**DEVELOP Spring 2021 Phenology Project Outline**

**Goals**

* Evaluate the utility/feasibility of NPN’s data and data protocol for species detection mapping using remote sensing.
* Summarize the findings and suggest recommendations on how NPN’s protocol could be adjusted to better allow for species detection mapping using remote sensing

**Objectives**

1. Record your own phenology observation(s) using the Nature’s Notebook app to become familiar with the program and associated data
2. Explore the Nature’s Notebook dataset
   1. Types of observations (specifically, different types of phenological observations)
   2. Riparian vegetation species captured
   3. Number of unique observations by species
   4. Dates and frequency of repeated observations
3. Select potential list of riparian species to evaluate based on data availability
   1. Tamarisk is likely one. Others may include cottonwood or Russian olive
4. Explore spatial attributes and accuracy of the database
   1. What is the distribution of locations?
   2. How does the alignment of a location according to the data recorded compare to the location on imagery?
5. Select case study locations and species based on findings above
   1. Two will likely be a know location near Reno, NV and a location monitored by Educating Children Outdoors near Tucson, AZ.
6. Plot key phenological observations at each site relative to remote sensing
   1. Basic RS indexes over time for single locations and perhaps clusters of locations (NDVI, Greenness, Brightness, Wetness)
   2. Plot correlation of phenology with remote sensing products
      1. Exiting phenological products
      2. MODIS, Landsat, Sentinel specific date signatures (could be indices or raw bands)
      3. High resolution imagery (Planet scope)
7. Experiment with deriving species specific phenological remote sensing products. For example, a difference in NDVI based on specific dates in the NPN dataset to detect a species relative to surrounding vegetation/environment
8. Explore extrapolating remote sensing products the proved successful at the case study scale to the larger Colorado River Basin

**Deliverables/ Key products**

Primary deliverable: Tech paper

Creative deliverable: Story Map

Key products (That will fold into the above products)

* + Conceptual diagram showing the full process from data to products
  + Maps showing examples NPN locations relative to high res imagery and remote sensing products (highlighting potential errors or good examples and how those appear relative to high res imagery and the pixel resolution of remote sensing products)
  + Plots of phenological locations/observations vs remote sensing products
  + Table or list of strengths and weakness of the NPN data and remote sensing products for species detection
  + Recommendations on protocol changes to improve the usefulness of NPN