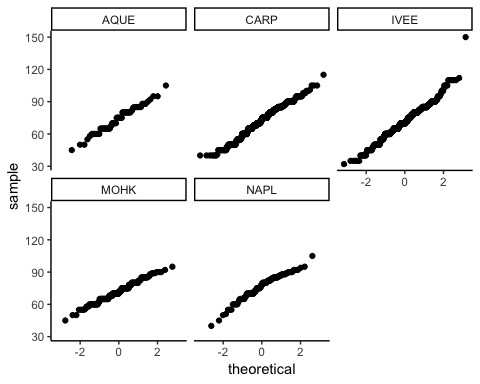
assignment4

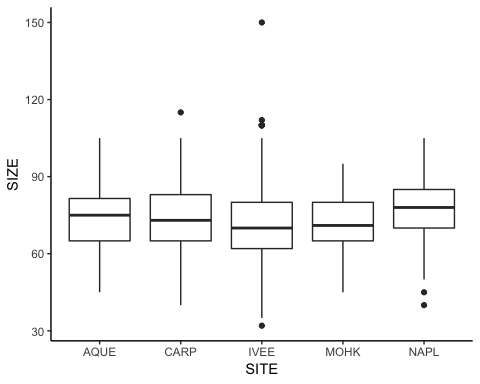
na

November 14, 2018

#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_part 2\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_#  
  
# filter for only 2017  
lsa\_filt2017 <- lsa\_filt %>%  
 filter(YEAR == 2017)  
  
# look at site distributions  
qq\_site\_means <- ggplot(lsa\_filt2017, aes(sample = SIZE)) +  
 geom\_qq() +  
 facet\_wrap(~ SITE) +  
 theme\_classic()  
qq\_site\_means



box\_site\_means <- ggplot(lsa\_filt2017, aes(x = SITE, y = SIZE)) +  
 geom\_boxplot() +  
 theme\_classic()  
box\_site\_means



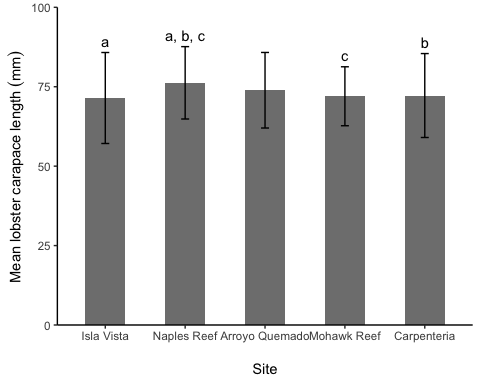
# convert site to factor in lsa\_filt  
lsa\_filt2017$SITE <- as.factor(lsa\_filt2017$SITE)  
  
# find site means, variance, etc.  
lsa\_site\_means <- lsa\_filt2017 %>%  
 group\_by(MPA, SITE) %>%  
 summarize(  
 mean\_size = mean(SIZE),  
 sd\_size = sd(SIZE),  
 var\_size = var(SIZE),  
 n = length(SIZE)  
 ) %>%  
 arrange(MPA) %>%  
 mutate(yloc = mean\_size + sd\_size + 3.5) # loc of annotation  
  
lsa\_site\_means$SITE <- factor(lsa\_site\_means$SITE, levels = c("IVEE","NAPL","AQUE","MOHK","CARP"))  
  
  
# levines test for equal variances  
lsa\_levine <- leveneTest(SIZE ~ SITE, data = lsa\_filt2017)  
lsa\_levine

## 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

# anova with unequal variances  
lsa\_aov\_size\_site <- oneway(lsa\_filt2017$SITE, y = lsa\_filt2017$SIZE, posthoc = 'games-howell', corrections = F, levene = T)  
lsa\_aov\_size\_site

## ### Oneway Anova for y=SIZE and x=SITE (groups: AQUE, CARP, IVEE, MOHK, NAPL)  
##   
## Omega squared: 95% CI = [0; .02], point estimate = .01  
## Eta Squared: 95% CI = [0; .01], point estimate = .01  
##   
## SS Df MS F p  
## Between groups (error + effect) 2354.51 4 588.63 3.42 .009  
## Within groups (error only) 285871.12 1663 171.9   
##   
##   
## ### Levene's test for homogeneity of variance:  
##   
## F[4, 1663] = 8.77, p < .001.  
##   
## ### Post hoc test: games-howell  
##   
## diff ci.lo ci.hi t df p  
## CARP-AQUE -1.67 -5.95 2.62 1.08 82.28 .814  
## IVEE-AQUE -2.44 -6.80 1.91 1.56 88.61 .526  
## MOHK-AQUE -1.90 -6.37 2.58 1.18 97.81 .765  
## NAPL-AQUE 2.34 -2.66 7.34 1.29 134.26 .696  
## IVEE-CARP -0.78 -2.87 1.31 1.02 1242.45 .848  
## MOHK-CARP -0.23 -2.57 2.11 0.27 379.43 .999  
## NAPL-CARP 4.00 0.73 7.27 3.38 162.35 .008  
## MOHK-IVEE 0.55 -1.94 3.03 0.60 447.17 .974  
## NAPL-IVEE 4.78 1.41 8.15 3.91 182.49 .001  
## NAPL-MOHK 4.23 0.71 7.76 3.30 201.12 .010

# y loc for annotations  
yloc\_i <- lsa\_site\_means %>%  
 filter(SITE == "IVEE") %>%  
 pull(yloc)  
  
yloc\_n <- lsa\_site\_means %>%  
 filter(SITE == "NAPL") %>%  
 pull(yloc)  
  
yloc\_c <- lsa\_site\_means %>%  
 filter(SITE == "CARP") %>%  
 pull(yloc)  
  
yloc\_m <- lsa\_site\_means %>%  
 filter(SITE == "MOHK") %>%  
 pull(yloc)  
  
  
#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_plot\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_#  
lsa\_aov\_colplt <- ggplot(lsa\_site\_means, aes(x = SITE, y = mean\_size)) +  
 geom\_col(fill = "gray50", width = 0.5) +  
 theme\_classic() +  
 geom\_errorbar(aes(ymax =mean\_size + sd\_size, ymin = mean\_size - sd\_size), width = 0.1) +  
 scale\_y\_continuous(expand = c(0,0), limits = c(0,100)) +  
 labs(y=expression(Mean~lobster~carapace~length~(mm))) +  
 scale\_x\_discrete(labels = c("Isla Vista","Naples Reef","Arroyo Quemado","Mohawk Reef", "Carpenteria")) +  
 annotate("text", x = c(1), y = yloc\_i, label = "a") +  
 annotate("text", x = c(2), y = yloc\_n, label = "a, b, c") +  
 annotate("text", x = c(5), y = yloc\_c, label = "b") +  
 annotate("text", x = c(4), y = yloc\_m, label = "c") +  
 xlab("\nSite")  
lsa\_aov\_colplt



ggsave(filename = "colplotlobstersize.png", plot = lsa\_aov\_colplt,  
 scale = 1, width = 6, height = 4.5, units = "in",  
 dpi = 300)  
  
#\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_table\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_#  
lsa\_aov\_tabledf <- lsa\_site\_means %>%  
 ungroup() %>%  
 mutate(sitel = case\_when(  
 SITE == "IVEE" ~ "Isla Vista",  
 SITE == "NAPL" ~ "Naples Reef",  
 SITE == "AQUE" ~ "Arroyo Quemado",  
 SITE == "CARP" ~ "Carpinteria",  
 SITE == "MOHK" ~ "Mohawk Reef")  
 ) %>%  
 select(sitel, mean\_size, sd\_size, n)  
  
lsa\_aov\_table <- kable(lsa\_aov\_tabledf,   
 format = "markdown",  
 caption = "Table 1. Mean and standard deviation of lobster carapace length at five California sites in 2017. Source: Santa Barbara Coastal Long Term Ecological Research Project.",   
 col.names=c('Site',  
 'Mean carapace length (mm)',  
 'Standard deviation of carapace length (mm)',  
 'n'),  
 digits=2)  
lsa\_aov\_table

|  |  |  |  |
| --- | --- | --- | --- |
| Site | Mean carapace length (mm) | Standard deviation of carapace length (mm) | n |
| Arroyo Quemado | 73.90 | 11.89 | 67 |
| Carpinteria | 72.23 | 13.21 | 705 |
| Mohawk Reef | 72.00 | 9.28 | 178 |
| Isla Vista | 71.45 | 14.32 | 606 |
| Naples Reef | 76.23 | 11.39 | 112 |

Significance result for MPA t.test between 2012 and 2017: (t(748) = -1.916, p = 0.056, = 0.05)

Significance result for nonMPA t.test between 2012 and 2017: (t(1147) = 2.697, p = 0.007, = 0.05)