Overall question- Have shifts in synchrony had any consequences?

1. Test of match-mismatch hypothesis: Is there a relationship between relative timing and performance? (model1: mismatch:performance) [experiments and observations]
2. Can you attribute temporal changes in performances to synchrony changes? (MUST HAVE HAD- changes in synchrony AND changes in performance)
   1. Has synchrony changed for these interactions? (model2: mismatch~year)
   2. Has performance declined over this time period? (model3: performance~year)
   3. Attribution- model5: performance change (fitness unit/year)~ sync change (days/year)

New methods

Excluded studies that did not form interactions themselves (i.e. potential interactions were not included)

Excluded studies that measured phenology as indecides (e.g. NDVI, EVI)

Old methods:

*Performance data*

We extracted performance data for all papers when possible; otherwise we contacted authors to request the data underlying their analyses. There were 9 studies and 10 interactions with annual performance data for the consumer or one of the mutualists (n=9 consumer, 1 mutualist species). For those species that had multiple estimates of performance (n=5), we prioritized the following estimates: population density>survival>reproduction>growth. To facilitate comparison of performance, we standardized performance across years: (year*i*- mean performance)/standard deviation of performance, where a positive value indicates a year with higher performance than an average year and vice versa for a negative value.

*iii) Consequences of shifts in synchrony for species’ performance*

To determine whether shifts in synchrony could translate into changes in performance over time, we built three models and then evaluated the relationship between those modeled relationships. First, we regressed the relative timing of the interaction on species’ performance (performance z score/days). We included interaction id as a random effect and took the absolute value of the differences in relative timing. Here, a negative correlation coefficient indicates that years with higher than average performance are associated with smaller differences in relative timing (i.e. fewer days apart). Second, we evaluated shift in synchrony for this group of interactions (days/year). Third, we modeled performance as a function of time (performance z score/year) with interaction id as a random effect. Finally, we performed two correlations: between the temporal change in performance and shift in synchrony, and with the sensitivity of performance to changes in relative timing (performance z score/days). ARE NON-LINEAR RELATIONSHIPS A PROBLEM HERE TOO?