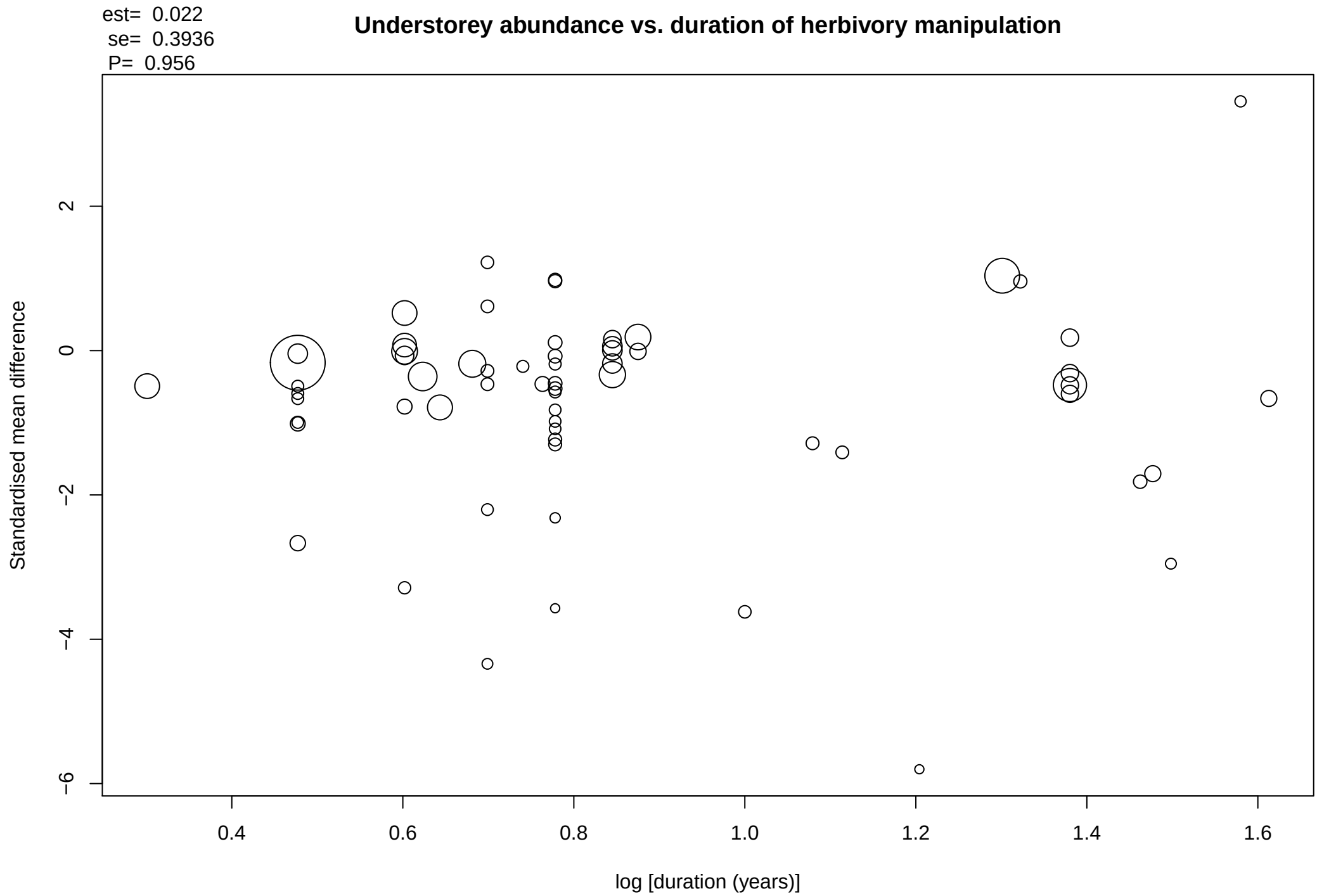
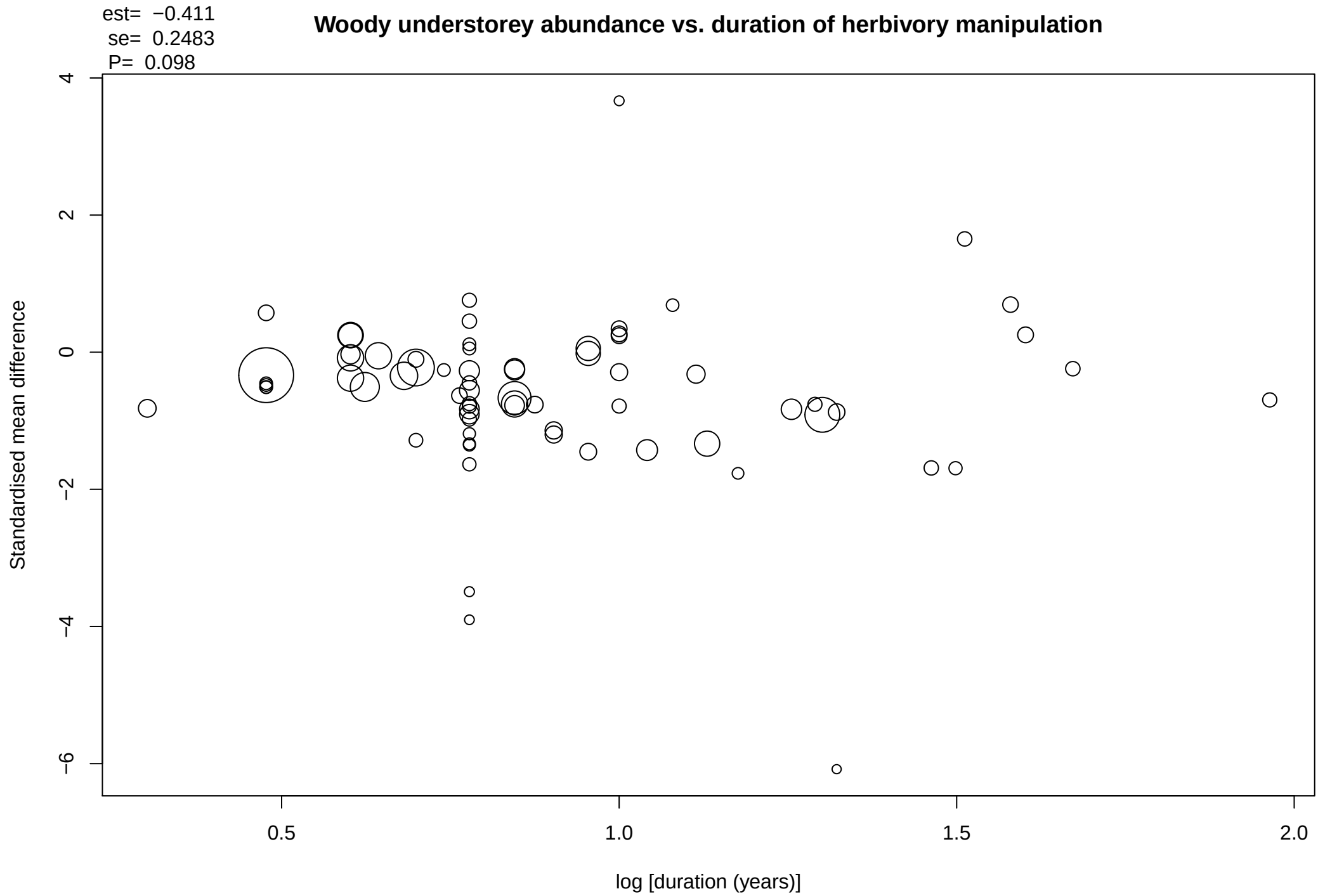
Additional file 9. Meta-regressions

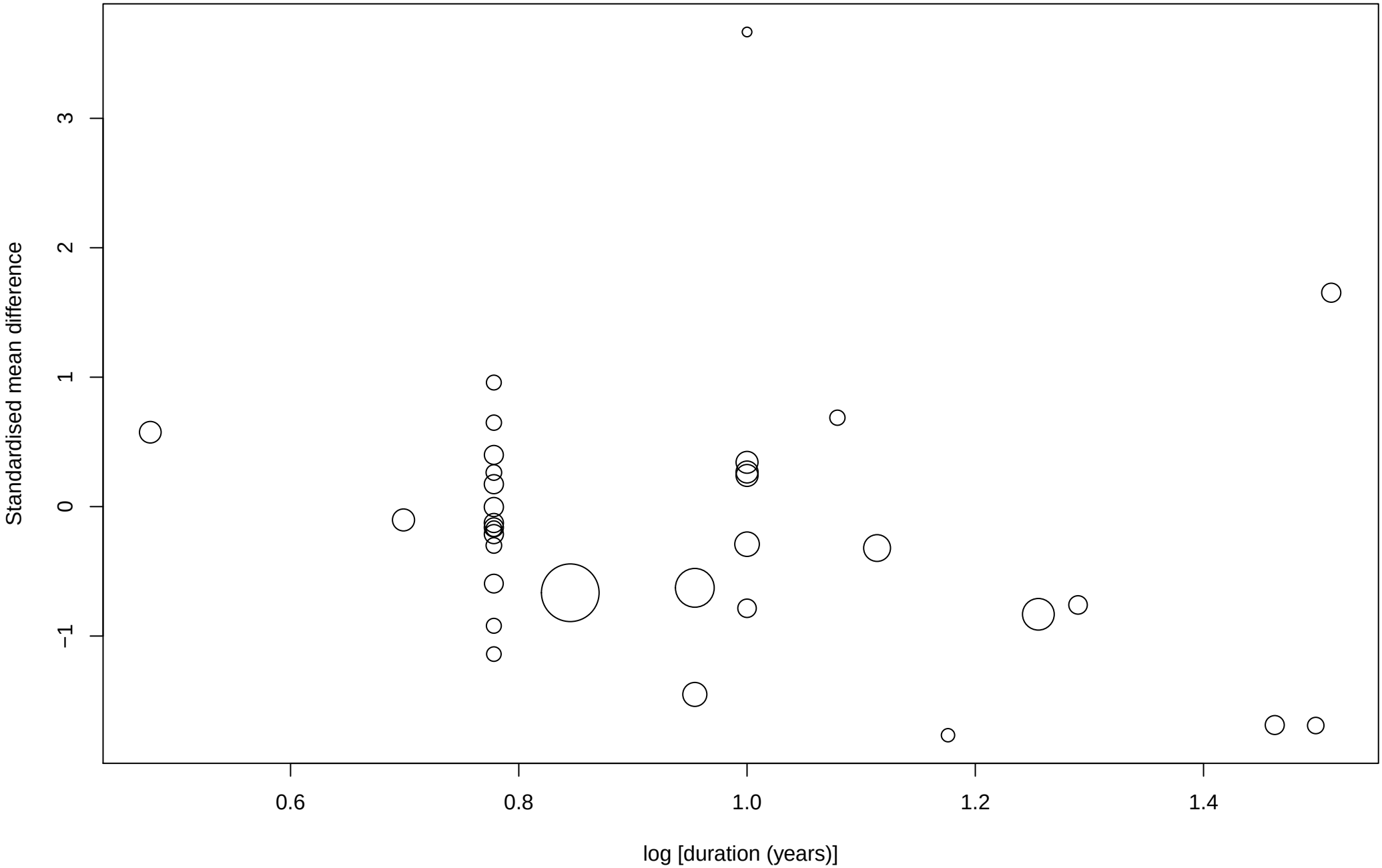
Sizes of symbols are proportional to the inverse variance of the standardised mean difference.
Where a significant relationship was found ($p < 0.05$), a regression line is shown (with 95% confidence limits).

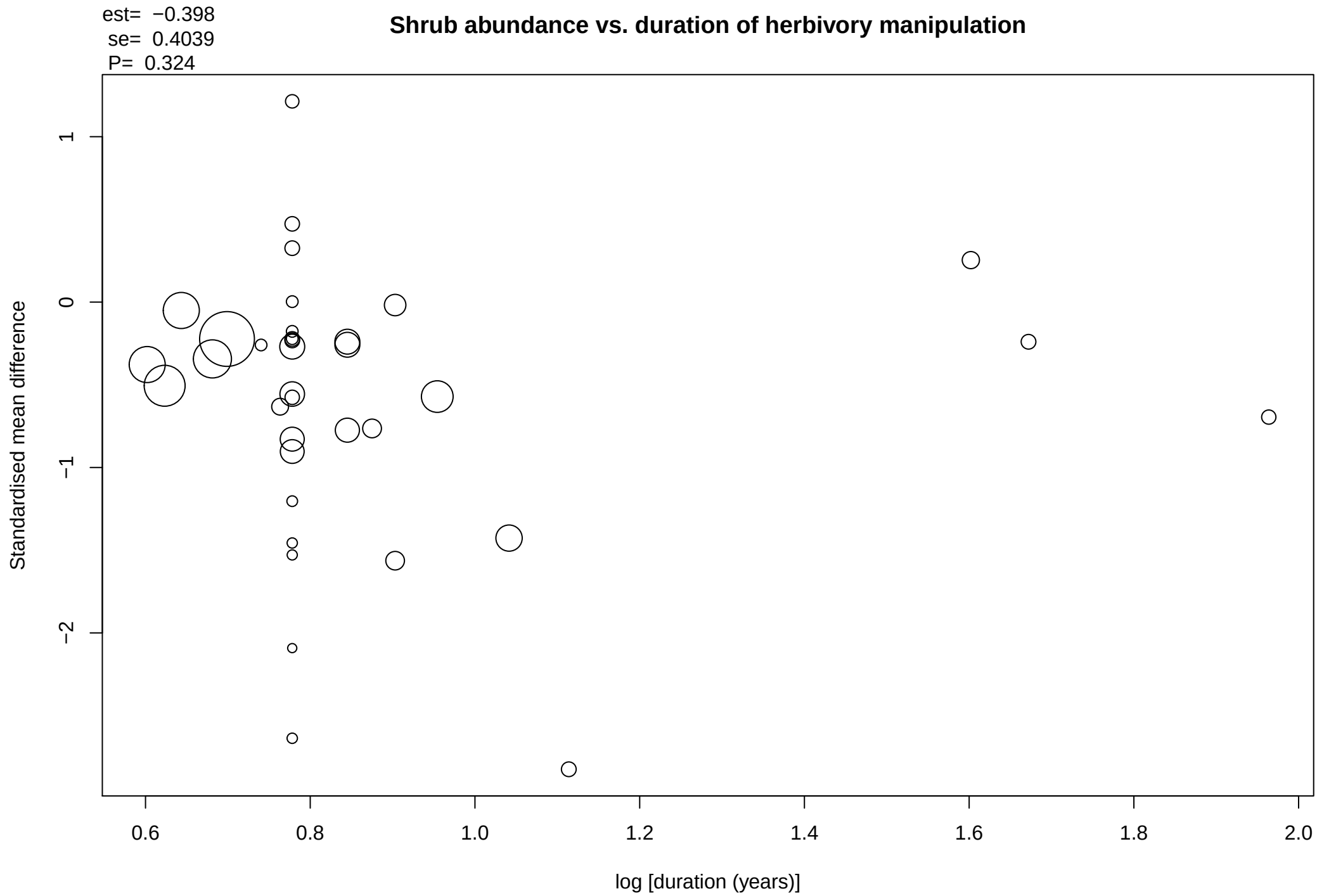

est= 0.022
se= 0.3936
P= 0.956
Understorey abundance vs. duration of herbivory manipulation
Standardised mean difference
2
0
−2
−4
−6
0.4
0.6
0.8
1.0
1.2
1.4
1.6
log [duration (years)]

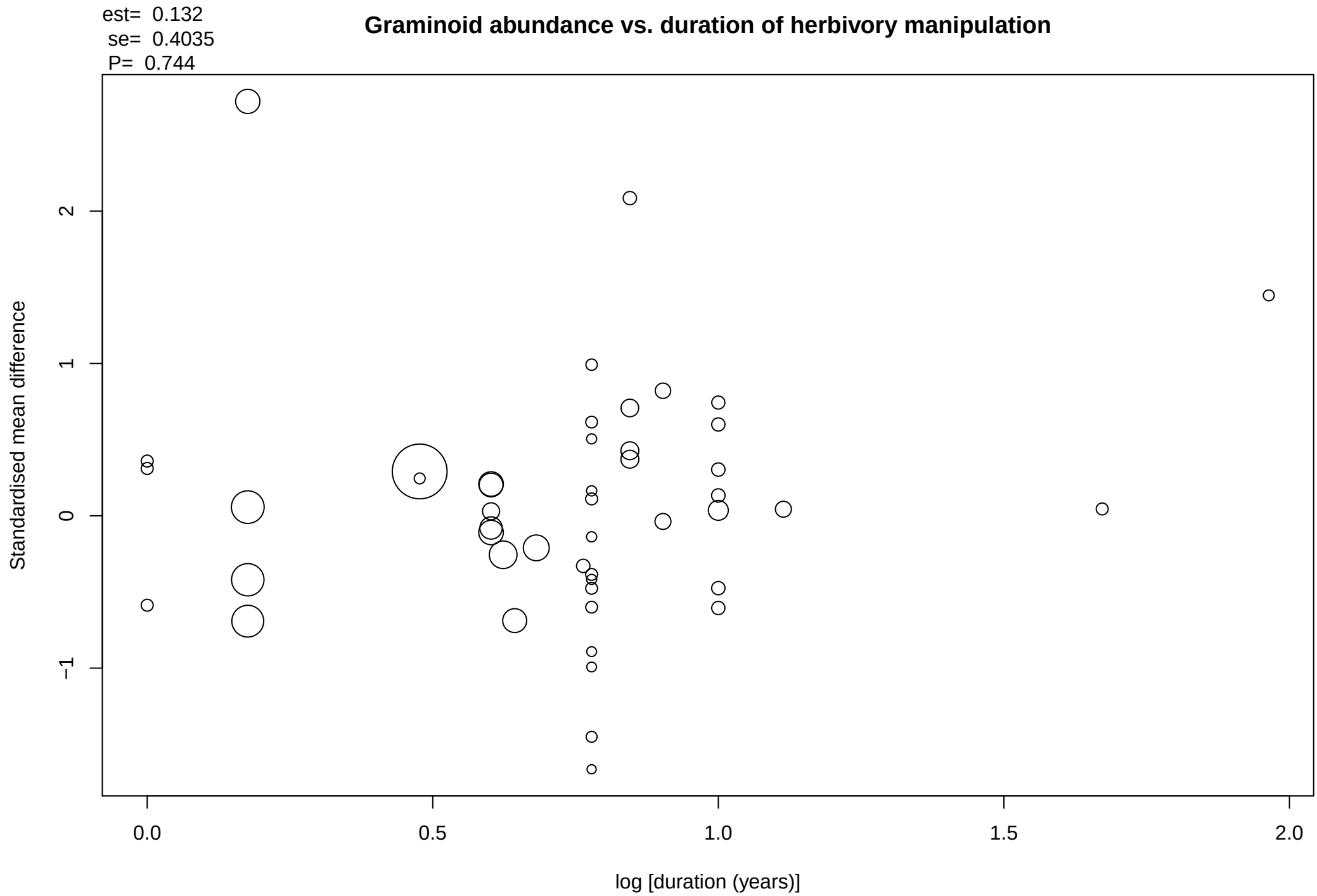

est= −0.411
se= 0.2483
P= 0.098
Woody understorey abundance vs. duration of herbivory manipulation
Standardised mean difference
4
2
0
−2
−4
−6
0.5
1.0
1.5
2.0
log [duration (years)]

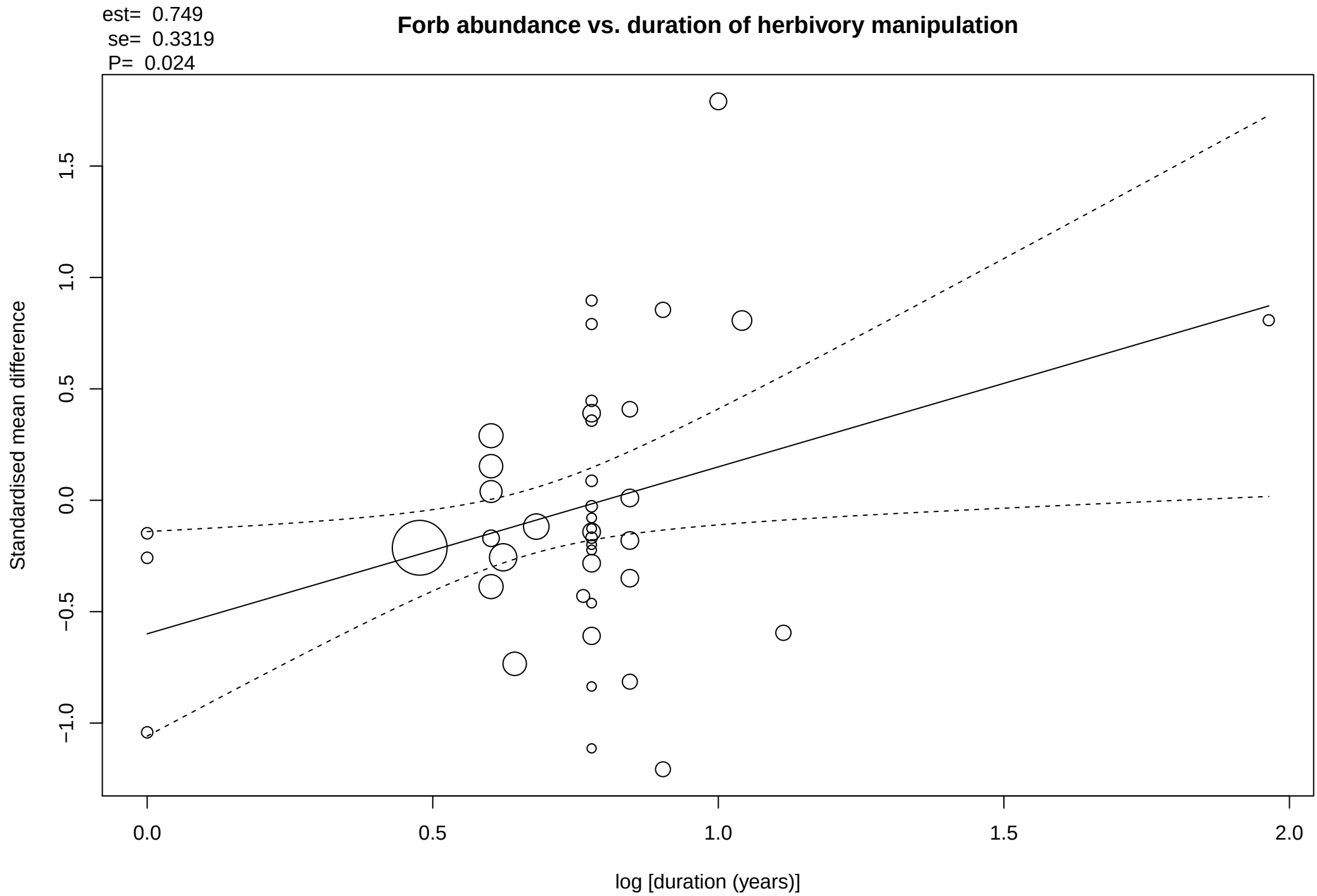
est= −0.717
se= 0.6512
P= 0.271

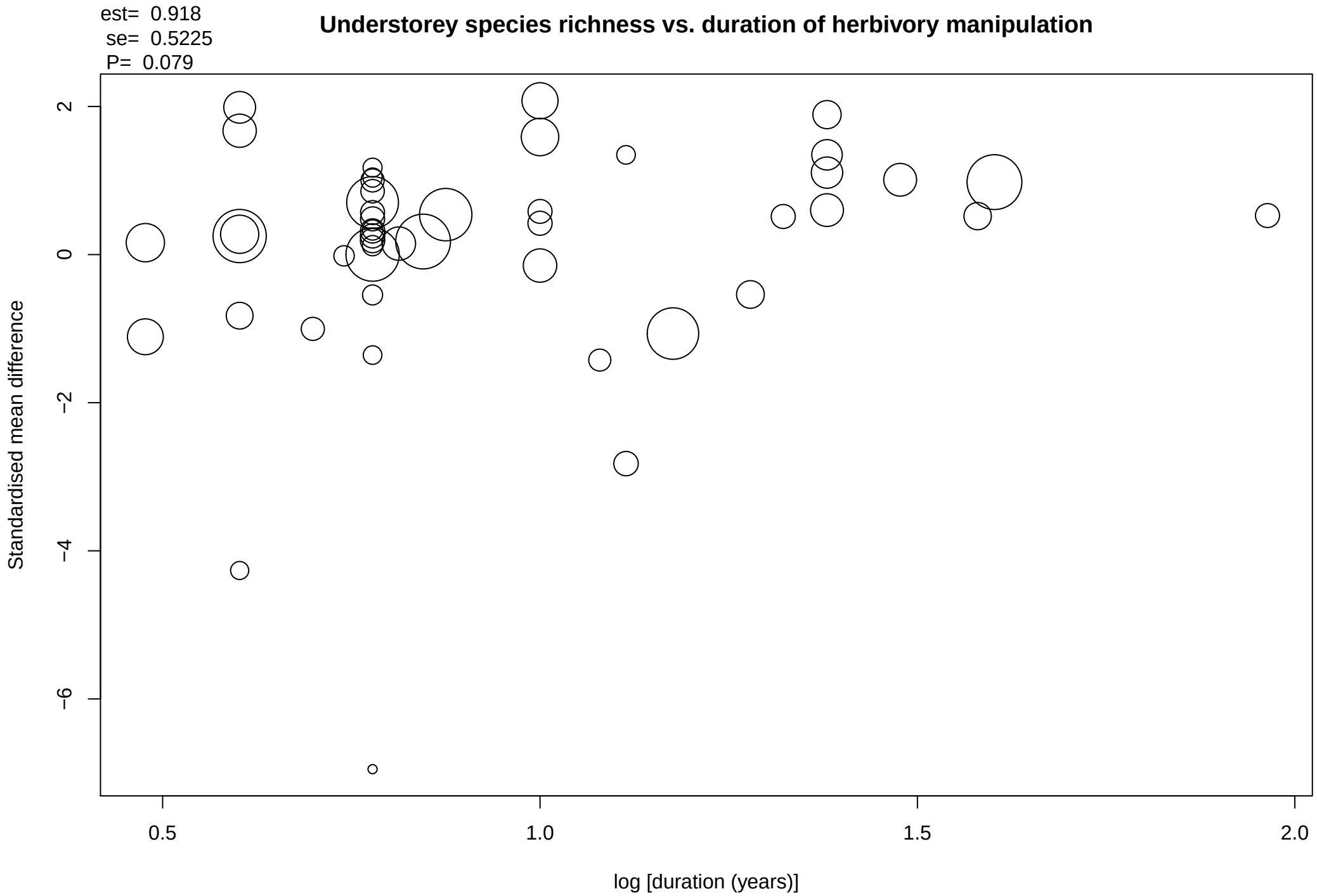
Tree sapling abundance vs. duration of herbivory manipulation

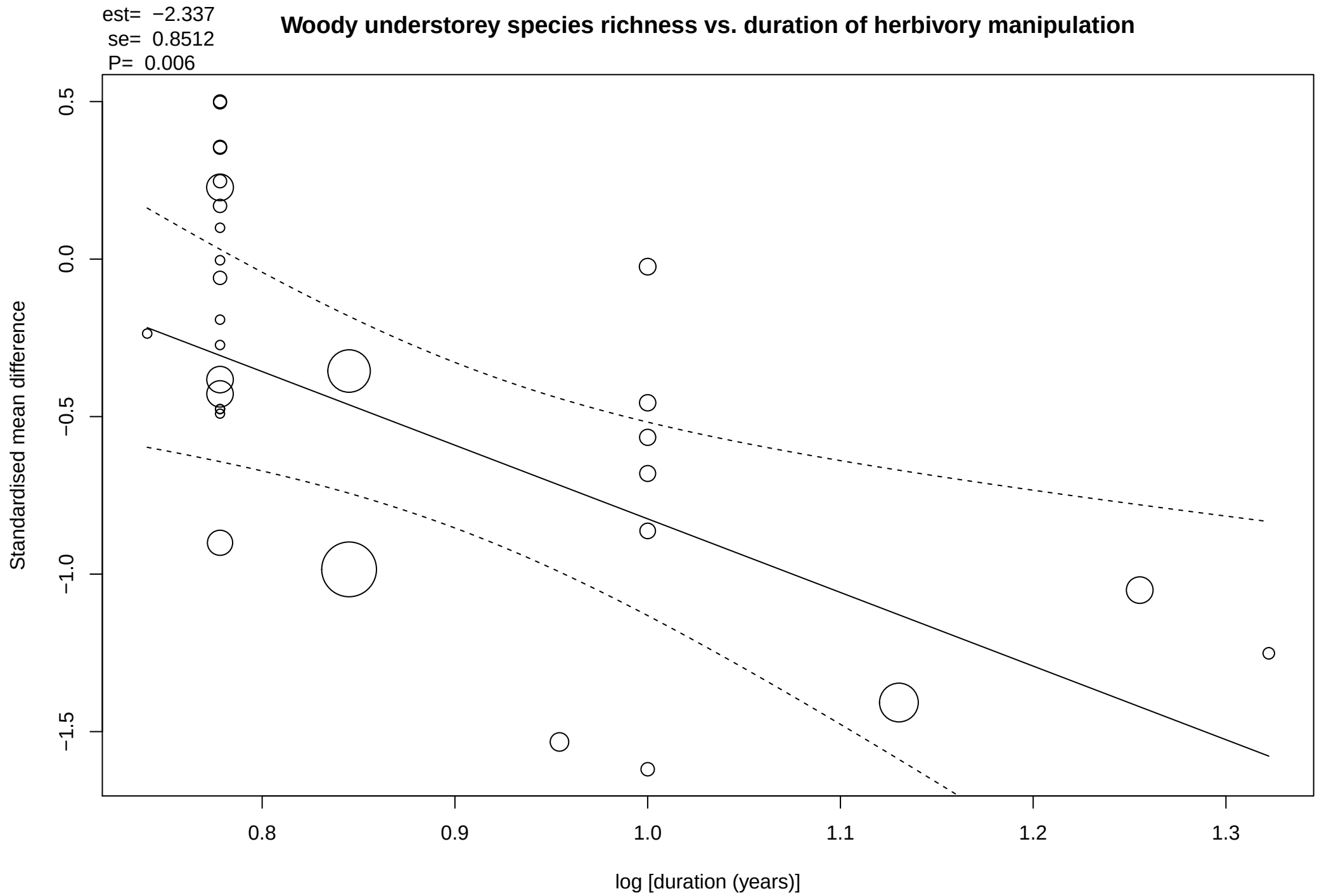


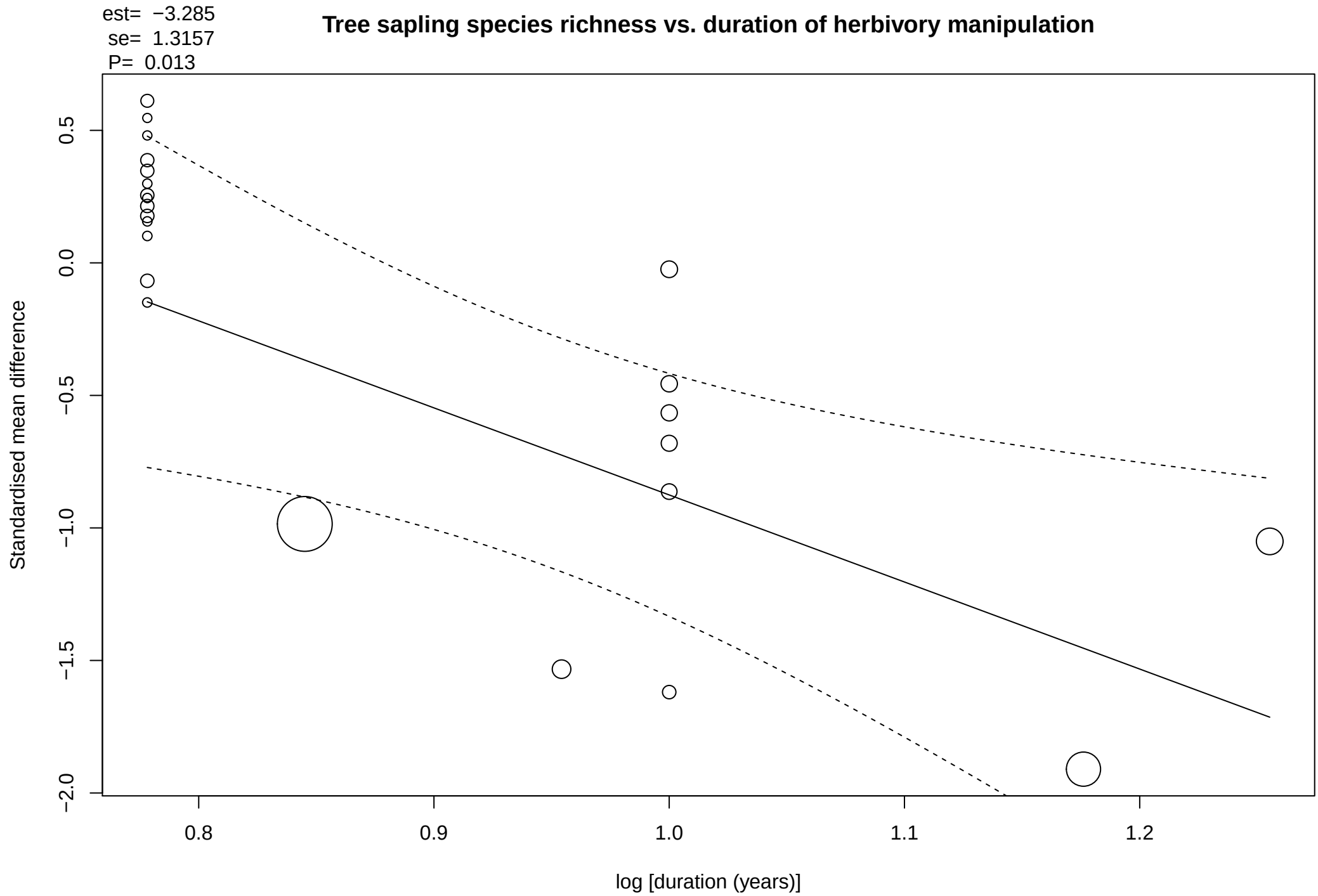

est= −0.398
se= 0.4039
P= 0.324
Shrub abundance vs. duration of herbivory manipulation
Standardised mean difference
1
0
−1
−2
0.6
0.8
1.0
1.2
1.4
1.6
1.8
2.0
log [duration (years)]

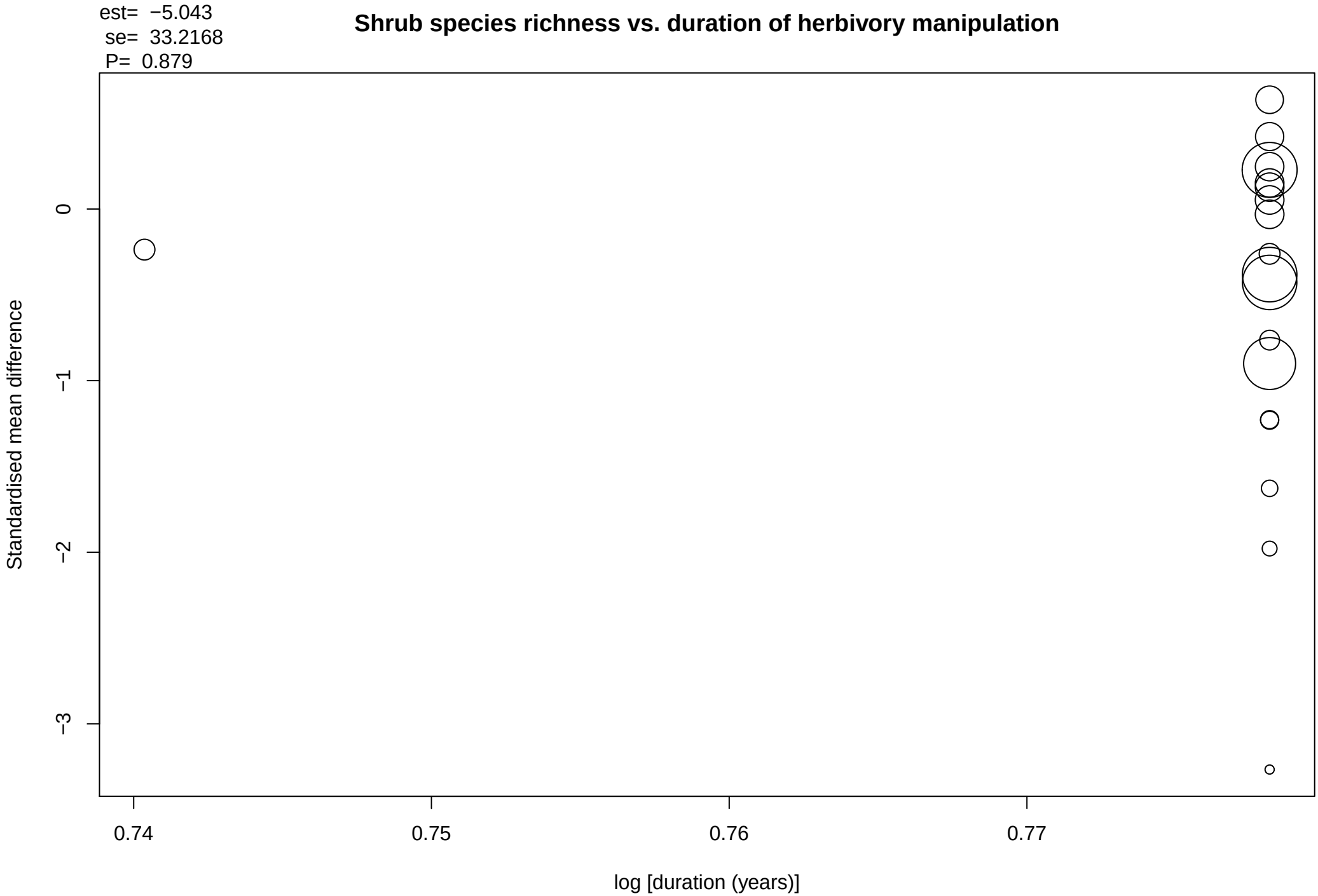

est= 0.132
se= 0.4035
P= 0.744
Graminoid abundance vs. duration of herbivory manipulation
Standardised mean difference
2
1
0
−1
0.0
0.5
1.0
1.5
2.0
log [duration (years)]

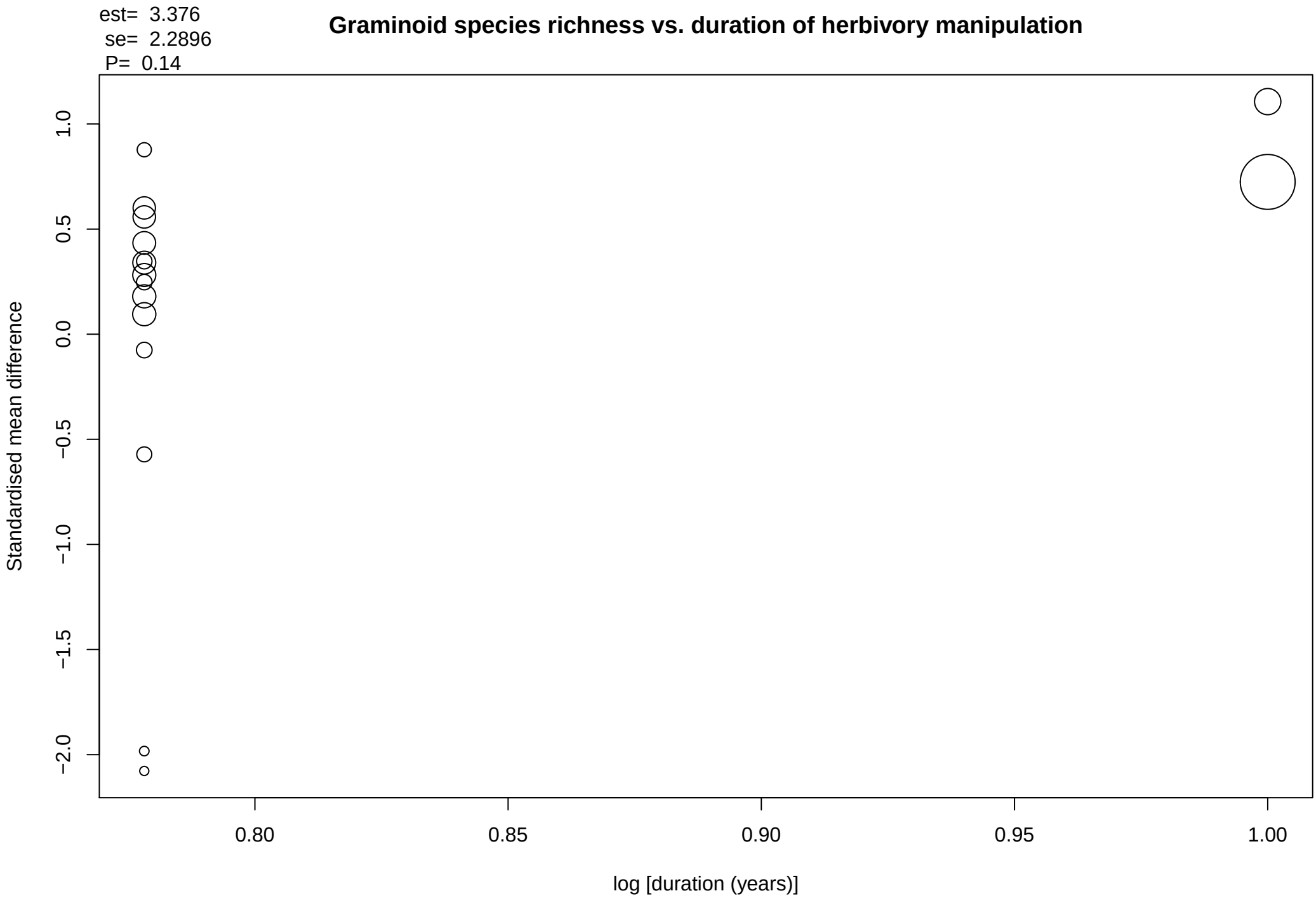

est= 0.749
se= 0.3319
P= 0.024
Forb abundance vs. duration of herbivory manipulation
Standardised mean difference
−1.0
−0.5
0.0
0.5
1.0
1.5
0.0
0.5
1.0
1.5
2.0
log [duration (years)]

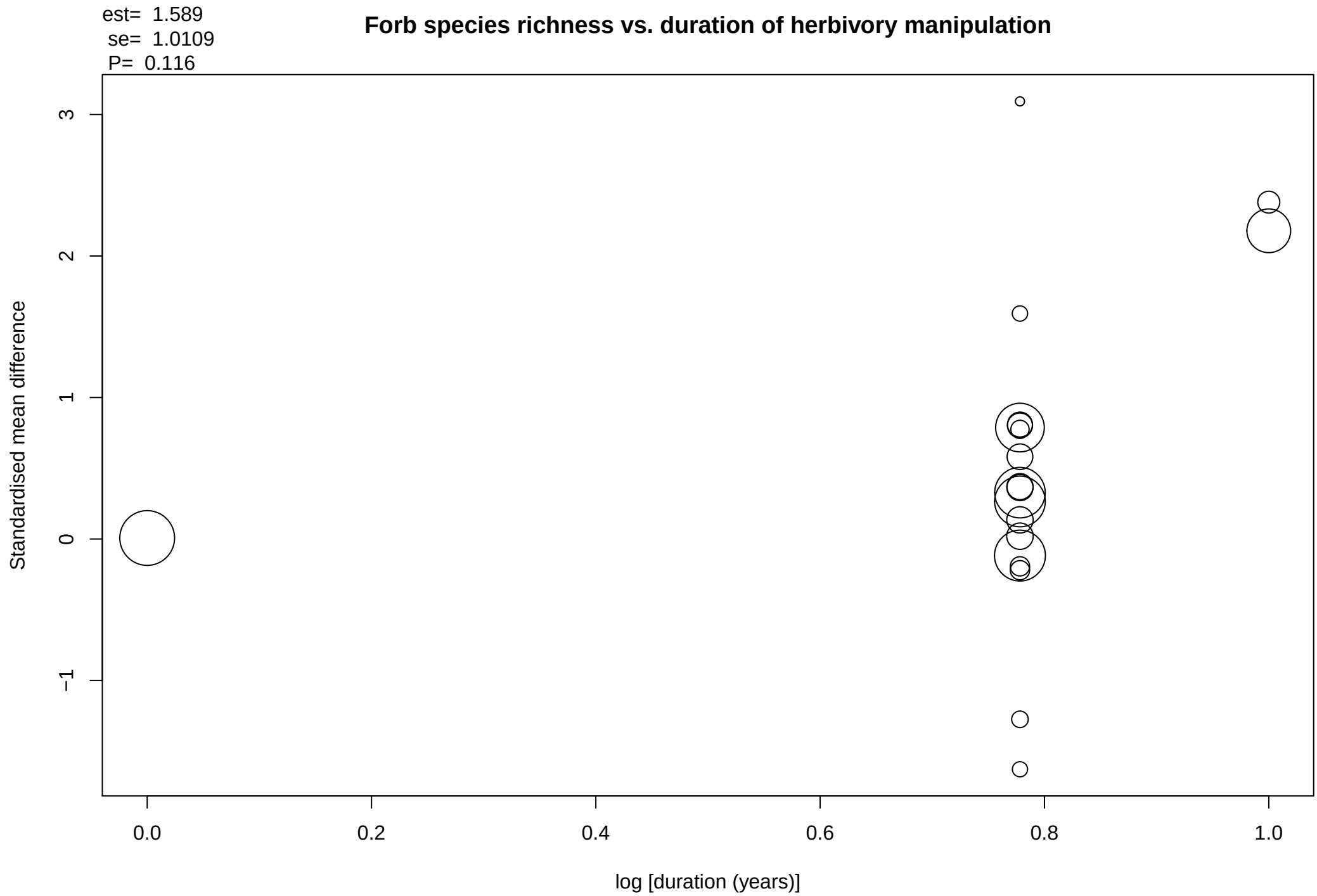

est= 0.918
se= 0.5225
P= 0.079
Understorey species richness vs. duration of herbivory manipulation
Standardised mean difference
2
0
−2
−4
−6
0.5
1.0
1.5
2.0
log [duration (years)]

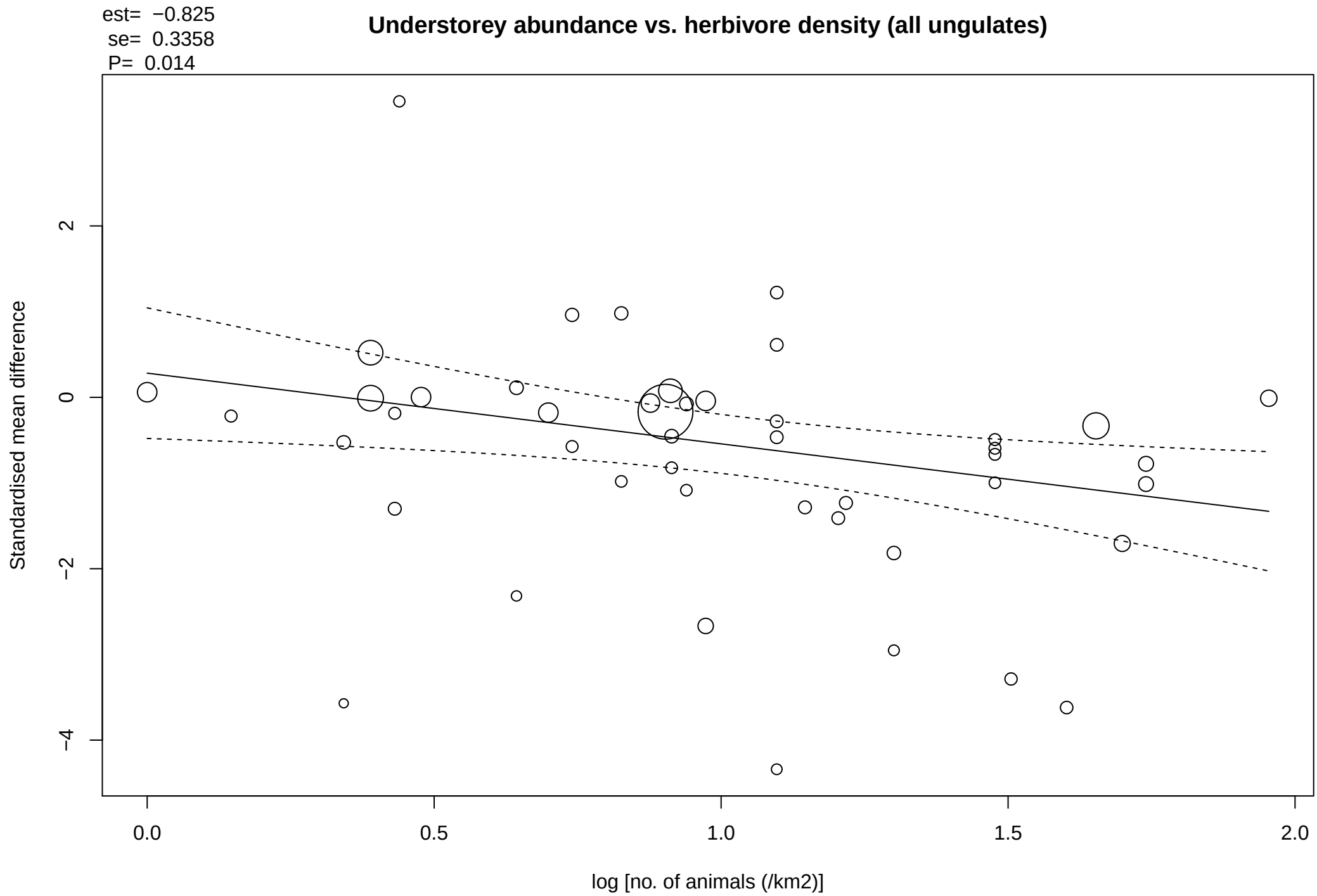

est= −2.337
se= 0.8512
P= 0.006
Woody understorey species richness vs. duration of herbivory manipulation
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
0.8
0.9
1.0
1.1
1.2
1.3
log [duration (years)]

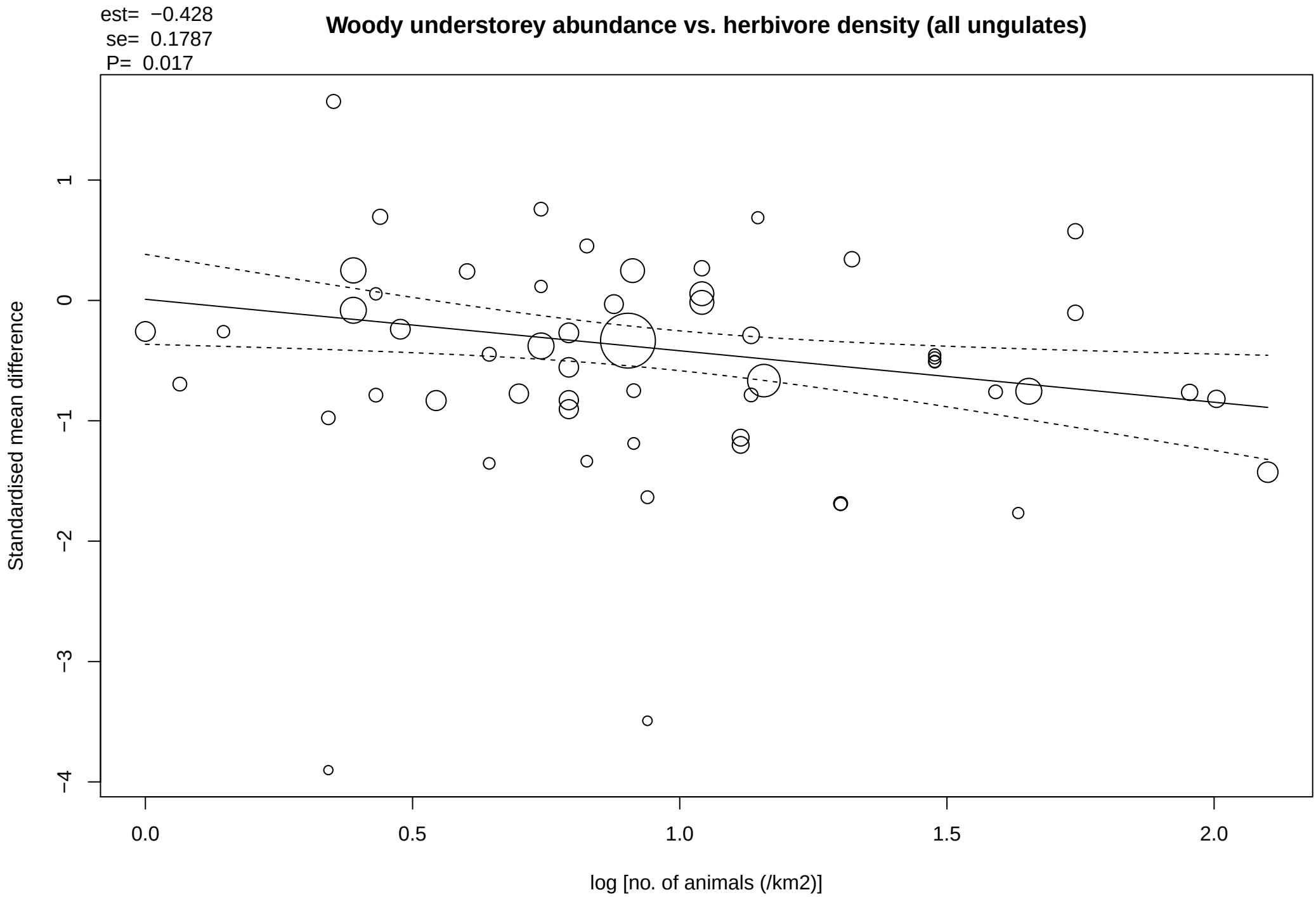

est= −3.285
se= 1.3157
P= 0.013
Tree sapling species richness vs. duration of herbivory manipulation
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
−2.0
0.8
0.9
1.0
1.1
1.2
log [duration (years)]

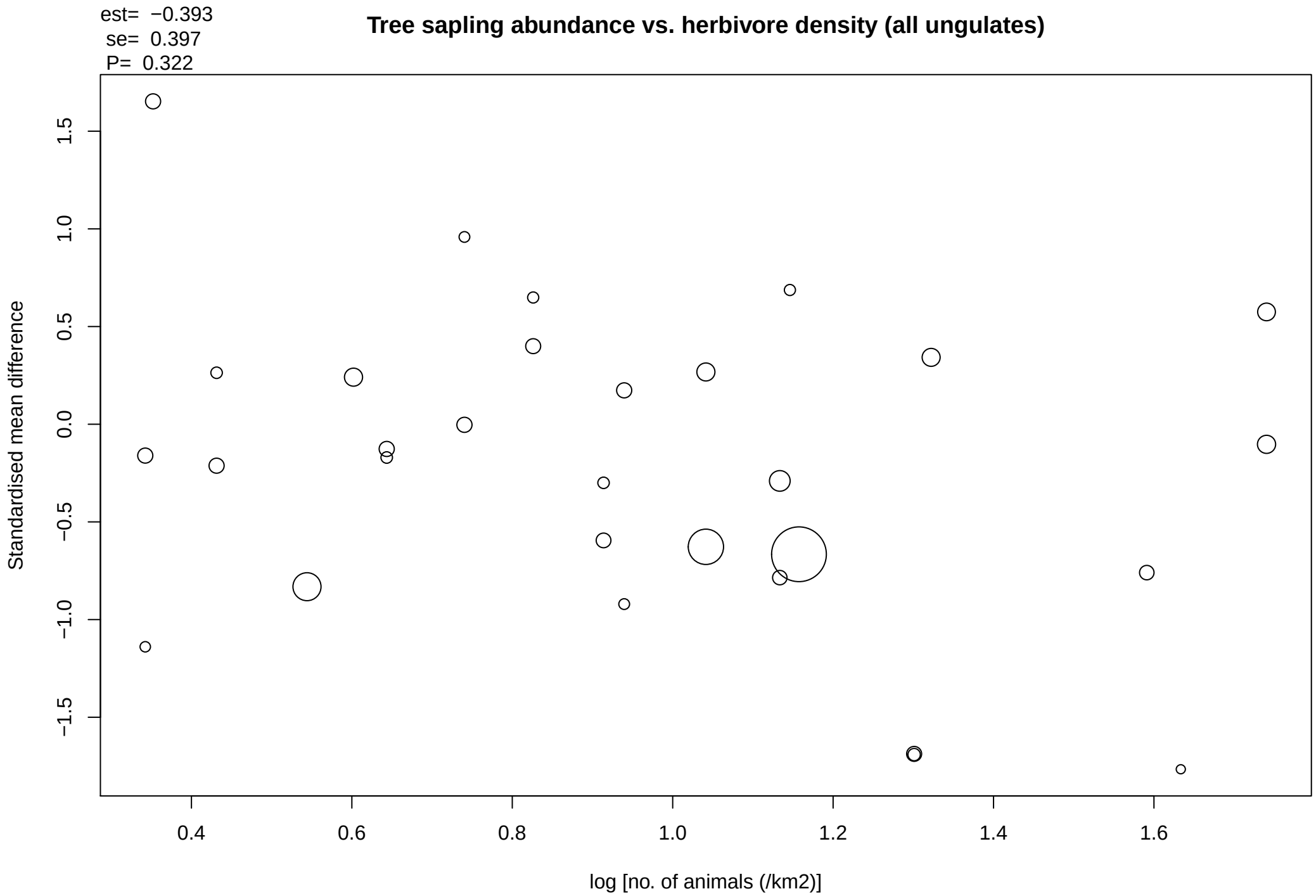

est= −5.043
se= 33.2168
P= 0.879
Shrub species richness vs. duration of herbivory manipulation
Standardised mean difference
0
−1
−2
−3
0.74
0.75
0.76
0.77
log [duration (years)]

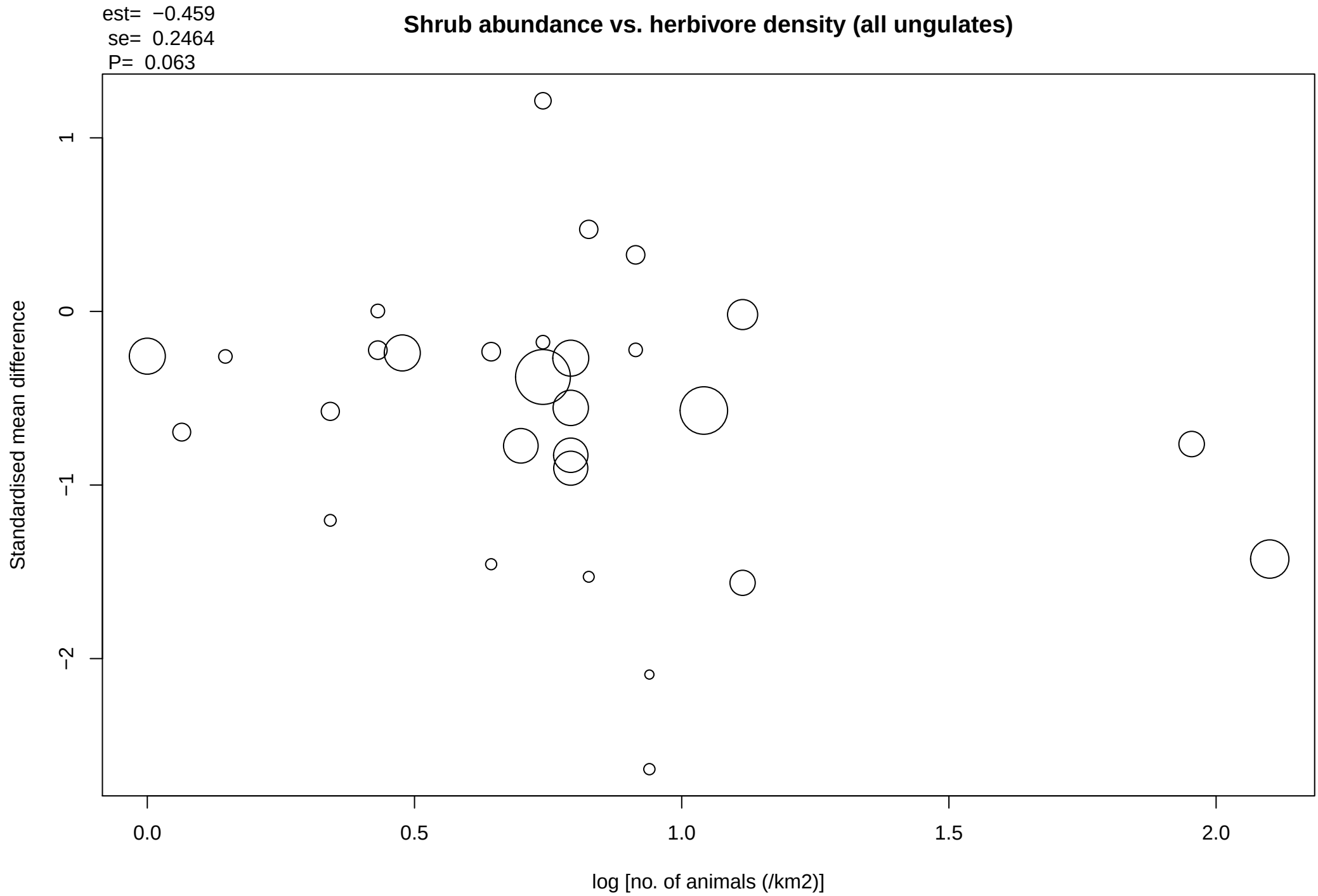

est= 3.376
se= 2.2896
P= 0.14
Graminoid species richness vs. duration of herbivory manipulation
Standardised mean difference
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
0.80
0.85
0.90
0.95
1.00
log [duration (years)]

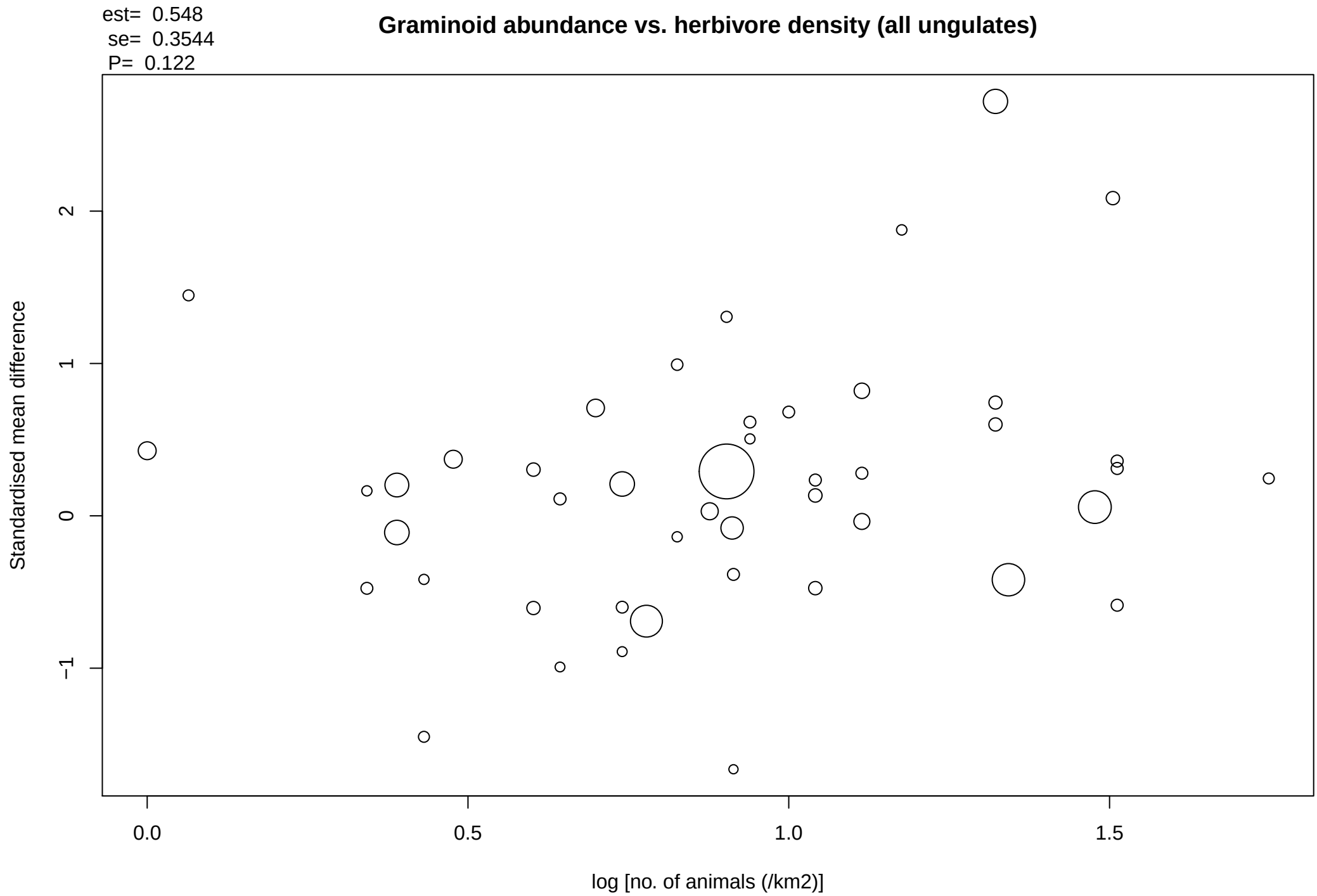

est= 1.589
se= 1.0109
P= 0.116
Forb species richness vs. duration of herbivory manipulation
Standardised mean difference
3
2
1
0
−1
0.0
0.2
0.4
0.6
0.8
1.0
log [duration (years)]

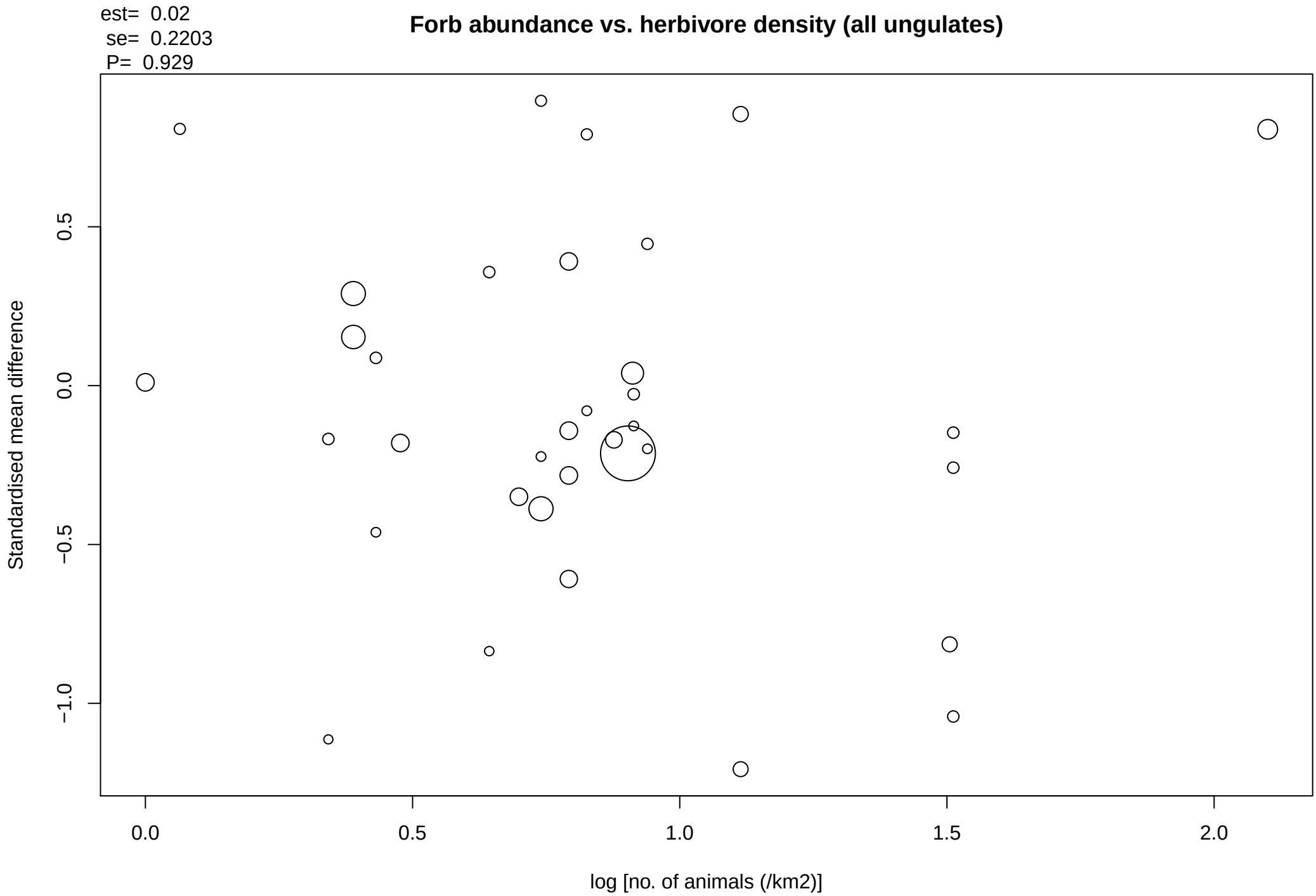

est= −0.825
se= 0.3358
P= 0.014
Understorey abundance vs. herbivore density (all ungulates)
Standardised mean difference
2
0
−2
−4
0.0
0.5
1.0
1.5
2.0
log [no. of animals (/km2)]

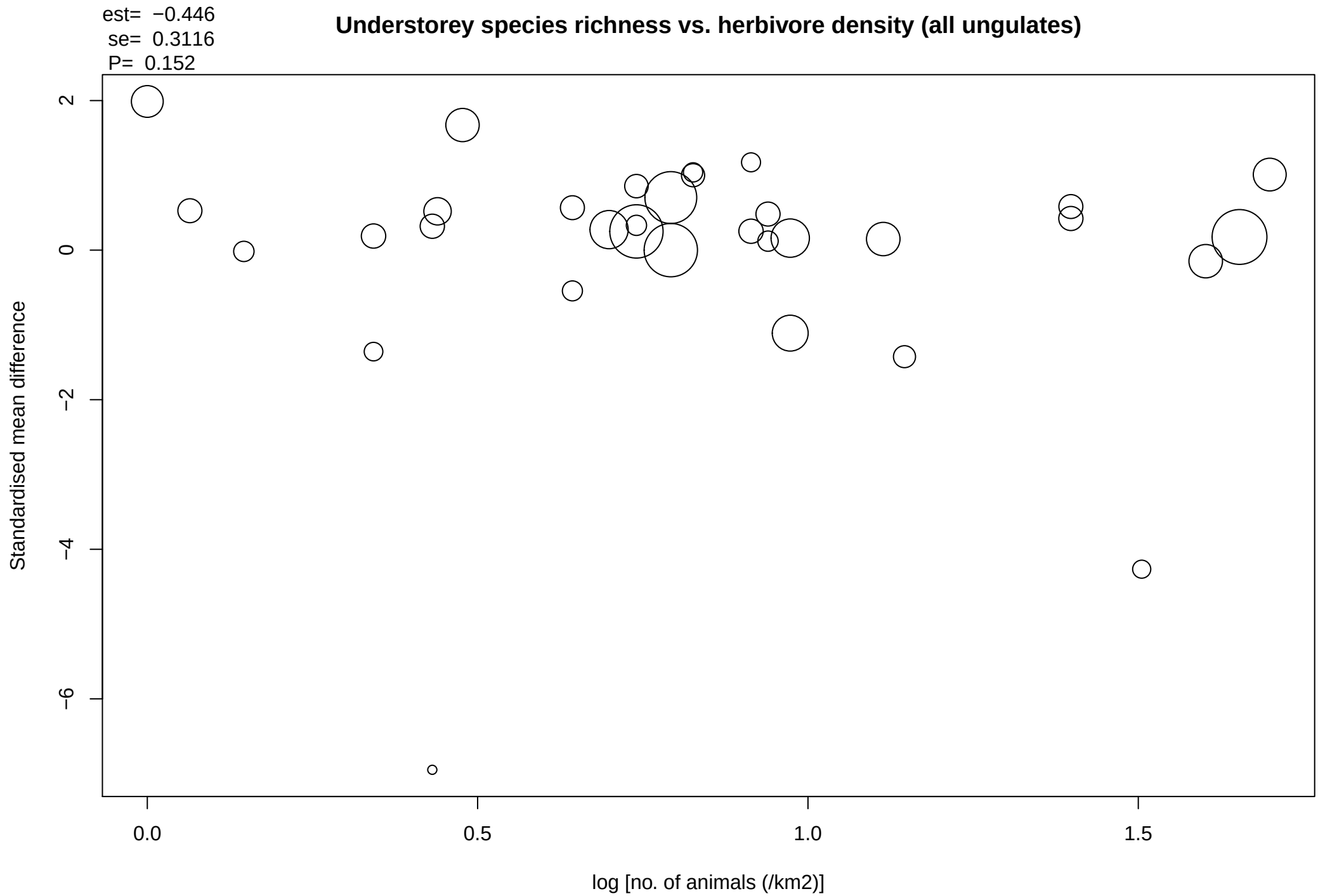

est= −0.428
se= 0.1787
P= 0.017
Woody understorey abundance vs. herbivore density (all ungulates)
Standardised mean difference
1
0
−1
−2
−3
−4
0.0
0.5
1.0
1.5
2.0
log [no. of animals (/km2)]

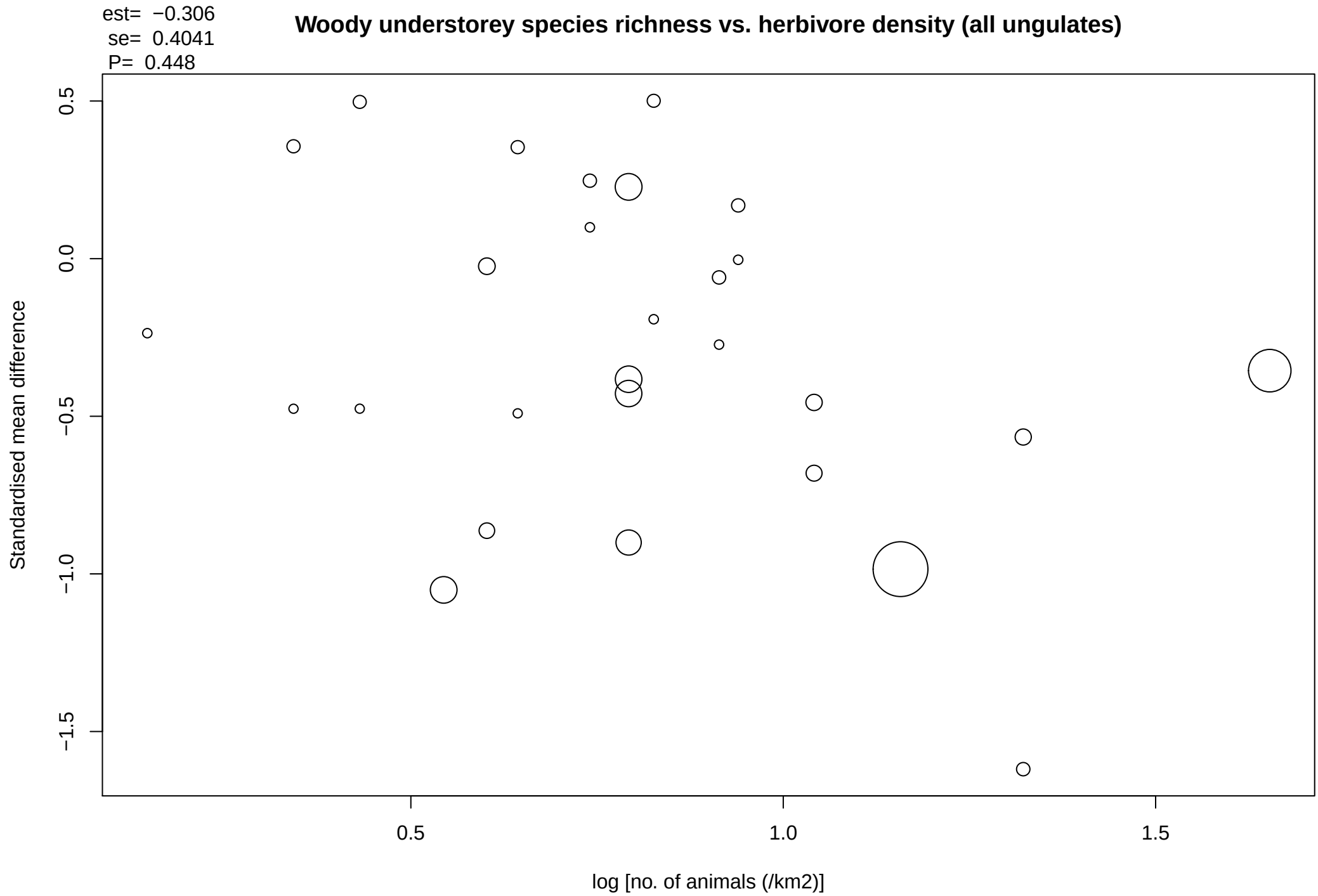

est= −0.393
se= 0.397
P= 0.322
Tree sapling abundance vs. herbivore density (all ungulates)
Standardised mean difference
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
0.4
0.6
0.8
1.0
1.2
1.4
1.6
log [no. of animals (/km2)]

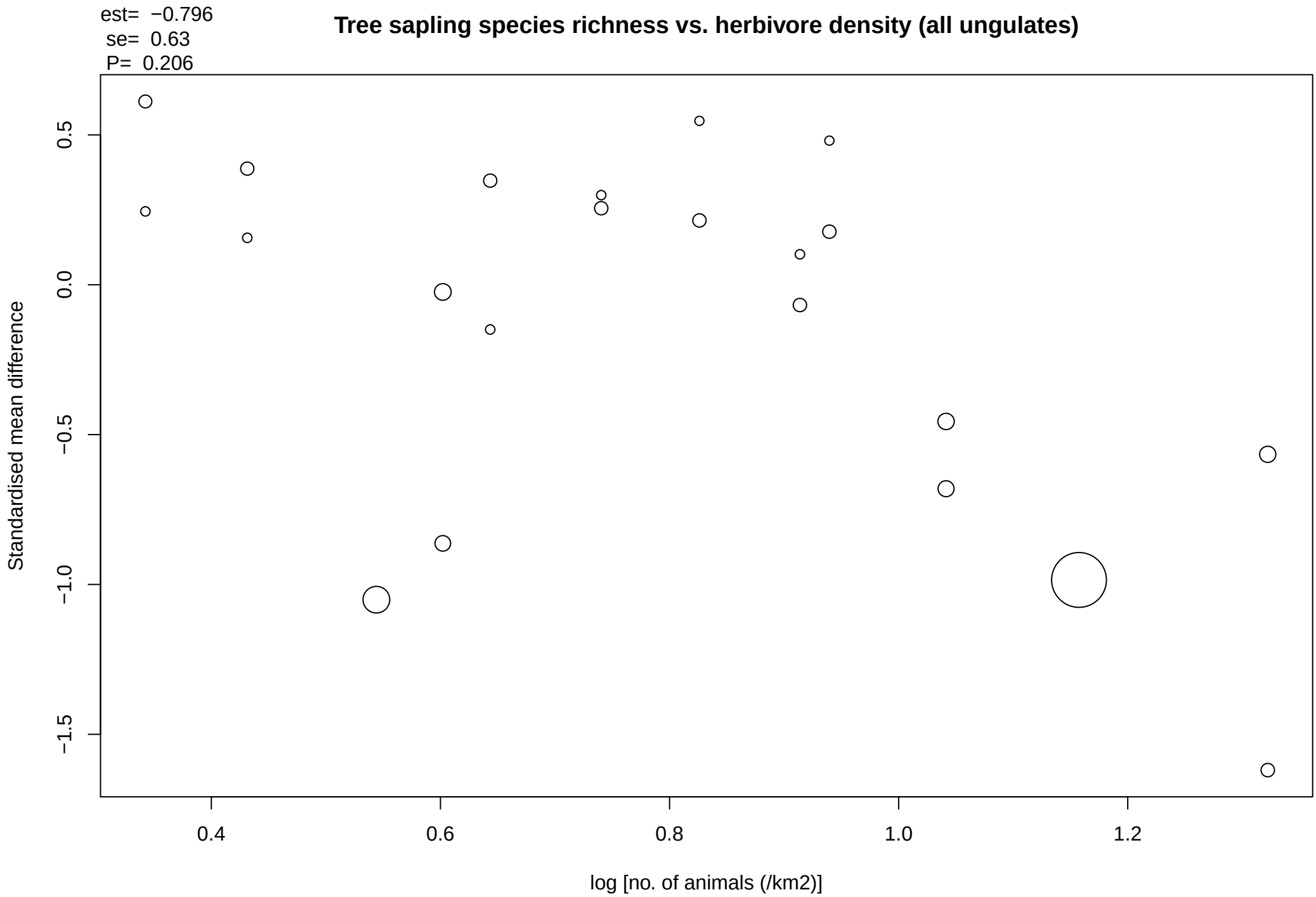

est= −0.459
se= 0.2464
P= 0.063
Shrub abundance vs. herbivore density (all ungulates)
Standardised mean difference
1
0
−1
−2
0.0
0.5
1.0
1.5
2.0
log [no. of animals (/km2)]

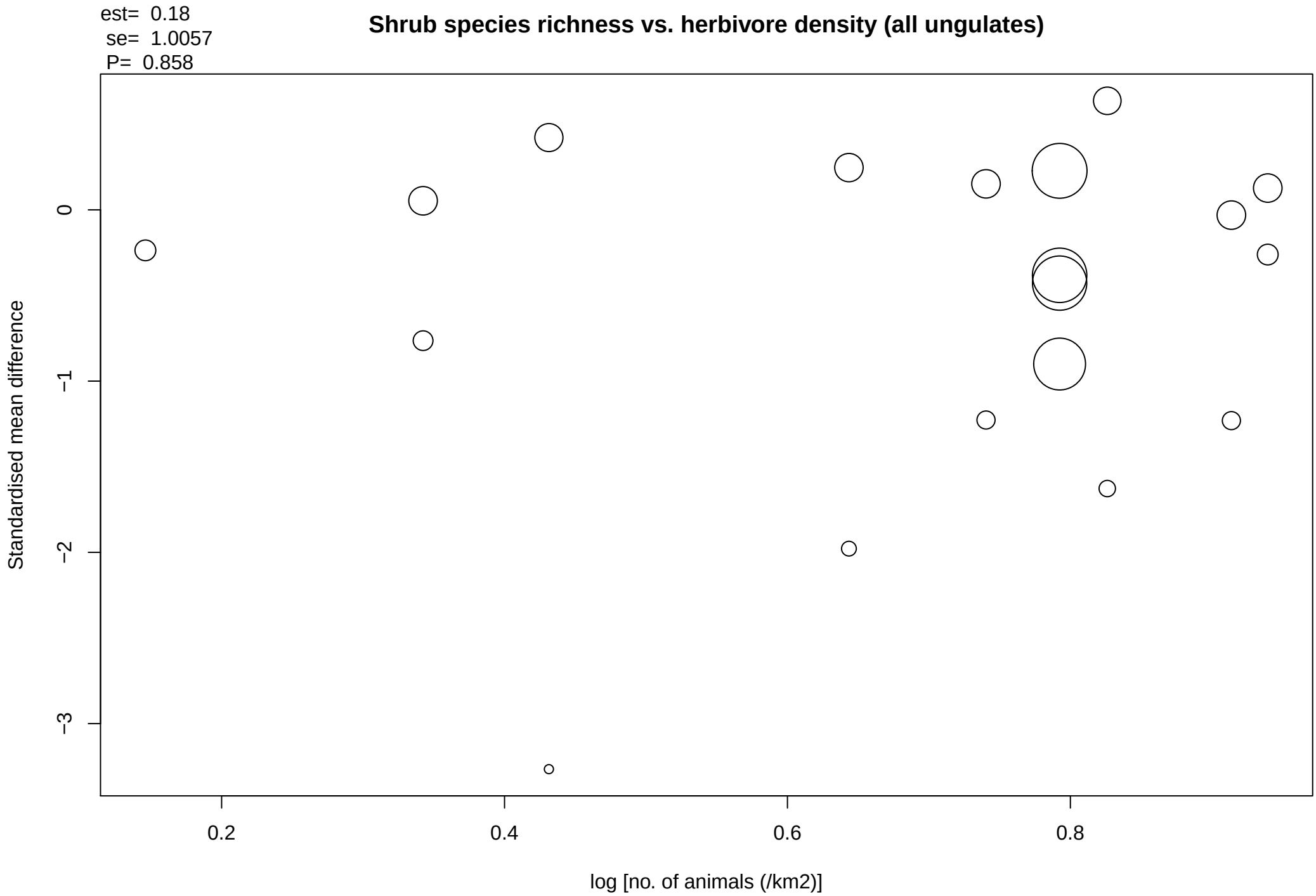

est= 0.548
se= 0.3544
P= 0.122
Graminoid abundance vs. herbivore density (all ungulates)
Standardised mean difference
2
1
0
−1
0.0
0.5
1.0
1.5
log [no. of animals (/km2)]

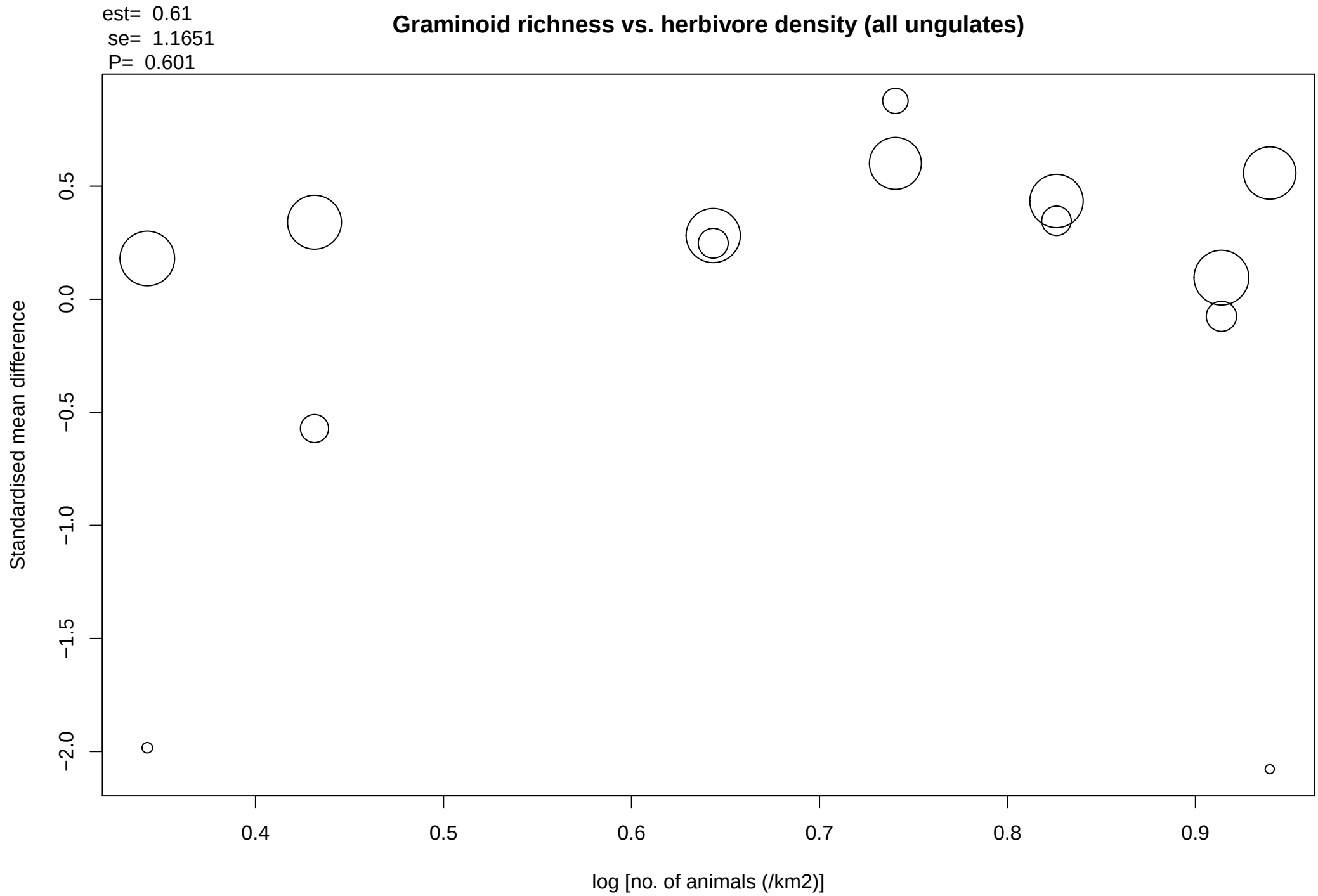

est= 0.02
se= 0.2203
P= 0.929
Forb abundance vs. herbivore density (all ungulates)
Standardised mean difference
0.5
0.0
−0.5
−1.0
0.0
0.5
1.0
1.5
2.0
log [no. of animals (/km2)]

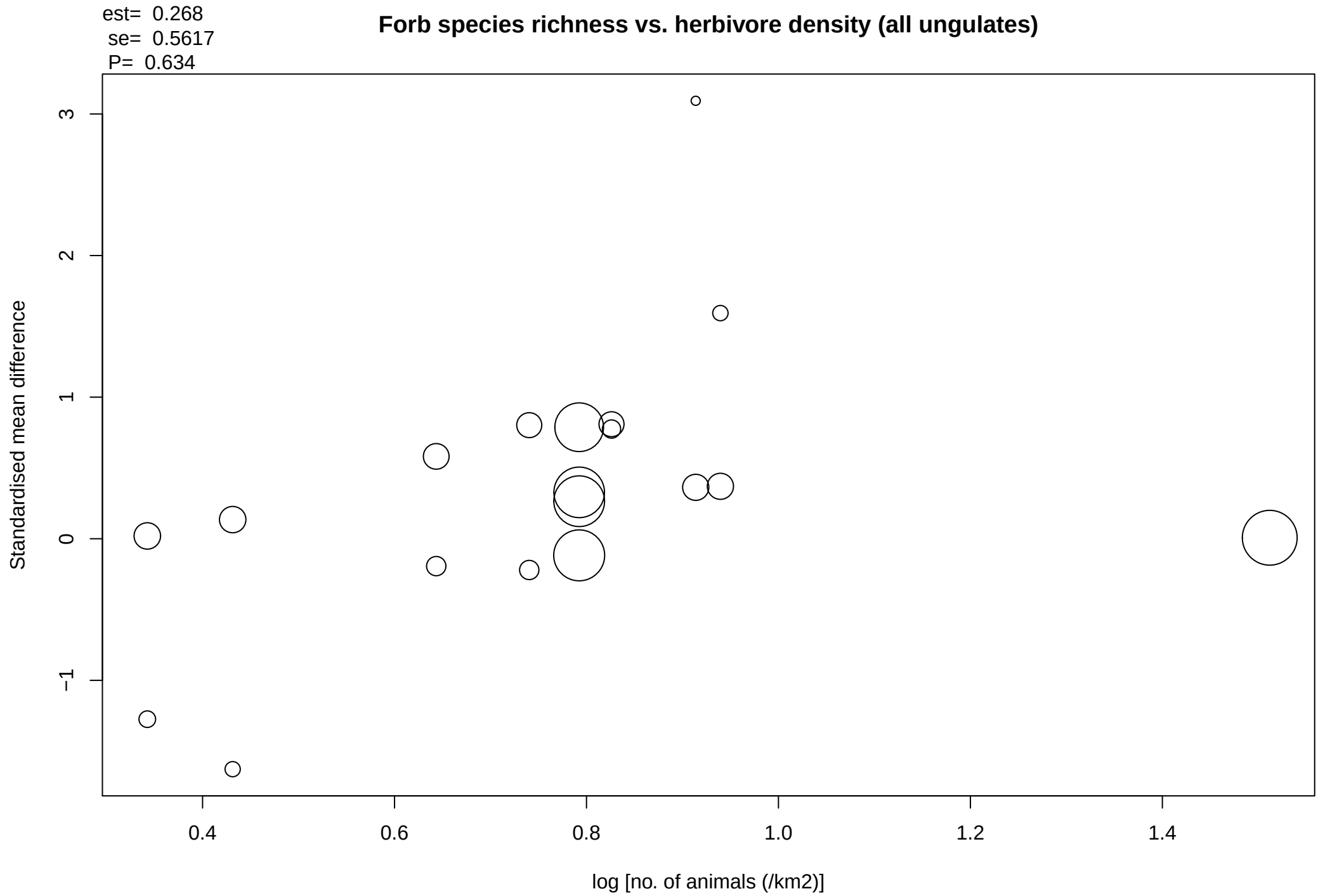

est= −0.446
se= 0.3116
P= 0.152
Understorey species richness vs. herbivore density (all ungulates)
Standardised mean difference
2
0
−2
−4
−6
0.0
0.5
1.0
1.5
log [no. of animals (/km2)]

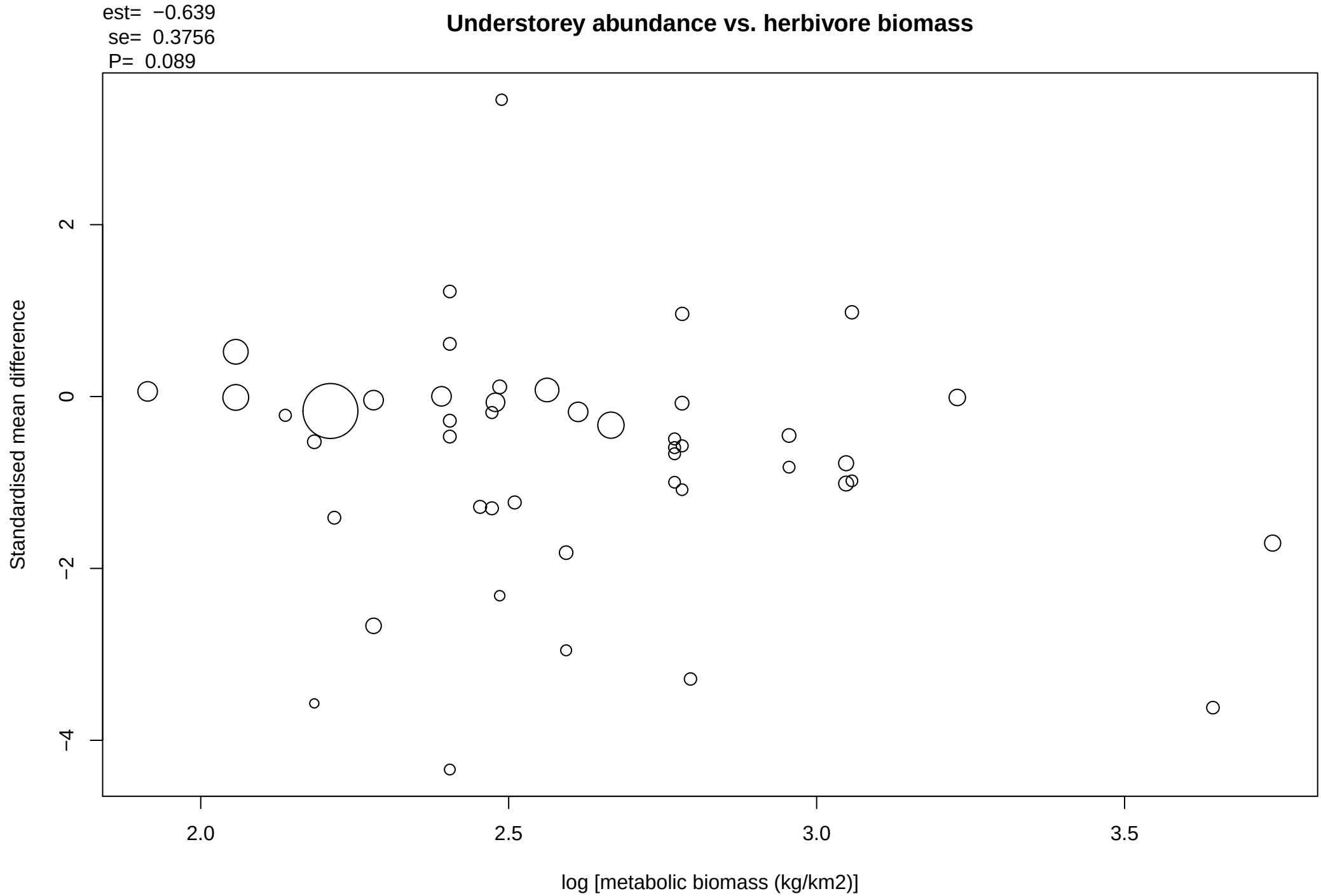

est= −0.306
se= 0.4041
P= 0.448
Woody understorey species richness vs. herbivore density (all ungulates)
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
0.5
1.0
1.5
log [no. of animals (/km2)]

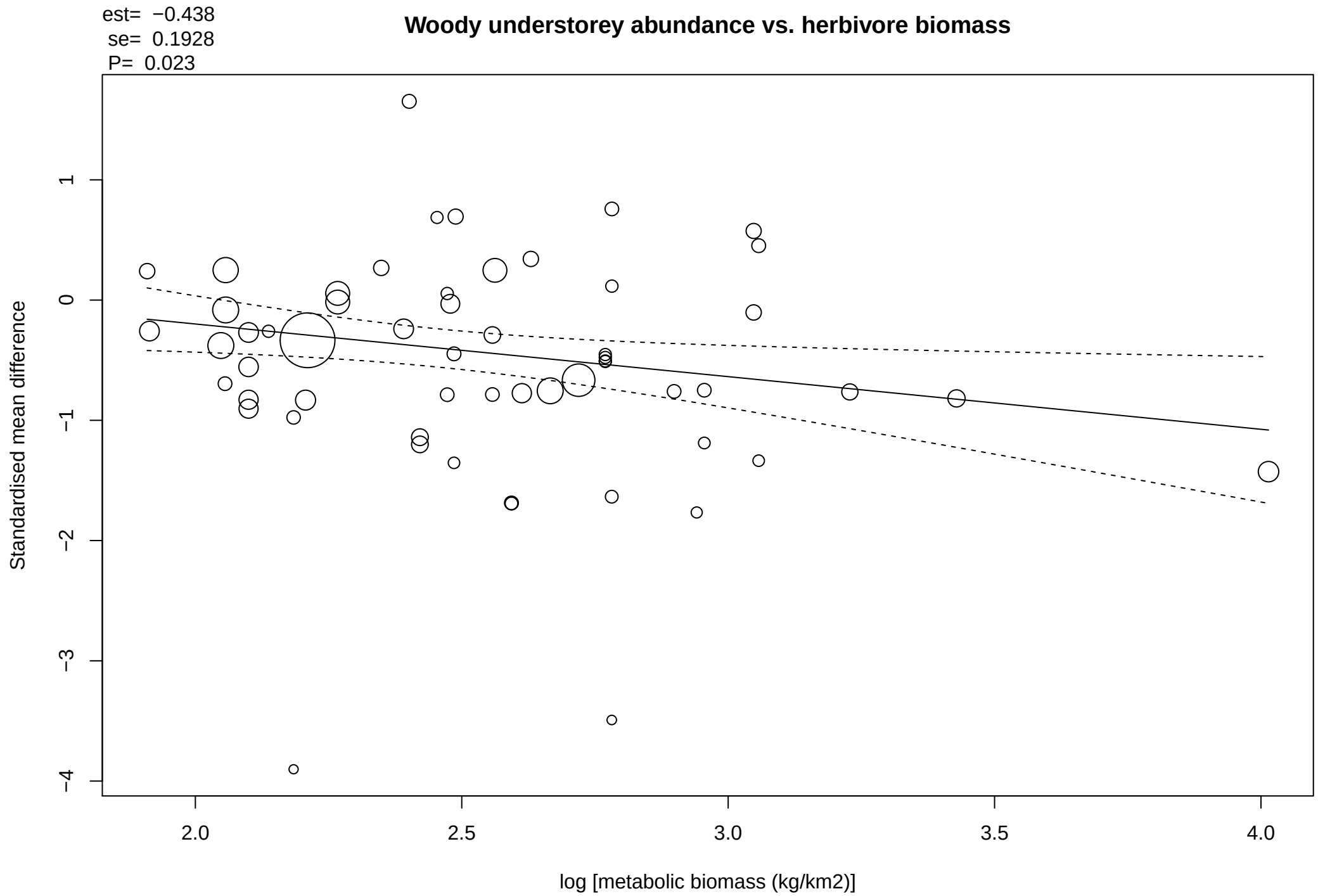

est= −0.796
se= 0.63
P= 0.206
Tree sapling species richness vs. herbivore density (all ungulates)
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
0.4
0.6
0.8
1.0
1.2
log [no. of animals (/km2)]

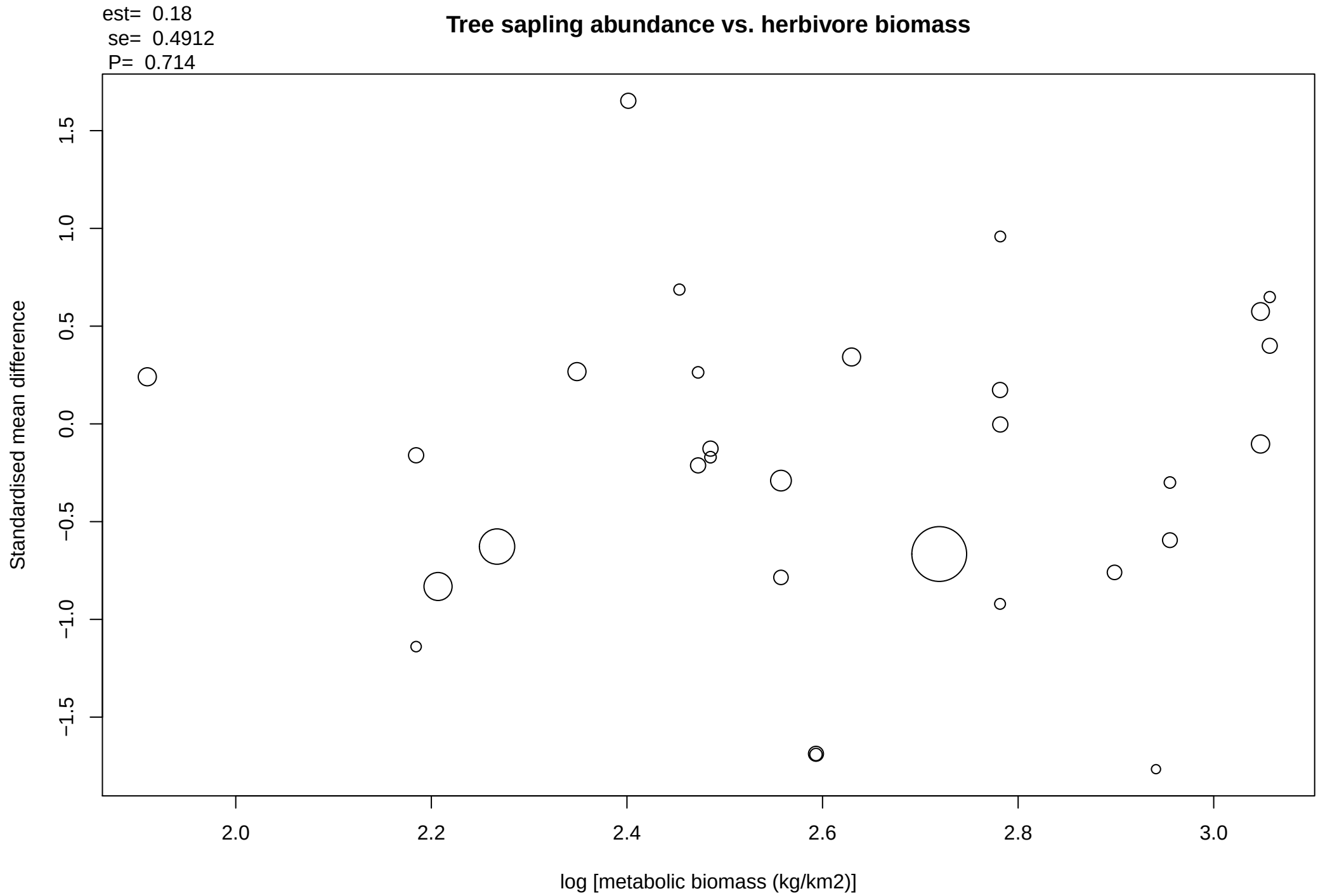

est= 0.18
se= 1.0057
P= 0.858
Shrub species richness vs. herbivore density (all ungulates)
Standardised mean difference
0
−1
−2
−3
0.2
0.4
0.6
0.8
log [no. of animals (/km2)]

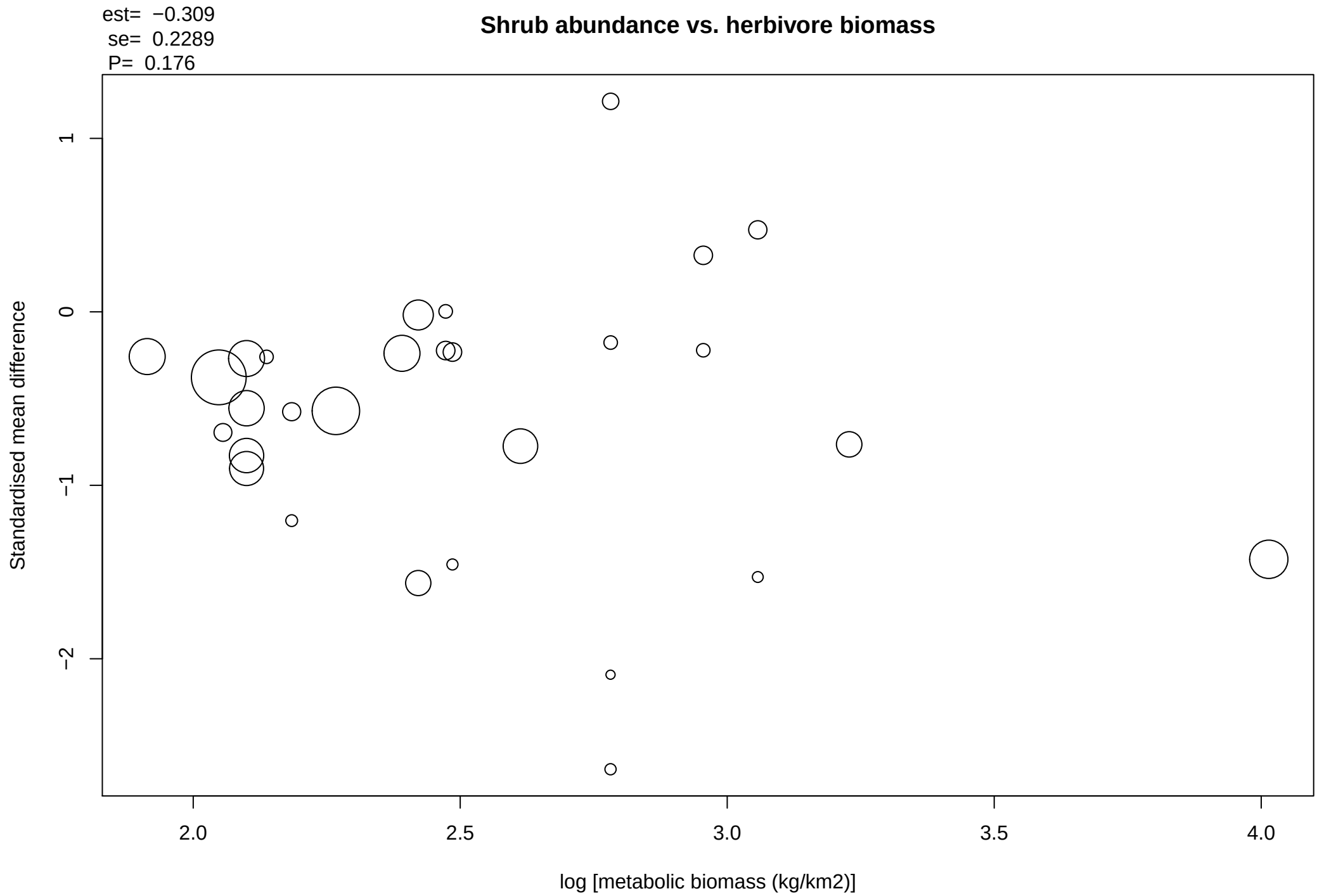

est= 0.61
se= 1.1651
P= 0.601
Graminoid richness vs. herbivore density (all ungulates)
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
−2.0
0.4
0.5
0.6
0.7
0.8
0.9
log [no. of animals (/km2)]

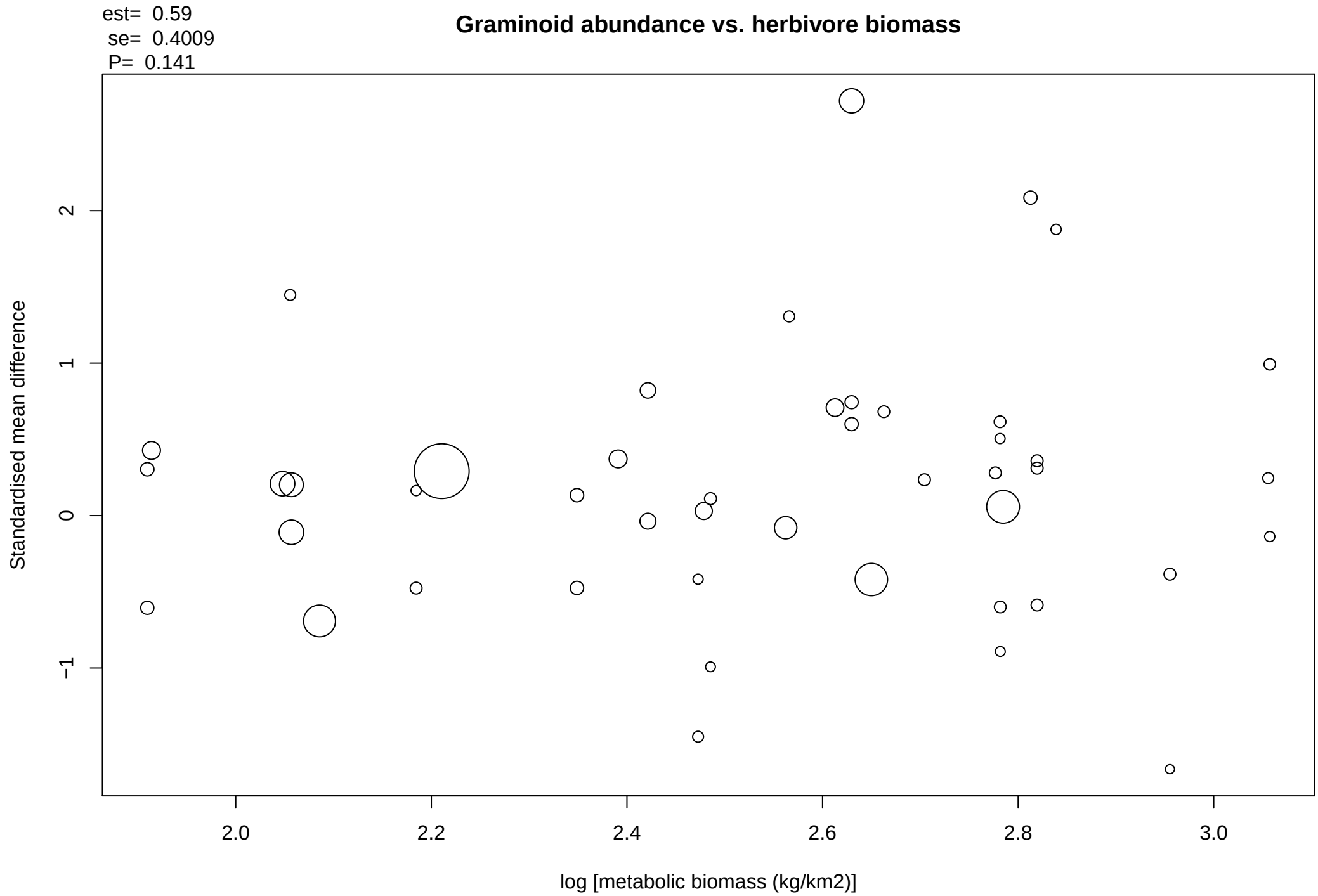

est= 0.268
se= 0.5617
P= 0.634
Forb species richness vs. herbivore density (all ungulates)
Standardised mean difference
3
2
1
0
−1
0.4
0.6
0.8
1.0
1.2
1.4
log [no. of animals (/km2)]

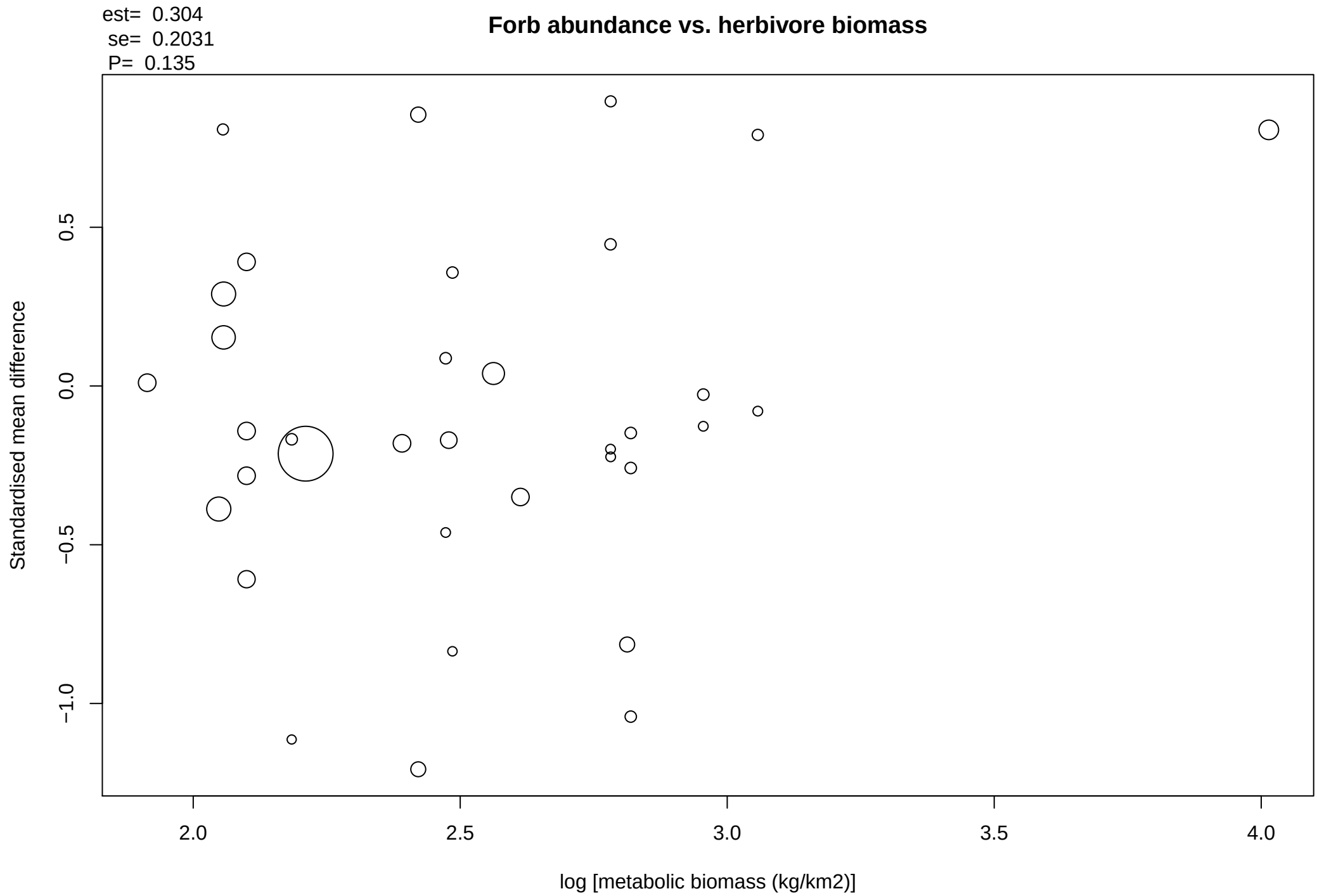

est= −0.639
se= 0.3756
P= 0.089
Understorey abundance vs. herbivore biomass
Standardised mean difference
2
0
−2
−4
2.0
2.5
3.0
3.5
log [metabolic biomass (kg/km2)]

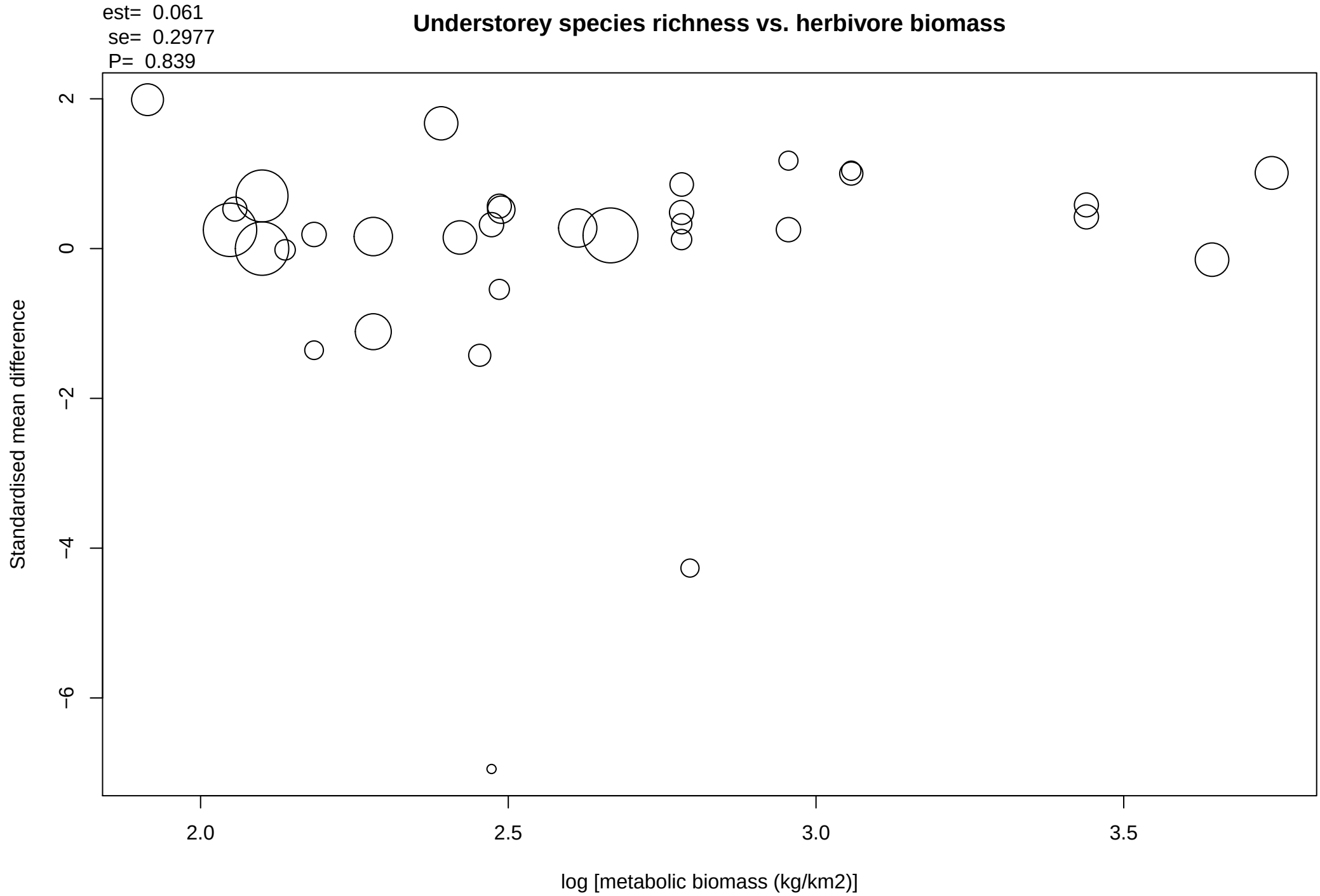

est= −0.438
se= 0.1928
P= 0.023
Woody understorey abundance vs. herbivore biomass
Standardised mean difference
1
0
−1
−2
−3
−4
2.0
2.5
3.0
3.5
4.0
log [metabolic biomass (kg/km2)]

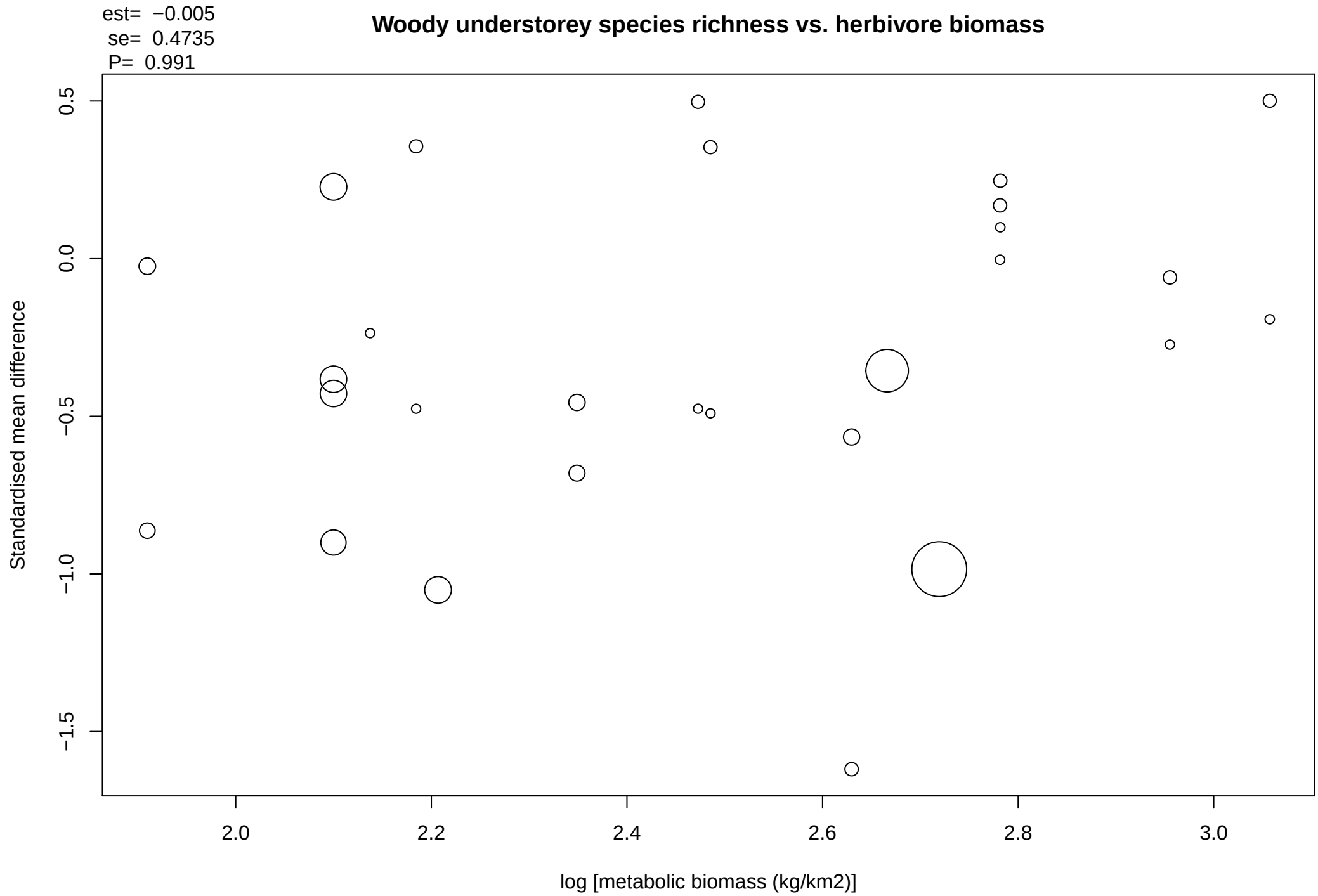

est= 0.18
se= 0.4912
P= 0.714
Tree sapling abundance vs. herbivore biomass
Standardised mean difference
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
2.0
2.2
2.4
2.6
2.8
3.0
log [metabolic biomass (kg/km2)]

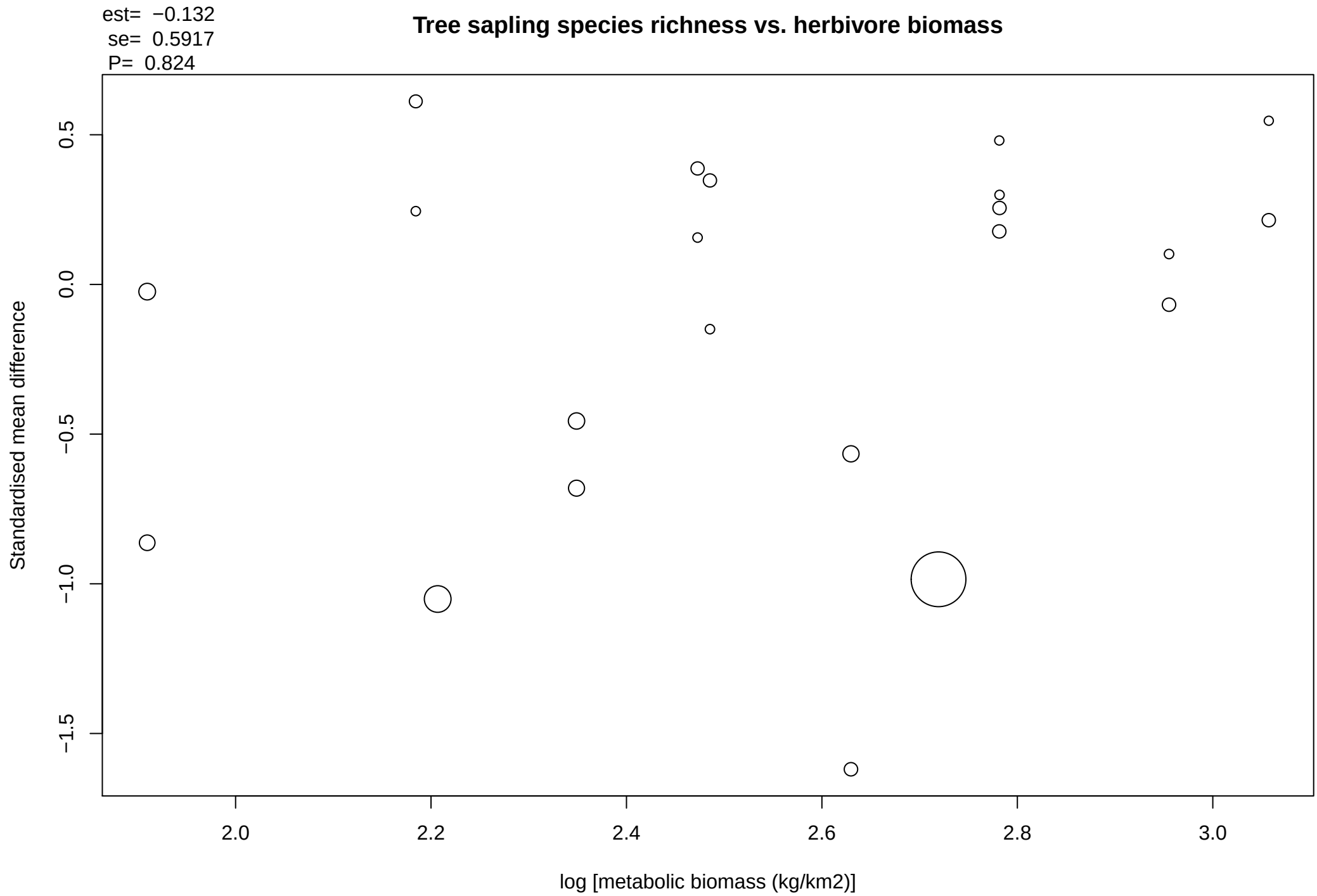

est= −0.309
se= 0.2289
P= 0.176
Shrub abundance vs. herbivore biomass
Standardised mean difference
1
0
−1
−2
2.0
2.5
3.0
3.5
4.0
log [metabolic biomass (kg/km2)]

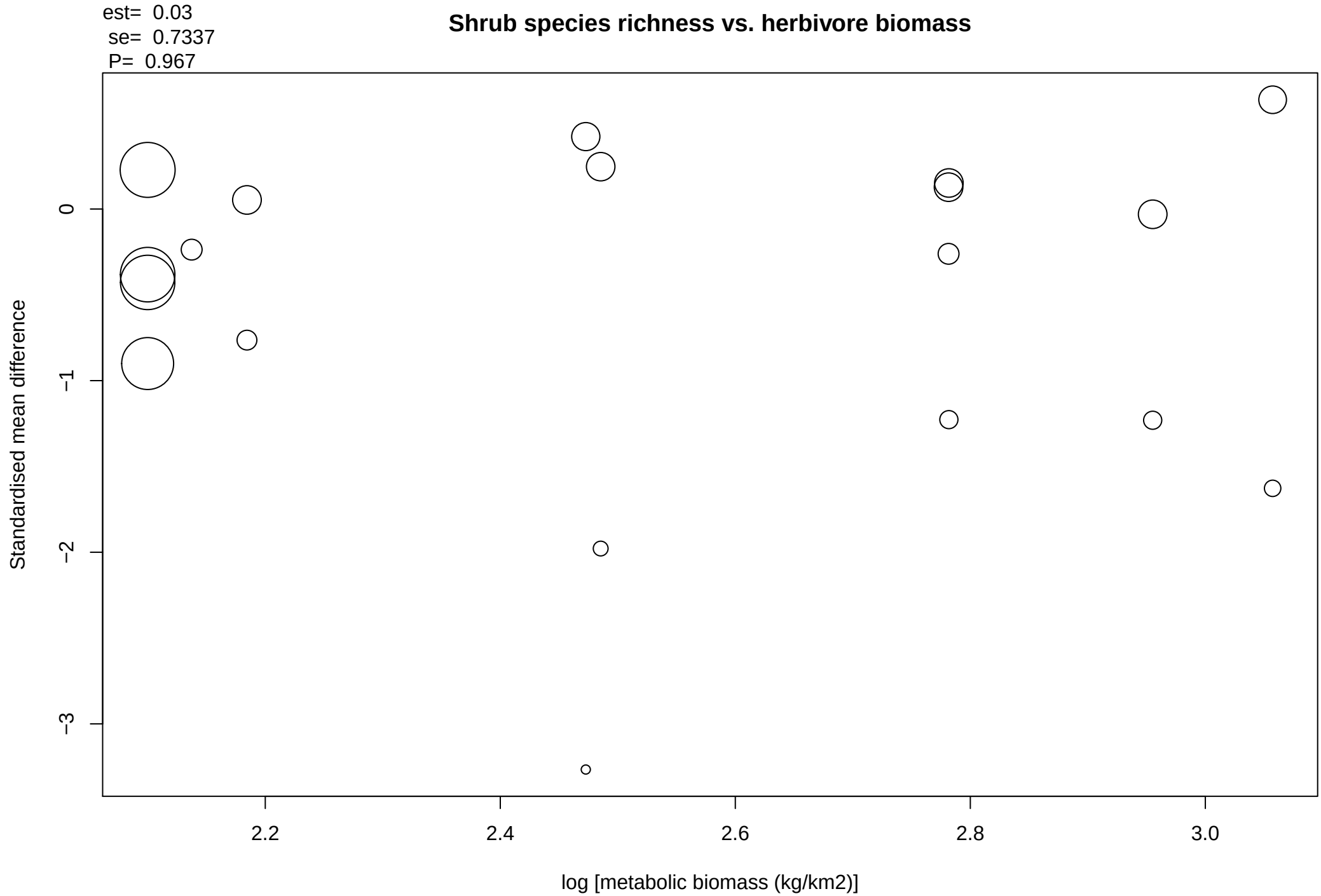

est= 0.59
se= 0.4009
P= 0.141
Graminoid abundance vs. herbivore biomass
Standardised mean difference
−1
0
1
2
2.0
2.2
2.4
2.6
2.8
3.0
log [metabolic biomass (kg/km2)]

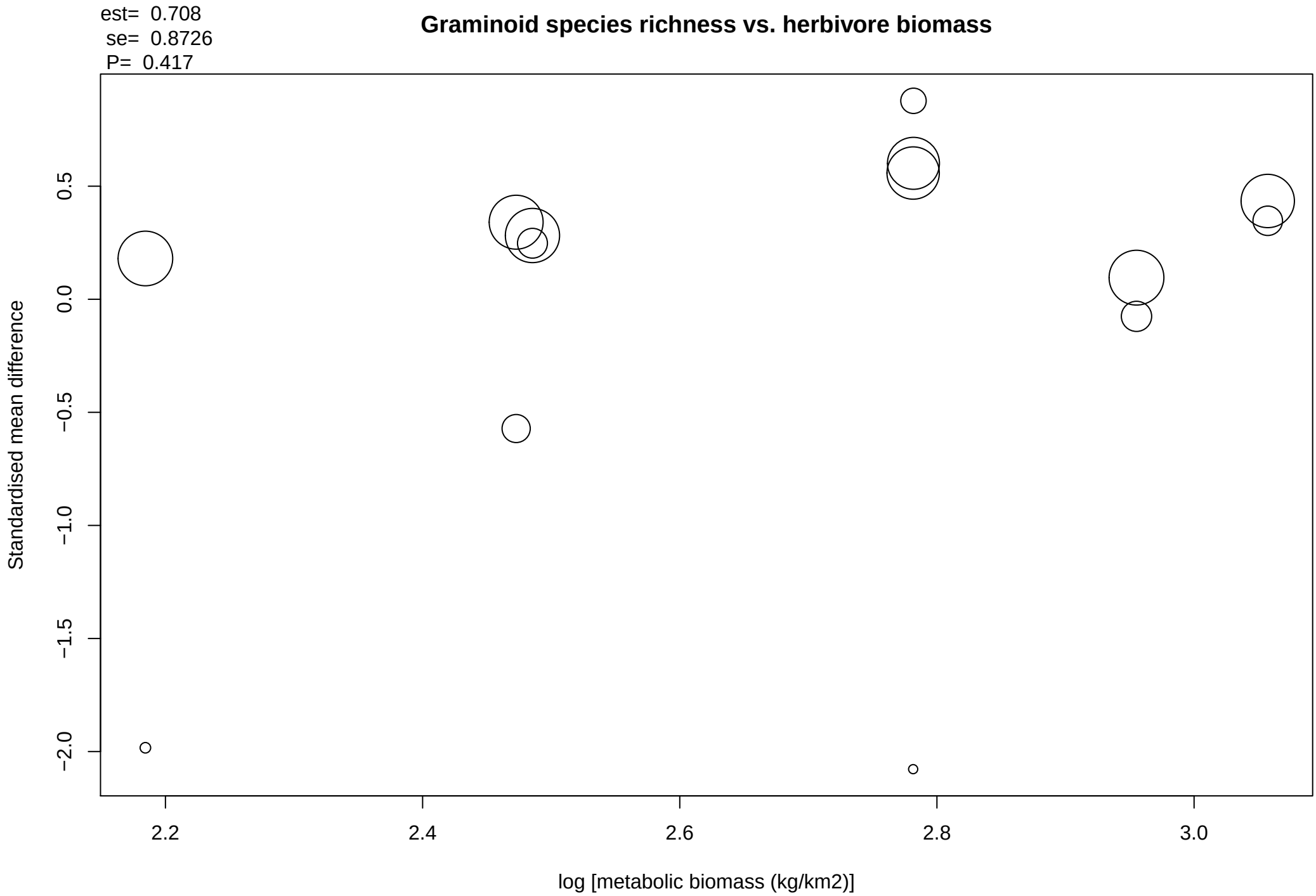

est= 0.304
se= 0.2031
P= 0.135
Forb abundance vs. herbivore biomass
Standardised mean difference
0.5
0.0
−0.5
−1.0
2.0
2.5
3.0
3.5
4.0
log [metabolic biomass (kg/km2)]

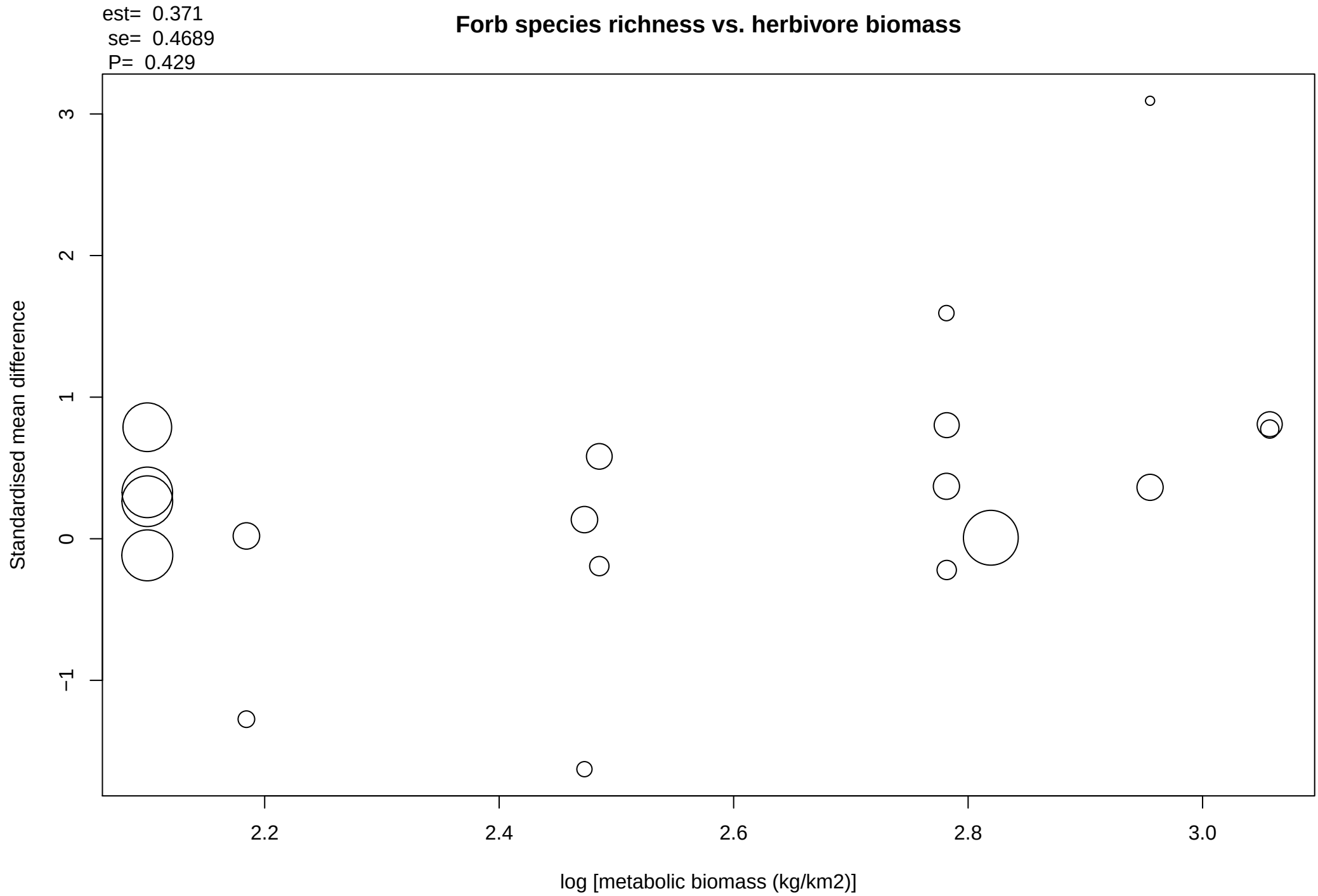

est= 0.061
se= 0.2977
P= 0.839
Understorey species richness vs. herbivore biomass
Standardised mean difference
2
0
−2
−4
−6
2.0
2.5
3.0
3.5
log [metabolic biomass (kg/km2)]

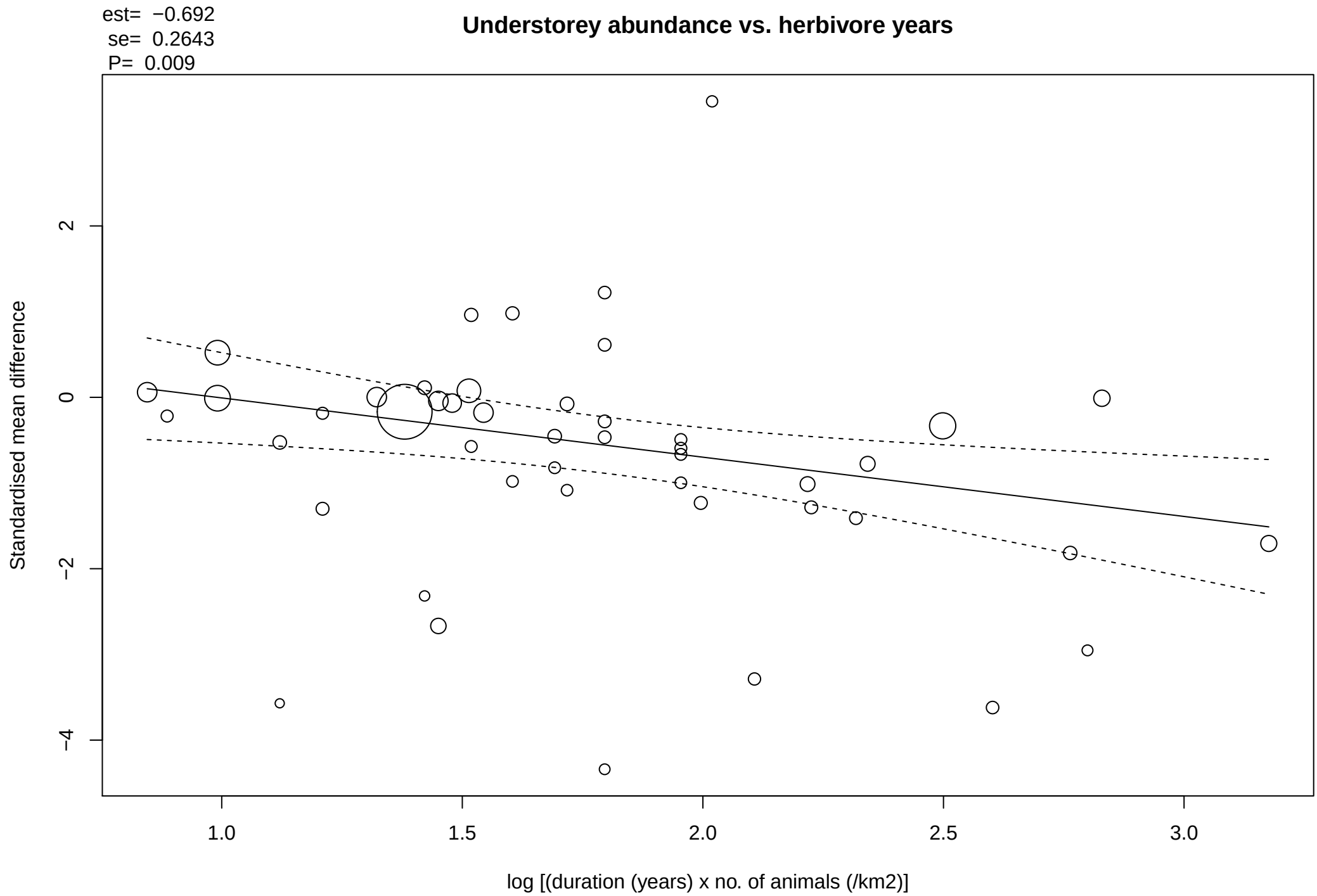

est= −0.005
se= 0.4735
P= 0.991
Woody understorey species richness vs. herbivore biomass
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
2.0
2.2
2.4
2.6
2.8
3.0
log [metabolic biomass (kg/km2)]

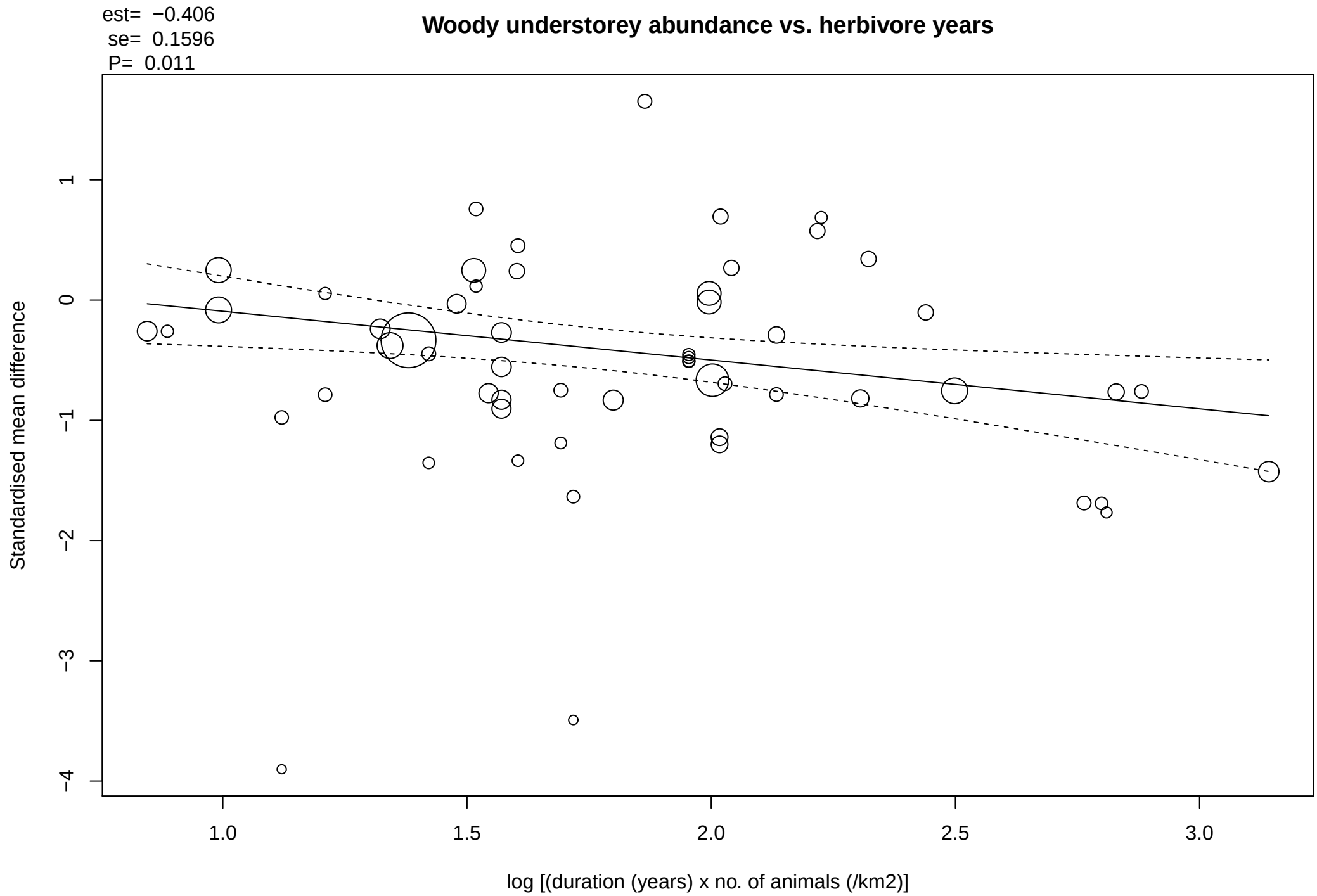

est= −0.132
se= 0.5917
P= 0.824
Tree sapling species richness vs. herbivore biomass
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
2.0
2.2
2.4
2.6
2.8
3.0
log [metabolic biomass (kg/km2)]

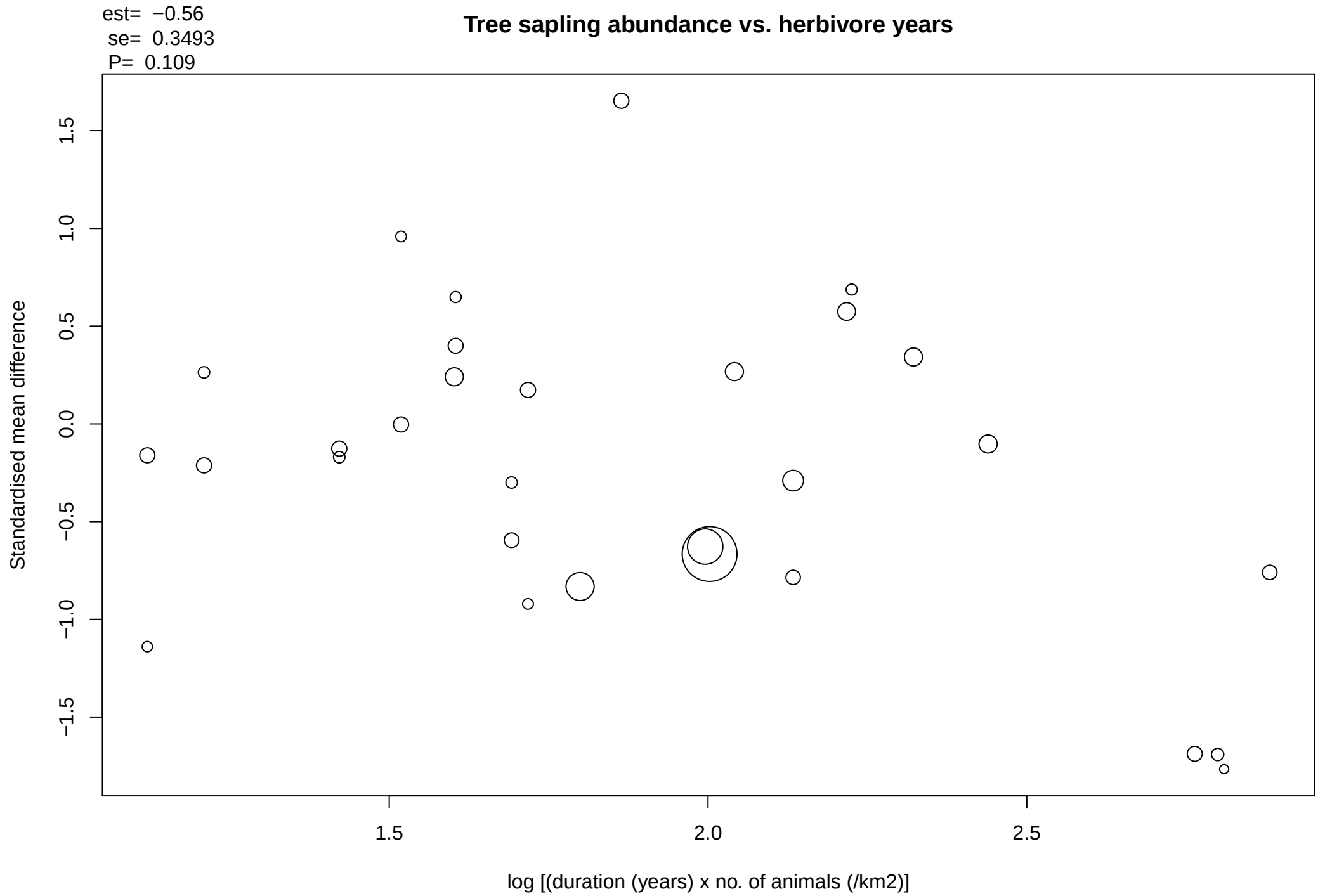

est= 0.03
se= 0.7337
P= 0.967
Shrub species richness vs. herbivore biomass
Standardised mean difference
0
−1
−2
−3
2.2
2.4
2.6
2.8
3.0
log [metabolic biomass (kg/km2)]

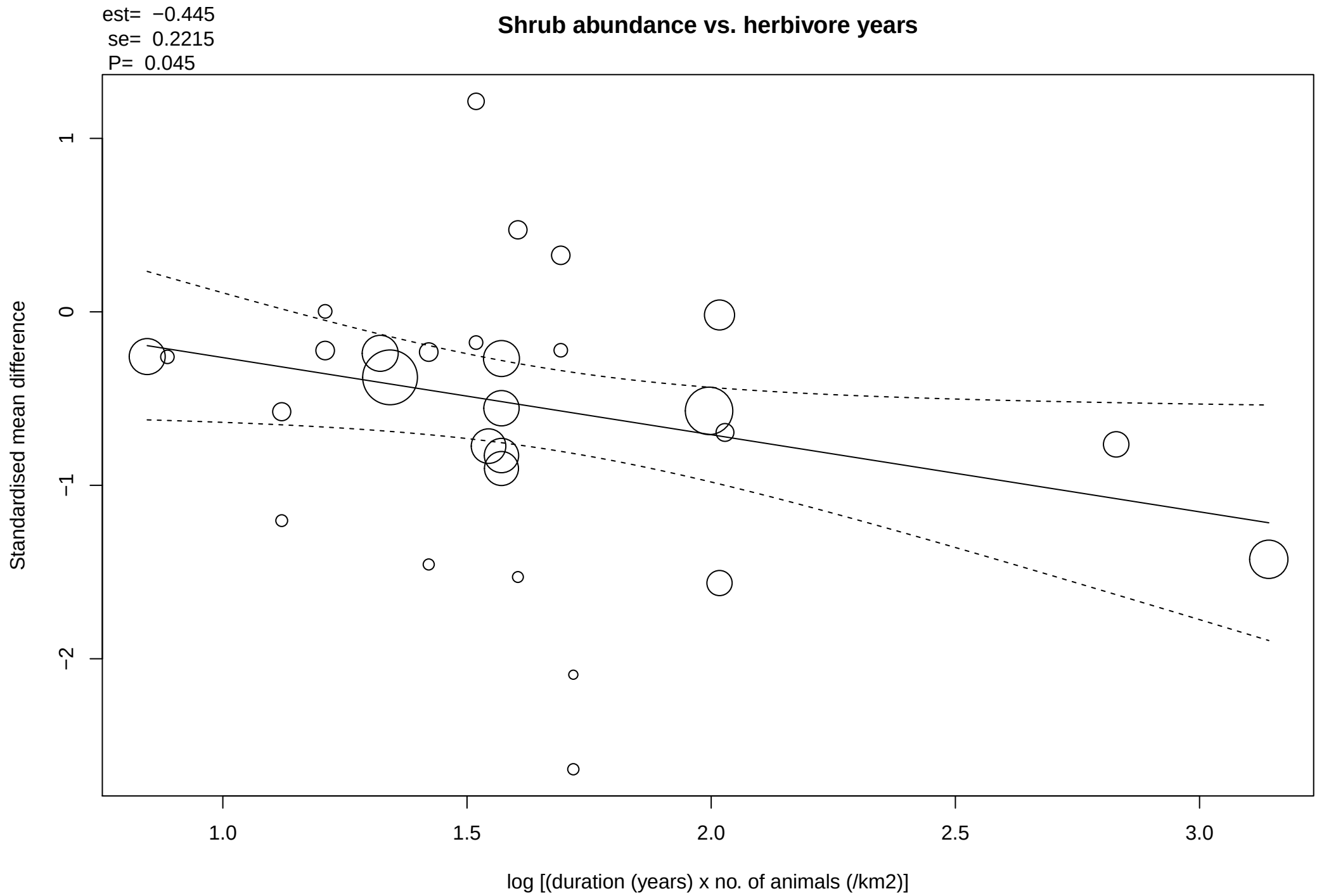

est= 0.708
se= 0.8726
P= 0.417
Graminoid species richness vs. herbivore biomass
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
−2.0
2.2
2.4
2.6
2.8
3.0
log [metabolic biomass (kg/km2)]

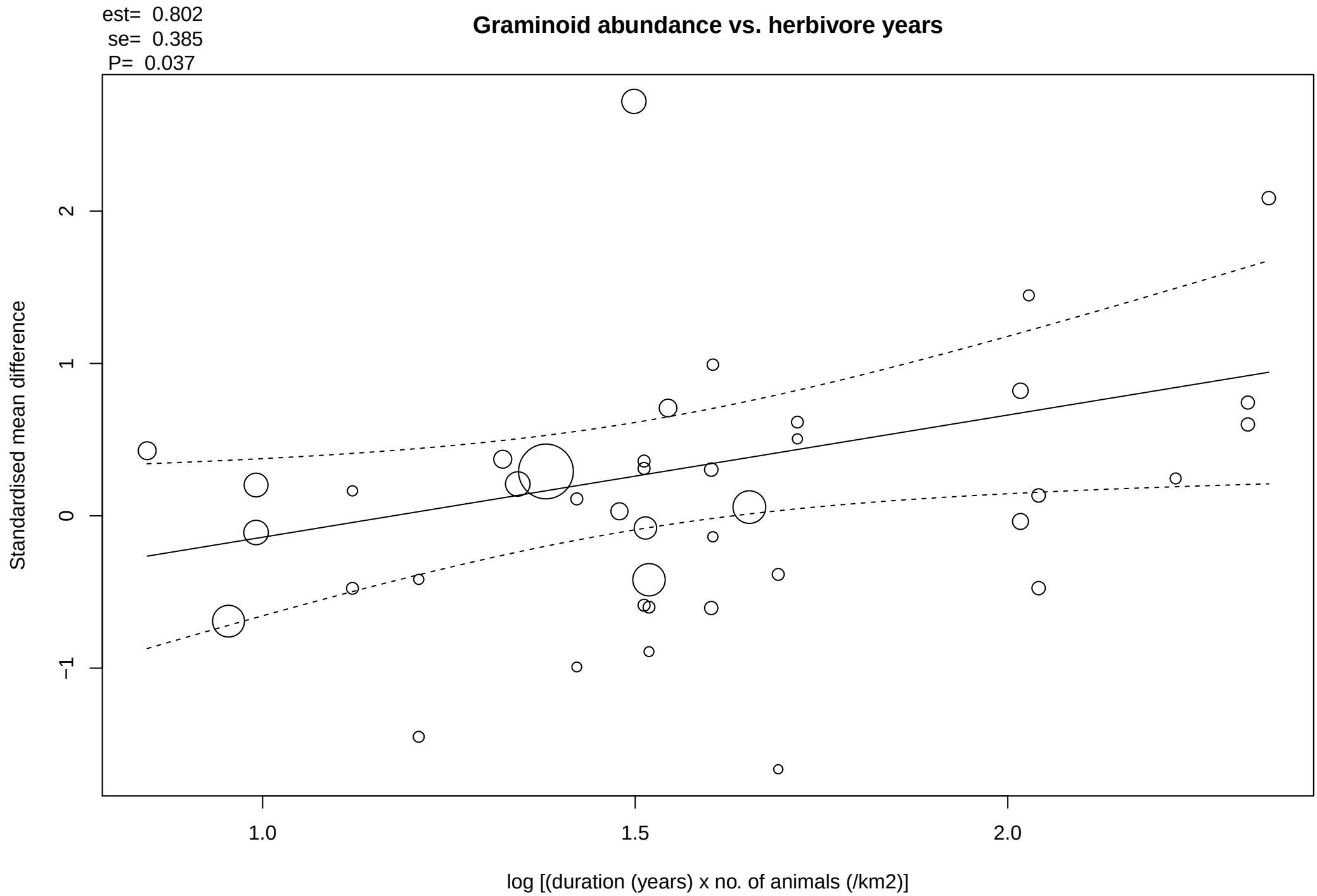

est= 0.371
se= 0.4689
P= 0.429
Forb species richness vs. herbivore biomass
Standardised mean difference
3
2
1
0
−1
2.2
2.4
2.6
2.8
3.0
log [metabolic biomass (kg/km2)]

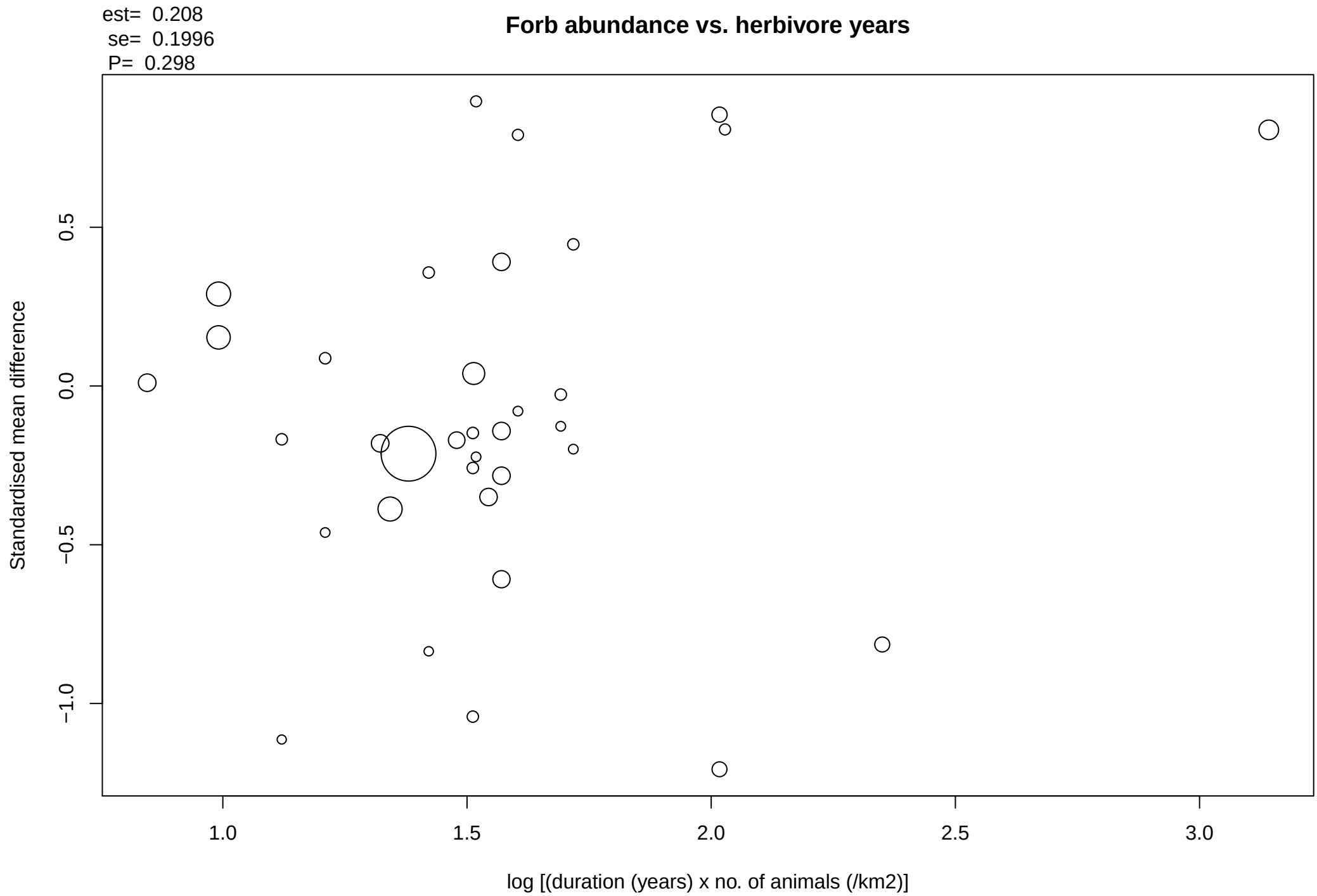

est= −0.692
se= 0.2643
P= 0.009
Understorey abundance vs. herbivore years
Standardised mean difference
2
0
−2
−4
1.0
1.5
2.0
2.5
3.0
log [(duration (years) x no. of animals (/km2)]

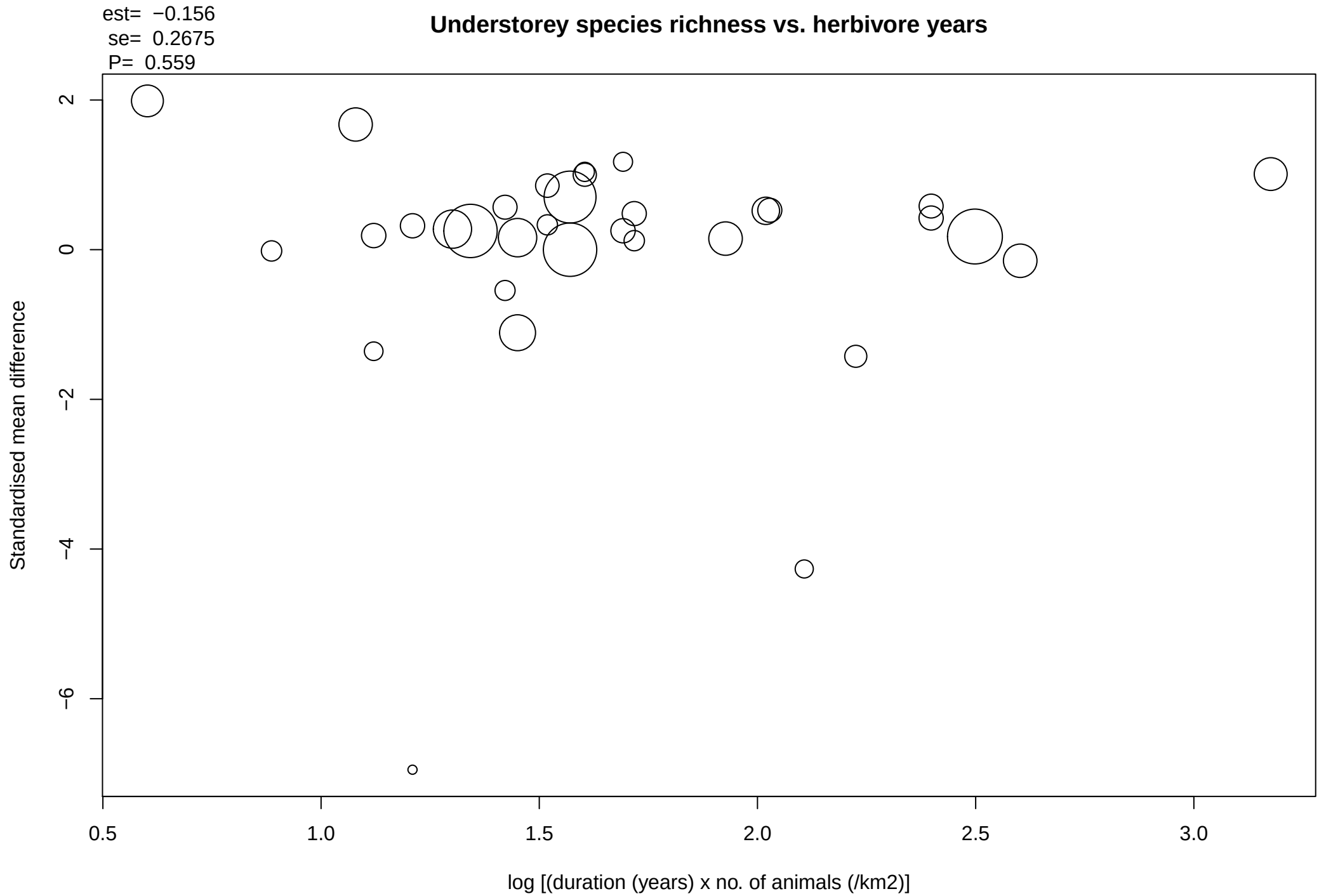

est= −0.406
se= 0.1596
P= 0.011
Woody understorey abundance vs. herbivore years
Standardised mean difference
1
0
−1
−2
−3
−4
1.0
1.5
2.0
2.5
3.0
log [(duration (years) x no. of animals (/km2)]

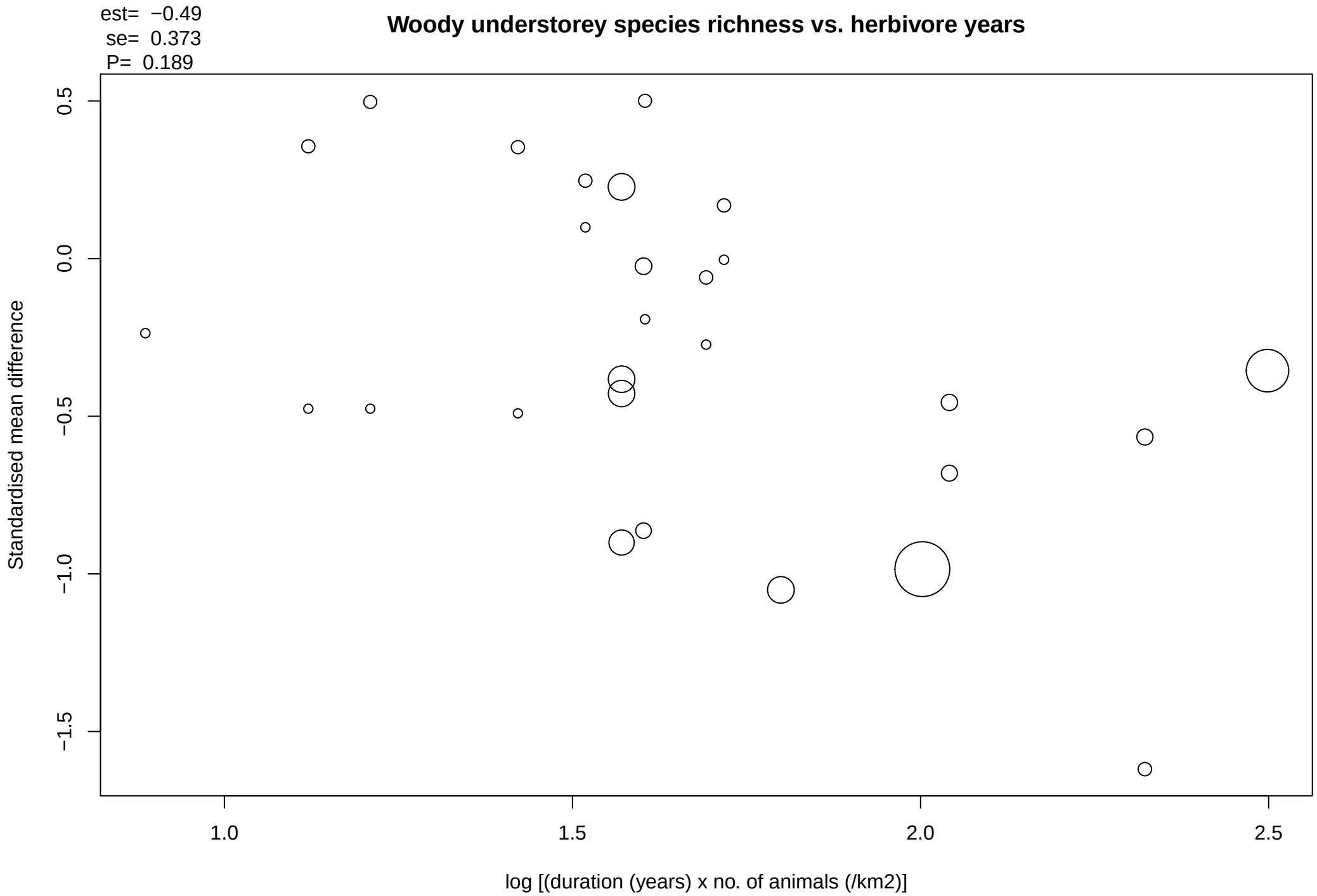

est= −0.56
se= 0.3493
P= 0.109
Tree sapling abundance vs. herbivore years
Standardised mean difference
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
1.5
2.0
2.5
log [(duration (years) x no. of animals (/km2)]

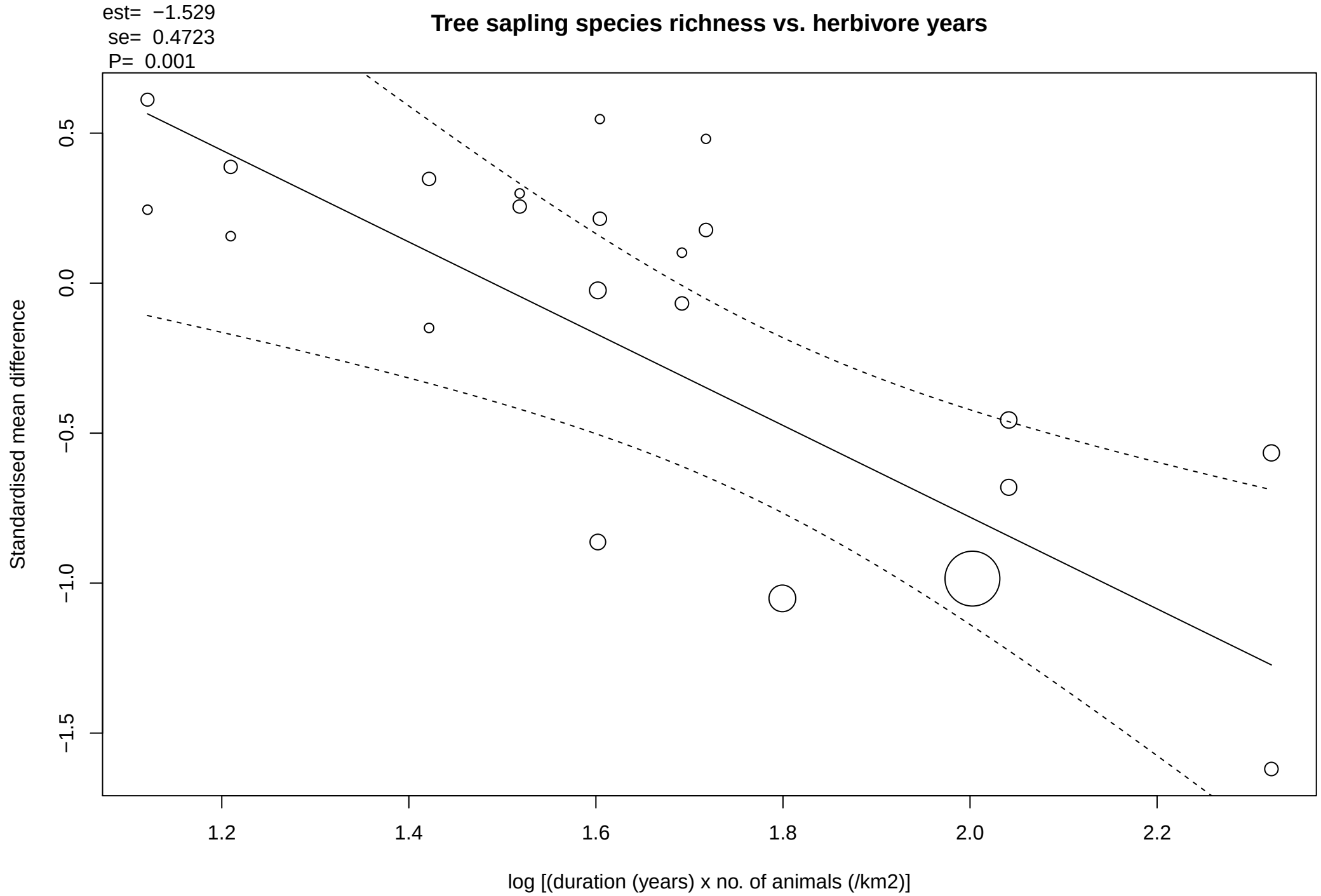

est= −0.445
se= 0.2215
P= 0.045
Shrub abundance vs. herbivore years
Standardised mean difference
1
0
−1
−2
1.0
1.5
2.0
2.5
3.0
log [(duration (years) x no. of animals (/km2)]

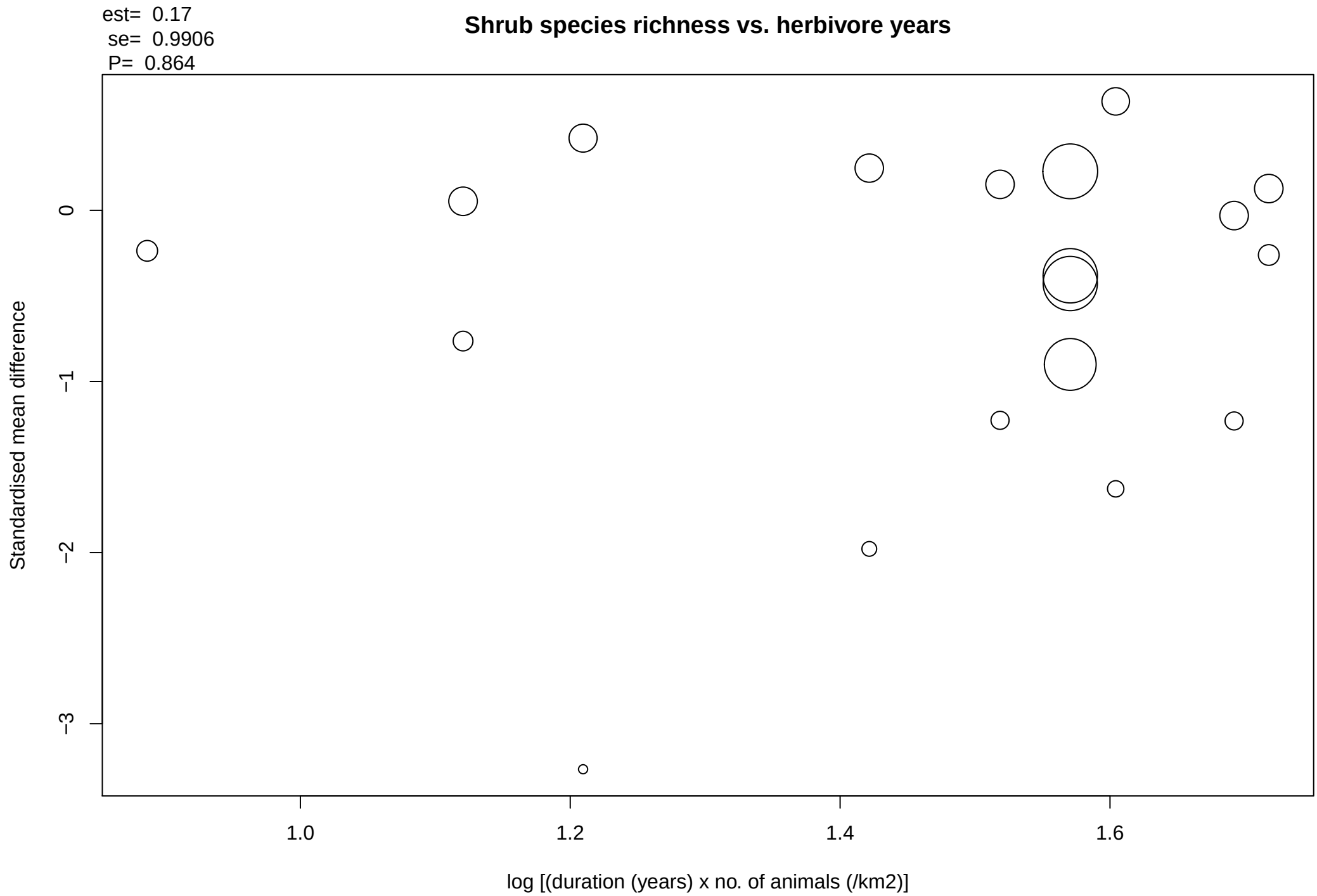

est= 0.802
se= 0.385
P= 0.037
Graminoid abundance vs. herbivore years
Standardised mean difference
2
1
0
−1
1.0
1.5
2.0
log [(duration (years) x no. of animals (/km2)]

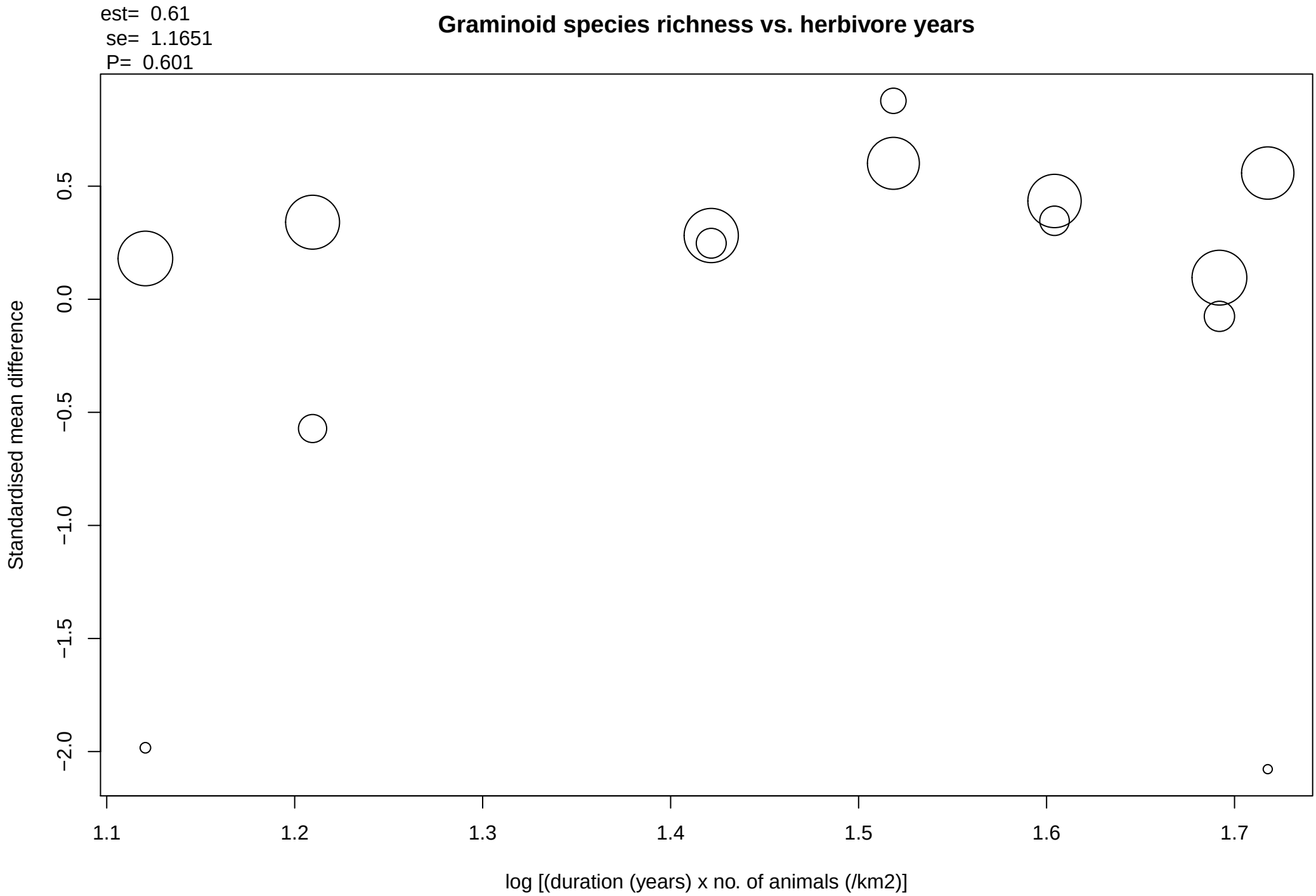

est= 0.208
se= 0.1996
P= 0.298
Forb abundance vs. herbivore years
Standardised mean difference
0.5
0.0
−0.5
−1.0
1.0
1.5
2.0
2.5
3.0
log [(duration (years) x no. of animals (/km2)]

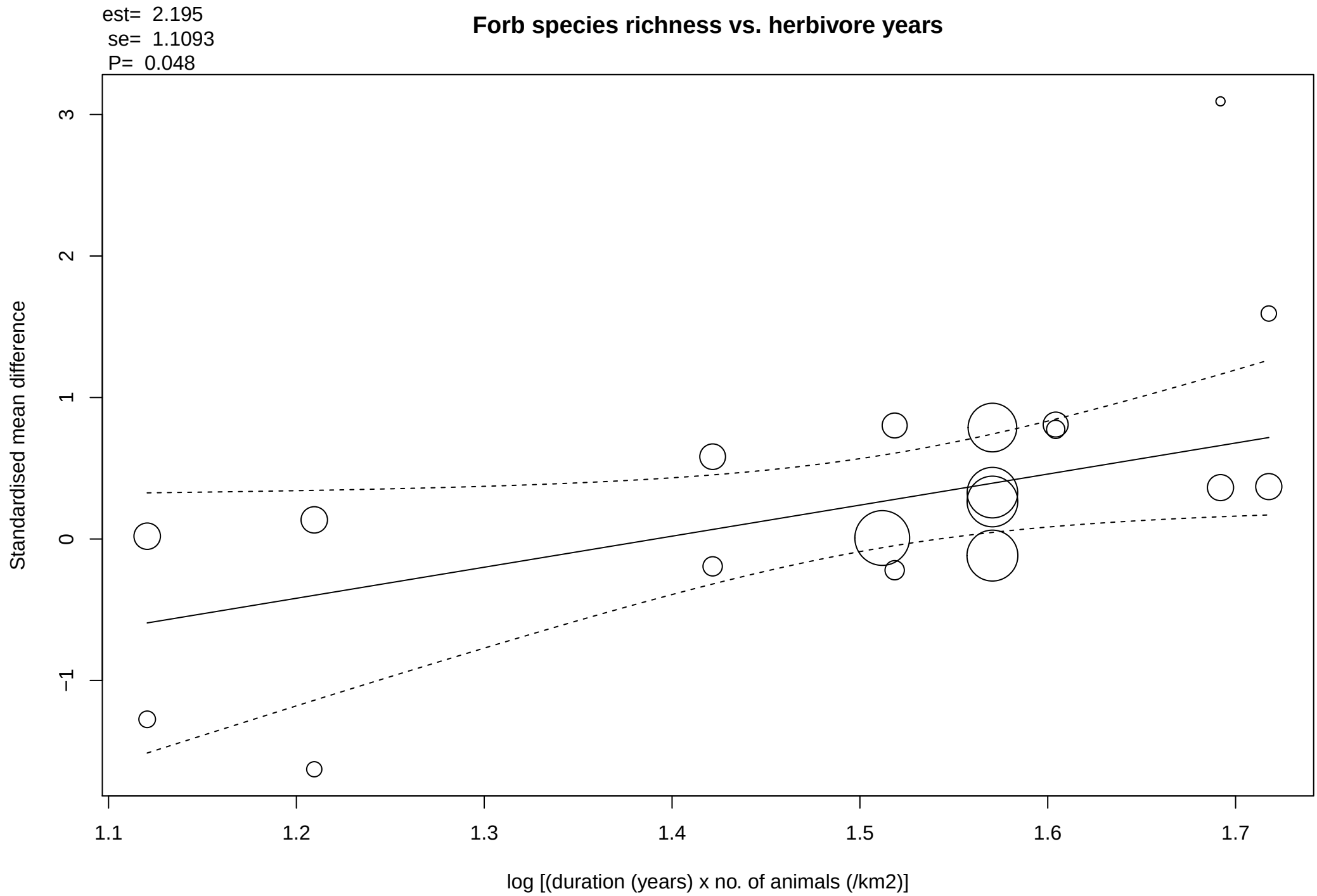

est= −0.156
se= 0.2675
P= 0.559
Understorey species richness vs. herbivore years
Standardised mean difference
2
0
−2
−4
−6
0.5
1.0
1.5
2.0
2.5
3.0
log [(duration (years) x no. of animals (/km2)]

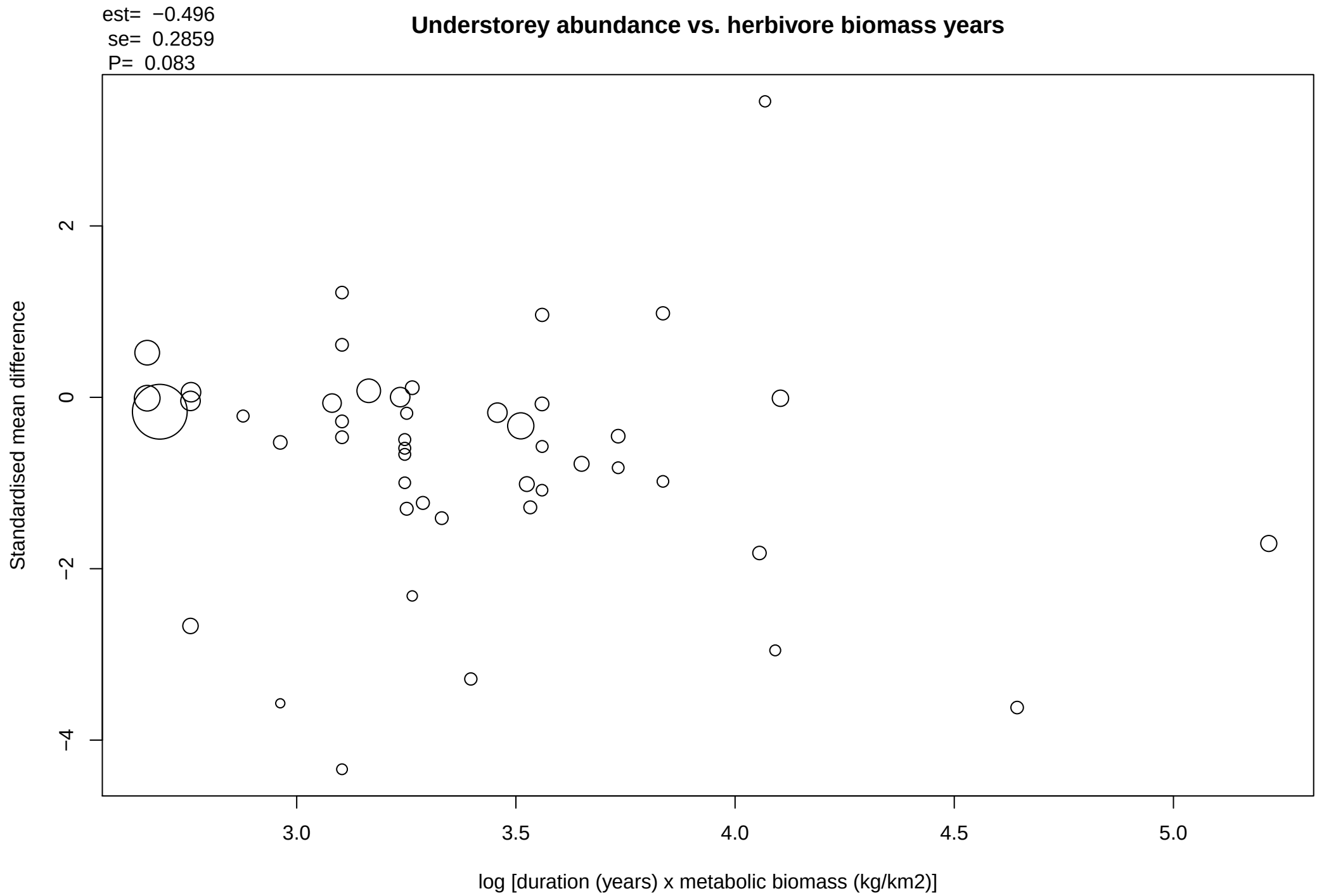

est= −0.49
se= 0.373
P= 0.189
Woody understorey species richness vs. herbivore years
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
1.0
1.5
2.0
2.5
log [(duration (years) x no. of animals (/km2)]

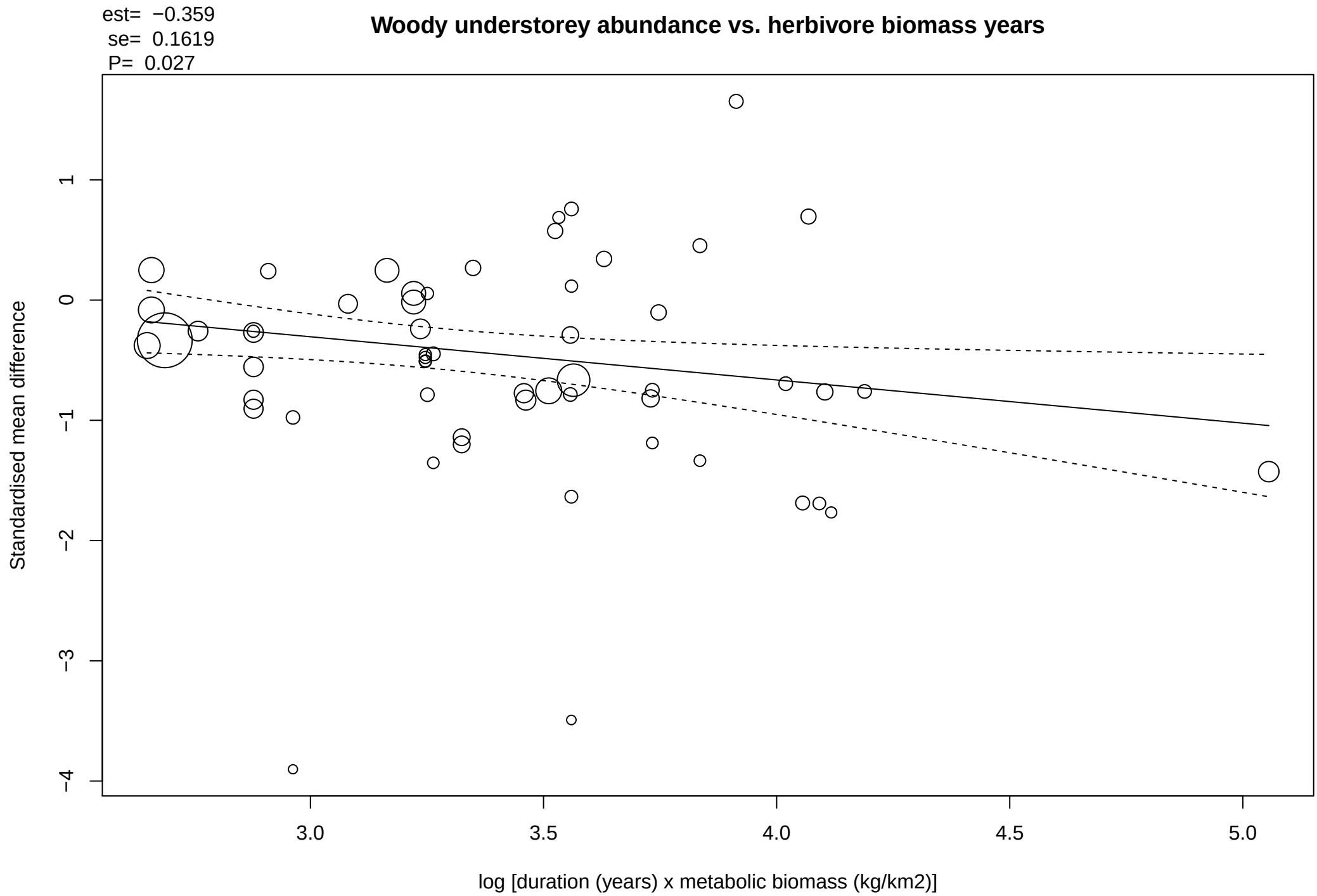

est= −1.529
se= 0.4723
P= 0.001
Tree sapling species richness vs. herbivore years
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
1.2
1.4
1.6
1.8
2.0
2.2
log [(duration (years) x no. of animals (/km2)]

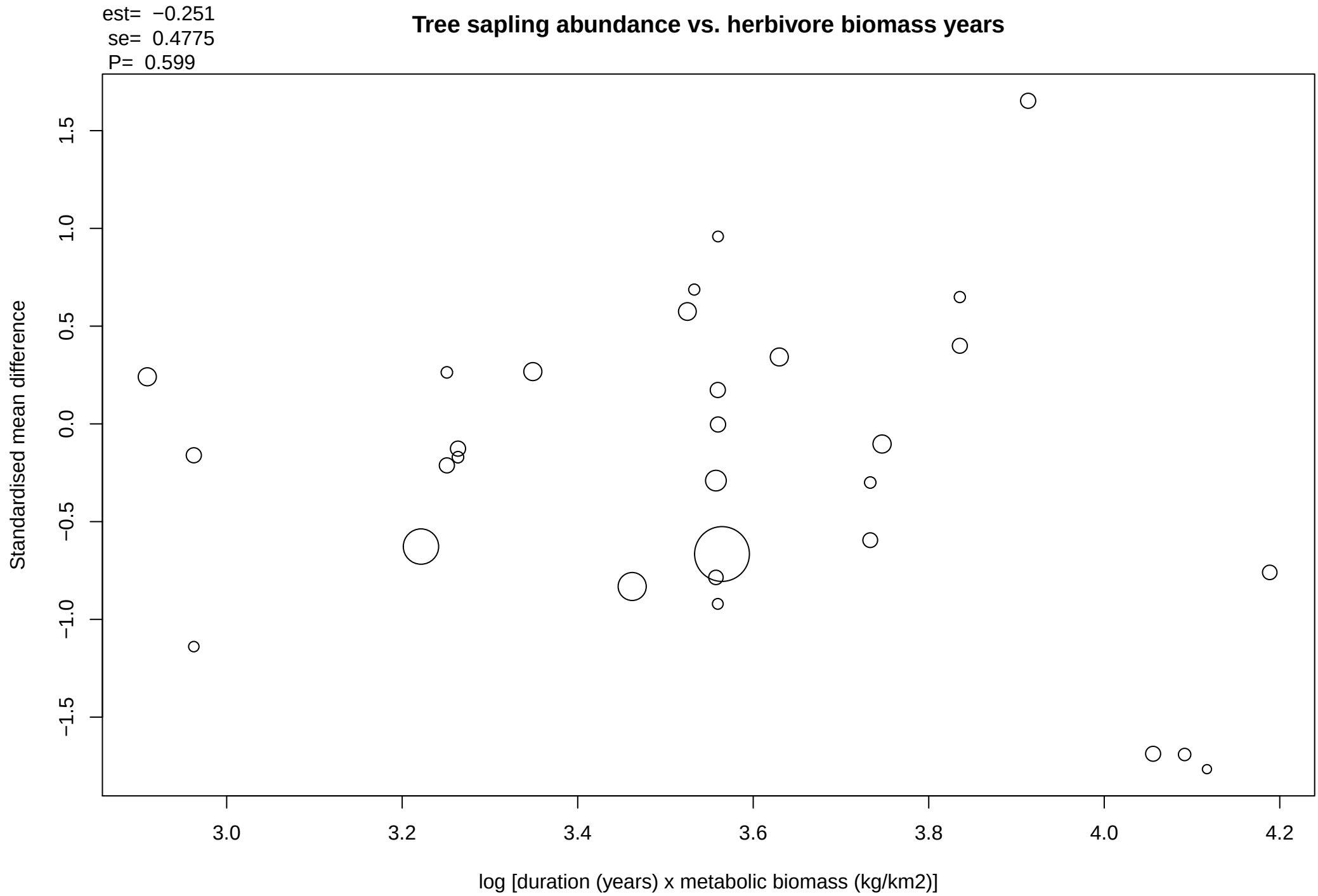

est= 0.17
se= 0.9906
P= 0.864
Shrub species richness vs. herbivore years
Standardised mean difference
0
−1
−2
−3
1.0
1.2
1.4
1.6
log [(duration (years) x no. of animals (/km2)]

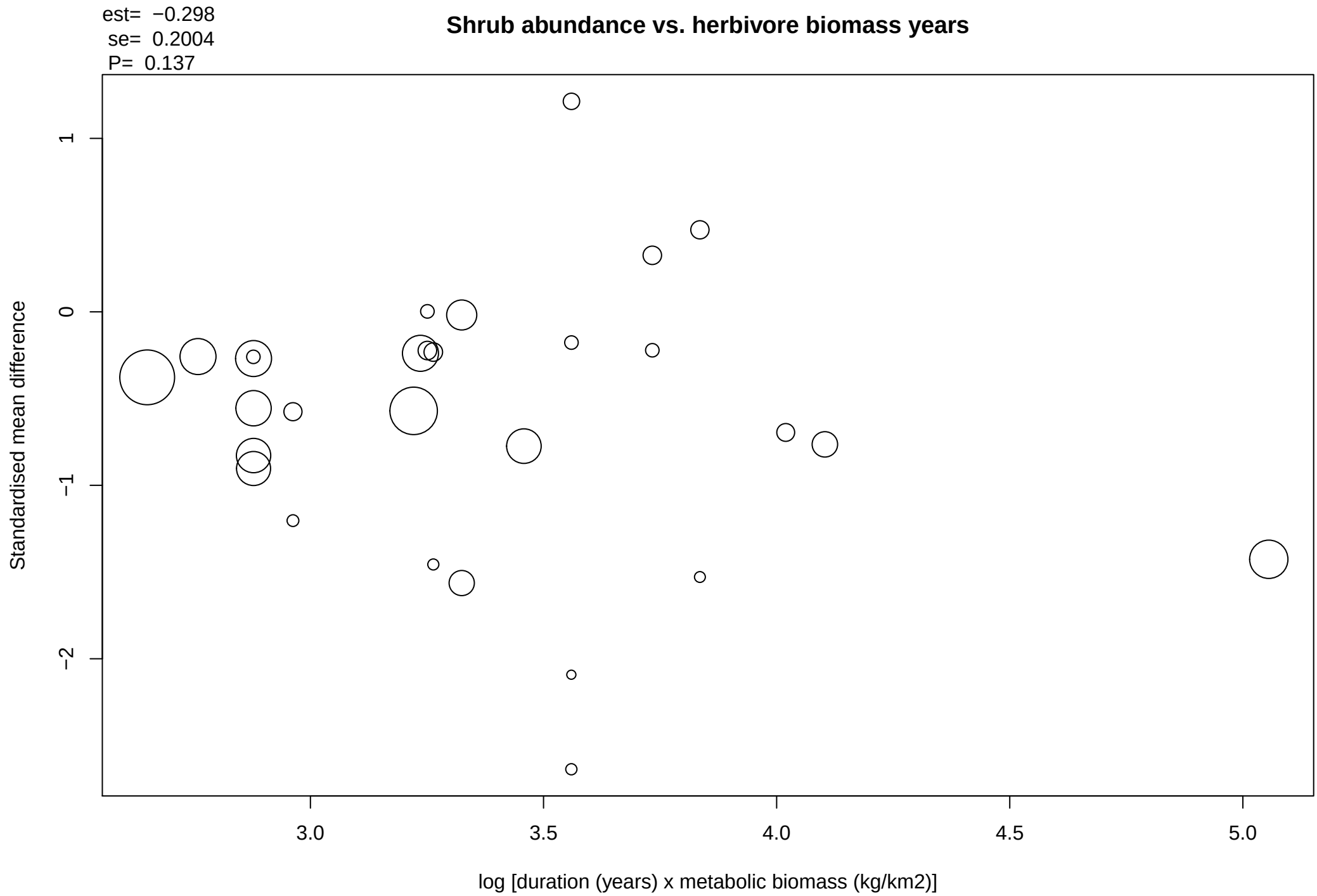

est= 0.61
se= 1.1651
P= 0.601
Graminoid species richness vs. herbivore years
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
−2.0
1.1
1.2
1.3
1.4
1.5
1.6
1.7
log [(duration (years) x no. of animals (/km2)]

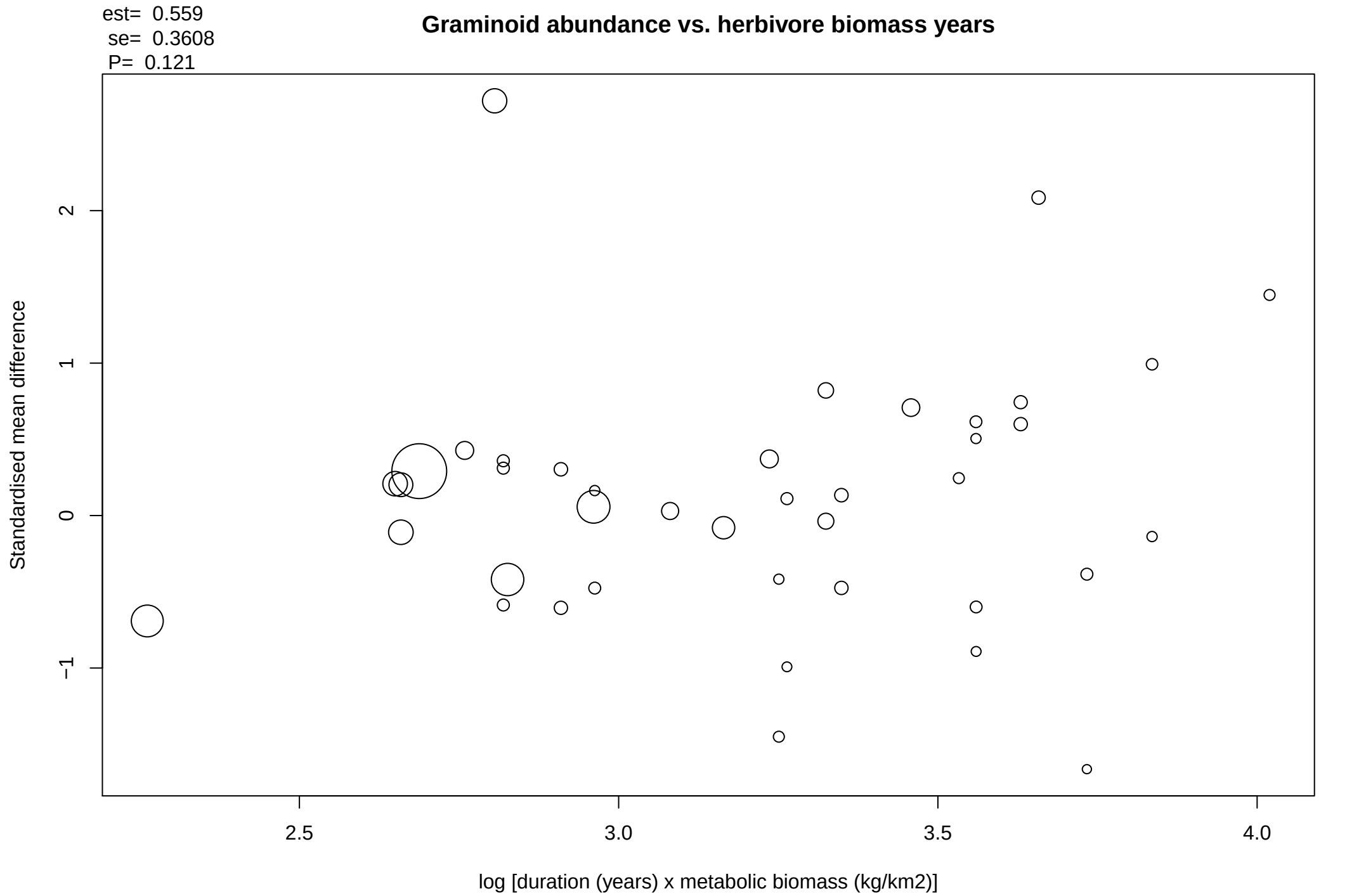

est= 2.195
se= 1.1093
P= 0.048
Forb species richness vs. herbivore years
Standardised mean difference
3
2
1
0
−1
1.1
1.2
1.3
1.4
1.5
1.6
1.7
log [(duration (years) x no. of animals (/km2)]

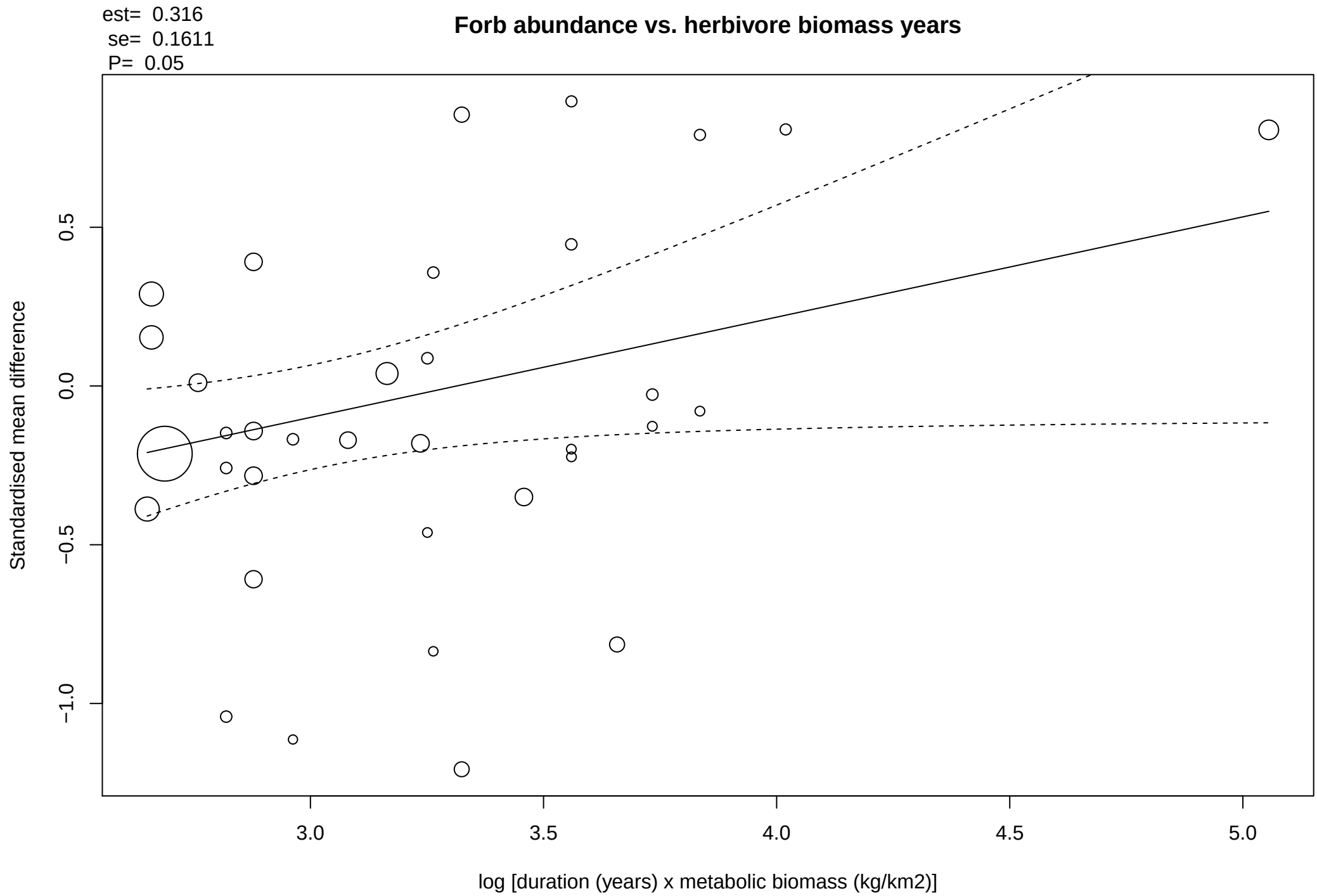

est= −0.496
se= 0.2859
P= 0.083
Understorey abundance vs. herbivore biomass years
Standardised mean difference
2
0
−2
−4
3.0
3.5
4.0
4.5
5.0
log [duration (years) x metabolic biomass (kg/km2)]

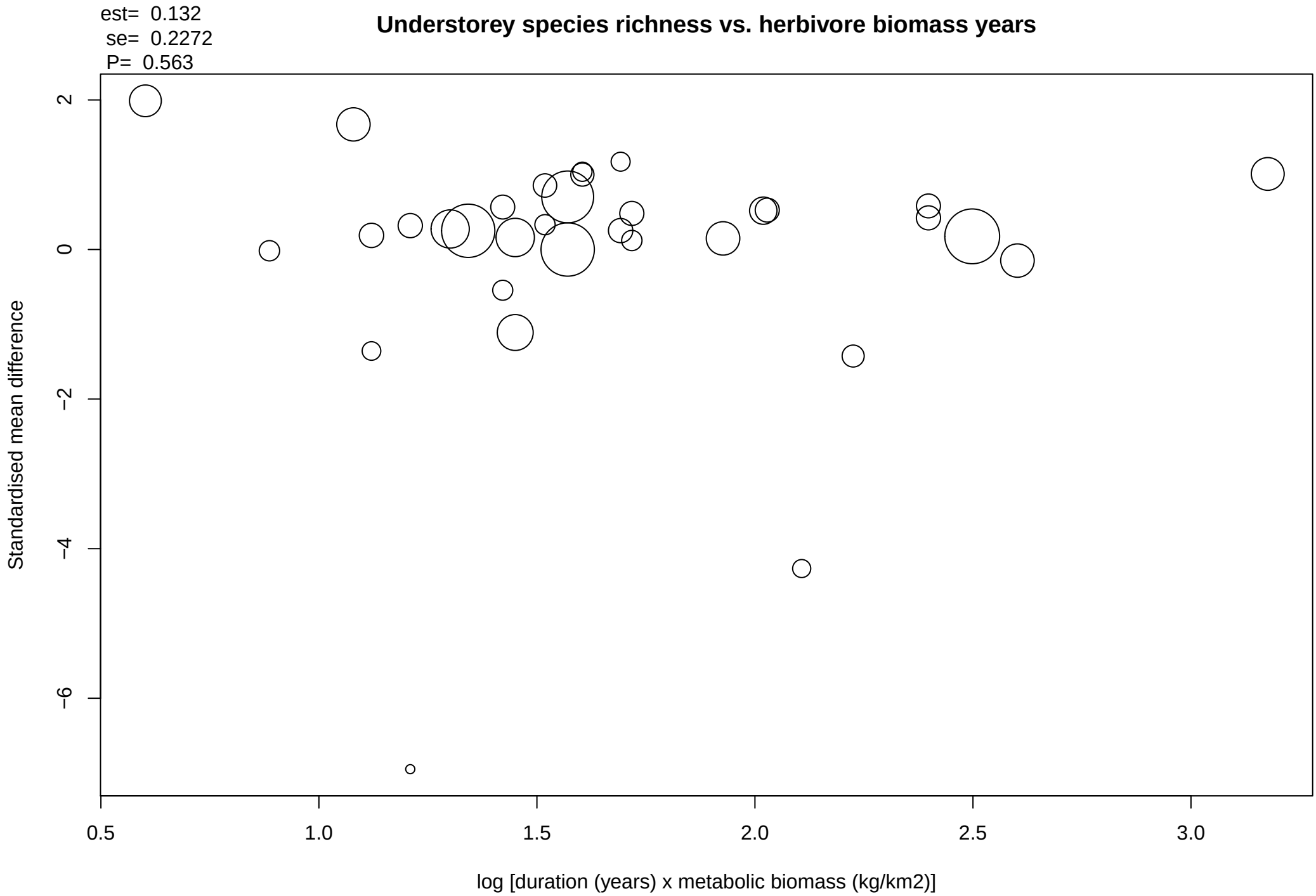

est= −0.359
se= 0.1619
P= 0.027
Woody understorey abundance vs. herbivore biomass years
Standardised mean difference
1
0
−1
−2
−3
−4
3.0
3.5
4.0
4.5
5.0
log [duration (years) x metabolic biomass (kg/km2)]

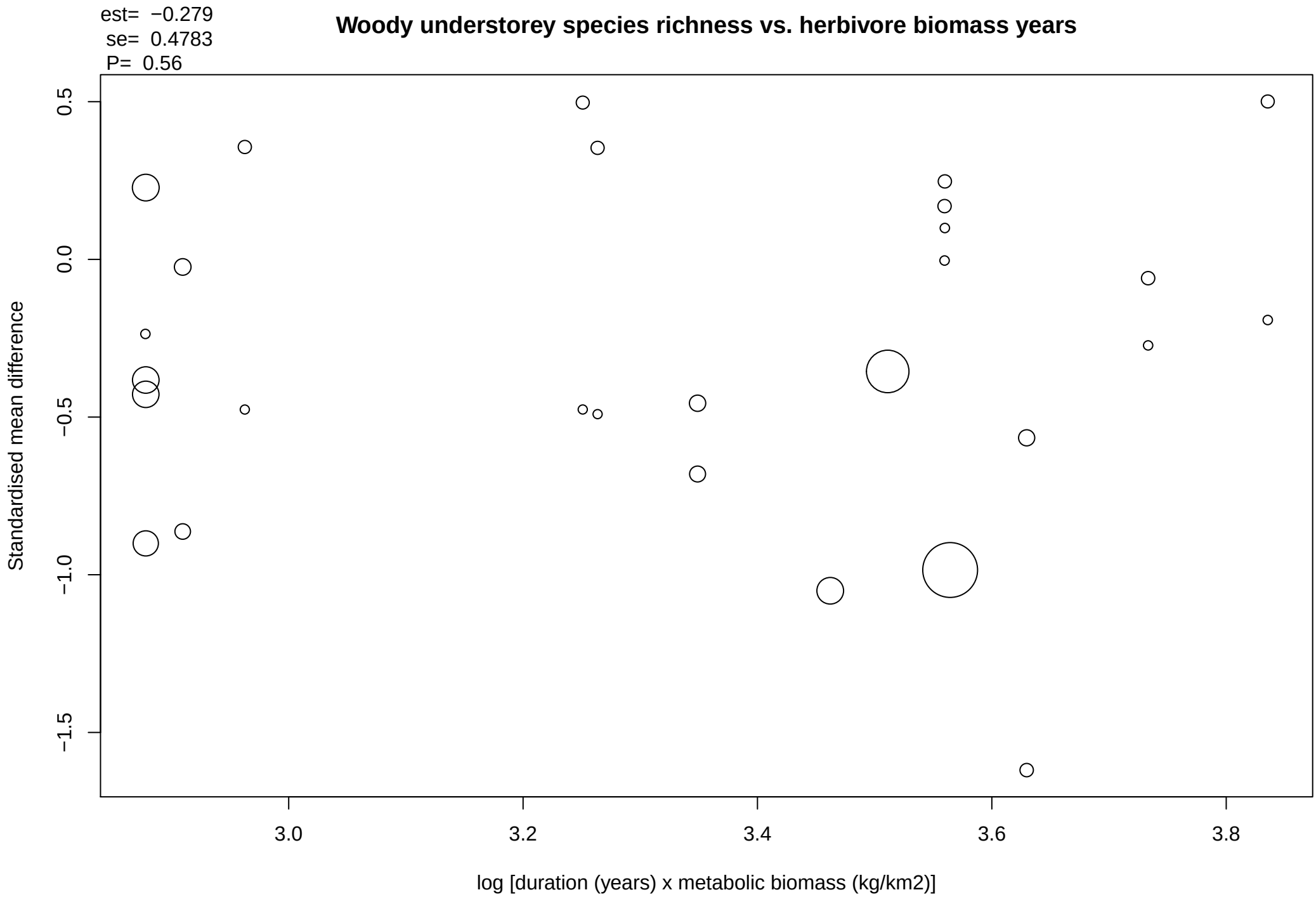

est= −0.251
se= 0.4775
P= 0.599
Tree sapling abundance vs. herbivore biomass years
Standardised mean difference
1.5
1.0
0.5
0.0
−0.5
−1.0
−1.5
3.0
3.2
3.4
3.6
3.8
4.0
4.2
log [duration (years) x metabolic biomass (kg/km2)]

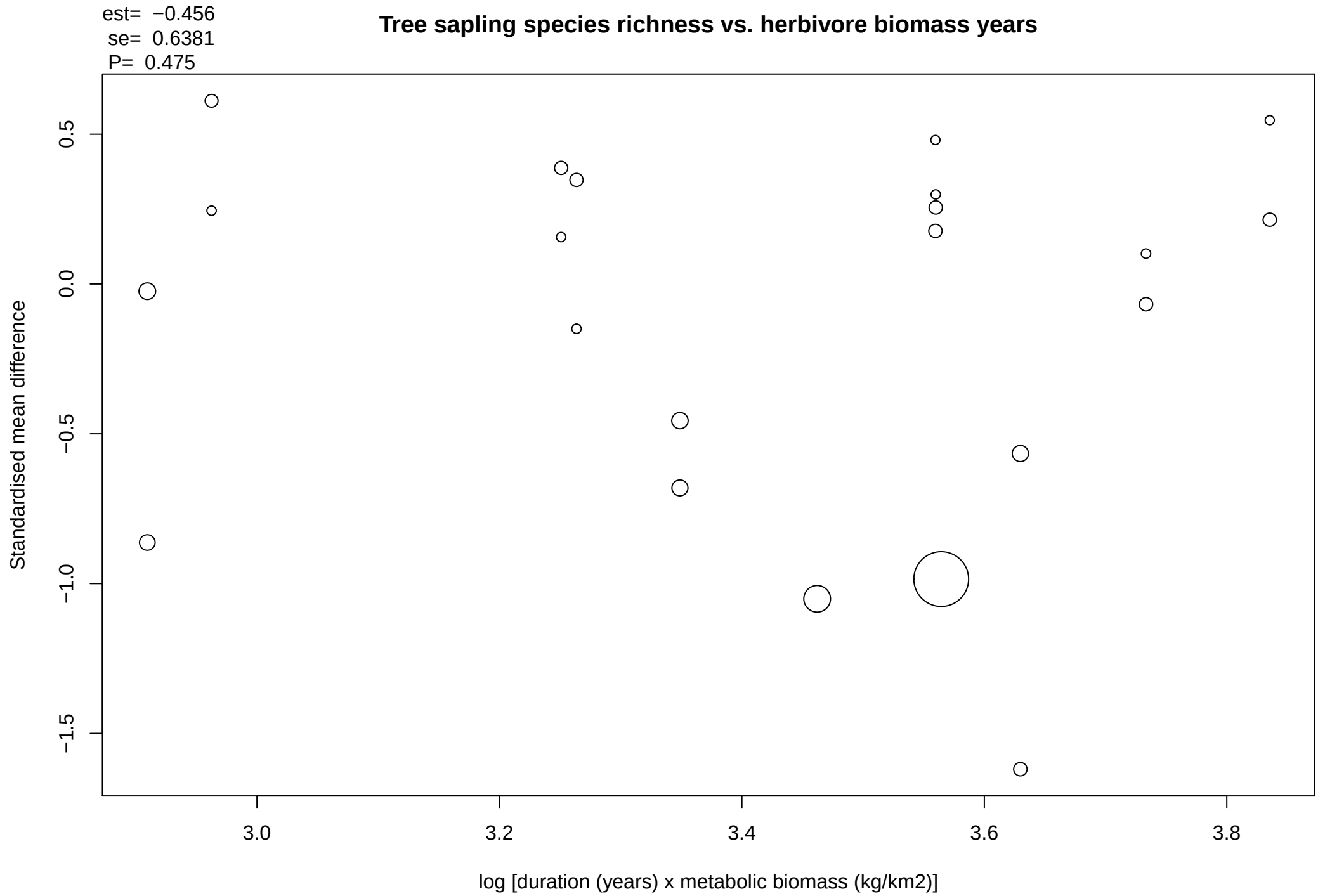

est= −0.298
se= 0.2004
P= 0.137
Shrub abundance vs. herbivore biomass years
Standardised mean difference
1
0
−1
−2
3.0
3.5
4.0
4.5
5.0
log [duration (years) x metabolic biomass (kg/km2)]

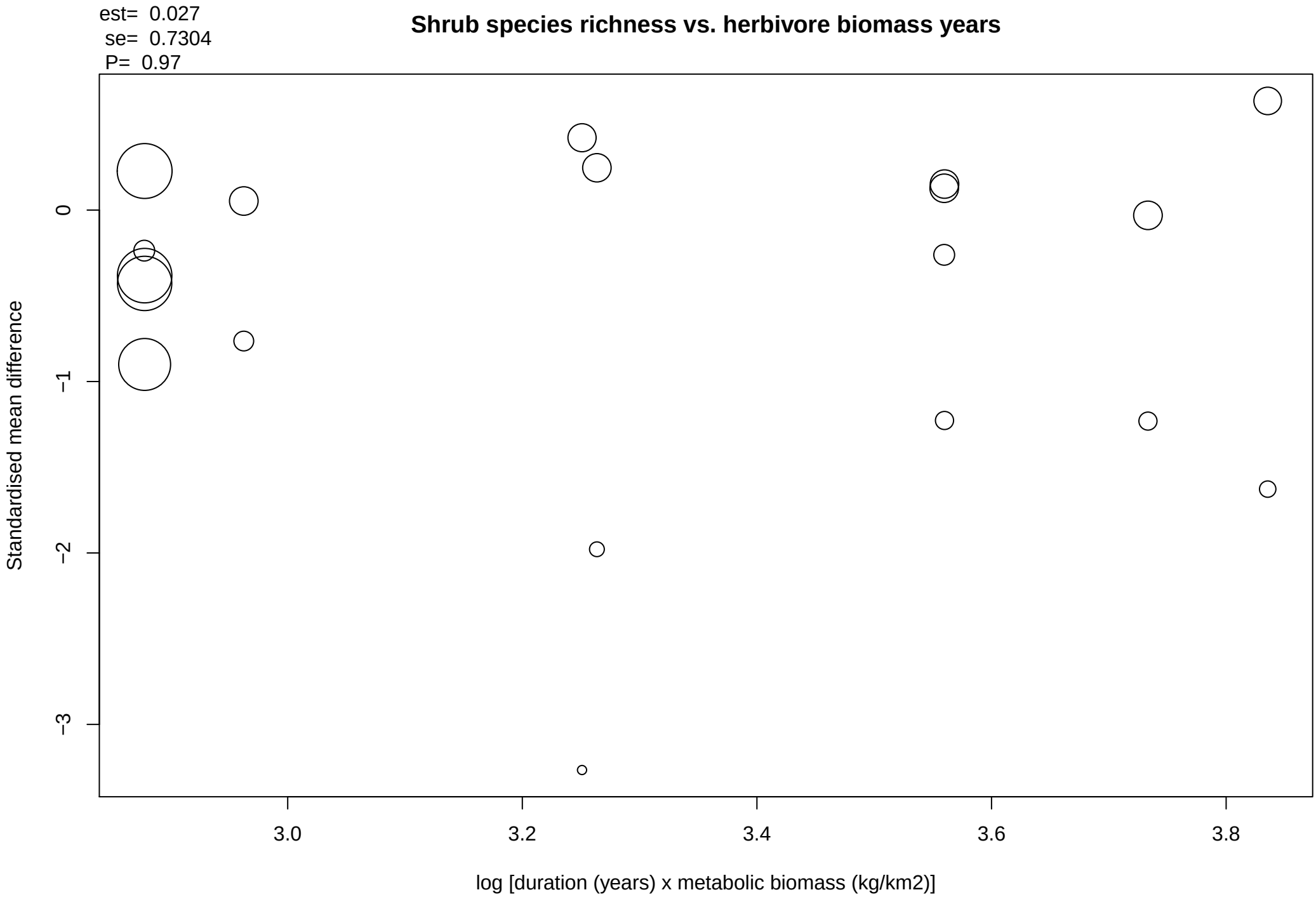

est= 0.559
se= 0.3608
P= 0.121
Graminoid abundance vs. herbivore biomass years
Standardised mean difference
2
1
0
−1
2.5
3.0
3.5
4.0
log [duration (years) x metabolic biomass (kg/km2)]

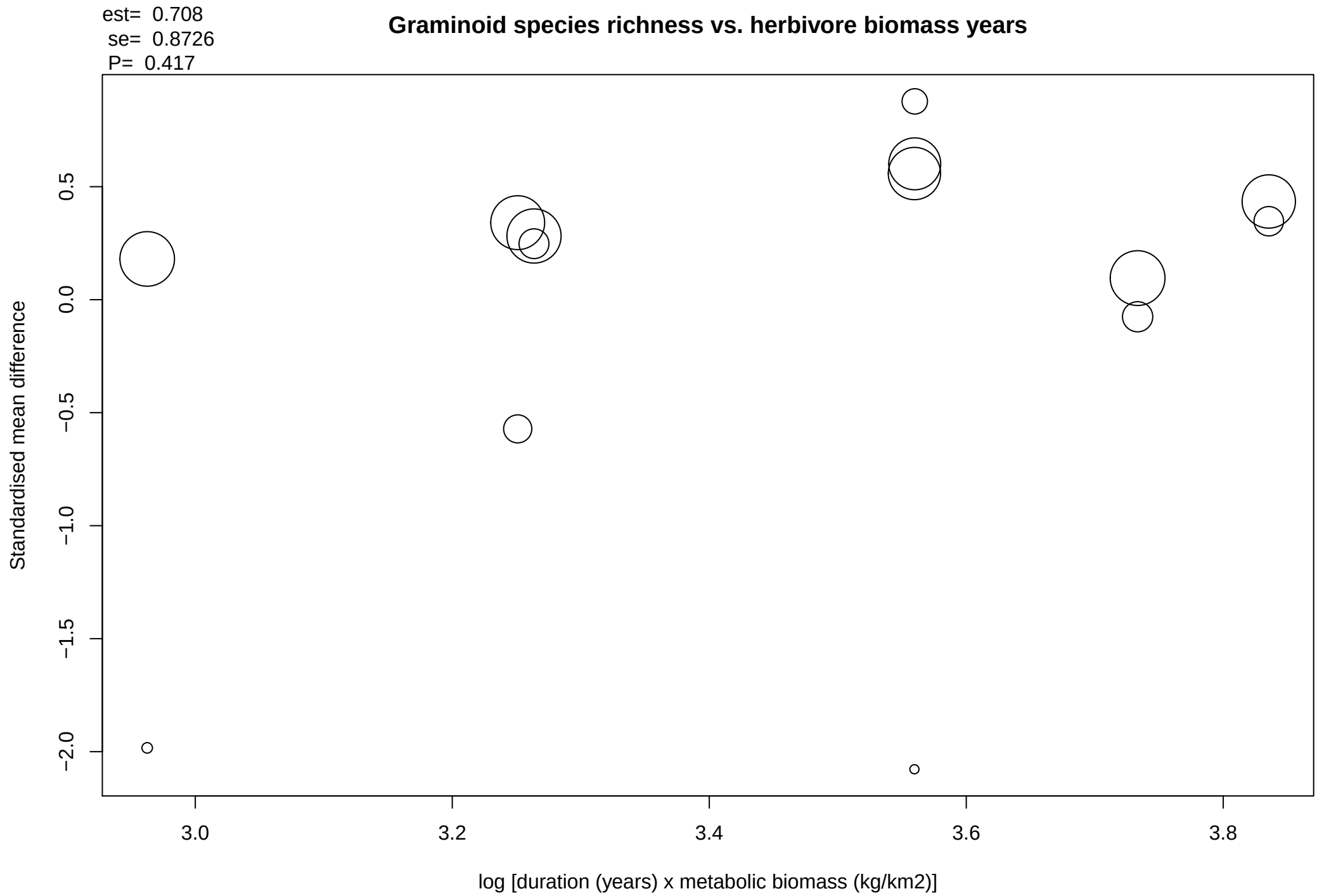

est= 0.316
se= 0.1611
P= 0.05
Forb abundance vs. herbivore biomass years
Standardised mean difference
0.5
0.0
−0.5
−1.0
3.0
3.5
4.0
4.5
5.0
log [duration (years) x metabolic biomass (kg/km2)]

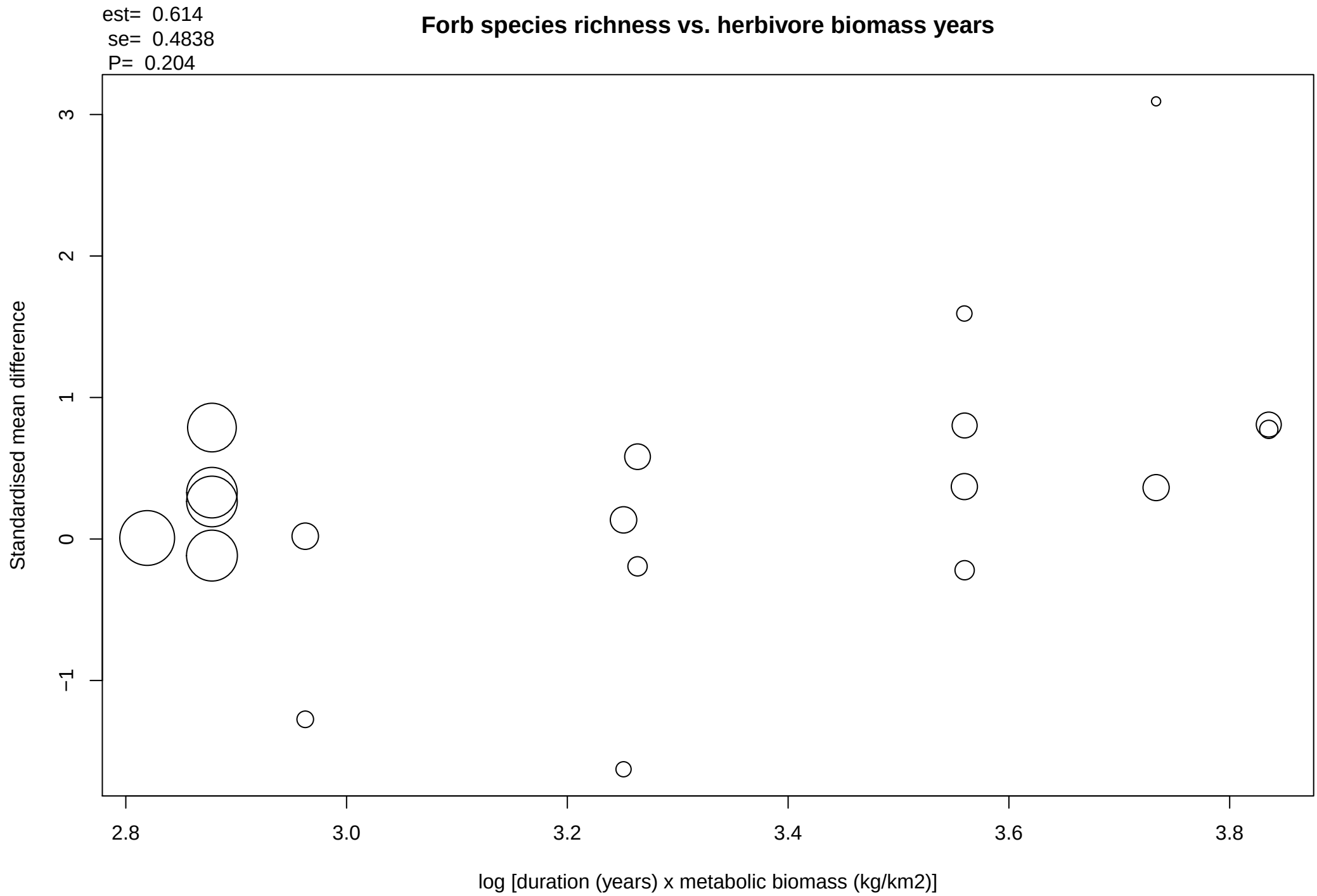

est= 0.132
se= 0.2272
P= 0.563
Understorey species richness vs. herbivore biomass years
Standardised mean difference
2
0
−2
−4
−6
0.5
1.0
1.5
2.0
2.5
3.0
log [duration (years) x metabolic biomass (kg/km2)]

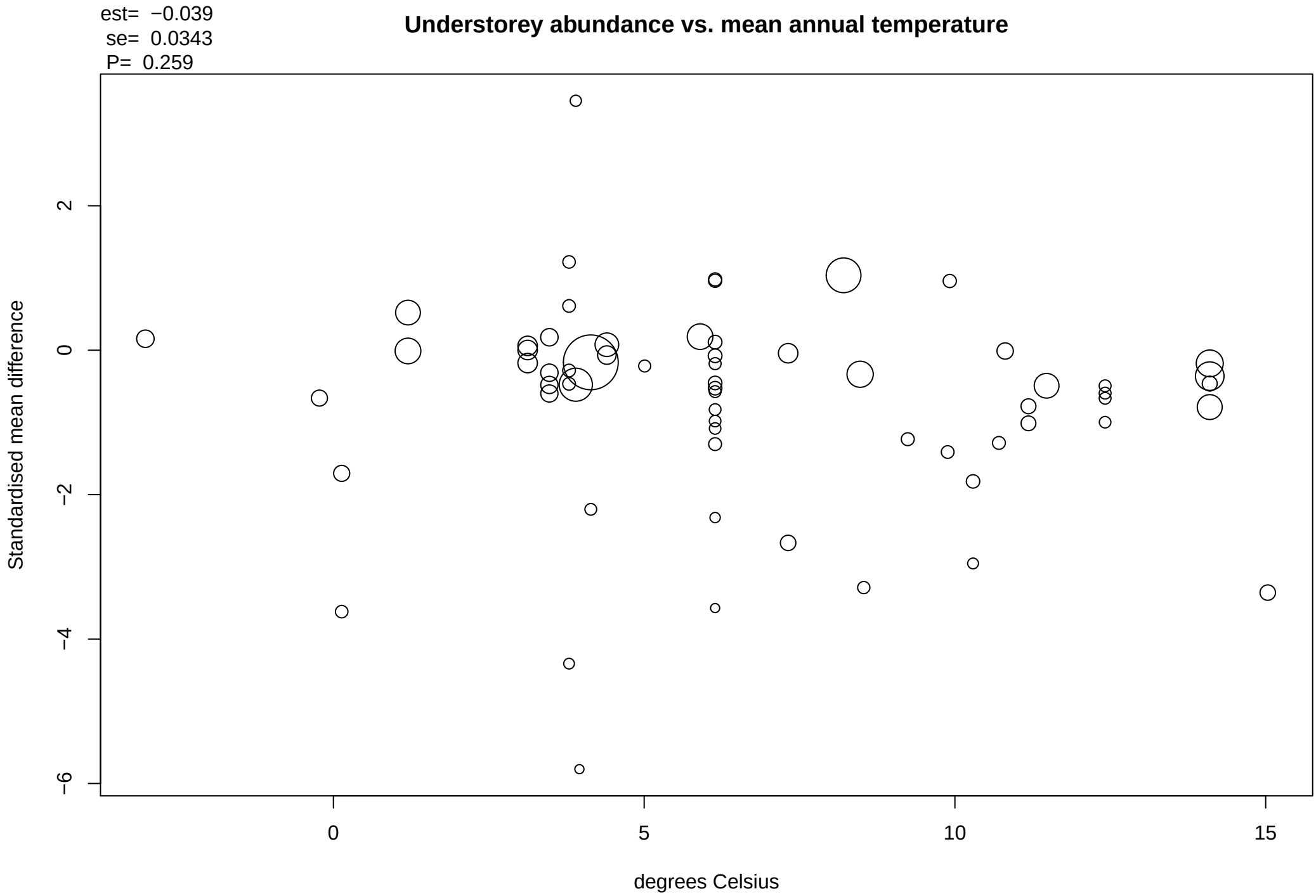

est= −0.279
se= 0.4783
P= 0.56
Woody understorey species richness vs. herbivore biomass years
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
3.0
3.2
3.4
3.6
3.8
log [duration (years) x metabolic biomass (kg/km2)]

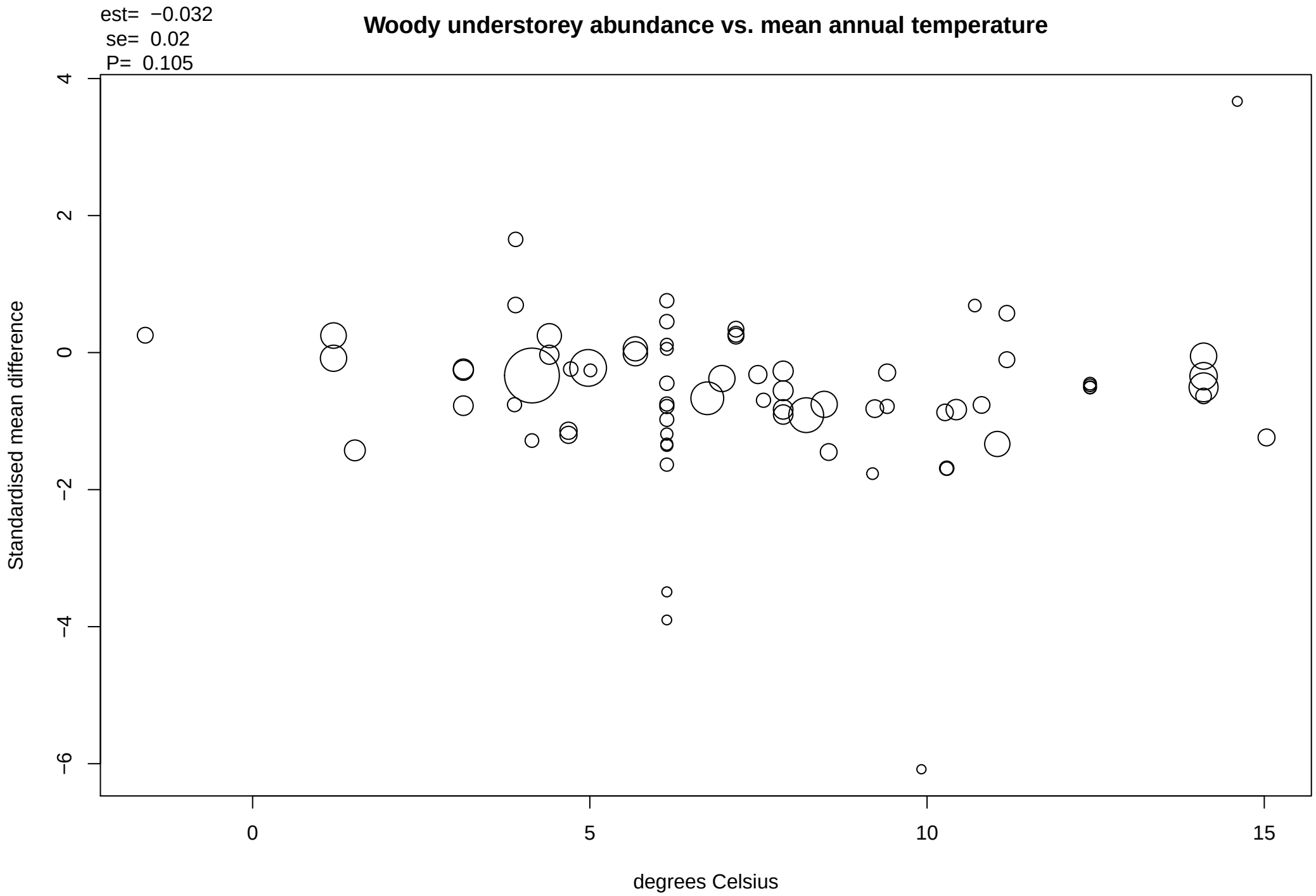

est= −0.456
se= 0.6381
P= 0.475
Tree sapling species richness vs. herbivore biomass years
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
3.0
3.2
3.4
3.6
3.8
log [duration (years) x metabolic biomass (kg/km2)]

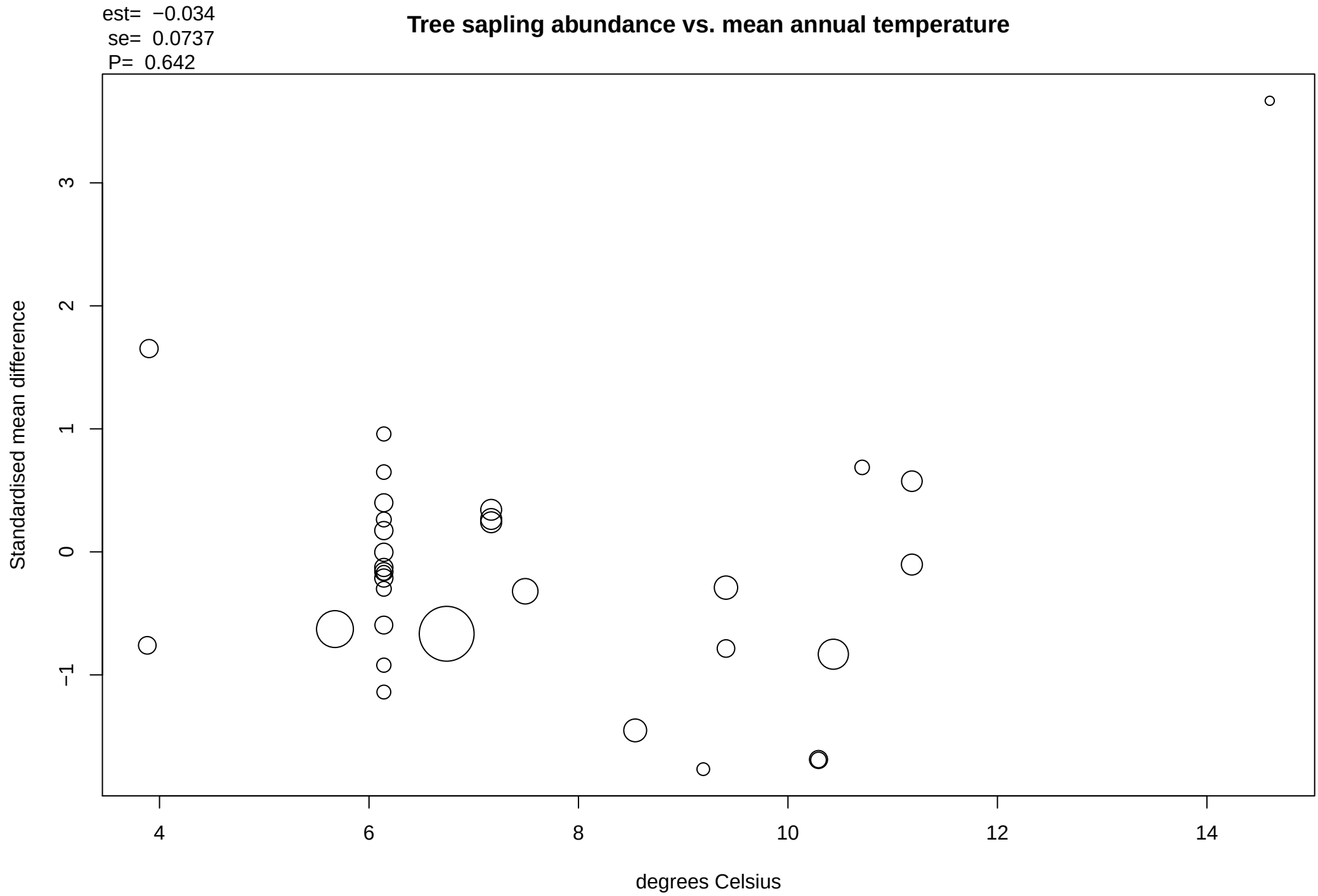

est= 0.027
se= 0.7304
P= 0.97
Shrub species richness vs. herbivore biomass years
Standardised mean difference
0
−1
−2
−3
3.0
3.2
3.4
3.6
3.8
log [duration (years) x metabolic biomass (kg/km2)]

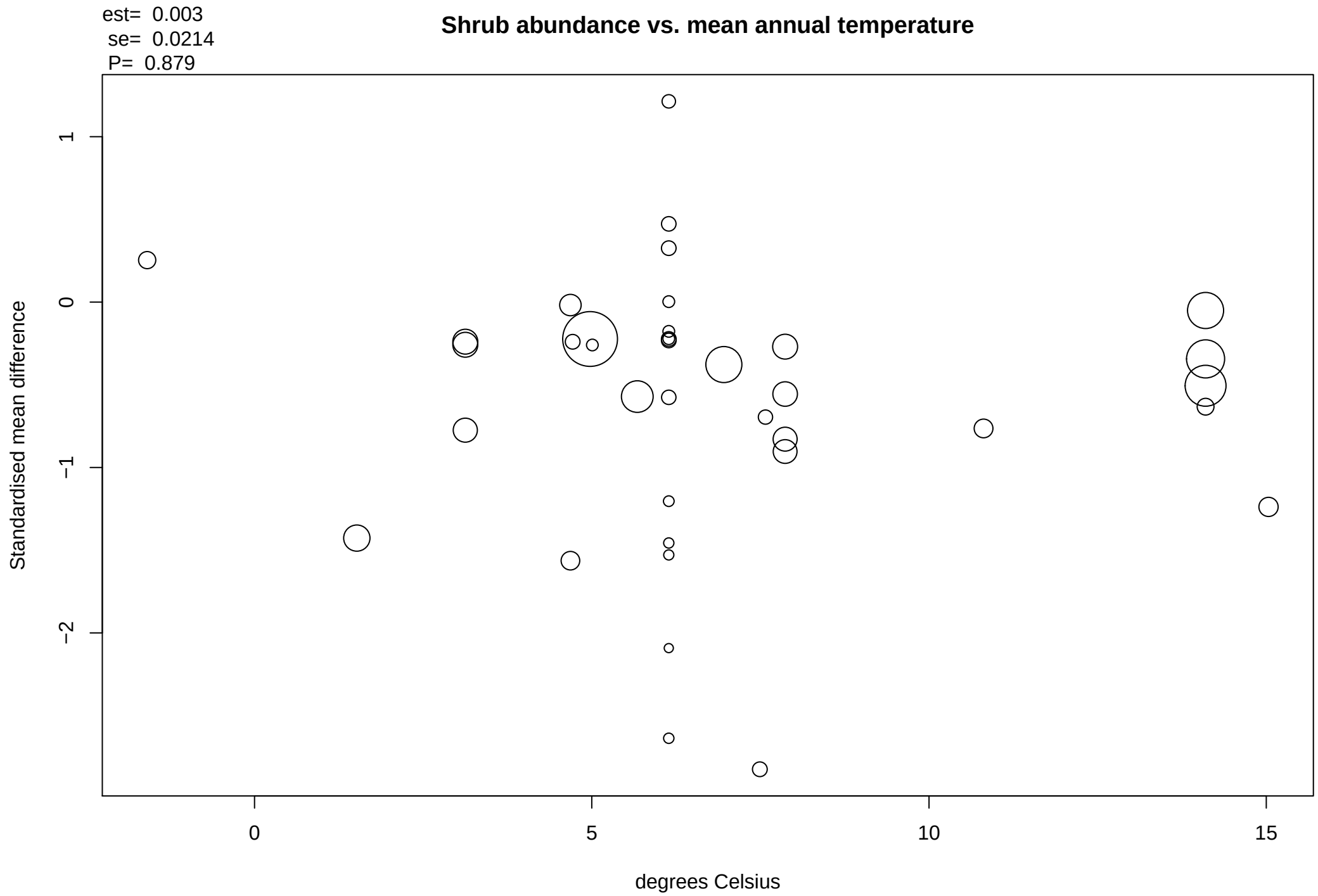

est= 0.708
se= 0.8726
P= 0.417
Graminoid species richness vs. herbivore biomass years
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
−2.0
3.0
3.2
3.4
3.6
3.8
log [duration (years) x metabolic biomass (kg/km2)]

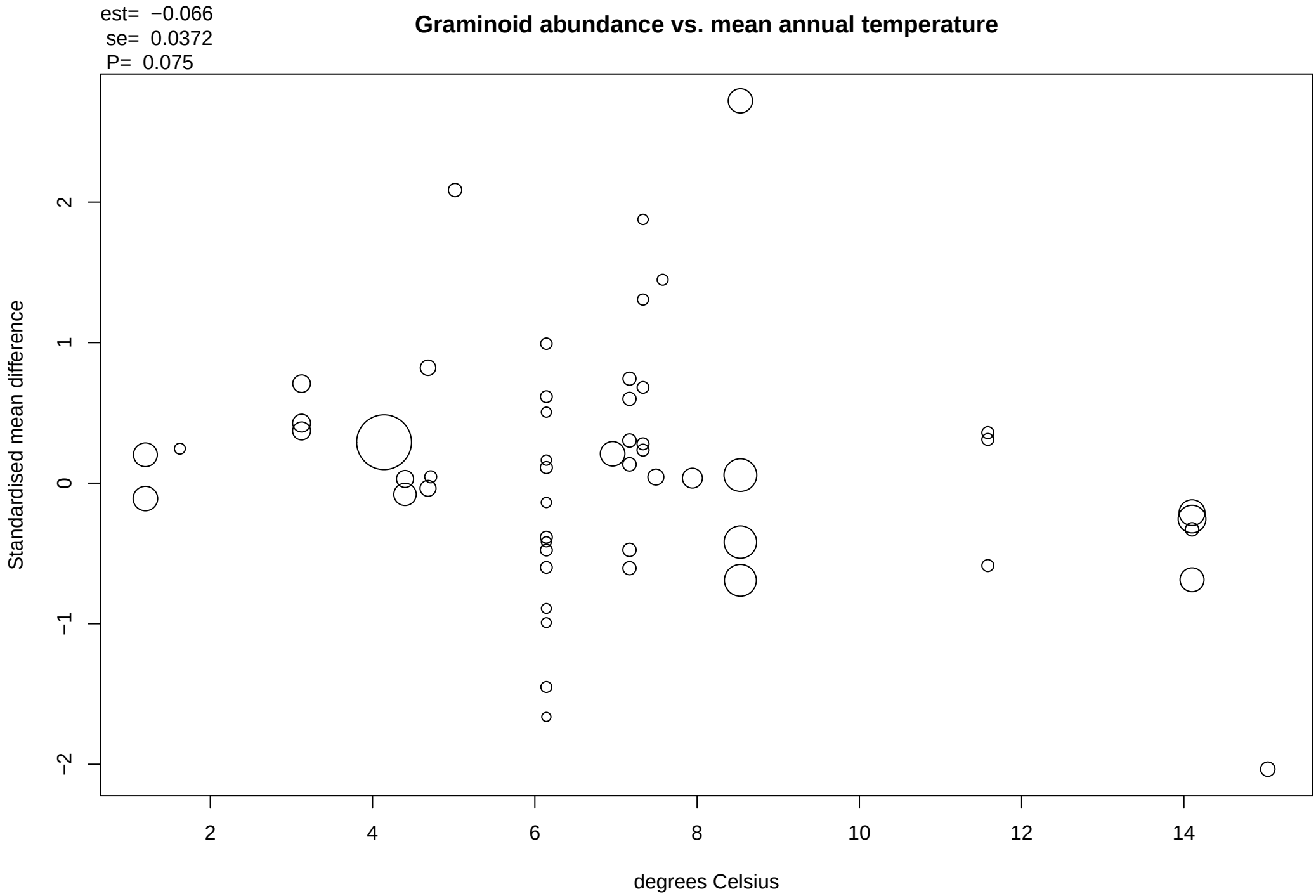

est= 0.614
se= 0.4838
P= 0.204
Forb species richness vs. herbivore biomass years
Standardised mean difference
3
2
1
0
−1
2.8
3.0
3.2
3.4
3.6
3.8
log [duration (years) x metabolic biomass (kg/km2)]

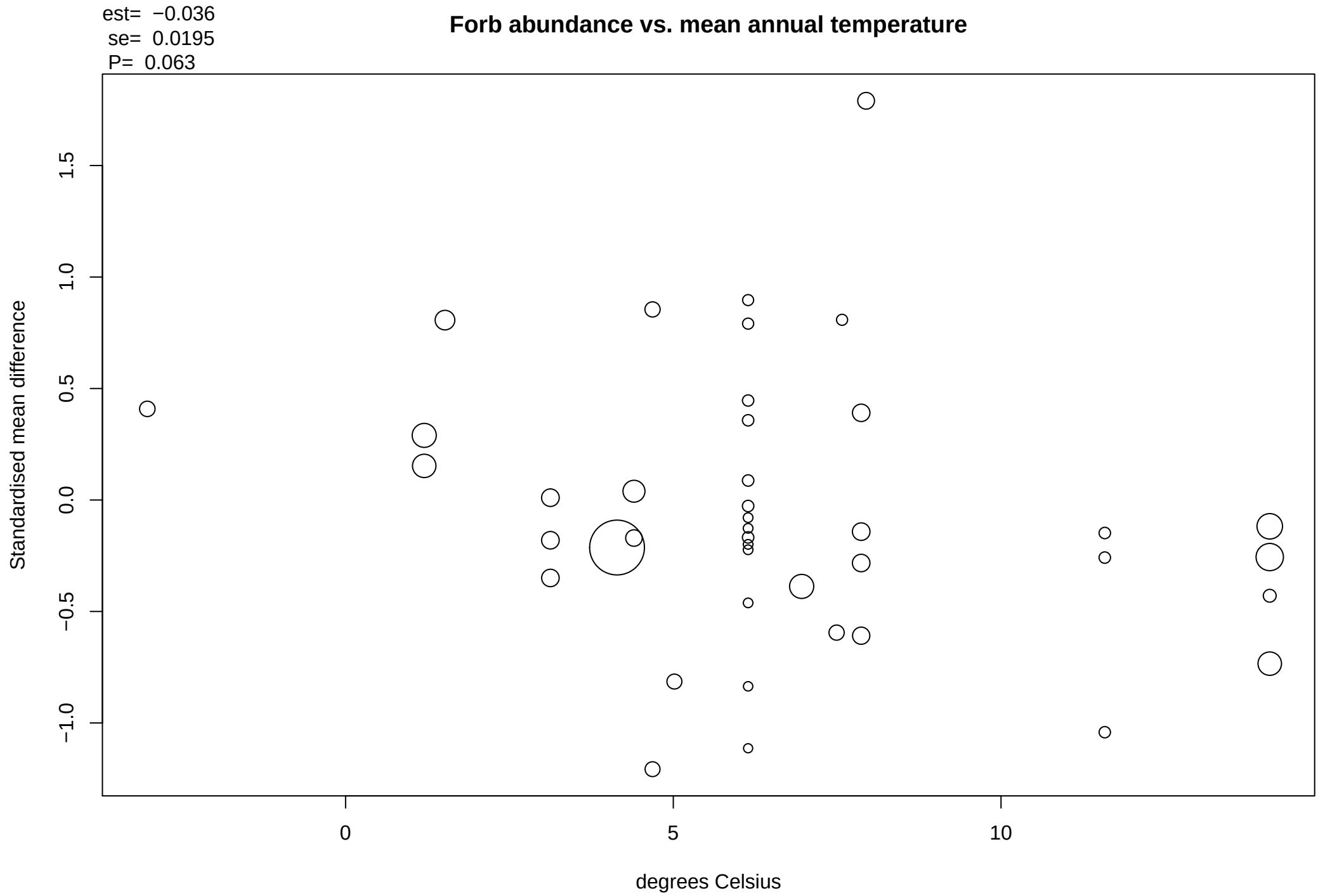

est= −0.039
se= 0.0343
P= 0.259
Understorey abundance vs. mean annual temperature
Standardised mean difference
2
0
−2
−4
−6
0
5
10
15
degrees Celsius

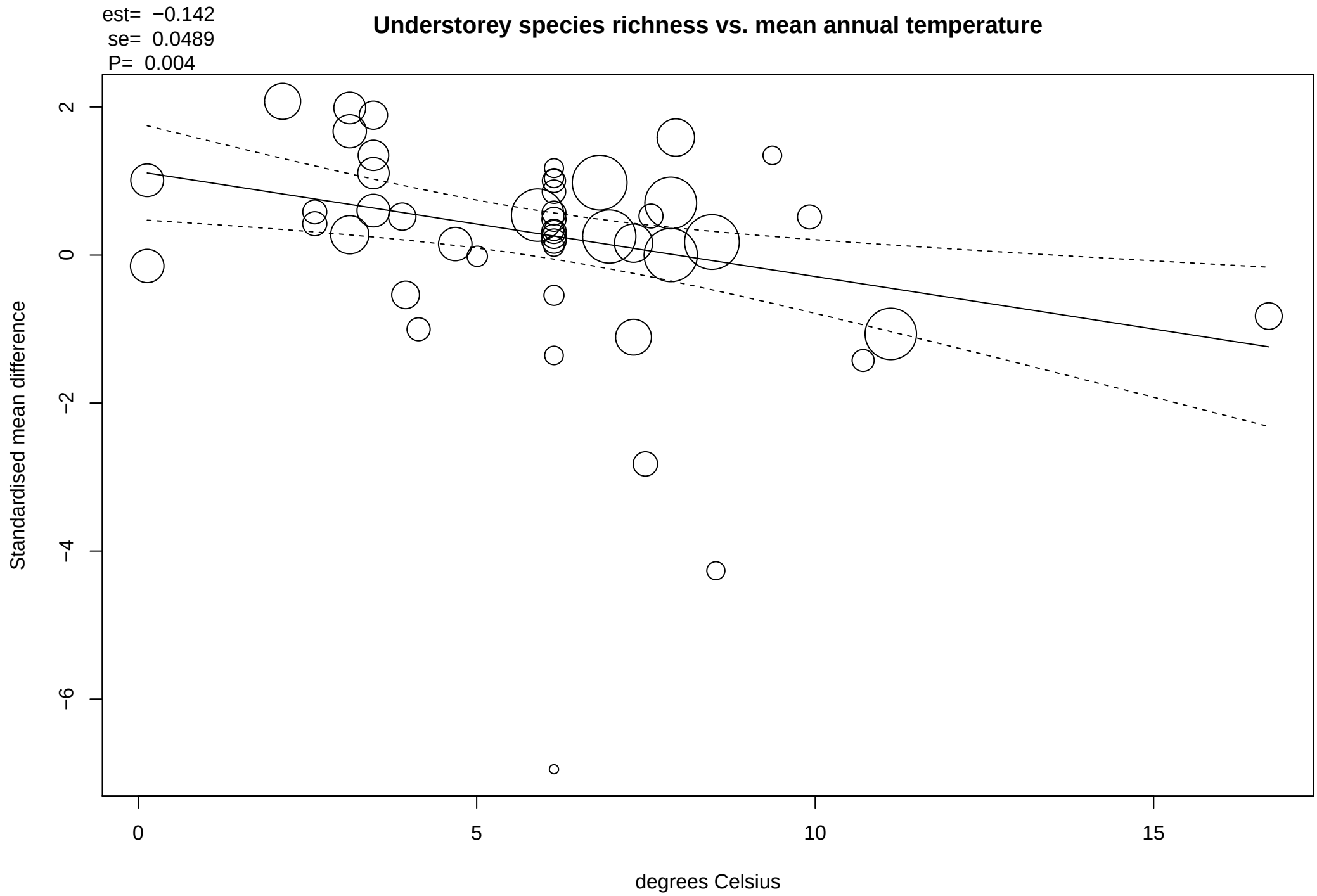

est= −0.032
se= 0.02
P= 0.105
Woody understorey abundance vs. mean annual temperature
Standardised mean difference
4
2
0
−2
−4
−6
0
5
10
15
degrees Celsius

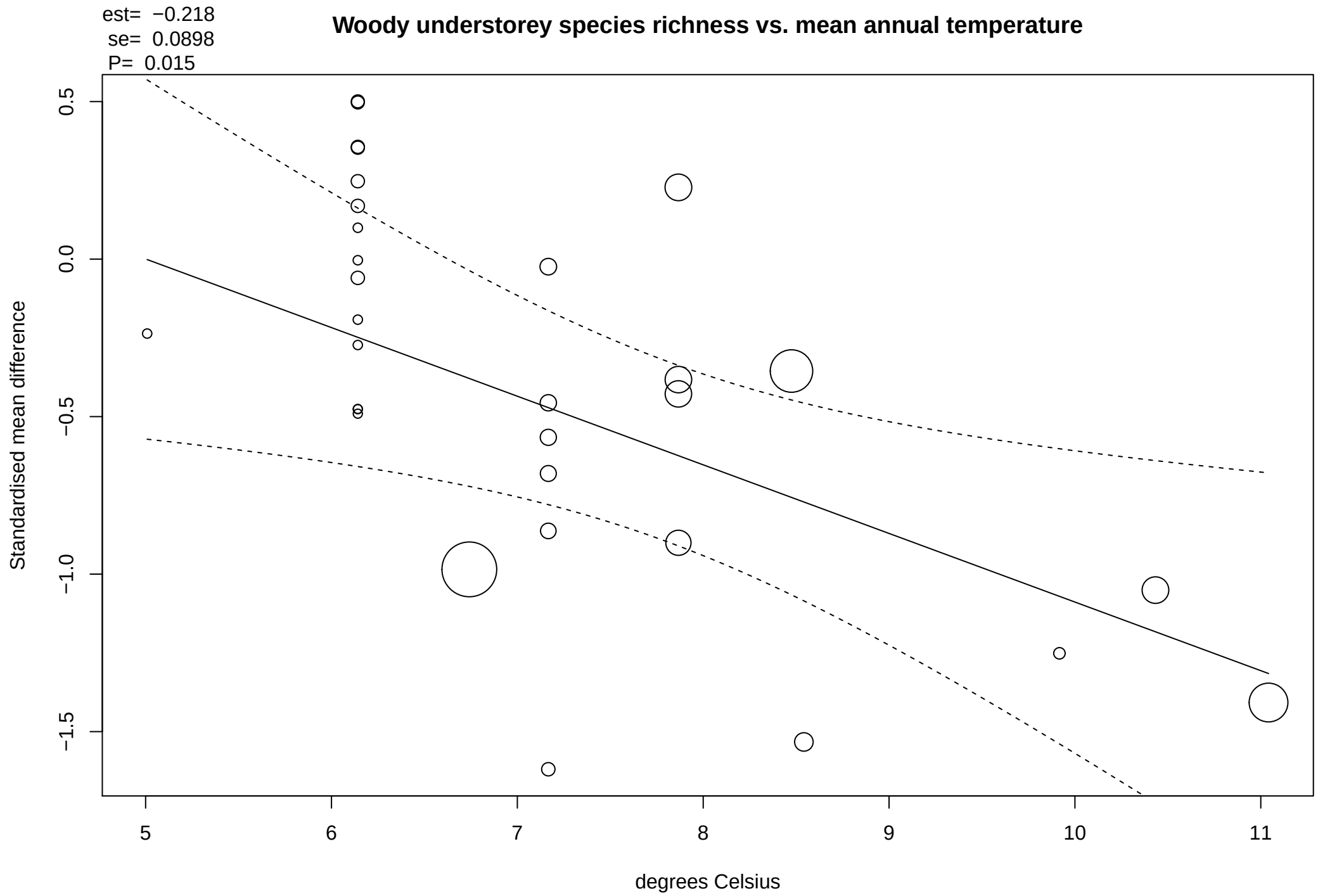

est= −0.034
se= 0.0737
P= 0.642
Tree sapling abundance vs. mean annual temperature
Standardised mean difference
degrees Celsius
−1
0
1
2
3
4
6
8
10
12
14

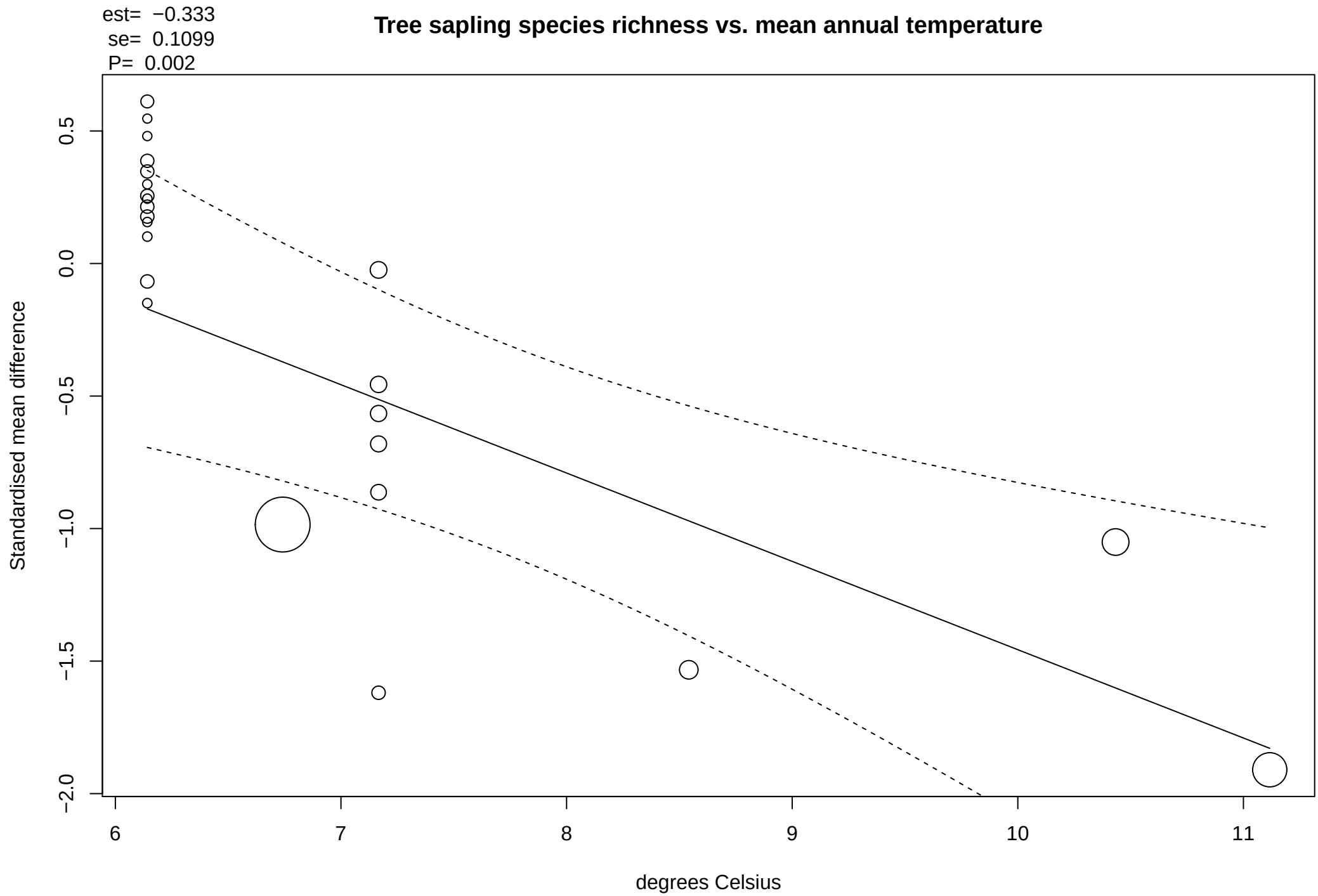

est= 0.003
se= 0.0214
P= 0.879
Shrub abundance vs. mean annual temperature
Standardised mean difference
1
0
−1
−2
0
5
10
15
degrees Celsius

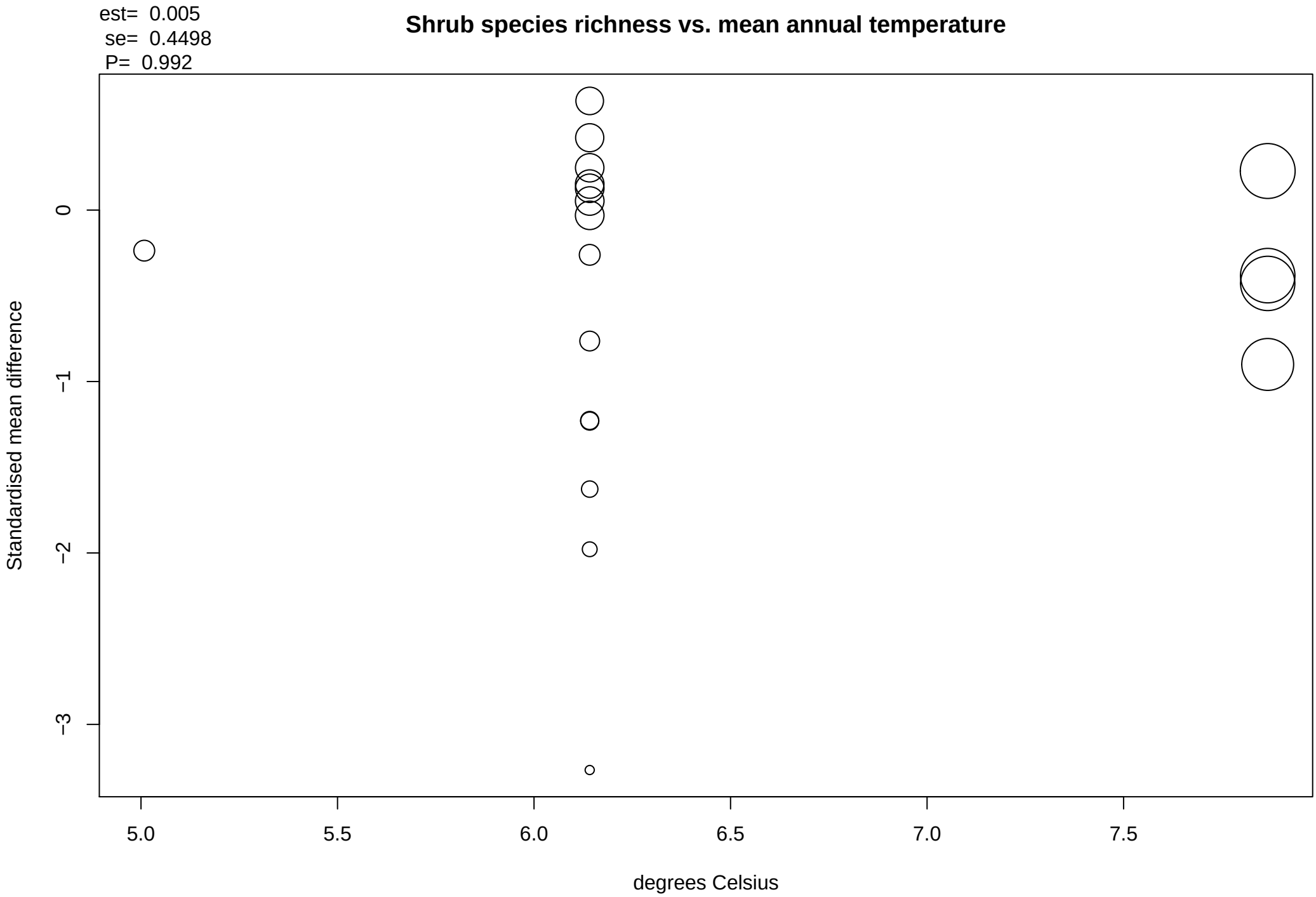

est= −0.066
se= 0.0372
P= 0.075
Graminoid abundance vs. mean annual temperature
Standardised mean difference
degrees Celsius
2
1
0
−1
−2
2
4
6
8
10
12
14

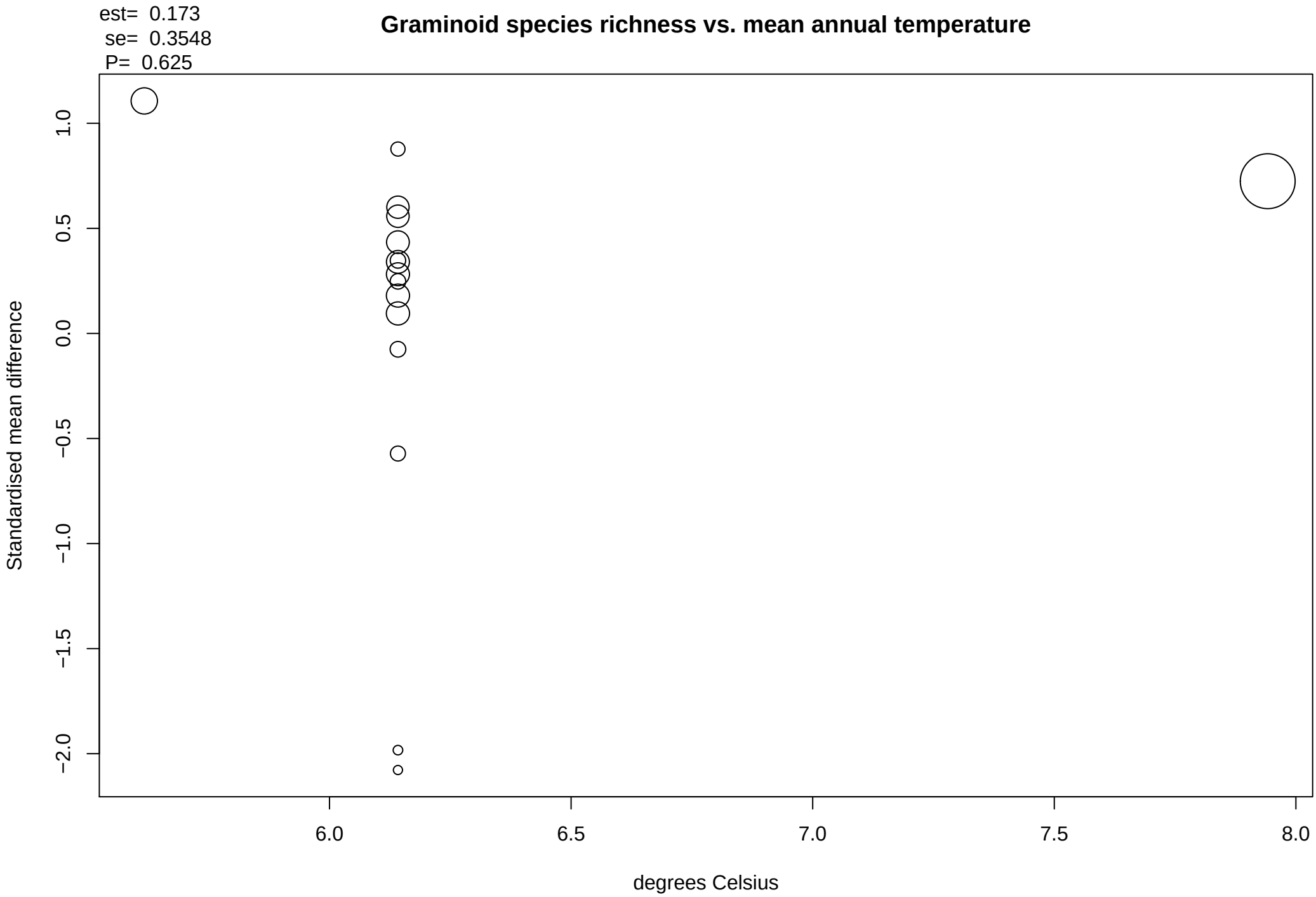

est= −0.036
se= 0.0195
P= 0.063
Forb abundance vs. mean annual temperature
Standardised mean difference
1.5
1.0
0.5
0.0
−0.5
−1.0
0
5
10
degrees Celsius

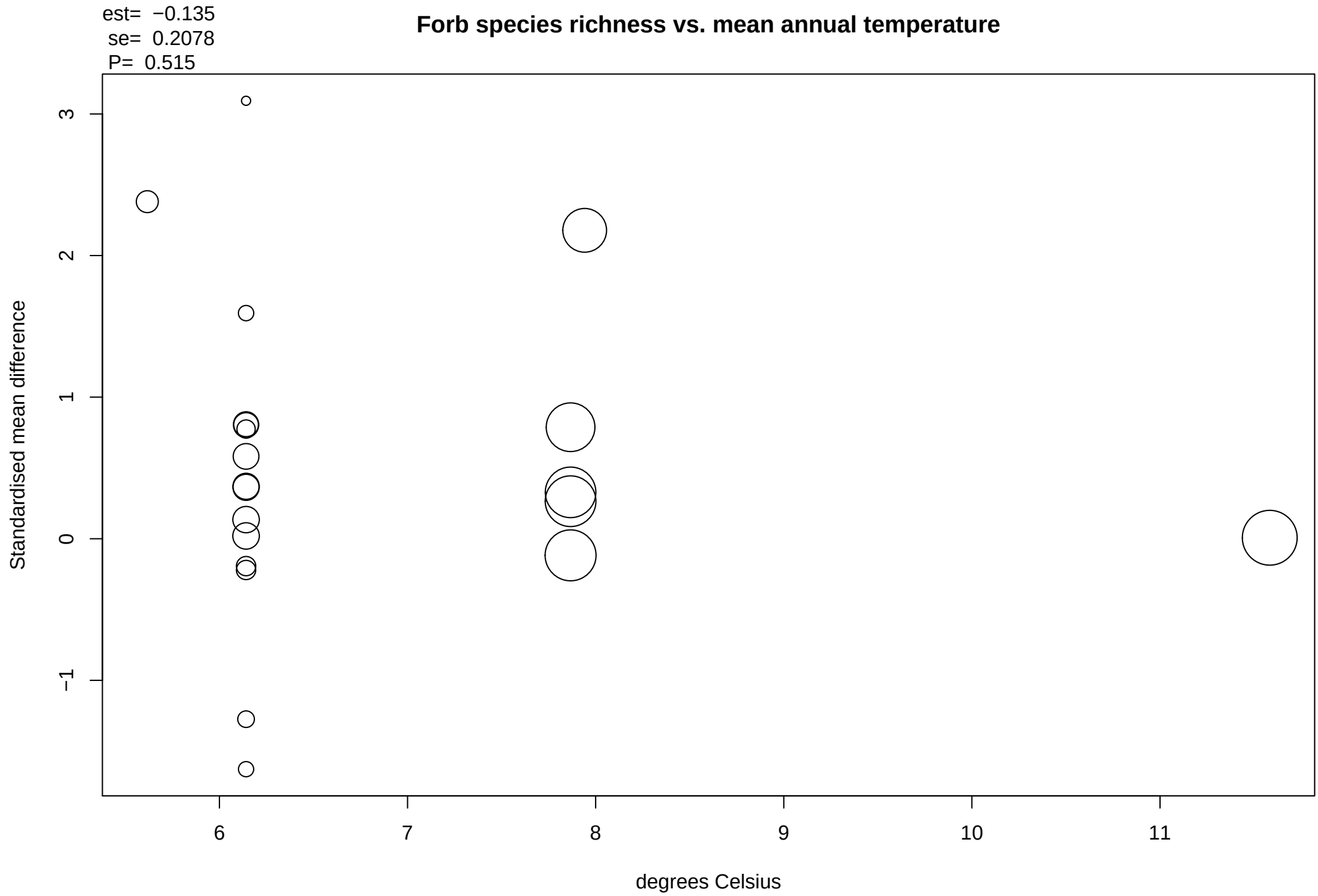

est= −0.142
se= 0.0489
P= 0.004
Understorey species richness vs. mean annual temperature
Standardised mean difference
2
0
−2
−4
−6
0
5
10
15
degrees Celsius

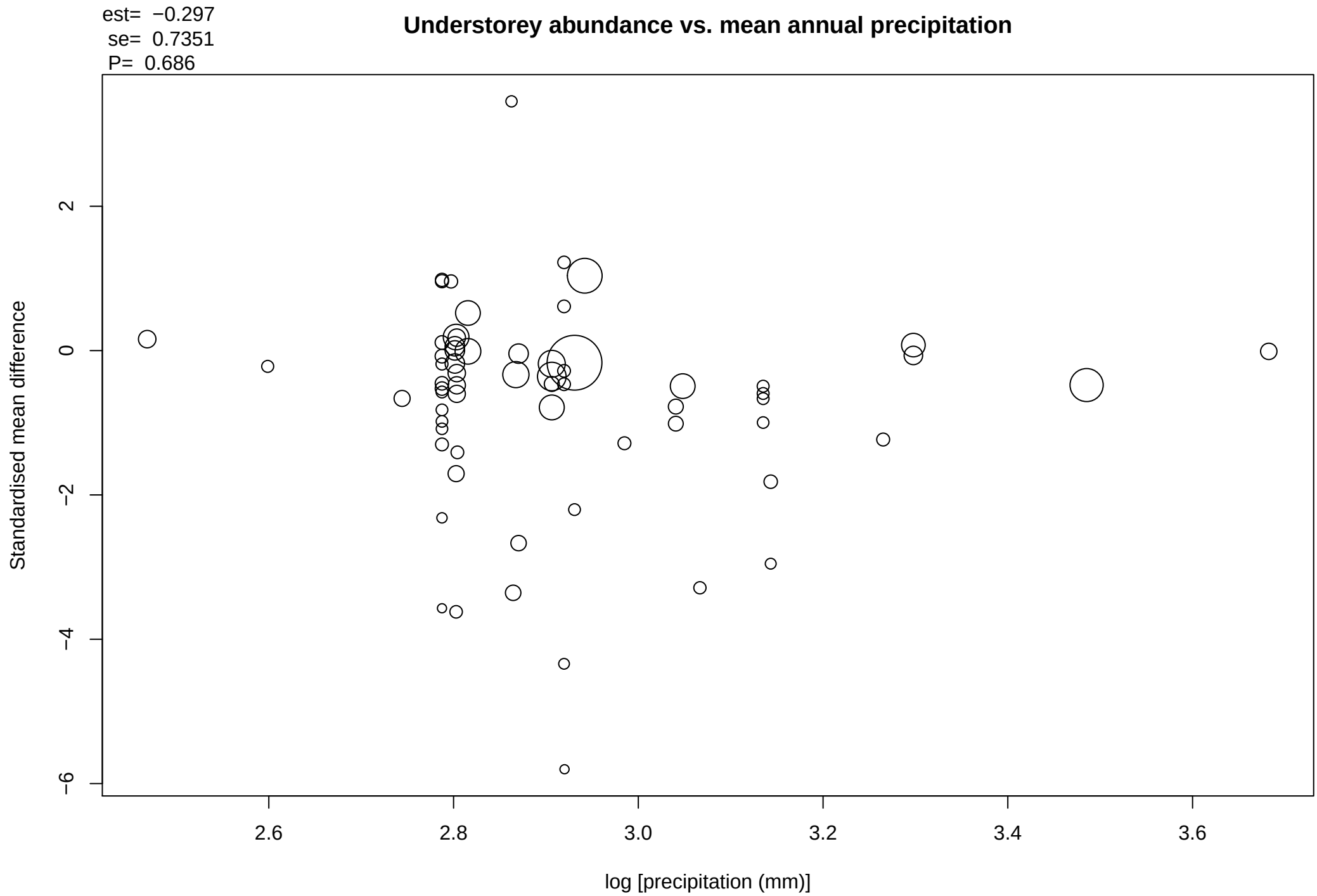

est= −0.218
se= 0.0898
P= 0.015
Woody understorey species richness vs. mean annual temperature
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
5
6
7
8
9
10
11
degrees Celsius

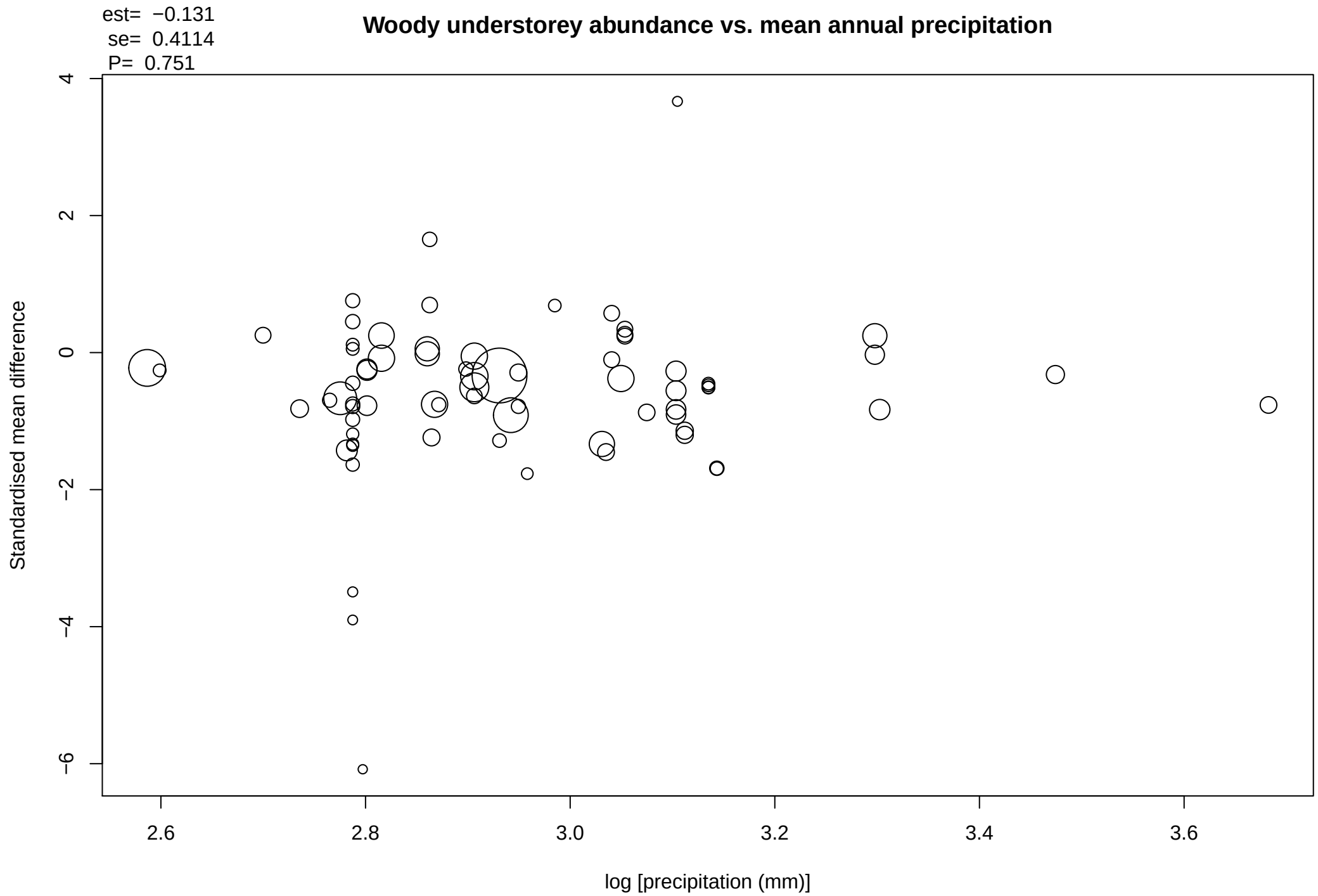

est= −0.333
se= 0.1099
P= 0.002
Tree sapling species richness vs. mean annual temperature
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
−2.0
6
7
8
9
10
11
degrees Celsius

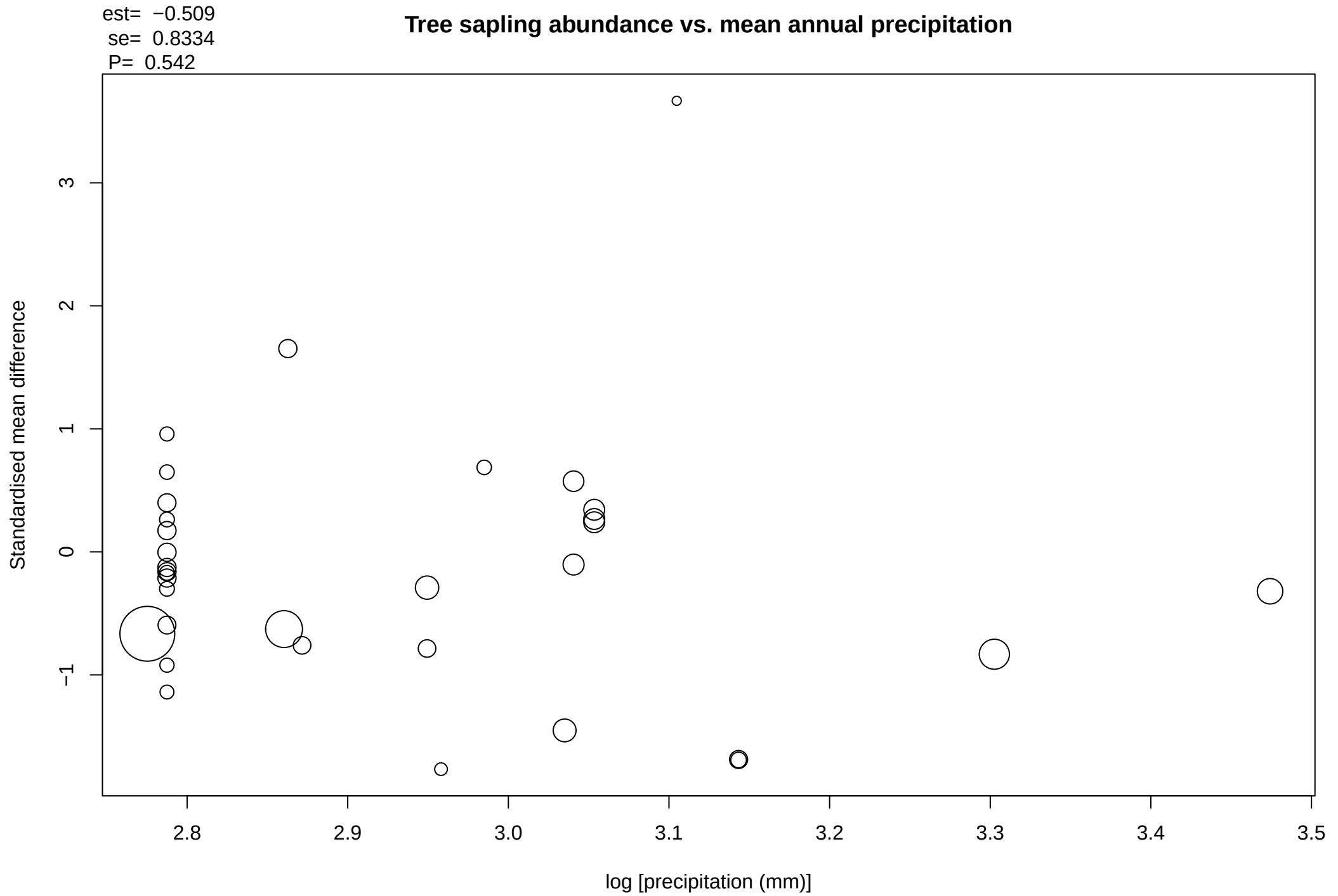

est= 0.005
se= 0.4498
P= 0.992
Shrub species richness vs. mean annual temperature
Standardised mean difference
0
−1
−2
−3
5.0
5.5
6.0
6.5
7.0
7.5
degrees Celsius

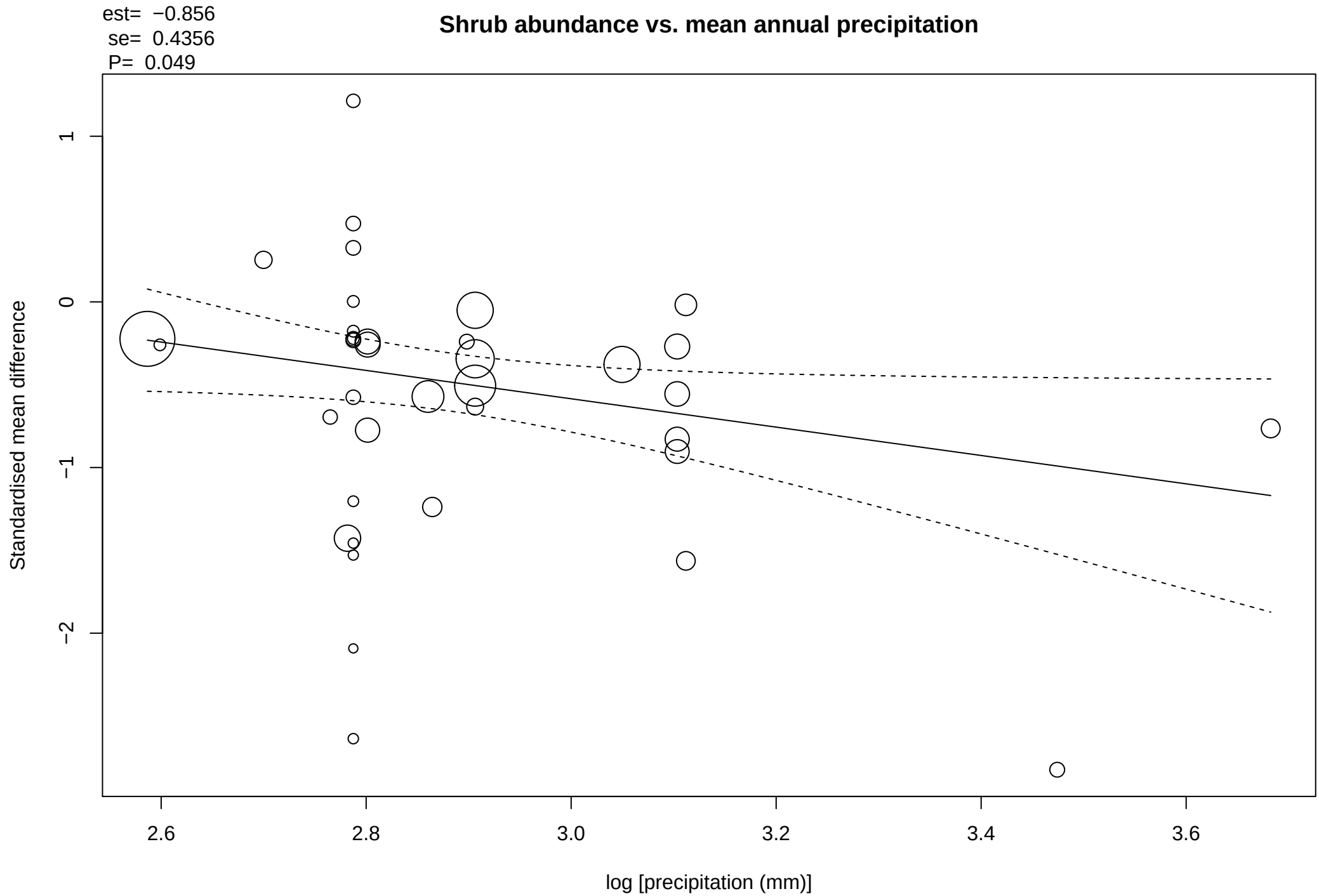

est= 0.173
se= 0.3548
P= 0.625
Graminoid species richness vs. mean annual temperature
Standardised mean difference
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
6.0
6.5
7.0
7.5
8.0
degrees Celsius

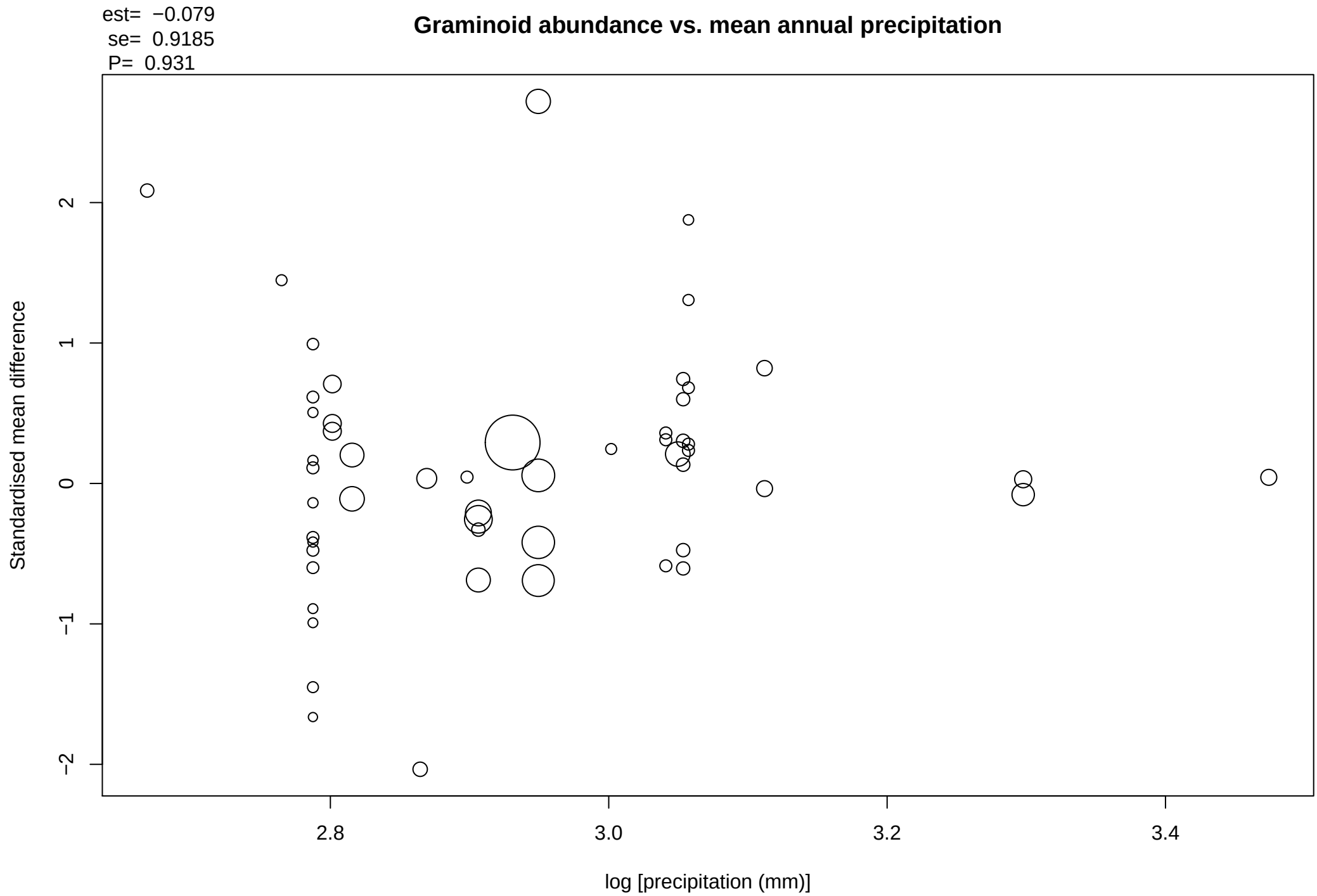

est= −0.135
se= 0.2078
P= 0.515
Forb species richness vs. mean annual temperature
Standardised mean difference
3
2
1
0
−1
6
7
8
9
10
11
degrees Celsius

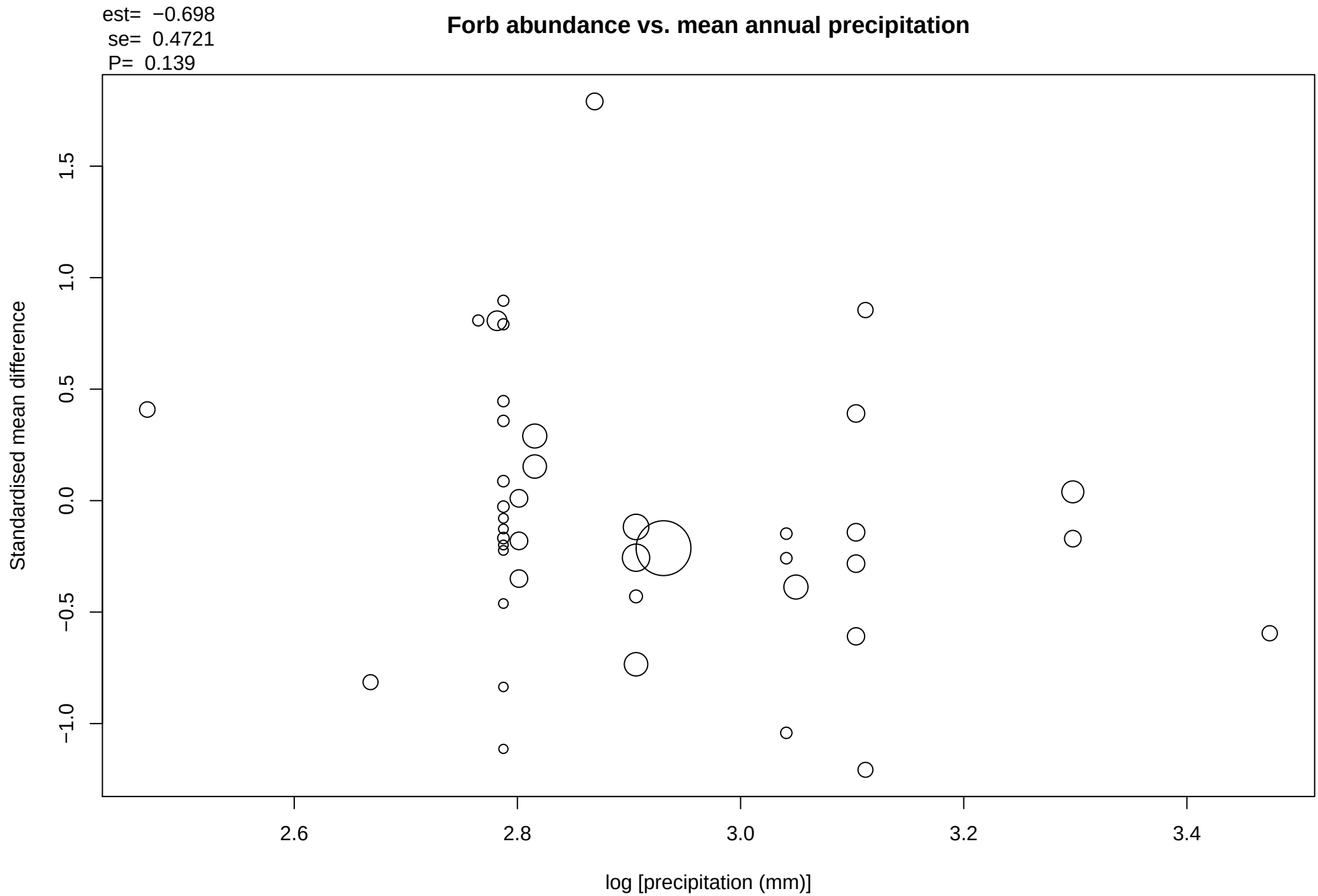

est= −0.297
se= 0.7351
P= 0.686
Understorey abundance vs. mean annual precipitation
Standardised mean difference
2
0
−2
−4
−6
2.6
2.8
3.0
3.2
3.4
3.6
log [precipitation (mm)]

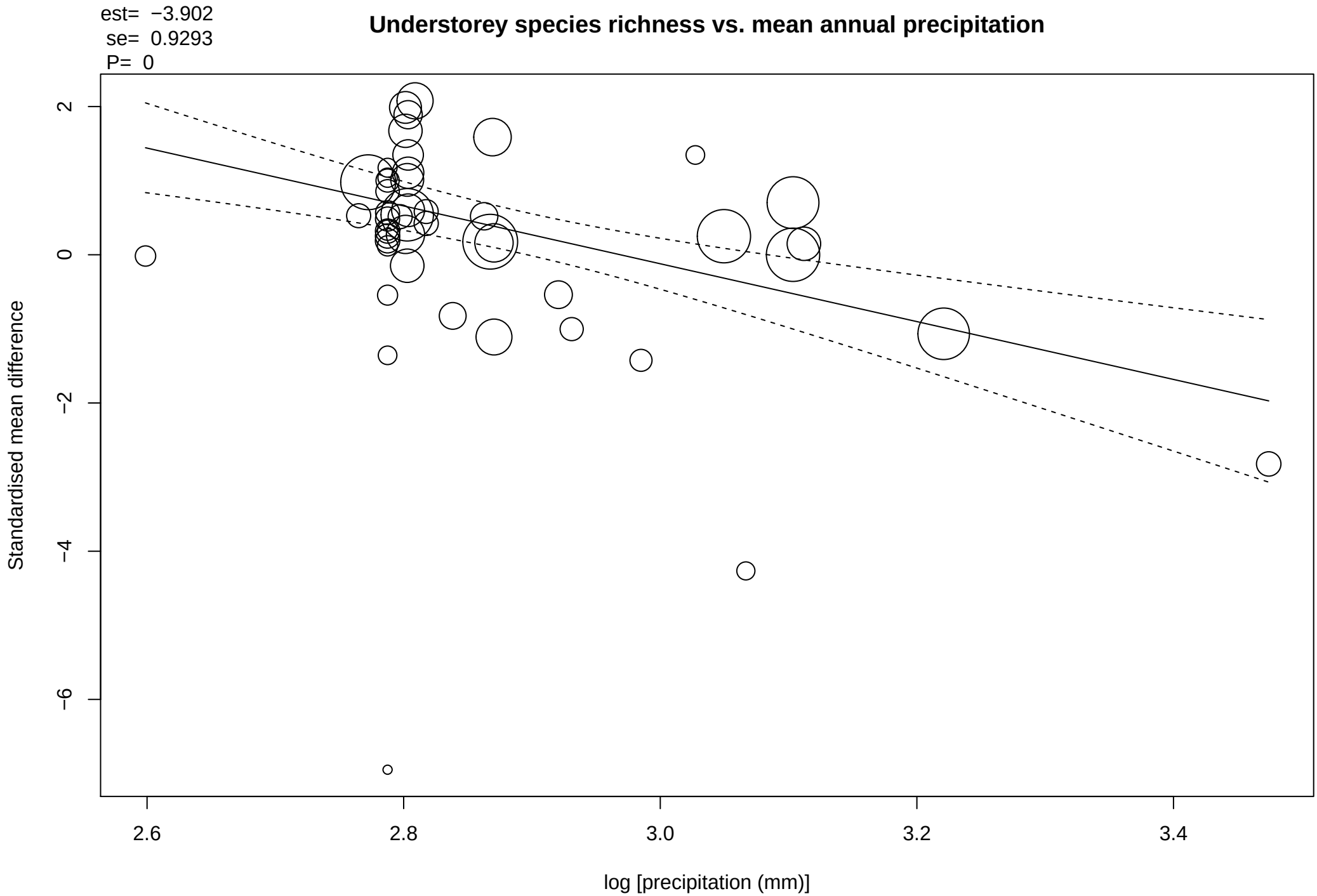

est= −0.131
se= 0.4114
P= 0.751
Woody understorey abundance vs. mean annual precipitation
Standardised mean difference
4
2
0
−2
−4
−6
2.6
2.8
3.0
3.2
3.4
3.6
log [precipitation (mm)]

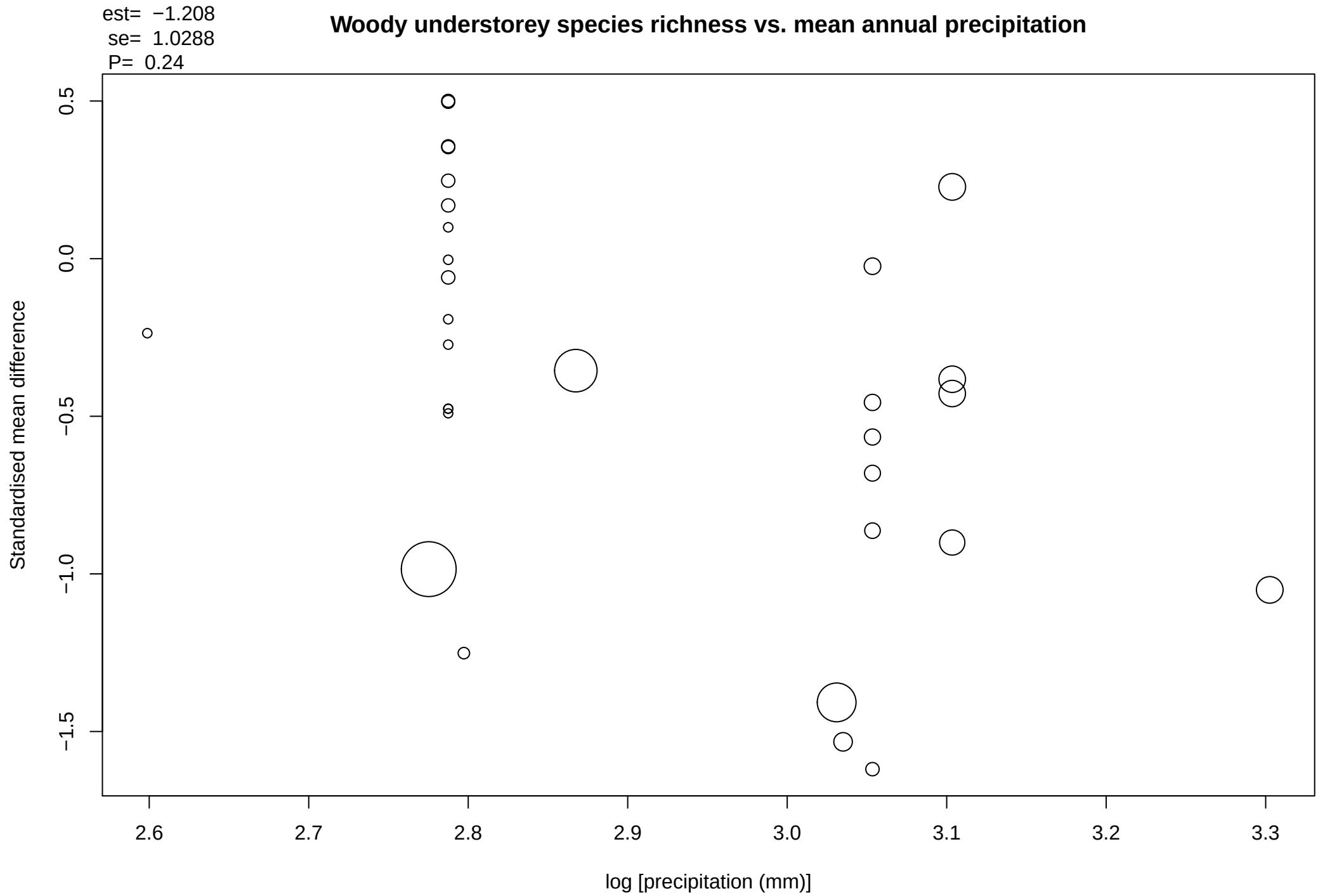

est= −0.509
se= 0.8334
P= 0.542
Tree sapling abundance vs. mean annual precipitation
Standardised mean difference
−1
0
1
2
3
2.8
2.9
3.0
3.1
3.2
3.3
3.4
3.5
log [precipitation (mm)]

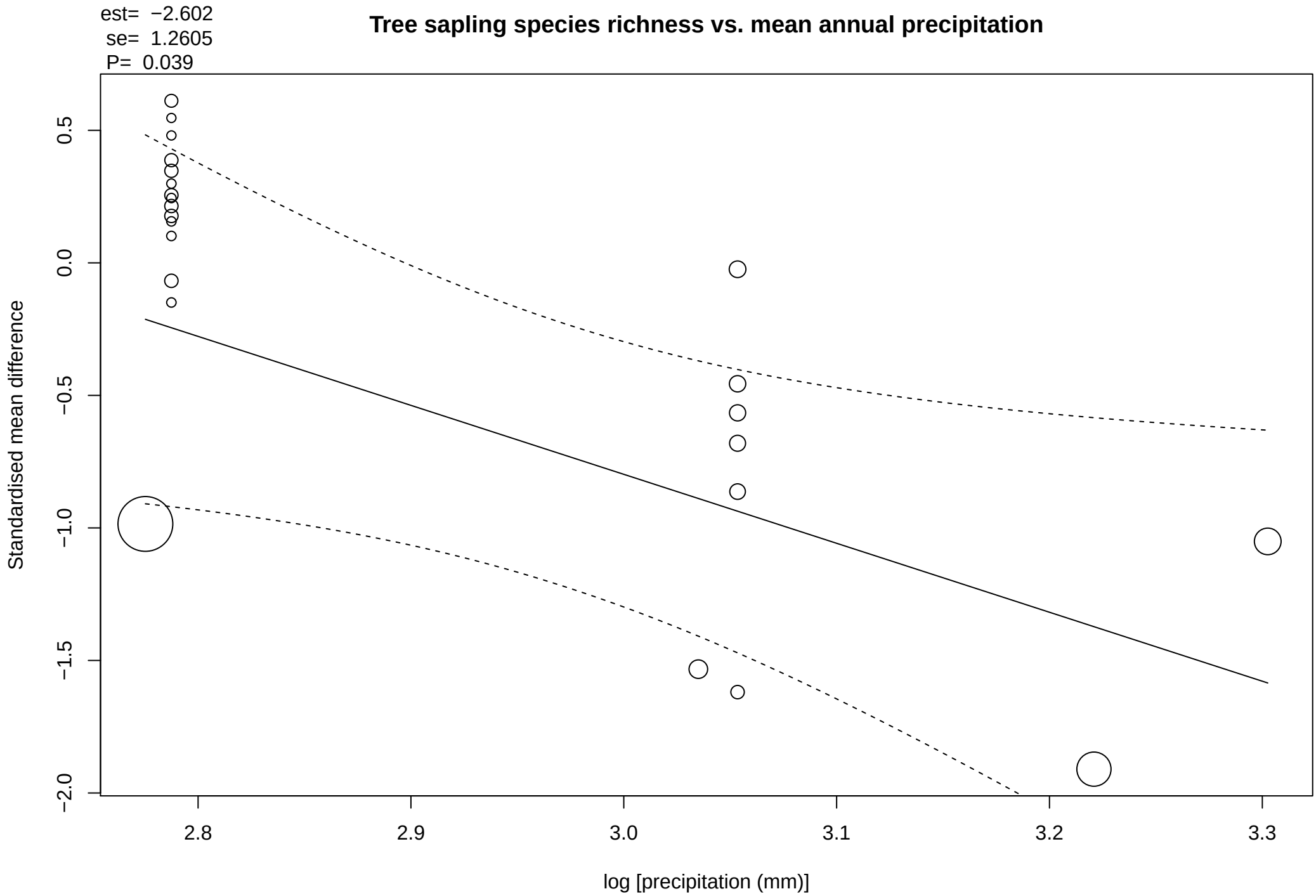

est= −0.856
se= 0.4356
P= 0.049
Shrub abundance vs. mean annual precipitation
Standardised mean difference
1
0
−1
−2
2.6
2.8
3.0
3.2
3.4
3.6
log [precipitation (mm)]

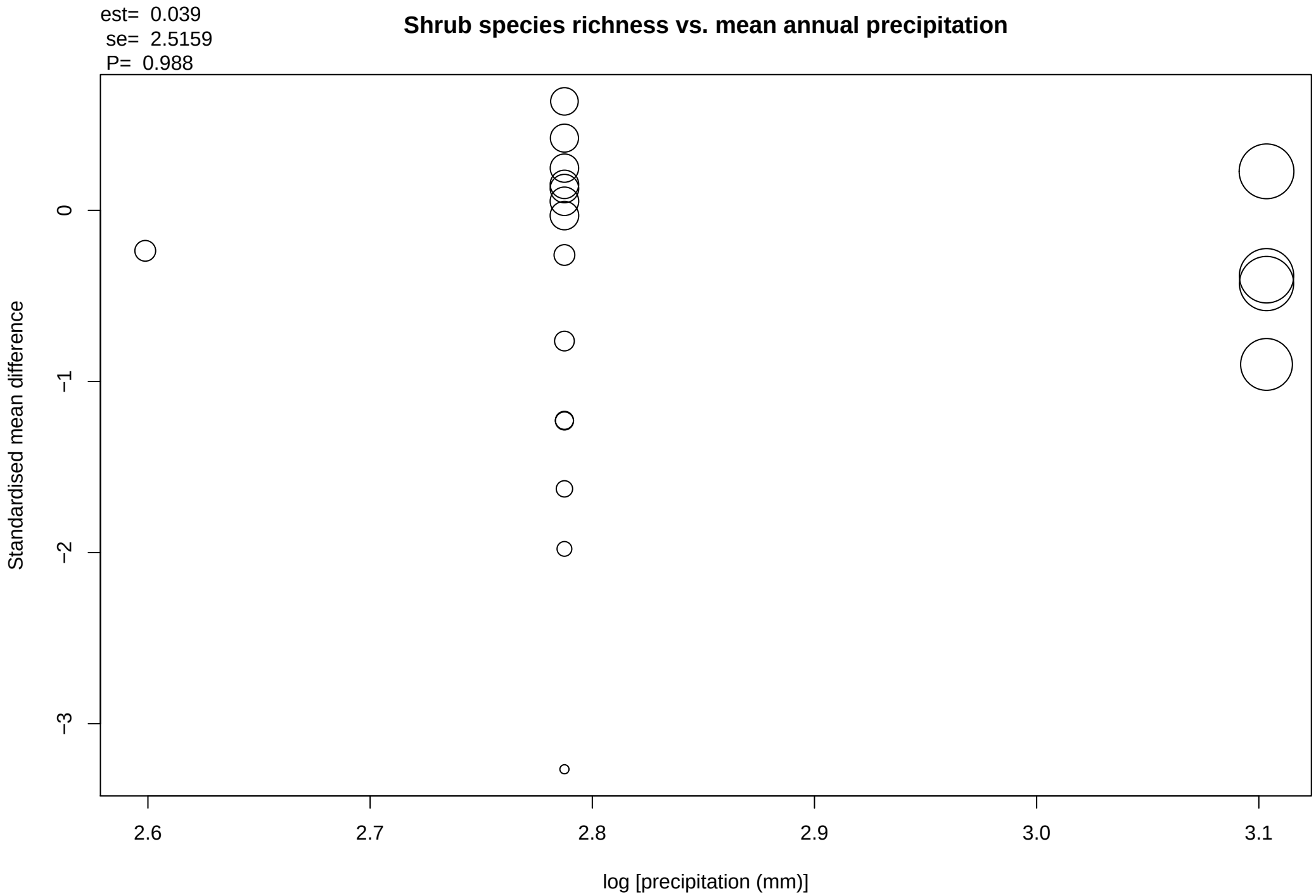

est= −0.079
se= 0.9185
P= 0.931
Graminoid abundance vs. mean annual precipitation
Standardised mean difference
2
1
0
−1
−2
2.8
3.0
3.2
3.4
log [precipitation (mm)]

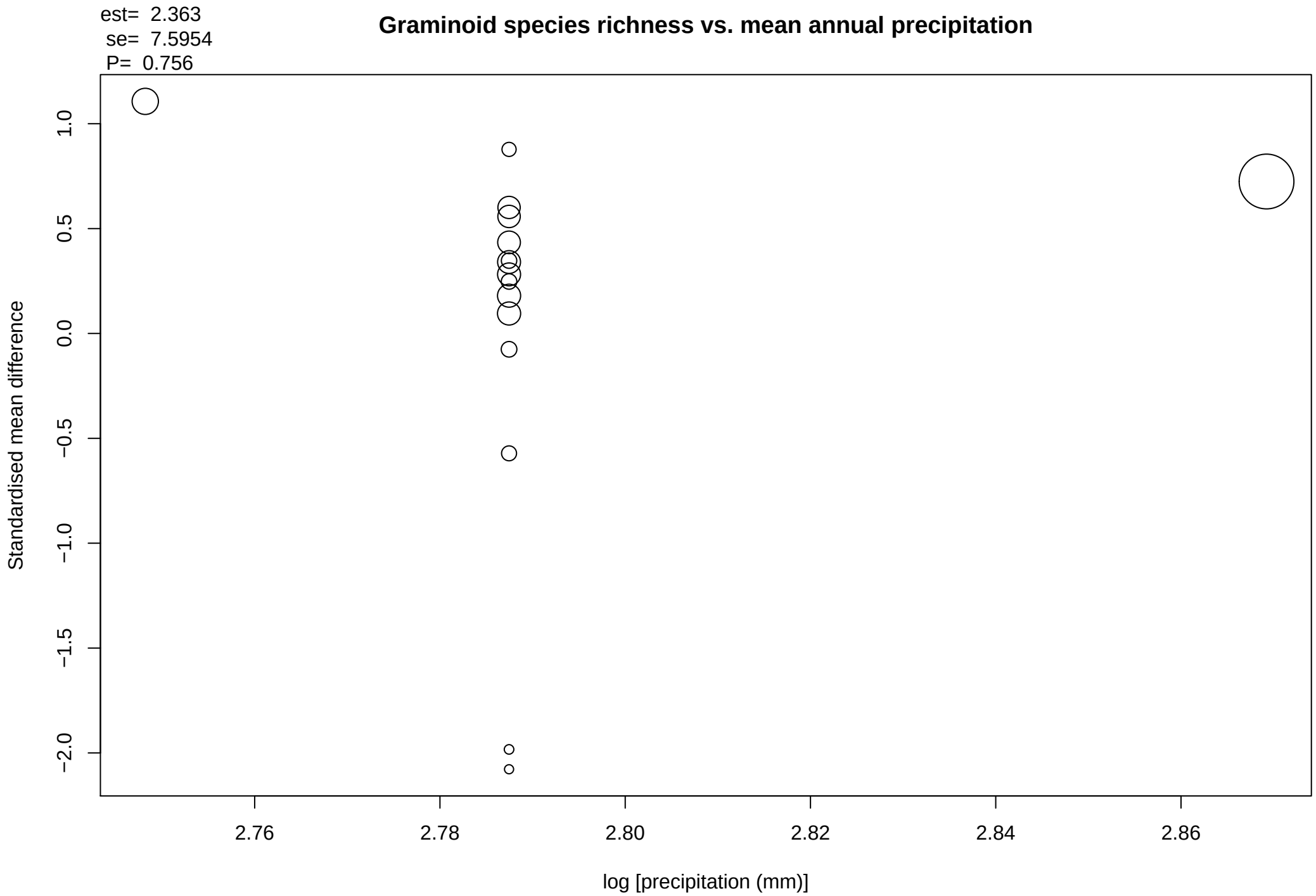

est= −0.698
se= 0.4721
P= 0.139
Forb abundance vs. mean annual precipitation
Standardised mean difference
1.5
1.0
0.5
0.0
−0.5
−1.0
2.6
2.8
3.0
3.2
3.4
log [precipitation (mm)]

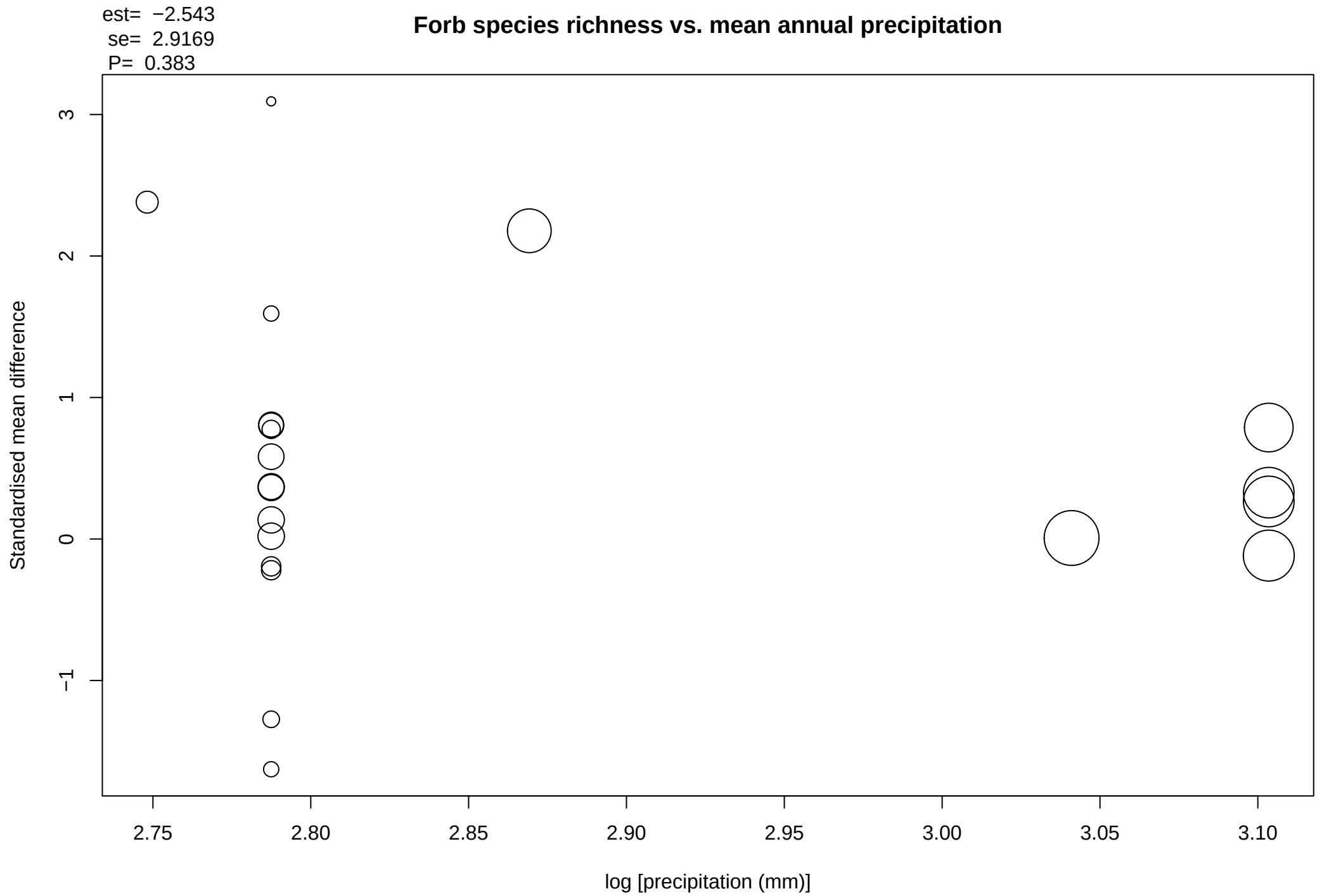

est= −3.902
se= 0.9293
P= 0
Understorey species richness vs. mean annual precipitation
Standardised mean difference
2
0
−2
−4
−6
2.6
2.8
3.0
3.2
3.4
log [precipitation (mm)]

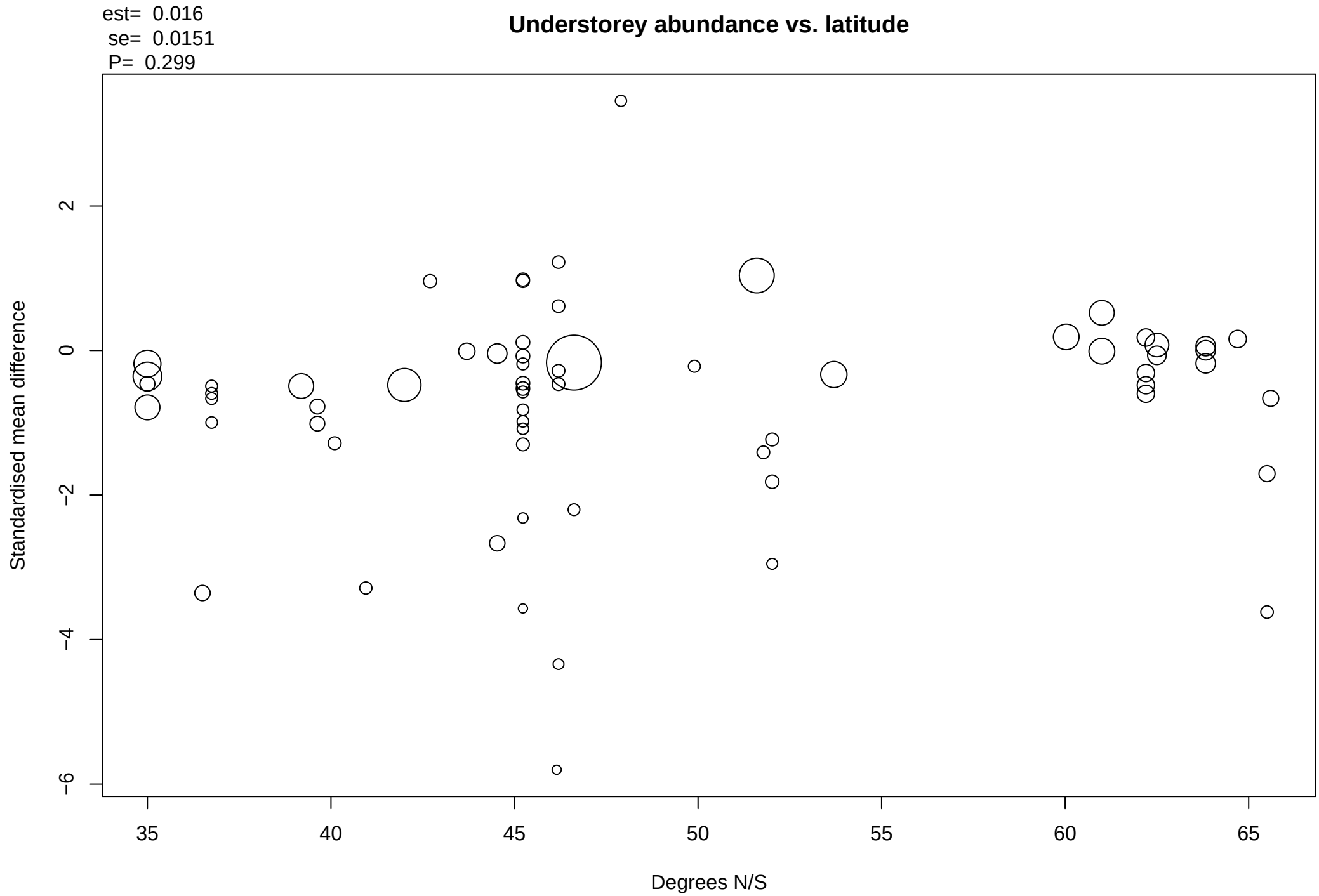

est= −1.208
se= 1.0288
P= 0.24
Woody understorey species richness vs. mean annual precipitation
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
2.6
2.7
2.8
2.9
3.0
3.1
3.2
3.3
log [precipitation (mm)]

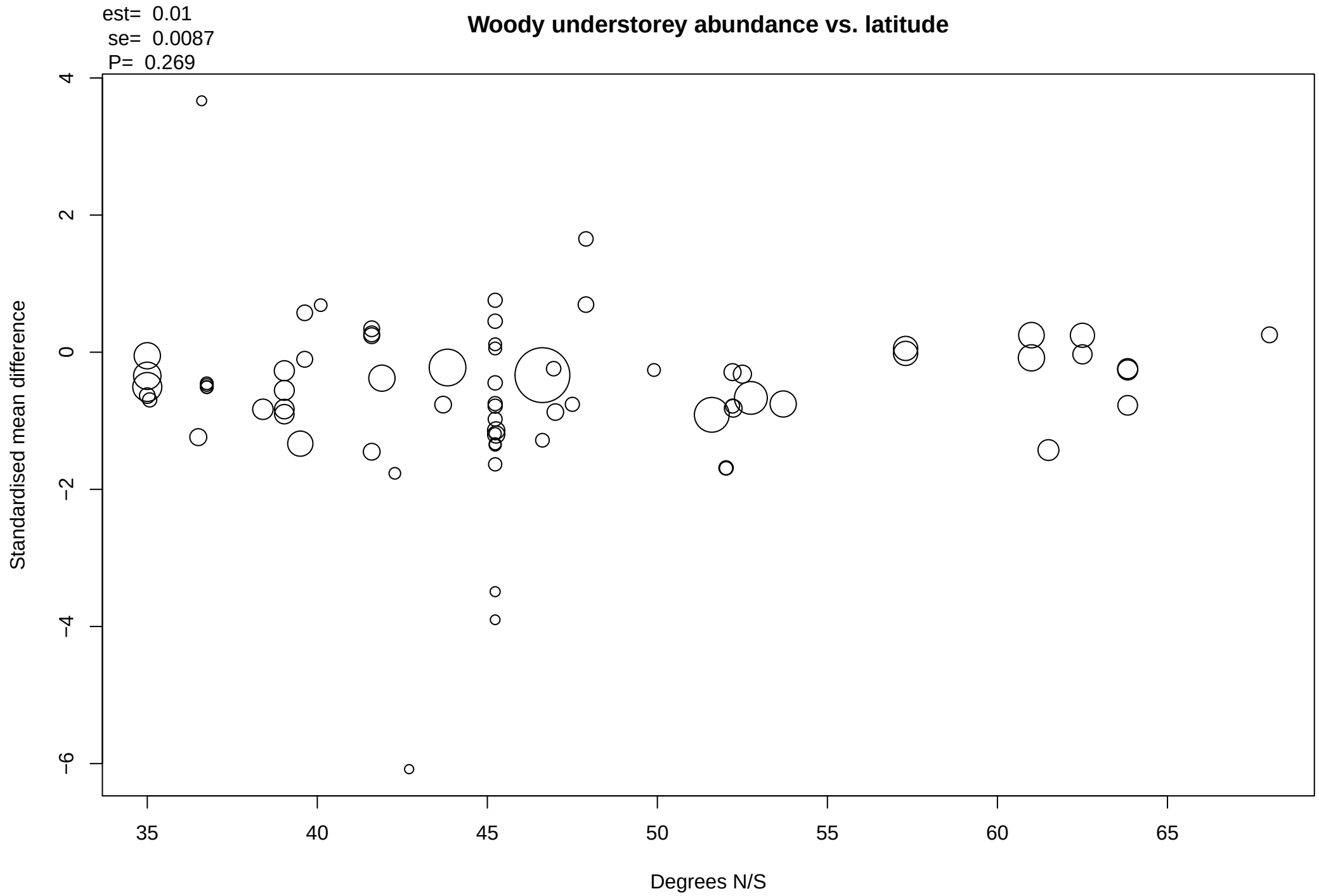

est= −2.602
se= 1.2605
P= 0.039
Tree sapling species richness vs. mean annual precipitation
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
−2.0
2.8
2.9
3.0
3.1
3.2
3.3
log [precipitation (mm)]

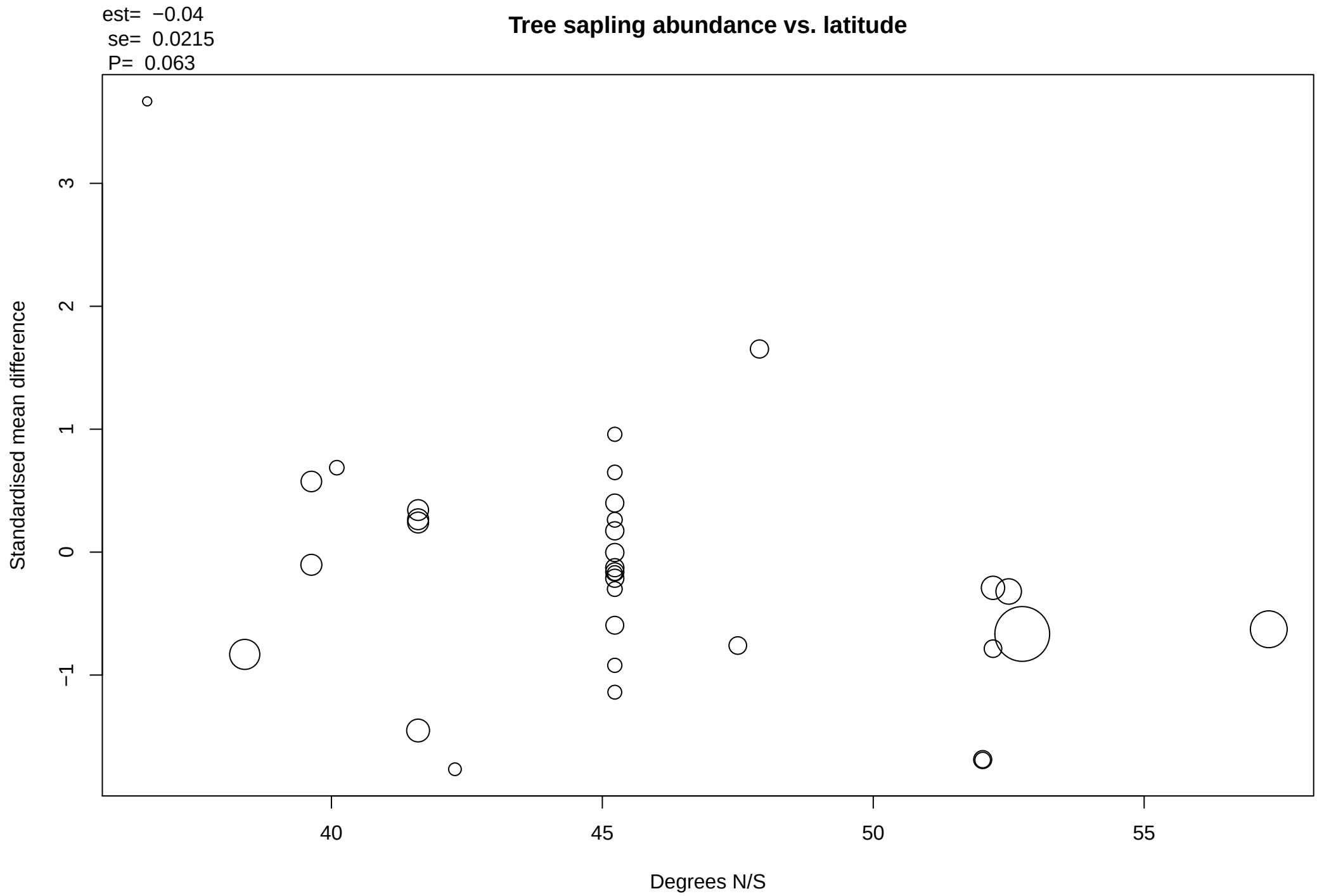

est= 0.039
se= 2.5159
P= 0.988
Shrub species richness vs. mean annual precipitation
Standardised mean difference
0
−1
−2
−3
2.6
2.7
2.8
2.9
3.0
3.1
log [precipitation (mm)]

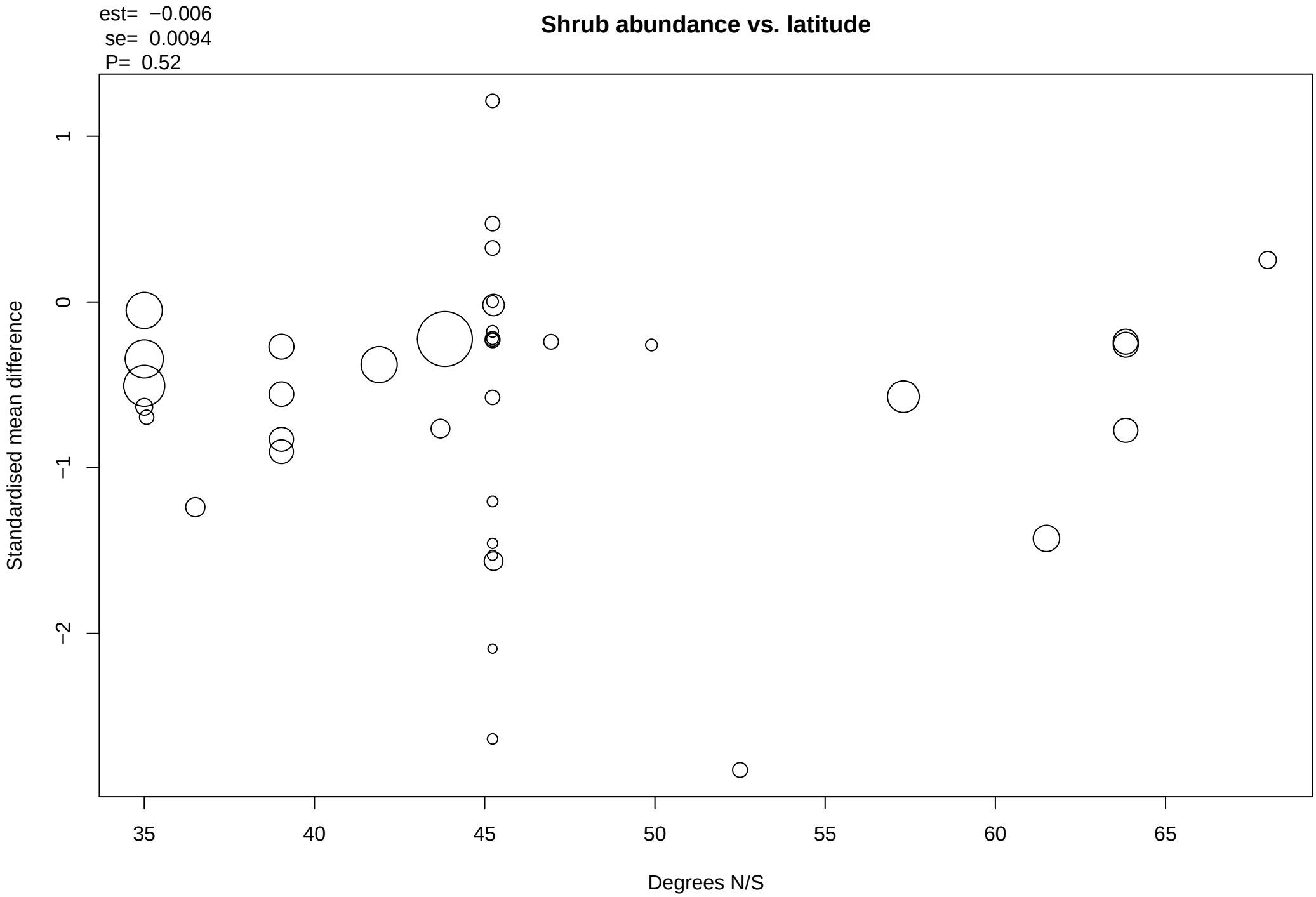

est= 2.363
se= 7.5954
P= 0.756
Graminoid species richness vs. mean annual precipitation
Standardised mean difference
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
2.76
2.78
2.80
2.82
2.84
2.86
log [precipitation (mm)]

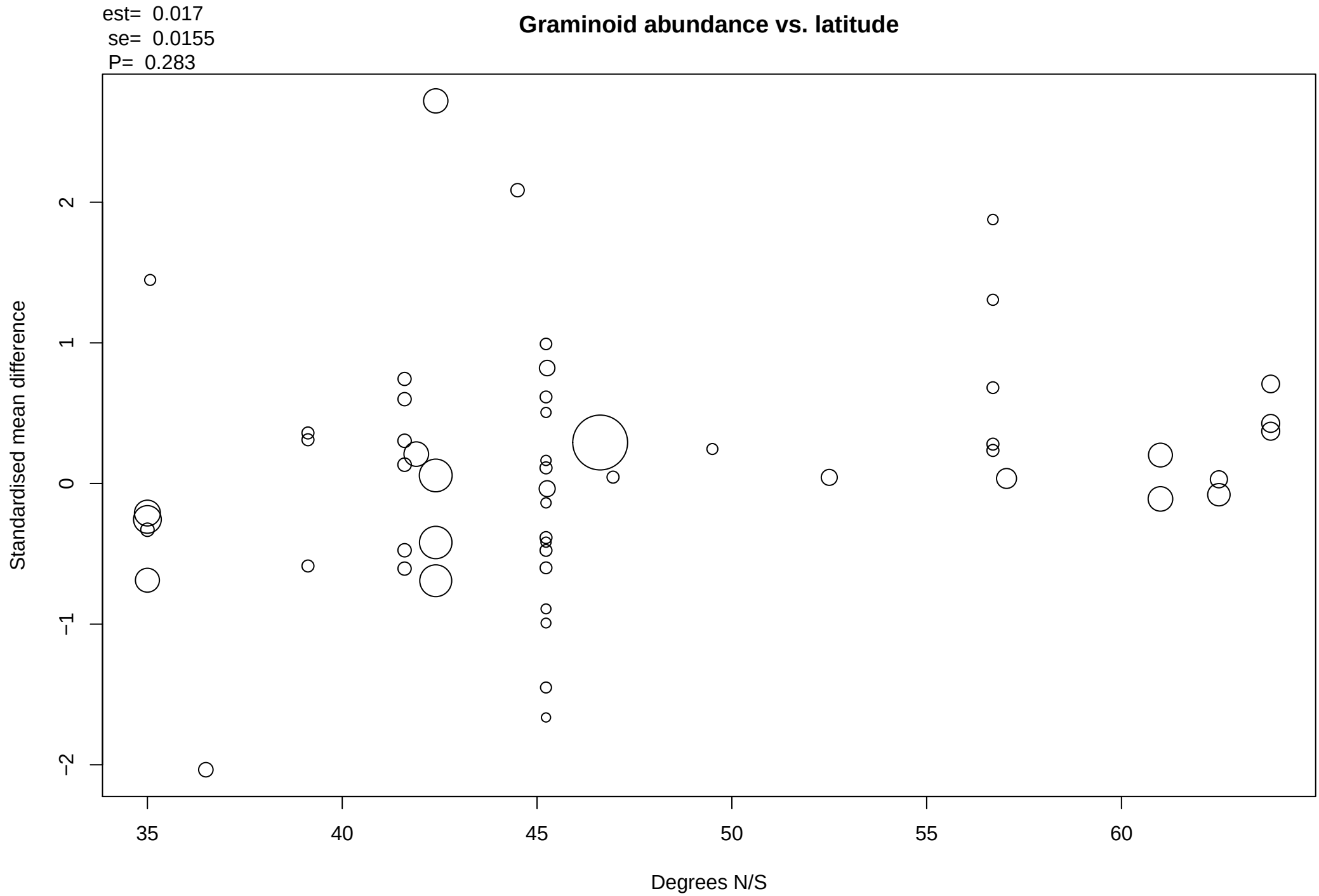

est= −2.543
se= 2.9169
P= 0.383
Forb species richness vs. mean annual precipitation
Standardised mean difference
3
2
1
0
−1
2.75
2.80
2.85
2.90
2.95
3.00
3.05
3.10
log [precipitation (mm)]

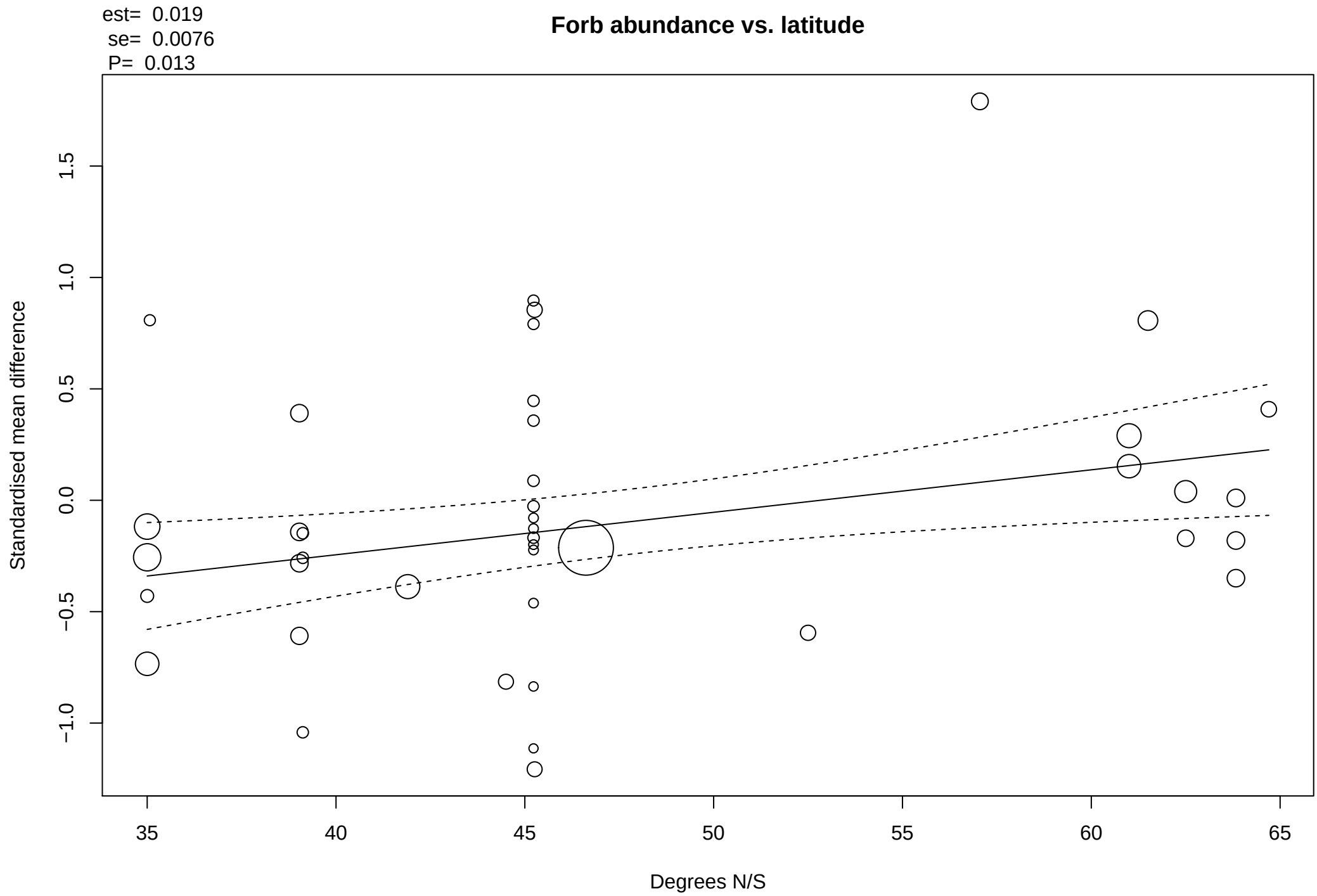

est= 0.016
se= 0.0151
P= 0.299
Understorey abundance vs. latitude
Standardised mean difference
Degrees N/S
2
0
−2
−4
−6
35
40
45
50
55
60
65

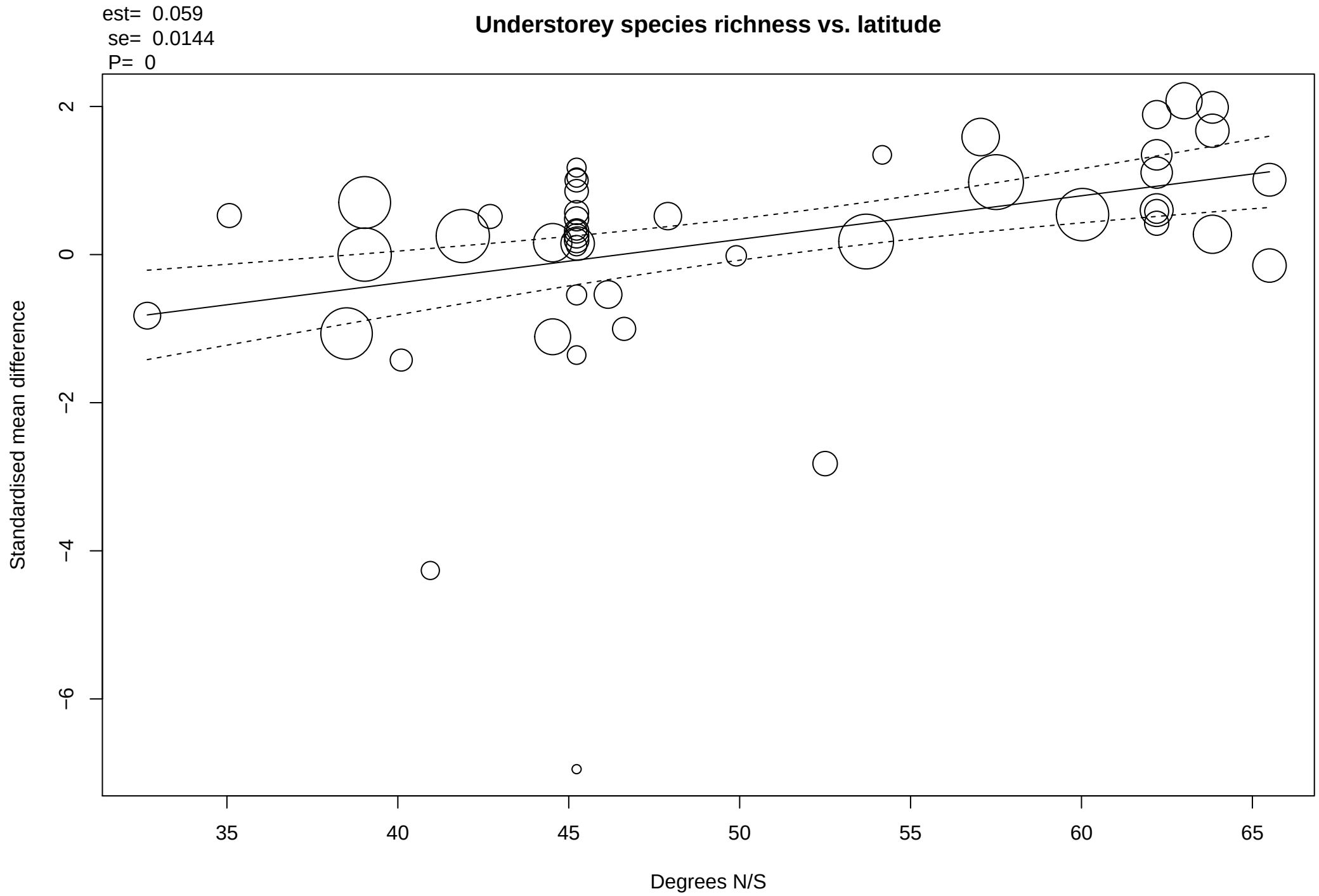

est= 0.01
se= 0.0087
P= 0.269
Woody understorey abundance vs. latitude
Standardised mean difference
4
2
0
−2
−4
−6
35
40
45
50
55
60
65
Degrees N/S

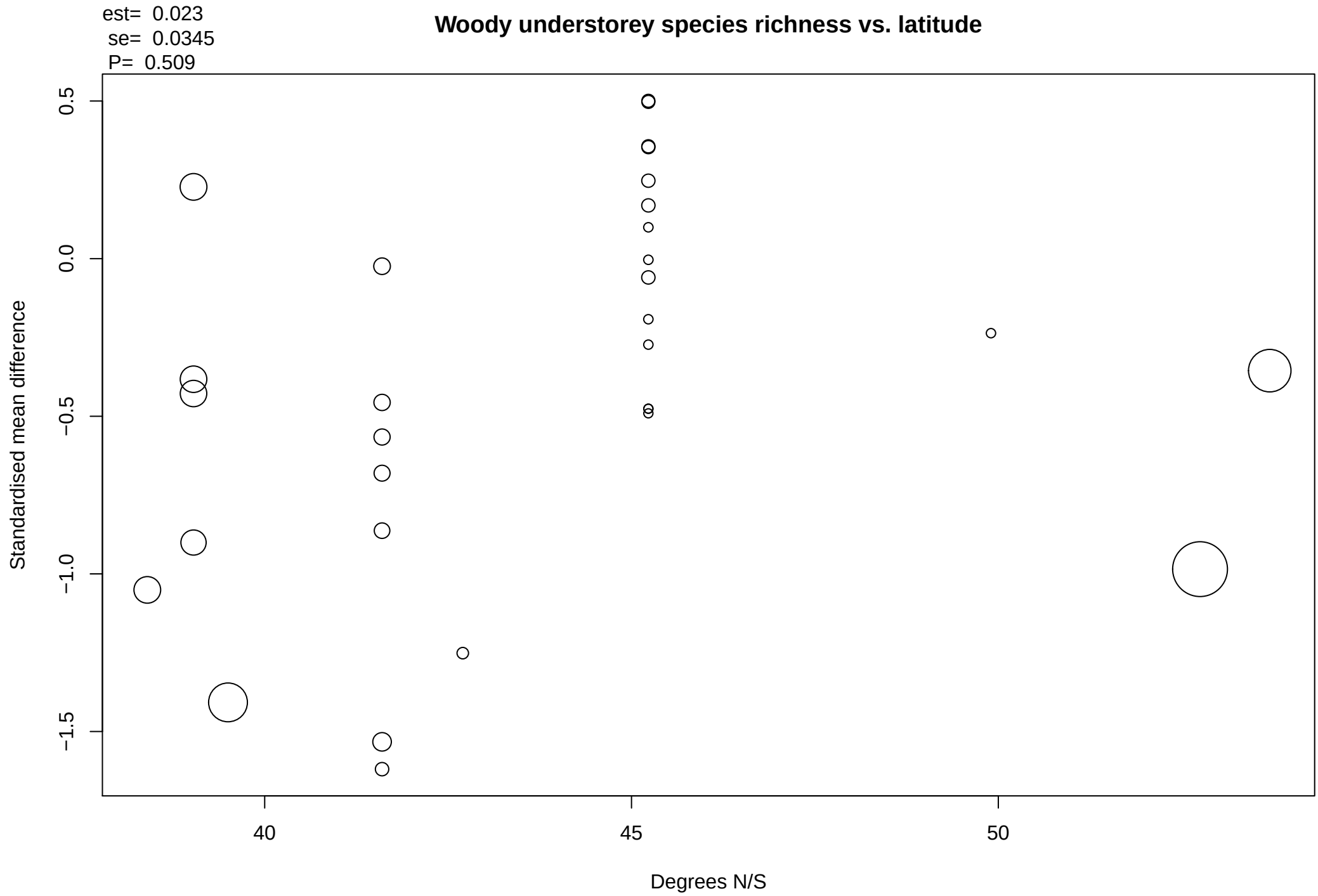

est= −0.04
se= 0.0215
P= 0.063
Tree sapling abundance vs. latitude
Standardised mean difference
3
2
1
0
−1
40
45
50
55
Degrees N/S

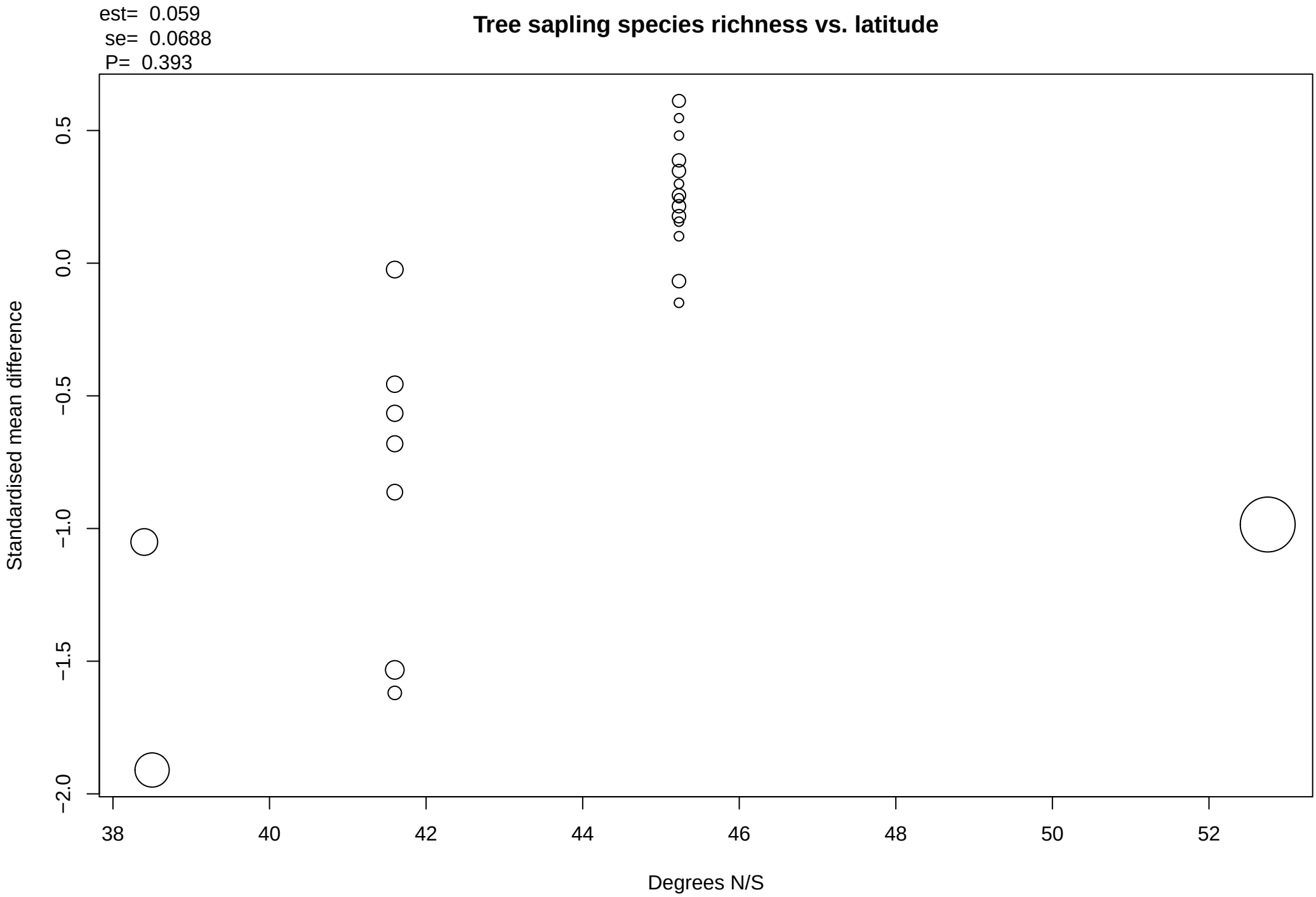

est= −0.006
se= 0.0094
P= 0.52
Shrub abundance vs. latitude
Standardised mean difference
1
0
−1
−2
35
40
45
50
55
60
65
Degrees N/S

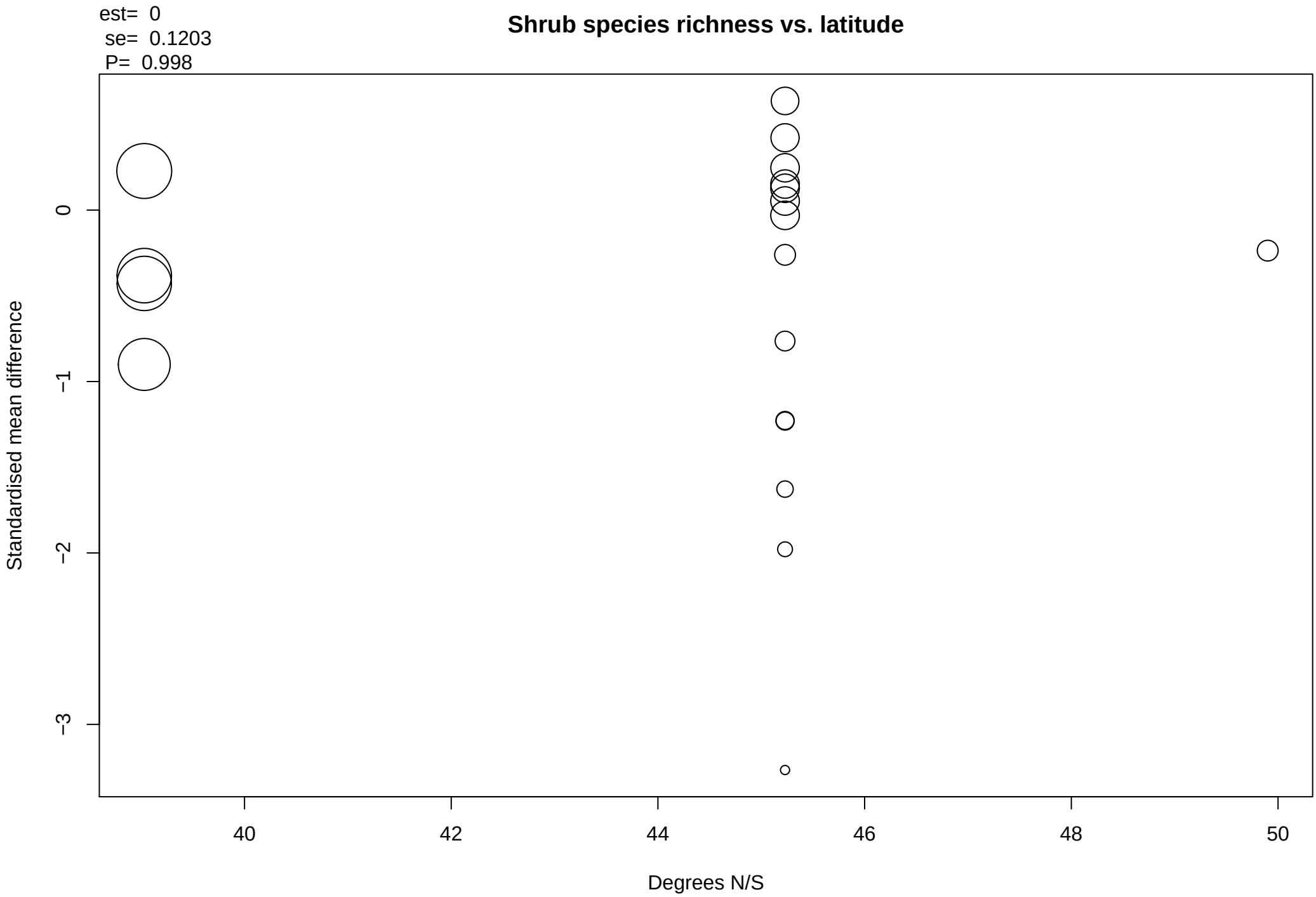

est= 0.017
se= 0.0155
P= 0.283
Graminoid abundance vs. latitude
Standardised mean difference
2
1
0
−1
−2
35
40
45
50
55
60
Degrees N/S

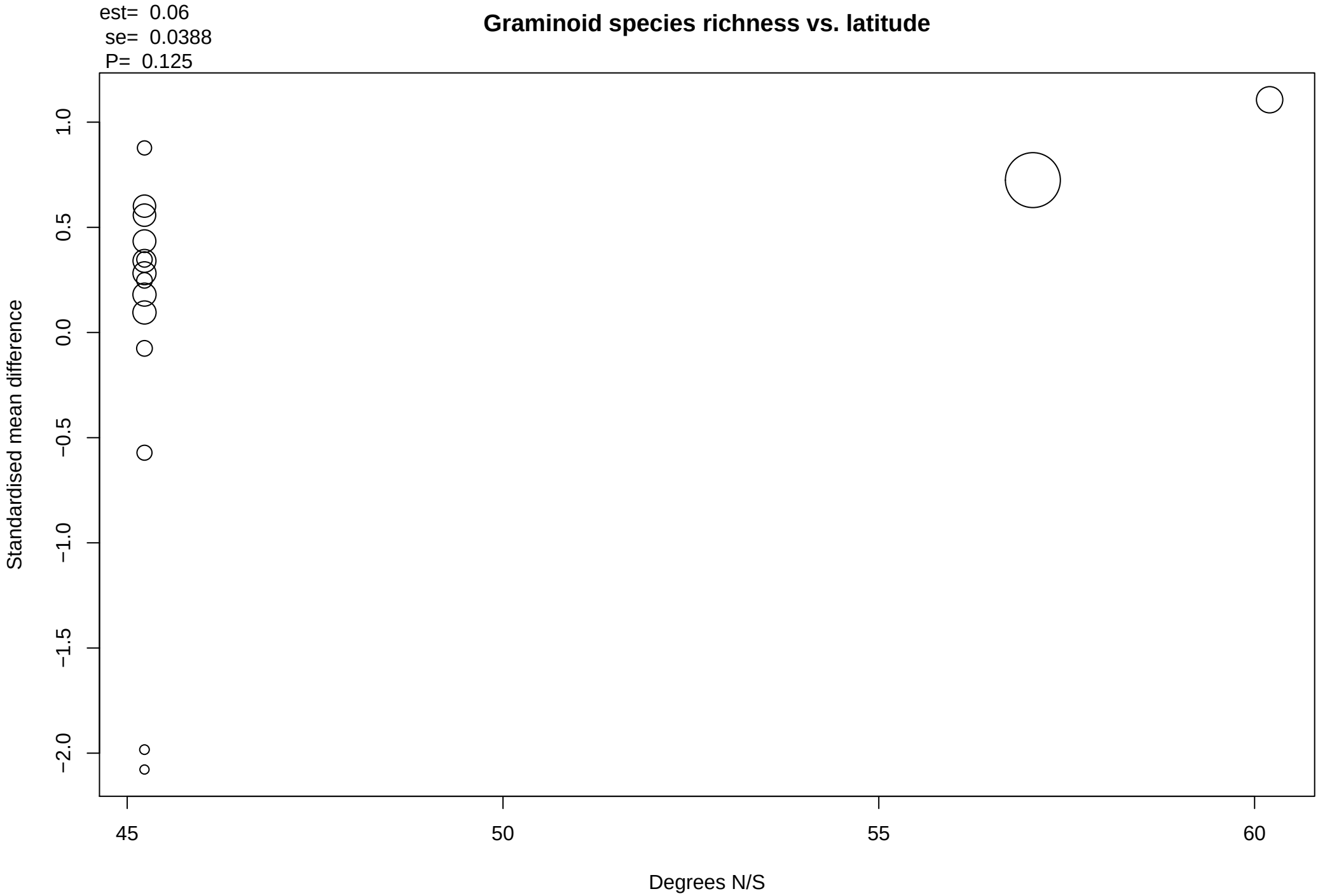

est= 0.019
se= 0.0076
P= 0.013
Forb abundance vs. latitude
Standardised mean difference
1.5
1.0
0.5
0.0
−0.5
−1.0
35
40
45
50
55
60
65
Degrees N/S

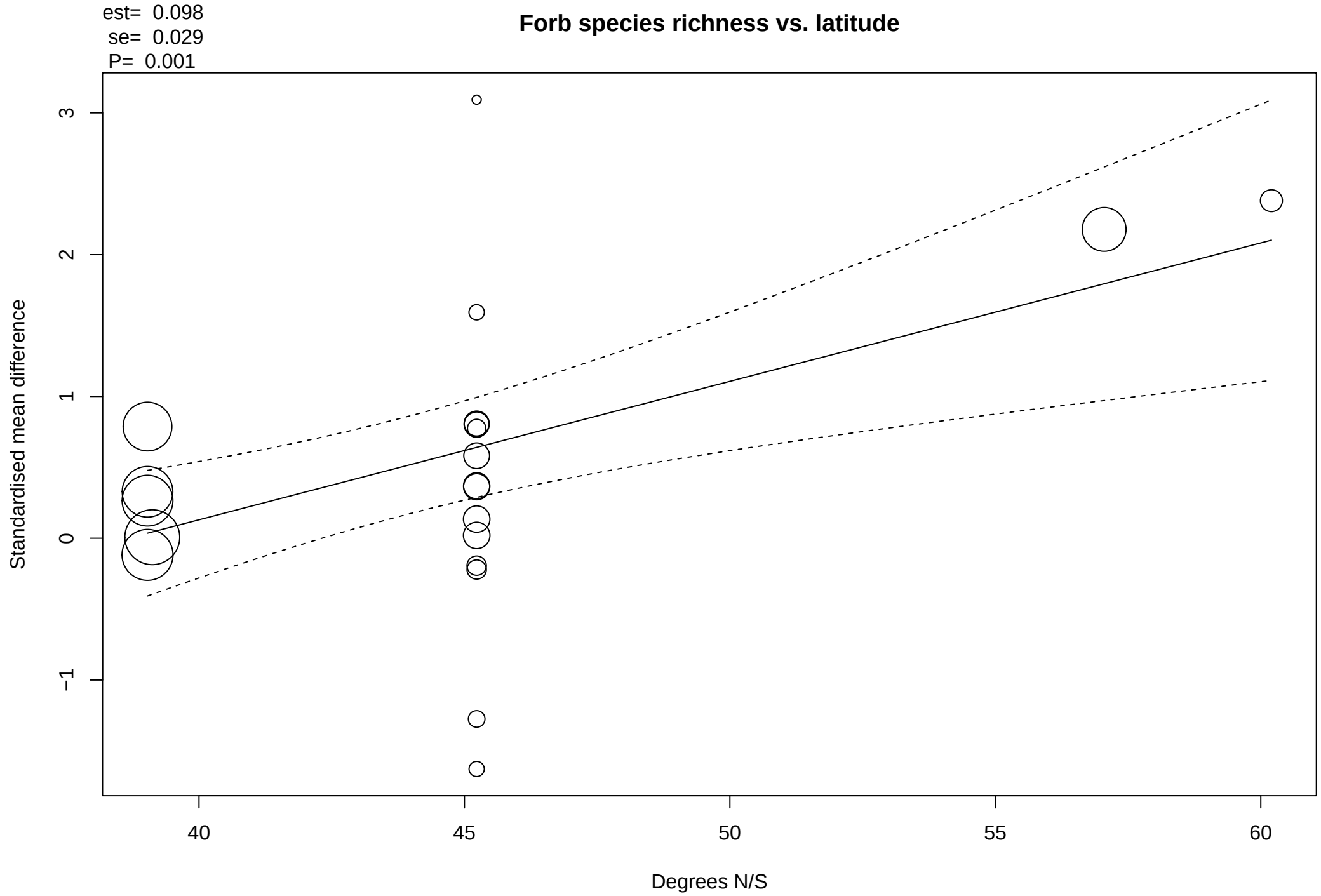

est= 0.059
se= 0.0144
P= 0
Understorey species richness vs. latitude
Standardised mean difference
2
0
−2
−4
−6
35
40
45
50
55
60
65
Degrees N/S


est= 0.023
se= 0.0345
P= 0.509
Woody understorey species richness vs. latitude
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
40
45
50
Degrees N/S


est= 0.059
se= 0.0688
P= 0.393
Tree sapling species richness vs. latitude
Standardised mean difference
0.5
0.0
−0.5
−1.0
−1.5
−2.0
38
40
42
44
46
48
50
52
Degrees N/S


est= 0
se= 0.1203
P= 0.998
Shrub species richness vs. latitude
Standardised mean difference
0
−1
−2
−3
40
42
44
46
48
50
Degrees N/S


est= 0.06
se= 0.0388
P= 0.125
Graminoid species richness vs. latitude
Standardised mean difference
1.0
0.5
0.0
−0.5
−1.0
−1.5
−2.0
45
50
55
60
Degrees N/S


est= 0.098
se= 0.029
P= 0.001
Forb species richness vs. latitude
Standardised mean difference
3
2
1
0
−1
40
45
50
55
60
Degrees N/S