Supplemental tables and figures

2025-09-16

Includes all supplemental tables and figures to accompany "Precipitation moderates the effect of native shrubs on invasive buffelgrass (*Pennisetum ciliare*) growth in the Sonoran Desert while local topography has less influence" by Ossanna et al. (2026).

Table S1. Actual values

Actual values of variables measured, averaged across all plots for each year (to contextualize year-to-year change values used in analyses). Precipitation measured in mm, buffelgrass density measured in individuals per m^2, and cover measured in percent.

		Buffelgrass				Native vegetation	
Year	Precipitation	Total culms	Repro culms	Density	Cover	Shrub cover	Herb cover
2020	222	24 ± 19	12 ± 13	3.8 ± 1.5	39 ± 19	18 ± 12	5.9 ± 10.5
2021	362	38 ± 33	14 ± 16	8 ± 7.6	40 ± 21	13 ± 8	9.9 ± 8.7
2022	264	53 ± 40	26 ± 25	6.8 ± 4.1	35 ± 17	12 ± 10	5.1 ± 6.4
2023	250	129 ± 80	53 ± 35	3 ± 1.5	39 ± 13	22 ± 13	2.6 ± 2.7

Table S2. Total culms model

Model-averaged coefficients of the buffelgrass culm count model calculated from two top models (response variable: year-to-year change in total number of culms). Marginal R^2 = 0.144–0.147; conditional R^2 = 0.386–0.391.

```
##
## Call:
## model.avg(object = total_set, subset = delta <= 2)
##
## Component model call:
## lmer(formula = Change_TotalCulms ~ <2 unique rhs>, data = culm.change)
##
## Component models:
##           df   logLik     AICc delta weight
## 123456789 15 -6006.56 12043.52  0.00    0.7
## 12346789  14 -6008.42 12045.19  1.67    0.3
##
## Term codes:
##                                          Aspect
##                                               1
##                           Change_BGDensity_scaled
##                                               2
##                           Change_HerbCover_scaled
##                                               3
##                          Change_ShrubCover_scaled
```

```
##                                             4
##                                PlotSlope_scaled
##                                             5
##                           Prev_year_precip_scaled
##                                             6
##  Change_BGDensity_scaled:Prev_year_precip_scaled
##                                             7
##  Change_HerbCover_scaled:Prev_year_precip_scaled
##                                             8
## Change_ShrubCover_scaled:Prev_year_precip_scaled
##                                             9
##
## Model-averaged coefficients:
## (full average)
##                                                Estimate Std. Error
## (Intercept)                                      9.9154     7.6168
## AspectN                                         -9.0486    13.5056
## AspectS                                         -5.2854    10.4379
## AspectSW                                        18.6775    13.5127
## AspectW                                          2.4818    10.3979
## Change_BGDensity_scaled                         -8.0732     1.4381
## Change_HerbCover_scaled                          0.7489     1.1107
## Change_ShrubCover_scaled                         5.8469     1.0880
## PlotSlope_scaled                                -1.0905     1.5290
## Prev_year_precip_scaled                         -3.5216     1.5449
## Change_BGDensity_scaled:Prev_year_precip_scaled  3.9087     1.8024
## Change_HerbCover_scaled:Prev_year_precip_scaled  2.3452     1.1330
## Change_ShrubCover_scaled:Prev_year_precip_scaled -6.6136     1.1385
##                                                Adjusted SE z value Pr(>|z|)
## (Intercept)                                         7.6243   1.301   0.1934
## AspectN                                            13.5188   0.669   0.5033
## AspectS                                            10.4482   0.506   0.6129
## AspectSW                                           13.5260   1.381   0.1673
## AspectW                                            10.4081   0.238   0.8115
## Change_BGDensity_scaled                             1.4395   5.608   <2e-16
## Change_HerbCover_scaled                             1.1118   0.674   0.5006
## Change_ShrubCover_scaled                            1.0891   5.369    1e-07
## PlotSlope_scaled                                    1.5302   0.713   0.4761
## Prev_year_precip_scaled                             1.5464   2.277   0.0228
## Change_BGDensity_scaled:Prev_year_precip_scaled     1.8042   2.167   0.0303
## Change_HerbCover_scaled:Prev_year_precip_scaled     1.1341   2.068   0.0386
## Change_ShrubCover_scaled:Prev_year_precip_scaled    1.1396   5.803   <2e-16
##
## (Intercept)
## AspectN
## AspectS
## AspectSW
## AspectW
## Change_BGDensity_scaled                         ***
## Change_HerbCover_scaled
## Change_ShrubCover_scaled                        ***
## PlotSlope_scaled
## Prev_year_precip_scaled                         *
## Change_BGDensity_scaled:Prev_year_precip_scaled *
```

```
## Change_HerbCover_scaled:Prev_year_precip_scaled  *
## Change_ShrubCover_scaled:Prev_year_precip_scaled ***
##
## (conditional average)
##                                                 Estimate Std. Error
## (Intercept)                                       9.9154     7.6168
## AspectN                                          -9.0486    13.5056
## AspectS                                          -5.2854    10.4379
## AspectSW                                         18.6775    13.5127
## AspectW                                           2.4818    10.3979
## Change_BGDensity_scaled                          -8.0732     1.4381
## Change_HerbCover_scaled                           0.7489     1.1107
## Change_ShrubCover_scaled                          5.8469     1.0880
## PlotSlope_scaled                                 -1.5637     1.6163
## Prev_year_precip_scaled                          -3.5216     1.5449
## Change_BGDensity_scaled:Prev_year_precip_scaled   3.9087     1.8024
## Change_HerbCover_scaled:Prev_year_precip_scaled   2.3452     1.1330
## Change_ShrubCover_scaled:Prev_year_precip_scaled -6.6136     1.1385
##                                                 Adjusted SE z value Pr(>|z|)
## (Intercept)                                          7.6243   1.301   0.1934
## AspectN                                             13.5188   0.669   0.5033
## AspectS                                             10.4482   0.506   0.6129
## AspectSW                                            13.5260   1.381   0.1673
## AspectW                                             10.4081   0.238   0.8115
## Change_BGDensity_scaled                              1.4395   5.608   <2e-16
## Change_HerbCover_scaled                              1.1118   0.674   0.5006
## Change_ShrubCover_scaled                             1.0891   5.369    1e-07
## PlotSlope_scaled                                     1.6179   0.966   0.3338
## Prev_year_precip_scaled                              1.5464   2.277   0.0228
## Change_BGDensity_scaled:Prev_year_precip_scaled      1.8042   2.167   0.0303
## Change_HerbCover_scaled:Prev_year_precip_scaled      1.1341   2.068   0.0386
## Change_ShrubCover_scaled:Prev_year_precip_scaled     1.1396   5.803   <2e-16
##
## (Intercept)
## AspectN
## AspectS
## AspectSW
## AspectW
## Change_BGDensity_scaled                          ***
## Change_HerbCover_scaled
## Change_ShrubCover_scaled                         ***
## PlotSlope_scaled
## Prev_year_precip_scaled                          *
## Change_BGDensity_scaled:Prev_year_precip_scaled  *
## Change_HerbCover_scaled:Prev_year_precip_scaled  *
## Change_ShrubCover_scaled:Prev_year_precip_scaled ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```