Grazing impacts on understory height:

Analysis of line-intercept transect data

Method: Repeat-measures ANOVA with mixed effects, accounting for random effects of individual transect observations (rcompansion). Dependent variable = understory height (m). Independent variables = time (pre vs. post-grazing) and whether transects were grazed or control.

Result: Significant effects of grazing, and interaction between plot type and grazing, but not plot type alone. Model pseudo- r2 = 0.527, p = 0.001

Analysis of Deviance Table (Type II tests)

Response: ht\_wtavg\_m

Chisq Df Pr(>Chisq)

plot\_type 1.5793 1 0.208864

time 28.9404 1 7.464e-08 \*\*\*

plot\_type:time 9.4286 1 0.002136 \*\*

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Means comparisons across time points for control vs. grazed plots:

Degrees-of-freedom method: containment

> m.emm2 <- emmeans(graze\_mod2\_v2, ~timepoint|plot\_type)

> pairs(m.emm2)

plot\_type = control:

contrast estimate SE df t.ratio p.value

(pre-grazing) - (post-1mo) 0.0198 0.0833 14 0.237 0.9695

(pre-grazing) - (post-2mo) 0.0698 0.1103 14 0.632 0.8051

(post-1mo) - (post-2mo) 0.0500 0.0833 14 0.599 0.8226

plot\_type = grazed:

contrast estimate SE df t.ratio p.value

(pre-grazing) - (post-1mo) 0.5425 0.0589 14 9.206 <.0001

(pre-grazing) - (post-2mo) 0.5078 0.0780 14 6.510 <.0001

(post-1mo) - (post-2mo) -0.0347 0.0589 14 -0.588 0.8285

Degrees-of-freedom method: containment

P value adjustment: tukey method for comparing a family of 3 estimates

>

Absolute values of understory heights, before and after grazing:

m.emm <- emmeans(graze\_mod2\_v2, ~plot\_type\*timepoint)

> m.emm

plot\_type timepoint emmean SE df lower.CL upper.CL

control pre-grazing 0.548 0.1312 8 0.24500 0.850

grazed pre-grazing 0.719 0.0928 7 0.49984 0.939

control post-1mo 0.528 0.1312 8 0.22521 0.831

grazed post-1mo 0.177 0.0928 7 -0.04263 0.396

control post-2mo 0.478 0.1312 8 0.17525 0.781

grazed post-2mo 0.211 0.0928 7 -0.00796 0.431

Degrees-of-freedom method: containment

Confidence level used: 0.95

> pairs(m.emm)

contrast estimate SE df t.ratio p.value

(control pre-grazing) - (grazed pre-grazing) -0.1716 0.1607 7 -1.068 0.8799

(control pre-grazing) - (control post-1mo) 0.0198 0.0833 14 0.237 0.9999

(control pre-grazing) - (grazed post-1mo) 0.3708 0.1607 7 2.307 0.3021

(control pre-grazing) - (control post-2mo) 0.0698 0.1103 14 0.632 0.9865

(control pre-grazing) - (grazed post-2mo) 0.3362 0.1607 7 2.091 0.3847

(grazed pre-grazing) - (control post-1mo) 0.1914 0.1607 7 1.191 0.8289

(grazed pre-grazing) - (grazed post-1mo) 0.5425 0.0589 14 9.206 <.0001

(grazed pre-grazing) - (control post-2mo) 0.2414 0.1607 7 1.502 0.6746

(grazed pre-grazing) - (grazed post-2mo) 0.5078 0.0780 14 6.510 0.0002

(control post-1mo) - (grazed post-1mo) 0.3511 0.1607 7 2.184 0.3474

(control post-1mo) - (control post-2mo) 0.0500 0.0833 14 0.599 0.9893

(control post-1mo) - (grazed post-2mo) 0.3164 0.1607 7 1.968 0.4386

(grazed post-1mo) - (control post-2mo) -0.3011 0.1607 7 -1.873 0.4833

(grazed post-1mo) - (grazed post-2mo) -0.0347 0.0589 14 -0.588 0.9902

(control post-2mo) - (grazed post-2mo) 0.2664 0.1607 7 1.657 0.5924

Degrees-of-freedom method: containment

P value adjustment: tukey method for comparing a family of 6 estimates