Testing for correlations between genetic diversity and historical environmental stability

Load required packages

```
library(raster)
```

```
## Loading required package: sp
```

Read in raster layer of stability measures

```
bo_curr <- raster("../../SDM/model_hadley/bo_proj.grd")
bo_stab <- raster("../../SDM/Stability/Output_MESS/bo_stab.tif")
bo_stab_blind <- raster("../../SDM/Stability/Output_MESS_blind/bo_stab_blind.tif")

ps_curr <- raster("../../SDM/model_hadley/ps_proj.grd")
ps_stab <- raster("../../SDM/Stability/Output_MESS/ps_stab.tif")
ps_stab_blind <- raster("../../SDM/Stability/Output_MESS_blind/ps_stab_blind.tif")
```

Read in locality information

```
localities <- read.csv("../../Samples/Syagrus_localities_final.csv")[-25,]
```

Subset localities by species

```
bo_loc <- subset(localities, localities$Syagrus_sp == "S_botryophora")
ps_loc <- subset(localities, localities$Syagrus_sp == "S_pseudococos")
```

Extract stability values at sample localities and within buffer of 10km

```
bo_curr_buffer <- extract(bo_curr,cbind(bo_loc$Long_dec,bo_loc$Lat_dec),
                                buffer=10000, fun = mean, na.rm = TRUE)

bo_stab_buffer <- extract(bo_stab,cbind(bo_loc$Long_dec,bo_loc$Lat_dec),
                                buffer=10000, fun = mean, na.rm = TRUE)

bo_stab_blind_buffer <- extract(bo_stab_blind,cbind(bo_loc$Long_dec,bo_loc$Lat_dec),
                                buffer=10000, fun = mean, na.rm = TRUE)

ps_curr_buffer <- extract(ps_curr,cbind(ps_loc$Long_dec,ps_loc$Lat_dec),
                                buffer=10000, fun = mean, na.rm = TRUE)

ps_stab_buffer <- extract(ps_stab,cbind(ps_loc$Long_dec,ps_loc$Lat_dec),
                                buffer=10000, fun = mean, na.rm = TRUE)

ps_stab_blind_buffer <- extract(ps_stab_blind,cbind(ps_loc$Long_dec,ps_loc$Lat_dec),
                                buffer=10000, fun = mean, na.rm = TRUE)
```

Read in diversity measures at 10% missing data threshold

```
all_div <- read.csv("../Output/DnaSP_summary.csv")
bo_div <- subset(all_div, species == "bo" & missing.data == "10")
ps_div <- subset(all_div, species == "ps" & missing.data == "10")
```

Linear models

```
bo_curr_lm <- lm(bo_div$pi~bo_curr_buffer)
bo_stab_lm <- lm(bo_div$pi~bo_stab_buffer)
bo_stab_blind_lm <- lm(bo_div$pi~bo_stab_blind_buffer)

ps_curr_lm <- lm(ps_div$pi~ps_curr_buffer)
ps_stab_lm <- lm(ps_div$pi~ps_stab_buffer)
ps_stab_blind_lm <- lm(ps_div$pi~ps_stab_blind_buffer)

summary(bo_curr_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_curr_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -4.365e-04 -2.989e-04  9.767e-05  2.499e-04  4.489e-04
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.0010575  0.0003098   3.414   0.0077 **
## bo_curr_buffer 0.0010415  0.0004491   2.319   0.0456 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.000324 on 9 degrees of freedom
## Multiple R-squared:  0.374,  Adjusted R-squared:  0.3044
## F-statistic: 5.376 on 1 and 9 DF,  p-value: 0.04558
```

```
summary(bo_stab_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_stab_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -7.185e-04 -2.159e-04  8.158e-05  2.496e-04  4.855e-04
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)    1.544e-03  2.195e-04   7.034 6.09e-05 ***
## bo_stab_buffer 2.470e-05  2.357e-05   1.048    0.322
## ---
```

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0003866 on 9 degrees of freedom
## Multiple R-squared:  0.1088, Adjusted R-squared:  0.009757
## F-statistic: 1.099 on 1 and 9 DF,  p-value: 0.3219
```

```
summary(bo_stab_blind_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_stab_blind_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0006061 -0.0002578  0.0002291  0.0002537  0.0002951
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)          1.157e-03  3.285e-04   3.521  0.00651 **
## bo_stab_blind_buffer 2.362e-05  1.263e-05   1.870  0.09425 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0003475 on 9 degrees of freedom
## Multiple R-squared:  0.2799, Adjusted R-squared:  0.1999
## F-statistic: 3.498 on 1 and 9 DF,  p-value: 0.09425
```

```
summary(ps_curr_lm)
```

```
##
## Call:
## lm(formula = ps_div$pi ~ ps_curr_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -4.440e-04 -3.446e-04 -4.866e-05  2.743e-04  7.887e-04
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.0020431  0.0003405   6.000 8.92e-05 ***
## ps_curr_buffer 0.0004279  0.0004431   0.966    0.355
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0003866 on 11 degrees of freedom
## Multiple R-squared:  0.07816,    Adjusted R-squared:  -0.005649
## F-statistic: 0.9326 on 1 and 11 DF,  p-value: 0.3549
```

```
summary(ps_stab_lm)
```

```
##
## Call:
```

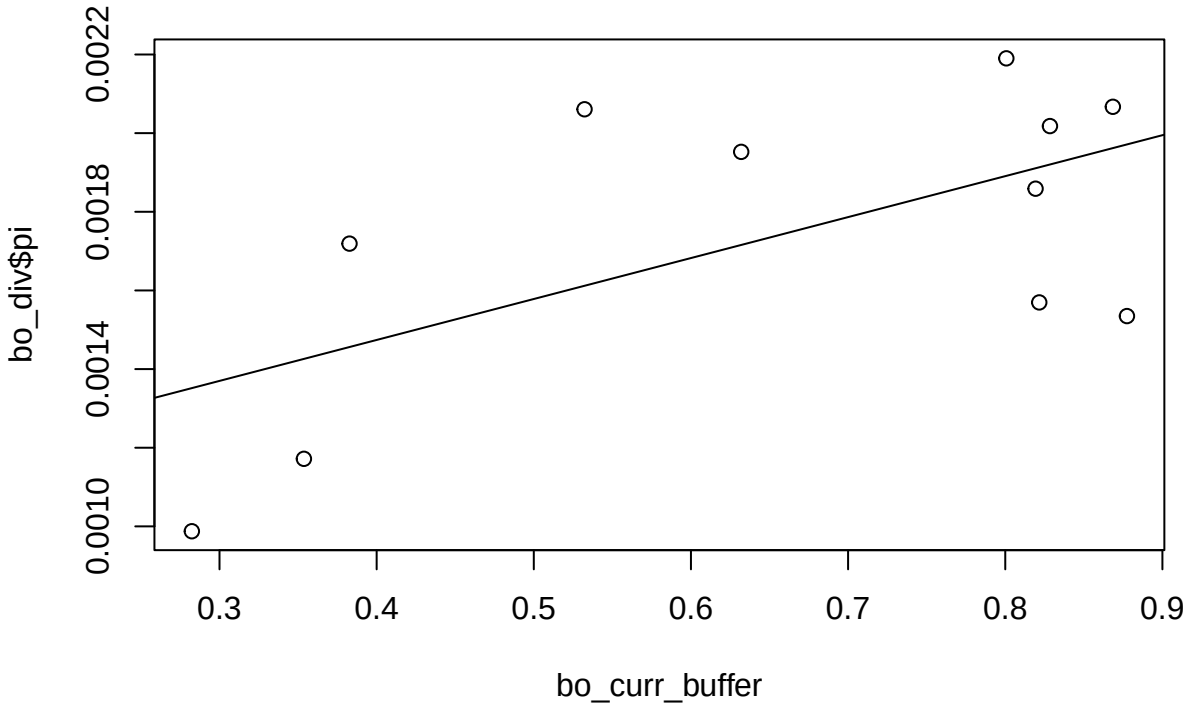
```
## lm(formula = ps_div$pi ~ ps_stab_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0005953 -0.0001917 -0.0001179  0.0001962  0.0008008
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     2.504e-03  2.395e-04  10.454 4.74e-07 ***
## ps_stab_buffer -7.620e-06  1.091e-05  -0.698      0.5
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.000394 on 11 degrees of freedom
## Multiple R-squared:  0.04243,    Adjusted R-squared:  -0.04462
## F-statistic: 0.4875 on 1 and 11 DF,  p-value: 0.4996
```

```
summary(ps_stab_blind_lm)
```

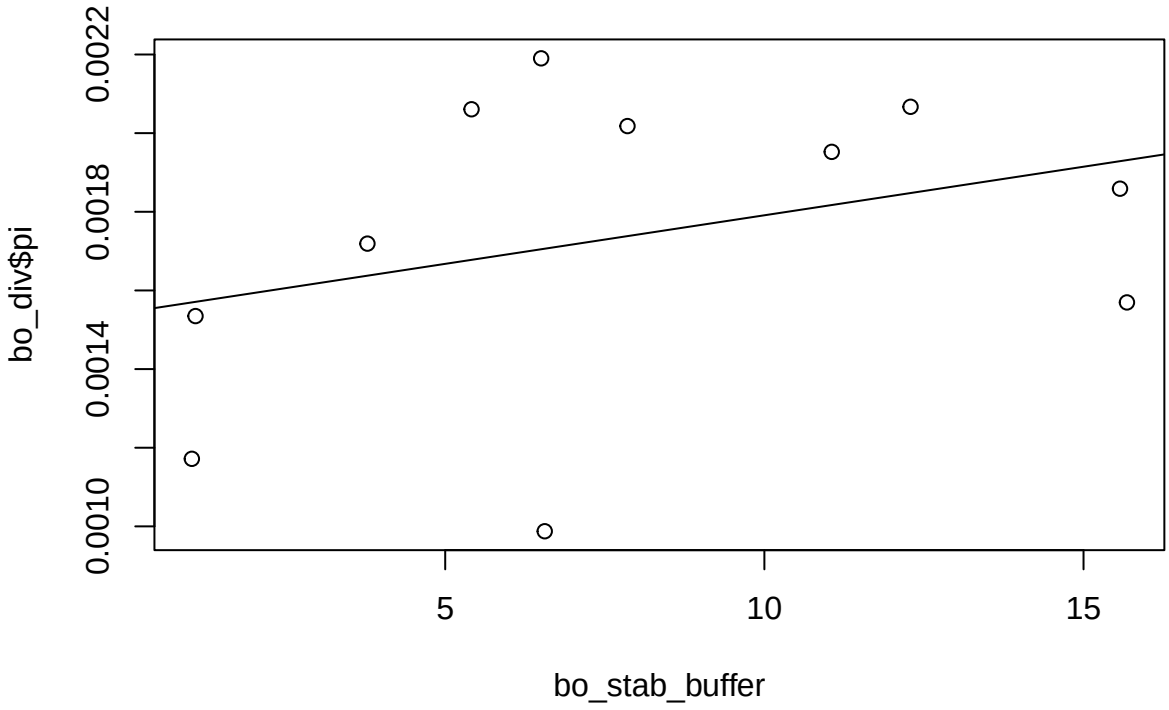
```
##
## Call:
## lm(formula = ps_div$pi ~ ps_stab_blind_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0005548 -0.0002926 -0.0001005  0.0001774  0.0008518
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)           2.403e-03  3.933e-04   6.110 7.62e-05 ***
## ps_stab_blind_buffer -1.411e-06  1.113e-05  -0.127    0.901
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0004023 on 11 degrees of freedom
## Multiple R-squared:  0.00146,    Adjusted R-squared:  -0.08932
## F-statistic: 0.01608 on 1 and 11 DF,  p-value: 0.9014
```

Including Plots

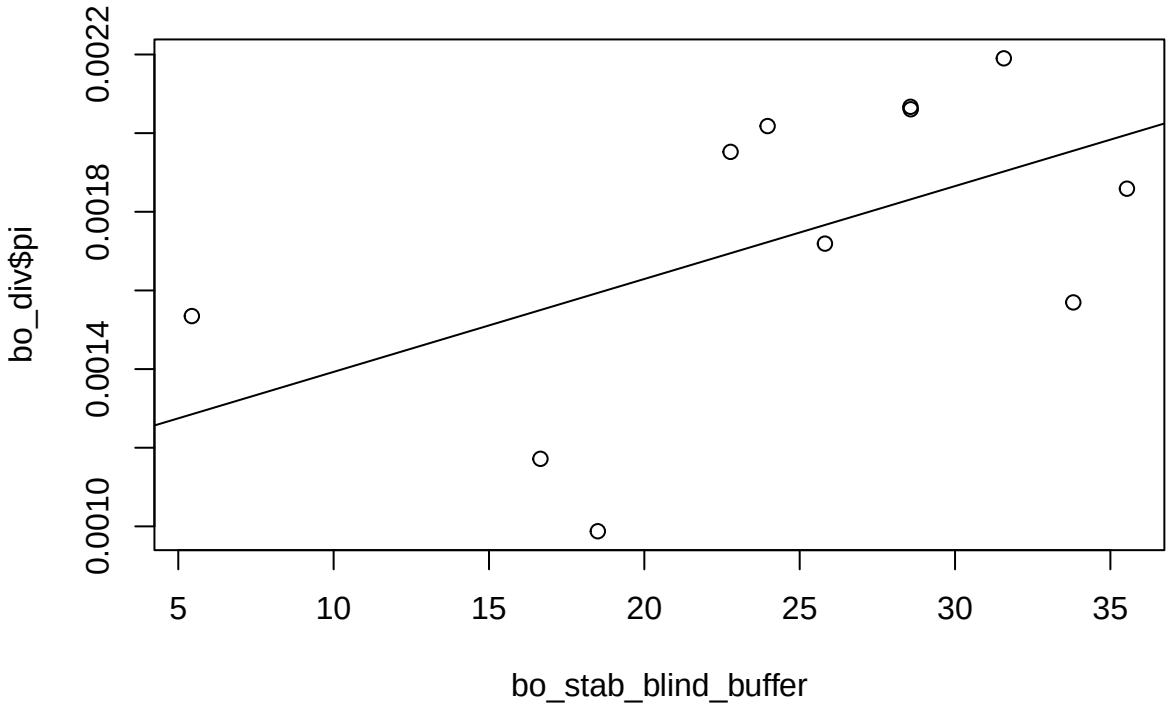
```
plot(bo_div$pi~bo_curr_buffer)
abline(lm(bo_div$pi ~ bo_curr_buffer))
```



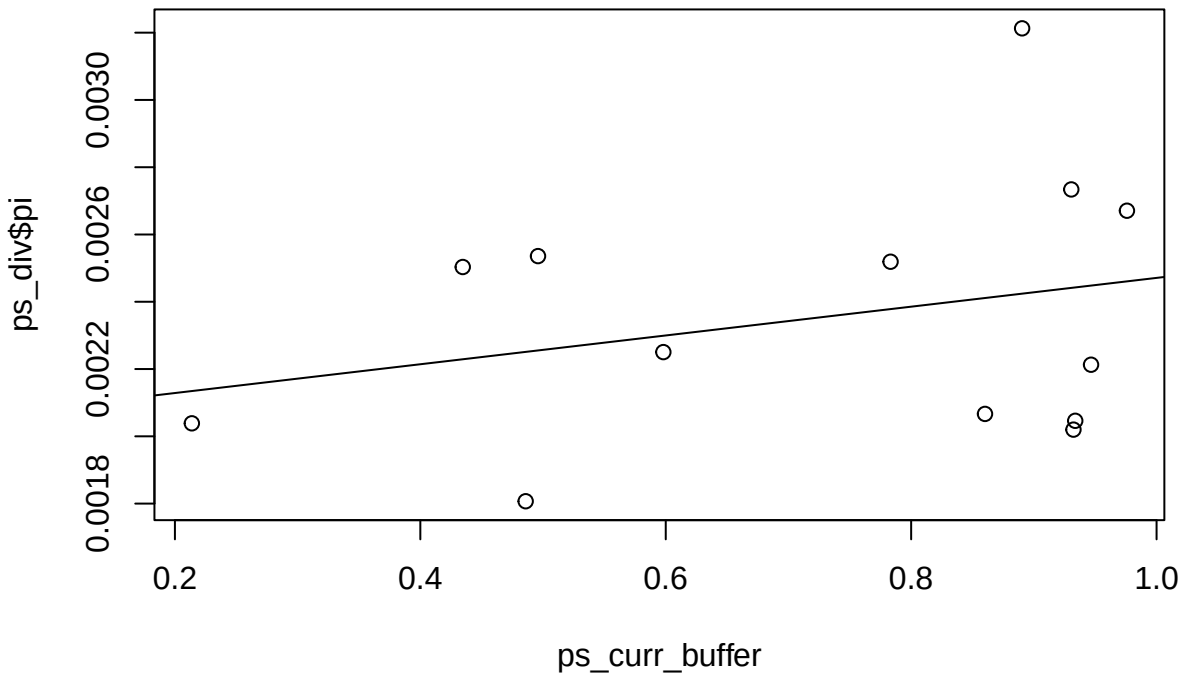

```
plot(bo_div$pi~bo_stab_buffer)
abline(lm(bo_div$pi ~ bo_stab_buffer))
```



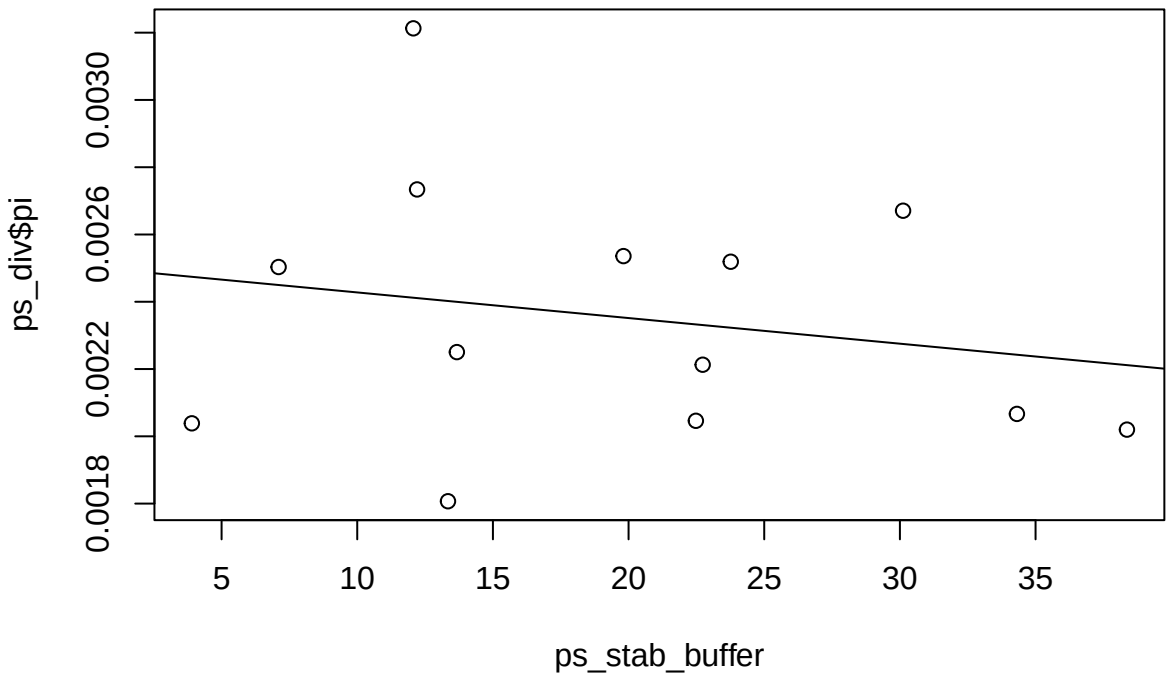

```
plot(bo_div$pi~bo_stab_blind_buffer)
abline(lm(bo_div$pi ~ bo_stab_blind_buffer))
```



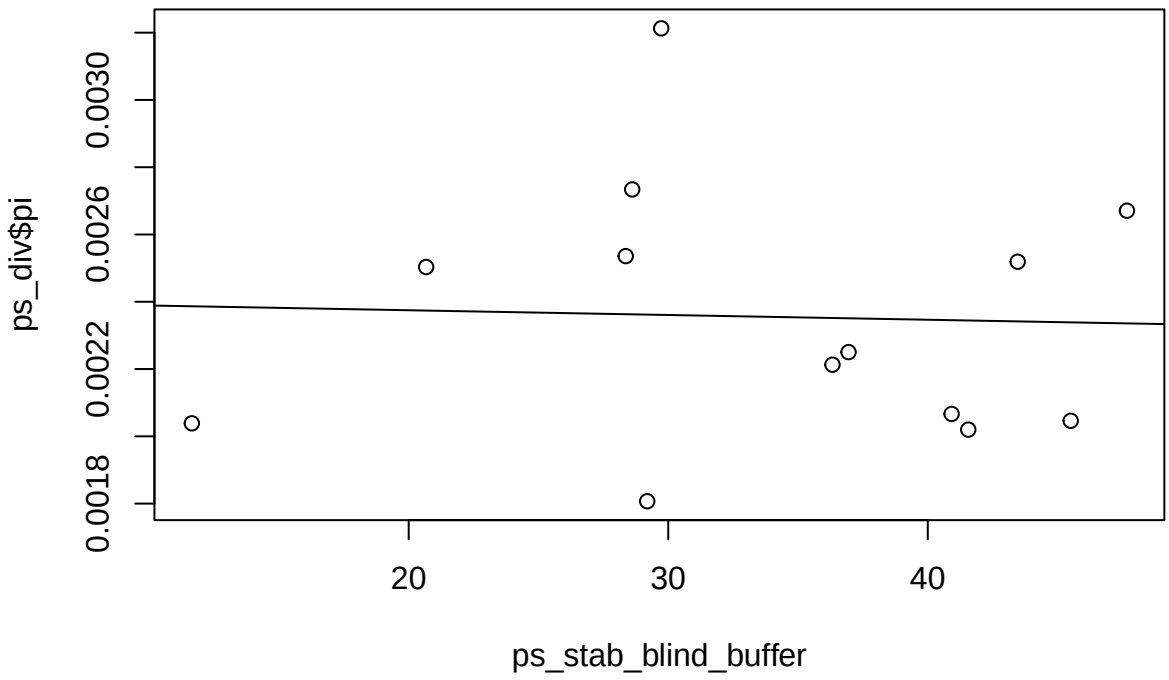

```
plot(ps_div$pi~ps_curr_buffer)
abline(lm(ps_div$pi ~ ps_curr_buffer))
```




```
plot(ps_div$pi~ps_stab_buffer)
abline(lm(ps_div$pi ~ ps_stab_buffer))
```




```
plot(ps_div$pi~ps_stab_blind_buffer)
abline(lm(ps_div$pi ~ ps_stab_blind_buffer))
```

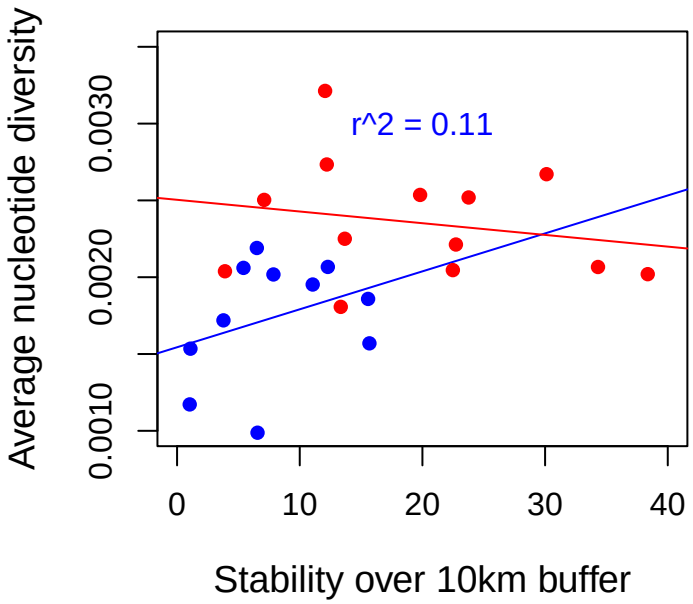


Prepare figure for manuscript

```
boCol <- "blue"
psCol <- "red"

bor2 <- paste("r^2 =", signif(summary(bo_stab_lm)$r.squared, 2))
psr2 <- paste("r^2 =", signif(summary(ps_stab_lm)$r.squared, 2))
```

```
plot(bo_div$pi~bo_stab_buffer, type="n",
     xlim = c(0,40), ylim = c(0.001,0.0035),
     cex.lab = 1.2,
     xlab = "Stability over 10km buffer",
     ylab = "Average nucleotide diversity")
points(bo_div$pi~bo_stab_buffer, col=boCol, pch = 16)
abline(bo_stab_lm, col = boCol)
points(ps_div$pi~ps_stab_buffer, col=psCol, pch = 16)
abline(ps_stab_lm, col = psCol)
text(20, 0.003,
     labels = bor2, col = boCol)
text(20, 0.004,
     labels = psr2, col = psCol)
```



Read in diversity measures at 30% missing data threshold

```
all_div <- read.csv("../Output/DnaSP_summary.csv")
bo_div <- subset(all_div, species == "bo" & missing.data == "30")
ps_div <- subset(all_div, species == "ps" & missing.data == "30")
```

Linear models

```
bo_curr_lm <- lm(bo_div$pi~bo_curr_buffer)
bo_stab_lm <- lm(bo_div$pi~bo_stab_buffer)
bo_stab_blind_lm <- lm(bo_div$pi~bo_stab_blind_buffer)

ps_curr_lm <- lm(ps_div$pi~ps_curr_buffer)
ps_stab_lm <- lm(ps_div$pi~ps_stab_buffer)
ps_stab_blind_lm <- lm(ps_div$pi~ps_stab_blind_buffer)

summary(bo_curr_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_curr_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -7.136e-04 -2.164e-04 -4.350e-06  2.060e-04  7.247e-04
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
```

```
## (Intercept)    0.0018059  0.0003955   4.566  0.00136 **
## bo_curr_buffer 0.0018036  0.0005735   3.145  0.01184 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0004138 on 9 degrees of freedom
## Multiple R-squared:  0.5235, Adjusted R-squared:  0.4706
## F-statistic: 9.889 on 1 and 9 DF,  p-value: 0.01184
```

```
summary(bo_stab_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_stab_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0013399 -0.0002078  0.0001254  0.0003060  0.0005878
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.722e-03  3.241e-04   8.398  1.5e-05 ***
## bo_stab_buffer 3.350e-05  3.479e-05   0.963    0.361
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0005707 on 9 degrees of freedom
## Multiple R-squared:  0.09338,    Adjusted R-squared:  -0.007351
## F-statistic: 0.927 on 1 and 9 DF,  p-value: 0.3608
```

```
summary(bo_stab_blind_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_stab_blind_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0012310 -0.0002067  0.0001750  0.0003875  0.0005661
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)          2.371e-03  5.237e-04   4.527  0.00143 **
## bo_stab_blind_buffer 2.497e-05  2.013e-05   1.240  0.24623
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0005539 on 9 degrees of freedom
## Multiple R-squared:  0.146,  Adjusted R-squared:  0.05108
## F-statistic: 1.538 on 1 and 9 DF,  p-value: 0.2462
```

```
summary(ps_curr_lm)
```

```
##
## Call:
## lm(formula = ps_div$pi ~ ps_curr_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0007087 -0.0002046  0.0001261  0.0002143  0.0005500
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     3.516e-03  3.697e-04   9.510 1.22e-06 ***
## ps_curr_buffer -4.864e-05  4.811e-04  -0.101    0.921
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0004197 on 11 degrees of freedom
## Multiple R-squared:  0.0009283,  Adjusted R-squared:  -0.0899
## F-statistic: 0.01022 on 1 and 11 DF,  p-value: 0.9213
```

```
summary(ps_stab_lm)
```

```
##
## Call:
## lm(formula = ps_div$pi ~ ps_stab_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -6.859e-04 -1.122e-04  6.734e-05  1.802e-04  6.461e-04
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     3.697e-03  2.445e-04  15.126 1.04e-08 ***
## ps_stab_buffer -1.113e-05  1.114e-05  -0.999    0.339
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0004021 on 11 degrees of freedom
## Multiple R-squared:  0.08315,    Adjusted R-squared:  -0.0001963
## F-statistic: 0.9976 on 1 and 11 DF,  p-value: 0.3393
```

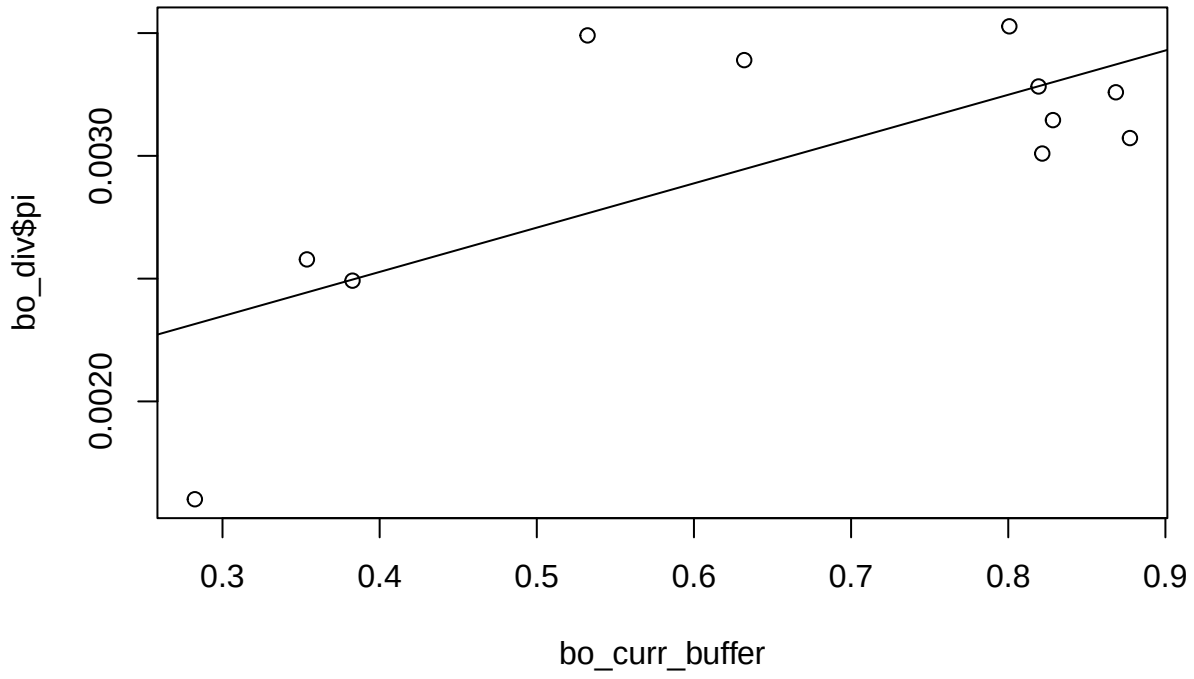
```
summary(ps_stab_blind_lm)
```

```
##
## Call:
## lm(formula = ps_div$pi ~ ps_stab_blind_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0006662 -0.0001791  0.0001463  0.0001806  0.0005906
```

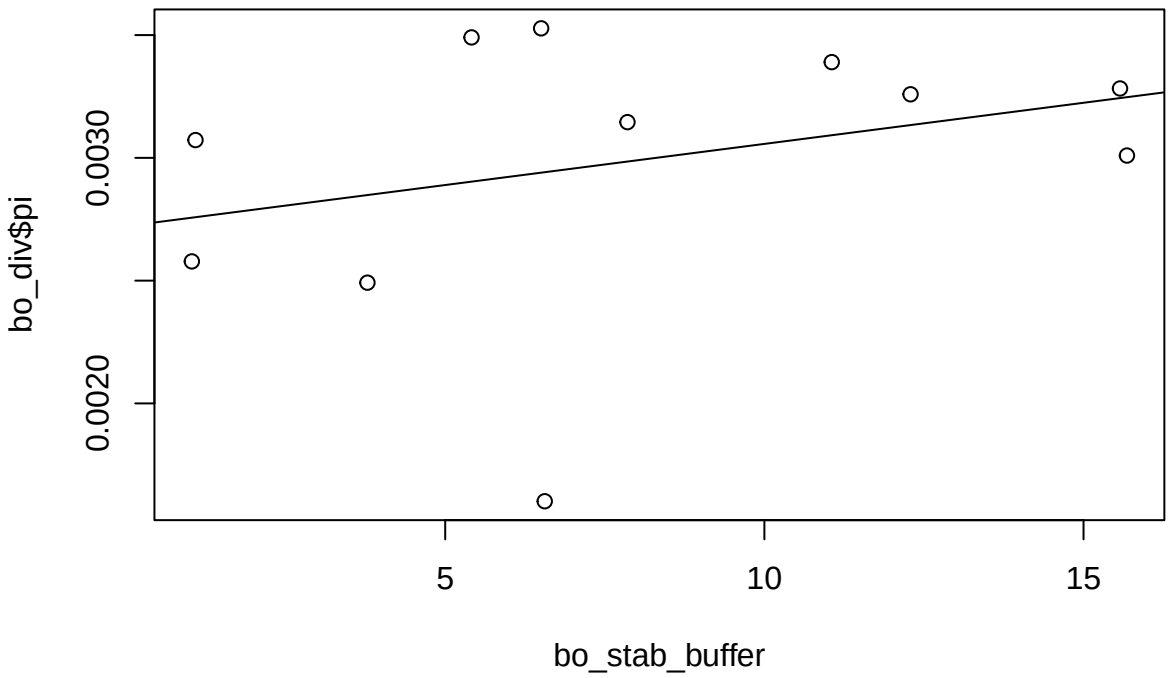
```
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)            3.633e-03  4.076e-04   8.914  2.3e-06 ***
## ps_stab_blind_buffer -4.524e-06  1.153e-05  -0.392    0.702
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.000417 on 11 degrees of freedom
## Multiple R-squared:  0.0138, Adjusted R-squared:  -0.07586
## F-statistic: 0.1539 on 1 and 11 DF,  p-value: 0.7024
```

Including Plots

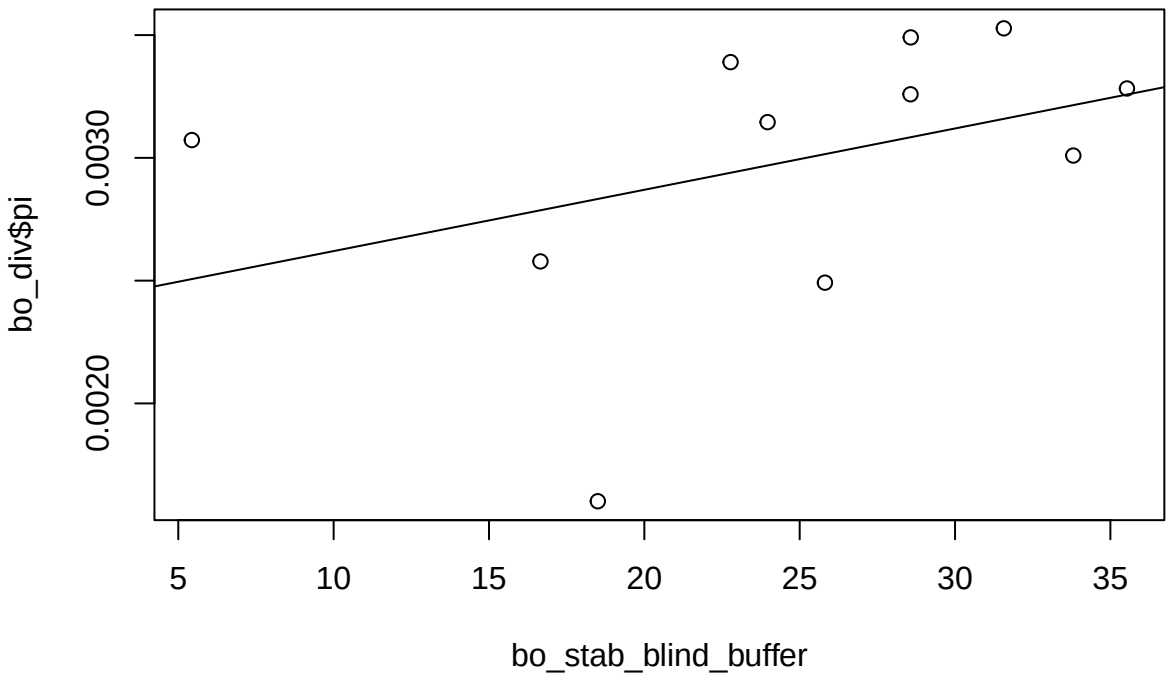
```
plot(bo_div$pi~bo_curr_buffer)
abline(lm(bo_div$pi ~ bo_curr_buffer))
```



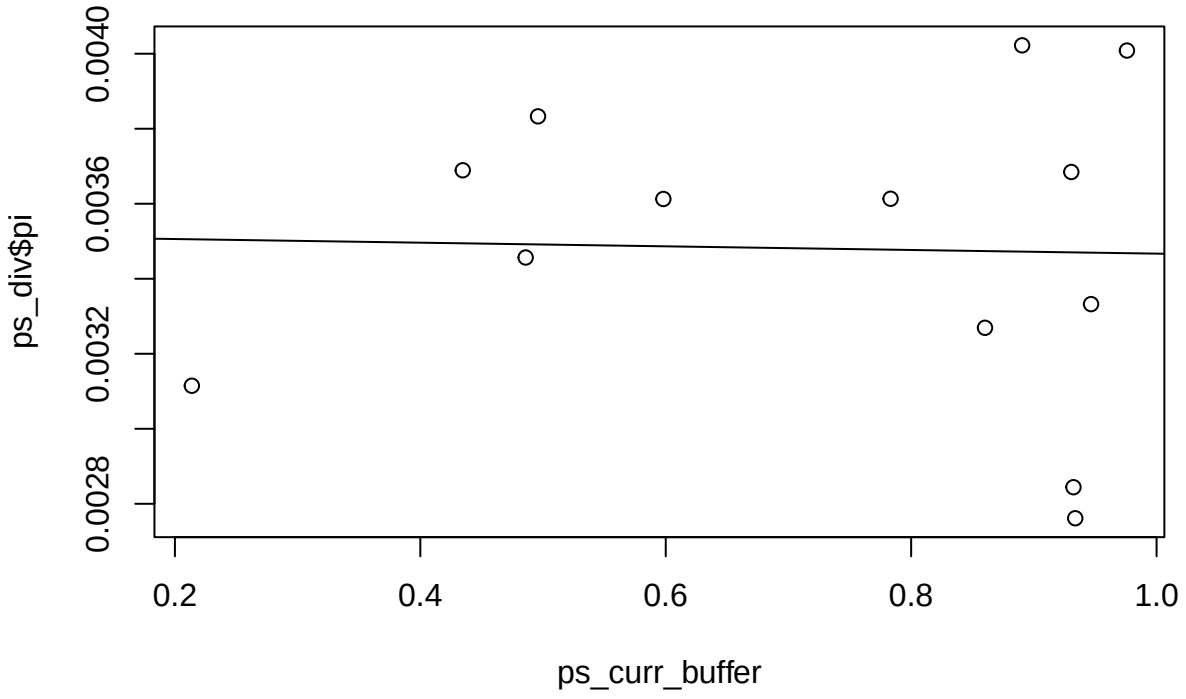

```
plot(bo_div$pi~bo_stab_buffer)
abline(lm(bo_div$pi ~ bo_stab_buffer))
```



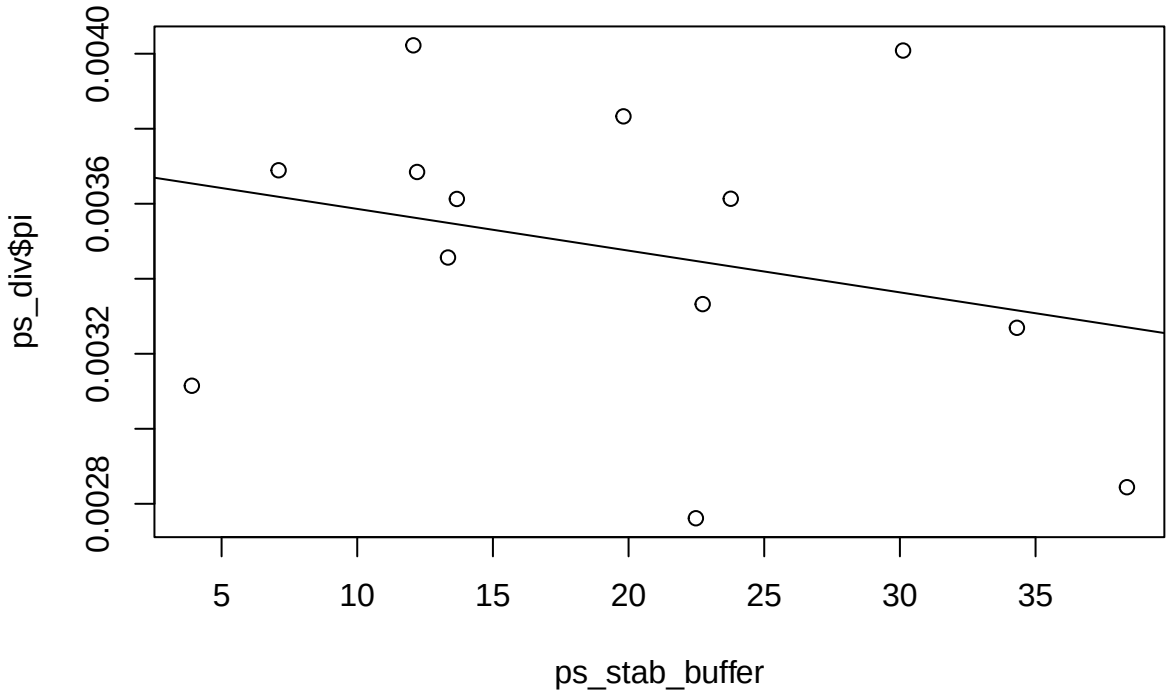

```
plot(bo_div$pi~bo_stab_blind_buffer)
abline(lm(bo_div$pi ~ bo_stab_blind_buffer))
```



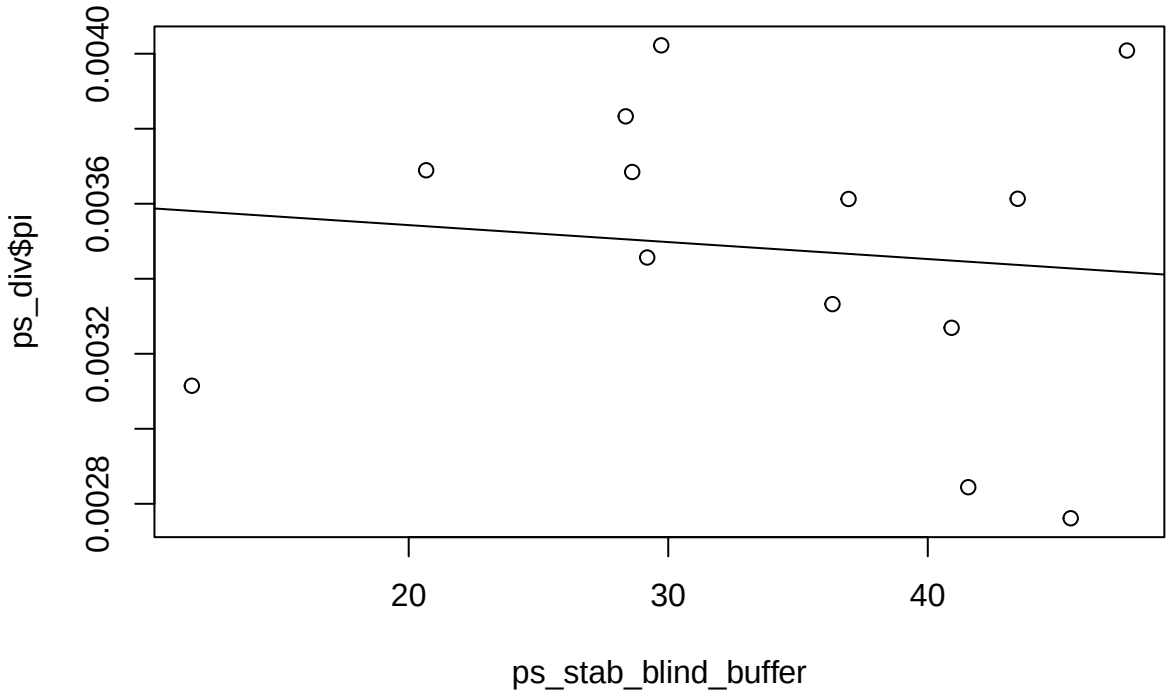

```
plot(ps_div$pi~ps_curr_buffer)
abline(lm(ps_div$pi ~ ps_curr_buffer))
```




```
plot(ps_div$pi~ps_stab_buffer)
abline(lm(ps_div$pi ~ ps_stab_buffer))
```




```
plot(ps_div$pi~ps_stab_blind_buffer)
abline(lm(ps_div$pi ~ ps_stab_blind_buffer))
```



Read in diversity measures at 50% missing data threshold

```
all_div <- read.csv("../Output/DnaSP_summary.csv")
bo_div <- subset(all_div, species == "bo" & missing.data == "50")
ps_div <- subset(all_div, species == "ps" & missing.data == "50")
```

Linear models

```
bo_curr_lm <- lm(bo_div$pi~bo_curr_buffer)
bo_stab_lm <- lm(bo_div$pi~bo_stab_buffer)
bo_stab_blind_lm <- lm(bo_div$pi~bo_stab_blind_buffer)

ps_curr_lm <- lm(ps_div$pi~ps_curr_buffer)
ps_stab_lm <- lm(ps_div$pi~ps_stab_buffer)
ps_stab_blind_lm <- lm(ps_div$pi~ps_stab_blind_buffer)

summary(bo_curr_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_curr_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0010670 -0.0003455 -0.0001010  0.0003581  0.0008263
```

```
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.0021120  0.0005846   3.613  0.00564 **
## bo_curr_buffer 0.0017216  0.0008477   2.031  0.07282 .
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0006115 on 9 degrees of freedom
## Multiple R-squared:  0.3143, Adjusted R-squared:  0.2381
## F-statistic: 4.125 on 1 and 9 DF,  p-value: 0.07282
```

```
summary(bo_stab_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_stab_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0016656 -0.0002066  0.0001909  0.0004596  0.0006941
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.990e-03  4.078e-04   7.333 4.41e-05 ***
## bo_stab_buffer 3.151e-05  4.378e-05   0.720     0.49
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0007181 on 9 degrees of freedom
## Multiple R-squared:  0.05444,    Adjusted R-squared:  -0.05062
## F-statistic: 0.5182 on 1 and 9 DF,  p-value: 0.4899
```

```
summary(bo_stab_blind_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_stab_blind_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0015805 -0.0001712  0.0001588  0.0004243  0.0008252
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)          2.730e-03  6.748e-04   4.045  0.00291 **
## bo_stab_blind_buffer 2.065e-05  2.594e-05   0.796  0.44641
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0007138 on 9 degrees of freedom
## Multiple R-squared:  0.0658, Adjusted R-squared:  -0.038
## F-statistic: 0.6339 on 1 and 9 DF,  p-value: 0.4464
```

```
summary(ps_curr_lm)
```

```
##
## Call:
## lm(formula = ps_div$pi ~ ps_curr_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0009385 -0.0004826  0.0002311  0.0004748  0.0006692
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.0037965  0.0005272   7.201 1.75e-05 ***
## ps_curr_buffer -0.0001499  0.0006861  -0.218    0.831
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0005986 on 11 degrees of freedom
## Multiple R-squared:  0.00432,    Adjusted R-squared:  -0.0862
## F-statistic: 0.04772 on 1 and 11 DF,  p-value: 0.8311
```

```
summary(ps_stab_lm)
```

```
##
## Call:
## lm(formula = ps_div$pi ~ ps_stab_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0009066 -0.0002774  0.0001091  0.0003083  0.0008565
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     4.101e-03  3.367e-04  12.181 9.97e-08 ***
## ps_stab_buffer -2.119e-05  1.534e-05  -1.381    0.195
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0005538 on 11 degrees of freedom
## Multiple R-squared:  0.1478, Adjusted R-squared:  0.07031
## F-statistic: 1.908 on 1 and 11 DF,  p-value: 0.1946
```

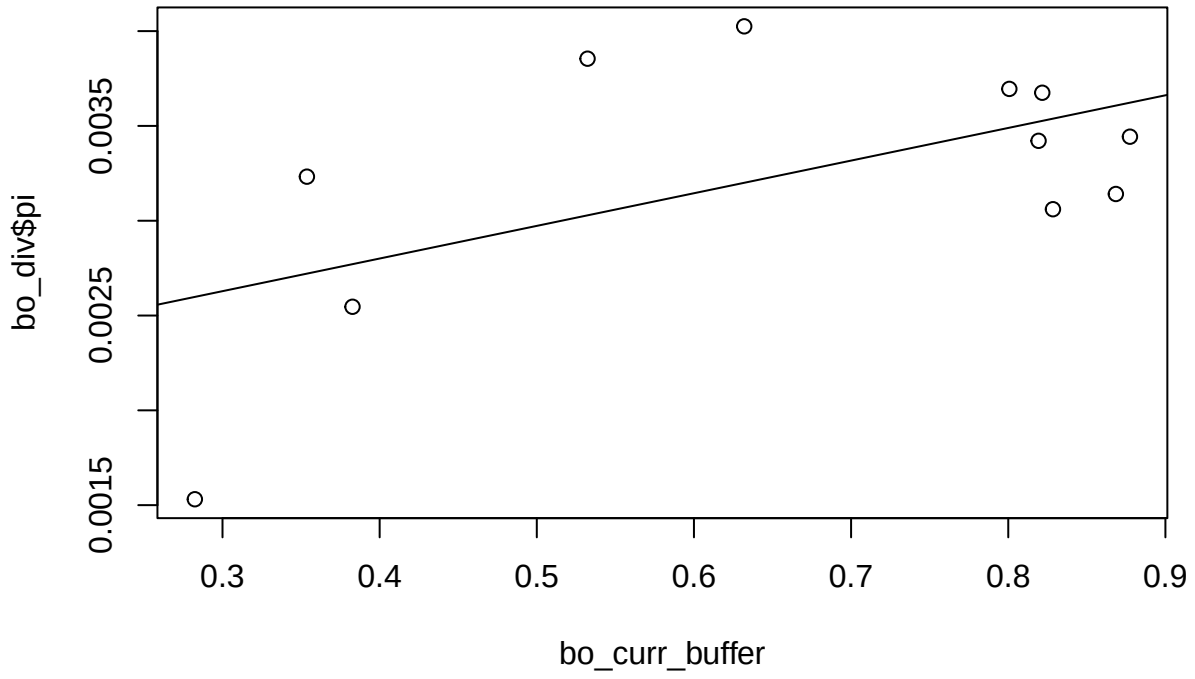
```
summary(ps_stab_blind_lm)
```

```
##
## Call:
## lm(formula = ps_div$pi ~ ps_stab_blind_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0008314 -0.0004880  0.0001793  0.0003863  0.0008335
```

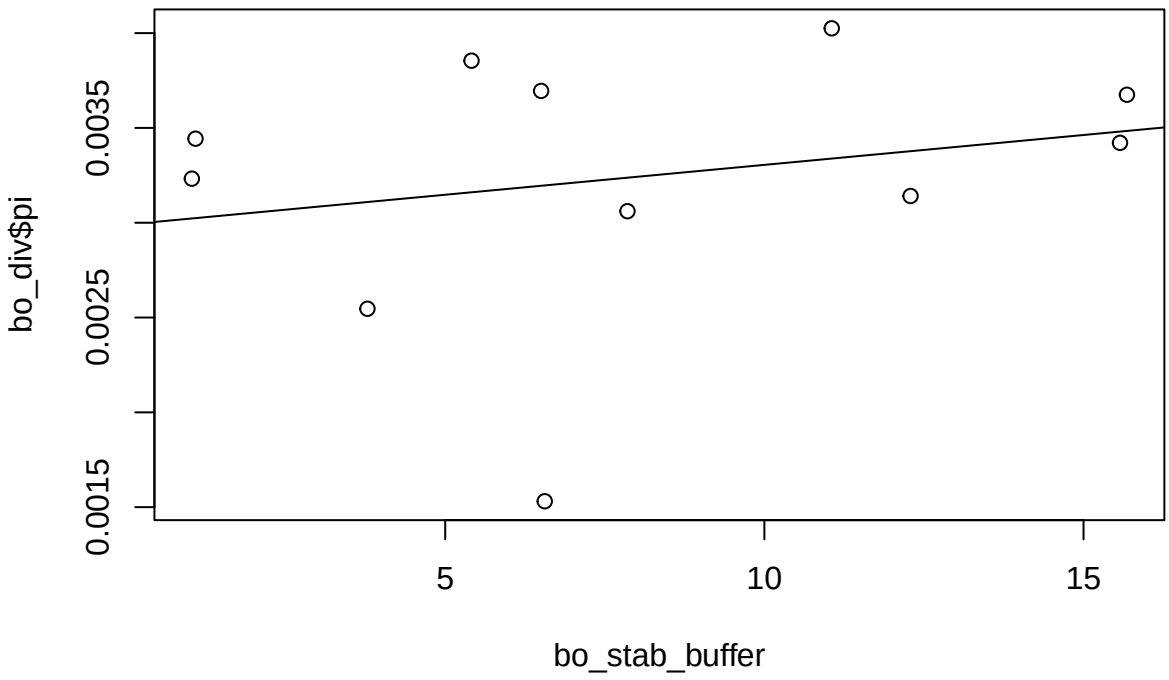
```
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)            4.182e-03  5.653e-04   7.398 1.36e-05 ***
## ps_stab_blind_buffer -1.461e-05  1.599e-05  -0.913    0.381
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0005783 on 11 degrees of freedom
## Multiple R-squared:  0.07049,    Adjusted R-squared:  -0.01402
## F-statistic: 0.8341 on 1 and 11 DF,  p-value: 0.3807
```

Including Plots

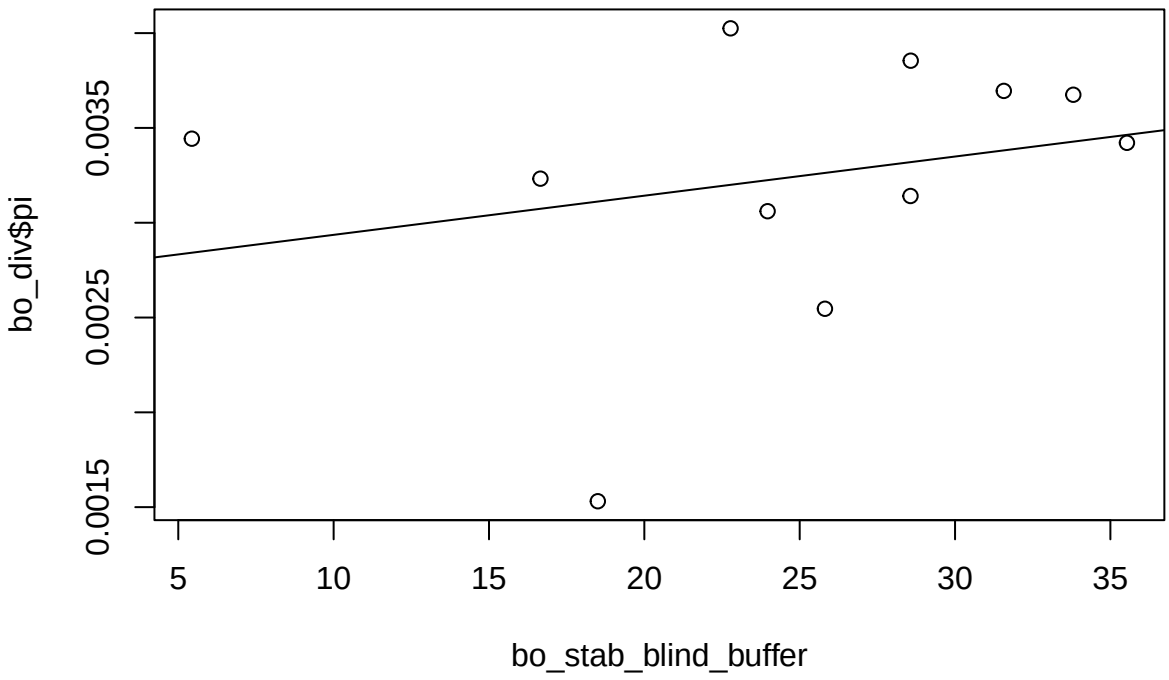
```
plot(bo_div$pi~bo_curr_buffer)
abline(lm(bo_div$pi ~ bo_curr_buffer))
```



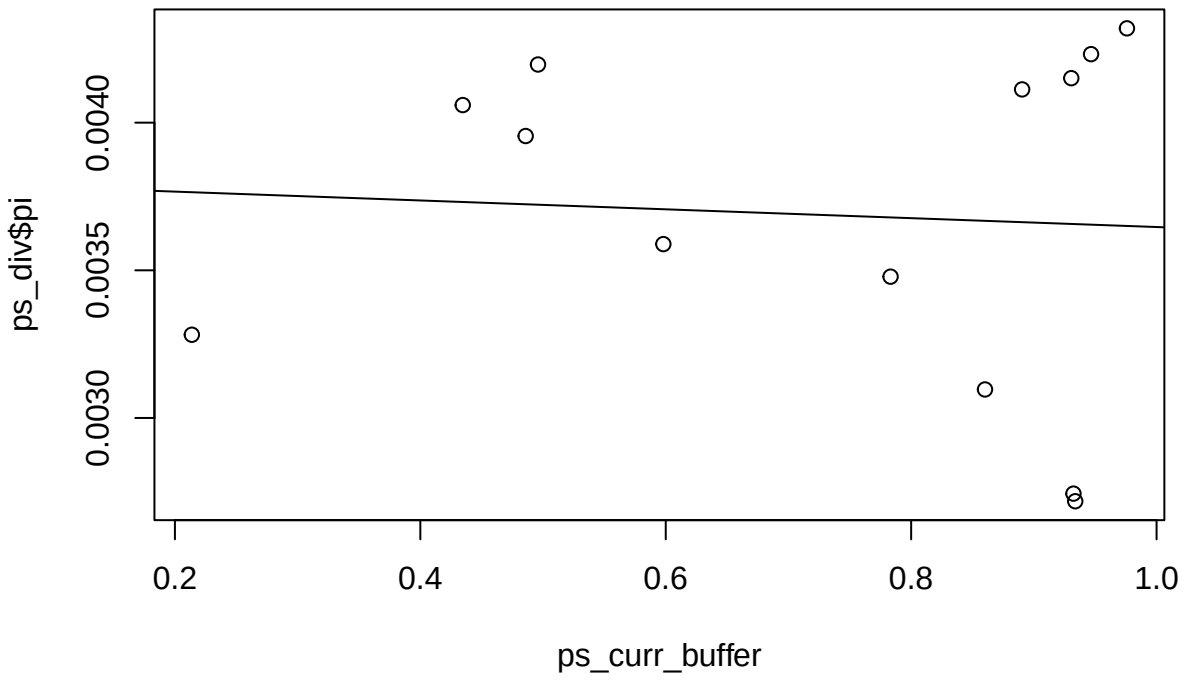

```
plot(bo_div$pi~bo_stab_buffer)
abline(lm(bo_div$pi ~ bo_stab_buffer))
```



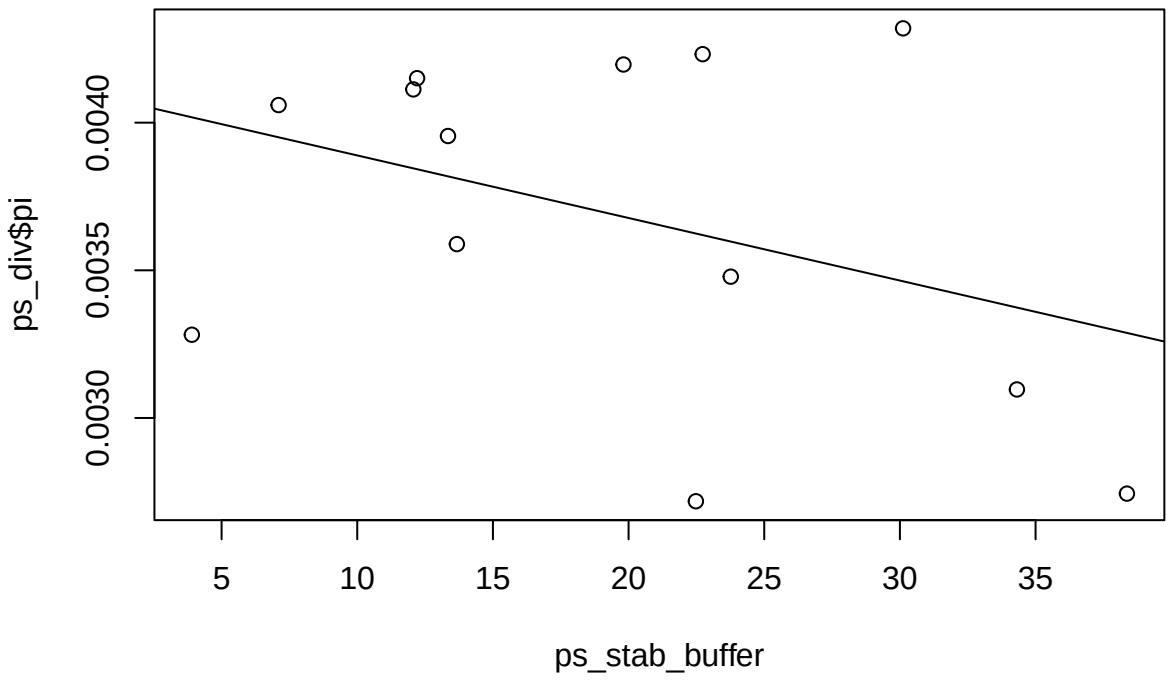

```
plot(bo_div$pi~bo_stab_blind_buffer)
abline(lm(bo_div$pi ~ bo_stab_blind_buffer))
```



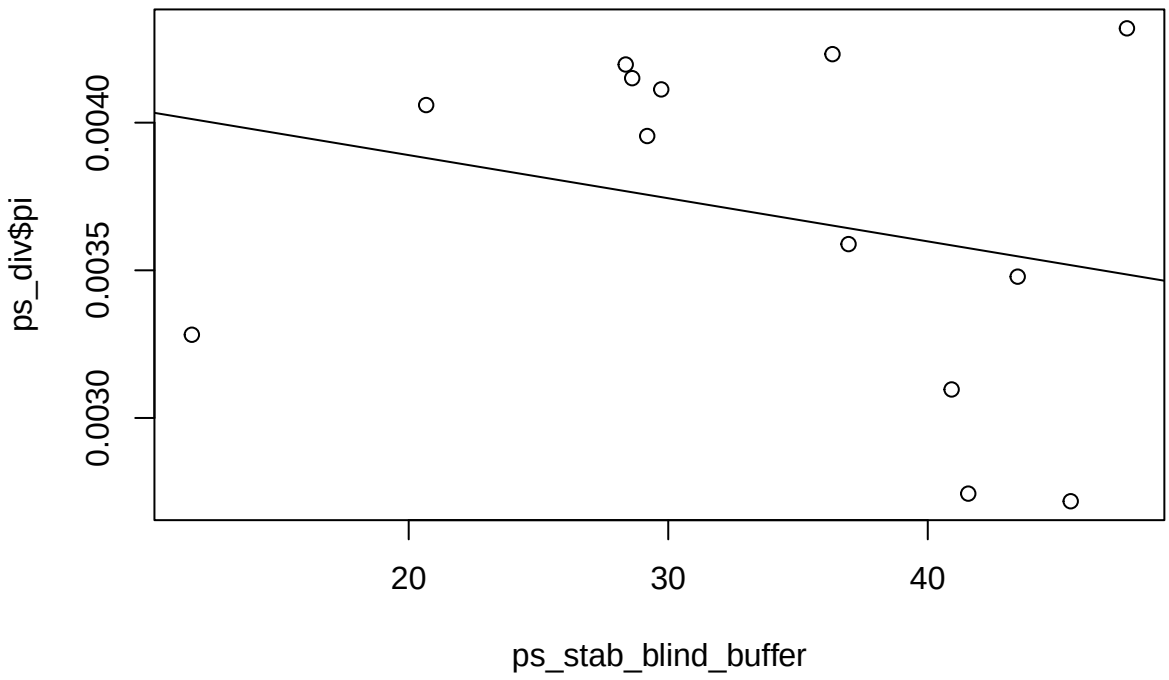

```
plot(ps_div$pi~ps_curr_buffer)
abline(lm(ps_div$pi ~ ps_curr_buffer))
```




```
plot(ps_div$pi~ps_stab_buffer)
abline(lm(ps_div$pi ~ ps_stab_buffer))
```




```
plot(ps_div$pi~ps_stab_blind_buffer)
abline(lm(ps_div$pi ~ ps_stab_blind_buffer))
```



Read in diversity measures at 70% missing data threshold

```
all_div <- read.csv("../Output/DnaSP_summary.csv")
bo_div <- subset(all_div, species == "bo" & missing.data == "70")
ps_div <- subset(all_div, species == "ps" & missing.data == "70")
```

Linear models

```
bo_curr_lm <- lm(bo_div$pi~bo_curr_buffer)
bo_stab_lm <- lm(bo_div$pi~bo_stab_buffer)
bo_stab_blind_lm <- lm(bo_div$pi~bo_stab_blind_buffer)

ps_curr_lm <- lm(ps_div$pi~ps_curr_buffer)
ps_stab_lm <- lm(ps_div$pi~ps_stab_buffer)
ps_stab_blind_lm <- lm(ps_div$pi~ps_stab_blind_buffer)

summary(bo_curr_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_curr_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0012092 -0.0003734 -0.0002481  0.0005919  0.0010296
```

```
##
## Coefficients:
##                Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.002063   0.000696   2.964   0.0159 *
## bo_curr_buffer 0.001182   0.001009   1.171   0.2717
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.000728 on 9 degrees of freedom
## Multiple R-squared:  0.1322, Adjusted R-squared:  0.0358
## F-statistic: 1.371 on 1 and 9 DF,  p-value: 0.2717
```

```
summary(bo_stab_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_stab_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -1.645e-03 -1.839e-04 -1.458e-05  5.122e-04  8.923e-04
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)    2.814e-03  4.437e-04   6.343 0.000134 ***
## bo_stab_buffer 2.816e-06  4.763e-05   0.059 0.954152
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0007813 on 9 degrees of freedom
## Multiple R-squared:  0.0003881,  Adjusted R-squared:  -0.1107
## F-statistic: 0.003495 on 1 and 9 DF,  p-value: 0.9542
```

```
summary(bo_stab_blind_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_stab_blind_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0015671 -0.0002409 -0.0001039  0.0005078  0.0009231
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)          2.509e-03  7.298e-04   3.437  0.00742 **
## bo_stab_blind_buffer 1.330e-05  2.805e-05   0.474  0.64685
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0007719 on 9 degrees of freedom
## Multiple R-squared:  0.02435,    Adjusted R-squared:  -0.08406
## F-statistic: 0.2246 on 1 and 9 DF,  p-value: 0.6468
```

```
summary(ps_curr_lm)
```

```
##
## Call:
## lm(formula = ps_div$pi ~ ps_curr_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0009771 -0.0006343  0.0002867  0.0004553  0.0010666
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.0033799  0.0005974   5.657 0.000147 ***
## ps_curr_buffer -0.0002931  0.0007775  -0.377 0.713331
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0006783 on 11 degrees of freedom
## Multiple R-squared:  0.01276,    Adjusted R-squared:  -0.07699
## F-statistic: 0.1421 on 1 and 11 DF,  p-value: 0.7133
```

```
summary(ps_stab_lm)
```

```
##
## Call:
## lm(formula = ps_div$pi ~ ps_stab_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -8.555e-04 -3.792e-04  6.295e-05  4.500e-04  1.079e-03
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     3.628e-03  3.844e-04   9.438 1.31e-06 ***
## ps_stab_buffer -2.365e-05  1.752e-05  -1.350    0.204
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0006323 on 11 degrees of freedom
## Multiple R-squared:  0.1422, Adjusted R-squared:  0.06419
## F-statistic: 1.823 on 1 and 11 DF,  p-value: 0.2041
```

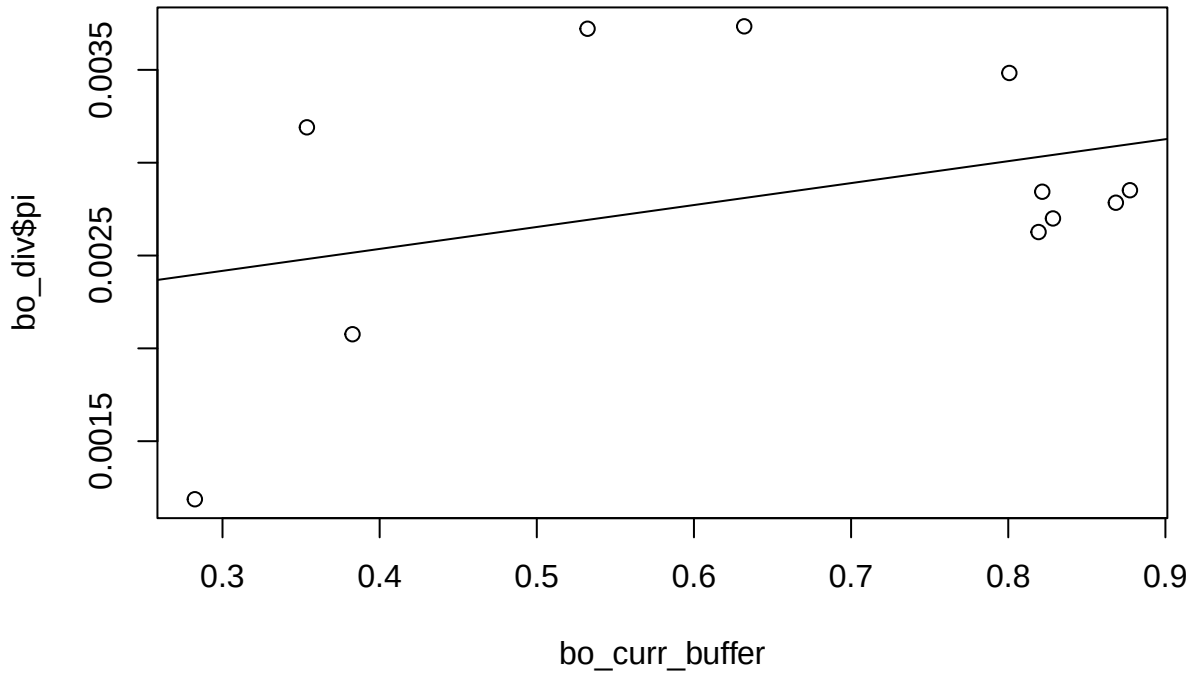
```
summary(ps_stab_blind_lm)
```

```
##
## Call:
## lm(formula = ps_div$pi ~ ps_stab_blind_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0008974 -0.0005673  0.0001638  0.0005108  0.0010471
```

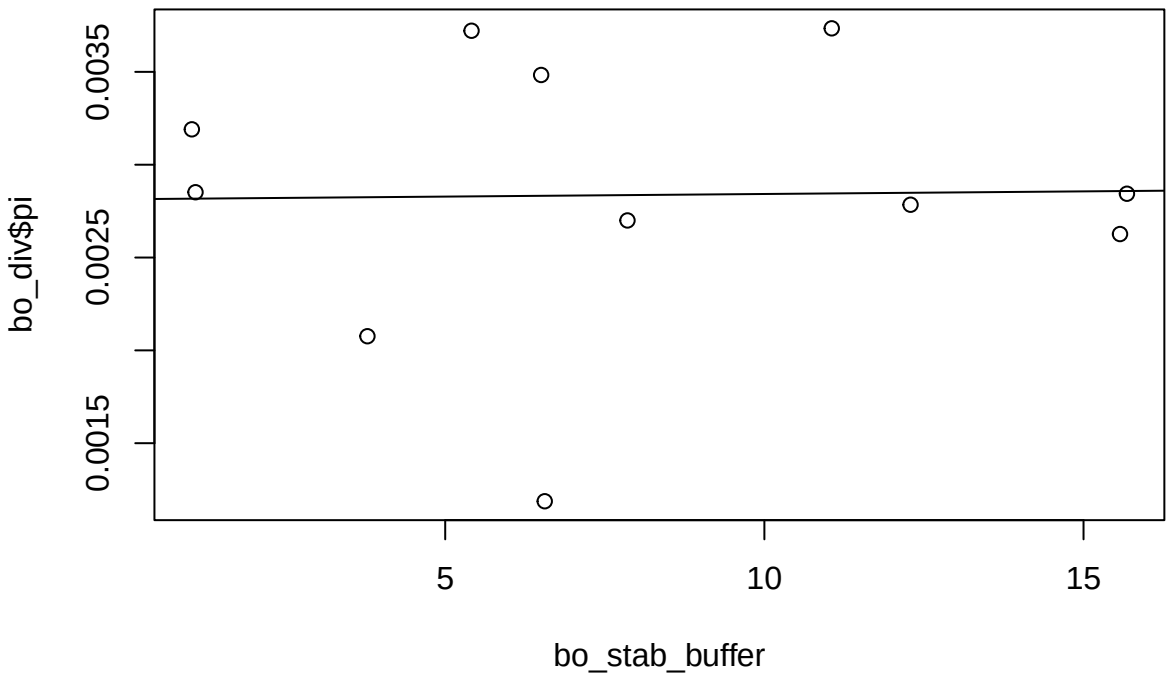
```
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)            3.782e-03  6.386e-04   5.922 9.99e-05 ***
## ps_stab_blind_buffer -1.816e-05  1.807e-05  -1.005    0.336
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0006533 on 11 degrees of freedom
## Multiple R-squared:  0.08412,    Adjusted R-squared:  0.0008602
## F-statistic:  1.01 on 1 and 11 DF,  p-value: 0.3364
```

Including Plots

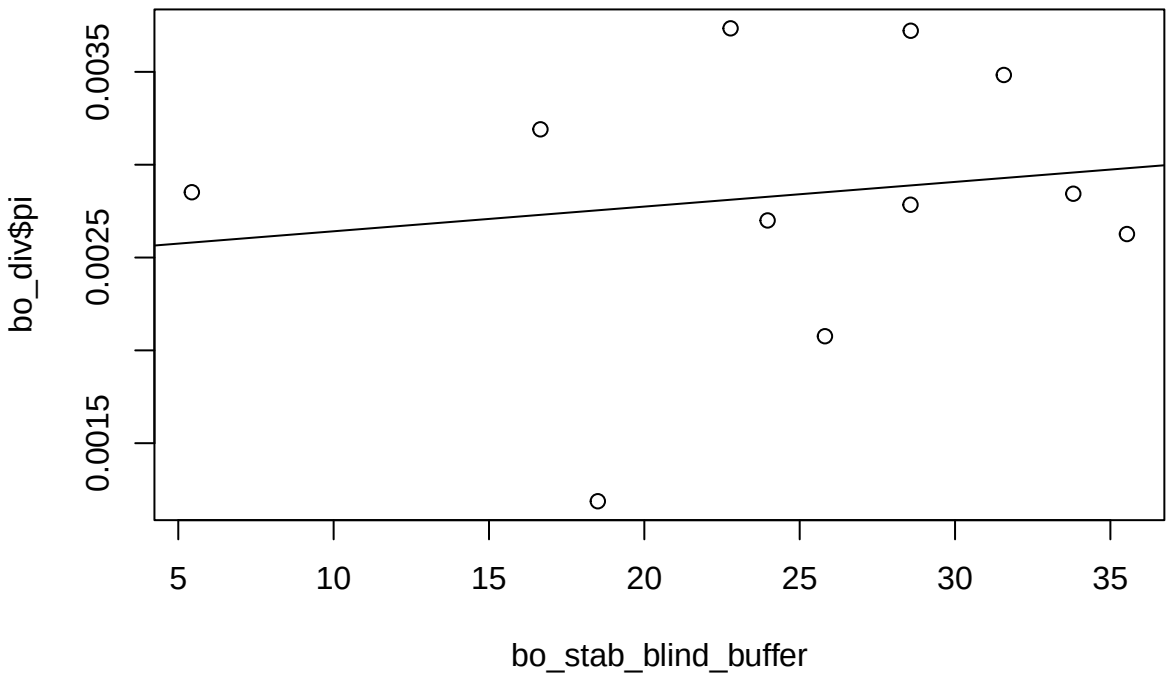
```
plot(bo_div$pi~bo_curr_buffer)
abline(lm(bo_div$pi ~ bo_curr_buffer))
```



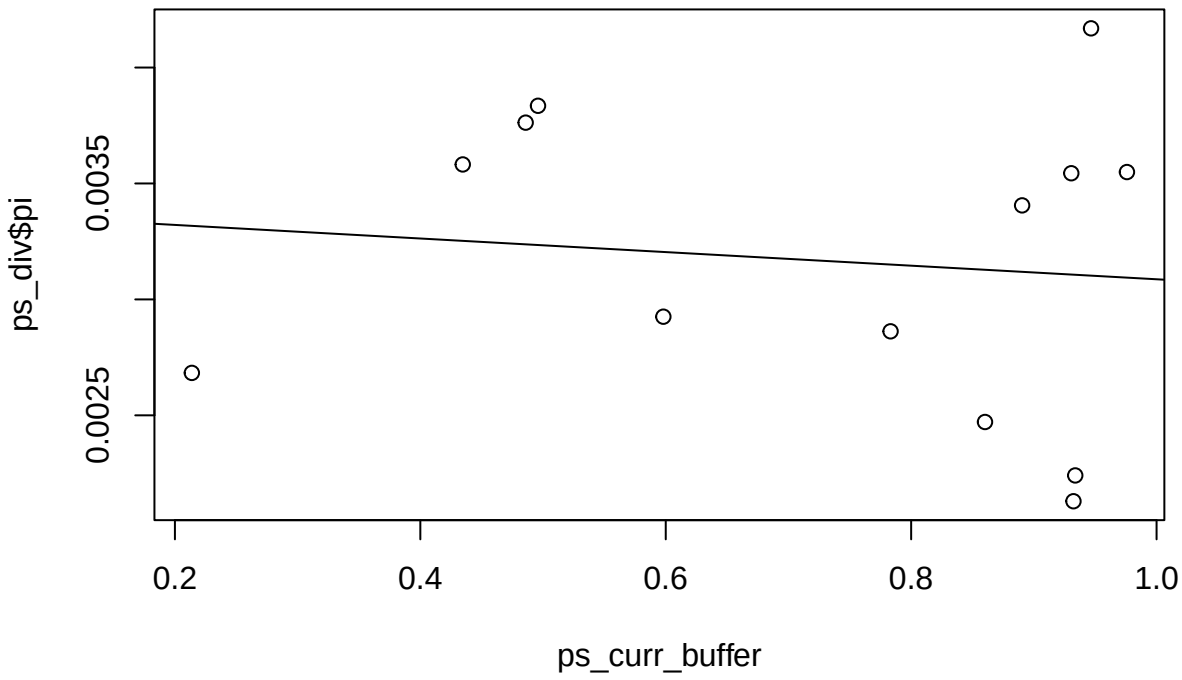

```
plot(bo_div$pi~bo_stab_buffer)
abline(lm(bo_div$pi ~ bo_stab_buffer))
```



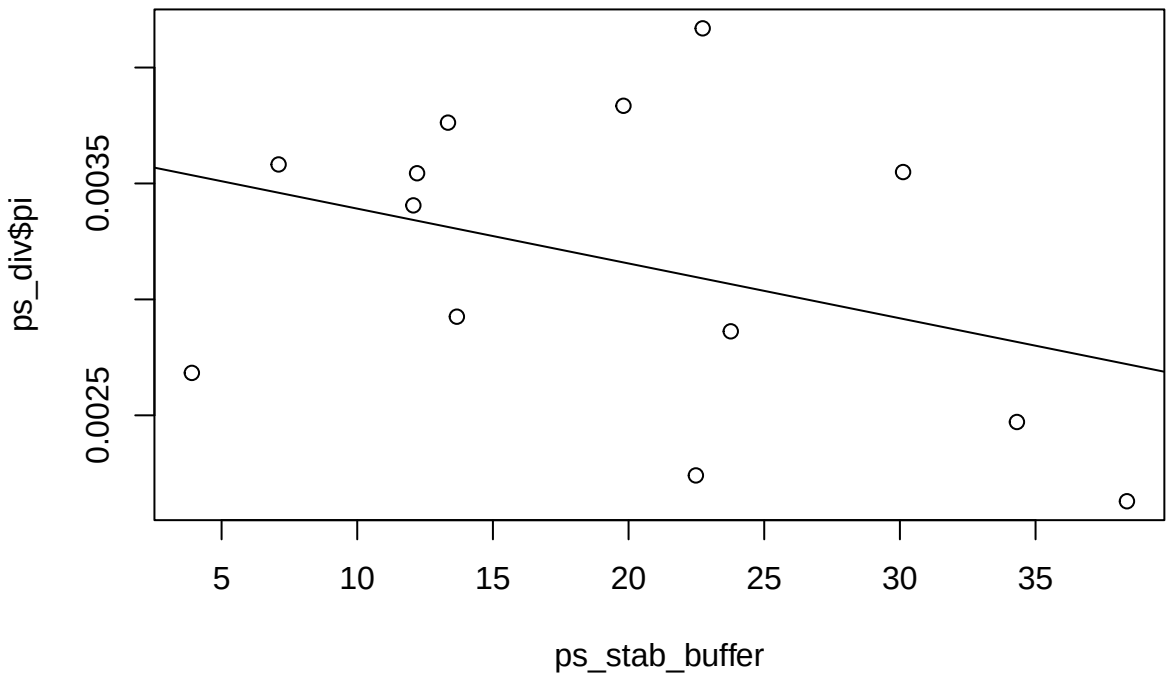

```
plot(bo_div$pi~bo_stab_blind_buffer)
abline(lm(bo_div$pi ~ bo_stab_blind_buffer))
```



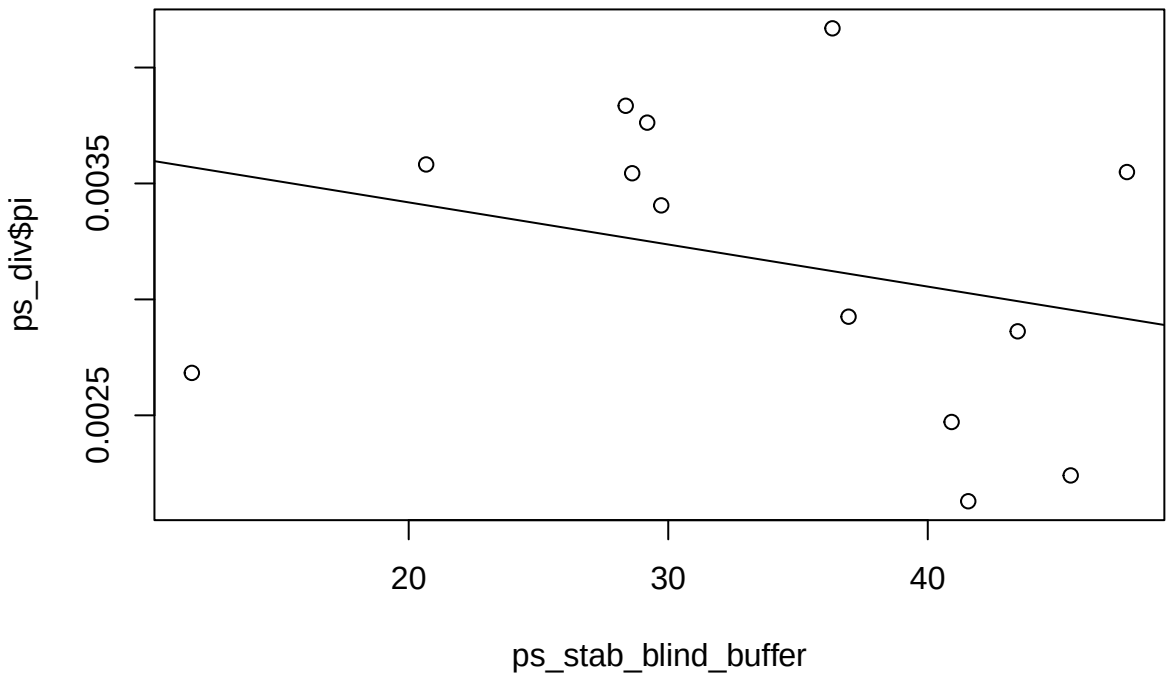

```
plot(ps_div$pi~ps_curr_buffer)
abline(lm(ps_div$pi ~ ps_curr_buffer))
```




```
plot(ps_div$pi~ps_stab_buffer)
abline(lm(ps_div$pi ~ ps_stab_buffer))
```




```
plot(ps_div$pi~ps_stab_blind_buffer)
abline(lm(ps_div$pi ~ ps_stab_blind_buffer))
```



Read in diversity measures at 90% missing data threshold

```
all_div <- read.csv("../Output/DnaSP_summary.csv")
bo_div <- subset(all_div, species == "bo" & missing.data == "90")
ps_div <- subset(all_div, species == "ps" & missing.data == "90")
```

Linear models

```
bo_curr_lm <- lm(bo_div$pi~bo_curr_buffer)
bo_stab_lm <- lm(bo_div$pi~bo_stab_buffer)
bo_stab_blind_lm <- lm(bo_div$pi~bo_stab_blind_buffer)

ps_curr_lm <- lm(ps_div$pi~ps_curr_buffer)
ps_stab_lm <- lm(ps_div$pi~ps_stab_buffer)
ps_stab_blind_lm <- lm(ps_div$pi~ps_stab_blind_buffer)

summary(bo_curr_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_curr_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0007941 -0.0003087 -0.0001571  0.0004533  0.0007279
```

```
##
## Coefficients:
##                 Estimate Std. Error t value Pr(>|t|)
## (Intercept)    0.0015398  0.0004975   3.095   0.0128 *
## bo_curr_buffer 0.0008001  0.0007214   1.109   0.2961
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0005204 on 9 degrees of freedom
## Multiple R-squared:  0.1203, Adjusted R-squared:  0.02251
## F-statistic:  1.23 on 1 and 9 DF,  p-value: 0.2961
```

```
summary(bo_stab_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_stab_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -1.095e-03 -1.631e-04  2.565e-05  3.807e-04  7.183e-04
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     2.084e-03  3.149e-04   6.618 9.73e-05 ***
## bo_stab_buffer -2.631e-06  3.381e-05  -0.078     0.94
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0005546 on 9 degrees of freedom
## Multiple R-squared:  0.0006726,  Adjusted R-squared:  -0.1104
## F-statistic: 0.006057 on 1 and 9 DF,  p-value: 0.9397
```

```
summary(bo_stab_blind_lm)
```

```
##
## Call:
## lm(formula = bo_div$pi ~ bo_stab_blind_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -1.076e-03 -1.865e-04  3.790e-06  3.929e-04  7.149e-04
##
## Coefficients:
##                       Estimate Std. Error t value Pr(>|t|)
## (Intercept)          1.999e-03  5.240e-04   3.814  0.00413 **
## bo_stab_blind_buffer 2.631e-06  2.015e-05   0.131  0.89897
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0005543 on 9 degrees of freedom
## Multiple R-squared:  0.001891,   Adjusted R-squared:  -0.109
## F-statistic: 0.01705 on 1 and 9 DF,  p-value: 0.899
```

```
summary(ps_curr_lm)
```

```
##
## Call:
## lm(formula = ps_div$pi ~ ps_curr_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0008423 -0.0004930  0.0001371  0.0004229  0.0010627
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     0.0026096  0.0005333   4.893 0.000477 ***
## ps_curr_buffer -0.0001610  0.0006941  -0.232 0.820873
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0006055 on 11 degrees of freedom
## Multiple R-squared:  0.004865,   Adjusted R-squared:  -0.0856
## F-statistic: 0.05378 on 1 and 11 DF,  p-value: 0.8209
```

```
summary(ps_stab_lm)
```

```
##
## Call:
## lm(formula = ps_div$pi ~ ps_stab_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0007659 -0.0004458  0.0002018  0.0002750  0.0011006
##
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     2.937e-03  3.368e-04   8.720 2.85e-06 ***
## ps_stab_buffer -2.278e-05  1.535e-05  -1.484    0.166
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.000554 on 11 degrees of freedom
## Multiple R-squared:  0.1668, Adjusted R-squared:  0.09111
## F-statistic: 2.203 on 1 and 11 DF,  p-value: 0.1658
```

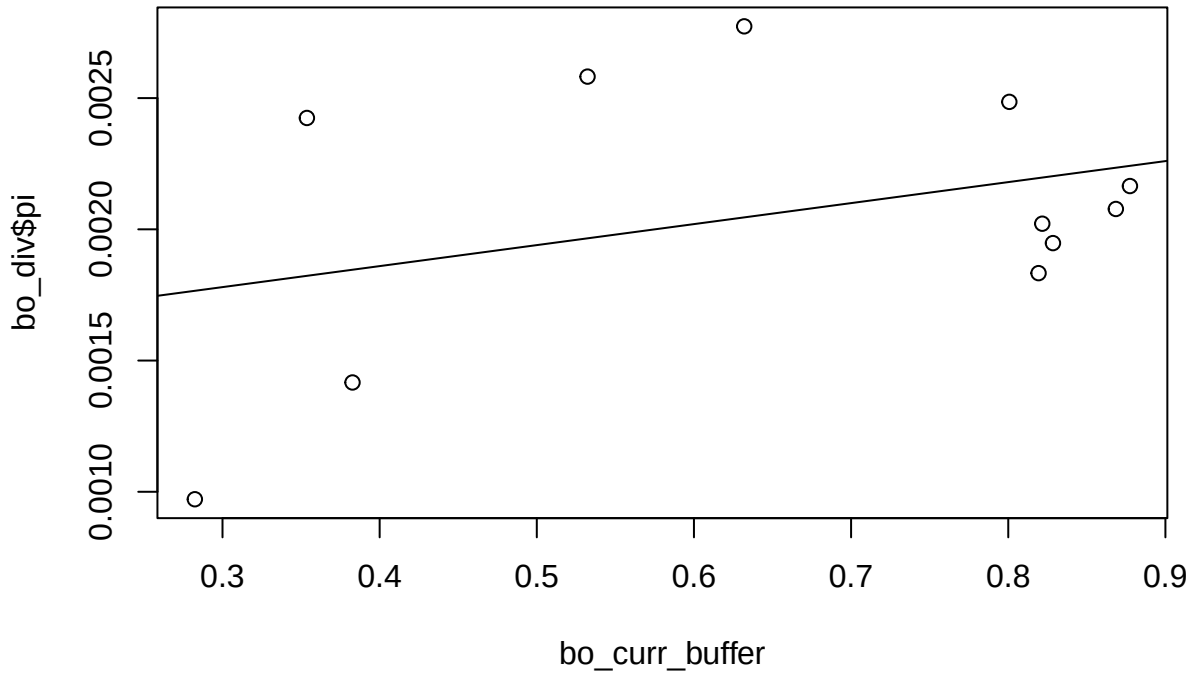
```
summary(ps_stab_blind_lm)
```

```
##
## Call:
## lm(formula = ps_div$pi ~ ps_stab_blind_buffer)
##
## Residuals:
##        Min         1Q     Median         3Q        Max
## -0.0008343 -0.0004563  0.0002390  0.0003262  0.0010741
```

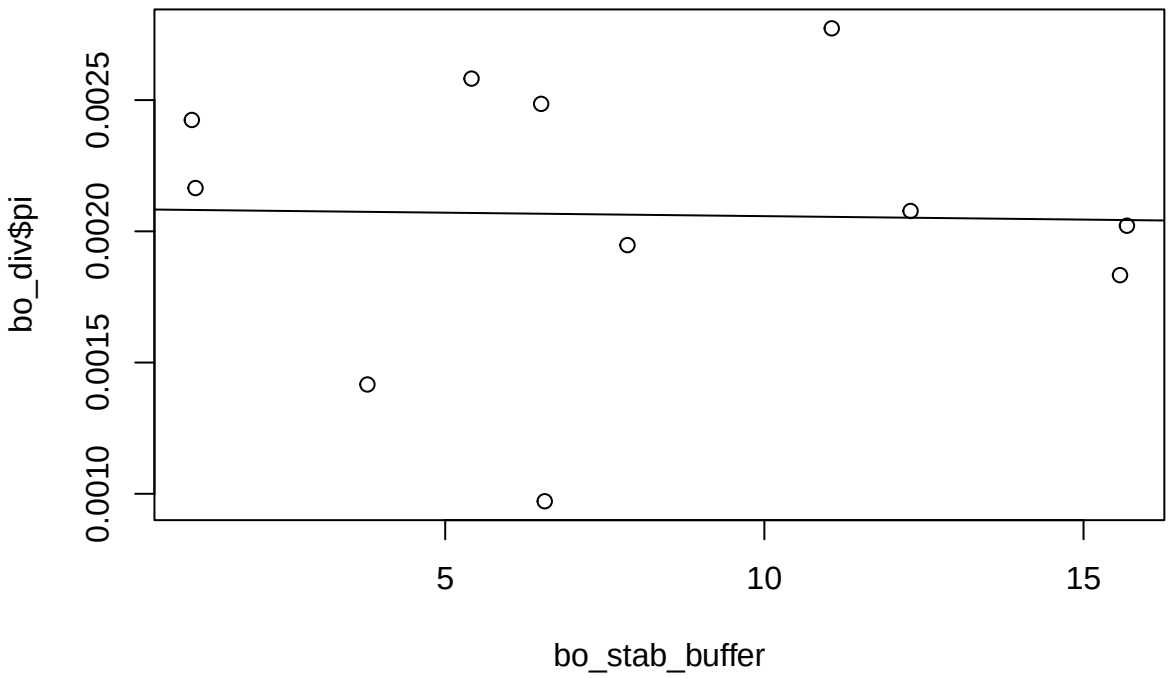
```
##
## Coefficients:
##                          Estimate Std. Error t value Pr(>|t|)
## (Intercept)            3.139e-03  5.574e-04   5.631 0.000153 ***
## ps_stab_blind_buffer -1.907e-05  1.577e-05  -1.209 0.251857
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.0005702 on 11 degrees of freedom
## Multiple R-squared:  0.1174, Adjusted R-squared:  0.03712
## F-statistic: 1.463 on 1 and 11 DF,  p-value: 0.2519
```

Including Plots

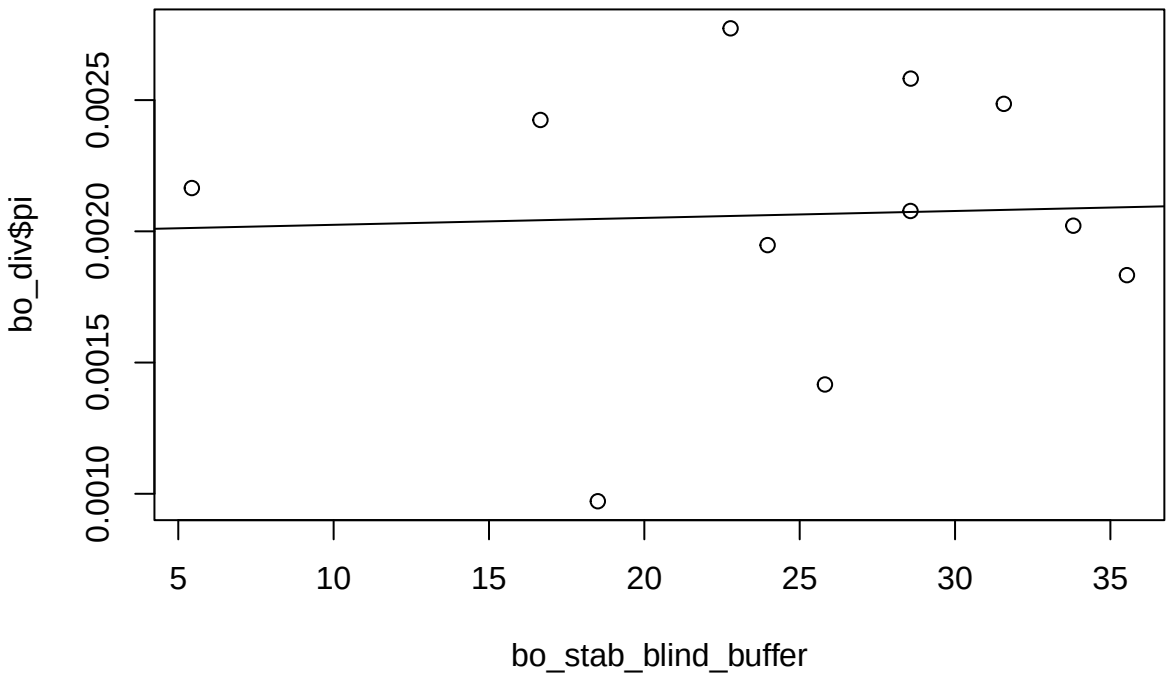
```
plot(bo_div$pi~bo_curr_buffer)
abline(lm(bo_div$pi ~ bo_curr_buffer))
```



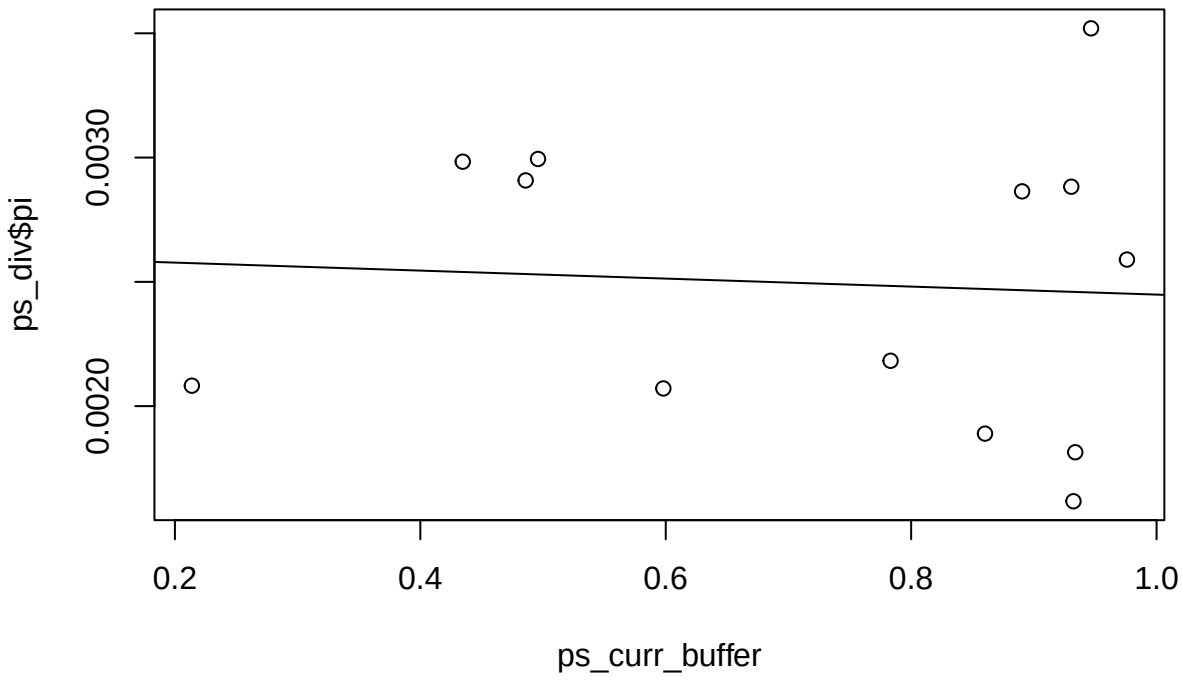

```
plot(bo_div$pi~bo_stab_buffer)
abline(lm(bo_div$pi ~ bo_stab_buffer))
```



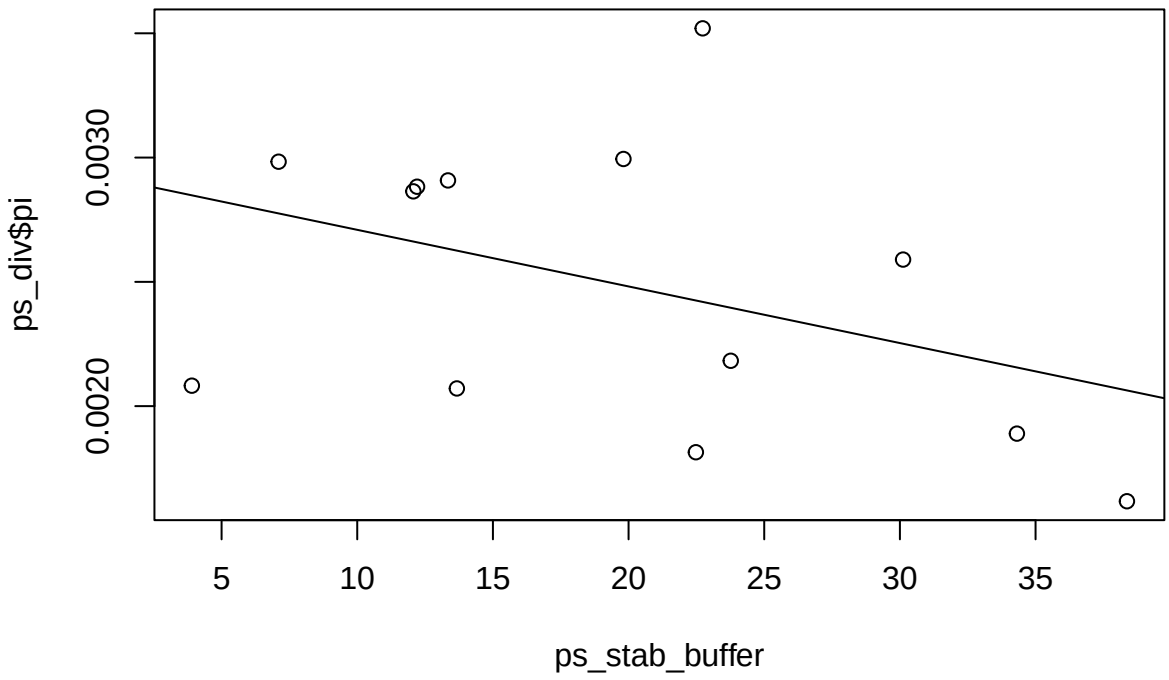

```
plot(bo_div$pi~bo_stab_blind_buffer)
abline(lm(bo_div$pi ~ bo_stab_blind_buffer))
```



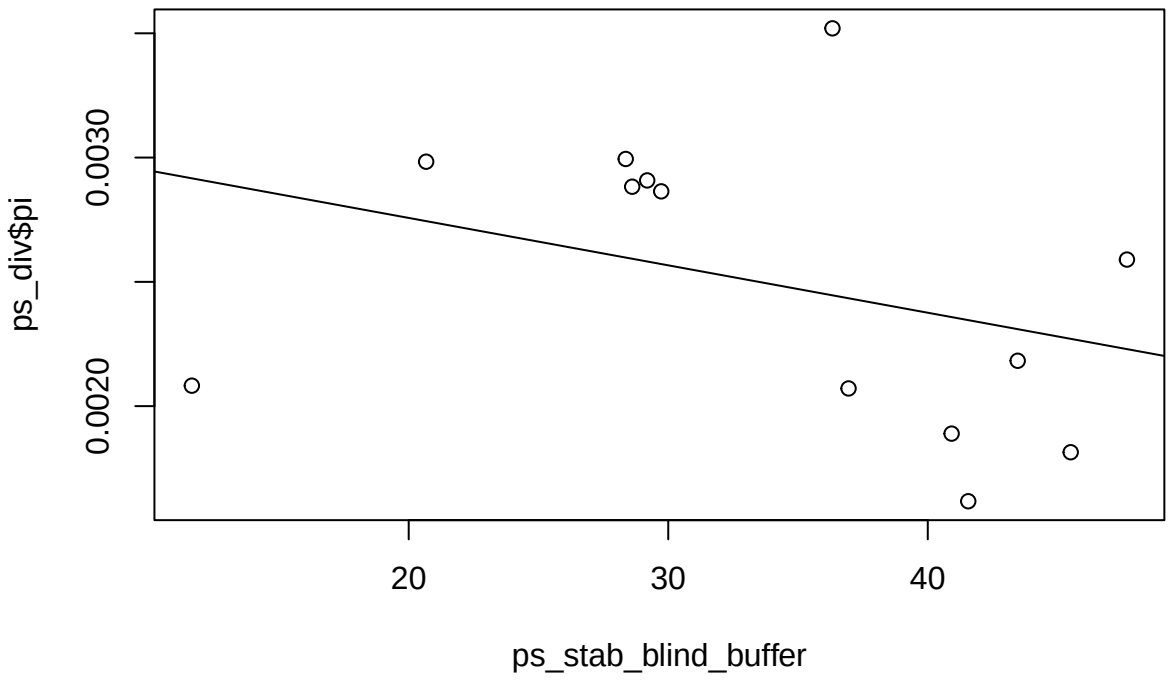

```
plot(ps_div$pi~ps_curr_buffer)
abline(lm(ps_div$pi ~ ps_curr_buffer))
```




```
plot(ps_div$pi~ps_stab_buffer)
abline(lm(ps_div$pi ~ ps_stab_buffer))
```




```
plot(ps_div$pi~ps_stab_blind_buffer)
abline(lm(ps_div$pi ~ ps_stab_blind_buffer))
```


ps_div$pi
0.0030
0.0020
20
30
40
ps_stab_blind_buffer