BLE\_Microbio\_18sSalinityRF

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2024-02-22

#housekeeping code and calling things in  
library(readr)  
library(tidyverse)

## ── Attaching core tidyverse packages ──────────────────────── tidyverse 2.0.0 ──  
## ✔ dplyr 1.1.3 ✔ purrr 1.0.2  
## ✔ forcats 1.0.0 ✔ stringr 1.5.0  
## ✔ ggplot2 3.4.4 ✔ tibble 3.2.1  
## ✔ lubridate 1.9.2 ✔ tidyr 1.3.0  
## ── Conflicts ────────────────────────────────────────── tidyverse\_conflicts() ──  
## ✖ dplyr::filter() masks stats::filter()  
## ✖ dplyr::lag() masks stats::lag()  
## ℹ Use the conflicted package (<http://conflicted.r-lib.org/>) to force all conflicts to become errors

library(ggplot2)  
library(readxl)  
  
library(lubridate)  
library(vegan)

## Loading required package: permute  
## Loading required package: lattice  
## This is vegan 2.6-4

library(plotly) #couldn't load

##   
## Attaching package: 'plotly'  
##   
## The following object is masked from 'package:ggplot2':  
##   
## last\_plot  
##   
## The following object is masked from 'package:stats':  
##   
## filter  
##   
## The following object is masked from 'package:graphics':  
##   
## layout

library(goeveg) #couldn't load

## This is GoeVeg 0.7.2 - build: 2024-02-06

library(patchwork)  
  
#######required libraries#######################  
library(randomForest)

## randomForest 4.7-1.1  
## Type rfNews() to see new features/changes/bug fixes.  
##   
## Attaching package: 'randomForest'  
##   
## The following object is masked from 'package:dplyr':  
##   
## combine  
##   
## The following object is masked from 'package:ggplot2':  
##   
## margin

library(caret)

##   
## Attaching package: 'caret'  
##   
## The following object is masked from 'package:vegan':  
##   
## tolerance  
##   
## The following object is masked from 'package:purrr':  
##   
## lift

library(e1071)  
library(dplyr)  
  
library(tidyverse)  
library(ranger)

##   
## Attaching package: 'ranger'  
##   
## The following object is masked from 'package:randomForest':  
##   
## importance

library(lubridate)  
library(vegan)  
library(ranger)  
library(Boruta)  
  
  
setwd("/Users/zachbrown/Desktop/SIO/Classes/2023-24/Winter2024/SIOB278\_MarineMicrobialSeminar/BLE\_LTER\_Data")

#Attempt 1 RF - regression

#Should we divide up by filter size as well?  
#Start with 16s data, RF\_classification template  
library(randomForest)  
library(caret)  
library(e1071)  
library(dplyr)

Work with MergedData16sSalinity3 for RF. This chunk discusses how I tailored the dataset to meet the RF requirements, starting from confirming numeric data to converting to relative abundance to pulling the ASV and one env data predicted value (salinity) and making sure the data frame was of an okay size.

#import main .csv - ~ 18s ASV values and all env data - how to get data ready to go from env/ASV .csv  
EnvASVData18 <- read.csv("EnvASV18Data2.csv")  
EnvASVData18\_2 <- t(EnvASVData18)  
colnames(EnvASVData18\_2) <- EnvASVData18\_2[1, ]  
EnvASVData18\_2 <- EnvASVData18\_2[-1, ]  
EnvASVData18\_2 <- as.data.frame(EnvASVData18\_2)  
  
Salinity18ASVData <- EnvASVData18\_2[, c(8, 24:14145), drop = FALSE]  
Salinity18ASVData2 <- Salinity18ASVData[!is.na(Salinity18ASVData[, 'Salinity']), ]  
str(Salinity18ASVData2)

## 'data.frame': 222 obs. of 14123 variables:  
## $ Salinity : chr "28.6" "29.6" "24.5" "15.8" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAATGTCATAGTGAGGTCCTCGGACTGTTTGGTTGGCGGATCACTCTGCCTGCCTGGCGGGAAGACGACCAAACTGTTGCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "4.643336e-01" "7.040514e-01" "2.758405e-01" "1.532890e-04" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAGTGTTTTAGTGAGGTCCTCGGATTGCTTGTCTGGCGGTTAACGCTGCCTAGCCGGCGAAAAGACGACCAAACTGTAGCACTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "2.712403e-03" "7.034016e-02" "1.572037e-02" "0.000000e+00" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAGTGGTCCGGTGAACCCTCGAGATTGTGATTAATTTCTTTTATTAGAATTTGATTGTGAGAACTTGTGTAAACCTTATCACTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "1.207350e-03" "3.180955e-03" "3.563063e-03" "1.053862e-04" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAGTGGTCCGGTGAAGACTCGGGATTGTGGCAATCTACTTTATTGCAGTTTGTCCACGAGAACCTGTCTAAACCTTATCACTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "3.142418e-04" "1.675987e-03" "3.761011e-03" "5.863305e-03" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAACGTTTTAGTGAGGTCCTCGGACTGTTTGCCTGGCGGATTACTCTGCCTGGCTGGCGGGAAGACGACCAAACTGTAGCGTTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "5.130573e-04" "1.457227e-01" "7.664450e-05" ...  
## $ GTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAGCGTTCGGACCGCTTCCTCTGGACGGGCAACCGTCTGTTGGTCGTGGGAAGTTCGTTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : chr "1.041960e-03" "3.745318e-03" "1.761737e-02" "4.137845e-02" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAACTCGGACTGATGCAGTGCTCAGCTTCTGGACGTTGCATCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "0.0000000000" "0.0000000000" "0.0000000000" "0.0000000000" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAGGACTCGGGACTGTGGTTTGGCTCCTTCATTGGGGCCAGACTGCGGGAACTTGTCCGAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "1.436560e-03" "1.798027e-03" "0.000000e+00" ...  
## $ GTTCGGTACACACCGCCCGTCGCTACTACCGATCGGATTTATTAGTGAGAACCAAAGACTTGAGGTGAAATAACTTTTTTGTTCATAACCGTTAAGGAAATAGTTCAAACTGATATTTCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : chr "9.261863e-04" "1.797411e-02" "1.501105e-03" "0.000000e+00" ...  
## $ CTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCTTTCGGACTGCGCGCGGCTTCGTGCCGTGCCGCGGAAAGTCAGGTAAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTG : chr "0.0004300151" "0.0129974518" "0.0138893471" "0.0318266301" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCAGTGTTCGGTTCCTGAACGTTGCAGCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "0.0241469990" "0.0025481846" "0.0431196595" "0.0192090287" ...  
## $ TCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAATGTTCGGACCGCTGCGAAGCGGACGGTTCGCCGTCAGCTTCGCGGTGGGAAGTTCATTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAG : chr "0.0004300151" "0.0026165923" "0.0068456996" "0.1155128475" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTTCGGTGAAACTTTCGGACCGTCGCTTTGACGCCTTCTGGCGACTGAGTAATGGGAAGTTATTTAAACCTCATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ GTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAGCGCTCGGACCGCGGCCTCTTGACGGTTCGCCGTCGATTGGCTGTGGGAAGTTCGTTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : chr "5.209798e-03" "8.550955e-05" "3.711524e-03" "4.790281e-03" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAATGGCTTAGTGAGCTCTGTGGACTGTTACGCACCGTTGGCAACTTCGGAGCGCGACGGGAAGCAGATCAAACTTGATCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "6.615616e-05" "1.539172e-04" "1.088714e-03" "2.031079e-03" ...  
## $ GTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAGCGTTCGGACTATGACTCTCTGACGGTTCGCCGTCTAAGTGTCGTGGGAAGTTCGTTGAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : chr "6.450226e-04" "1.539172e-04" "1.501105e-03" "5.690854e-03" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAGGACTCGGGATTGTGGTTTGGCTCCTTCATTGGGGCCTGACCGCGAGAACTTGTCCAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "2.315466e-04" "2.462675e-03" "3.431098e-03" "0.000000e+00" ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCAGTGTTCGGCAACGAGCGCTGCAGCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCAT : chr "0.0000000000" "0.0000000000" "0.0088416746" "0.0000000000" ...  
## $ CTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCTTTCGGACTGCGCGCGGCTTCGTGCCGTGTCGCGGAAAGTCAGGTAAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTG : chr "0.0000000000" "0.0072854138" "0.0122232853" "0.0297763897" ...  
## $ CGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAATCTTCGGATTGCTGGGTAGGACTTCGCAAGTTGACCTATCTGCGAGAAGTTGCTTGAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGAT : chr "0.0011577328" "0.0063790125" "0.0060704035" "0.0541493418" ...  
## $ ACTATCGCCGTTCGGTACACACCGCCCGTCGCTACTACCGATTTCGAGTGGTCCGGTGAATCTTTTGGACTGTGTGCCGTCTTGTCGGTGTCGCGGAAAGTCAGGTAAACCTTATCACTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGA : chr "3.638589e-04" "2.820105e-02" "4.156907e-03" "8.105156e-03" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGCAATCCGGTGAATATTTCGGACCGGATCCTGTCGGGGCAACTCGTTCAGGAACTGGAAAGTCAAGTTAACCTTATTGCTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ ACACTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAACCCTTTGGACCGAGAGCGCCTCGTGCGCTTTTGGAAAGTCGAGTAAACCACATCACTTAGAGGAAGGAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGACT : chr "0.0002480856" "0.0108768149" "0.0073075781" "0.0093697906" ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCAGTGTTCGGCAACGAGCGTTGCAGCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCAT : chr "0.0011246547" "0.0142629932" "0.0451981129" "0.0017149208" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCAATGTTTGGATCCCAATCGTTGCAGCGGAAAGTTTGGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "0.0216330648" "0.0018128025" "0.0352512289" "0.0136331411" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAACGTTTTAGTGAGGTATTTGGATCGGCACTCTGGAGGTTTGCGCCTCTATTGCGCTGAAAAGACTCCCAAACTTGAGCGTTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "3.933439e-04" "0.000000e+00" "0.000000e+00" ...  
## $ GTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAGCGTTCGGACTATGATACTCTGACGGTTCGCCGTCTAAGTGTCGTGGGAAGTTCGTTGAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : chr "1.852373e-03" "0.000000e+00" "1.550592e-03" "6.256108e-03" ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCACCTACCGATCGAAGGTAATGATGAGCCCTCAGGACAGTTGATGGAGCCCTCACGGGTTCTTTCGGTTGAAATTTGTGCAAATCCTTACCTTTAGAGGAAGGTGAAGTCGTAACAAGGTTACCGTAGGTGAACCTGCAGAAGGATCAT : chr "0.0002646246" "0.0002052229" "0.0004123915" "0.0018011458" ...  
## $ CTATCGCCGTTCGGTACACACCGCCCGTCGCTACTACCGATTTCGAGTGGTCCGGTGAAGCTTTTGGACTGCGCGTGGCTTCGTGCCGTGTCGCGGAAAGTCAGCTAAACCTTATCACTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTG : chr "8.550684e-03" "0.000000e+00" "3.447593e-02" "1.570829e-01" ...  
## $ GGTACACACCGCCCGTCGCTACTACCGATTGGATGGCTTAGTGAGGTCCTCGGATCGGCCCCGCCGGAGTCTTCACGGCTCTGGCGCGCGTGCCGAGAAGACGATCAAACTTGACTATCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGA : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ GGTACACACCGCCCGTCGCTACTACCGATTGGATGGTTTAGTGAGACTCACGGATTGGTCCCAGCATGGTGGGTTACCGCCGCGCTGGCGTGCCGAAAAGTCAGTCAAACTTGATTATCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGA : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAATGGCTTAGTGAGCTCTGTGGACTGTTGCGCAGCGGGGGCAACTCCGAAGCGTGACGGGAAGCAGATCAAACTTGATCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAGGCCTCGGGATTGTGGTTAGTTTCCTTTATTGGAAGTTAGTCGCGAGAACTTGTCCAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "1.984685e-04" "5.267388e-03" "3.958959e-04" "2.682558e-04" ...  
## $ CTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCTTTCGGACTGTGCTTGGTCTTGTGCCATGTCGCGGAAAGTCAGGTAAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTG : chr "0.0000000000" "0.0004788535" "0.0158028439" "0.0011592481" ...  
## $ ACACTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAACCCTTTGGACTGGAAGCGTCTTGAACGCTGCTAGAAAGTCGAGTAAACCACATCACTTAGAGGAAGGAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGACT : chr "7.177944e-03" "6.498726e-04" "2.540332e-03" "1.389182e-03" ...  
## $ TCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAATGTTCGGACTGTTGCGTGGCGAACGGTCCGCCGTCTGCTTCGCGATGGGAAGTTCATTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAG : chr "0.0007773349" "0.0000000000" "0.0005938438" "0.0149265171" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCAGTGTTCAGTTCCTGAACGTTGCAGCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "0.0020012239" "0.0035058916" "0.0034970803" "0.0161528291" ...  
## $ GGTACACACCGCCCGTCGCTACTACCGATTGAATGGTTTAGTGAGATCCTCGGATTGGTCCCGGCCCGGAGGGCAACCTTCGGGACGGTGCGCCGAGAAGACGATCAAACTTGATCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGA : chr "0.0000000000" "0.0000000000" "0.0000000000" "0.0000000000" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTTCGGTGAAACTCTCGGACCGTCGCTTGGACGCCTTCTGGCGACTAAGCAATGGGAAGTTATTTAAACCTCATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "2.086433e-03" "4.054634e-02" "1.280921e-02" ...  
## $ GGTACACACCGCCCGTCGCTACTACCGATTGAATGGTTTAGTGAGATCCTCGGACCGGCCCCGGCACGGCAGTCTCTGTCGAGCCGTGGCTGCCGGGAAGACGATCGAACTTGATCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGA : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ CTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCTTTCGGACTGTGCGTGGTCTTGTGCCATGTCGCGGAAAGTCAGGTAAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTG : chr "0.0045316971" "0.0000000000" "0.0034970803" "0.0041771254" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAAGCCTCGGGATTGTGGTCAGTTTGCTTCATTGCGAGTTGATTGCGAGAACTTGTCTAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "1.026115e-04" "0.000000e+00" "0.000000e+00" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCTGCAGTGCCCAGTTCCTGAGCGTTGCGGCGGAAAGTTTCGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "0.0000000000" "0.0000000000" "0.0000000000" "0.0000000000" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCGGCATTGTTCAGCTTCTGGACGTTGCTGCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "3.357425e-03" "2.342962e-03" "7.258091e-04" "1.264634e-03" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGGGTGTGCTGGTGAAGCGTTCGGATTGGGAACTTTGGTTGGCAACAATTGAGGTTTCTGAAAAGTTCGTTAAACCCTCCCACCTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "0.000000e+00" "4.948698e-05" "7.089617e-04" ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGTTCCGGTGAATAATTCGGACTGCAGCAGTGTTCGGCAACGAGTATTGCAGCGGAAAGTTTAGTGAACCTTAACACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCAT : chr "0.0000000000" "0.0000000000" "0.0000000000" "0.0000000000" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCAGCTACCGATTGAATGTCTCGGTGAAGACTTGGGACCGTGGTGCCATCGTTTTATCGCGGCGGCATTGTGGGAACTGGTTTAAACCTCGTTATTTAGAGGAAGCTAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "1.881210e-04" "3.629046e-04" "4.049704e-02" ...  
## $ CGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAATCTTCGGATTGCTGGCTAGGACTTGGCAACTTGACCTAGCTGCGAGAAGTTGATTGAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGAT : chr "0.0000000000" "0.0000000000" "0.0000000000" "0.0000000000" ...  
## $ TACACACCGCCCGTCGCTACTACCGATTGGATGATTTAGTGAGGCCTTCGGACTGGCTGCTAGTGGGGTACCTTGTGTCCCCTGCTGGTGGATTGGGAAGATGTTCAAACTGTATCATCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCA : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ GTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAAATTTTCGGACTGCGGCAATGTCGCCGGTTTCGGGGACGCTGCTGTGGGAAGTTGCTTAAACCTTACCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : chr "1.769677e-03" "0.000000e+00" "8.445779e-03" "9.293146e-04" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACCGCAGCAGTGTTCAGCTCCTGAACGTTGCAGTGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "0.0000000000" "0.0000000000" "0.0000000000" "0.0000000000" ...  
## $ CGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAATGGCTTAGTGAGCCCTCTGGACTGTTGTAATTCGTTGGCAACTTCGAGTCACATACGGGAAGGAGGTCAAACTTGATCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGAT : chr "6.599077e-03" "5.814649e-04" "3.068193e-03" "8.909924e-04" ...  
## $ TCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGATCCGGTGAATACTTCGGACTGCGAAAGGTGTAGATTCTATACTATTCACAGAAAGTTGAATAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATG : chr "6.615616e-05" "0.000000e+00" "5.278612e-04" "2.531185e-02" ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAGCGGCTCGGTGAGGGGTCCGGATTGTTTTTAGCTCCTTTACTGGGGTCAAAAACAAAAAGTTCTCCAAACCTCGTCGCTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCAT : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "4.790281e-05" ...  
## $ ACTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAACCTTTCGGACCGAGGGCAGCCTCGTGCTGCACTTGGGAAGTCAAGTAAACCACATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGA : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ GTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAGCGTTCGGACCGCTTCCTCTGGACGGGTAACCGTCTGTTGGTCGTGGGAAGTTCGTTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAAGCCTCGGGATTGTGGTCTGGCTCCTTTATTGGGGCCTGACTGTGAAAACTTGTCTAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "0.000000e+00" "6.598265e-04" "0.000000e+00" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACCGCGGCAGTGTTTGGATCCCAAGCGTTGCCATGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "0.000000e+00" "0.000000e+00" "1.004586e-02" "1.462952e-02" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCAGTGTTCAGTTCCTGAACGTTGCAGTGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "0.0047136265" "0.0000000000" "0.0026722972" "0.0011496676" ...  
## $ TTCGGTACACACCGCCCGTCGCTACTACCGATTGGATGGTTTAGTGAGATCCTCGGATTGGTCCCGGTGCGGCTTCTGGTCGCGCCGGAGTGCCGAAAAGAATGTCGAACTTGATCATCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGG : chr "0.0000000000" "0.0000000000" "0.0000000000" "0.0000000000" ...  
## $ TTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGATCCGGTGAGTTTTTTGGACTGTGGCAACGGTTTCGGTTCGCCGTACTGATGCCGCGGGAAGATACGCAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGG : chr "1.538131e-03" "2.394267e-04" "2.309393e-04" "1.428462e-02" ...  
## $ CGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAATCTTCGGATTGCTGGCCTTGCCTTGGCAACTTGGCTTGGTTGCGAGAAGTTGATTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGAT : chr "1.488514e-04" "6.327707e-04" "0.000000e+00" "0.000000e+00" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACGGCAGCTTTTTCCAGTTTCTGGAAGTGGCAGCTGGAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "0.0000000000" "0.0000000000" "0.0000000000" "0.0000000000" ...  
## $ TCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAATGTTCGGACTGTTGCGTAGCGAACGGTTCGCCGTCTGCTTCGCGATGGGAAGTTCATTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAG : chr "0.000000e+00" "1.265541e-03" "5.575534e-03" "8.443350e-02" ...  
## $ ACACTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCCTTTGGACCGAGAGCGCCTCGTGCGTTTTTGGAAAGTCGAGTAAACCACATCACTTAGAGGAAGGAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGACT : chr "0.0000000000" "0.0000000000" "0.0000000000" "0.0000000000" ...  
## $ TTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAAATTTTCGGACTGCGGCAATGTTCCCCGGTTTCGGGGACGCTGCTGTGGGAAGTTGCTTAAACCTTACCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGG : chr "2.710749e-02" "0.000000e+00" "1.369140e-03" "0.000000e+00" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATCGAAGGTAATGATGAGCCCTCAGGACTACTGATCGGGTCCCTCACGGGGCCTTTTTGGTTGAAATTTGTGCAAATCCTTACCTTTAGAGGAAGGTGAAGTCGTAACAAGGTTACCGTAGGTGAACCTGCAGAAGGATC : chr "6.863702e-03" "0.000000e+00" "5.773482e-04" "3.544808e-03" ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCACCTACCGATCGAAGGTAATGATGAGCCCTCAGGATAGTTGTTTGGTCCCTCACGGGTCCTTACGGTTAGAATTTGTGCAAATCCTTGCCTTTAGAGGAAGGTGAAGTCGTAACAAGGTTACCGTAGGTGAACCTGCAGAAGGATCAT : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAGGCCTCGGGATCGTGGCGAACTTTCTTCATTGGAGGTGAGCTGTGAGAACTTGTCCAAATCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCATTGTTCAGTTCCTGAACGTTGCAGCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "0.0025470122" "0.0012142356" "0.0000000000" "0.0000000000" ...  
## $ ACTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAGCCTTTCGGACTGTGACGGTGCTCGACACCGACGCGGAAAGTCCGGCAAATCTTACTACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGA : chr "3.803979e-04" "0.000000e+00" "9.237571e-04" "1.088352e-02" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAGTGTTCCGGTGAAGCCTCGGGATTGTAGTTGGGTTCCTTTATTGGATCCTGACCGCGAGAACTTGTCTAAACCTTATCACTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGGGTGTGCTGGTGAAGTGTTCGGATTGGTTTTAGTTGATGGCAACATTGGCTTTTACTGAGAAGATCATTAAACCCTCCCACCTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ TCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGATCCGGTGAAATCTTCGGACCGAGATTTTGTCGATGGTTCGCCGTTGCTGATAACTTGGGAAGTTGATTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAG : chr "1.653904e-04" "0.000000e+00" "9.897397e-05" "7.377033e-04" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAGGACTCGGGATTGTGGTTTGGCTCCTTCATTGGGGCCTGACCGCGAGAACTTGTCCGAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ CGTTCGGTACACACCGCCCGTCGCTACTACCGATTGGATGGTCTGGTGAGTCTTTCGGACTGCGGCTCTGGCTCGGGCAACCGGGCTTTGCTGCGGGAAGTTACGCAAACCCTATCATCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGAT : chr "0.0000000000" "0.0004275478" "0.0013031573" "0.0017245013" ...  
## $ TTCGGTACACACCGCCCGTCGCTACTACCGATTGAACGGCTTAGTGAGTTTCGAGGATTTGGGTACTGTTCGGTTTCACGACCGTCAGTATCTGGAGAGCAGACACAAACTTGGTCGTTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGG : chr "1.356201e-02" "0.000000e+00" "1.138201e-03" "5.173504e-04" ...  
## $ GTTCGGTACACACCGCCCGTCGCTGCTACCGATTGGATGGTCCGGTGAGAACTCTGGATTGCGGTCGGTGTGTCGCTCTGCGATGCATGACTGCGAGAAGTTGATCGAACCTTATCATCTAGAGGAAGCAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : chr "3.969370e-04" "1.197134e-04" "9.897397e-05" "9.580563e-05" ...  
## $ GTTCGGTACACACCGCCCGTCGCTGCCCGGAACTGAGCCGTTTCGAGAAATGCGGGGACCGTTGATTAGCTGGTCGCAAGGCTGACTTGTCGATGGAAACCGTCTTAATCGCAGCGGCTTGAACCGGGCAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACTGATTGAGTGATCCGGTGAATATTTTGGACTGCAGCAAGGCTCAGCTTCTGAGTTTTGCAGCATAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "1.984685e-04" "0.000000e+00" "3.761011e-03" "4.023836e-04" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTTCGGTGAAAATCTCGGACTGTGGCTTGGATGCCTTCGGGCAACCAGGCTGTGGAAAGTTGTTTAAACCTCATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.0000000000" "0.0000000000" "0.0000000000" "0.0000000000" ...  
## $ ATCGCCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAACATTTTAGTGAGTTGCGAGGAGTGGGGATAGTCAGGCAACTGGCTATACCTGCGAGAAGCTGCAAACTTGGATGTTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGC : chr "1.139540e-02" "0.000000e+00" "4.618785e-04" "1.916113e-04" ...  
## $ TCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGATCCGGTGAGCTATTCGGACTTTTGCTTCGTCGGTTTCCGGCTTTGCGAGGGAAAGTTTCGCGAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATG : chr "5.590196e-03" "5.985669e-04" "2.688793e-03" "1.739830e-02" ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGCTCAGGTGAGCCATTCGGACCTCCTTCGTACCAGTTTCTGGTTTCGCTGGAGGAAAGTCTTGCGAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCAT : chr "3.539355e-03" "0.000000e+00" "2.144436e-04" "1.686179e-03" ...  
## $ TTCGGTACACACCGCCCGTCGCTACTACCGATTGAATGGTTTAGCAAGGTCATCGGATTGCTTCAATCACTGGCGTAAGCTAGAGATTGATGGTGAGAAGACGACCGAACTTGATCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGG : chr "2.613168e-03" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAGATTTCGGGATCGAATGATTGTTGATTTATTTTGACTGTTATTTGAGAACTTACTCAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "1.339662e-03" "0.000000e+00" "0.000000e+00" "1.628696e-04" ...  
## $ GTTCGGTACACACCGCCCGTCGCTACTACCGATTGAACGTTTTAGTGAGGTATTTGGACTGGGCCTTGGGAGGATTCGTTCTCCCATGTTGCTCGGGAAGACTCCCAAACTTGAGCGTTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : chr "1.422357e-03" "5.130573e-04" "6.482795e-03" "0.000000e+00" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAAGCCTCGGGATTGTGGTTGGTTTCCTTTATTGGAATCTGACCACGAGAACCTGTCTAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "0.000000e+00" ...  
## $ TACACACCGCCCGTCGCTACTACCGATCGGATGGTTTAGTGAGACACTCGGACTGGTCCCGACGGGGCGGGTGACCGCCCCTTCGTGTGTTGCCGGGAAGAATGTCAAACTTGATTATCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCA : chr "0.000000e+00" "1.829904e-03" "0.000000e+00" "0.000000e+00" ...  
## $ CGTTCGGTACACACCGCCCGTCGCTACTACCGATCGGATTTATTAGTGAGATTTAAAGACTTGAGGTGAAATAACTTTCTGTTAATAACCGTCAAGGAAATAGTTCAAACTGATATTTCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGAT : chr "0.000000e+00" "3.027038e-03" "2.639306e-04" "0.000000e+00" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTTCGGTGAAACTTTCGGACCGTCGCTTTGATGCCTTCTGGCGACTGAGTAATGGGAAGTTATTTAAACCTCATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.0000000000" "0.0000000000" "0.0000000000" "0.0000000000" ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGACTCTACCGATTGAATGGTTCGGTGAAAACTTTGGACTGTGGCATTGTCCTTCATTGGACTTCGCCGTAGGAAATTGTTTAAACCTCATCATTTAGAGGAAGAATAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCAT : chr "3.803979e-04" "0.000000e+00" "1.319653e-04" "1.255054e-03" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATCGAAGGTAATGATGAGCCCTCAGGACAGTTGTTCGTGGCCTTCACGGGCTGCTTACGGTTGAAATTTGTGCAAATCCTTACCTTTAGAGGAAGGTGAAGTCGTAACAAGGTTACCGTAGGTGAACCTGCAGAAGGATC : chr "3.704745e-03" "0.000000e+00" "5.608525e-04" "3.640614e-03" ...  
## $ CTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCTTTCGGACTGCGCGCAGCTTCGTGCCGTGTCGCGGAAAGTCAGGTAAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTG : chr "0.0000000000" "0.0000000000" "0.0000000000" "0.0000000000" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATCGAAGGTAATGATGAGCCCTCAGGACTACTGATCGGGTCCCTCACGGGGCCTTTTCGGTTGAAATTTGTGCAAATCCTTACCTTTAGAGGAAGGTGAAGTCGTAACAAGGTTACCGTAGGTGAACCTGCAGAAGGATC : chr "0.0043332286" "0.0000000000" "0.0000000000" "0.0028166855" ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAAGCCTCGGGATTGTGACTTGTCTCCTTTACTGGGGGCTTGTTACAAGAACTTGTCTAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : chr "0.0000000000" "0.0000000000" "0.0000000000" "0.0000000000" ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGGAGCAGTGTTCAGTTCCTGAACGTTGCATCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : chr "0.0063344525" "0.0009919108" "0.0020949490" "0.0006323172" ...  
## $ ACTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCTTTTGGACTGCGCGCGGTCTCGAACCGCGCGCGGGAAGTCAGGTAAACCTTGTCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGA : chr "0.000000e+00" "0.000000e+00" "0.000000e+00" "5.939949e-04" ...  
## [list output truncated]

Salinity18ASVData3 <- apply(Salinity18ASVData2, MARGIN = 2, FUN = as.numeric)  
Salinity18ASVData3 <- as.data.frame(Salinity18ASVData3)  
str(Salinity18ASVData3)

## 'data.frame': 222 obs. of 14123 variables:  
## $ Salinity : num 28.6 29.6 24.5 15.8 18.4 21.6 29.6 14.9 31.3 3.9 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAATGTCATAGTGAGGTCCTCGGACTGTTTGGTTGGCGGATCACTCTGCCTGCCTGGCGGGAAGACGACCAAACTGTTGCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0.464334 0.704051 0.27584 0.000153 0.127431 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAGTGTTTTAGTGAGGTCCTCGGATTGCTTGTCTGGCGGTTAACGCTGCCTAGCCGGCGAAAAGACGACCAAACTGTAGCACTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0.00271 0.07034 0.01572 0 0.19413 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAGTGGTCCGGTGAACCCTCGAGATTGTGATTAATTTCTTTTATTAGAATTTGATTGTGAGAACTTGTGTAAACCTTATCACTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0.001207 0.003181 0.003563 0.000105 0.000664 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAGTGGTCCGGTGAAGACTCGGGATTGTGGCAATCTACTTTATTGCAGTTTGTCCACGAGAACCTGTCTAAACCTTATCACTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0.000314 0.001676 0.003761 0.005863 0.001329 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAACGTTTTAGTGAGGTCCTCGGACTGTTTGCCTGGCGGATTACTCTGCCTGGCTGGCGGGAAGACGACCAAACTGTAGCGTTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0.00 5.13e-04 1.46e-01 7.66e-05 4.86e-02 ...  
## $ GTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAGCGTTCGGACCGCTTCCTCTGGACGGGCAACCGTCTGTTGGTCGTGGGAAGTTCGTTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : num 0.00104 0.00375 0.01762 0.04138 0.01338 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAACTCGGACTGATGCAGTGCTCAGCTTCTGGACGTTGCATCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0 0 0 0 0 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAGGACTCGGGACTGTGGTTTGGCTCCTTCATTGGGGCCAGACTGCGGGAACTTGTCCGAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0.00144 0.0018 0 0 ...  
## $ GTTCGGTACACACCGCCCGTCGCTACTACCGATCGGATTTATTAGTGAGAACCAAAGACTTGAGGTGAAATAACTTTTTTGTTCATAACCGTTAAGGAAATAGTTCAAACTGATATTTCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : num 0.000926 0.017974 0.001501 0 0.007031 ...  
## $ CTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCTTTCGGACTGCGCGCGGCTTCGTGCCGTGCCGCGGAAAGTCAGGTAAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTG : num 0.00043 0.013 0.01389 0.03183 0.00605 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCAGTGTTCGGTTCCTGAACGTTGCAGCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0.02415 0.00255 0.04312 0.01921 0.00122 ...  
## $ TCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAATGTTCGGACCGCTGCGAAGCGGACGGTTCGCCGTCAGCTTCGCGGTGGGAAGTTCATTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAG : num 0.00043 0.00262 0.00685 0.11551 0.09574 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTTCGGTGAAACTTTCGGACCGTCGCTTTGACGCCTTCTGGCGACTGAGTAATGGGAAGTTATTTAAACCTCATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0 0 0 0 ...  
## $ GTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAGCGCTCGGACCGCGGCCTCTTGACGGTTCGCCGTCGATTGGCTGTGGGAAGTTCGTTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : num 5.21e-03 8.55e-05 3.71e-03 4.79e-03 5.04e-02 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAATGGCTTAGTGAGCTCTGTGGACTGTTACGCACCGTTGGCAACTTCGGAGCGCGACGGGAAGCAGATCAAACTTGATCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 6.62e-05 1.54e-04 1.09e-03 2.03e-03 1.52e-04 ...  
## $ GTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAGCGTTCGGACTATGACTCTCTGACGGTTCGCCGTCTAAGTGTCGTGGGAAGTTCGTTGAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : num 0.000645 0.000154 0.001501 0.005691 0.005467 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAGGACTCGGGATTGTGGTTTGGCTCCTTCATTGGGGCCTGACCGCGAGAACTTGTCCAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0.000232 0.002463 0.003431 0 0.000291 ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCAGTGTTCGGCAACGAGCGCTGCAGCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCAT : num 0 0 0.00884 0 0 ...  
## $ CTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCTTTCGGACTGCGCGCGGCTTCGTGCCGTGTCGCGGAAAGTCAGGTAAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTG : num 0 0.00729 0.01222 0.02978 0 ...  
## $ CGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAATCTTCGGATTGCTGGGTAGGACTTCGCAAGTTGACCTATCTGCGAGAAGTTGCTTGAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGAT : num 0.00116 0.00638 0.00607 0.05415 0.01055 ...  
## $ ACTATCGCCGTTCGGTACACACCGCCCGTCGCTACTACCGATTTCGAGTGGTCCGGTGAATCTTTTGGACTGTGTGCCGTCTTGTCGGTGTCGCGGAAAGTCAGGTAAACCTTATCACTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGA : num 0.000364 0.028201 0.004157 0.008105 0.000651 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGCAATCCGGTGAATATTTCGGACCGGATCCTGTCGGGGCAACTCGTTCAGGAACTGGAAAGTCAAGTTAACCTTATTGCTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0 0 0 0 0 ...  
## $ ACACTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAACCCTTTGGACCGAGAGCGCCTCGTGCGCTTTTGGAAAGTCGAGTAAACCACATCACTTAGAGGAAGGAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGACT : num 0.000248 0.010877 0.007308 0.00937 0.001384 ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCAGTGTTCGGCAACGAGCGTTGCAGCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCAT : num 0.00112 0.01426 0.0452 0.00171 0.01237 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCAATGTTTGGATCCCAATCGTTGCAGCGGAAAGTTTGGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0.02163 0.00181 0.03525 0.01363 0.05017 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAACGTTTTAGTGAGGTATTTGGATCGGCACTCTGGAGGTTTGCGCCTCTATTGCGCTGAAAAGACTCCCAAACTTGAGCGTTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0.000393 0 0 0 ...  
## $ GTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAGCGTTCGGACTATGATACTCTGACGGTTCGCCGTCTAAGTGTCGTGGGAAGTTCGTTGAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : num 0.00185 0 0.00155 0.00626 0.004 ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCACCTACCGATCGAAGGTAATGATGAGCCCTCAGGACAGTTGATGGAGCCCTCACGGGTTCTTTCGGTTGAAATTTGTGCAAATCCTTACCTTTAGAGGAAGGTGAAGTCGTAACAAGGTTACCGTAGGTGAACCTGCAGAAGGATCAT : num 0.000265 0.000205 0.000412 0.001801 0.00746 ...  
## $ CTATCGCCGTTCGGTACACACCGCCCGTCGCTACTACCGATTTCGAGTGGTCCGGTGAAGCTTTTGGACTGCGCGTGGCTTCGTGCCGTGTCGCGGAAAGTCAGCTAAACCTTATCACTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTG : num 0.00855 0 0.03448 0.15708 0.0058 ...  
## $ GGTACACACCGCCCGTCGCTACTACCGATTGGATGGCTTAGTGAGGTCCTCGGATCGGCCCCGCCGGAGTCTTCACGGCTCTGGCGCGCGTGCCGAGAAGACGATCAAACTTGACTATCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGA : num 0 0 0 0 0 ...  
## $ GGTACACACCGCCCGTCGCTACTACCGATTGGATGGTTTAGTGAGACTCACGGATTGGTCCCAGCATGGTGGGTTACCGCCGCGCTGGCGTGCCGAAAAGTCAGTCAAACTTGATTATCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGA : num 0 0 0 0 0 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAATGGCTTAGTGAGCTCTGTGGACTGTTGCGCAGCGGGGGCAACTCCGAAGCGTGACGGGAAGCAGATCAAACTTGATCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0 0 0 0 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAGGCCTCGGGATTGTGGTTAGTTTCCTTTATTGGAAGTTAGTCGCGAGAACTTGTCCAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0.000198 0.005267 0.000396 0.000268 0.001052 ...  
## $ CTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCTTTCGGACTGTGCTTGGTCTTGTGCCATGTCGCGGAAAGTCAGGTAAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTG : num 0 0.000479 0.015803 0.001159 0 ...  
## $ ACACTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAACCCTTTGGACTGGAAGCGTCTTGAACGCTGCTAGAAAGTCGAGTAAACCACATCACTTAGAGGAAGGAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGACT : num 0.00718 0.00065 0.00254 0.00139 0.04158 ...  
## $ TCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAATGTTCGGACTGTTGCGTGGCGAACGGTCCGCCGTCTGCTTCGCGATGGGAAGTTCATTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAG : num 0.000777 0 0.000594 0.014927 0.034283 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCAGTGTTCAGTTCCTGAACGTTGCAGCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0.002 0.00351 0.0035 0.01615 0 ...  
## $ GGTACACACCGCCCGTCGCTACTACCGATTGAATGGTTTAGTGAGATCCTCGGATTGGTCCCGGCCCGGAGGGCAACCTTCGGGACGGTGCGCCGAGAAGACGATCAAACTTGATCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGA : num 0 0 0 0 0 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTTCGGTGAAACTCTCGGACCGTCGCTTGGACGCCTTCTGGCGACTAAGCAATGGGAAGTTATTTAAACCTCATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0.00209 0.04055 0.01281 0.0013 ...  
## $ GGTACACACCGCCCGTCGCTACTACCGATTGAATGGTTTAGTGAGATCCTCGGACCGGCCCCGGCACGGCAGTCTCTGTCGAGCCGTGGCTGCCGGGAAGACGATCGAACTTGATCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGA : num 0 0 0 0 0 ...  
## $ CTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCTTTCGGACTGTGCGTGGTCTTGTGCCATGTCGCGGAAAGTCAGGTAAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTG : num 0.00453 0 0.0035 0.00418 0.00107 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAAGCCTCGGGATTGTGGTCAGTTTGCTTCATTGCGAGTTGATTGCGAGAACTTGTCTAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0.000103 0 0 0 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCTGCAGTGCCCAGTTCCTGAGCGTTGCGGCGGAAAGTTTCGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0 0 0 0 0 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCGGCATTGTTCAGCTTCTGGACGTTGCTGCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0.003357 0.002343 0.000726 0.001265 0 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGGGTGTGCTGGTGAAGCGTTCGGATTGGGAACTTTGGTTGGCAACAATTGAGGTTTCTGAAAAGTTCGTTAAACCCTCCCACCTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0.00 0.00 4.95e-05 7.09e-04 0.00 ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGTTCCGGTGAATAATTCGGACTGCAGCAGTGTTCGGCAACGAGTATTGCAGCGGAAAGTTTAGTGAACCTTAACACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCAT : num 0 0 0 0 0 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCAGCTACCGATTGAATGTCTCGGTGAAGACTTGGGACCGTGGTGCCATCGTTTTATCGCGGCGGCATTGTGGGAACTGGTTTAAACCTCGTTATTTAGAGGAAGCTAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0.00 1.88e-04 3.63e-04 4.05e-02 4.15e-05 ...  
## $ CGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAATCTTCGGATTGCTGGCTAGGACTTGGCAACTTGACCTAGCTGCGAGAAGTTGATTGAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGAT : num 0 0 0 0 0 ...  
## $ TACACACCGCCCGTCGCTACTACCGATTGGATGATTTAGTGAGGCCTTCGGACTGGCTGCTAGTGGGGTACCTTGTGTCCCCTGCTGGTGGATTGGGAAGATGTTCAAACTGTATCATCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCA : num 0 0 0 0 0 0 0 0 0 0 ...  
## $ GTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAAATTTTCGGACTGCGGCAATGTCGCCGGTTTCGGGGACGCTGCTGTGGGAAGTTGCTTAAACCTTACCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : num 0.00177 0 0.008446 0.000929 0.00245 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACCGCAGCAGTGTTCAGCTCCTGAACGTTGCAGTGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0 0 0 0 0 ...  
## $ CGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAATGGCTTAGTGAGCCCTCTGGACTGTTGTAATTCGTTGGCAACTTCGAGTCACATACGGGAAGGAGGTCAAACTTGATCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGAT : num 0.006599 0.000581 0.003068 0.000891 0.000651 ...  
## $ TCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGATCCGGTGAATACTTCGGACTGCGAAAGGTGTAGATTCTATACTATTCACAGAAAGTTGAATAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATG : num 6.62e-05 0.00 5.28e-04 2.53e-02 3.86e-02 ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAGCGGCTCGGTGAGGGGTCCGGATTGTTTTTAGCTCCTTTACTGGGGTCAAAAACAAAAAGTTCTCCAAACCTCGTCGCTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCAT : num 0.00 0.00 0.00 4.79e-05 0.00 ...  
## $ ACTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAACCTTTCGGACCGAGGGCAGCCTCGTGCTGCACTTGGGAAGTCAAGTAAACCACATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGA : num 0 0 0 0 0 0 0 0 0 0 ...  
## $ GTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAGCGTTCGGACCGCTTCCTCTGGACGGGTAACCGTCTGTTGGTCGTGGGAAGTTCGTTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : num 0 0 0 0 0.0191 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAAGCCTCGGGATTGTGGTCTGGCTCCTTTATTGGGGCCTGACTGTGAAAACTTGTCTAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0 0.00066 0 0.000484 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACCGCGGCAGTGTTTGGATCCCAAGCGTTGCCATGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0 0 0.010046 0.01463 0.000651 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCAGTGTTCAGTTCCTGAACGTTGCAGTGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0.00471 0 0.00267 0.00115 0 ...  
## $ TTCGGTACACACCGCCCGTCGCTACTACCGATTGGATGGTTTAGTGAGATCCTCGGATTGGTCCCGGTGCGGCTTCTGGTCGCGCCGGAGTGCCGAAAAGAATGTCGAACTTGATCATCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGG : num 0 0 0 0 0 0 0 0 0 0 ...  
## $ TTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGATCCGGTGAGTTTTTTGGACTGTGGCAACGGTTTCGGTTCGCCGTACTGATGCCGCGGGAAGATACGCAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGG : num 0.001538 0.000239 0.000231 0.014285 0.000623 ...  
## $ CGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAATCTTCGGATTGCTGGCCTTGCCTTGGCAACTTGGCTTGGTTGCGAGAAGTTGATTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGAT : num 0.000149 0.000633 0 0 0.001578 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACGGCAGCTTTTTCCAGTTTCTGGAAGTGGCAGCTGGAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0 0 0 0 0 ...  
## $ TCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGGTCCGGTGAAATGTTCGGACTGTTGCGTAGCGAACGGTTCGCCGTCTGCTTCGCGATGGGAAGTTCATTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAG : num 0 0.001266 0.005576 0.084433 0.000457 ...  
## $ ACACTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCCTTTGGACCGAGAGCGCCTCGTGCGTTTTTGGAAAGTCGAGTAAACCACATCACTTAGAGGAAGGAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGACT : num 0 0 0 0 0 ...  
## $ TTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAAATTTTCGGACTGCGGCAATGTTCCCCGGTTTCGGGGACGCTGCTGTGGGAAGTTGCTTAAACCTTACCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGG : num 0.02711 0 0.00137 0 0.00296 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATCGAAGGTAATGATGAGCCCTCAGGACTACTGATCGGGTCCCTCACGGGGCCTTTTTGGTTGAAATTTGTGCAAATCCTTACCTTTAGAGGAAGGTGAAGTCGTAACAAGGTTACCGTAGGTGAACCTGCAGAAGGATC : num 0.006864 0 0.000577 0.003545 0.006644 ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCACCTACCGATCGAAGGTAATGATGAGCCCTCAGGATAGTTGTTTGGTCCCTCACGGGTCCTTACGGTTAGAATTTGTGCAAATCCTTGCCTTTAGAGGAAGGTGAAGTCGTAACAAGGTTACCGTAGGTGAACCTGCAGAAGGATCAT : num 0 0 0 0 0 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAGGCCTCGGGATCGTGGCGAACTTTCTTCATTGGAGGTGAGCTGTGAGAACTTGTCCAAATCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0 0 0 0 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGCAGCATTGTTCAGTTCCTGAACGTTGCAGCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0.002547 0.001214 0 0 0.000581 ...  
## $ ACTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAGCCTTTCGGACTGTGACGGTGCTCGACACCGACGCGGAAAGTCCGGCAAATCTTACTACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGA : num 0.00038 0 0.000924 0.010884 0.021342 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAGTGTTCCGGTGAAGCCTCGGGATTGTAGTTGGGTTCCTTTATTGGATCCTGACCGCGAGAACTTGTCTAAACCTTATCACTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0 0 0 0.000706 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGGGTGTGCTGGTGAAGTGTTCGGATTGGTTTTAGTTGATGGCAACATTGGCTTTTACTGAGAAGATCATTAAACCCTCCCACCTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0 0 0 0 ...  
## $ TCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGATCCGGTGAAATCTTCGGACCGAGATTTTGTCGATGGTTCGCCGTTGCTGATAACTTGGGAAGTTGATTAAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAG : num 0.000165 0 0.000099 0.000738 0.000083 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAGGACTCGGGATTGTGGTTTGGCTCCTTCATTGGGGCCTGACCGCGAGAACTTGTCCGAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0 0 0 0 ...  
## $ CGTTCGGTACACACCGCCCGTCGCTACTACCGATTGGATGGTCTGGTGAGTCTTTCGGACTGCGGCTCTGGCTCGGGCAACCGGGCTTTGCTGCGGGAAGTTACGCAAACCCTATCATCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGAT : num 0 0.000428 0.001303 0.001725 0.001426 ...  
## $ TTCGGTACACACCGCCCGTCGCTACTACCGATTGAACGGCTTAGTGAGTTTCGAGGATTTGGGTACTGTTCGGTTTCACGACCGTCAGTATCTGGAGAGCAGACACAAACTTGGTCGTTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGG : num 0.013562 0 0.001138 0.000517 0.006796 ...  
## $ GTTCGGTACACACCGCCCGTCGCTGCTACCGATTGGATGGTCCGGTGAGAACTCTGGATTGCGGTCGGTGTGTCGCTCTGCGATGCATGACTGCGAGAAGTTGATCGAACCTTATCATCTAGAGGAAGCAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : num 3.97e-04 1.20e-04 9.90e-05 9.58e-05 2.35e-04 ...  
## $ GTTCGGTACACACCGCCCGTCGCTGCCCGGAACTGAGCCGTTTCGAGAAATGCGGGGACCGTTGATTAGCTGGTCGCAAGGCTGACTTGTCGATGGAAACCGTCTTAATCGCAGCGGCTTGAACCGGGCAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : num 0 0 0 0 0 0 0 0 0 0 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACTGATTGAGTGATCCGGTGAATATTTTGGACTGCAGCAAGGCTCAGCTTCTGAGTTTTGCAGCATAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0.000198 0 0.003761 0.000402 0.002353 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTTCGGTGAAAATCTCGGACTGTGGCTTGGATGCCTTCGGGCAACCAGGCTGTGGAAAGTTGTTTAAACCTCATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0 0 0 0 ...  
## $ ATCGCCGTTCGGTACACACCGCCCGTCGCTACTACCGATTGAACATTTTAGTGAGTTGCGAGGAGTGGGGATAGTCAGGCAACTGGCTATACCTGCGAGAAGCTGCAAACTTGGATGTTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGC : num 0.011395 0 0.000462 0.000192 0.002048 ...  
## $ TCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGATCCGGTGAGCTATTCGGACTTTTGCTTCGTCGGTTTCCGGCTTTGCGAGGGAAAGTTTCGCGAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATG : num 0.00559 0.000599 0.002689 0.017398 0 ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAATGCTCAGGTGAGCCATTCGGACCTCCTTCGTACCAGTTTCTGGTTTCGCTGGAGGAAAGTCTTGCGAACCTTATCATTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCAT : num 0.003539 0 0.000214 0.001686 0 ...  
## $ TTCGGTACACACCGCCCGTCGCTACTACCGATTGAATGGTTTAGCAAGGTCATCGGATTGCTTCAATCACTGGCGTAAGCTAGAGATTGATGGTGAGAAGACGACCGAACTTGATCATTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGG : num 0.00261 0 0 0 0 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAGATTTCGGGATCGAATGATTGTTGATTTATTTTGACTGTTATTTGAGAACTTACTCAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0.00134 0 0 0.000163 0.000291 ...  
## $ GTTCGGTACACACCGCCCGTCGCTACTACCGATTGAACGTTTTAGTGAGGTATTTGGACTGGGCCTTGGGAGGATTCGTTCTCCCATGTTGCTCGGGAAGACTCCCAAACTTGAGCGTTTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGA : num 0.001422 0.000513 0.006483 0 0 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAAGCCTCGGGATTGTGGTTGGTTTCCTTTATTGGAATCTGACCACGAGAACCTGTCTAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0 0 0 0 ...  
## $ TACACACCGCCCGTCGCTACTACCGATCGGATGGTTTAGTGAGACACTCGGACTGGTCCCGACGGGGCGGGTGACCGCCCCTTCGTGTGTTGCCGGGAAGAATGTCAAACTTGATTATCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCA : num 0 0.00183 0 0 0 ...  
## $ CGTTCGGTACACACCGCCCGTCGCTACTACCGATCGGATTTATTAGTGAGATTTAAAGACTTGAGGTGAAATAACTTTCTGTTAATAACCGTCAAGGAAATAGTTCAAACTGATATTTCTAGAGGAAGTAAAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGAT : num 0 0.003027 0.000264 0 0.001329 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTTCGGTGAAACTTTCGGACCGTCGCTTTGATGCCTTCTGGCGACTGAGTAATGGGAAGTTATTTAAACCTCATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0 0 0 0 ...  
## $ CGCCGTTCGGTACACACCGCCCGTCGACTCTACCGATTGAATGGTTCGGTGAAAACTTTGGACTGTGGCATTGTCCTTCATTGGACTTCGCCGTAGGAAATTGTTTAAACCTCATCATTTAGAGGAAGAATAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCAT : num 0.00038 0 0.000132 0.001255 0 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATCGAAGGTAATGATGAGCCCTCAGGACAGTTGTTCGTGGCCTTCACGGGCTGCTTACGGTTGAAATTTGTGCAAATCCTTACCTTTAGAGGAAGGTGAAGTCGTAACAAGGTTACCGTAGGTGAACCTGCAGAAGGATC : num 0.003705 0 0.000561 0.003641 0.00281 ...  
## $ CTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCTTTCGGACTGCGCGCAGCTTCGTGCCGTGTCGCGGAAAGTCAGGTAAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTG : num 0 0 0 0 0 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATCGAAGGTAATGATGAGCCCTCAGGACTACTGATCGGGTCCCTCACGGGGCCTTTTCGGTTGAAATTTGTGCAAATCCTTACCTTTAGAGGAAGGTGAAGTCGTAACAAGGTTACCGTAGGTGAACCTGCAGAAGGATC : num 0.00433 0 0 0.00282 0.00426 ...  
## $ CCGTTCGGTACACACCGCCCGTCGCACCTACCGATTGAATGGTCCGGTGAAGCCTCGGGATTGTGACTTGTCTCCTTTACTGGGGGCTTGTTACAAGAACTTGTCTAAACCTTATCATTTAGAGGAAGGTGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATC : num 0 0 0 0 0 ...  
## $ GCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTGAGTGATCCGGTGAATAATTCGGACTGGAGCAGTGTTCAGTTCCTGAACGTTGCATCGGAAAGTTTAGTGAACCTTATCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCA : num 0.006334 0.000992 0.002095 0.000632 0 ...  
## $ ACTATCGCCGTTCGGTACACACCGCCCGTCGCTCCTACCGATTTCGAGTGGTCCGGTGAATCTTTTGGACTGCGCGCGGTCTCGAACCGCGCGCGGGAAGTCAGGTAAACCTTGTCACTTAGAGGAAGGAGAAGTCGTAACAAGGTTTCCGTAGGTGAACCTGCAGAAGGATCATGCTGA : num 0 0 0 0.000594 0 ...  
## [list output truncated]

#Set a dataframe as the dataframe we want to put through random forest  
Data18sTry1 <- Salinity18ASVData3  
  
# Data Partition in 70% training dataset and 30% test dataset - directly from code  
#set.seed(123)  
#ind <- sample(2, nrow(Data18sTry1), replace = TRUE, prob = c(0.7, 0.3))  
#train18sSalinity <- Data18sTry1[ind==1,]  
#test18sSalinity <- Data18sTry1[ind==2,]  
  
#running rf - taken directly from code  
#set.seed(4444)  
#rf18sSalinity1 <- randomForest(Salinity~., #looking at phase while compared to all the columns so dot (.) is given after tilda (~)  
 # data=train18sSalinity, #train data is used to train  
 # ntree = 200, #number of trees to run  
 # importance = TRUE, #evaluates importance of a predictor  
 # proximity = TRUE) #calculates the proximity measure among the rows  
  
#plotting error-shows the error with growing number of trees in a forest  
#plot(rf18sSalinity1)  
  
#saving the parameters used in running RF  
#sink(paste0("RF18Sal\_parameter",".txt"))  
#rf18sSalinity1  
#sink()  
  
#predicting the dependent variable in the training set using generated RF model  
#p1 <- predict(rf18sSalinity1, train18sSalinity)  
#write.csv(p1,paste0("trainingSalinity18s",".csv"))  
  
#predicting the dependent variable in the validation set using generated RF model  
#p2 <- predict(rf18sSalinity1, test18sSalinity)  
#write.csv(p2,paste0("validationSalinity18s",".csv"))

#read in data  
#data18 <- Salinity18ASVData3 #define the dataframe we used for training  
#data18\_2 <- read.csv(paste0("trainingSalinity18s",".csv")) #pull in data from RF  
#colnames(data18\_2) <- c("SampleNumber", "ActualValue") #and rename it  
  
#pull real data for samples that line up with the training dataset  
#df2 <- data18 %>% select(1, Salinity) #pull all salinity values  
#df2 <- data.frame(blank\_column = NA, df2) #create a blank column aligning with salinity values  
#df2$blank\_column <- 1:222 #label blank column with the number of rows there are   
#colnames(df2) <- c("SampleNumber", "ActualValue") #change the column names  
  
#call in the the trained data with the predicted values  
  
#tr18 <- read.csv(paste0("trainingSalinity18s",".csv")) #call in the csv saved at the end of the last chunk  
#colnames(tr18) <- c("SampleNumber", "PredictedValue") #rename the column names  
#trainingdatapoints18 <- tr18[,1] #make a vector that has the salinity values that were predicted in the above random forest model  
  
#From the training data, pull the associated   
#indices18 <- match(trainingdatapoints18, df2$SampleNumber) #make a list of the row numbers that match with the trained data  
#df2\_18 <- df2[indices18, ] #make a new dataframe that pulls the correct rows out of the dataframe that had all of the real data  
#colnames(df2\_18) <- c("SampleNumber", "ActualValue")  
  
#Finally merge the training data and the real values into a new dataframe by the sample number  
#total18 <- merge(tr18,df2\_18,by="SampleNumber")  
#write.csv(total18,"predicted\_vs\_actual\_in\_training18Sal.csv", row.names = FALSE) #save the dataframe as a CSV  
  
  
#plotting predicted vs actual value  
  
#pdf(paste0("Training\_plot",".pdf"),8,4) - don't need to run this I don't think  
#ggplot(total18, aes(y=ActualValue, x=PredictedValue)) + geom\_point() + geom\_smooth(method=lm)+  
 # ggtitle(paste0("Model RM"," training plot")) +  
 #xlab("Predicted Salinity") + ylab("Actual Salinity")   
#dev.off() - also don't need to run this  
  
#running linear model for training - did not change any of this from the example  
#fit <- lm(ActualValue ~ PredictedValue, data = total18)  
#sink(paste0("training","\_accuracy18.txt"))  
#print(summary(fit))  
#sink()

#ggplot(x=train18sSalinity$Salinity, y=p1)  
#train18sSalinity$PredictedSalinity<-p1  
#ggplot(data=train18sSalinity, aes(x=Salinity, y=PredictedSalinity)) +  
# geom\_point()+  
 # geom\_smooth(method = "lm")+  
 #xlab("Actual Salinity Concentration")+  
 #ylab("Predicted Salinity Concentration")+  
 #ggtitle("Random Forest Training Data Validation")  
  
#Model18\_1<-lm(Salinity~PredictedSalinity,data=train18sSalinity)  
#summary(Model18\_1) #Same as what was put out by the linear model for training

#pr18 <- read.csv(paste0("validationSalinity18s",".csv"))  
#colnames(pr18) <- c("SampleNumber", "PredictedValue")  
#validationdatapoints18 <- pr18[,1] #make a vector that has the salinity values that were predicted in the above random forest model  
#From the training data, pull the associated   
#indices2\_18 <- match(validationdatapoints18, df2$SampleNumber) #make a list of the row numbers that match with the trained data  
#df2\_18\_2 <- df2[indices2\_18, ] #make a new dataframe that pulls the correct rows out of the dataframe that had all of the real data  
#colnames(df2\_18\_2) <- c("SampleNumber", "ActualValue")  
  
#total2\_18 <- merge(pr18,df2\_18\_2,by="SampleNumber")  
#write.csv(total2\_18,"predicted\_vs\_actual\_in\_validation18.csv", row.names = FALSE)  
  
#plotting predicted vs actual value  
  
#pdf(paste0("Validation\_plot",x,y,z,".pdf"),8,4)  
#ggplot(total2\_18, aes(y=ActualValue, x=PredictedValue)) + geom\_point() + geom\_smooth(method=lm)+   
 # ggtitle(paste0("Model RM"," validation plot")) +  
 #xlab("Predicted Salinity") + ylab("Actual Salinity")   
#dev.off()  
  
#running linear model for validation  
#fit2\_18 <- lm(ActualValue ~ PredictedValue, data = total2\_18)  
  
#sink(paste0("validation","\_accuracy18.txt"))  
#print(summary(fit2\_18))  
#sink()

#ggplot(x=test16sSalinity$Salinity, y=p2)  
#test16sSalinity$PredictedSalinity<-p2  
#ggplot(data=train16sSalinity, aes(x=Salinity, y=PredictedSalinity)) +  
 # geom\_point()+  
 #geom\_smooth(method = "lm")+  
 #xlab("Actual Salinity Concentration")+  
 #ylab("Predicted Salinity Concentration")+  
 #ggtitle("Random Forest Training Data Validation")  
  
#Model2<-lm(Salinity~PredictedSalinity,data=test16sSalinity)  
#summary(Model2)

#Follow example from microbiome group  
  
#predictors should be all ASV values used in RF model  
#predictors <- Salinity18ASVData3[ , c(2:ncol(Salinity18ASVData3))]  
  
#hyper.grid <- expand.grid(  
 # n.edges = seq(100, 2000, 100), # aka n.trees  
 #mtry = seq(10, 30, by = 2), #   
 #node\_size = seq(3, 9, by = 2),   
 #sample\_size = c(.55, .632, .70), # internal  
 #OOB\_RMSE = 0 # internal  
#)  
  
#for(i in 1:nrow(hyper.grid)){ ## AKA for every combination of parameter settings  
   
 # predictors <- boruta.index[order(colSums(asv.train)[colnames(asv.train) %in% boruta.index], decreasing = T)] # cannot use more n.edges than boruta predictors  
   
 # try({ ## try clause necessary because some parameter combinations are incompatible  
   
 #model <- ranger(  
 #formula = Salinity~.,  
 # data = train18sSalinity,   
 # num.trees = hyper.grid$n.edges[i],  
 # mtry = hyper.grid$mtry[i],  
 # min.node.size = hyper.grid$node\_size[i],  
 # sample.fraction = hyper.grid$sample\_size[i],  
 # seed = 123,  
 # )  
   
 ## add OOB error to grid  
# hyper.grid$OOB\_RMSE[i] <- sqrt(model$prediction.error)  
   
 ## From the internet:   
 ## OOB (out-of-bag) score is a performance metric for a machine learning model,   
 ## specifically for ensemble models such as random forests.   
 ## It is calculated using the samples that are not used in the training of the model,   
 ## which is called out-of-bag samples.  
 ## The OOB\_score is computed as the number of correctly predicted rows from the out-of-bag sample.   
 ## OOB Error is the number of wrongly classifying the OOB Sample.  
   
 #}, silent = F)  
   
 #print(paste(i, 'out of', nrow(hyper.grid), hyper.grid$OOB\_RMSE[i]))  
   
#}  
  
#hyper.grid$OOB\_RMSE[hyper.grid$OOB\_RMSE == 0] <- NA  
#hyper.grid <- na.omit(hyper.grid)  
  
#hist(hyper.grid$OOB\_RMSE, breaks = 100)  
  
## define selected optimal parameters for the model  
#selected.params <- hyper.grid[which.min(hyper.grid$OOB\_RMSE),]