Michael Roswell, Jonathan Dushoff and Rachael Winfree. 2021. A conceptual guide to measuring species diversity**,** Oikos

* Coverage is a method for equalizing samples that is preferable to equal-effort or rarefying
* Richness, Shannon, and Simpson indices are variants of the same equation and can be expressed on the same scale and in units of species.
* Relative abundance inevitably affects diversity metrics which necessitates research choice of sensitivity towards rare species (‘leverage’)
* Equal sample effort is hindered by unequal sample size across communities
  + Small samples underestimate diversity
* Equalizing sample sizes by removing individuals from larger samples to match lower samples (rarefaction)
  + Does not account for the distribution of relative abundances in the whole larger community
  + Sample size standardization underestimates diversity for more diverse communities
* More diverse communities require more effort to characterize
* Coverage is a measure of how completely a community has been sampled: estimates the total true relative abundance in the community of all the species within the sample
  + 1-slope(species accumulation curve)
  + iNEXT and estimated in iNEXT R package
* Richness has high uncertainty due to the impacts of relative abundance on likelihood of detection of rare species
* Shannon and Simpson indices have different units that do not scale evenly with addition or loss of species which confounds their direct interpretation
* Hill diversity can be interpreted as the equivalent diversity of a community with equally abundant species.
* Hill diversity scales intuitively as species are lost or gained
* Species richness
  + arithmetic rarity scale – high leverage to rare species
  + arithmetic mean rarity
  + Not recommended because it has low accuracy outside of experiments
* Hill-Shannon
  + logarithmic scale intermediate leverage
  + Geometric mean rarity
  + Good choice for characterizing gradients in biodiversity in an ecologically meaningful way
  + Responds to very high and very low rarity values
* Hill-Simpson
  + Reciprocal scale shifts leverage towards common species
  + harmonic mean rarity
  + recommended for patterns among common species (robust to sample standardization and changes little as sample sizes increase)
* Consider plot of Diversity versus Exponent of L (aka hill number order)