

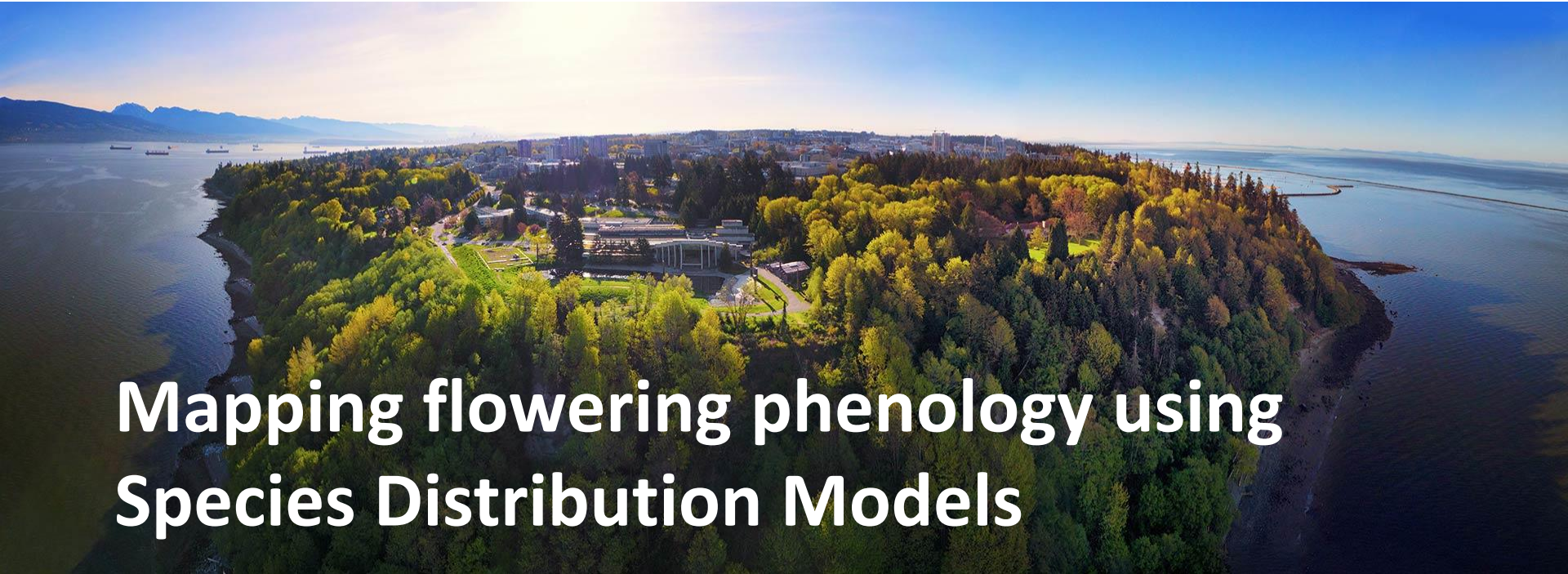


THE UNIVERSITY OF BRITISH COLUMBIA

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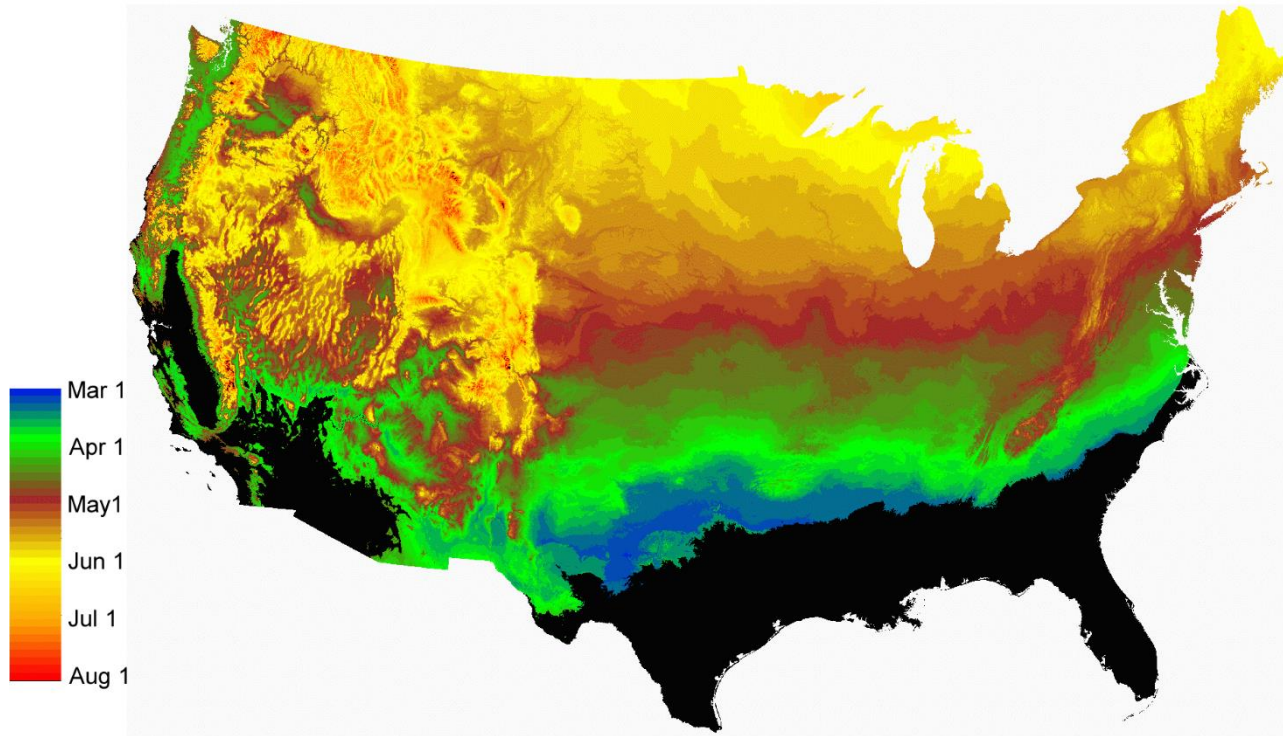
Mapping flowering phenology using Species Distribution Models



plant biochemistry
cytoskeleton
cell biology
marine biology
genomics
ecology
ecology
polyploidy
microbial diversity
evolution
systematics & phylogenetics
plant cell wall
climate change
plant immunity
chemical ecology
biodiversity
fungi
molecular biology
plant physiology
conservation biology
plant development
cytoskeleton
algae
soti

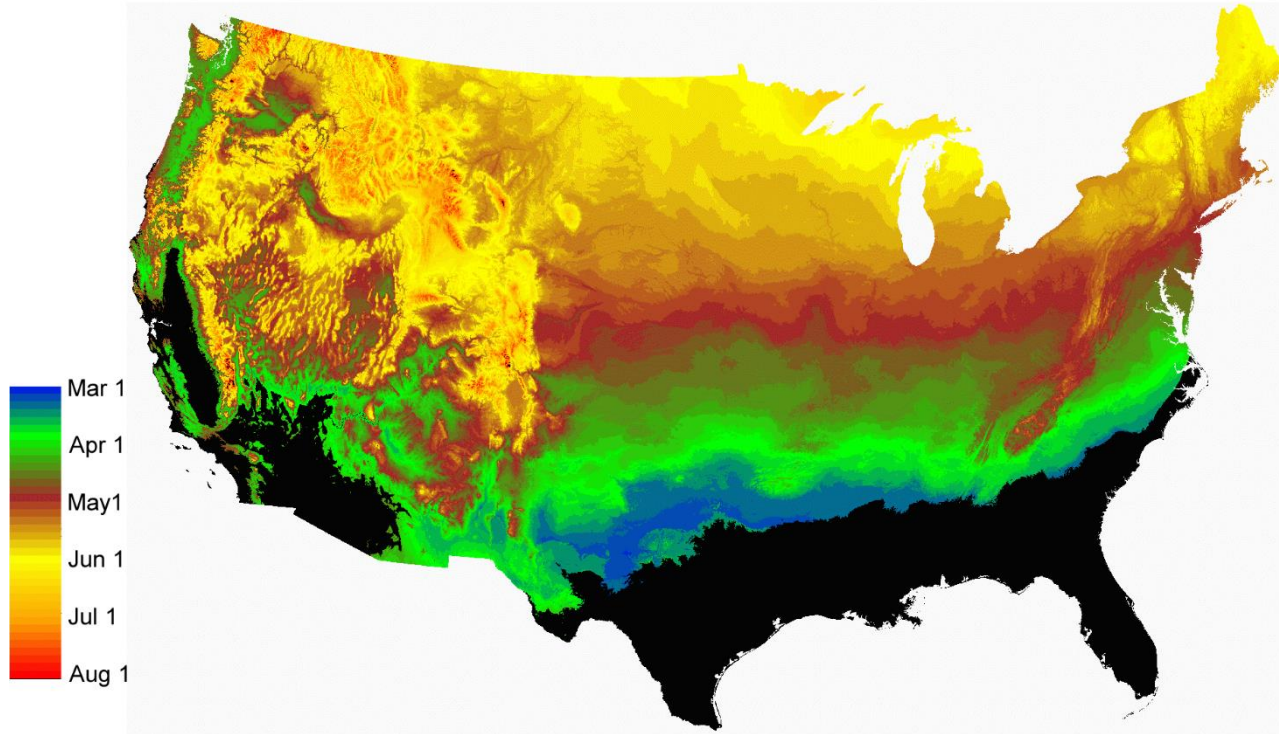


1996 SI First Bloom Dates



Syringa chinensis (cloned lilac) Mark D. Schwartz

1996 SI First Bloom Dates



- First -2.2°C freeze date in autumn
- Composite chill date – average date when winter cold requirements are met
- First leaf date
- First bloom date
- Last -2.2°C freeze date in spring
- Freeze period, the number of days from first freeze date in autumn to last freeze date in spring
- Damage index value, the difference in days between the first leaf date and last -2.2°C freeze date
- Average annual temperature, and all four average seasonal temperatures

Syringa chinensis (cloned lilac) Mark D. Schwartz

WorldClim climate variables

BIO1 = Annual Mean Temperature

BIO2 = Mean Diurnal Range (Mean of monthly (max temp - min temp))

BIO3 = Isothermality (BIO2/BIO7) (* 100)

BIO4 = Temperature Seasonality (standard deviation *100)

BIO5 = Max Temperature of Warmest Month

BIO6 = Min Temperature of Coldest Month

BIO7 = Temperature Annual Range (BIO5-BIO6)

BIO8 = Mean Temperature of Wettest Quarter

BIO9 = Mean Temperature of Driest Quarter

BIO10 = Mean Temperature of Warmest Quarter

BIO11 = Mean Temperature of Coldest Quarter

BIO12 = Annual Precipitation

BIO13 = Precipitation of Wettest Month

BIO14 = Precipitation of Driest Month

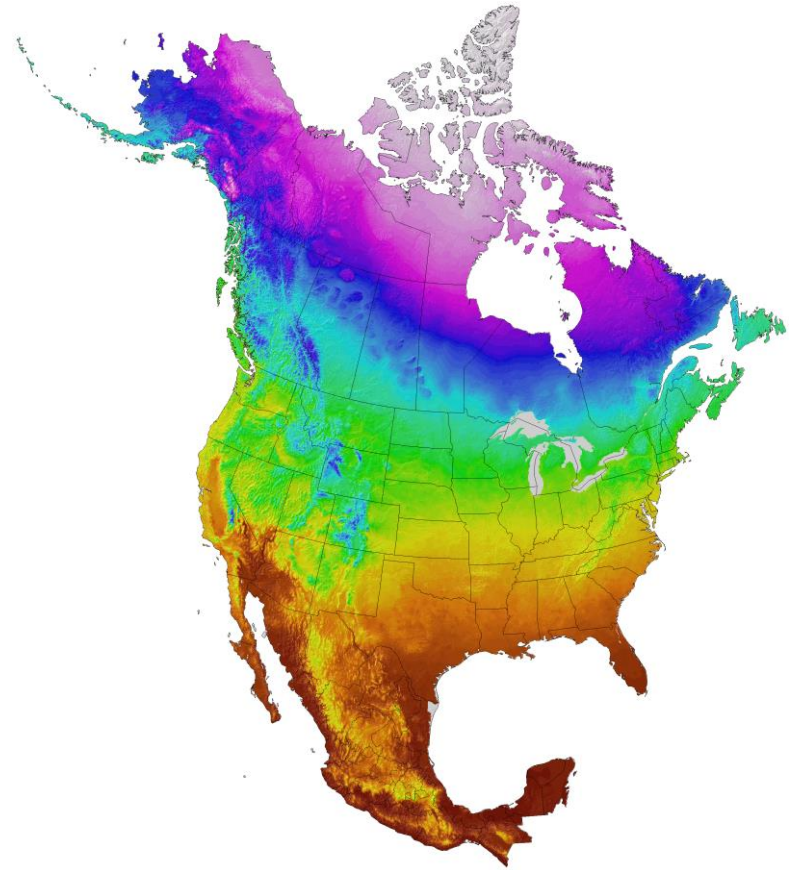
BIO15 = Precipitation Seasonality (Coefficient of Variation)

BIO16 = Precipitation of Wettest Quarter

BIO17 = Precipitation of Driest Quarter

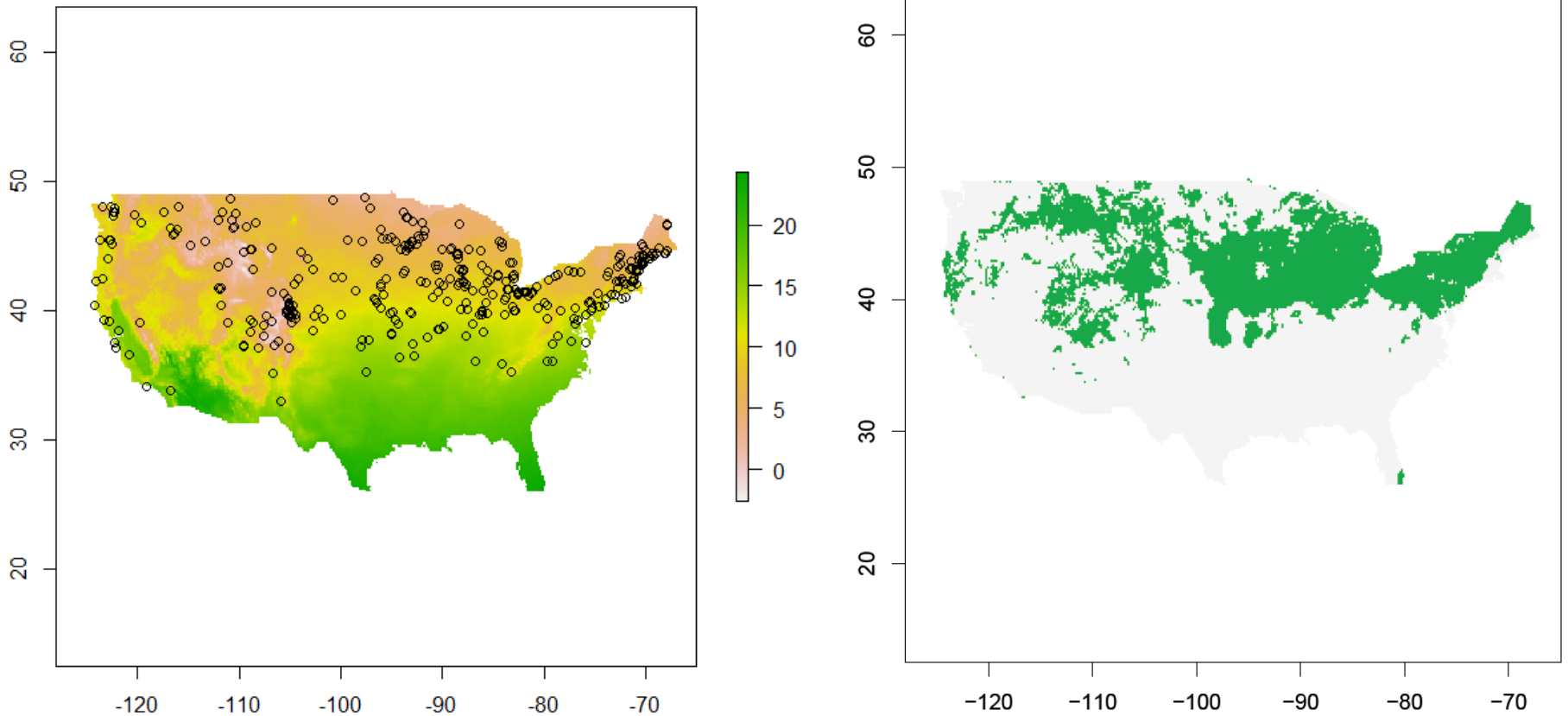
BIO18 = Precipitation of Warmest Quarter

BIO19 = Precipitation of Coldest Quarter



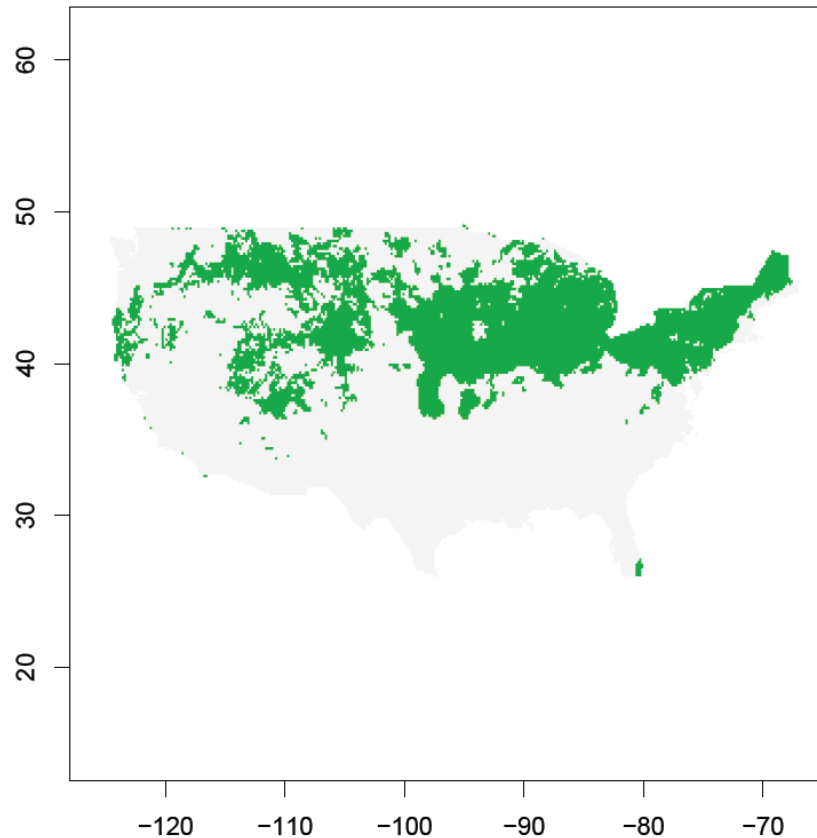
Predicted species distribution for lilac (*Syringa chinensis*) using location data from NPN and WorldClim variables

Annual Mean Temperature

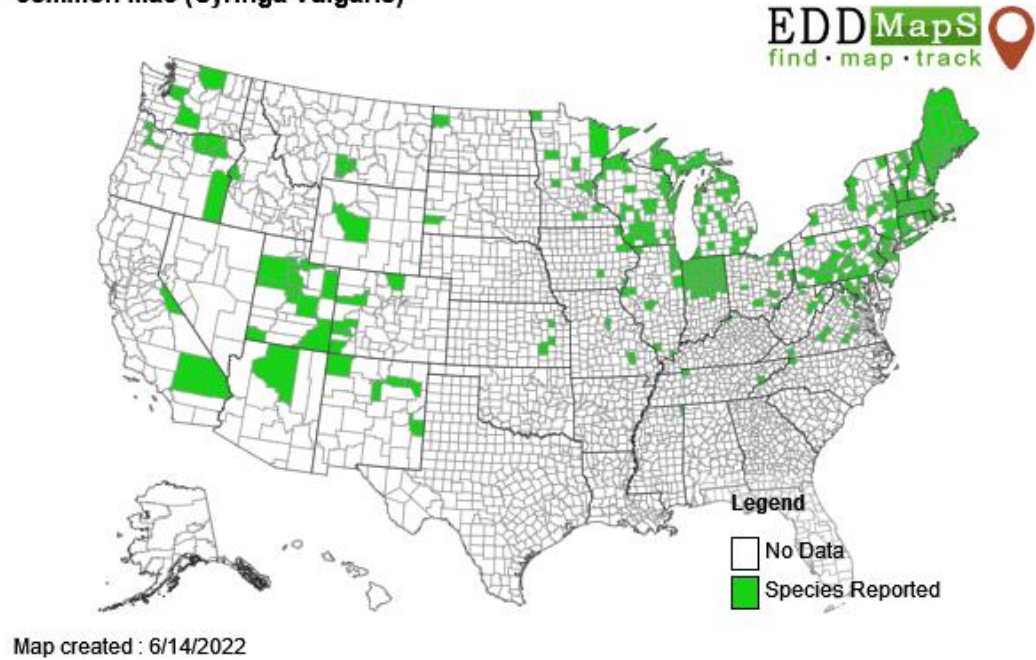


Syringa vulgaris (common lilac) Distribution data from NPN

How did we do?



common lilac (*Syringa vulgaris*)

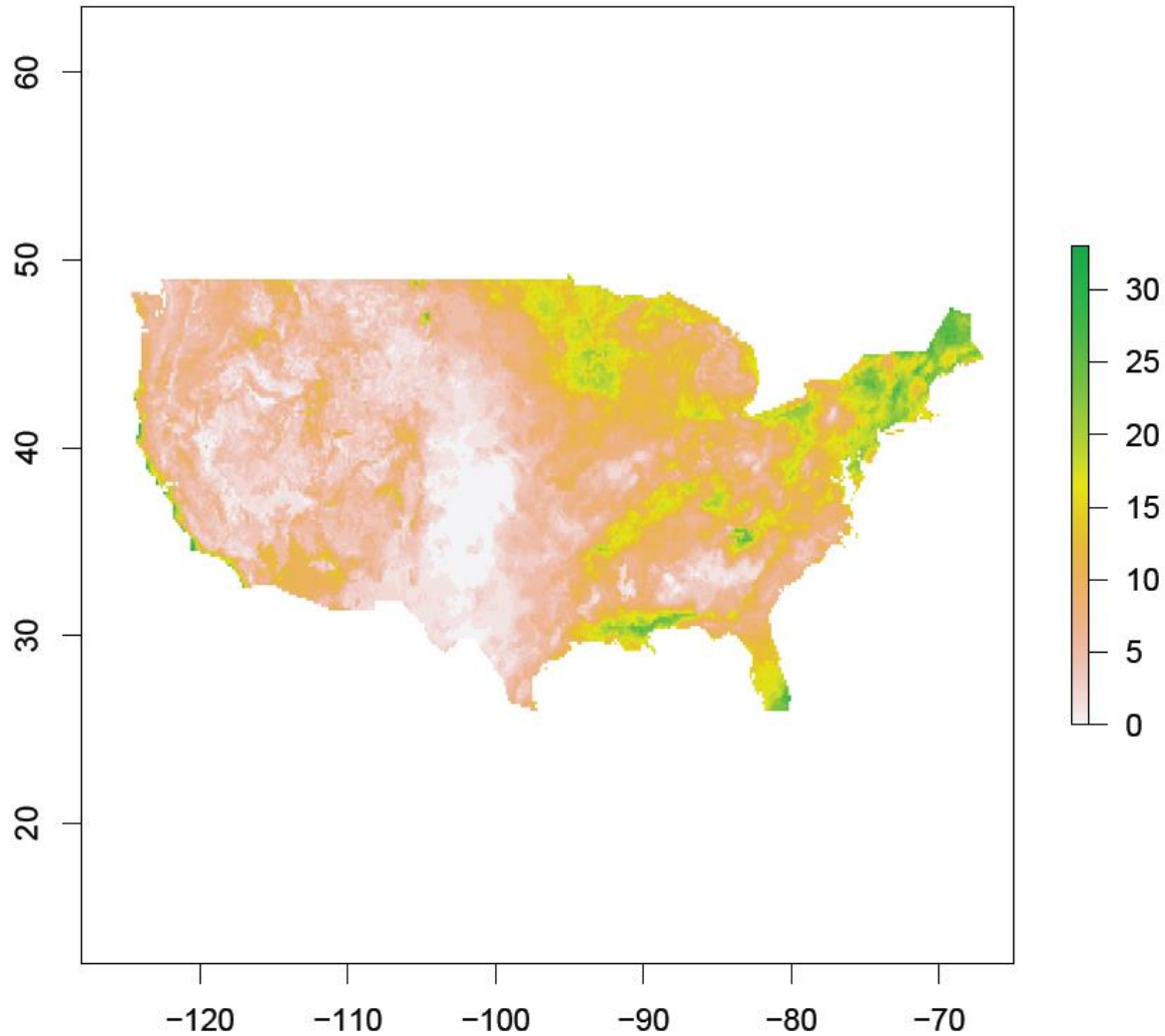


EDDMapS—Early Detection and Distribution Mapping System

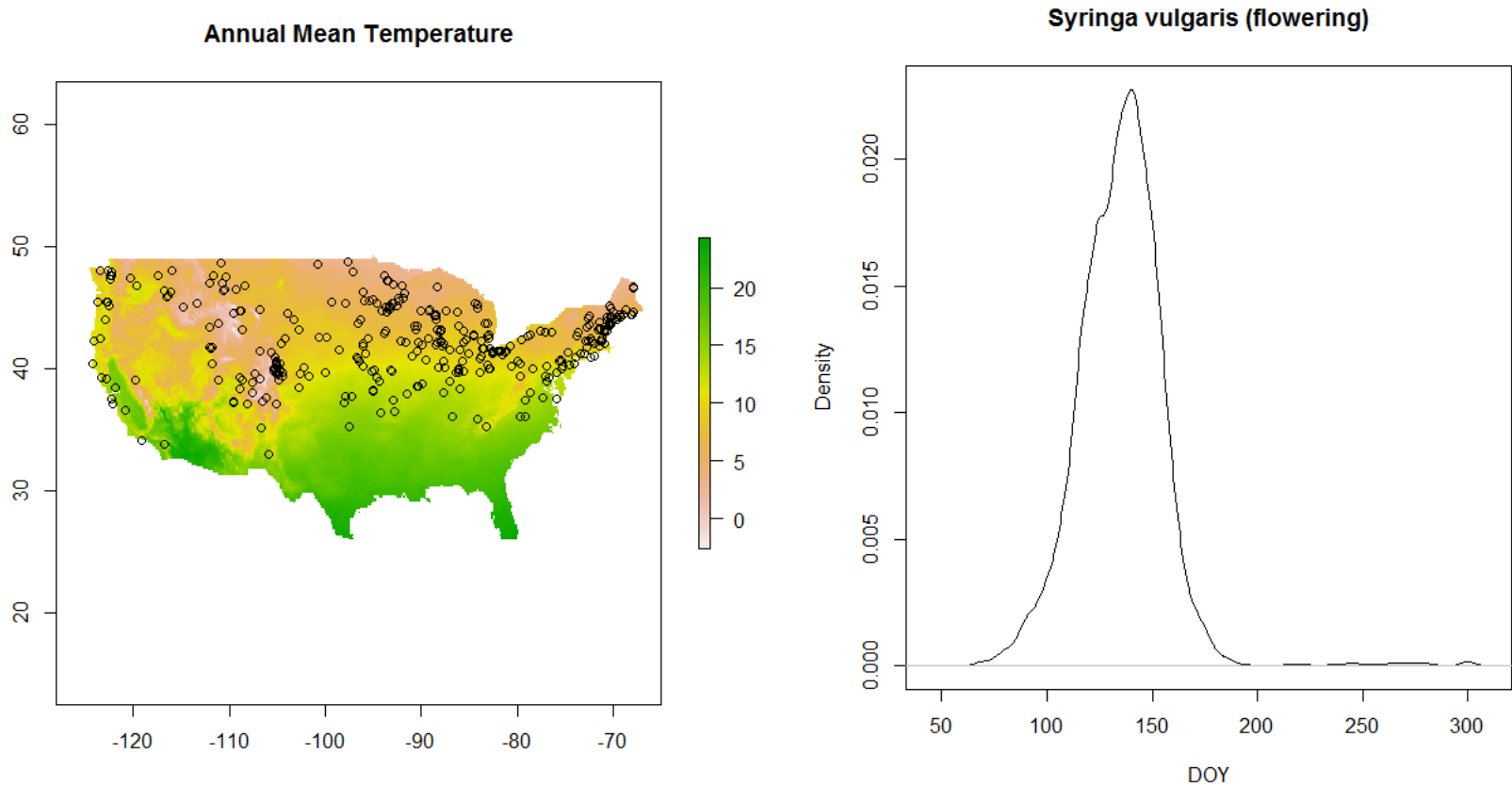
Invasive Species Mapping Made Easy!

<https://www.eddmaps.org/distribution/uscounty.cfm?sub=11529>

Species richness for species in the NPN dataset with flowering records

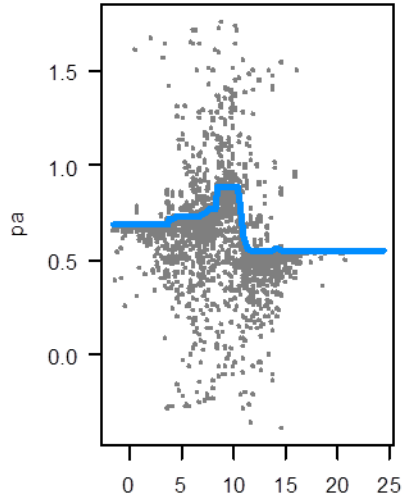


Can we generate an SDM for flowering time?

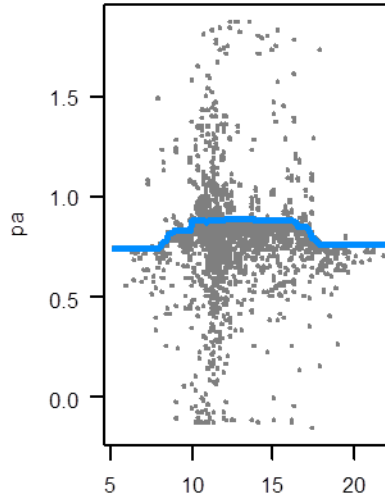


Random Forest with WoldClim predictors plus DOY fit using 5-fold cross validation

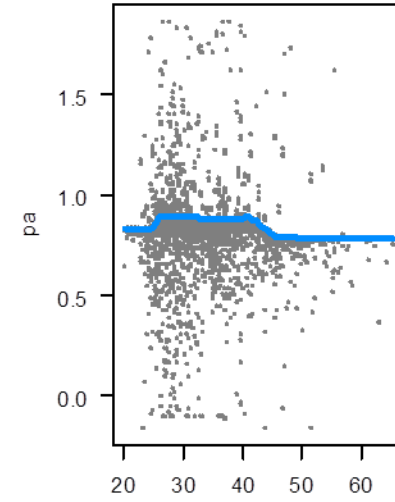
Annual Mean Temperature



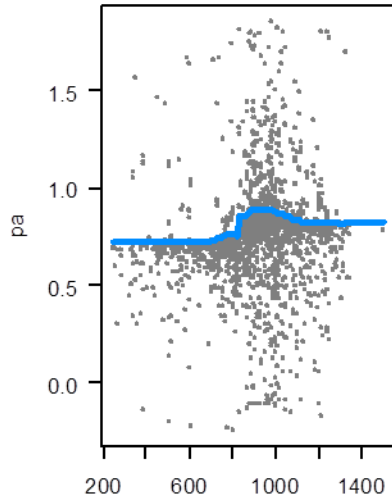
Mean Diurnal Range



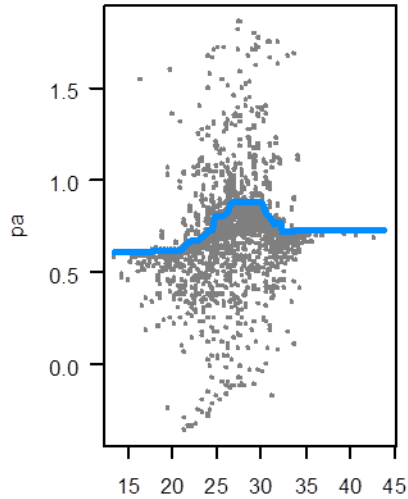
Isothermality (BIO2/BIO7)



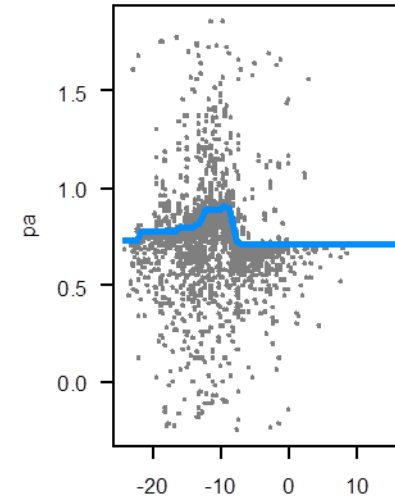
Temperature Seasonality



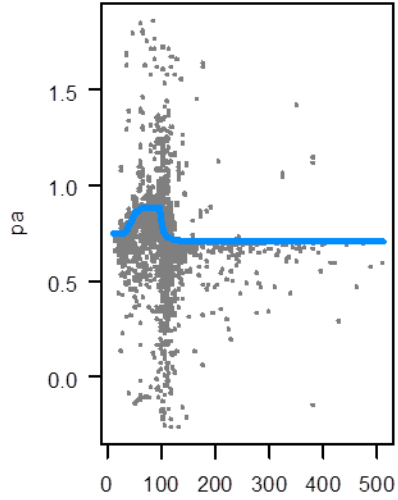
Max Temperature of Warmest Month



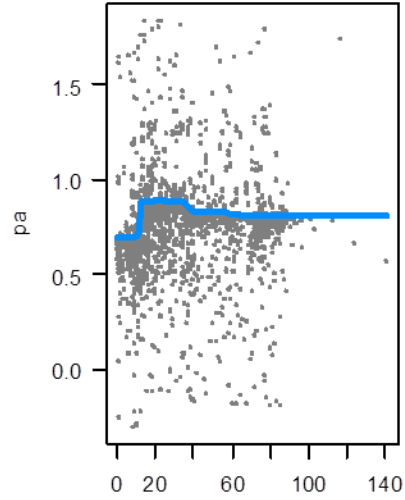
Min Temperature of Coldest Month



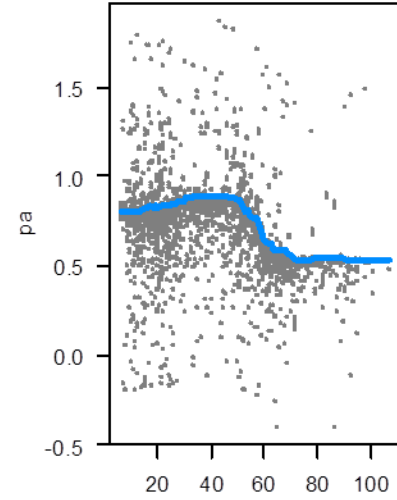
Precipitation of
Wettest Month



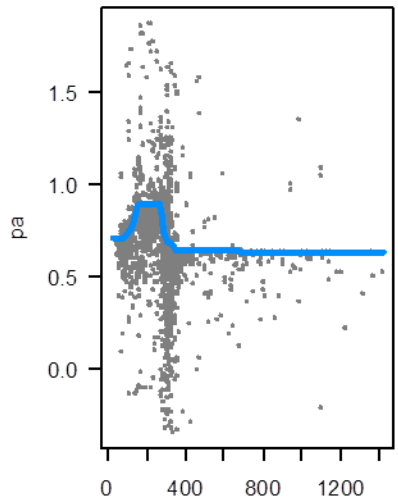
Precipitation of
Driest Month



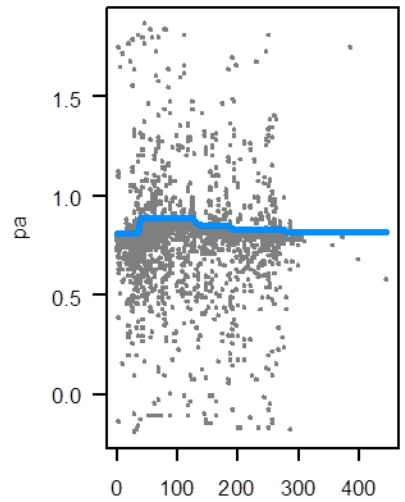
Precipitation
Seasonality



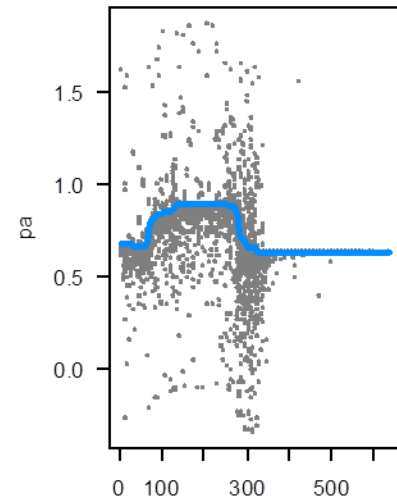
Precipitation of
Wettest Quarter



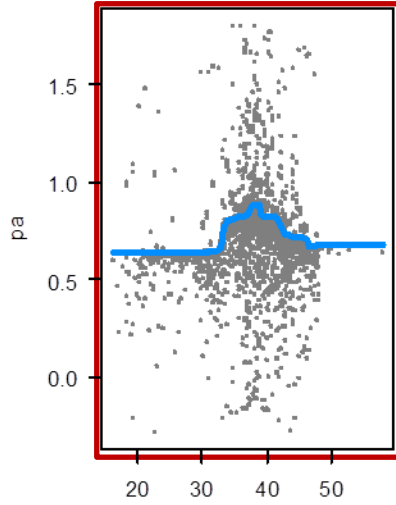
Precipitation of
Driest Quarter



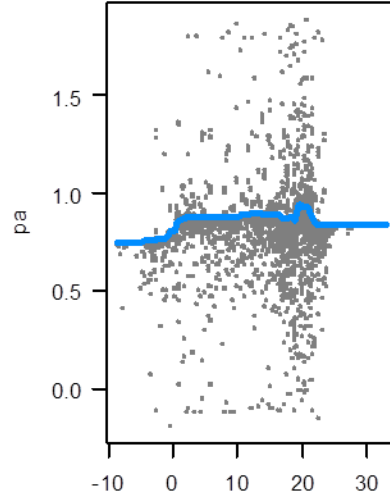
Precipitation of
Warmest Quarter



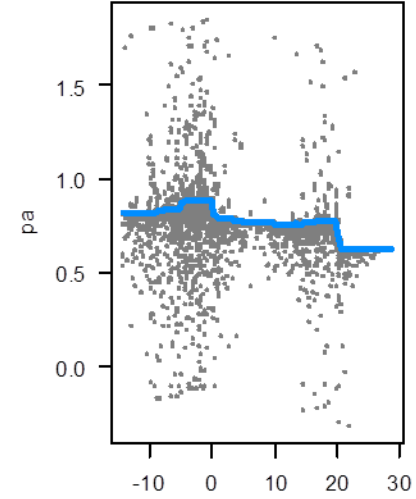
Temperature
Annual Range



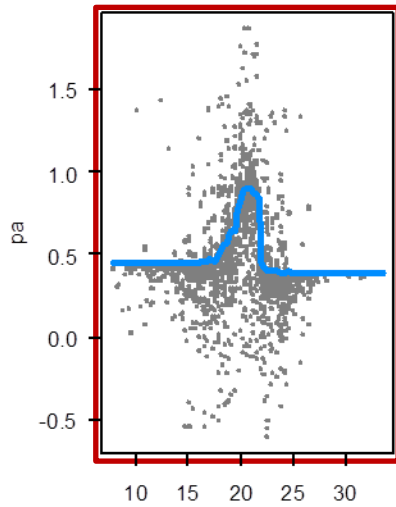
Mean Temperature
of Wettest Quarter



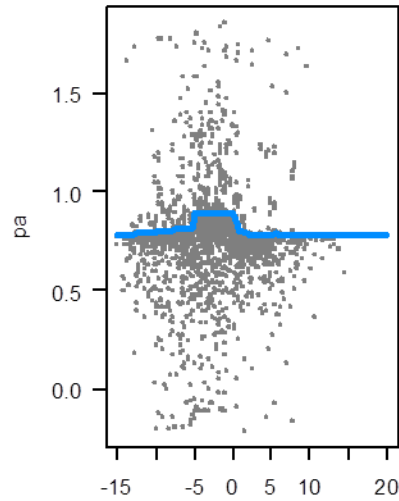
Mean Temperature
of Driest Quarter



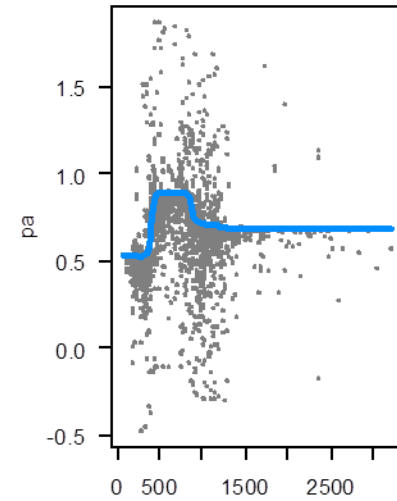
Mean Temperature
of Warmest Quarter



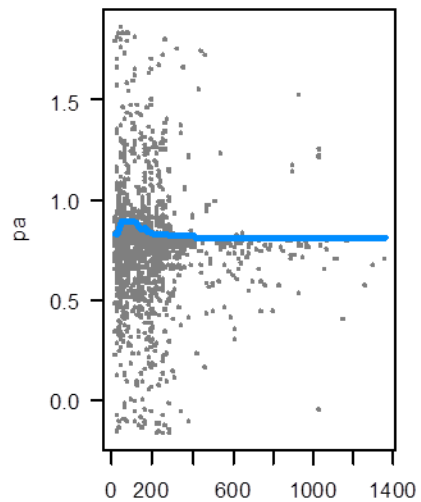
Mean Temperature
of Coldest Quarter



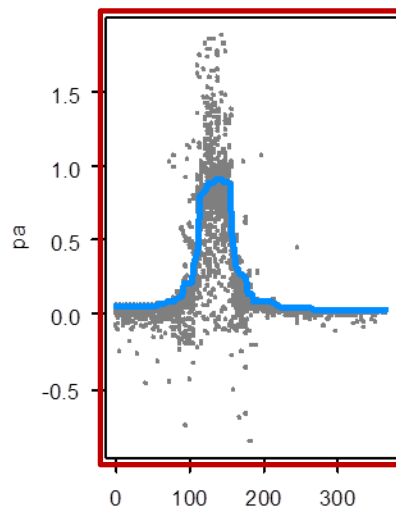
Annual
Precipitation



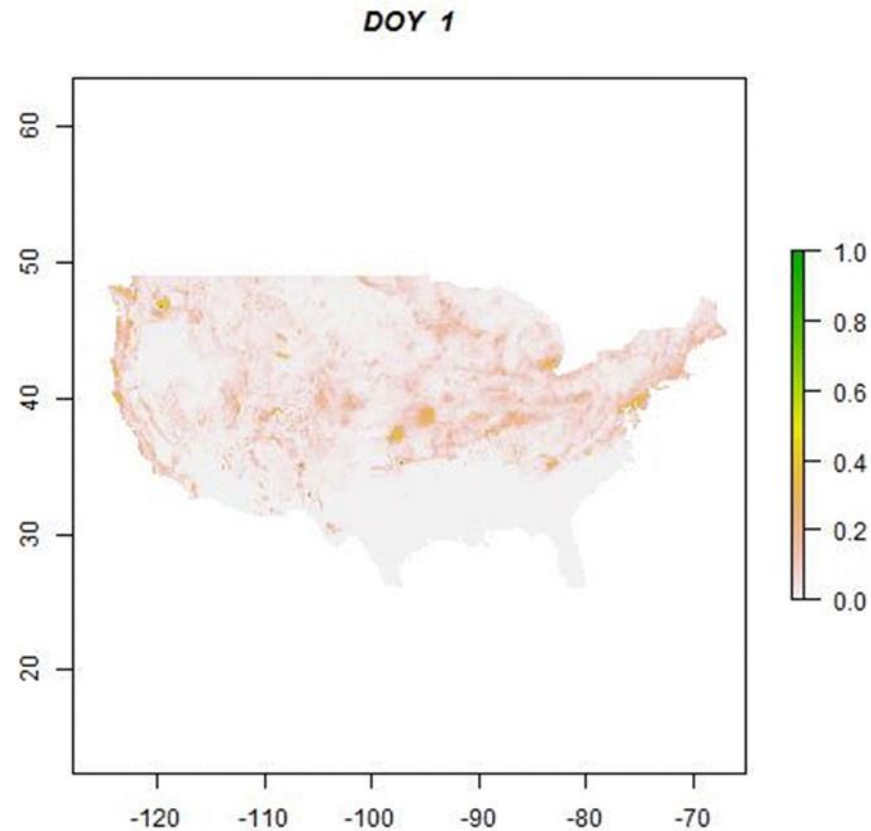
Precipitation of
Coldest Quarter



DOY

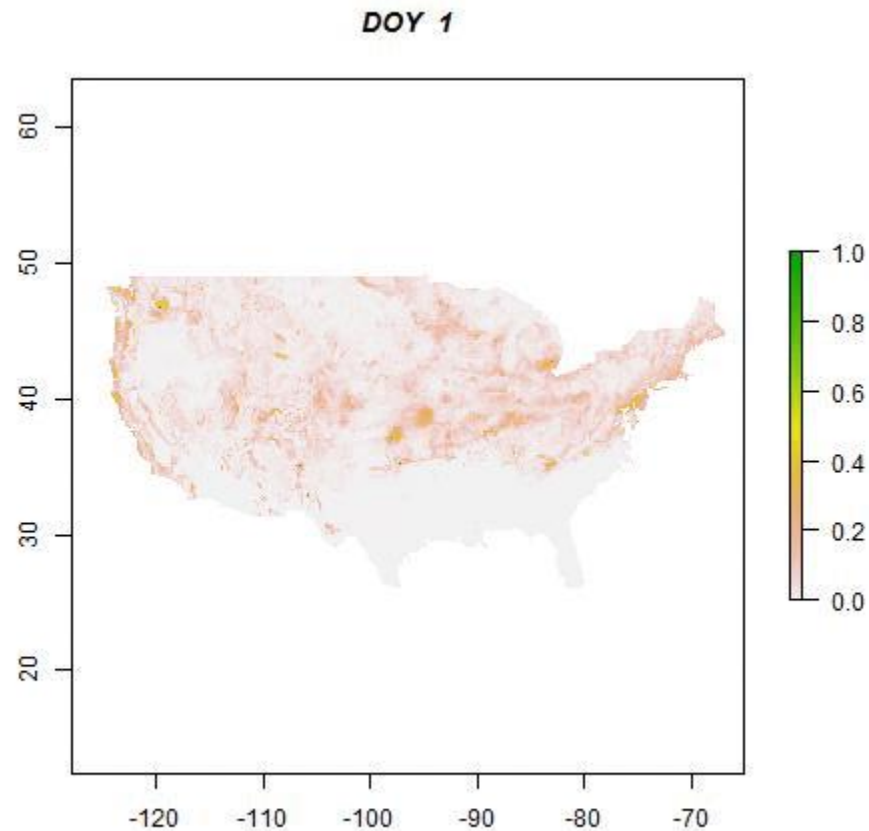


Probability of observing *Syringa vulgaris* flowering in a given location on a given day



Syringa vulgaris (common lilac)

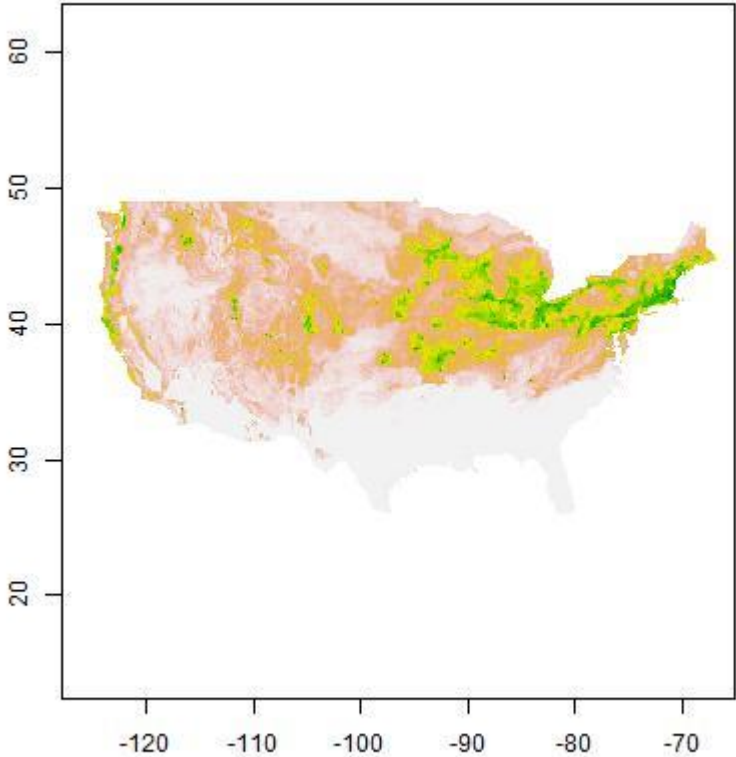
Probability of observing *Syringa vulgaris* flowering in a given location on a given day



Syringa vulgaris (common lilac)

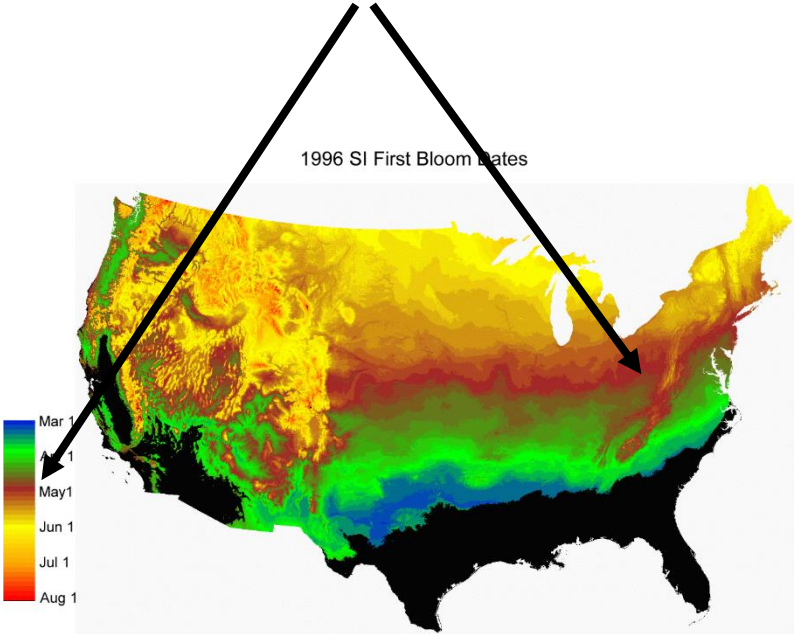
Probability of observing *Syringa vulgaris* flowering in a given location on a given day

DOY 120



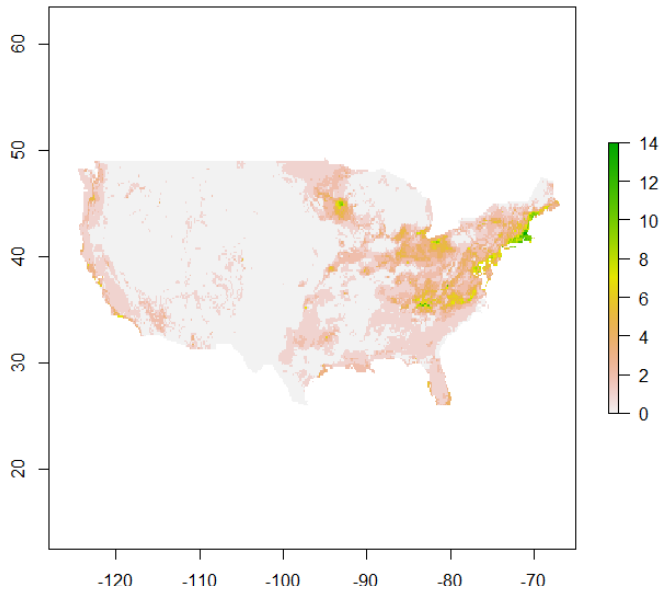
Present day projection

DOY 120 = April 30

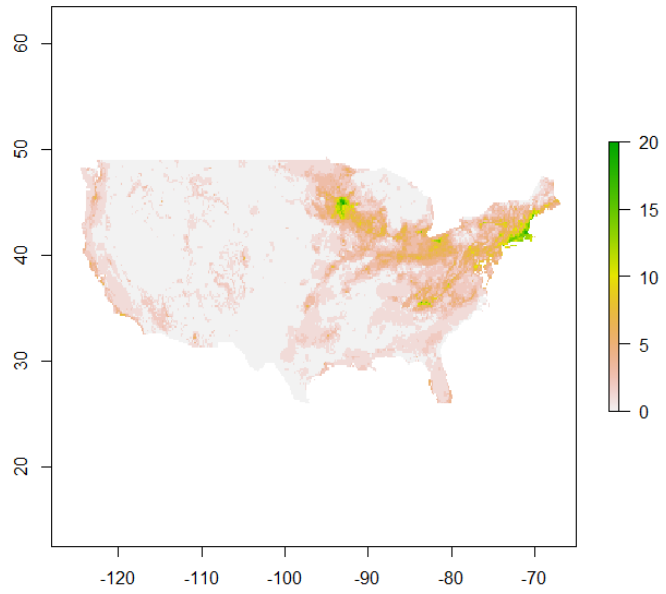


Syringa chinensis SI

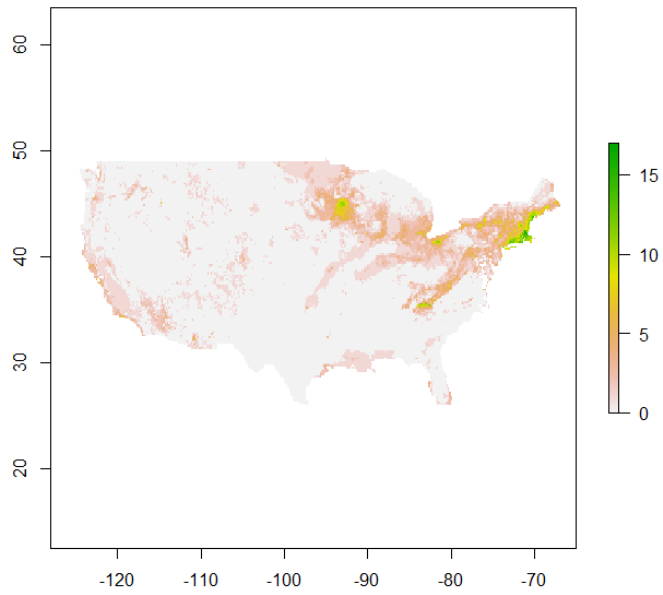
April 01



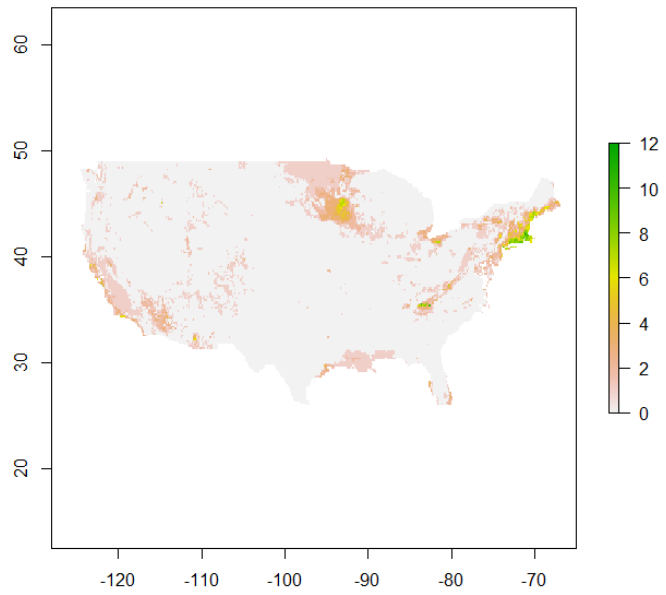
May 01



June 01



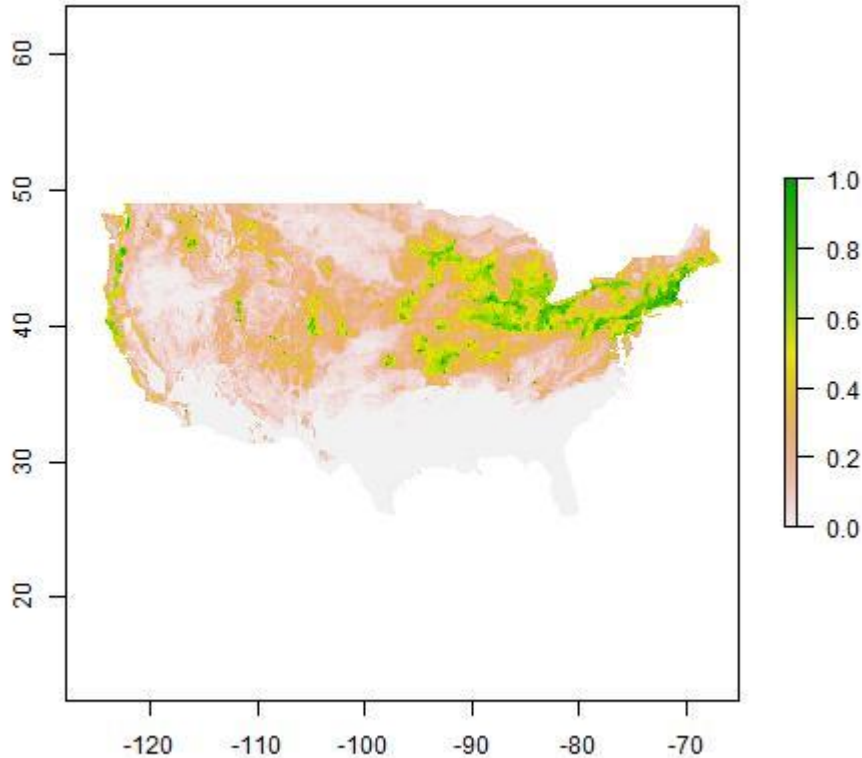
July 01



Community of co-flowering species

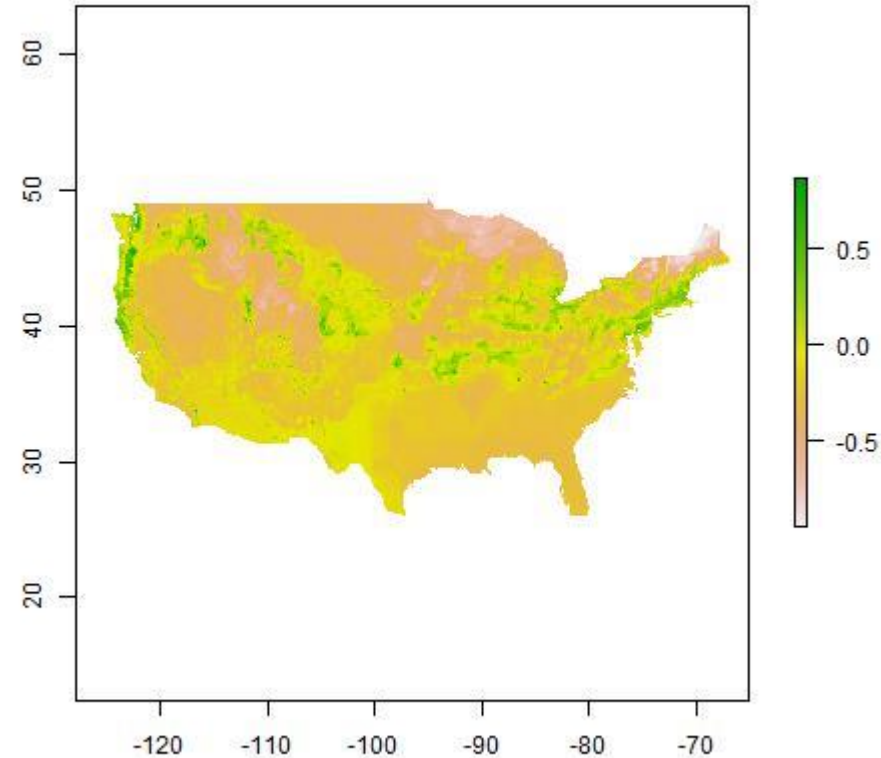
Probability of observing *Syringa vulgaris* flowering in a given location on a given day

DOY 120



Present day projection

DOY 120



Difference between current and future projections (green = generally shift earlier)

(HadGEM2-ES ensemble predictions, RCP 8.5, 2070)

Thanks to:

Zoe Panchen, Ignacio Morales-Castilla, Elizabeth Wolkovich

