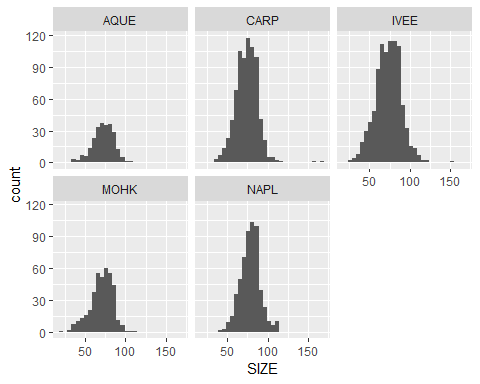
Assignment4\_Lobsters

Robert Saldivar

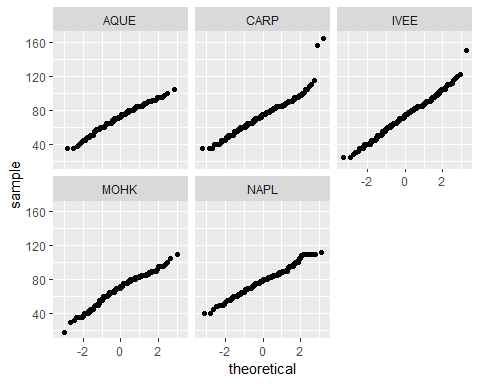
November 13, 2018

#3 checking data for normality  
  
lobster\_size\_hist <- ggplot(lobster\_size\_edits, aes(x=SIZE)) +  
 geom\_histogram() +  
 facet\_wrap(~SITE)  
  
lobster\_size\_hist

## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.

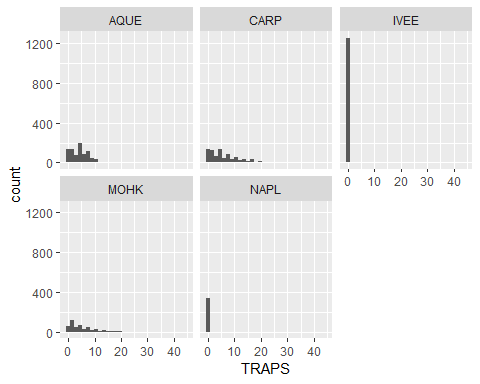


lobster\_size\_qq <- ggplot(lobster\_size\_edits, aes(sample=SIZE)) +  
 geom\_qq() +  
 facet\_wrap(~SITE)  
  
lobster\_size\_qq

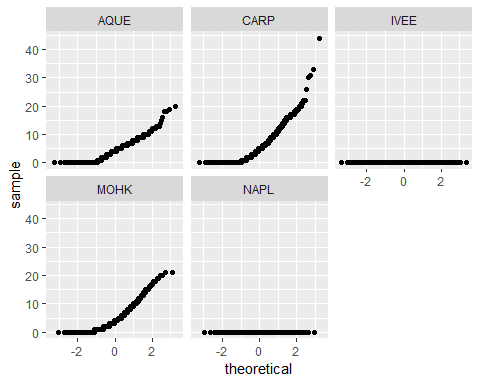


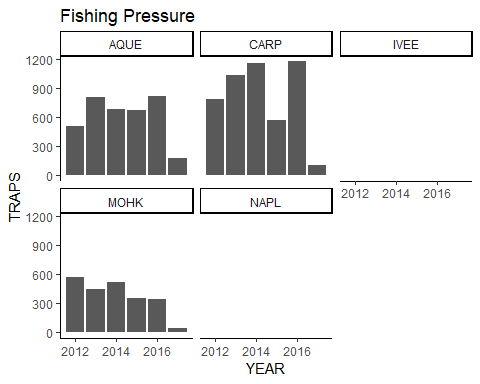
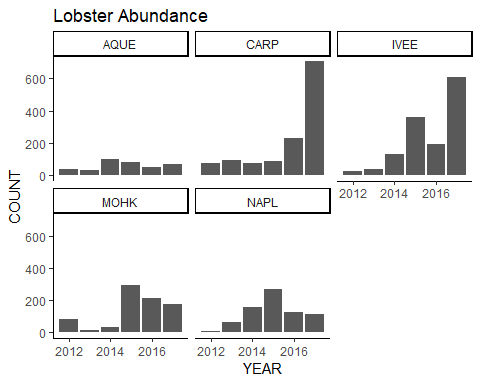
lobster\_traps\_hist <- ggplot(lobster\_traps\_edits, aes(x=TRAPS)) +  
 geom\_histogram() +  
 facet\_wrap(~SITE)  
  
lobster\_traps\_hist

## `stat\_bin()` using `bins = 30`. Pick better value with `binwidth`.



lobster\_traps\_qq <- ggplot(lobster\_traps\_edits, aes(sample=TRAPS)) +  
 geom\_qq() +  
 facet\_wrap(~SITE)  
  
lobster\_traps\_qq





#6 run significance tests for lobster size  
lobster\_levene <- leveneTest(SIZE~SITE, data=lobster\_case\_format)  
lobster\_levene

## Levene's Test for Homogeneity of Variance (center = median)  
## Df F value Pr(>F)   
## group 4 8.3893 1.065e-06 \*\*\*  
## 1663   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

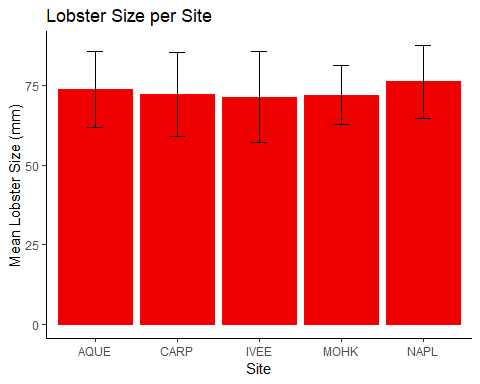
#Variences are not equal check to see if another need to do another test beside anova  
  
lobster\_aov <- aov(SIZE~SITE, data=lobster\_case\_format)  
summary(lobster\_aov)

## Df Sum Sq Mean Sq F value Pr(>F)   
## SITE 4 2355 588.6 3.424 0.0085 \*\*  
## Residuals 1663 285871 171.9   
## ---  
## Signif. codes: 0 '\*\*\*' 0.001 '\*\*' 0.01 '\*' 0.05 '.' 0.1 ' ' 1

lobster\_tukeys <- TukeyHSD(lobster\_aov)  
lobster\_tukeys

## Tukey multiple comparisons of means  
## 95% family-wise confidence level  
##   
## Fit: aov(formula = SIZE ~ SITE, data = lobster\_case\_format)  
##   
## $SITE  
## diff lwr upr p adj  
## CARP-AQUE -1.6657352 -6.24294710 2.911477 0.8582355  
## IVEE-AQUE -2.4433772 -7.05292315 2.166169 0.5968998  
## MOHK-AQUE -1.8955224 -7.02720717 3.236162 0.8514711  
## NAPL-AQUE 2.3366205 -3.19311600 7.866357 0.7775633  
## IVEE-CARP -0.7776420 -2.76097123 1.205687 0.8216104  
## MOHK-CARP -0.2297872 -3.23309697 2.773523 0.9995765  
## NAPL-CARP 4.0023556 0.36042398 7.644287 0.0228728  
## MOHK-IVEE 0.5478548 -2.50450730 3.600217 0.9882889  
## NAPL-IVEE 4.7799976 1.09751057 8.462485 0.0037001  
## NAPL-MOHK 4.2321429 -0.08607271 8.550358 0.0579286

## % latex table generated in R 3.5.1 by xtable 1.8-3 package  
## % Fri Nov 16 10:13:08 2018  
## \begin{table}[ht]  
## \centering  
## \begin{tabular}{lrrrrr}  
## \hline  
## & Df & Sum Sq & Mean Sq & F value & Pr($>$F) \\   
## \hline  
## SITE & 4 & 2354.51 & 588.63 & 3.42 & 0.0085 \\   
## Residuals & 1663 & 285871.12 & 171.90 & & \\   
## \hline  
## \end{tabular}  
## \end{table}



# 8 Creating dataframes for lobster size at each site in 2012 and 2017  
lobster\_NAPL\_2012\_17 <- lobster\_size\_edits %>%  
 filter(YEAR=="2012" |YEAR=="2017", SITE=="NAPL") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_NAPL\_2012 <- lobster\_size\_edits %>%  
 filter(YEAR=="2012", SITE=="NAPL") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_NAPL\_2017 <- lobster\_size\_edits %>%  
 filter(YEAR=="2017", SITE=="NAPL") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_IVEE\_2012\_17 <- lobster\_size\_edits %>%  
 filter(YEAR=="2012" |YEAR=="2017", SITE=="IVEE") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_IVEE\_2012 <- lobster\_size\_edits %>%  
 filter(YEAR=="2012", SITE=="IVEE") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_IVEE\_2017 <- lobster\_size\_edits %>%  
 filter(YEAR=="2017", SITE=="IVEE") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_AQUE\_2012\_17 <- lobster\_size\_edits %>%  
 filter(YEAR=="2012" |YEAR=="2017", SITE=="AQUE") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_AQUE\_2012 <- lobster\_size\_edits %>%  
 filter(YEAR=="2012", SITE=="AQUE") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_AQUE\_2017 <- lobster\_size\_edits %>%  
 filter(YEAR=="2017", SITE=="AQUE") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_MOHK\_2012\_17 <- lobster\_size\_edits %>%  
 filter(YEAR=="2012" |YEAR=="2017", SITE=="MOHK") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_MOHK\_2012 <- lobster\_size\_edits %>%  
 filter(YEAR=="2012", SITE=="MOHK") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_MOHK\_2017 <- lobster\_size\_edits %>%  
 filter(YEAR=="2017", SITE=="MOHK") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_CARP\_2012\_17 <- lobster\_size\_edits %>%  
 filter(YEAR=="2012" |YEAR=="2017", SITE=="CARP") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_CARP\_2012 <- lobster\_size\_edits %>%  
 filter(YEAR=="2012", SITE=="CARP") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")  
  
lobster\_CARP\_2017 <- lobster\_size\_edits %>%  
 filter(YEAR=="2017", SITE=="CARP") %>%  
 as.data.frame() %>%  
 expand.dft(freq="COUNT")

#9 Running f and t tests to see if there is a difference in size at each site between 2012 and 2017  
  
#Running F test for each of the sites  
NAPL\_ftest <- var.test(lobster\_NAPL\_2012$SIZE, lobster\_NAPL\_2017$SIZE)  
NAPL\_ftest

##   
## F test to compare two variances  
##   
## data: lobster\_NAPL\_2012$SIZE and lobster\_NAPL\_2017$SIZE  
## F = 1.064, num df = 5, denom df = 111, p-value = 0.7685  
## alternative hypothesis: true ratio of variances is not equal to 1  
## 95 percent confidence interval:  
## 0.3966019 6.4626426  
## sample estimates:  
## ratio of variances   
## 1.064048

IVEE\_ftest <- var.test(lobster\_IVEE\_2012$SIZE, lobster\_IVEE\_2017$SIZE)  
IVEE\_ftest

##   
## F test to compare two variances  
##   
## data: lobster\_IVEE\_2012$SIZE and lobster\_IVEE\_2017$SIZE  
## F = 0.71311, num df = 25, denom df = 605, p-value = 0.307  
## alternative hypothesis: true ratio of variances is not equal to 1  
## 95 percent confidence interval:  
## 0.4322948 1.3698611  
## sample estimates:  
## ratio of variances   
## 0.713111

AQUE\_ftest <- var.test(lobster\_AQUE\_2012$SIZE, lobster\_AQUE\_2017$SIZE)  
AQUE\_ftest

##   
## F test to compare two variances  
##   
## data: lobster\_AQUE\_2012$SIZE and lobster\_AQUE\_2017$SIZE  
## F = 0.72863, num df = 37, denom df = 66, p-value = 0.2986  
## alternative hypothesis: true ratio of variances is not equal to 1  
## 95 percent confidence interval:  
## 0.419142 1.327868  
## sample estimates:  
## ratio of variances   
## 0.7286314

MOHK\_ftest <- var.test(lobster\_MOHK\_2012$SIZE, lobster\_MOHK\_2017$SIZE)  
MOHK\_ftest

##   
## F test to compare two variances  
##   
## data: lobster\_MOHK\_2012$SIZE and lobster\_MOHK\_2017$SIZE  
## F = 1.3015, num df = 82, denom df = 177, p-value = 0.1509  
## alternative hypothesis: true ratio of variances is not equal to 1  
## 95 percent confidence interval:  
## 0.9085131 1.9131403  
## sample estimates:  
## ratio of variances   
## 1.301535

CARP\_ftest <- var.test(lobster\_CARP\_2012$SIZE, lobster\_CARP\_2017$SIZE)  
CARP\_ftest

##   
## F test to compare two variances  
##   
## data: lobster\_CARP\_2012$SIZE and lobster\_CARP\_2017$SIZE  
## F = 1.2244, num df = 77, denom df = 704, p-value = 0.2043  
## alternative hypothesis: true ratio of variances is not equal to 1  
## 95 percent confidence interval:  
## 0.896208 1.750406  
## sample estimates:  
## ratio of variances   
## 1.224405

#Running t test for each of the sites  
NAPL\_ttest <- t.test(lobster\_NAPL\_2012$SIZE, lobster\_NAPL\_2017$SIZE, var.equal=TRUE)  
NAPL\_ttest

##   
## Two Sample t-test  
##   
## data: lobster\_NAPL\_2012$SIZE and lobster\_NAPL\_2017$SIZE  
## t = -0.67636, df = 116, p-value = 0.5002  
## alternative hypothesis: true difference in means is not equal to 0  
## 95 percent confidence interval:  
## -12.697051 6.232765  
## sample estimates:  
## mean of x mean of y   
## 73.00000 76.23214

IVEE\_ttest <- t.test(lobster\_IVEE\_2012$SIZE, lobster\_IVEE\_2017$SIZE, var.equal=TRUE)  
IVEE\_ttest

##   
## Two Sample t-test  
##   
## data: lobster\_IVEE\_2012$SIZE and lobster\_IVEE\_2017$SIZE  
## t = -1.885, df = 630, p-value = 0.0599  
## alternative hypothesis: true difference in means is not equal to 0  
## 95 percent confidence interval:  
## -10.9750916 0.2246473  
## sample estimates:  
## mean of x mean of y   
## 66.07692 71.45215

AQUE\_ttest <- t.test(lobster\_AQUE\_2012$SIZE, lobster\_AQUE\_2017$SIZE, var.equal=TRUE)  
AQUE\_ttest

##   
## Two Sample t-test  
##   
## data: lobster\_AQUE\_2012$SIZE and lobster\_AQUE\_2017$SIZE  
## t = -1.2622, df = 103, p-value = 0.2097  
## alternative hypothesis: true difference in means is not equal to 0  
## 95 percent confidence interval:  
## -7.445357 1.654312  
## sample estimates:  
## mean of x mean of y   
## 71.00000 73.89552

MOHK\_ttest <- t.test(lobster\_MOHK\_2012$SIZE, lobster\_MOHK\_2017$SIZE, var.equal=TRUE)  
MOHK\_ttest

##   
## Two Sample t-test  
##   
## data: lobster\_MOHK\_2012$SIZE and lobster\_MOHK\_2017$SIZE  
## t = 4.0689, df = 259, p-value = 6.276e-05  
## alternative hypothesis: true difference in means is not equal to 0  
## 95 percent confidence interval:  
## 2.710776 7.795248  
## sample estimates:  
## mean of x mean of y   
## 77.25301 72.00000

CARP\_ttest <- t.test(lobster\_CARP\_2012$SIZE, lobster\_CARP\_2017$SIZE, var.equal=TRUE)  
CARP\_ttest

##   
## Two Sample t-test  
##   
## data: lobster\_CARP\_2012$SIZE and lobster\_CARP\_2017$SIZE  
## t = 1.3361, df = 781, p-value = 0.1819  
## alternative hypothesis: true difference in means is not equal to 0  
## 95 percent confidence interval:  
## -0.998958 5.257332  
## sample estimates:  
## mean of x mean of y   
## 74.35897 72.22979

#there is a significant difference at the MOHK site, all the other sites are not significantly different  
  
  
#Running cohen's d for effect size for each of the sites  
NAPL\_eff <- cohen.d(lobster\_NAPL\_2012$SIZE, lobster\_NAPL\_2017$SIZE)  
NAPL\_eff

##   
## Cohen's d  
##   
## d estimate: -0.2834216 (small)  
## 95 percent confidence interval:  
## inf sup   
## -1.1141889 0.5473456

IVEE\_eff <- cohen.d(lobster\_IVEE\_2012$SIZE, lobster\_IVEE\_2017$SIZE)  
IVEE\_eff

##   
## Cohen's d  
##   
## d estimate: -0.3775177 (small)  
## 95 percent confidence interval:  
## inf sup   
## -0.77136540 0.01633002

AQUE\_eff <- cohen.d(lobster\_AQUE\_2012$SIZE, lobster\_AQUE\_2017$SIZE)  
AQUE\_eff

##   
## Cohen's d  
##   
## d estimate: -0.2563169 (small)  
## 95 percent confidence interval:  
## inf sup   
## -0.6606014 0.1479675

MOHK\_eff <- cohen.d(lobster\_MOHK\_2012$SIZE, lobster\_MOHK\_2017$SIZE)  
MOHK\_eff

##   
## Cohen's d  
##   
## d estimate: 0.5408116 (medium)  
## 95 percent confidence interval:  
## inf sup   
## 0.2749635 0.8066597

CARP\_eff <- cohen.d(lobster\_CARP\_2012$SIZE, lobster\_CARP\_2017$SIZE)  
CARP\_eff

##   
## Cohen's d  
##   
## d estimate: 0.1594364 (negligible)  
## 95 percent confidence interval:  
## inf sup   
## -0.07493682 0.39380971

#10 Create a data frame showing if lobsters are above the legal format or not  
  
#Make table of lobsters above the legal size with yes for above and no for not above  
  
lobster\_legal <- lobster\_case\_format %>%  
 mutate(legal = ifelse(SIZE > 86.2, "YES", "NO")) %>%  
 count(SITE, legal) %>%  
 spread(legal, n) %>%  
 select(-SITE)  
#Yes means the lobster is of legal size, no means the lobster is not legal size  
  
rownames(lobster\_legal) <- c("AQUE", "CARP", "IVEE", "MOHK", "NAPL")

## Warning: Setting row names on a tibble is deprecated.

#11 Get Propoprtions for each of the sites  
  
lobster\_legal\_prop <- round(prop.table(as.matrix(lobster\_legal), 1), 3)  
#creates prop table show the proportion of legal lobsters at each site  
  
lobster\_x2 <- chisq.test(lobster\_legal)  
lobster\_x2 #Running a chi square test

##   
## Pearson's Chi-squared test  
##   
## data: lobster\_legal  
## X-squared = 10.99, df = 4, p-value = 0.02668

#there is a significant difference between the site in terms of legal lobster size