia ##########################  
  
metsch.cw1 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Metschnikowia",  
 Depth=="1")  
  
metsch.cw1.x <- metsch.cw1$Concentration  
  
adf.test(x = metsch.cw1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.cw1.x  
## Dickey-Fuller = -2.0369, Lag order = 2, p-value = 0.5583  
## alternative hypothesis: stationary

## p = 0.55, nonstationary  
  
metsch.cw2 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Metschnikowia",  
 Depth=="2")  
  
metsch.cw2.x <- metsch.cw2$Concentration  
  
adf.test(x = metsch.cw2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.cw2.x  
## Dickey-Fuller = -1.7097, Lag order = 2, p-value = 0.683  
## alternative hypothesis: stationary

## p = 0.68, nonstationary  
  
metsch.cw3 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Metschnikowia",  
 Depth=="3")  
  
metsch.cw3.x <- metsch.cw3$Concentration  
  
adf.test(x = metsch.cw3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.cw3.x  
## Dickey-Fuller = -2.0933, Lag order = 2, p-value = 0.5368  
## alternative hypothesis: stationary

## p = 0.53, nonstationary  
  
metsch.cw4 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Metschnikowia",  
 Depth=="4")  
  
metsch.cw4.x <- metsch.cw4$Concentration  
  
adf.test(x = metsch.cw4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.cw4.x  
## Dickey-Fuller = -1.9643, Lag order = 2, p-value = 0.586  
## alternative hypothesis: stationary

## p = 0.58, nonstationary  
  
metsch.cw5 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Metschnikowia",  
 Depth=="5")  
  
metsch.cw5.x <- metsch.cw5$Concentration  
  
adf.test(x = metsch.cw5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.cw5.x  
## Dickey-Fuller = -2.4451, Lag order = 2, p-value = 0.4028  
## alternative hypothesis: stationary

## p = 0.4, nonstationary  
  
metsch.cw6 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Metschnikowia",  
 Depth=="6")  
  
metsch.cw6.x <- metsch.cw6$Concentration  
  
adf.test(x = metsch.cw6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.cw6.x  
## Dickey-Fuller = 4.0691, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
metsch.cw0 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Metschnikowia",  
 Depth=="0")  
  
metsch.cw0.x <- metsch.cw0$Concentration  
  
adf.test(x = metsch.cw0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.cw0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
######## CrookedW MicG #####################  
  
mg.cw1 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Ordospora",  
 Depth=="1")  
  
mg.cw1.x <- mg.cw1$Concentration  
  
adf.test(x = mg.cw1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.cw1.x  
## Dickey-Fuller = -6.1324, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
mg.cw2 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Ordospora",  
 Depth=="2")  
  
mg.cw2.x <- mg.cw2$Concentration  
  
adf.test(x = mg.cw2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.cw2.x  
## Dickey-Fuller = -8.0728, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
mg.cw3 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Ordospora",  
 Depth=="3")  
  
mg.cw3.x <- mg.cw3$Concentration  
  
adf.test(x = mg.cw3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.cw3.x  
## Dickey-Fuller = -3.4003, Lag order = 2, p-value = 0.07773  
## alternative hypothesis: stationary

## p = 0.07, nonstationary  
  
mg.cw4 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Ordospora",  
 Depth=="4")  
  
mg.cw4.x <- mg.cw4$Concentration  
  
adf.test(x = mg.cw4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.cw4.x  
## Dickey-Fuller = -4.0898, Lag order = 2, p-value = 0.02012  
## alternative hypothesis: stationary

## p = 0.02, stationary  
  
mg.cw5 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Ordospora",  
 Depth=="5")  
  
mg.cw5.x <- mg.cw5$Concentration  
  
adf.test(x = mg.cw5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.cw5.x  
## Dickey-Fuller = -9.1601, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
mg.cw6 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Ordospora",  
 Depth=="6")  
  
mg.cw6.x <- mg.cw6$Concentration  
  
adf.test(x = mg.cw6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.cw6.x  
## Dickey-Fuller = -1.2146, Lag order = 2, p-value = 0.8716  
## alternative hypothesis: stationary

## p = 0.87, nonstationary  
  
mg.cw0 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Ordospora",  
 Depth=="0")  
  
mg.cw0.x <- mg.cw0$Concentration  
  
adf.test(x = mg.cw0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.cw0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
########## CrookedW Pasteuria #############################  
  
p.cw1 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Pasteuria",  
 Depth=="1")  
  
p.cw1.x <- p.cw1$Concentration  
  
adf.test(x = p.cw1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.cw1.x  
## Dickey-Fuller = -4.5792, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
p.cw2 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Pasteuria",  
 Depth=="2")  
  
p.cw2.x <- p.cw2$Concentration  
  
adf.test(x = p.cw2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.cw2.x  
## Dickey-Fuller = -1.4502, Lag order = 2, p-value = 0.7818  
## alternative hypothesis: stationary

## p = 0.78, nonstationary  
  
p.cw3 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Pasteuria",  
 Depth=="3")  
  
p.cw3.x <- p.cw3$Concentration  
  
adf.test(x = p.cw3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.cw3.x  
## Dickey-Fuller = -1.6456, Lag order = 2, p-value = 0.7074  
## alternative hypothesis: stationary

## p = 0.7, nonstationary  
  
p.cw4 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Pasteuria",  
 Depth=="4")  
  
p.cw4.x <- p.cw4$Concentration  
  
adf.test(x = p.cw4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.cw4.x  
## Dickey-Fuller = -4.3512, Lag order = 2, p-value = 0.01101  
## alternative hypothesis: stationary

## p = 0.01, stationary  
  
p.cw5 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Pasteuria",  
 Depth=="5")  
  
p.cw5.x <- p.cw5$Concentration  
  
adf.test(x = p.cw5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.cw5.x  
## Dickey-Fuller = -2.8428, Lag order = 2, p-value = 0.2513  
## alternative hypothesis: stationary

## p = 0.25, nonstationary  
  
p.cw6 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Pasteuria",  
 Depth=="6")  
  
p.cw6.x <- p.cw6$Concentration  
  
adf.test(x = p.cw6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.cw6.x  
## Dickey-Fuller = -11.24, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
p.cw0 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Pasteuria",  
 Depth=="0")  
  
p.cw0.x <- p.cw0$Concentration  
  
adf.test(x = p.cw0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.cw0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
############# CrookedW Blastulidium #####################  
  
b.cw1 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Blastulidium",  
 Depth=="1")  
  
b.cw1.x <- b.cw1$Concentration  
  
adf.test(x = b.cw1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.cw1.x  
## Dickey-Fuller = 1.6577, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
b.cw2 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Blastulidium",  
 Depth=="2")  
  
b.cw2.x <- b.cw2$Concentration  
  
adf.test(x = b.cw2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.cw2.x  
## Dickey-Fuller = -2.156, Lag order = 2, p-value = 0.5129  
## alternative hypothesis: stationary

## p = 0.51, nonstationary  
  
b.cw3 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Blastulidium",  
 Depth=="3")  
  
b.cw3.x <- b.cw3$Concentration  
  
adf.test(x = b.cw3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.cw3.x  
## Dickey-Fuller = -1.9957, Lag order = 2, p-value = 0.574  
## alternative hypothesis: stationary

## p = 0.57, nonstationary  
  
b.cw4 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Blastulidium",  
 Depth=="4")  
  
b.cw4.x <- b.cw4$Concentration  
  
adf.test(x = b.cw4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.cw4.x  
## Dickey-Fuller = -2.1544, Lag order = 2, p-value = 0.5136  
## alternative hypothesis: stationary

## p = 0.51, nonstationary  
  
b.cw5 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Blastulidium",  
 Depth=="5")  
  
b.cw5.x <- b.cw5$Concentration  
  
adf.test(x = b.cw5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.cw5.x  
## Dickey-Fuller = -1.715, Lag order = 2, p-value = 0.681  
## alternative hypothesis: stationary

## p = 0.68, nonstationary  
  
b.cw6 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Blastulidium",  
 Depth=="6")  
  
b.cw6.x <- b.cw6$Concentration  
  
adf.test(x = b.cw6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.cw6.x  
## Dickey-Fuller = -1.2606, Lag order = 2, p-value = 0.8541  
## alternative hypothesis: stationary

## p = 0.85, nonstationary  
  
b.cw0 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Blastulidium",  
 Depth=="0")  
  
b.cw0.x <- b.cw0$Concentration  
  
adf.test(x = b.cw0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.cw0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
  
###### CrookedW Spirobacillus #####################  
  
s.cw1 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Spirobacillus",  
 Depth=="1")  
  
s.cw1.x <- s.cw1$Concentration  
  
adf.test(x = s.cw1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.cw1.x  
## Dickey-Fuller = -4.6808, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
s.cw2 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Spirobacillus",  
 Depth=="2")  
  
s.cw2.x <- s.cw2$Concentration  
  
adf.test(x = s.cw2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.cw2.x  
## Dickey-Fuller = -4.2675, Lag order = 2, p-value = 0.01393  
## alternative hypothesis: stationary

## p = 0.01, stationary  
  
s.cw3 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Spirobacillus",  
 Depth=="3")  
  
s.cw3.x <- s.cw3$Concentration  
  
adf.test(x = s.cw3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.cw3.x  
## Dickey-Fuller = -6.2717, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
s.cw4 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Spirobacillus",  
 Depth=="4")  
  
s.cw4.x <- s.cw4$Concentration  
  
adf.test(x = s.cw4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.cw4.x  
## Dickey-Fuller = -10.365, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
s.cw5 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Spirobacillus",  
 Depth=="5")  
  
s.cw5.x <- s.cw5$Concentration  
  
adf.test(x = s.cw5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.cw5.x  
## Dickey-Fuller = -8.6602, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
s.cw6 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Spirobacillus",  
 Depth=="6")  
  
s.cw6.x <- s.cw6$Concentration  
  
adf.test(x = s.cw6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.cw6.x  
## Dickey-Fuller = -24.592, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
s.cw0 = a %>%  
 filter(Lake== "CrookedW",  
 Parasite=="Spirobacillus",  
 Depth=="0")  
  
s.cw0.x <- s.cw0$Concentration  
  
adf.test(x = s.cw0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.cw0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
############### LilAp Metschnikowia ##########################  
  
metsch.l1 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Metschnikowia",  
 Depth=="1")  
  
metsch.l1.x <- metsch.l1$Concentration  
  
adf.test(x = metsch.l1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.l1.x  
## Dickey-Fuller = -0.47171, Lag order = 2, p-value = 0.9762  
## alternative hypothesis: stationary

## p = 0.97, nonstationary  
  
metsch.l2 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Metschnikowia",  
 Depth=="2")  
  
metsch.l2.x <- metsch.l2$Concentration  
  
adf.test(x = metsch.l2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.l2.x  
## Dickey-Fuller = -0.99727, Lag order = 2, p-value = 0.921  
## alternative hypothesis: stationary

## p = 0.92, nonstationary  
  
metsch.l3 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Metschnikowia",  
 Depth=="3")  
  
metsch.l3.x <- metsch.l3$Concentration  
  
adf.test(x = metsch.l3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.l3.x  
## Dickey-Fuller = 0.28687, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
metsch.l4 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Metschnikowia",  
 Depth=="4")  
  
metsch.l4.x <- metsch.l4$Concentration  
  
adf.test(x = metsch.l4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.l4.x  
## Dickey-Fuller = -1.1724, Lag order = 2, p-value = 0.8876  
## alternative hypothesis: stationary

## p = 0.88, nonstationary  
  
metsch.l5 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Metschnikowia",  
 Depth=="5")  
  
metsch.l5.x <- metsch.l5$Concentration  
  
adf.test(x = metsch.l5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.l5.x  
## Dickey-Fuller = 0.90079, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
metsch.l6 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Metschnikowia",  
 Depth=="6")  
  
metsch.l6.x <- metsch.l6$Concentration  
  
adf.test(x = metsch.l6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.l6.x  
## Dickey-Fuller = -0.36522, Lag order = 2, p-value = 0.9808  
## alternative hypothesis: stationary

## p = 0.98, nonstationary  
  
metsch.l0 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Metschnikowia",  
 Depth=="0")  
  
metsch.l0.x <- metsch.l0$Concentration  
  
adf.test(x = metsch.l0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: metsch.l0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
######## LilAp MicG #####################  
  
mg.l1 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Ordospora",  
 Depth=="1")  
  
mg.l1.x <- mg.l1$Concentration  
  
adf.test(x = mg.l1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.l1.x  
## Dickey-Fuller = -1.4757, Lag order = 2, p-value = 0.7721  
## alternative hypothesis: stationary

## p = 0.77, nonstationary  
  
mg.l2 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Ordospora",  
 Depth=="2")  
  
mg.l2.x <- mg.l2$Concentration  
  
adf.test(x = mg.l2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.l2.x  
## Dickey-Fuller = -4.2765, Lag order = 2, p-value = 0.01361  
## alternative hypothesis: stationary

## p = 0.013, stationary  
  
mg.l3 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Ordospora",  
 Depth=="3")  
  
mg.l3.x <- mg.l3$Concentration  
  
adf.test(x = mg.l3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.l3.x  
## Dickey-Fuller = -2.5456, Lag order = 2, p-value = 0.3645  
## alternative hypothesis: stationary

## p = 0.36, nonstationary  
  
mg.l4 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Ordospora",  
 Depth=="4")  
  
mg.l4.x <- mg.l4$Concentration  
  
adf.test(x = mg.l4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.l4.x  
## Dickey-Fuller = -3.7899, Lag order = 2, p-value = 0.03643  
## alternative hypothesis: stationary

## p = 0.03, stationary  
  
mg.l5 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Ordospora",  
 Depth=="5")  
  
mg.l5.x <- mg.l5$Concentration  
  
adf.test(x = mg.l5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.l5.x  
## Dickey-Fuller = 0.30282, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
mg.l6 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Ordospora",  
 Depth=="6")  
  
mg.l6.x <- mg.l6$Concentration  
  
adf.test(x = mg.l6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.l6.x  
## Dickey-Fuller = -2.9981, Lag order = 2, p-value = 0.1921  
## alternative hypothesis: stationary

## p = 0.19, nonstationary  
  
mg.l0 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Ordospora",  
 Depth=="0")  
  
mg.l0.x <- mg.l0$Concentration  
  
adf.test(x = mg.l0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: mg.l0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
########## LilAp Pasteuria #############################  
  
p.l1 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Pasteuria",  
 Depth=="1")  
  
p.l1.x <- p.l1$Concentration  
  
adf.test(x = p.l1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.l1.x  
## Dickey-Fuller = -0.65631, Lag order = 2, p-value = 0.962  
## alternative hypothesis: stationary

## p = 0.96, nonstationary  
  
p.l2 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Pasteuria",  
 Depth=="2")  
  
p.l2.x <- p.l2$Concentration  
  
adf.test(x = p.l2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.l2.x  
## Dickey-Fuller = -1.3517, Lag order = 2, p-value = 0.8194  
## alternative hypothesis: stationary

## p = 0.81, nonstationary  
  
p.l3 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Pasteuria",  
 Depth=="3")  
  
p.l3.x <- p.l3$Concentration  
  
adf.test(x = p.l3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.l3.x  
## Dickey-Fuller = -0.4169, Lag order = 2, p-value = 0.9786  
## alternative hypothesis: stationary

## p = 0.97, nonstationary  
  
p.l4 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Pasteuria",  
 Depth=="4")  
  
p.l4.x <- p.l4$Concentration  
  
adf.test(x = p.l4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.l4.x  
## Dickey-Fuller = -1.0517, Lag order = 2, p-value = 0.913  
## alternative hypothesis: stationary

## p = 0.91, nonstationary  
  
p.l5 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Pasteuria",  
 Depth=="5")  
  
p.l5.x <- p.l5$Concentration  
  
adf.test(x = p.l5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.l5.x  
## Dickey-Fuller = -0.7337, Lag order = 2, p-value = 0.9555  
## alternative hypothesis: stationary

## p = 0.95, nonstationary  
  
p.l6 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Pasteuria",  
 Depth=="6")  
  
p.l6.x <- p.l6$Concentration  
  
adf.test(x = p.l6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.l6.x  
## Dickey-Fuller = -2.1074, Lag order = 2, p-value = 0.5315  
## alternative hypothesis: stationary

## p = 0.53, nonstationary  
  
p.l0 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Pasteuria",  
 Depth=="0")  
  
p.l0.x <- p.l0$Concentration  
  
adf.test(x = p.l0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: p.l0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
############# LilAp Blastulidium #####################  
  
b.l1 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Blastulidium",  
 Depth=="1")  
  
b.l1.x <- b.l1$Concentration  
  
adf.test(x = b.l1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.l1.x  
## Dickey-Fuller = -1.4625, Lag order = 2, p-value = 0.7772  
## alternative hypothesis: stationary

## p = 0.77, nonstationary  
  
b.l2 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Blastulidium",  
 Depth=="2")  
  
b.l2.x <- b.l2$Concentration  
  
adf.test(x = b.l2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.l2.x  
## Dickey-Fuller = -2.5012, Lag order = 2, p-value = 0.3814  
## alternative hypothesis: stationary

## p = 0.38, nonstationary  
  
b.l3 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Blastulidium",  
 Depth=="3")  
  
b.l3.x <- b.l3$Concentration  
  
adf.test(x = b.l3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.l3.x  
## Dickey-Fuller = -0.80984, Lag order = 2, p-value = 0.9486  
## alternative hypothesis: stationary

## p = 0.94, nonstationary  
  
b.l4 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Blastulidium",  
 Depth=="4")  
  
b.l4.x <- b.l4$Concentration  
  
adf.test(x = b.l4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.l4.x  
## Dickey-Fuller = -1.6756, Lag order = 2, p-value = 0.696  
## alternative hypothesis: stationary

## p = 0.69, nonstationary  
  
b.l5 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Blastulidium",  
 Depth=="5")  
  
b.l5.x <- b.l5$Concentration  
  
adf.test(x = b.l5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.l5.x  
## Dickey-Fuller = NaN, Lag order = 2, p-value = NA  
## alternative hypothesis: stationary

## NA  
  
b.l6 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Blastulidium",  
 Depth=="6")  
  
b.l6.x <- b.l6$Concentration  
  
adf.test(x = b.l6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.l6.x  
## Dickey-Fuller = 1.7321, Lag order = 2, p-value = 0.99  
## alternative hypothesis: stationary

## p > 0.99, nonstationary  
  
b.l0 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Blastulidium",  
 Depth=="0")  
  
b.l0.x <- b.l0$Concentration  
  
adf.test(x = b.l0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: b.l0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values  
  
  
###### LilAp Spirobacillus #####################  
  
s.l1 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Spirobacillus",  
 Depth=="1")  
  
s.l1.x <- s.l1$Concentration  
  
adf.test(x = s.l1.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.l1.x  
## Dickey-Fuller = -2.1832, Lag order = 2, p-value = 0.5026  
## alternative hypothesis: stationary

## p = 0.5, nonstationary  
  
s.l2 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Spirobacillus",  
 Depth=="2")  
  
s.l2.x <- s.l2$Concentration  
  
adf.test(x = s.l2.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.l2.x  
## Dickey-Fuller = -0.86698, Lag order = 2, p-value = 0.9401  
## alternative hypothesis: stationary

## p = 0.94, nonstationary  
  
s.l3 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Spirobacillus",  
 Depth=="3")  
  
s.l3.x <- s.l3$Concentration  
  
adf.test(x = s.l3.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.l3.x  
## Dickey-Fuller = -4.7411, Lag order = 2, p-value = 0.01  
## alternative hypothesis: stationary

## p < 0.01, stationary  
  
s.l4 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Spirobacillus",  
 Depth=="4")  
  
s.l4.x <- s.l4$Concentration  
  
adf.test(x = s.l4.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.l4.x  
## Dickey-Fuller = -1.0359, Lag order = 2, p-value = 0.9153  
## alternative hypothesis: stationary

## p = 0.91, nonstationary  
  
s.l5 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Spirobacillus",  
 Depth=="5")  
  
s.l5.x <- s.l5$Concentration  
  
adf.test(x = s.l5.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.l5.x  
## Dickey-Fuller = -1.77, Lag order = 2, p-value = 0.66  
## alternative hypothesis: stationary

## p = 0.66, nonstationary  
  
s.l6 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Spirobacillus",  
 Depth=="6")  
  
s.l6.x <- s.l6$Concentration  
  
adf.test(x = s.l6.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.l6.x  
## Dickey-Fuller = -0.49456, Lag order = 2, p-value = 0.9752  
## alternative hypothesis: stationary

## p = 0.97, nonstationary  
  
s.l0 = a %>%  
 filter(Lake== "LilAp",  
 Parasite=="Spirobacillus",  
 Depth=="0")  
  
s.l0.x <- s.l0$Concentration  
  
adf.test(x = s.l0.x, alternative = "stationary")

##   
## Augmented Dickey-Fuller Test  
##   
## data: s.l0.x  
## Dickey-Fuller = NaN, Lag order = 1, p-value = NA  
## alternative hypothesis: stationary

## can't be tested, too few values