

# 1 Between-bay comparisons

Table 1: Inter-bay differences for median depth of colonization and light requirements. Gaussian models with nuggets for the spatial correlation structures were used. Tampa Bay data were masked to remove points farther than 1km from seagrass.

	<i>Dependent variable:</i>	
	z_c_all	light
	(1)	(2)
baychoc	1.425 (0.379)	58.061 (3.229)
bayirl	1.118 (0.264)	18.146 (2.908)
baytb	0.911 (0.309)	41.842 (2.608)
Observations	637	570
Log Likelihood	-173.039	-1,893.847
Akaike Inf. Crit.	360.079	3,801.695
Bayesian Inf. Crit.	391.243	3,832.077
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

```
library(multcomp)
summary(glht(zmall, linfct = mcp(bay = 'Tukey'))))

##
## Simultaneous Tests for General Linear Hypotheses
##
## Multiple Comparisons of Means: Tukey Contrasts
##
##
## Fit: lme.formula(fixed = z_c_all ~ 0 + bay, data = all_light, random = ~1 |
## bay, correlation = corGaus(form = ~Latitude + Longitude |
## bay, nugget = TRUE))
##
## Linear Hypotheses:
## Estimate Std. Error z value Pr(>|z|)
## irl - choc == 0 -0.3075 0.4614 -0.667 0.782
```

```
## tb - choc == 0    -0.5142      0.4886  -1.052    0.542
## tb - irl == 0     -0.2066      0.4060  -0.509    0.866
## (Adjusted p values reported -- single-step method)

summary(glht(lmall, linfct = mcp(bay = 'Tukey')))
```

```
##
## Simultaneous Tests for General Linear Hypotheses
##
## Multiple Comparisons of Means: Tukey Contrasts
##
##
## Fit: lme.formula(fixed = light ~ 0 + bay, data = all_light, random = ~1 |
##      bay, correlation = corGaus(form = ~Latitude + Longitude |
##      bay, nugget = TRUE), na.action = na.omit)
##
## Linear Hypotheses:
##              Estimate Std. Error z value Pr(>|z|)
## irl - choc == 0  -39.915      4.346  -9.185 < 1e-04 ***
## tb - choc == 0   -16.219      4.151  -3.907 0.000267 ***
## tb - irl == 0    23.696      3.906   6.066 < 1e-04 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Adjusted p values reported -- single-step method)
```

## 2 Within-bay comparisons

Table 2: Linears models of depth of colonization and light requirements comparing bay segments of Tampa Bay. Models have no intercept, a random segment effect, and a Gaussian correlation structure to control for spatial effects (nugget, separate for each bay). Data were masked to remove points farther than 1km from seagrass.

	<i>Dependent variable:</i>	
	z_c.all	light
	(1)	(2)
segHB	0.962 (0.159)	43.172 (6.930)
segLTB	1.261 (0.129)	38.318 (5.581)
segMTB	1.376 (0.126)	36.485 (5.450)
segOTB	0.796 (0.132)	47.726 (5.641)
Observations	252	220
Log Likelihood	406.686	−686.499
Akaike Inf. Crit.	−797.372	1,388.998
Bayesian Inf. Crit.	−769.265	1,416.001
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

Table 3: Linears models of depth of colonization and light requirements comparing bay segments of Choctawhatchee Bay. Models have no intercept, a random segment effect, and a Gaussian correlation structure to control for spatial effects (nugget, separate for each bay).

	<i>Dependent variable:</i>	
	z_c_all	light
	(1)	(2)
segCCB	1.867 (0.217)	59.380 (4.599)
segECB	0.807 (0.414)	74.712 (8.650)
segWCB	2.328 (0.264)	50.478 (5.724)
Observations	338	303
Log Likelihood	−36.030	−994.295
Akaike Inf. Crit.	86.059	2,002.591
Bayesian Inf. Crit.	112.758	2,028.517
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

Table 4: Linears models of depth of colonization and light requirements comparing bay segments of Indian River Lagoon. Models have no intercept, a random segment effect, and a Gaussian correlation structure to control for spatial effects (nugget, separate for each bay).

	<i>Dependent variable:</i>	
	z.c_all	light
	(1)	(2)
segBR	1.021 (0.362)	20.746 (7.526)
segLCIRL	1.235 (0.316)	13.619 (6.408)
segLIRL	1.557 (0.363)	9.197 (7.112)
segLML	0.989 (0.363)	22.147 (6.896)
segUCIRL	1.010 (0.318)	20.018 (6.373)
segUIRL	1.030 (0.366)	24.091 (8.649)
segUML	0.960 (0.331)	24.019 (6.673)
Observations	47	47
Log Likelihood	56.756	-133.830
Akaike Inf. Crit.	-91.512	289.659
Bayesian Inf. Crit.	-72.934	308.237
<i>Note:</i>	*p<0.1; **p<0.05; ***p<0.01	

```

library(multcomp)
zc1 <- glht(zc1, linfct = mcp(seg = 'Tukey'))
summary(zc1)

##
## Simultaneous Tests for General Linear Hypotheses
##
## Multiple Comparisons of Means: Tukey Contrasts
##
##
## Fit: lme.formula(fixed = z_c_all ~ 0 + seg, data = tb_light, random = ~1 |
## seg, correlation = corGaus(form = ~Latitude + Longitude |
## seg, nugget = TRUE))
##
## Linear Hypotheses:
##
## Estimate Std. Error z value Pr(>|z|)
## LTB - HB == 0 0.2987 0.2049 1.458 0.46233
## MTB - HB == 0 0.4138 0.2030 2.038 0.17343
## OTB - HB == 0 -0.1660 0.2062 -0.805 0.85174
## MTB - LTB == 0 0.1150 0.1810 0.636 0.92023
## OTB - LTB == 0 -0.4647 0.1846 -2.518 0.05677 .
## OTB - MTB == 0 -0.5797 0.1825 -3.177 0.00799 **
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Adjusted p values reported -- single-step method)

cld(zc1)

## HB LTB MTB OTB
## "ab" "ab" "b" "a"

summary(glht(lm1, linfct = mcp(seg = 'Tukey'))))

##
## Simultaneous Tests for General Linear Hypotheses
##
## Multiple Comparisons of Means: Tukey Contrasts
##
##
## Fit: lme.formula(fixed = light ~ 0 + seg, data = tb_light, random = ~1 |

```

```
##      seg, correlation = corGaus(form = ~Latitude + Longitude |
##      seg, nugget = TRUE), na.action = na.omit)
##
## Linear Hypotheses:
##              Estimate Std. Error z value Pr(>|z|)
## LTB - HB == 0    -4.855      8.898  -0.546   0.948
## MTB - HB == 0    -6.687      8.817  -0.758   0.873
## OTB - HB == 0     4.553      8.936   0.510   0.957
## MTB - LTB == 0    -1.833      7.801  -0.235   0.995
## OTB - LTB == 0     9.408      7.936   1.185   0.635
## OTB - MTB == 0    11.240      7.844   1.433   0.477
## (Adjusted p values reported -- single-step method)

zc2 <- glht(zc2, linfct = mcp(seg = 'Tukey'))
summary(zc2)

##
## Simultaneous Tests for General Linear Hypotheses
##
## Multiple Comparisons of Means: Tukey Contrasts
##
##
## Fit: lme.formula(fixed = z_c_all ~ 0 + seg, data = choc_light, random = ~1 |
##      seg, correlation = corGaus(form = ~Latitude + Longitude |
##      seg, nugget = TRUE))
##
## Linear Hypotheses:
##              Estimate Std. Error z value Pr(>|z|)
## ECB - CCB == 0    -1.0606      0.4673  -2.270  0.05846 .
## WCB - CCB == 0     0.4604      0.3415   1.348  0.36330
## WCB - ECB == 0     1.5210      0.4912   3.097  0.00563 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Adjusted p values reported -- single-step method)

cld(zc2)

## CCB ECB WCB
## "ab" "a" "b"

summary(glht(lm2, linfct = mcp(seg = 'Tukey')))
```

```
##
## Simultaneous Tests for General Linear Hypotheses
##
## Multiple Comparisons of Means: Tukey Contrasts
##
##
## Fit: lme.formula(fixed = light ~ 0 + seg, data = choc_light, random = ~1 |
## seg, correlation = corGaus(form = ~Latitude + Longitude |
## seg, nugget = TRUE), na.action = na.omit)
##
## Linear Hypotheses:
## Estimate Std. Error z value Pr(>|z|)
## ECB - CCB == 0 15.332 9.796 1.565 0.2566
## WCB - CCB == 0 -8.901 7.342 -1.212 0.4410
## WCB - ECB == 0 -24.234 10.372 -2.336 0.0496 *
## ---
## Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Adjusted p values reported -- single-step method)
```

```
zc3 <- glht(zc3, linfct = mcp(seg = 'Tukey'))
summary(zc3)
```

```
##
## Simultaneous Tests for General Linear Hypotheses
##
## Multiple Comparisons of Means: Tukey Contrasts
##
##
## Fit: lme.formula(fixed = z_c_all ~ 0 + seg, data = irl_light, random = ~1 |
## seg, correlation = corGaus(form = ~Latitude + Longitude |
## seg, nugget = TRUE))
##
## Linear Hypotheses:
## Estimate Std. Error z value Pr(>|z|)
## LCIRL - BR == 0 0.214204 0.480563 0.446 0.999
## LIRL - BR == 0 0.536046 0.512571 1.046 0.943
## LML - BR == 0 -0.032428 0.512530 -0.063 1.000
## UCIRL - BR == 0 -0.011314 0.482368 -0.023 1.000
## UIRL - BR == 0 0.008486 0.514792 0.016 1.000
## UML - BR == 0 -0.061691 0.490519 -0.126 1.000
## LIRL - LCIRL == 0 0.321842 0.480783 0.669 0.994
## LML - LCIRL == 0 -0.246632 0.480738 -0.513 0.999
## UCIRL - LCIRL == 0 -0.225518 0.448443 -0.503 0.999
```



```
## UIRL - LCIRL == 0 -0.205717 0.483149 -0.426 1.000
## UML - LCIRL == 0 -0.275895 0.457199 -0.603 0.997
## LML - LIRL == 0 -0.568474 0.512735 -1.109 0.925
## UCIRL - LIRL == 0 -0.547360 0.482586 -1.134 0.917
## UIRL - LIRL == 0 -0.527559 0.514997 -1.024 0.948
## UML - LIRL == 0 -0.597737 0.490734 -1.218 0.887
## UCIRL - LML == 0 0.021114 0.482542 0.044 1.000
## UIRL - LML == 0 0.040915 0.514955 0.079 1.000
## UML - LML == 0 -0.029263 0.490690 -0.060 1.000
## UIRL - UCIRL == 0 0.019801 0.484944 0.041 1.000
## UML - UCIRL == 0 -0.050377 0.459095 -0.110 1.000
## UML - UIRL == 0 -0.070178 0.493052 -0.142 1.000
## (Adjusted p values reported -- single-step method)
```

```
cld(zc3)
```

```
##      BR LCIRL  LIRL   LML UCIRL  UIRL   UML
##      "a"  "a"   "a"   "a"  "a"   "a"   "a"
```

```
summary(glht(lm3, linfct = mcp(seg = 'Tukey')))
```

```
##
## Simultaneous Tests for General Linear Hypotheses
##
## Multiple Comparisons of Means: Tukey Contrasts
##
##
## Fit: lme.formula(fixed = light ~ 0 + seg, data = irl_light, random = ~1 |
##      seg, correlation = corGaus(form = ~Latitude + Longitude |
##      seg, nugget = TRUE), na.action = na.omit)
##
## Linear Hypotheses:
##
##      Estimate Std. Error z value Pr(>|z|)
## LCIRL - BR == 0 -7.12681 9.88463 -0.721 0.991
## LIRL - BR == 0 -11.54834 10.35471 -1.115 0.923
## LML - BR == 0 1.40159 10.20749 0.137 1.000
## UCIRL - BR == 0 -0.72737 9.86144 -0.074 1.000
## UIRL - BR == 0 3.34556 11.46463 0.292 1.000
## UML - BR == 0 3.27282 10.05811 0.325 1.000
## LIRL - LCIRL == 0 -4.42153 9.57348 -0.462 0.999
## LML - LCIRL == 0 8.52840 9.41405 0.906 0.972
```

```

## UCIRL - LCIRL == 0    6.39944    9.03767    0.708    0.992
## UIRL - LCIRL == 0    10.47236    10.76426    0.973    0.960
## UML - LCIRL == 0     10.39962    9.25187    1.124    0.920
## LML - LIRL == 0      12.94993    9.90648    1.307    0.848
## UCIRL - LIRL == 0    10.82097    9.54953    1.133    0.917
## UIRL - LIRL == 0     14.89390    11.19747    1.330    0.837
## UML - LIRL == 0      14.82116    9.75249    1.520    0.731
## UCIRL - LML == 0     -2.12896    9.38969   -0.227    1.000
## UIRL - LML == 0       1.94396    11.06147    0.176    1.000
## UML - LML == 0        1.87122    9.59604    0.195    1.000
## UIRL - UCIRL == 0     4.07293    10.74297    0.379    1.000
## UML - UCIRL == 0      4.00018    9.22709    0.434    0.999
## UML - UIRL == 0      -0.07274    10.92378   -0.007    1.000
## (Adjusted p values reported -- single-step method)

```