Methods for SEM methods section

We proposed habitat diversity would modulate food web module interaction strengths through its effects on prey resource diversity and production. To quantify this effect, as well as the relative importance of prey diversity and production on interaction strengths, we needed to account for the variety of direct and indirect pathways that habitat diversity influences prey resource diversity and secondary production. Therefore, we used structural equation models (SEM, **grace?**, **shipley?**) to examine the multiple causal pathways (Fig. 1) while accounting for the correlation between the multiple variables. We hypothesized habitat diversity, measured by Shannon-Weiner entropy, would influence both the Models were fit using the lavaan package (ver. 0.6-15, **rosseel2012?**).

| lhs | op | rhs | est.std | se | z | pvalue | ci.lower | ci.upper |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| is\_scaled | ~ | prod\_scaled | -0.595 | 0.048 | -12.490 | 0.000 | -0.689 | -0.502 |
| is\_scaled | ~ | bioH\_scaled | -0.690 | 0.041 | -16.784 | 0.000 | -0.771 | -0.610 |
| prod\_scaled | ~ | habH\_scaled | 0.971 | 0.026 | 37.107 | 0.000 | 0.920 | 1.022 |
| prod\_scaled | ~ | bioH\_scaled | -0.382 | 0.082 | -4.640 | 0.000 | -0.543 | -0.221 |
| prod\_scaled | ~ | sediment\_size\_scaled | 0.170 | 0.076 | 2.237 | 0.025 | 0.021 | 0.319 |
| bioH\_scaled | ~ | habH\_scaled | 0.163 | 0.056 | 2.893 | 0.004 | 0.053 | 0.274 |
| bioH\_scaled | ~ | sediment\_size\_scaled | 0.788 | 0.038 | 20.481 | 0.000 | 0.713 | 0.863 |
| sediment\_size\_scaled | ~ | habH\_scaled | 0.229 | 0.093 | 2.455 | 0.014 | 0.046 | 0.413 |
| bioH\_scaled | =~ | bioH\_shannon\_scaled | 0.919 | 0.017 | 54.985 | 0.000 | 0.886 | 0.952 |
| bioH\_scaled | =~ | bioH\_richness\_scaled | 0.672 | 0.055 | 12.161 | 0.000 | 0.564 | 0.781 |
| bioH\_scaled | =~ | bioH\_evenness\_scaled | 0.994 | 0.007 | 151.853 | 0.000 | 0.981 | 1.007 |
| bioH\_shannon\_scaled | ~~ | bioH\_shannon\_scaled | 0.155 | 0.031 | 5.043 | 0.000 | 0.095 | 0.215 |
| bioH\_richness\_scaled | ~~ | bioH\_richness\_scaled | 0.548 | 0.074 | 7.367 | 0.000 | 0.402 | 0.694 |
| bioH\_evenness\_scaled | ~~ | bioH\_evenness\_scaled | 0.012 | 0.013 | 0.890 | 0.374 | -0.014 | 0.037 |
| is\_scaled | ~~ | is\_scaled | 0.093 | 0.017 | 5.370 | 0.000 | 0.059 | 0.127 |
| prod\_scaled | ~~ | prod\_scaled | 0.169 | 0.025 | 6.779 | 0.000 | 0.120 | 0.218 |
| sediment\_size\_scaled | ~~ | sediment\_size\_scaled | 0.947 | 0.043 | 22.084 | 0.000 | 0.863 | 1.031 |
| bioH\_scaled | ~~ | bioH\_scaled | 0.293 | 0.050 | 5.813 | 0.000 | 0.194 | 0.392 |
| habH\_scaled | ~~ | habH\_scaled | 1.000 | 0.000 | NA | NA | 1.000 | 1.000 |

# References