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.

	Dependent variable:	
	z_c_all	light
	(1)	(2)
baychoc	2.033	49.743
	(0.119)	(2.997)
bayirl	1.098	17.731
	(0.109)	(2.853)
baytb	1.158	40.816
	(0.097)	(2.520)
Observations	518	518
Log Likelihood	170.629	−1,685.096
Akaike Inf. Crit.	−327.259	3,384.193
Bayesian Inf. Crit.	−297.550	3,413.902
Note:	*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 -0.93416    0.16081  -5.809   <1e-05 ***
```

```
## tb - choc == 0  -0.87432    0.15340  -5.700   <1e-05 ***
## tb - irl == 0    0.05984    0.14569   0.411    0.911
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (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))
##
## Linear Hypotheses:
##                 Estimate Std. Error z value Pr(>|z|)
## irl - choc == 0  -32.011      4.138  -7.736   <0.001 ***
## tb - choc == 0    -8.927      3.915  -2.280   0.0586 .
## tb - irl == 0     23.085      3.807   6.064   <0.001 ***
## ---
## 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.

	Dependent variable:	
	z_c_all	light
	(1)	(2)
segHB	1.075	34.084
	(0.128)	(7.320)
segLTB	1.294	39.990
	(0.108)	(6.096)
segMTB	1.373	36.077
	(0.102)	(5.656)
segOTB	0.840	48.855
	(0.107)	(6.013)
Observations	218	218
Log Likelihood	369.383	−709.479
Akaike Inf. Crit.	−722.766	1,434.959
Bayesian Inf. Crit.	−695.838	1,461.886
Note:	*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).

	Dependent variable:	
	z_c_all	light
	(1)	(2)
segCCB	1.991	50.644
	(0.203)	(4.523)
segECB	0.862	63.981
	(0.412)	(9.167)
segWCB	2.336	45.808
	(0.234)	(5.164)
Observations	255	255
Log Likelihood	86.461	−782.632
Akaike Inf. Crit.	−158.922	1,579.265
Bayesian Inf. Crit.	−134.216	1,603.971
Note:	*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).

	Dependent variable:	
	z_c_all	light
	(1)	(2)
segBR	1.021	20.746
	(0.275)	(7.814)
segLCIRL	1.212	13.619
	(0.233)	(6.690)
segLIRL	1.545	9.197
	(0.275)	(7.397)
segLML	0.981	22.147
	(0.272)	(7.180)
segUCIRL	0.932	20.018
	(0.233)	(6.654)
segUIRL	1.030	24.091
	(0.282)	(8.948)
segUML	0.775	23.552
	(0.254)	(7.180)
Observations	45	45
Log Likelihood	59.214	−128.060
Akaike Inf. Crit.	−96.427	278.121
Bayesian Inf. Crit.	−78.414	296.134
Note:	*p<0.1; **p<0.05; ***p<0.01	

```r
library(multcomp)
summary(glht(zc1, linfct = mcp(seg = 'Tukey')))
```

```
##
##   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   0.21927    0.16785   1.306  0.55790
## MTB - HB == 0   0.29853    0.16375   1.823  0.26158
## OTB - HB == 0  -0.23503    0.16718  -1.406  0.49468
## MTB - LTB == 0  0.07926    0.14849   0.534  0.95069
## OTB - LTB == 0 -0.45430    0.15227  -2.984  0.01531 *
## OTB - MTB == 0 -0.53357    0.14774  -3.611  0.00188 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Adjusted p values reported -- single-step method)
```

```r
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))
##
## Linear Hypotheses:
##                Estimate Std. Error z value Pr(>|z|)
## LTB - HB == 0     5.906      9.526   0.620    0.925
## MTB - HB == 0     1.993      9.250   0.215    0.996
## OTB - HB == 0    14.771      9.473   1.559    0.401
```

```
## MTB - LTB == 0   -3.913      8.316  -0.471    0.965
## OTB - LTB == 0    8.865      8.563   1.035    0.728
## OTB - MTB == 0   12.778      8.255   1.548    0.408
## (Adjusted p values reported -- single-step method)
```

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

```
##
##   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  -1.1293     0.4588  -2.461  0.03522 *
## WCB - CCB == 0   0.3448     0.3096   1.114  0.49898
## WCB - ECB == 0   1.4741     0.4733   3.115  0.00515 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
## (Adjusted p values reported -- single-step method)
```

```
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))
##
## Linear Hypotheses:
##                Estimate Std. Error z value Pr(>|z|)
## ECB - CCB == 0   13.337     10.222   1.305    0.386
```

```
## WCB - CCB == 0   -4.836      6.864  -0.704    0.757
## WCB - ECB == 0  -18.173     10.522  -1.727    0.190
## (Adjusted p values reported -- single-step method)
```

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

```
##
##   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      0.190379   0.360031   0.529    0.998
## LIRL - BR == 0       0.523831   0.388774   1.347    0.829
## LML - BR == 0       -0.040662   0.386613  -0.105    1.000
## UCIRL - BR == 0     -0.088792   0.360395  -0.246    1.000
## UIRL - BR == 0       0.008486   0.393707   0.022    1.000
## UML - BR == 0       -0.246138   0.374128  -0.658    0.995
## LIRL - LCIRL == 0    0.333452   0.360185   0.926    0.968
## LML - LCIRL == 0    -0.231041   0.357851  -0.646    0.995
## UCIRL - LCIRL == 0 -0.279171   0.329351  -0.848    0.980
## UIRL - LCIRL == 0   -0.181893   0.365504  -0.498    0.999
## UML - LCIRL == 0    -0.436517   0.344325  -1.268    0.866
## LML - LIRL == 0     -0.564493   0.386756  -1.460    0.768
## UCIRL - LIRL == 0   -0.612623   0.360549  -1.699    0.616
## UIRL - LIRL == 0    -0.515345   0.393848  -1.308    0.848
## UML - LIRL == 0     -0.769968   0.374276  -2.057    0.377
## UCIRL - LML == 0    -0.048130   0.358217  -0.134    1.000
## UIRL - LML == 0      0.049148   0.391715   0.125    1.000
## UML - LML == 0      -0.205476   0.372031  -0.552    0.998
## UIRL - UCIRL == 0    0.097279   0.365863   0.266    1.000
## UML - UCIRL == 0    -0.157345   0.344705  -0.456    0.999
## UML - UIRL == 0     -0.254624   0.379398  -0.671    0.994
## (Adjusted p values reported -- single-step method)
```

```
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))
##
## Linear Hypotheses:
##                     Estimate Std. Error z value Pr(>|z|)
## LCIRL - BR == 0      -7.1268    10.2864  -0.693    0.993
## LIRL - BR == 0      -11.5483    10.7595  -1.073    0.935
## LML - BR == 0         1.4016    10.6112   0.132    1.000
## UCIRL - BR == 0      -0.7274    10.2631  -0.071    1.000
## UIRL - BR == 0        3.3456    11.8790   0.282    1.000
## UML - BR == 0         2.8061    10.6112   0.264    1.000
## LIRL - LCIRL == 0    -4.4215     9.9736  -0.443    0.999
## LML - LCIRL == 0      8.5284     9.8135   0.869    0.977
## UCIRL - LCIRL == 0    6.3994     9.4360   0.678    0.994
## UIRL - LCIRL == 0    10.4724    11.1722   0.937    0.966
## UML - LCIRL == 0      9.9329     9.8135   1.012    0.951
## LML - LIRL == 0      12.9499    10.3083   1.256    0.871
## UCIRL - LIRL == 0    10.8210     9.9496   1.088    0.931
## UIRL - LIRL == 0     14.8939    11.6092   1.283    0.859
## UML - LIRL == 0      14.3544    10.3083   1.393    0.805
## UCIRL - LML == 0     -2.1290     9.7891  -0.217    1.000
## UIRL - LML == 0       1.9440    11.4720   0.169    1.000
## UML - LML == 0        1.4045    10.1535   0.138    1.000
## UIRL - UCIRL == 0     4.0729    11.1507   0.365    1.000
## UML - UCIRL == 0      3.5334     9.7891   0.361    1.000
## UML - UIRL == 0      -0.5395    11.4720  -0.047    1.000
## (Adjusted p values reported -- single-step method)
```