Data Visualization

Rachael E. Blake

May 1, 2017

Invertebrates: Percent Cover Data

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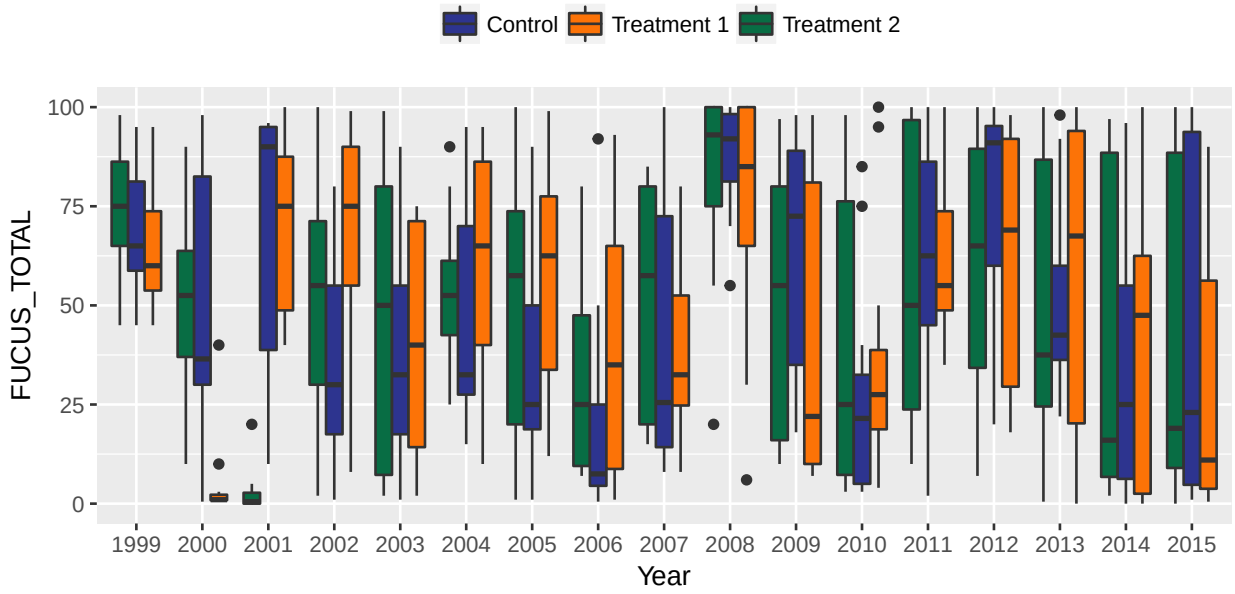
## [[1]]
```

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##
## [[2]]
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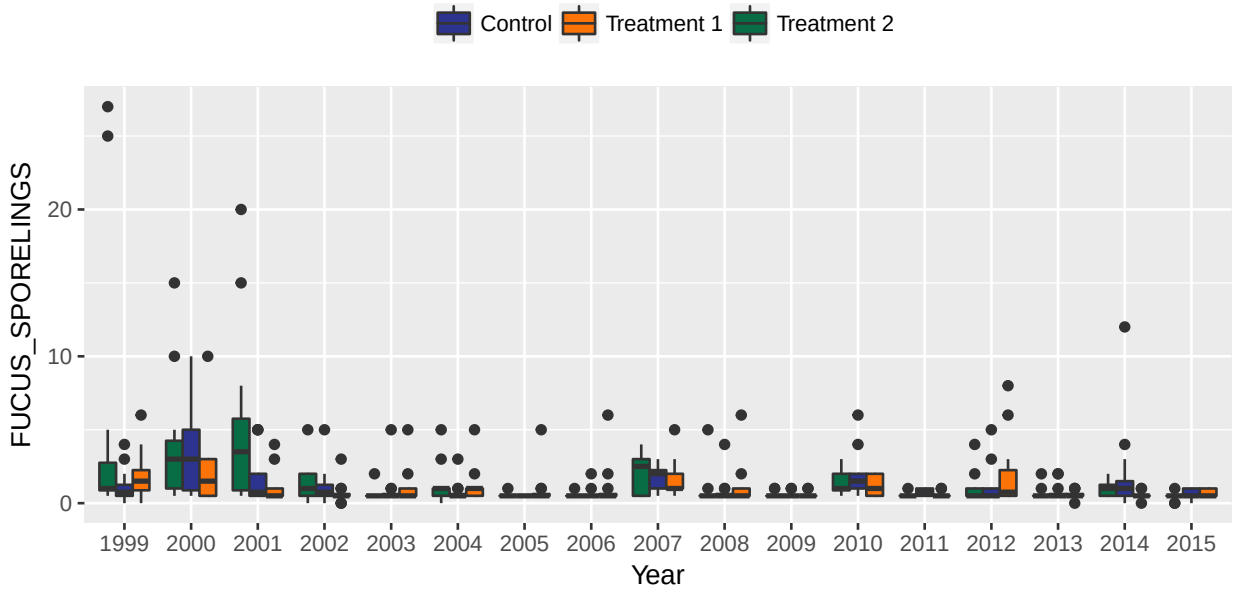

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##
## [[3]]
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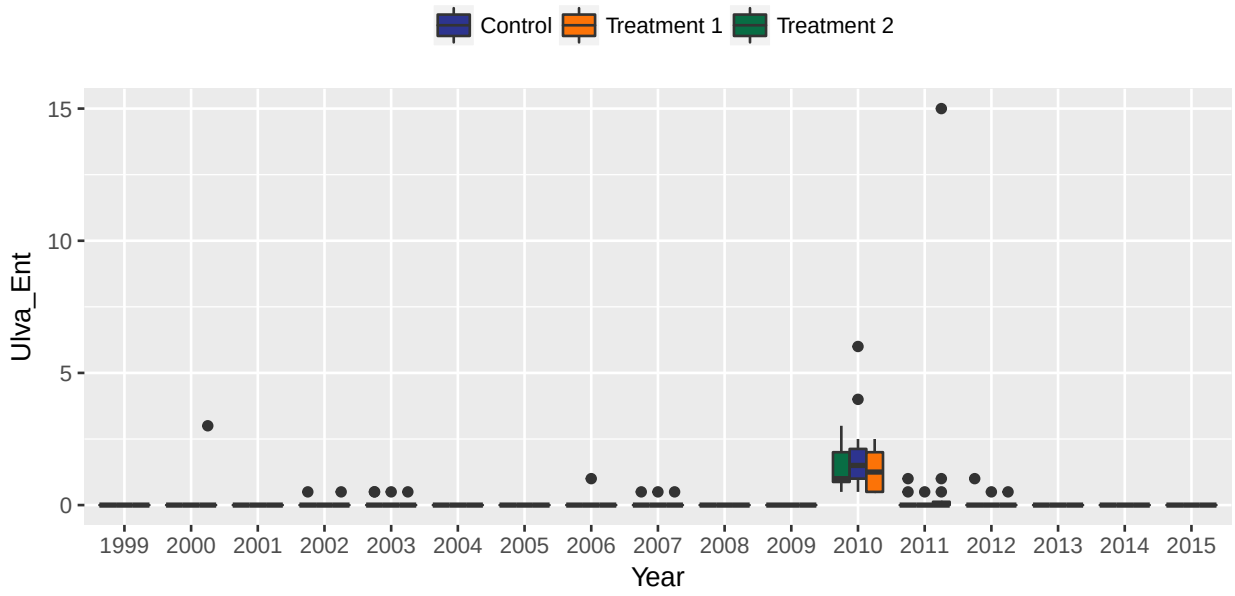
Control
Treatment 1
Treatment 2
Ulva_Ent
15
10
5
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

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##
## [[4]]
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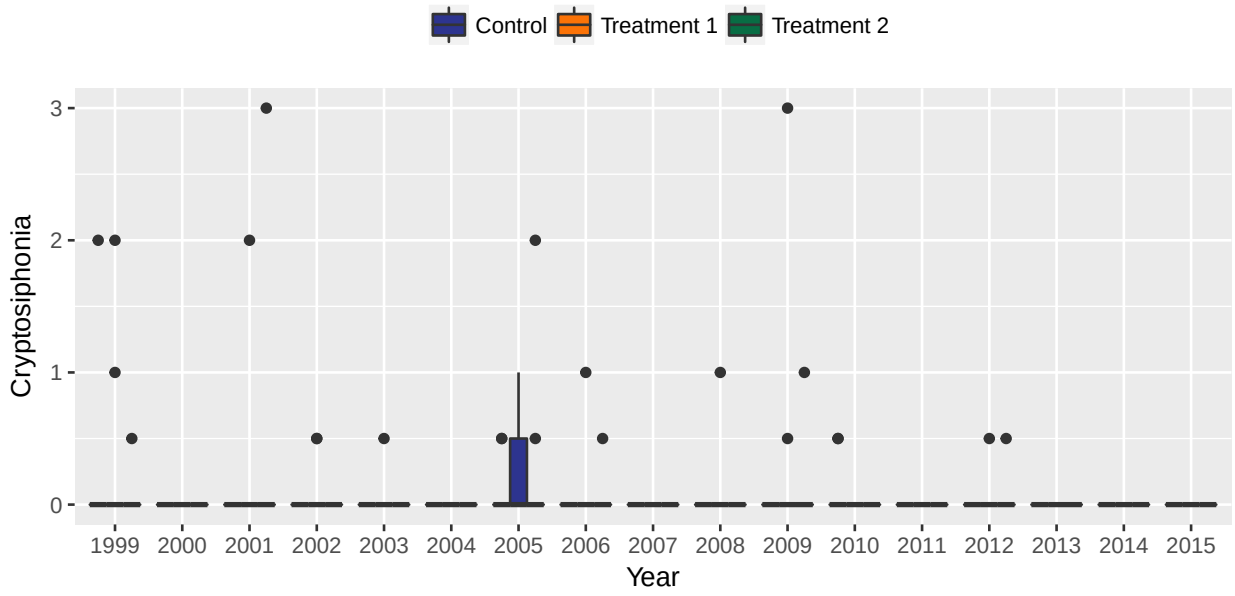
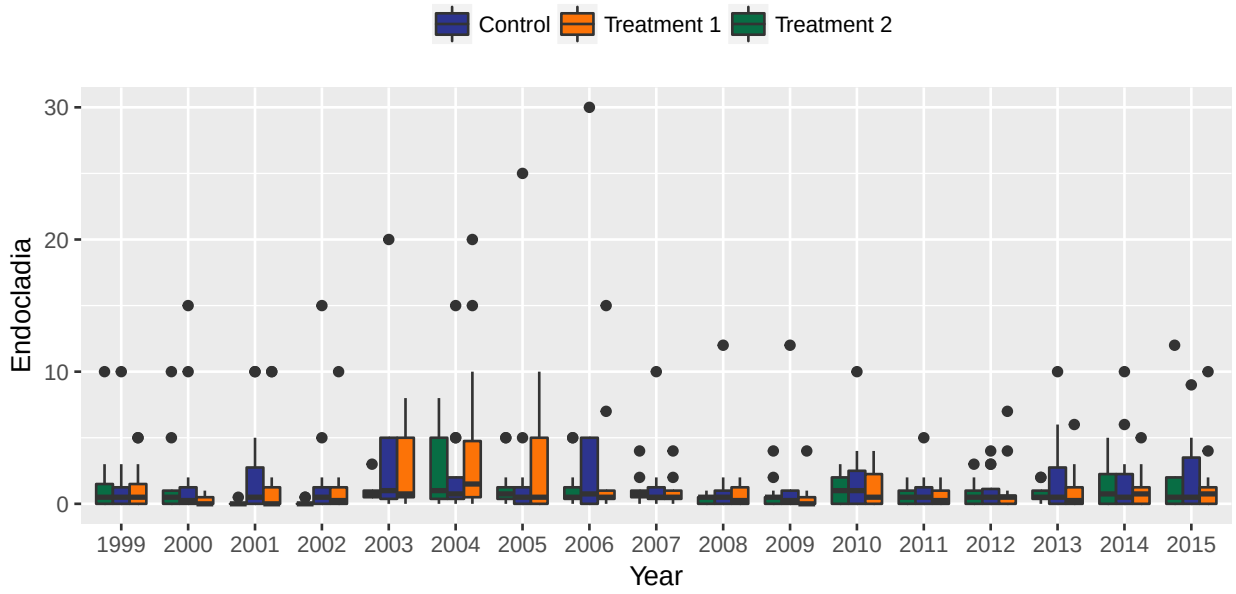

Control
Treatment 1
Treatment 2
Cryptosiphonia
3
2
1
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

```
##
## [[5]]
```


Control
Treatment 1
Treatment 2
Endocladia
30
20
10
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

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##
## [[6]]
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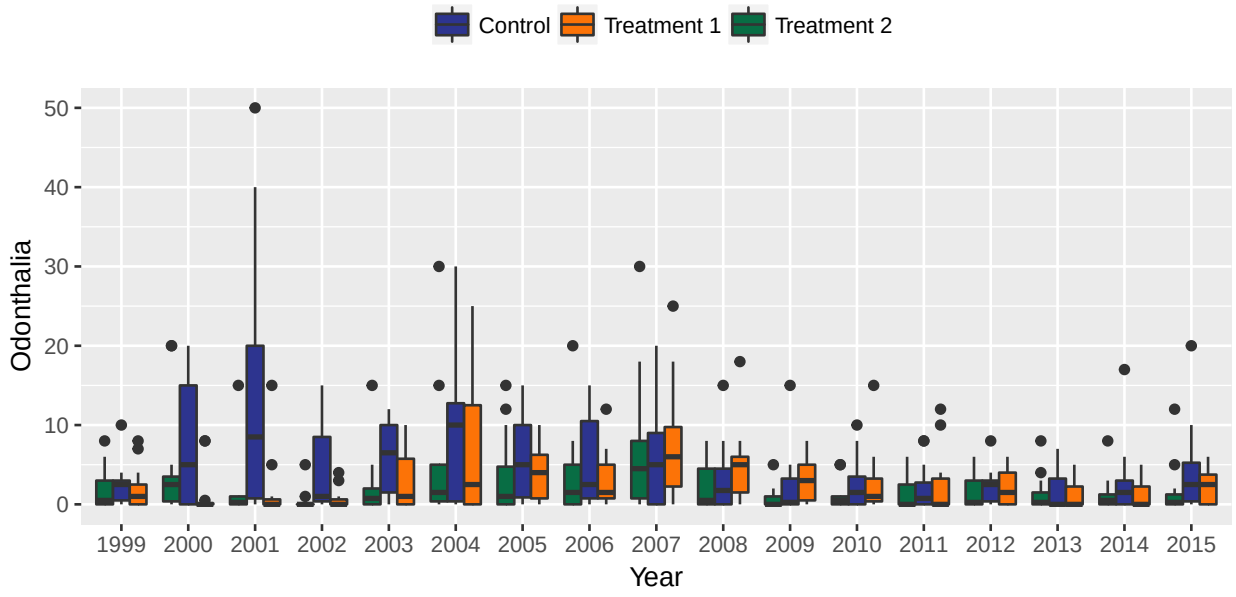
Control
Treatment 1
Treatment 2
Odonthalia
50
40
30
20
10
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

```
##
## [[7]]
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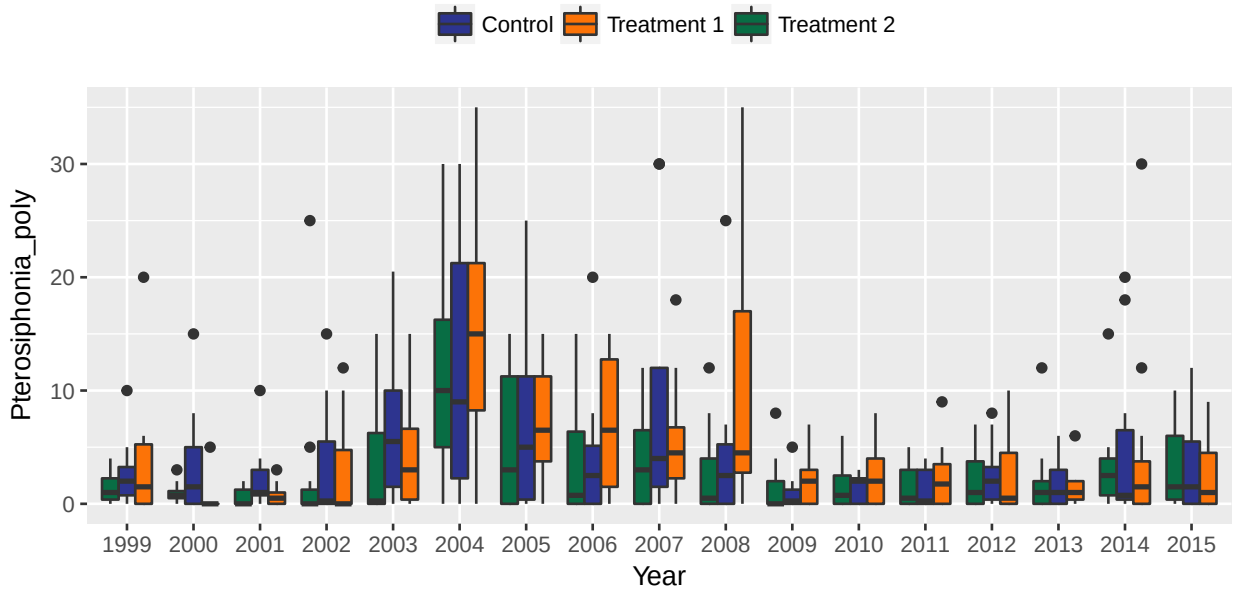
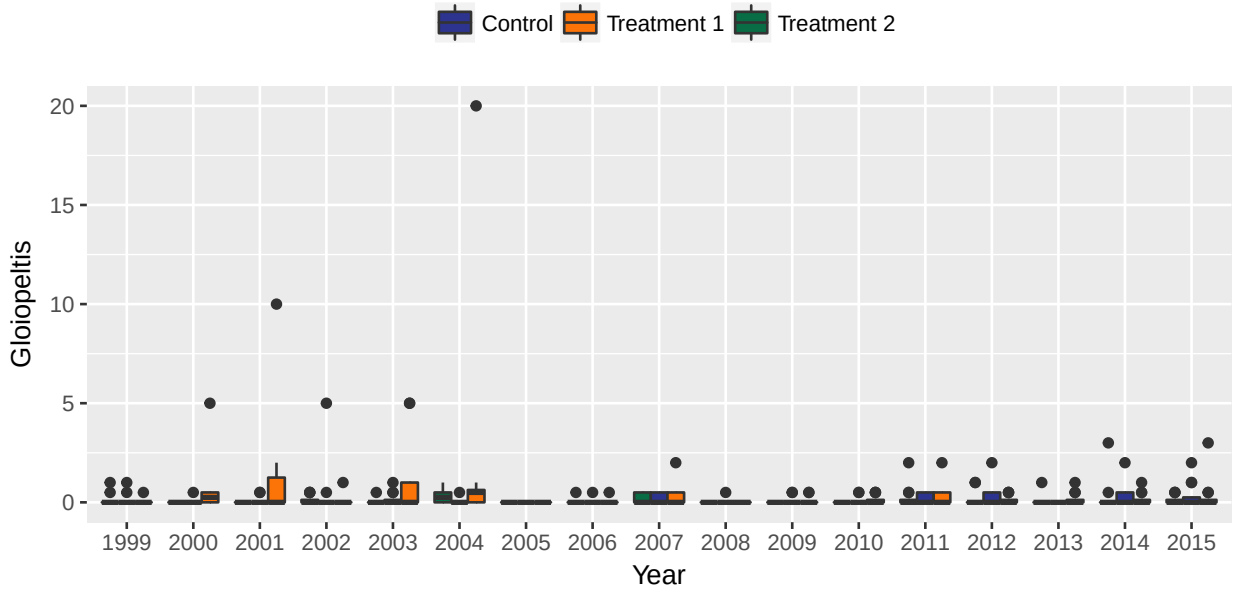
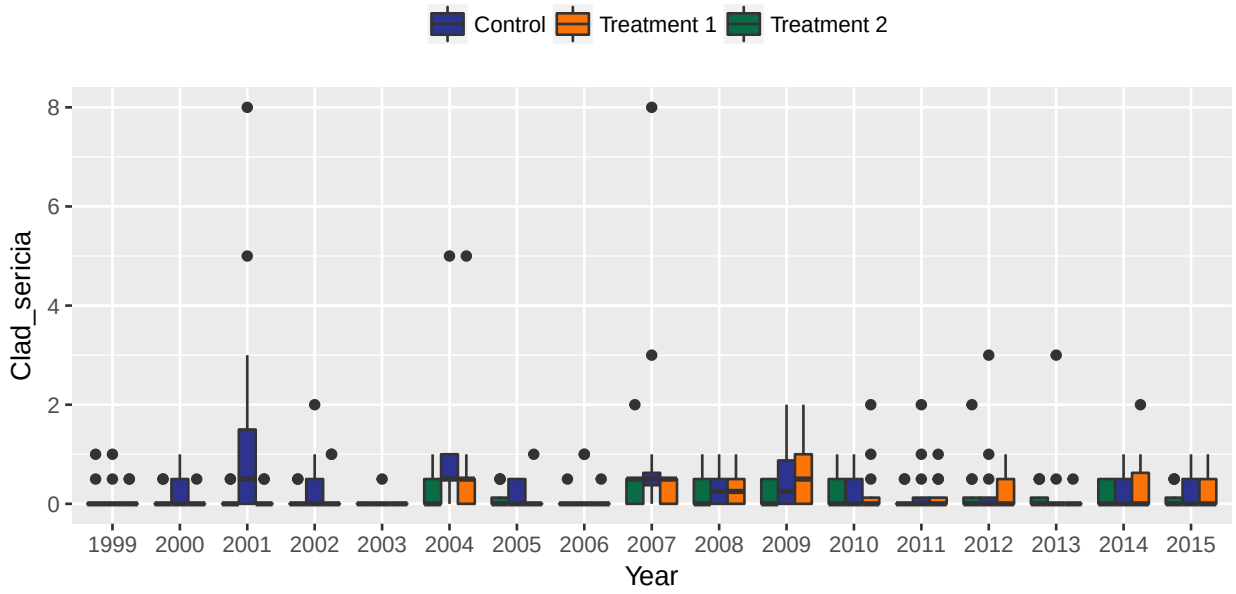

Control
Treatment 1
Treatment 2
Pterosiphonia_poly
30
20
10
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

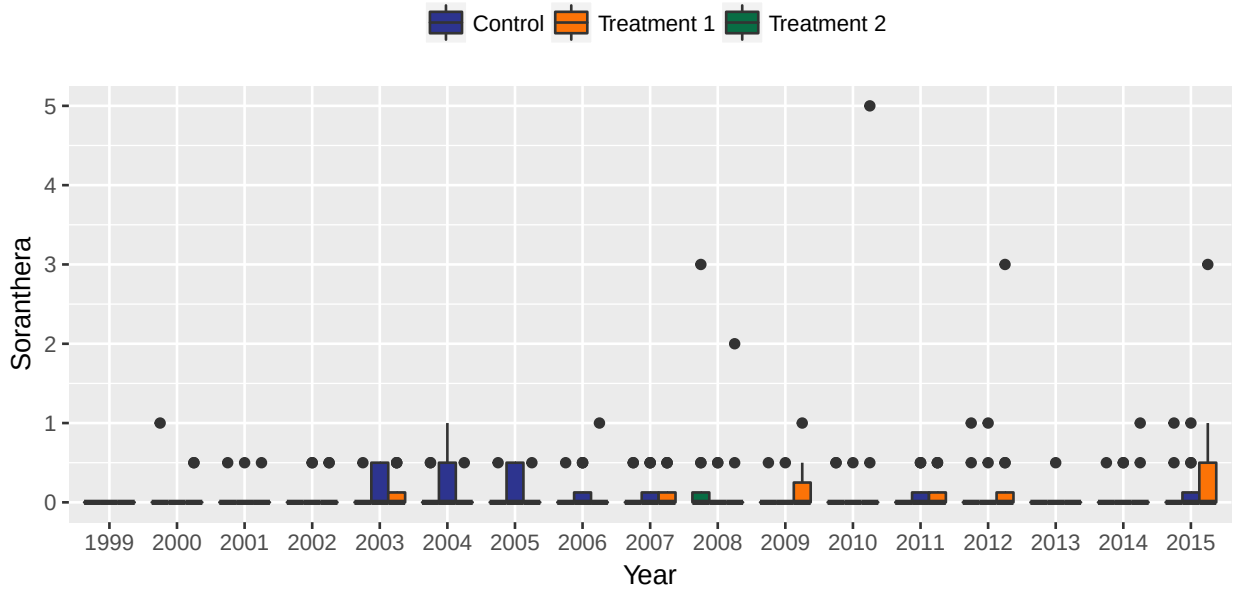
```
##
## [[8]]
```


Control
Treatment 1
Treatment 2
Gloiopeltis
20
15
10
5
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

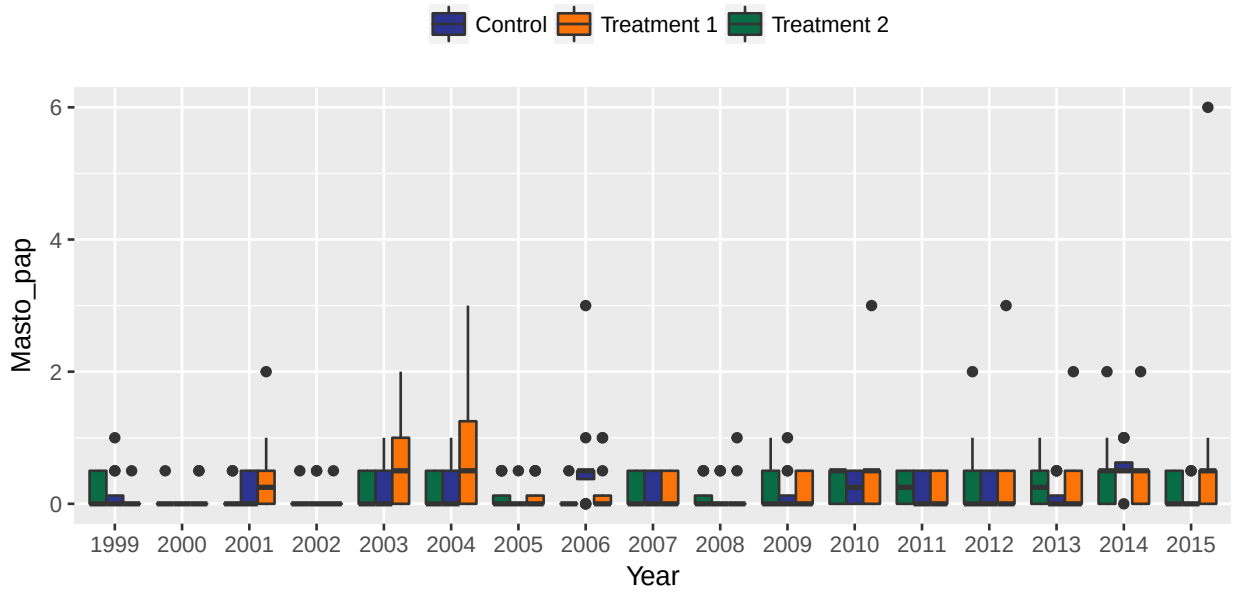
```
##
## [[9]]
```


Control
Treatment 1
Treatment 2
Clad_sericia
0
2
4
6
8
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

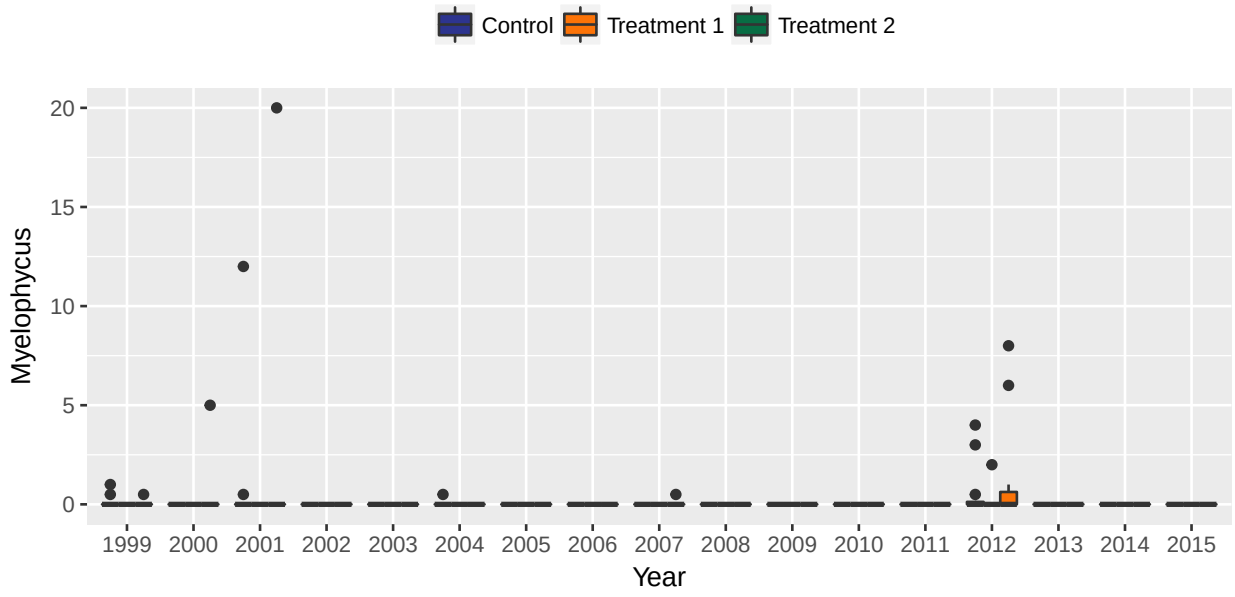
```
##
## [[10]]
```


Control
Treatment 1
Treatment 2
Soranthera
0
1
2
3
4
5
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

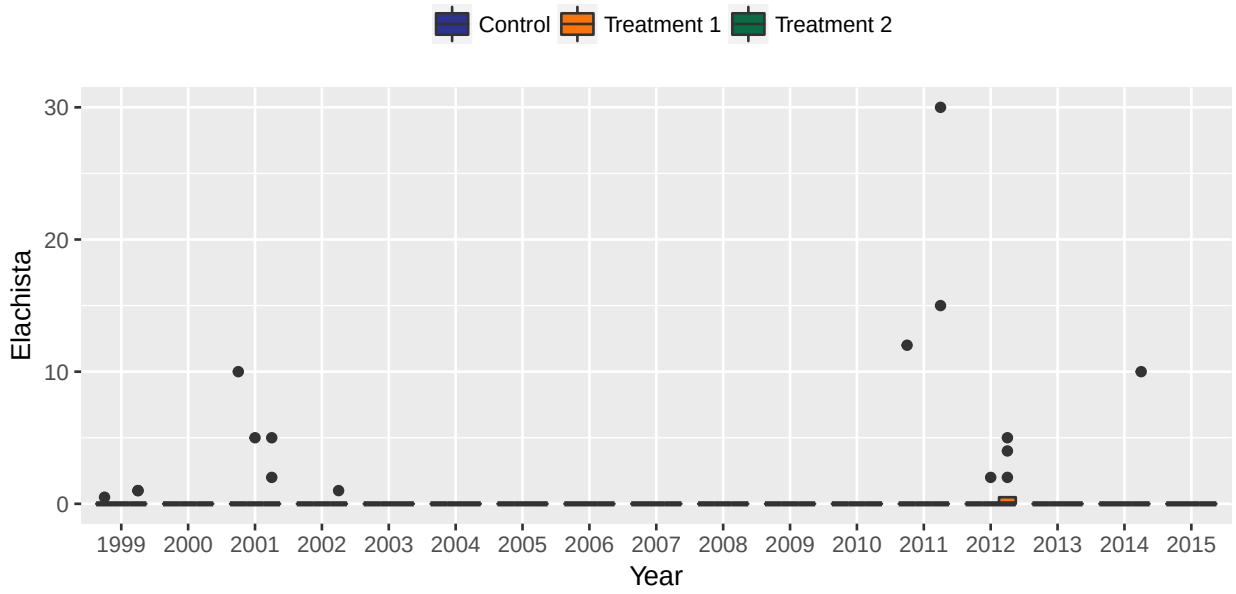
```
##
## [[11]]
```


Control
Treatment 1
Treatment 2
Masto_pap
0
2
4
6
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

```
##
## [[12]]
```


Control
Treatment 1
Treatment 2
Myelophycus
0
5
10
15
20
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

```
##
## [[13]]
```


Control
Treatment 1
Treatment 2
Elachista
30
20
10
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

```
##
## [[14]]
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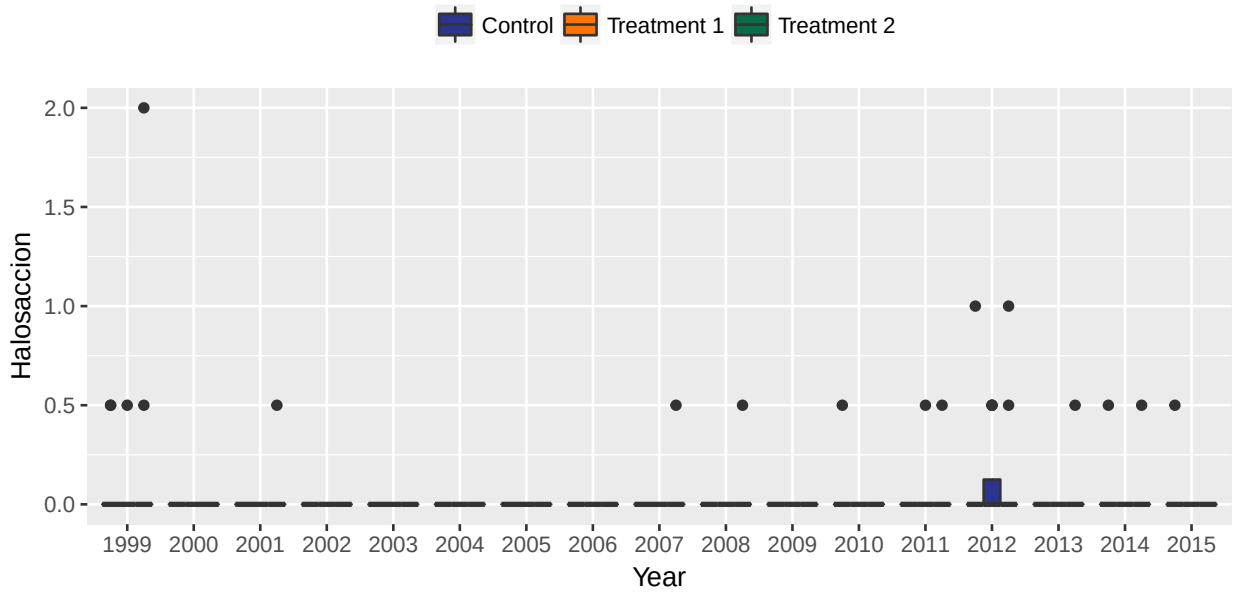
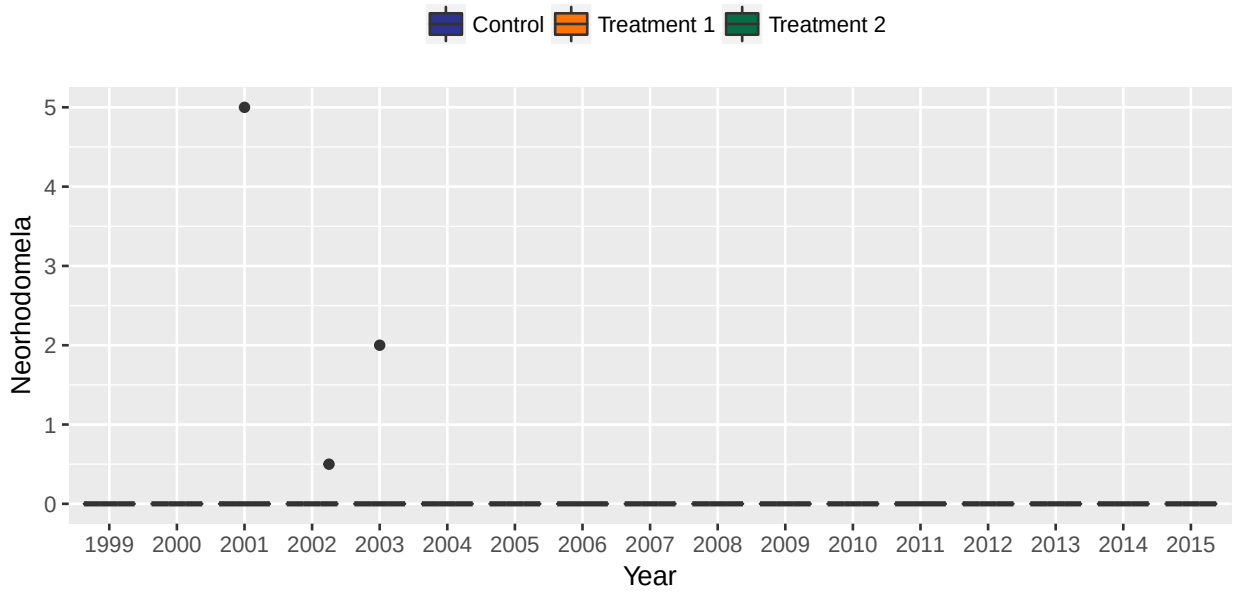

Control
Treatment 1
Treatment 2
Halosaccion
2.0
1.5
1.0
0.5
0.0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

```
##
## [[15]]
```


Control
Treatment 1
Treatment 2
Neorhodomela
5
4
3
2
1
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
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2010
2011
2012
2013
2014
2015
Year

```
##
## [[16]]
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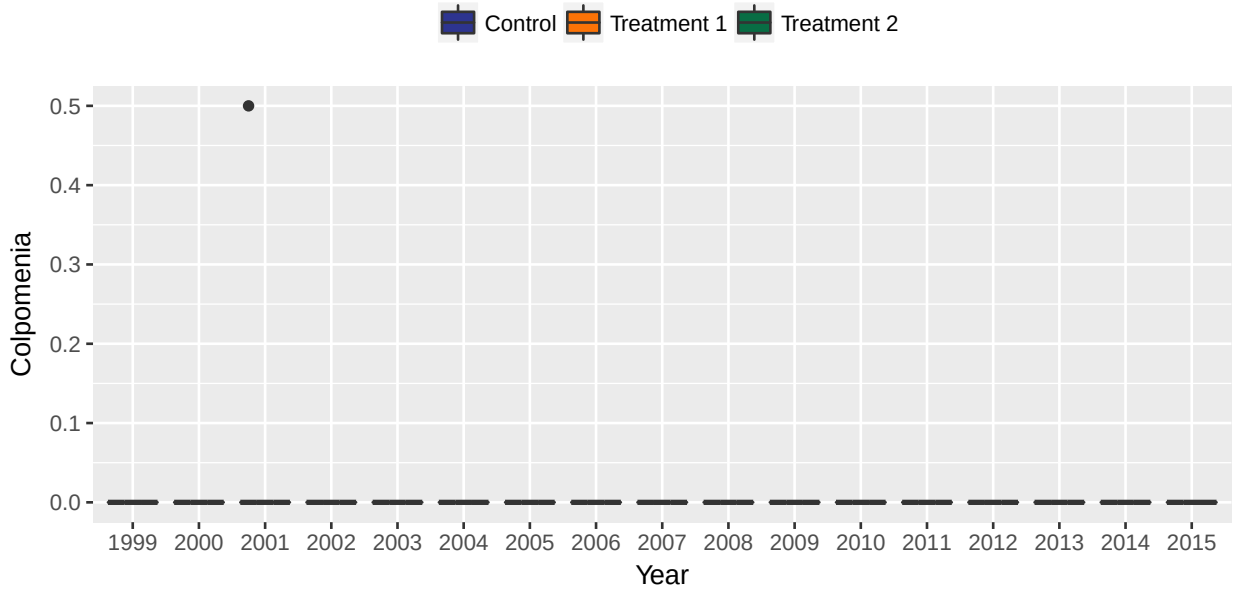
Control
Treatment 1
Treatment 2
Colpomenia
0.5
0.4
0.3
0.2
0.1
0.0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
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2010
2011
2012
2013
2014
2015
Year

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##
## [[17]]
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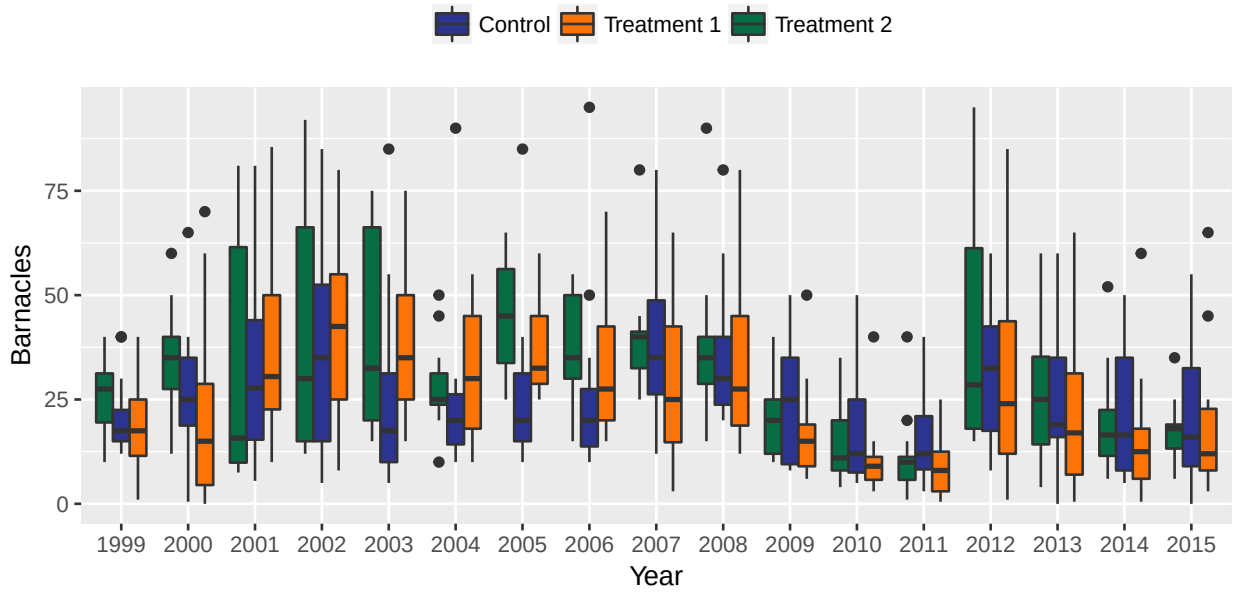
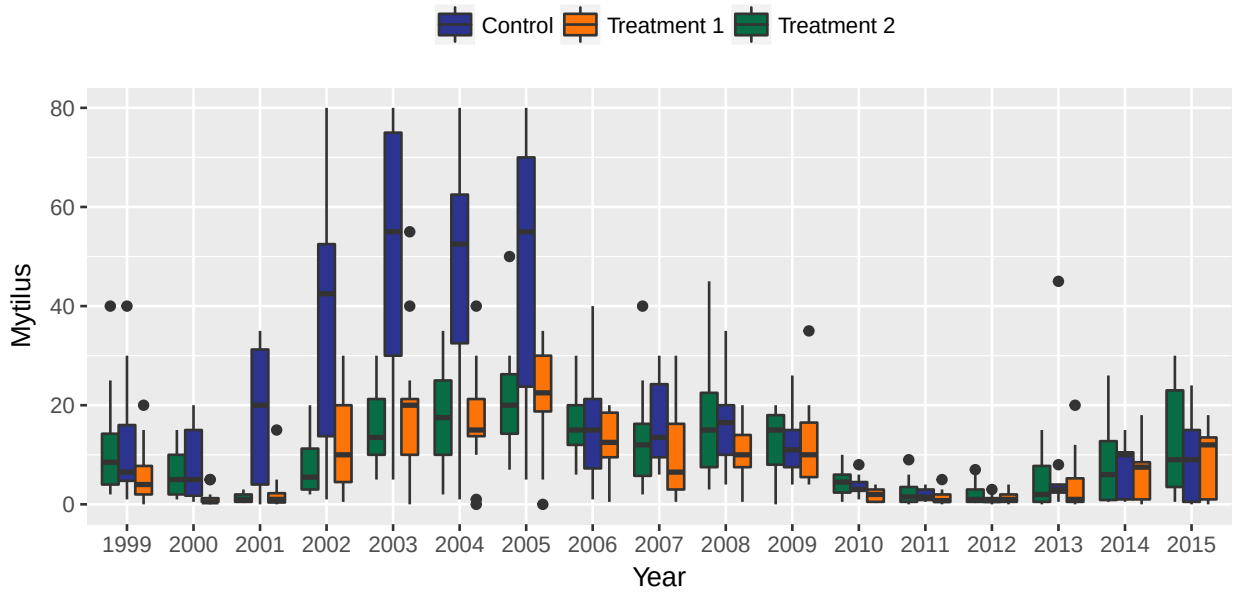

Control
Treatment 1
Treatment 2
Barnacles
75
50
25
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

```
##
## [[18]]
```


Control
Treatment 1
Treatment 2
Mytilus
80
60
40
20
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
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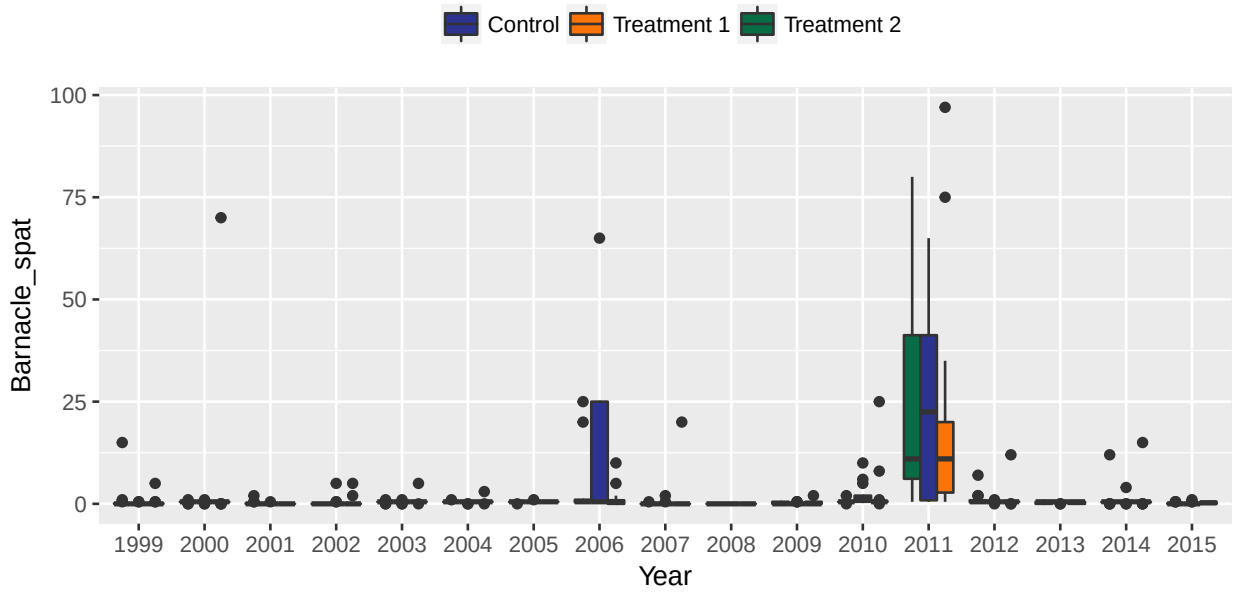
2010
2011
2012
2013
2014
2015
Year

```
##
## [[19]]
```


Control
Treatment 1
Treatment 2
Barnacle_spat
100
75
50
25
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

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##
## [[20]]
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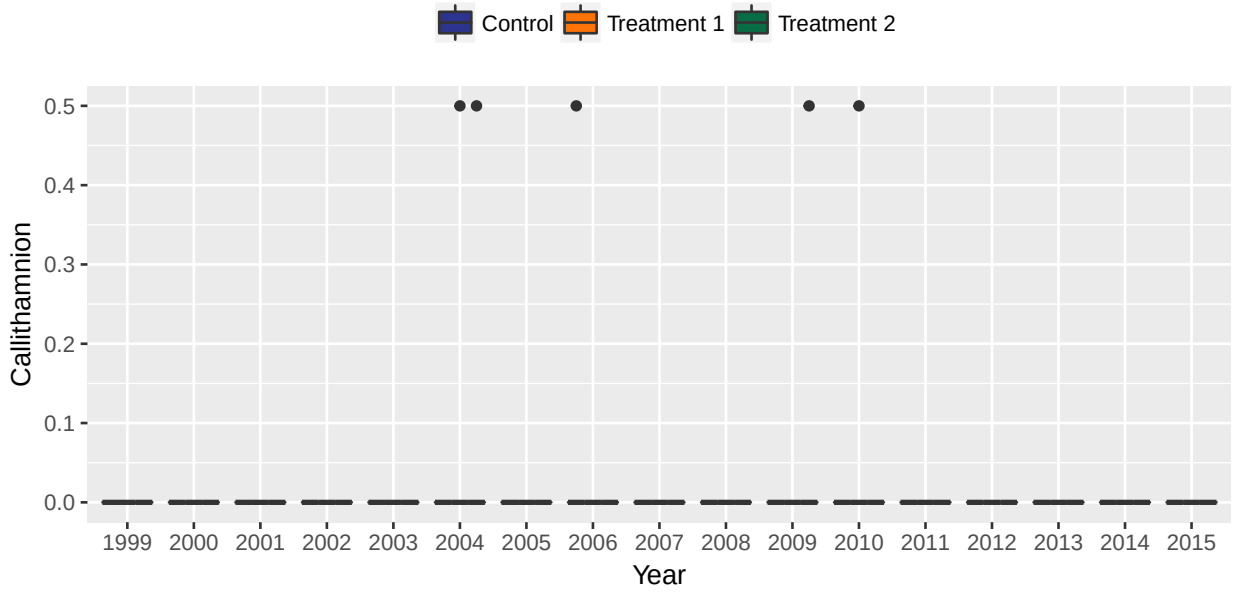
Control
Treatment 1
Treatment 2
Callithamnion
0.5
0.4
0.3
0.2
0.1
0.0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

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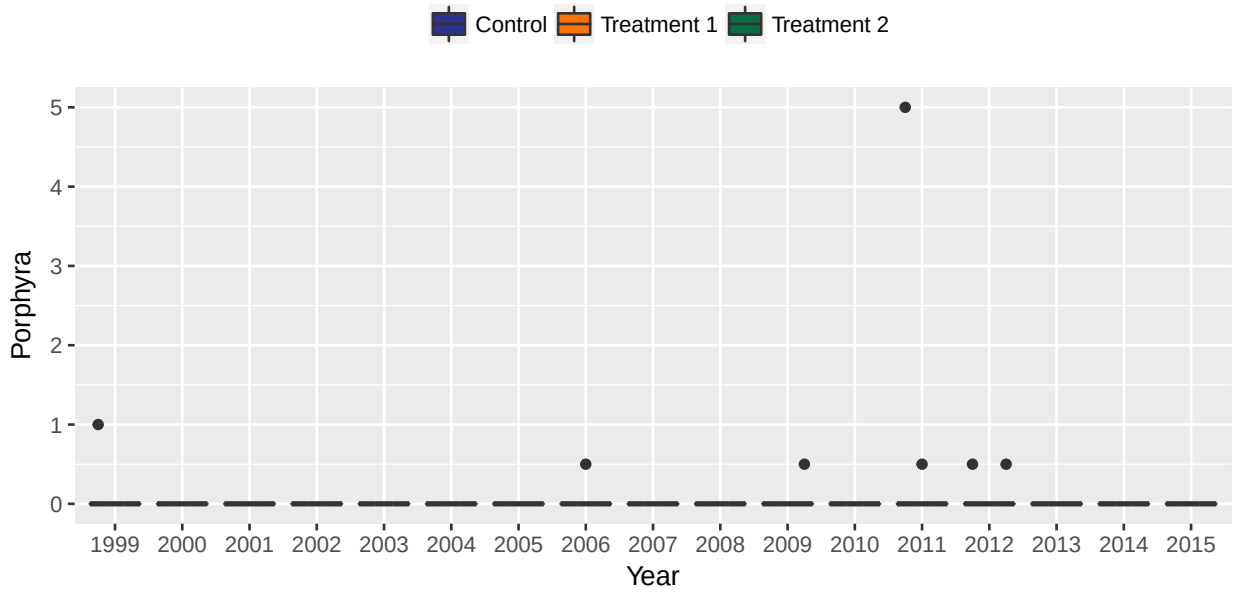
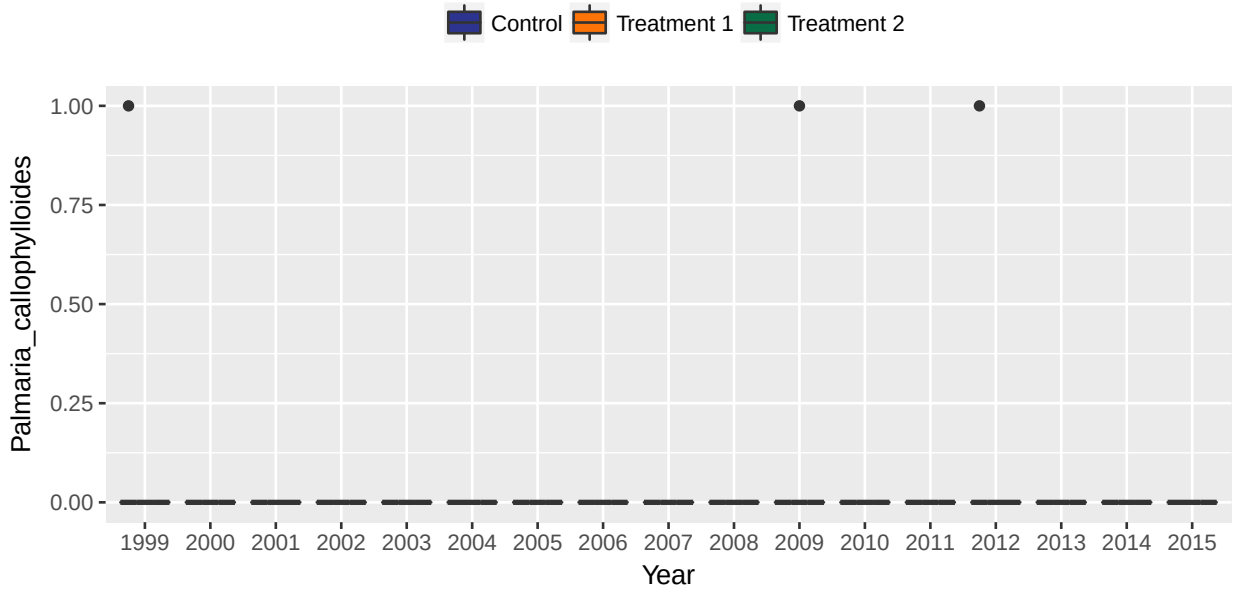
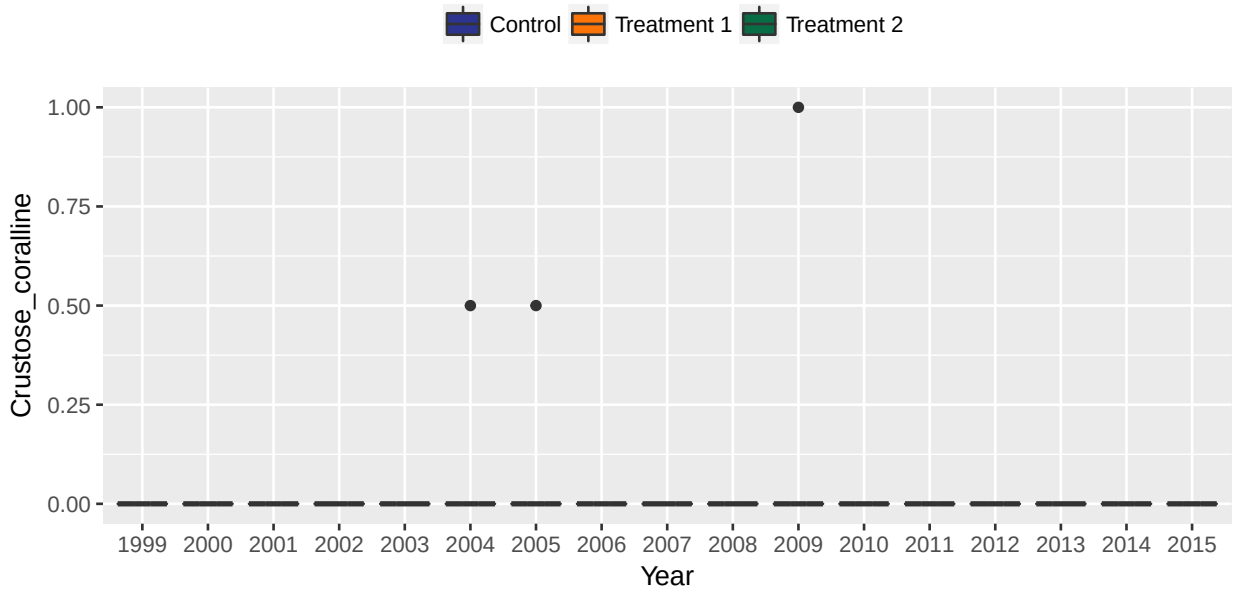
##
## [[21]]
```


Control
Treatment 1
Treatment 2
Porphyra
5
4
3
2
1
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

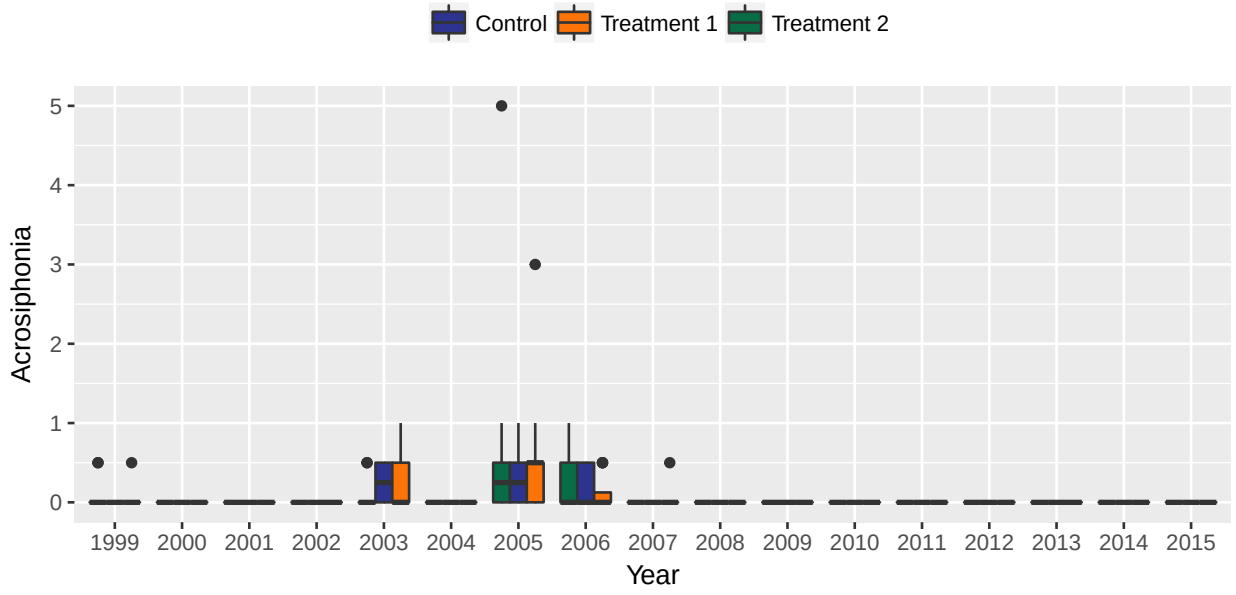
```
##
## [[22]]
```


Control
Treatment 1
Treatment 2
Palmaria_callophylloides
1.00
0.75
0.50
0.25
0.00
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

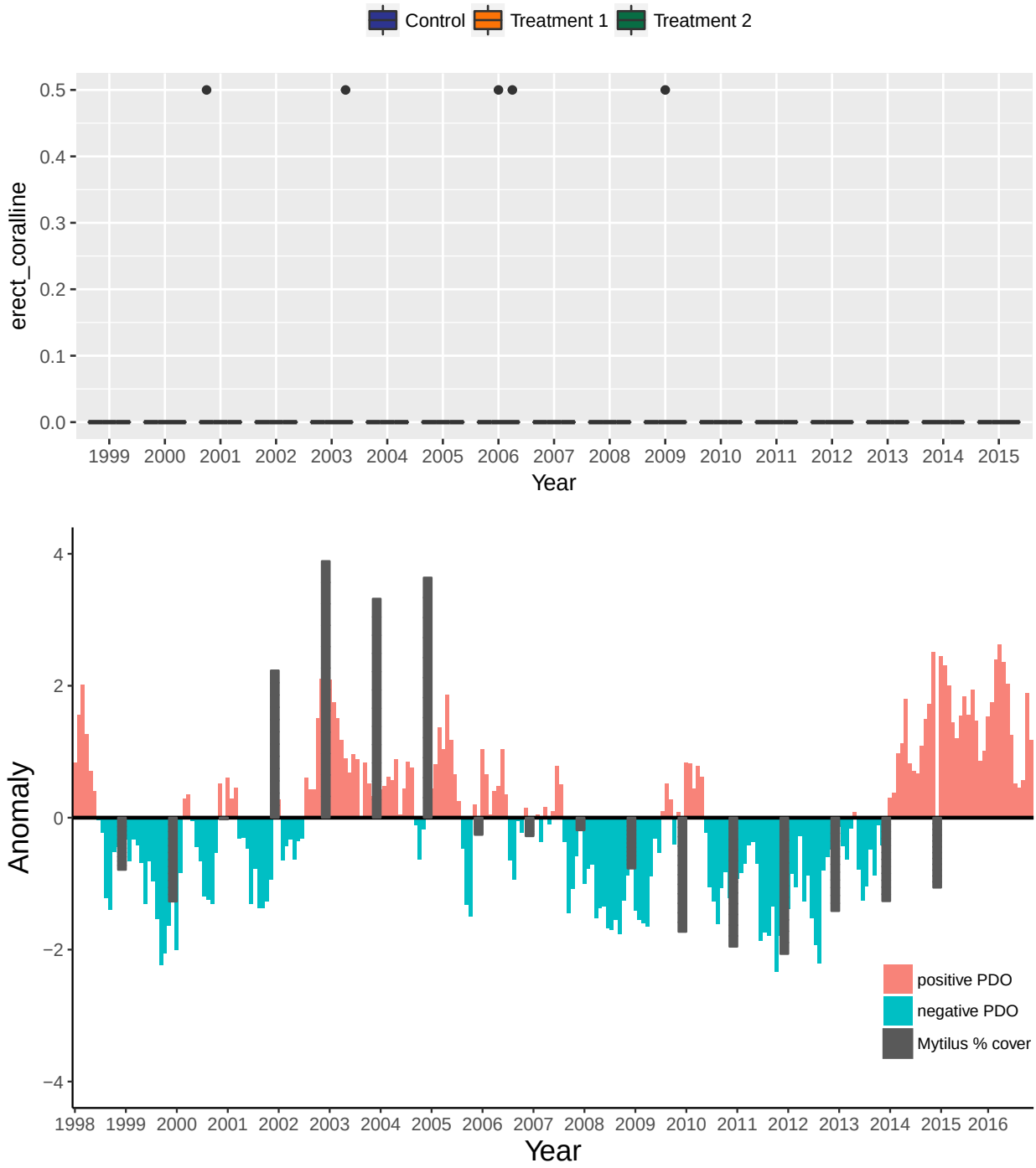
```
##
## [[23]]
```


Control
Treatment 1
Treatment 2
Crustose_coralline
1.00
0.75
0.50
0.25
0.00
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

```
##
## [[24]]
```


Control
Treatment 1
Treatment 2
Acrosiphonia
5
4
3
2
1
0
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

```
##
## [[25]]
```




```
## Warning: Removed 2 rows containing missing values (geom_col).
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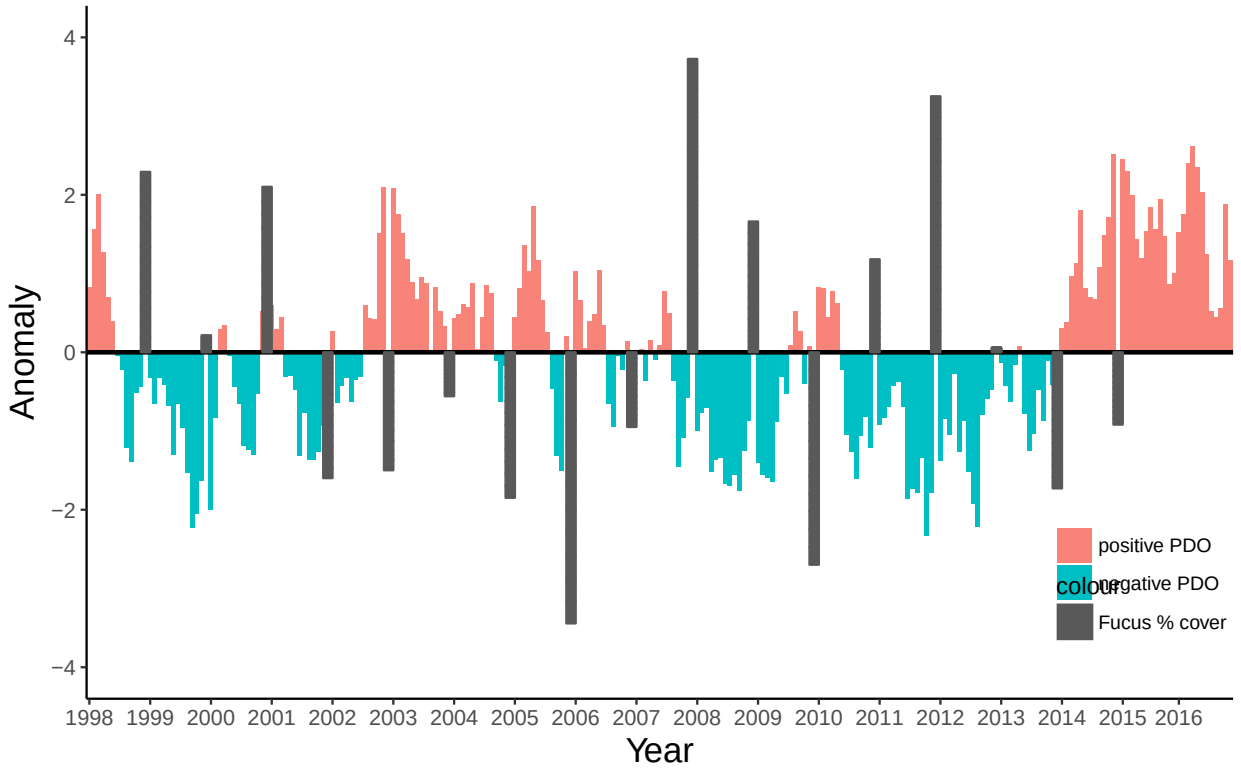
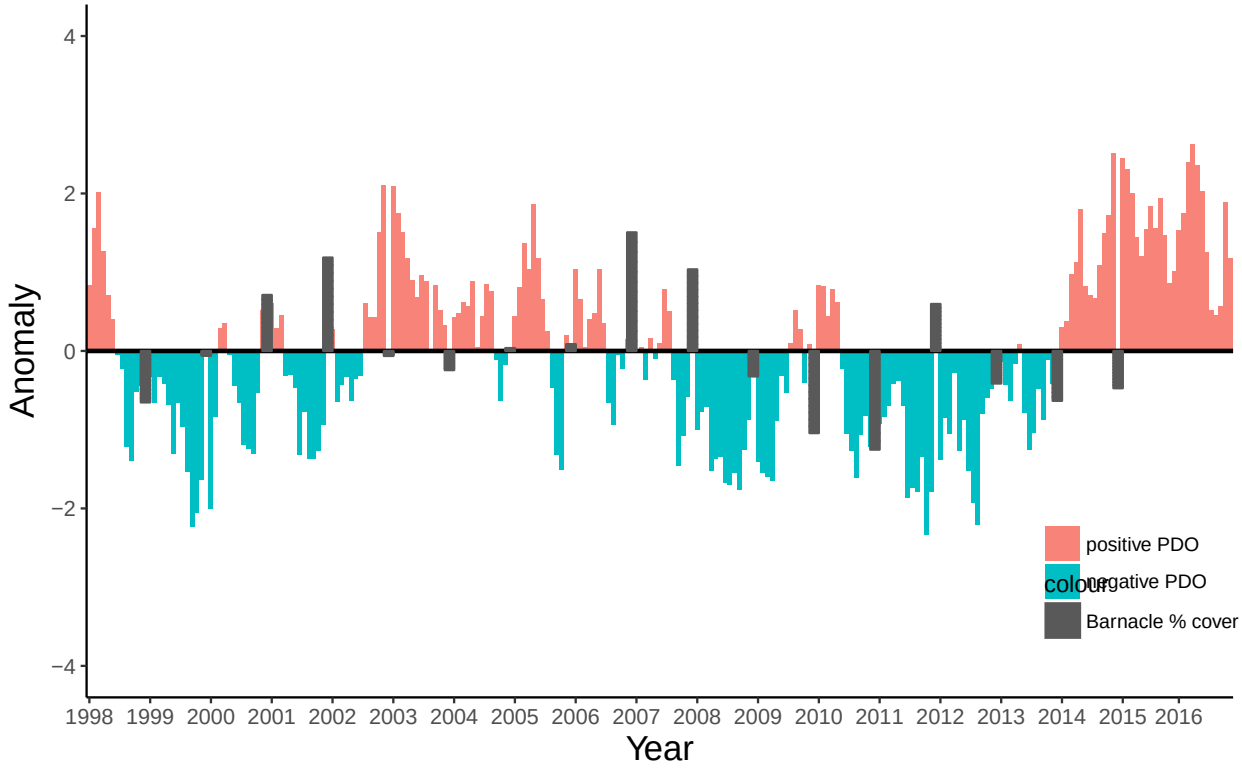
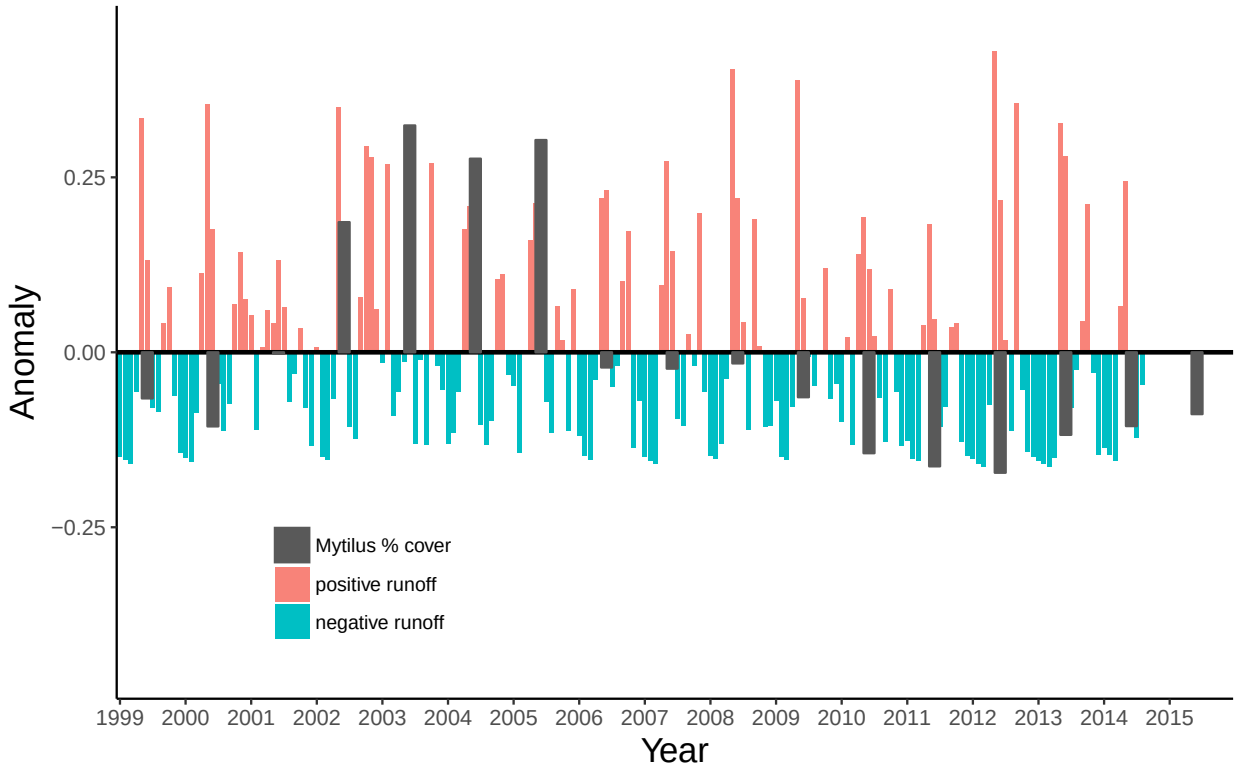
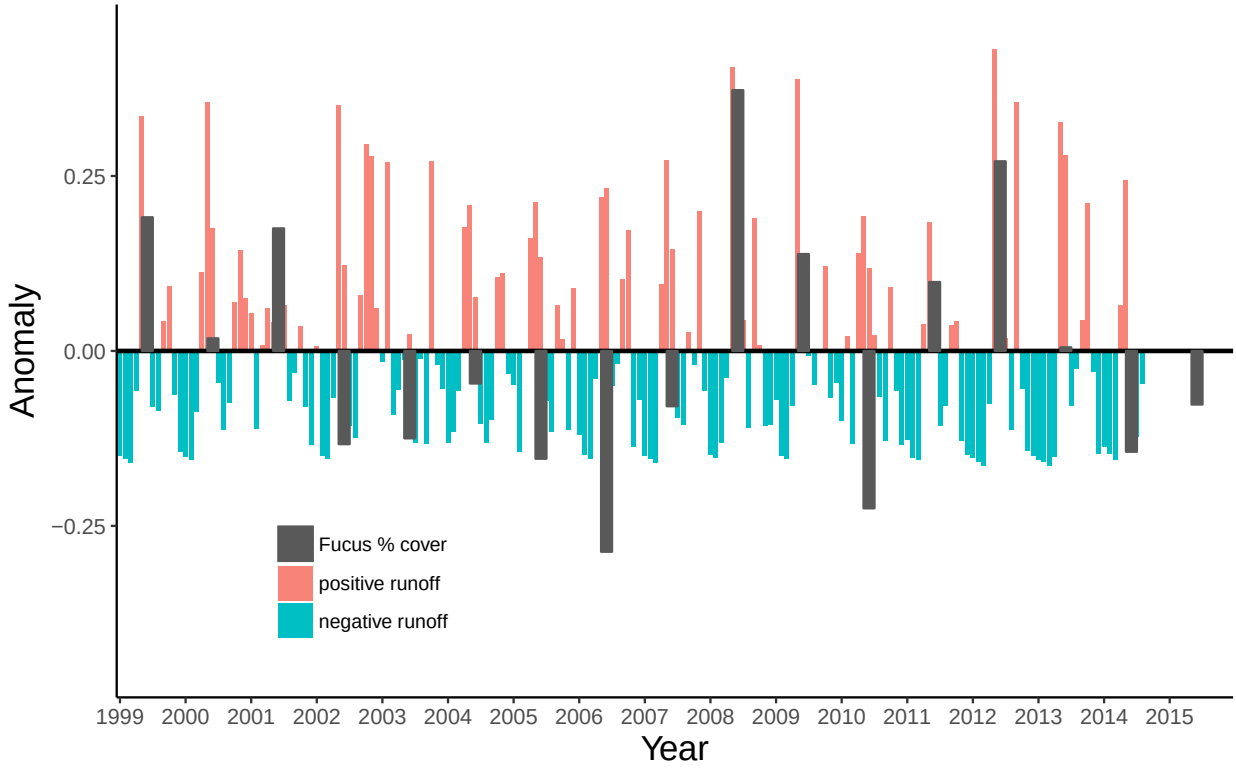
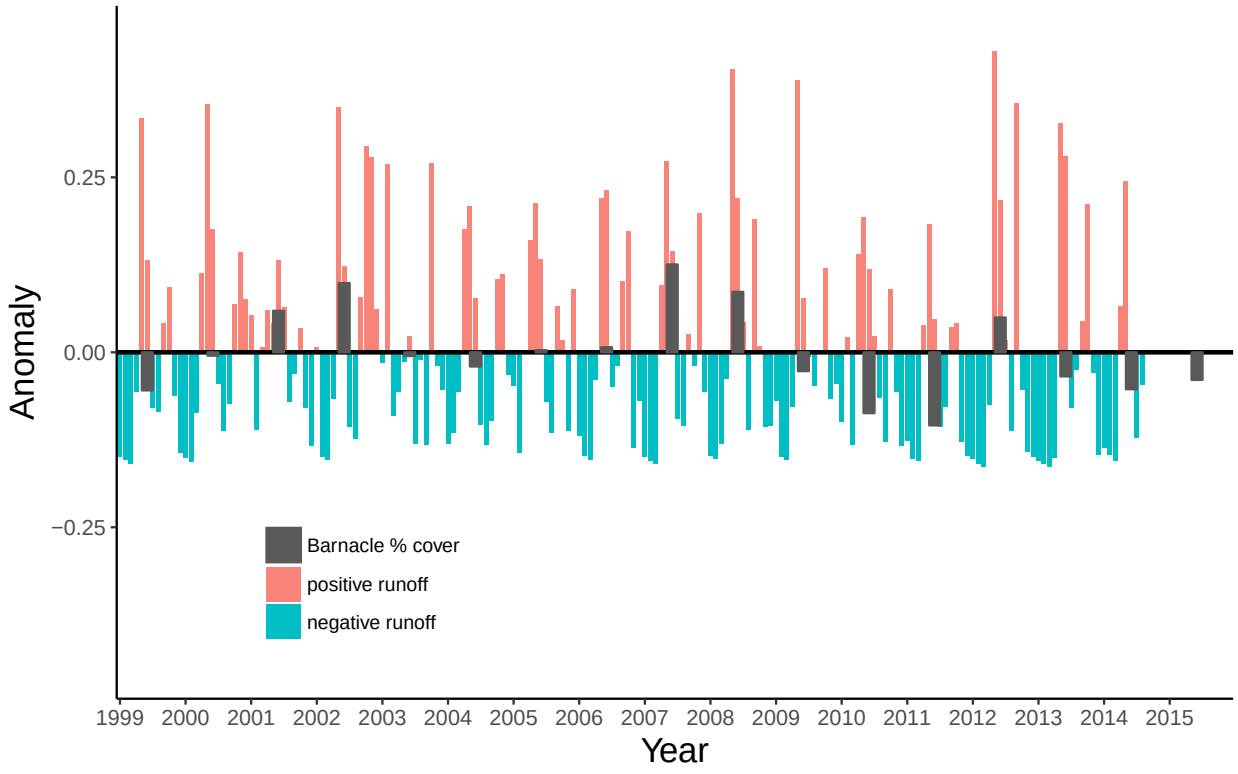

Anomaly
4
2
0
−2
−4
1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Year
colour
positive PDO
negative PDO
Fucus % cover

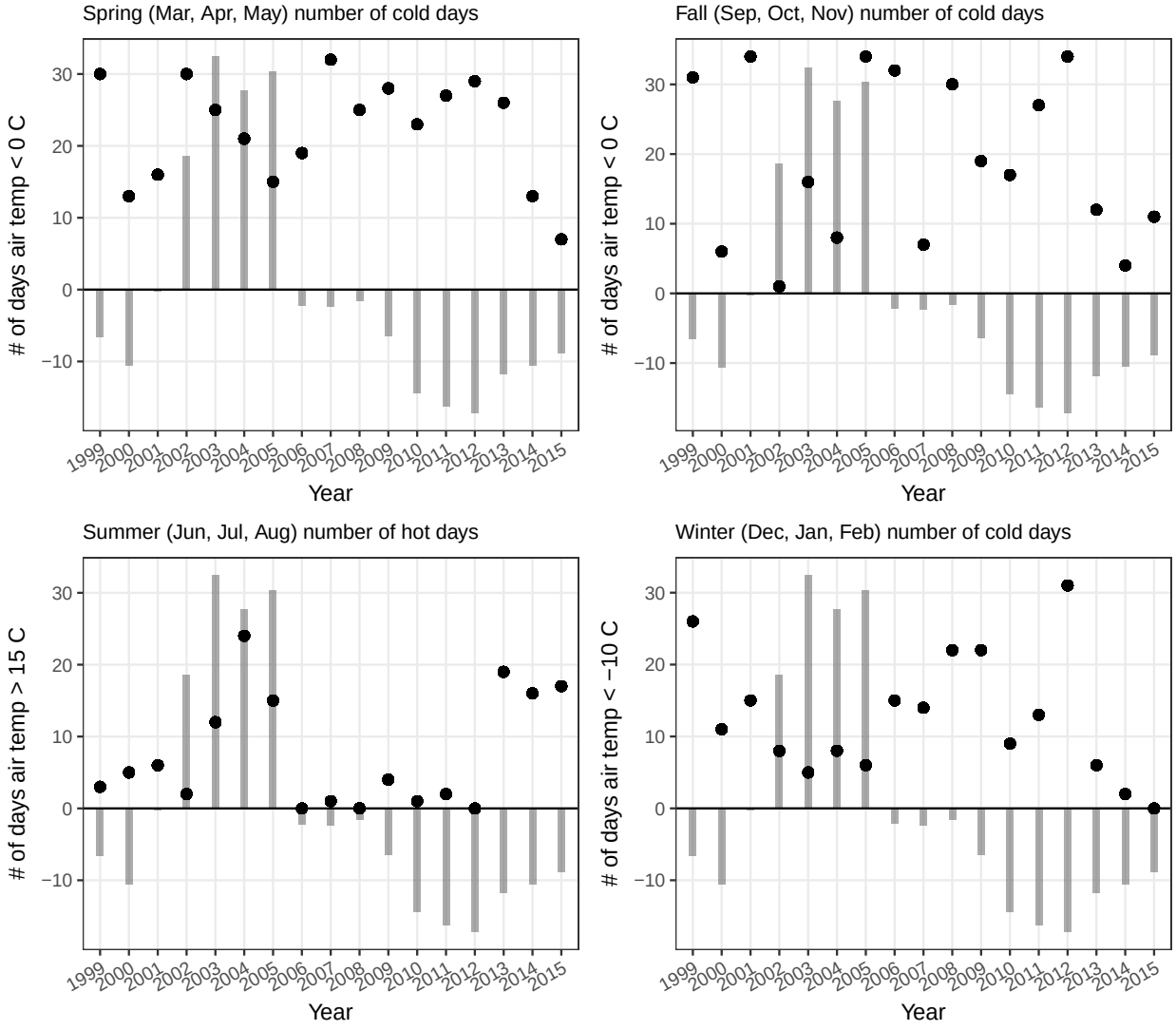

Anomaly
4
2
0
−2
−4
1998 1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015 2016
Year
colour
positive PDO
negative PDO
Barnacle % cover


Anomaly
0.25
0.00
−0.25
Mytilus % cover
positive runoff
negative runoff
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

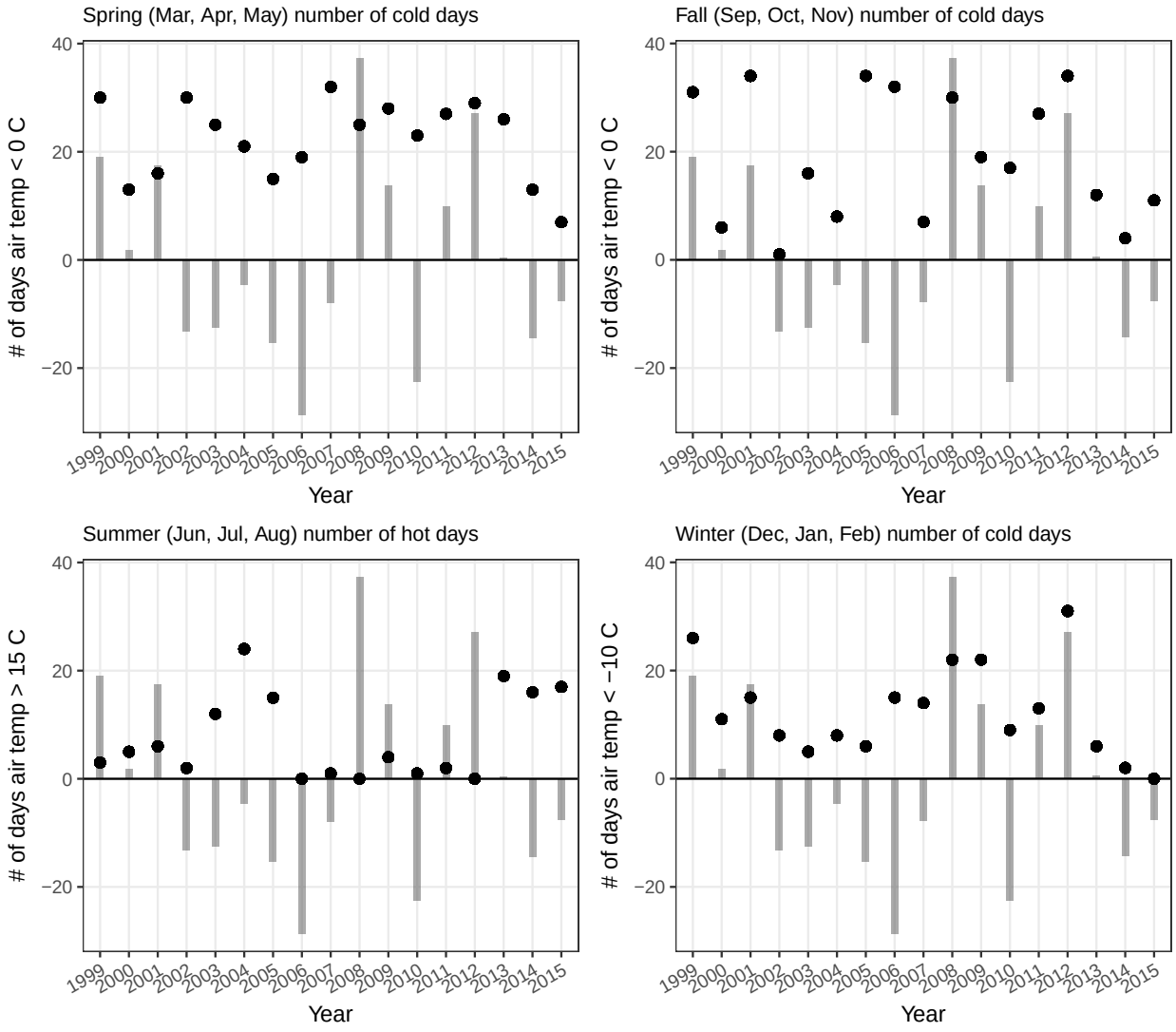

Anomaly
0.25
0.00
−0.25
Fucus % cover
positive runoff
negative runoff
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year


0.25
0.00
−0.25
Anomaly
Barnacle % cover
positive runoff
negative runoff
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011
2012
2013
2014
2015
Year

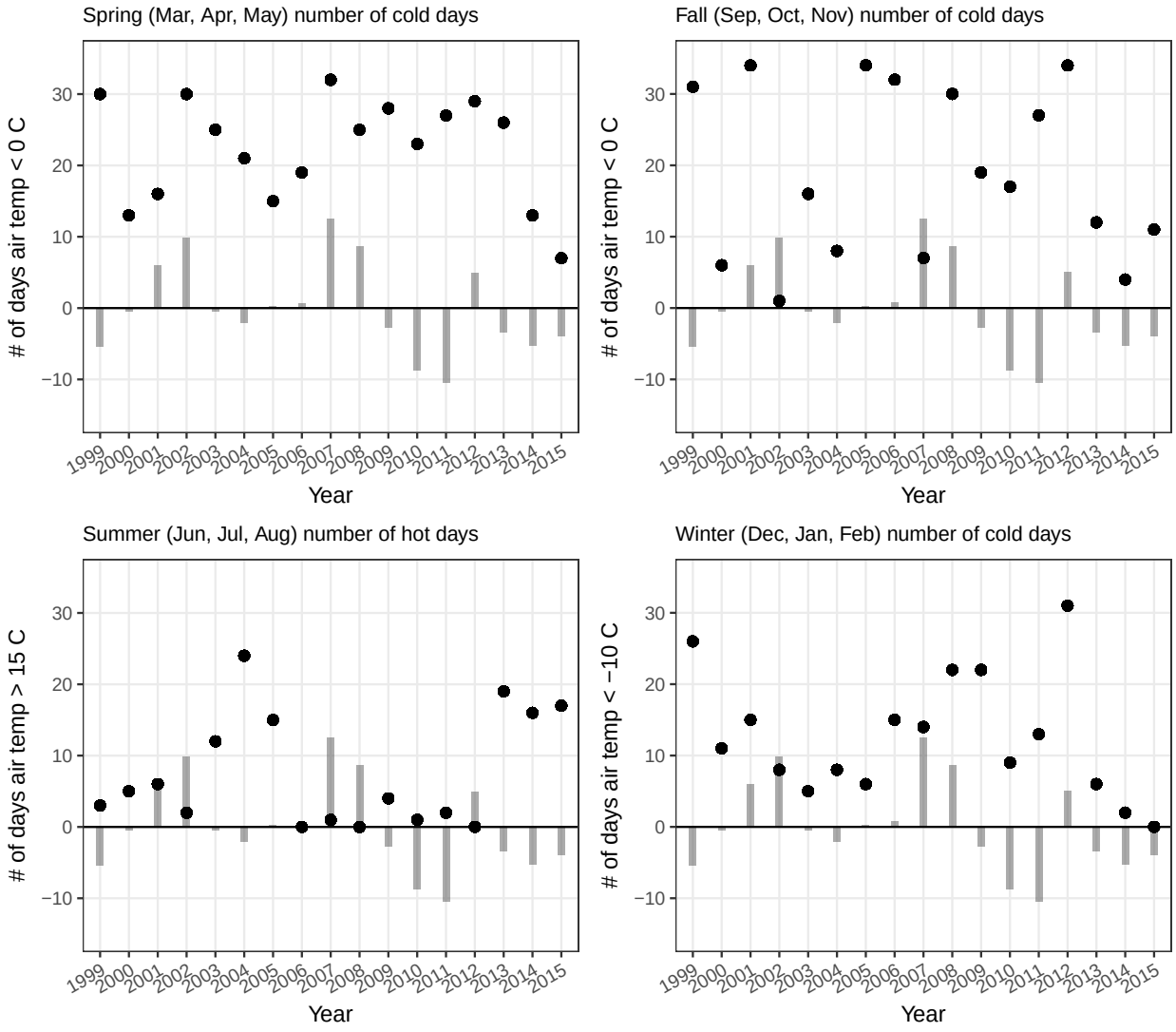
Mytilus

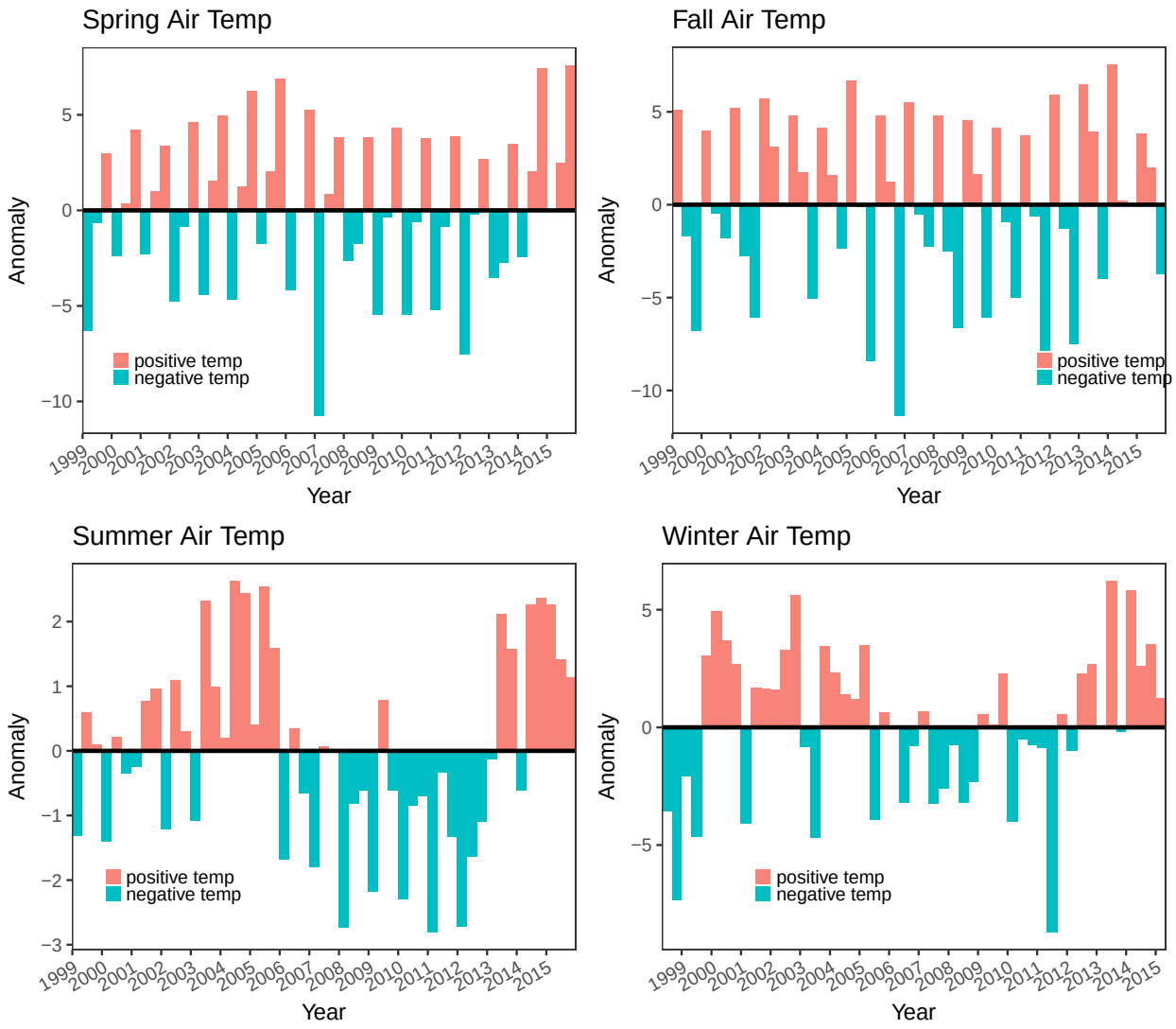

Spring (Mar, Apr, May) number of cold days
# of days air temp < 0 C
Year
Fall (Sep, Oct, Nov) number of cold days
# of days air temp < 0 C
Year
Summer (Jun, Jul, Aug) number of hot days
# of days air temp > 15 C
Year
Winter (Dec, Jan, Feb) number of cold days
# of days air temp < −10 C
Year

Fucus


Spring (Mar, Apr, May) number of cold days
# of days air temp < 0 C
Year
Fall (Sep, Oct, Nov) number of cold days
# of days air temp < 0 C
Year
Summer (Jun, Jul, Aug) number of hot days
# of days air temp > 15 C
Year
Winter (Dec, Jan, Feb) number of cold days
# of days air temp < −10 C
Year

Barnacles


Spring (Mar, Apr, May) number of cold days
# of days air temp < 0 C
Year
Fall (Sep, Oct, Nov) number of cold days
# of days air temp < 0 C
Year
Summer (Jun, Jul, Aug) number of hot days
# of days air temp > 15 C
Year
Winter (Dec, Jan, Feb) number of cold days
# of days air temp < −10 C
Year




```
## Warning: Removed 2 rows containing missing values (position_stack).
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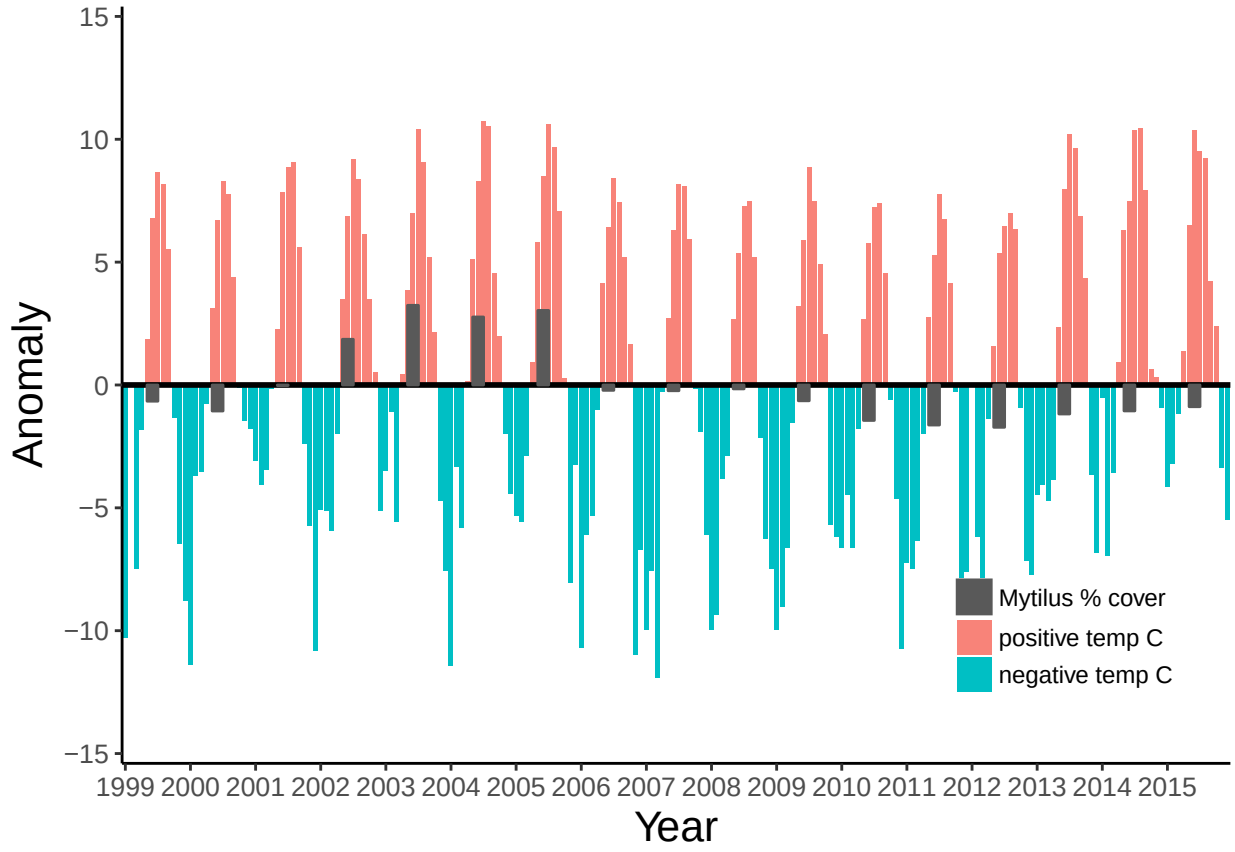
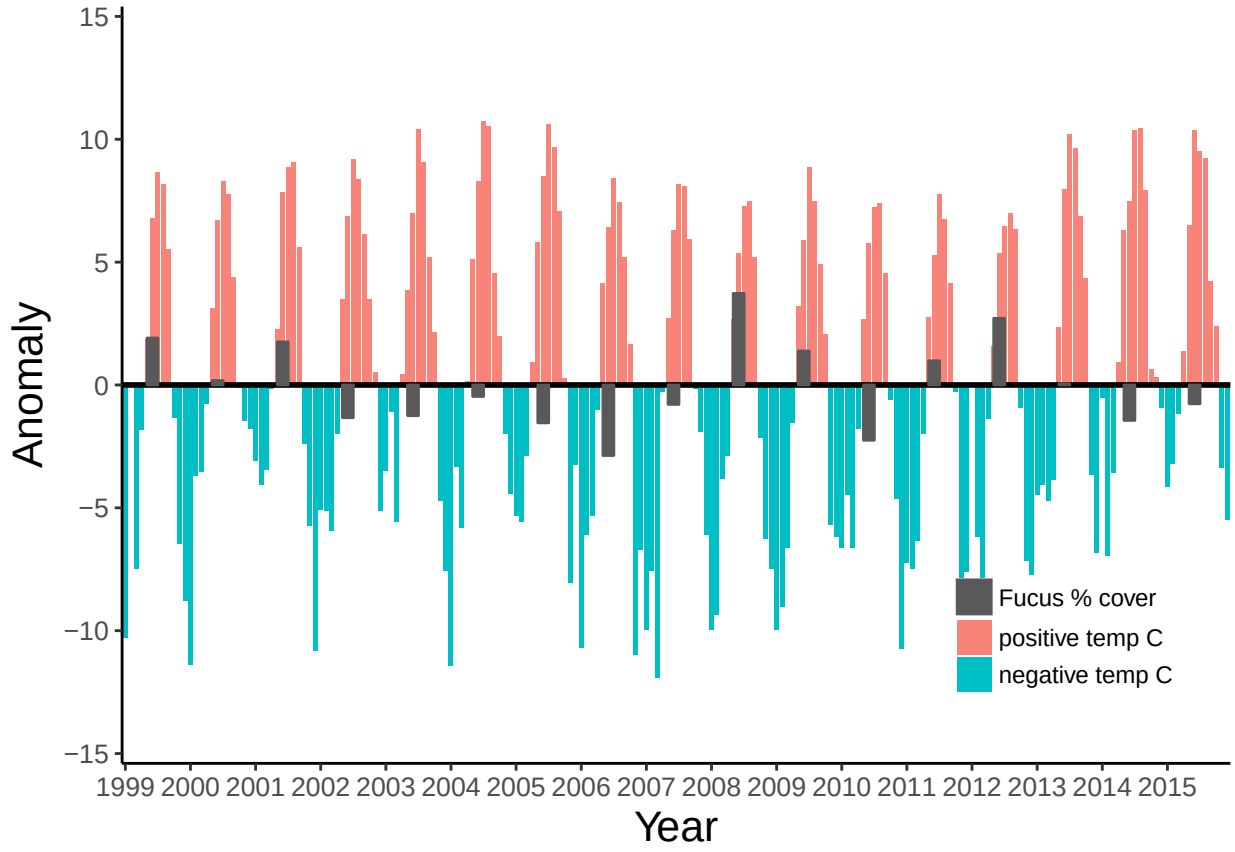
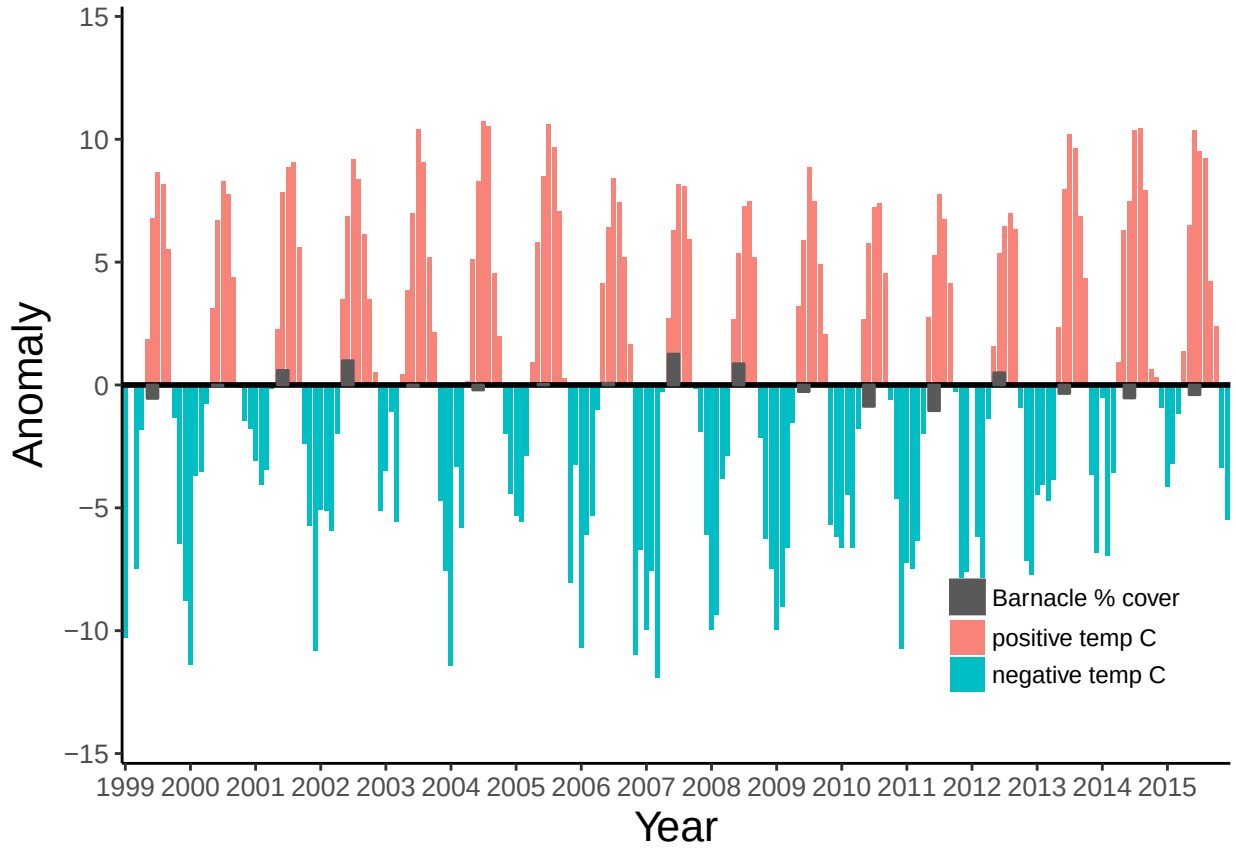



```
## Warning: Removed 2 rows containing missing values (position_stack).
```

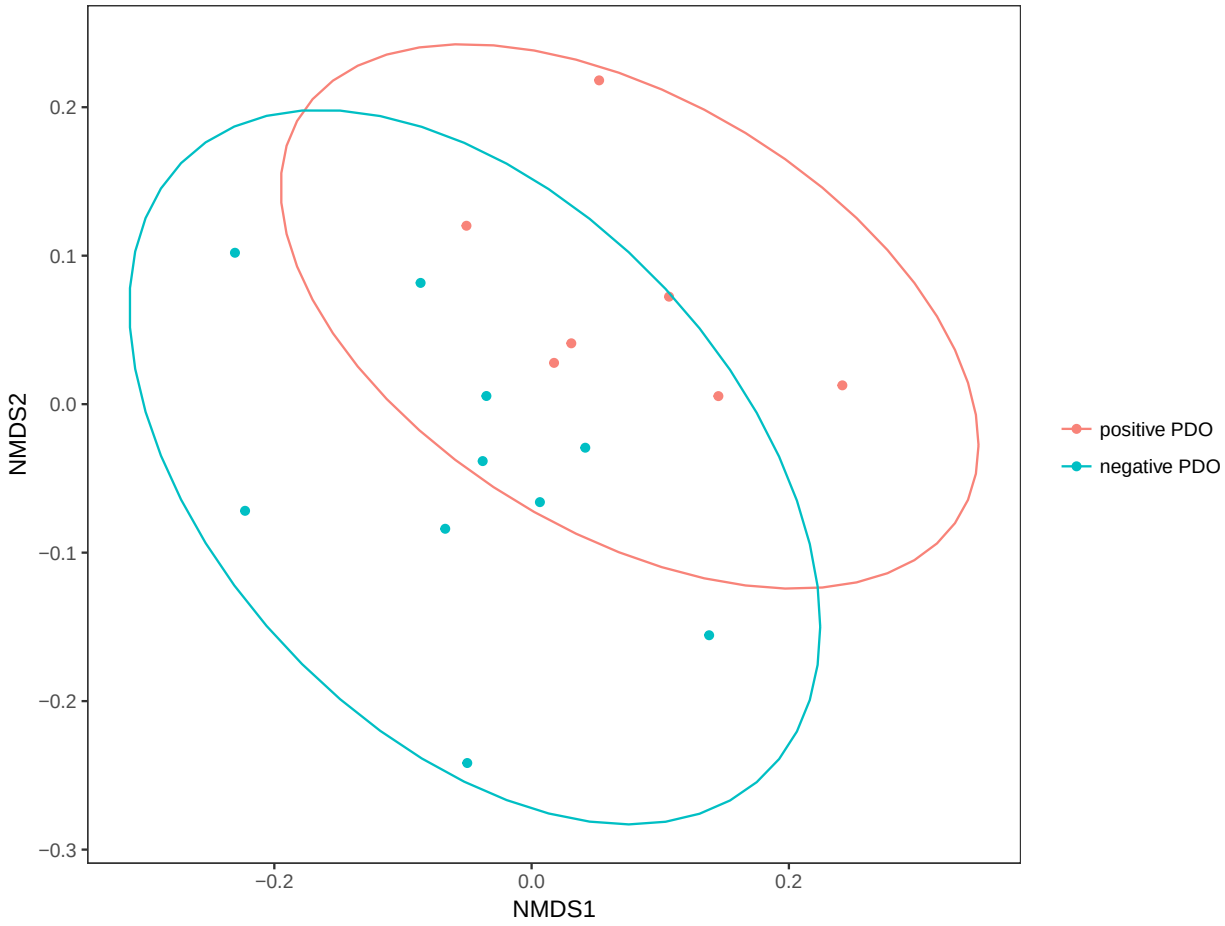



```
## Warning: Removed 2 rows containing missing values (position_stack).
```


15
10
5
0
−5
−10
−15
Anomaly
1999 2000 2001 2002 2003 2004 2005 2006 2007 2008 2009 2010 2011 2012 2013 2014 2015
Year
Barnacle % cover
positive temp C
negative temp C

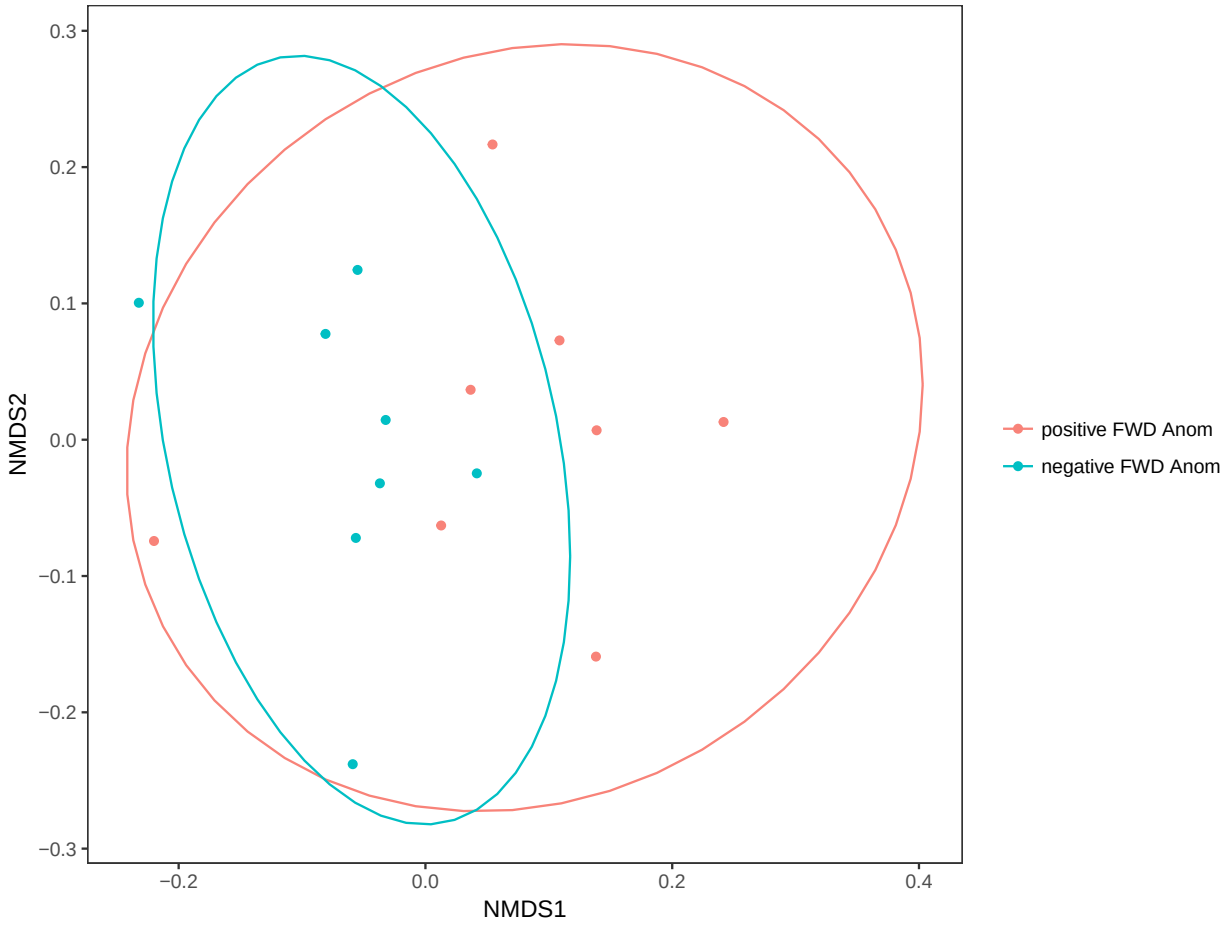
NMDS Plots

PDO



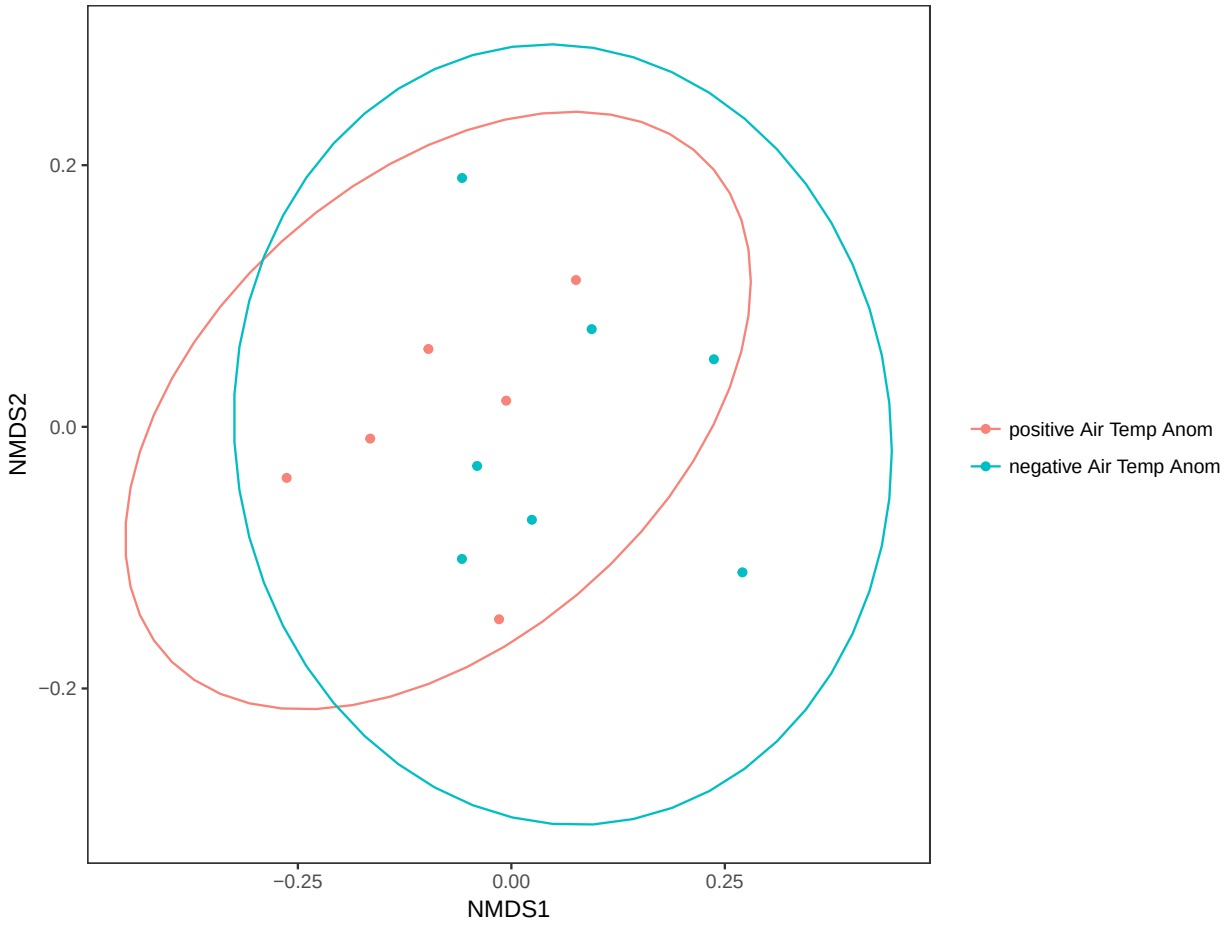

```
##
## Call:
## vegan::adonis(formula = sp_percov ~ PDO_anul_mn, data = pdo_treats,      permutations = 1000, method
##
## Permutation: free
## Number of permutations: 1000
##
## Terms added sequentially (first to last)
##
##             Df SumsOfSqs  MeanSqs F.Model      R2   Pr(>F)
## PDO_anul_mn  1   0.18366 0.183660   5.655 0.27378 0.000999 ***
## Residuals   15   0.48716 0.032477         0.72622
## Total       16   0.67082                  1.00000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Freshwater



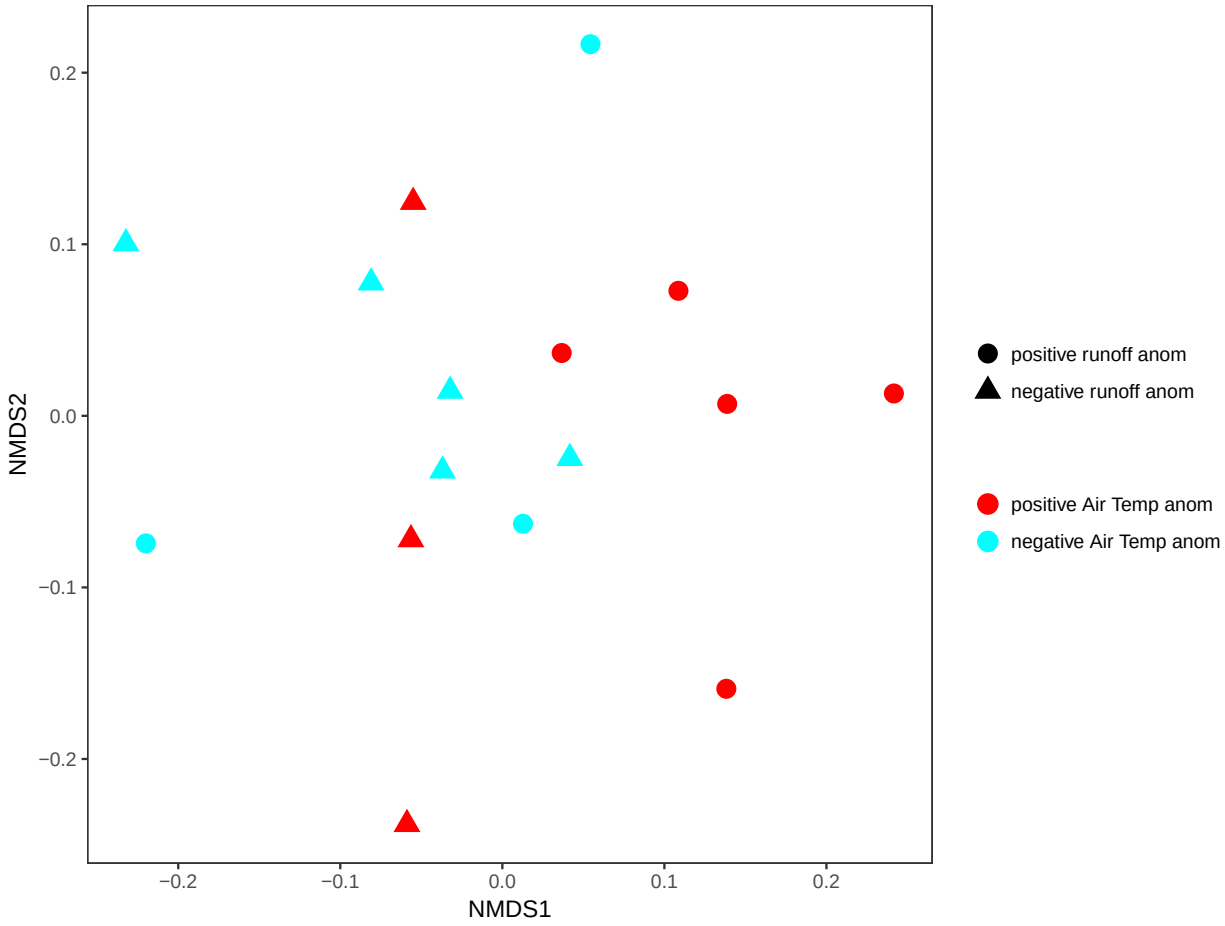

```
##
## Call:
## vegan::adonis(formula = sp_percov2 ~ mean_yearly_discharge_m3s1,      data = fresh_treats, permutati
##
## Permutation: free
## Number of permutations: 1000
##
## Terms added sequentially (first to last)
##
##                            Df SumsOfSqs  MeanSqs F.Model      R2  Pr(>F)
## mean_yearly_discharge_m3s1  1   0.10794 0.107936  2.7347 0.16342 0.06094 .
## Residuals                  14   0.55256 0.039469         0.83658
## Total                      15   0.66050                  1.00000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Air Temp



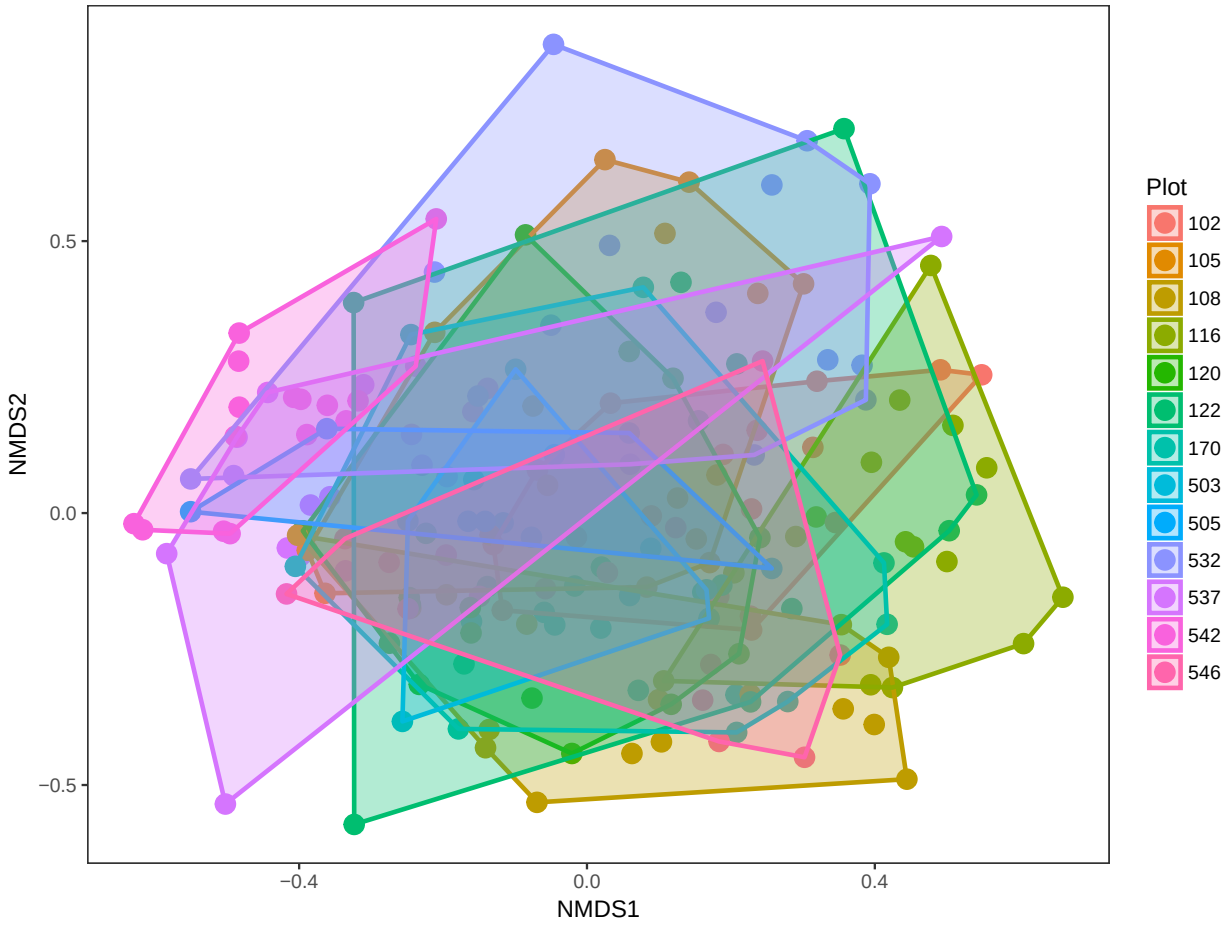

```
##
## Call:
## vegan::adonis(formula = sp_percov3 ~ ATemp_YearMn, data = atemp_treats,      permutations = 1000, me
##
## Permutation: free
## Number of permutations: 1000
##
## Terms added sequentially (first to last)
##
##              Df SumsOfSqs  MeanSqs F.Model     R2  Pr(>F)
## ATemp_YearMn  1   0.12079 0.120791  2.9682 0.2125 0.03297 *
## Residuals    11   0.44764 0.040695         0.7875
## Total        12   0.56843                  1.0000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

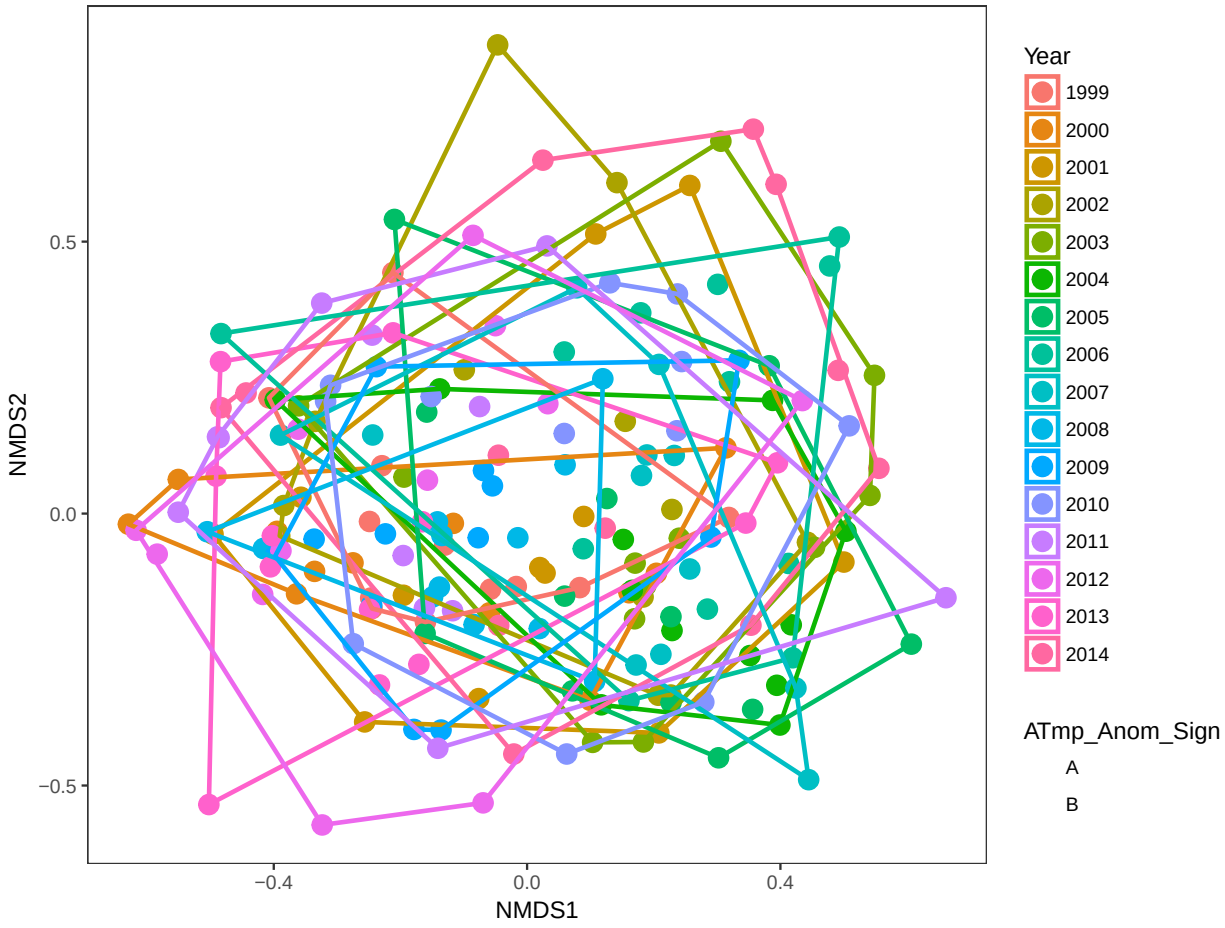
All env. variables




```
##
## Call:
## vegan::adonis(formula = sp_percov4 ~ ATemp_YearMn + mn_yr_discharge,      data = all_treats, permuta
##
## Permutation: free
## Number of permutations: 1000
##
## Terms added sequentially (first to last)
##
##                 Df SumsOfSqs  MeanSqs F.Model      R2   Pr(>F)
## ATemp_YearMn     1   0.15102 0.151023  4.5478 0.22865 0.004995 **
## mn_yr_discharge  1   0.07778 0.077779  2.3422 0.11776 0.090909 .
## Residuals       13   0.43170 0.033207         0.65359
## Total           15   0.66050                  1.00000
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

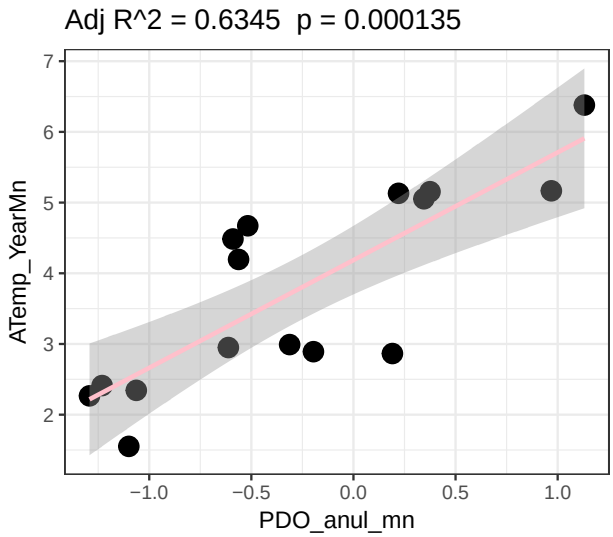
Biological NMDS

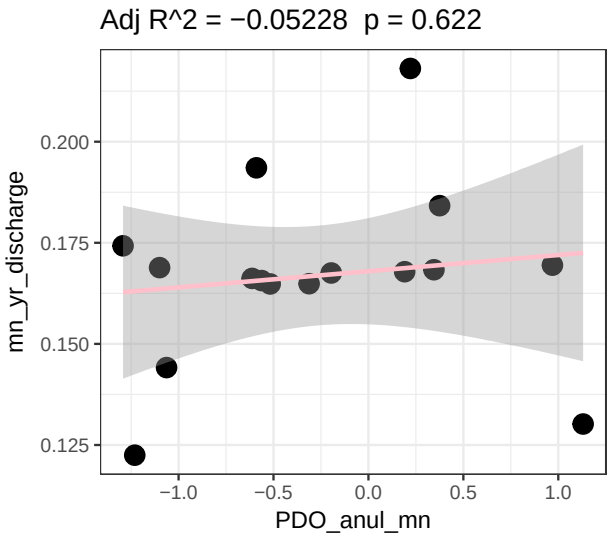


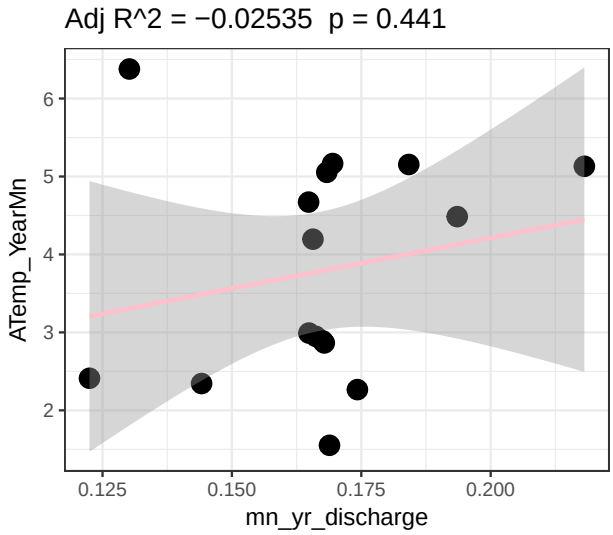



```
##
## Call:
## vegan::adonis(formula = sp_percov5 ~ ATemp_YearMn * mn_yr_discharge,      data = all_treats2, permuta
##
## Permutation: free
## Number of permutations: 1000
##
## Terms added sequentially (first to last)
##
##                                Df SumsOfSqs MeanSqs F.Model      R2
## ATemp_YearMn                    1    1.4209 1.42087 12.3037 0.05888
## mn_yr_discharge                 1    0.6750 0.67500  5.8450 0.02797
## ATemp_YearMn:mn_yr_discharge    1    0.3240 0.32396  2.8053 0.01343
## Residuals                     188   21.7109 0.11548         0.89972
## Total                         191   24.1308                 1.00000
##                                 Pr(>F)
## ATemp_YearMn                  0.000999 ***
## mn_yr_discharge               0.000999 ***
## ATemp_YearMn:mn_yr_discharge  0.033966 *
## Residuals
## Total
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

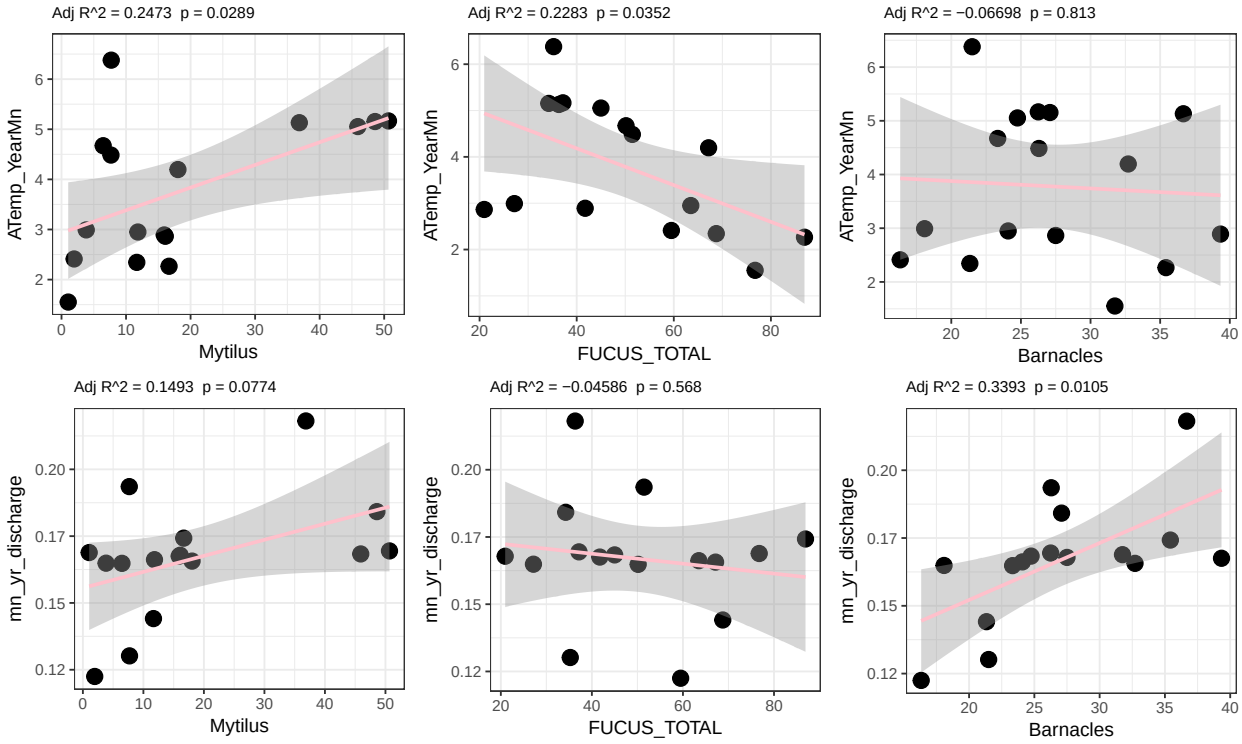
Correlations between env. variables







Correlations between other variables



MVABUND Results