



Harvard University | Department of
Organismic and Evolutionary Biology

Rethinking False Spring

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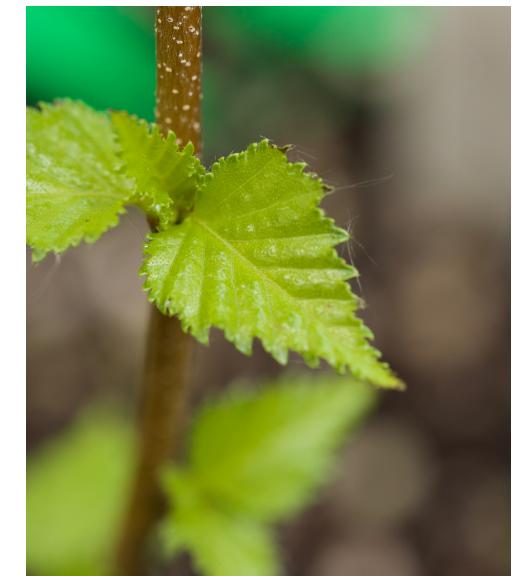
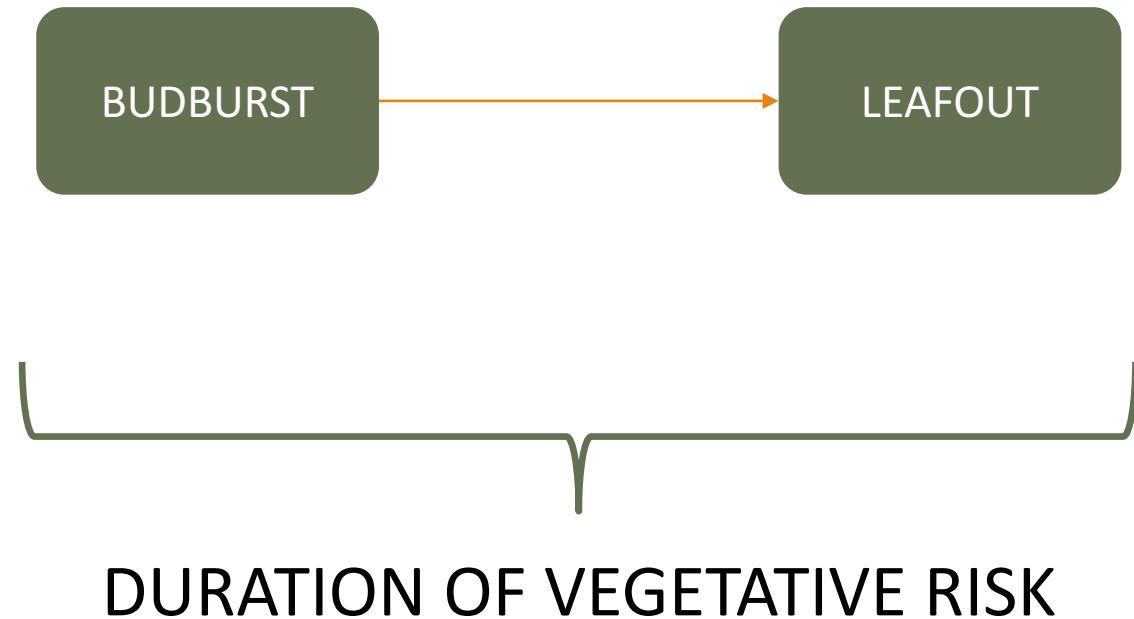
OUTLINE

- Quick Review of False Spring
- Talk about Buds Experiment: Initial Results
- Field Freezing Experiment
- Regional Risk: Maps and Ideas
- Questions



False Spring Risk

Interested in time between leaf budburst and leafout,
when frost tolerance is lowest but risk is still relatively high.



Betula populifolia - leafout

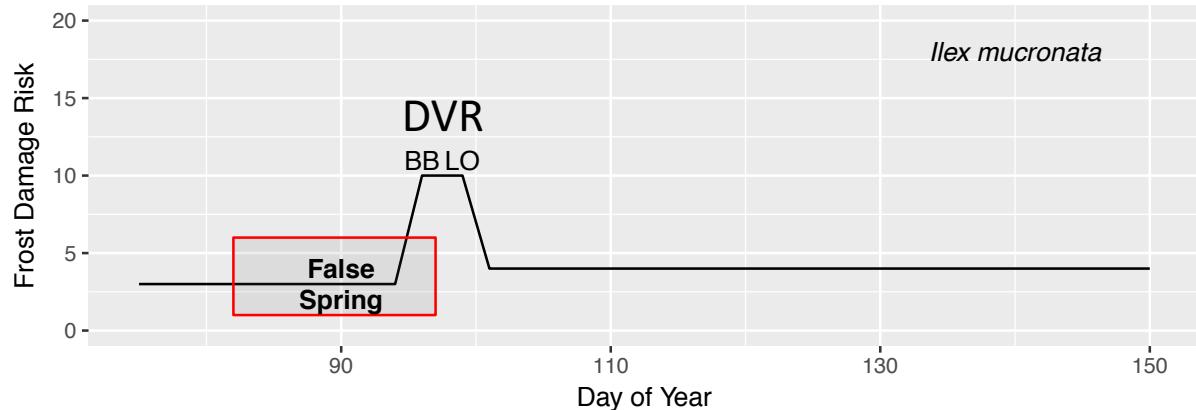
STRATEGIES:

Avoidance

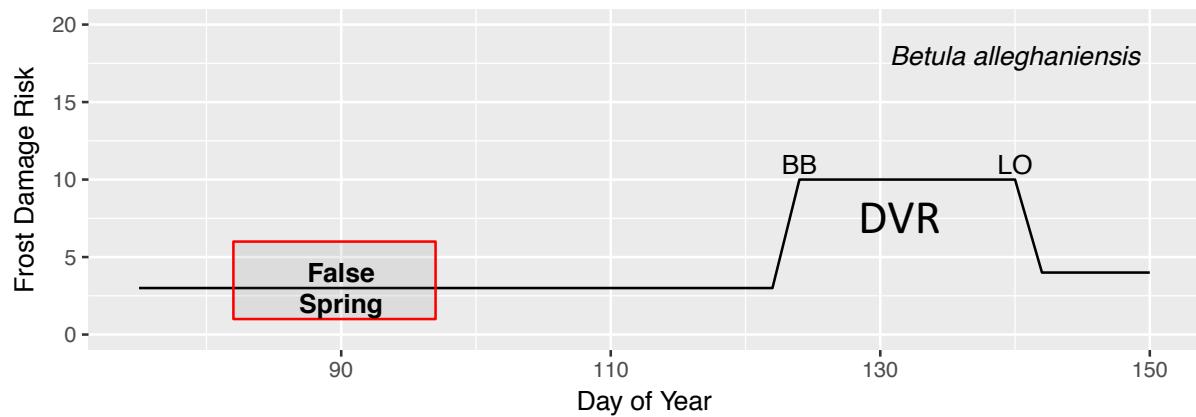
Tolerance

STRATEGIES:

Avoidance

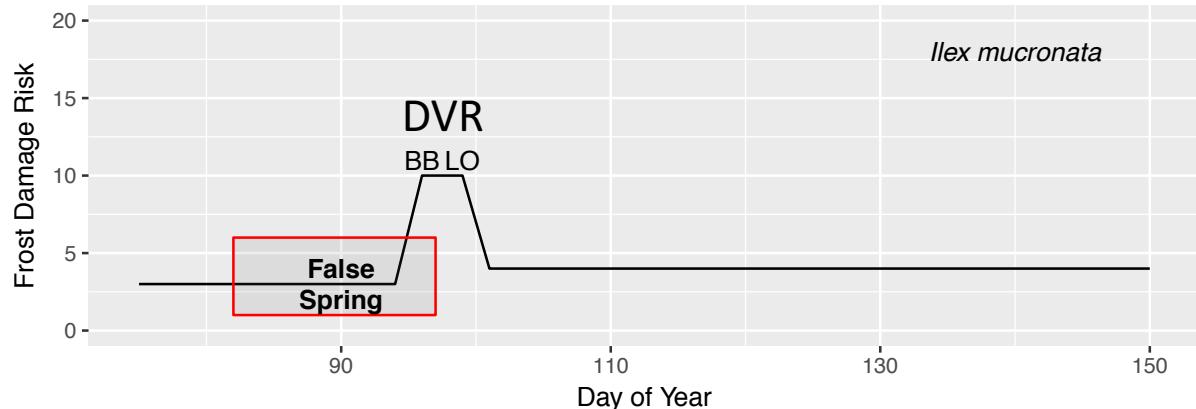


Tolerance

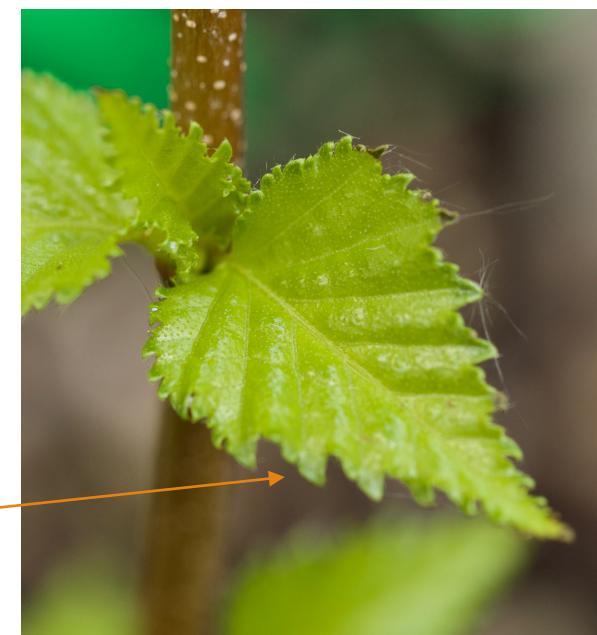


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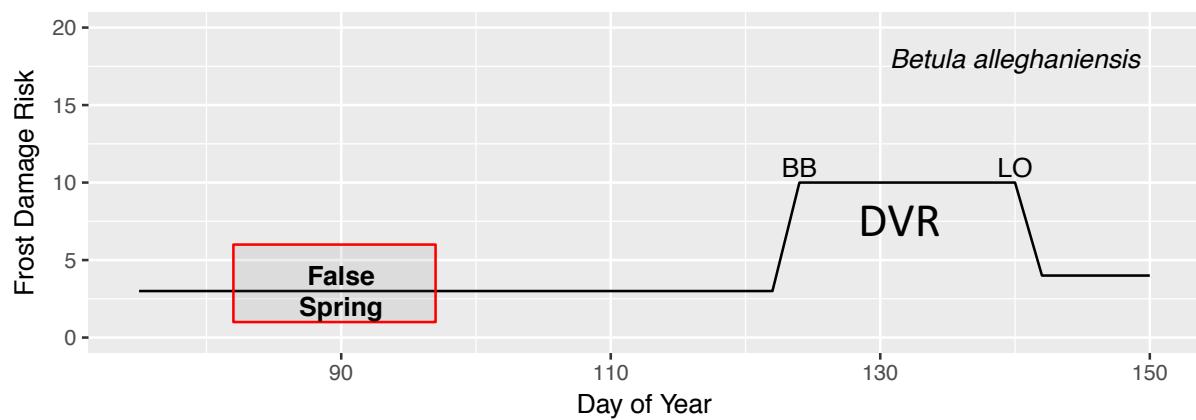
Avoidance



Tolerance

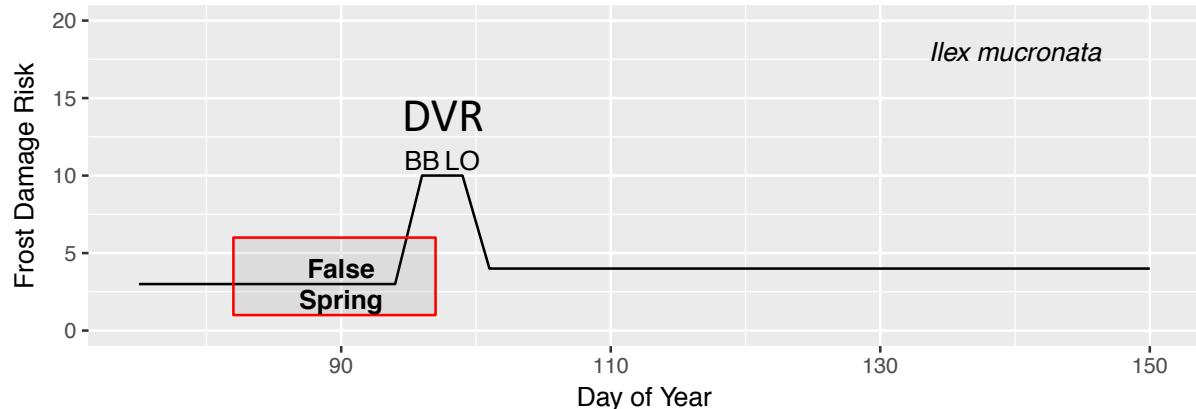


Serrations
along
leave
margins

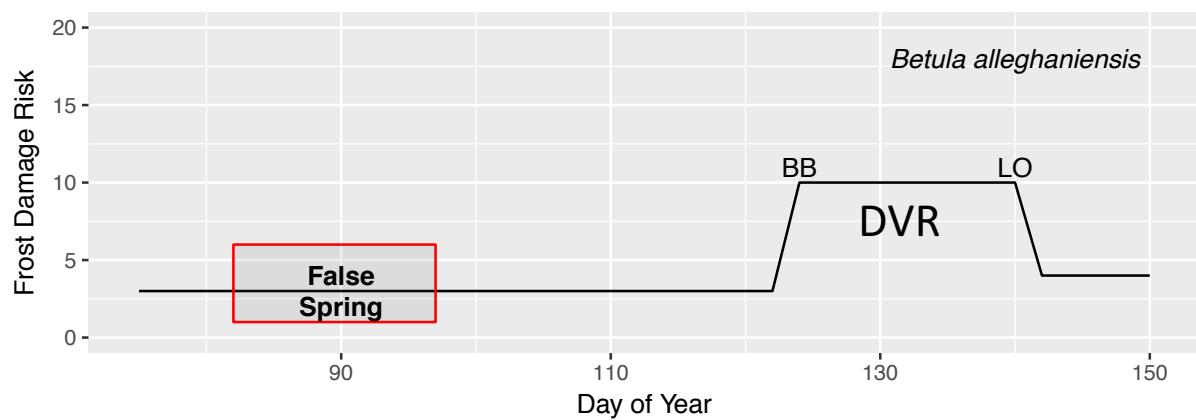


STRATEGIES:

Avoidance

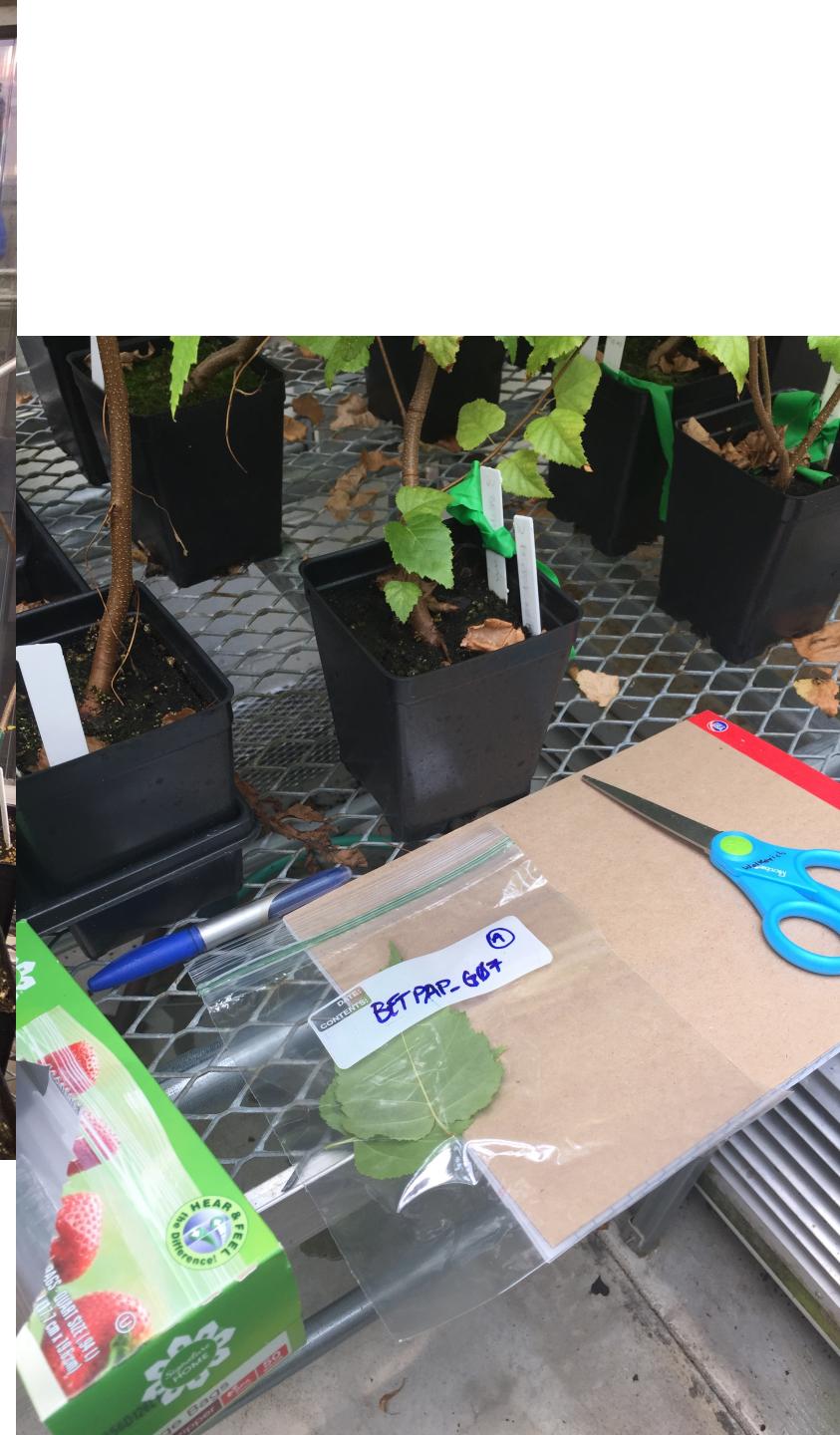
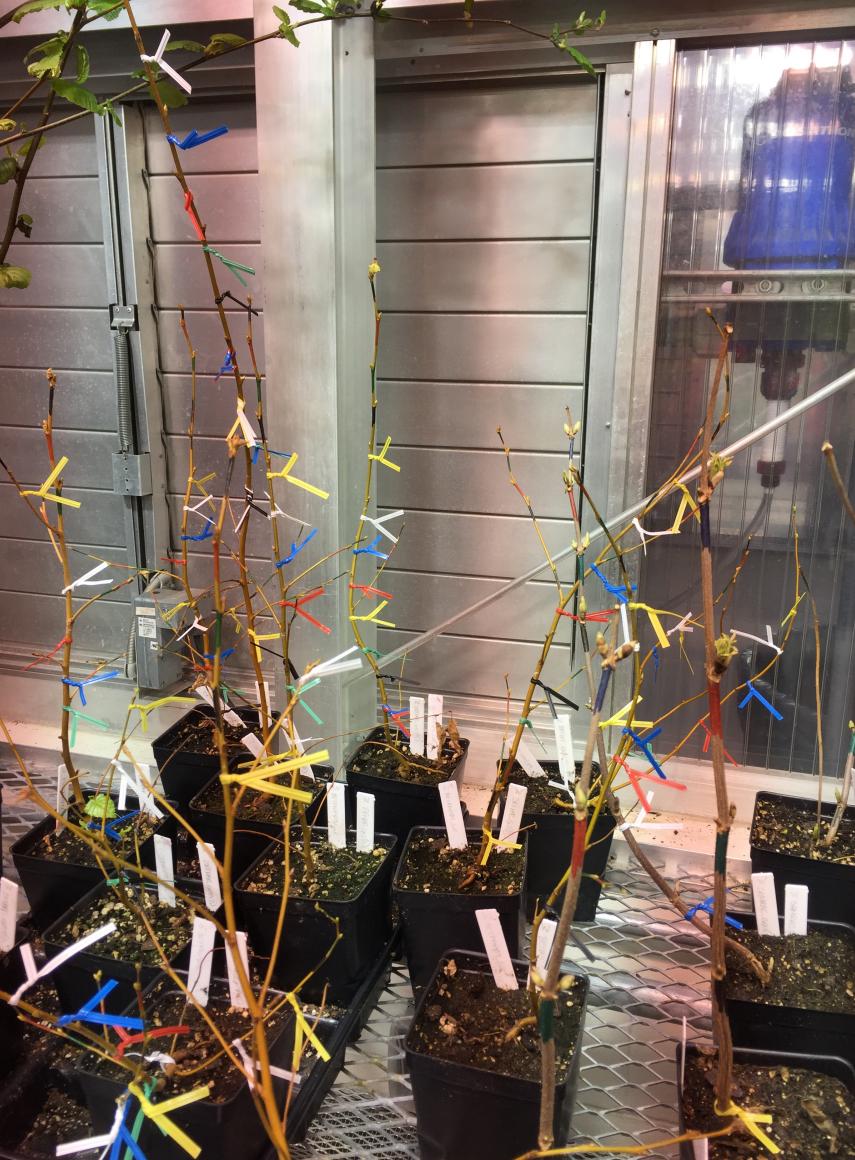


Tolerance



Buds Experiment

Freezing Experiment with Greenhouse individuals



EXPERIMENT LAYOUT

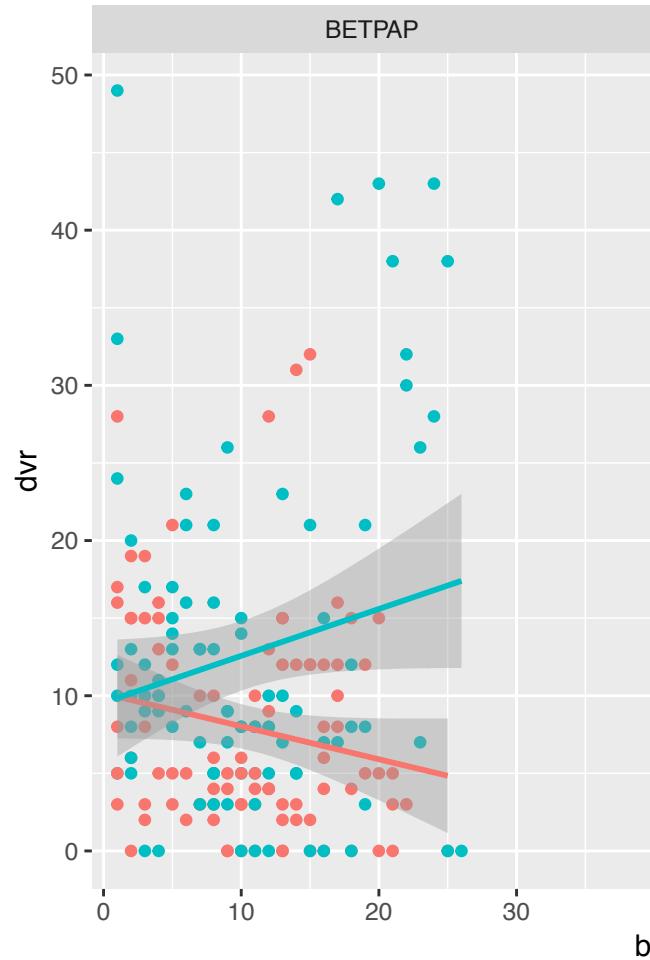
SPECIES:

- | | |
|---------------|----------------|
| 1. ACESAC | 6. ILEVER |
| 2. ACEPEN (?) | 7. LONCAN |
| 3. QUEALB | 8. ALNINC |
| 4. QUERUB | 9. BETALL |
| 5. POPGRA | 10. FAGGRA (?) |

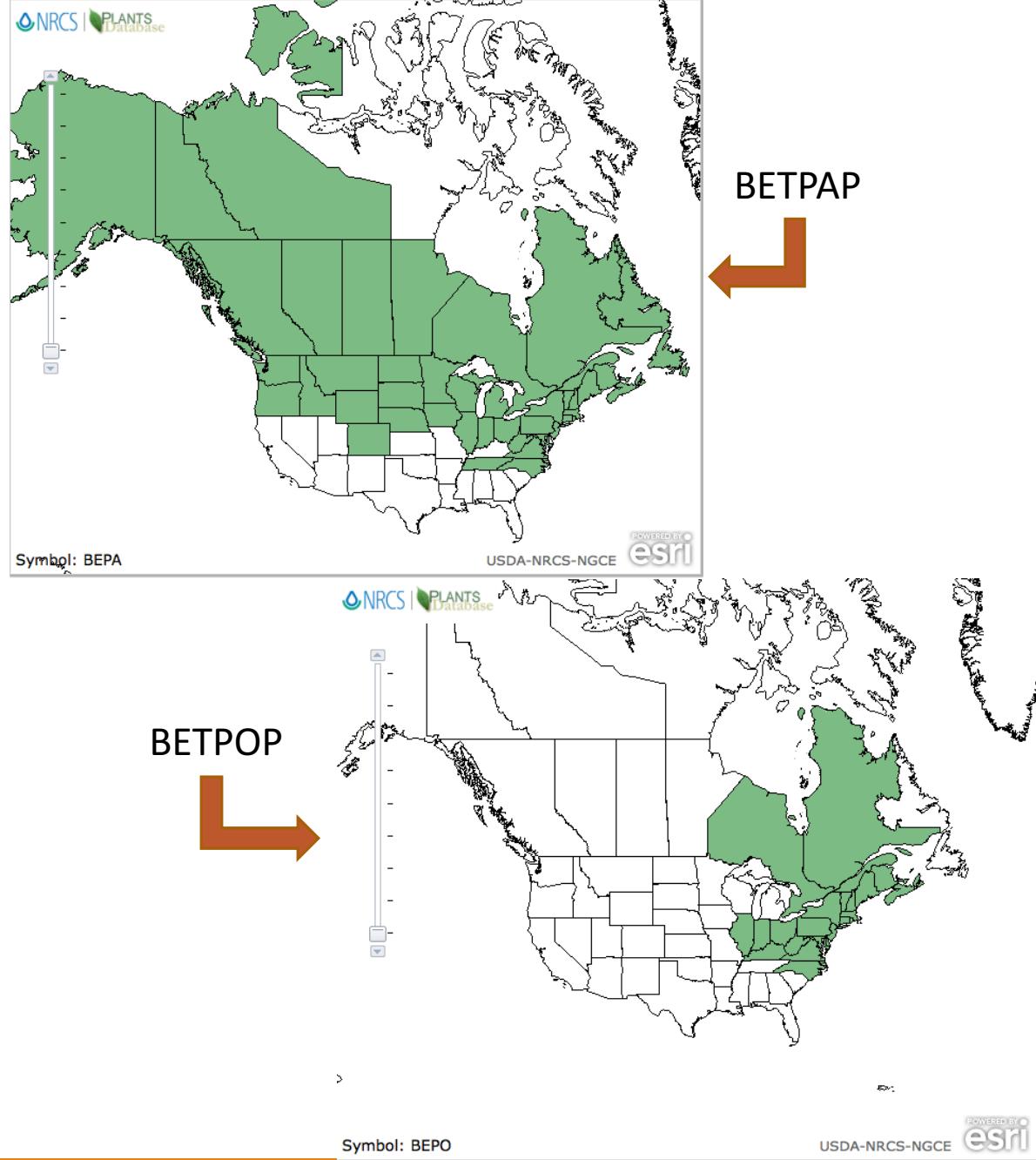
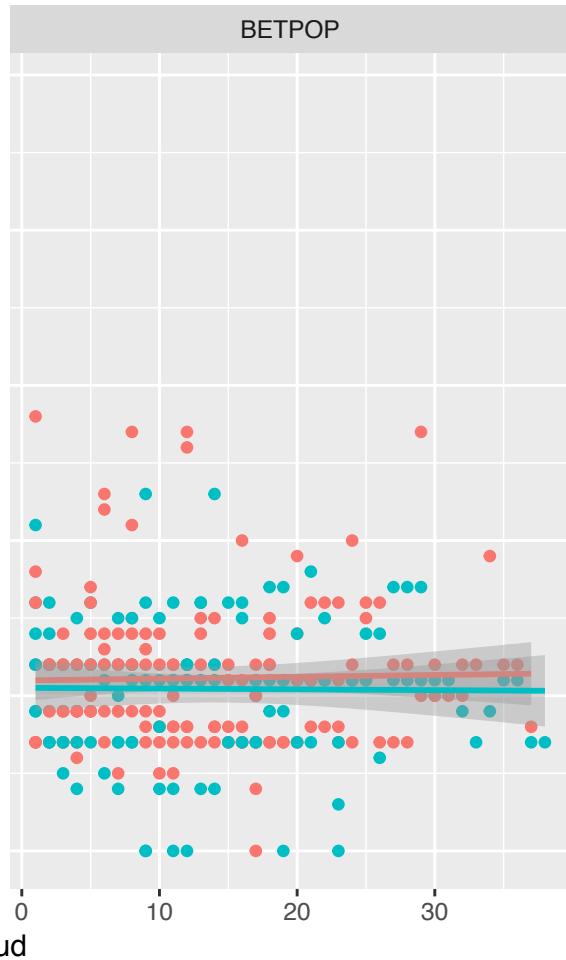




BETPAP



BETPOP



Species: 2-3 -- BETPAP, BETPOP, SAMRAC (?)

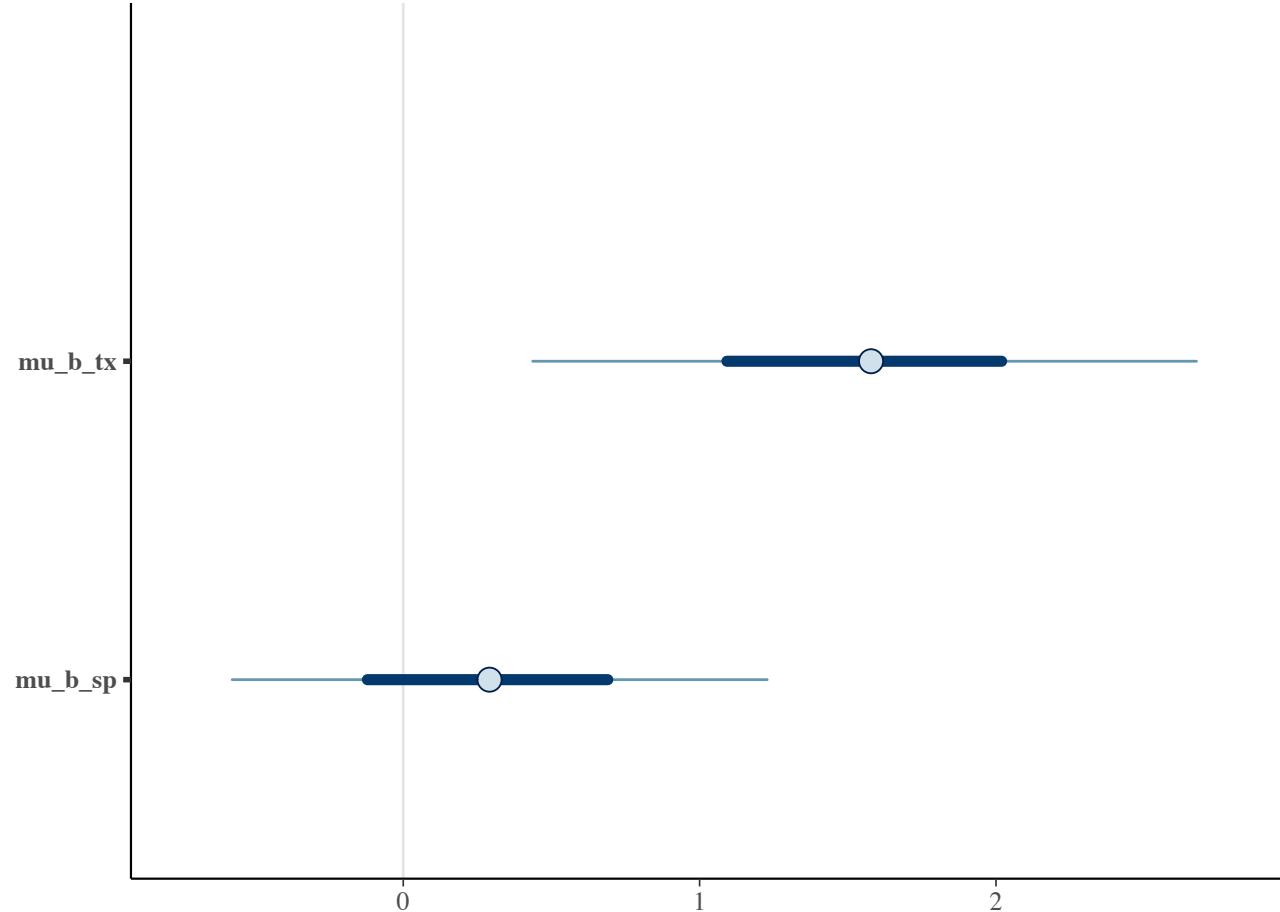
Individuals: 14-18

Buds: 6-36

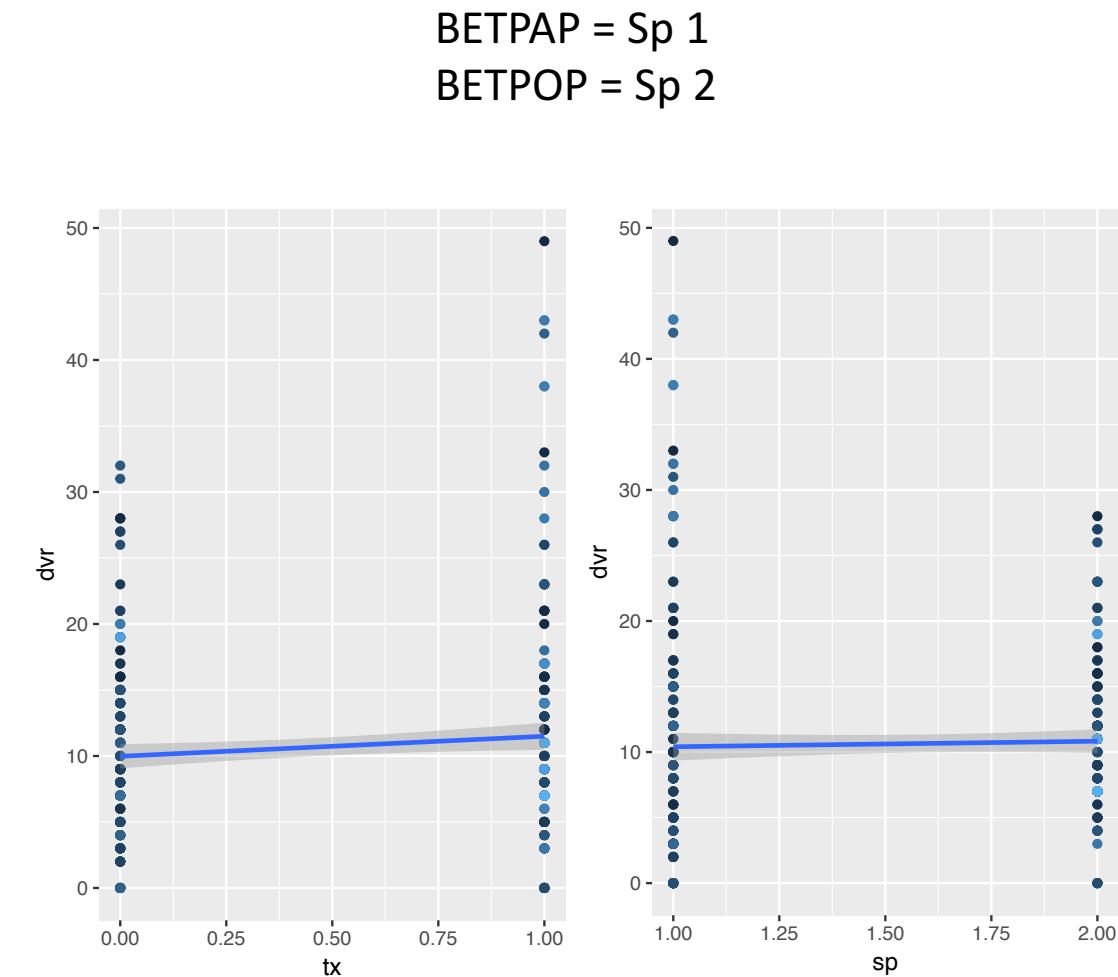
TX: Control vs. Freeze

$$\text{dvr} \sim \text{tx} + \text{species} + (1|\text{individual})$$

DVR: Duration of Vegetative Risk



dvr ~ tx + species + (1|individual)



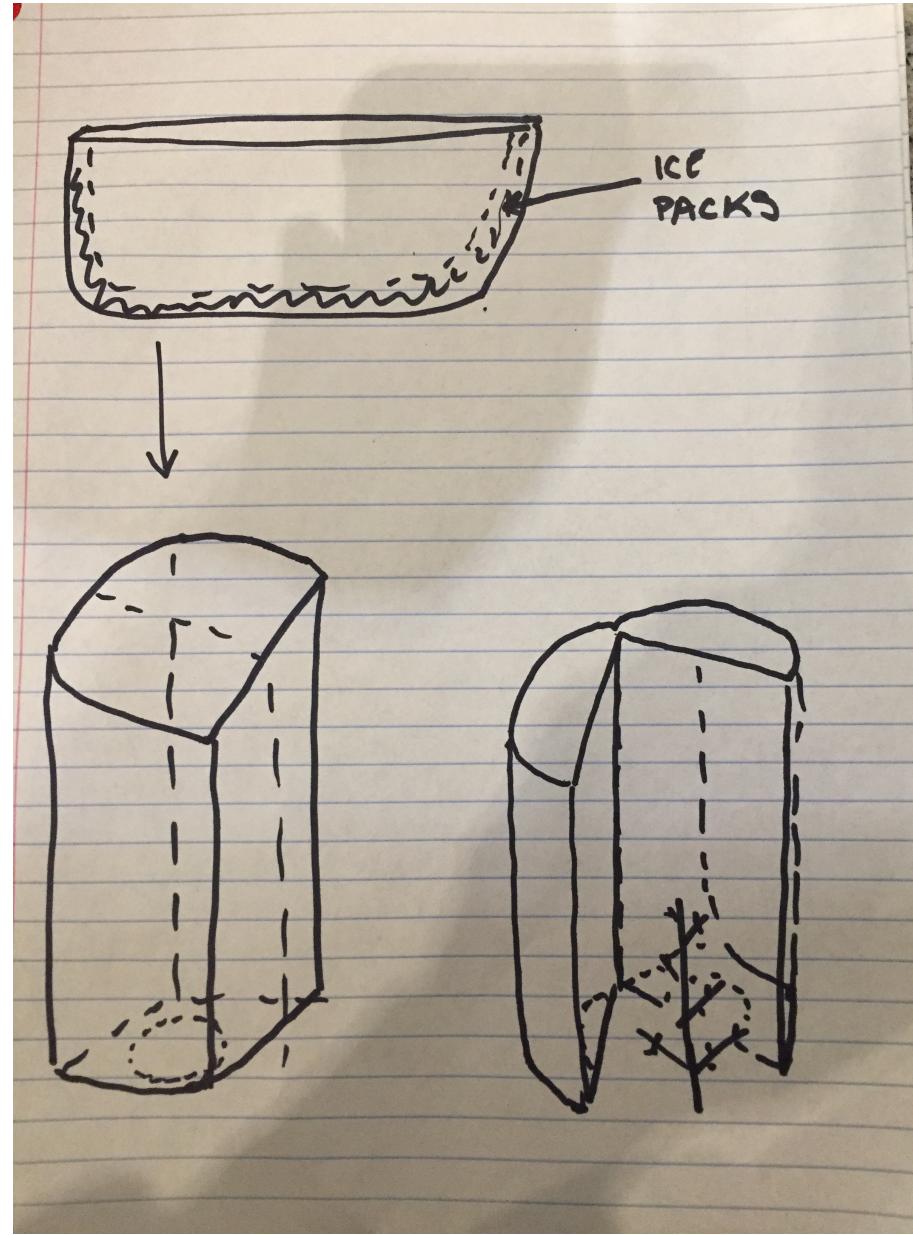
FIELD FREEZING EXPERIMENT

ACEPEN
ACESAC
BETLEN
CAROVA
CORCOR
FAGGRA (?)
HAMVIR
ILEVER
VIBACE

24 saplings
per species

16 adults
per species





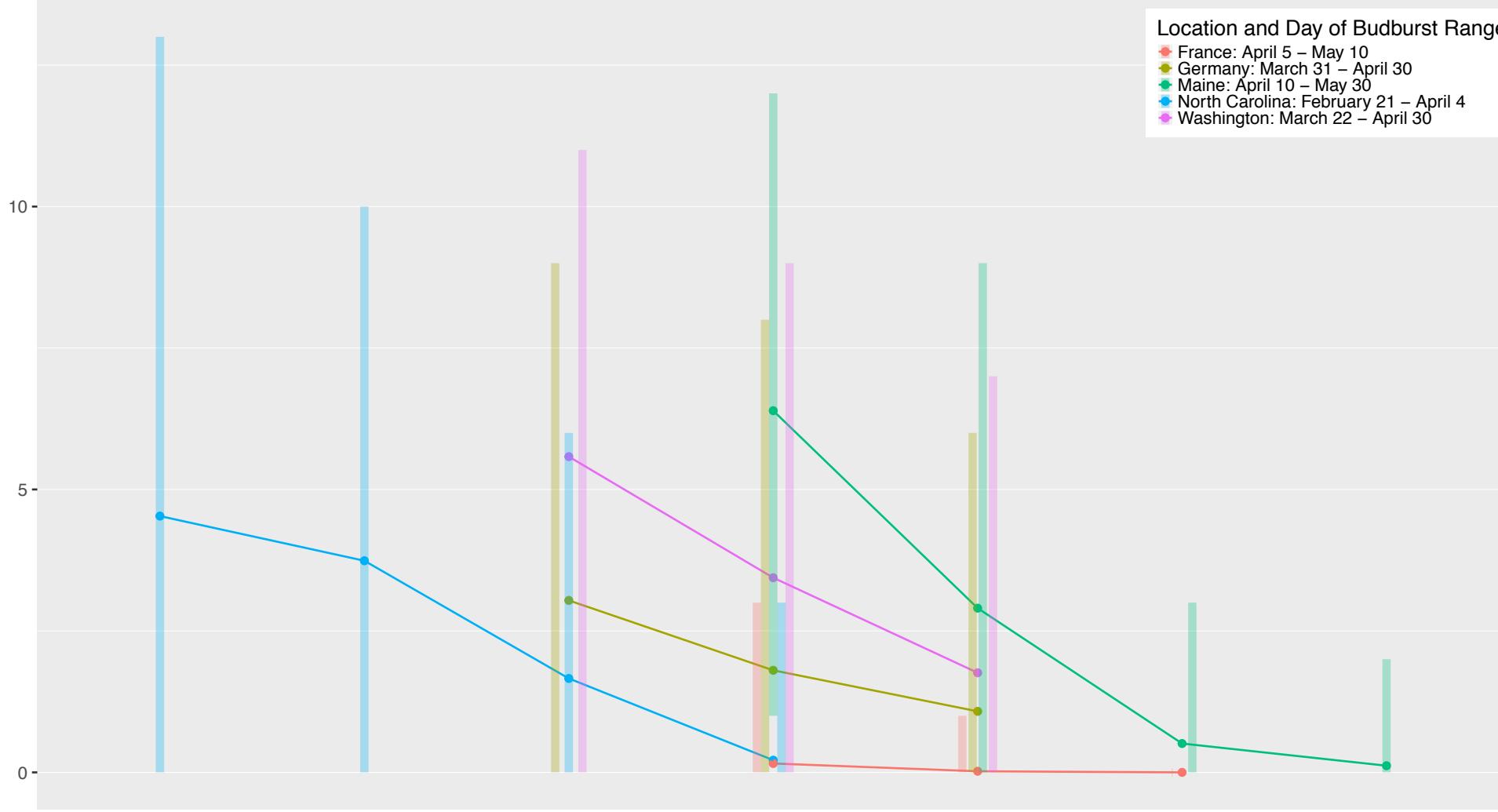
REGIONAL RISK

Investigating the frequency of false spring events from
1950 – 2016.

ACEPSU
ALNGLU
AESHIP
BETPEN
FAGSYL
FRAEXC
TILCOR
TILPLA
QUEROB

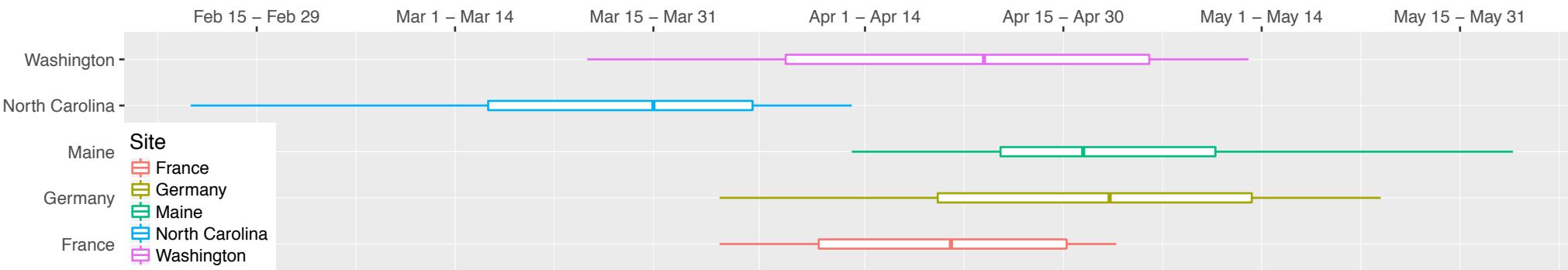
PEP725: phenology data
E-OBS: gridded climate data

Number of days below -2.2C per two week period

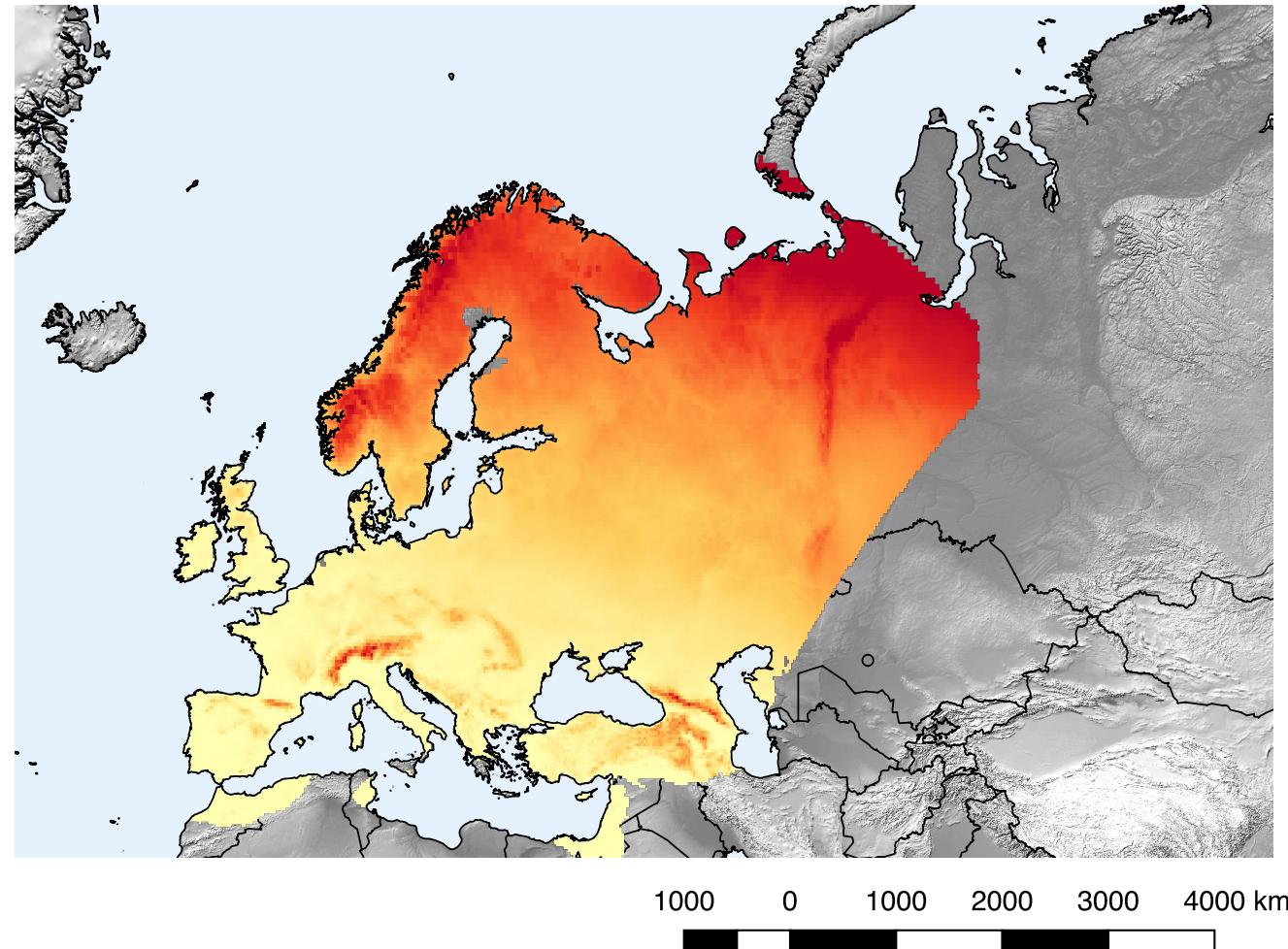


Location and Day of Budburst Range

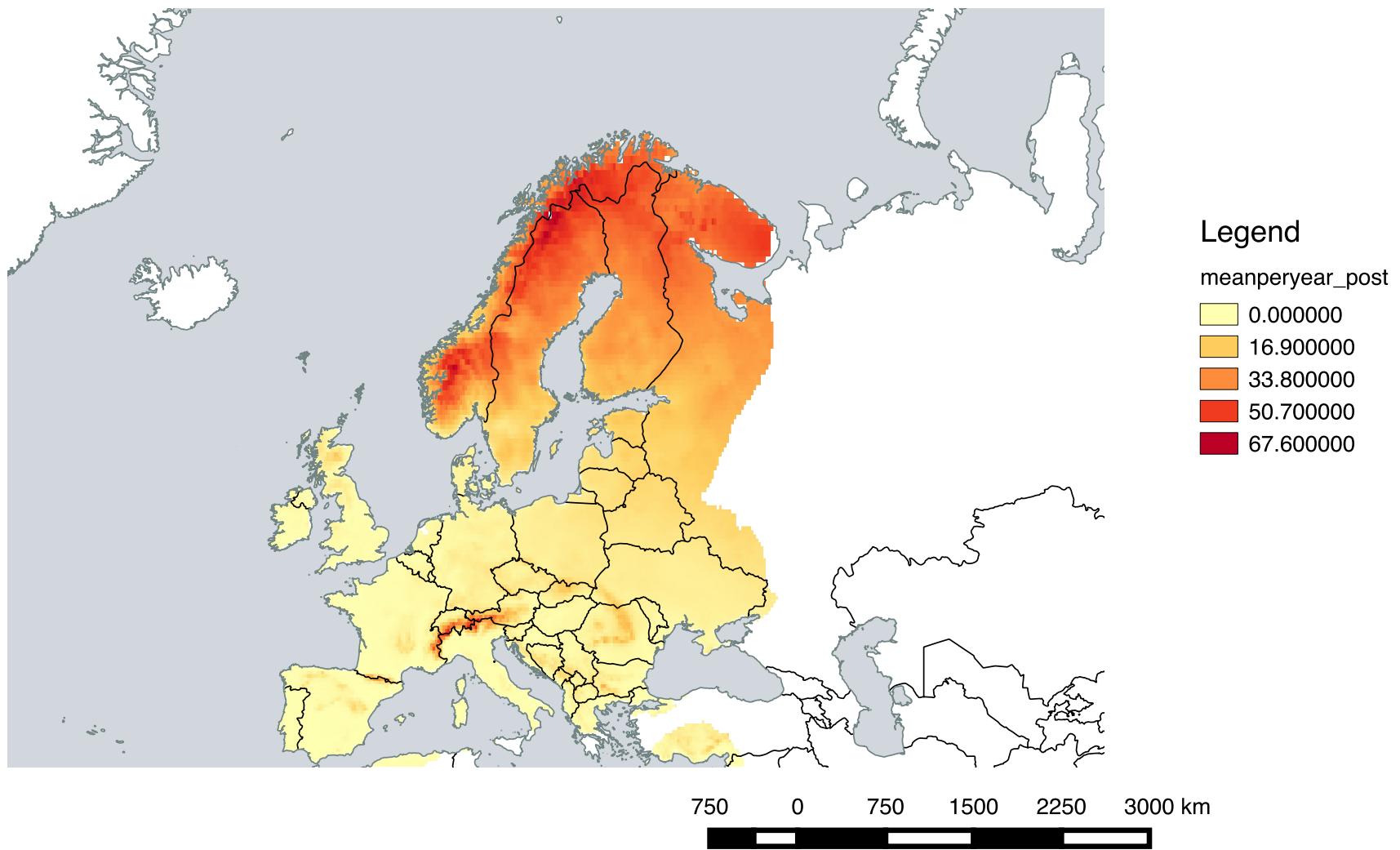
- France: April 5 – May 10
- Germany: March 31 – April 30
- Maine: April 10 – May 30
- North Carolina: February 21 – April 4
- Washington: March 22 – April 30



Mean Number of False Spring events per year: 1950-1983

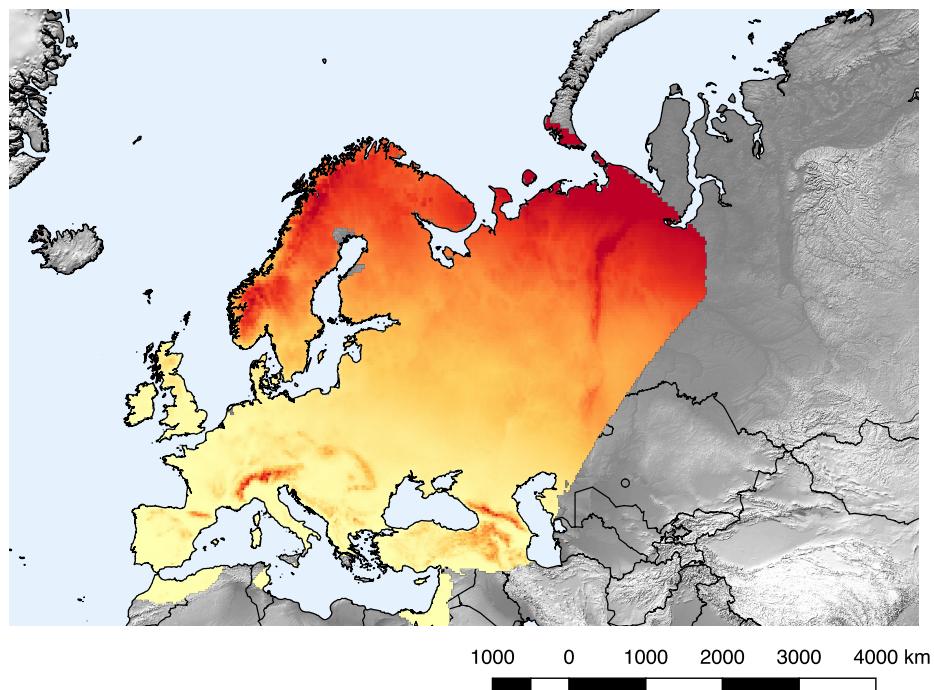


Mean number of False Spring events per year: 1984-2016

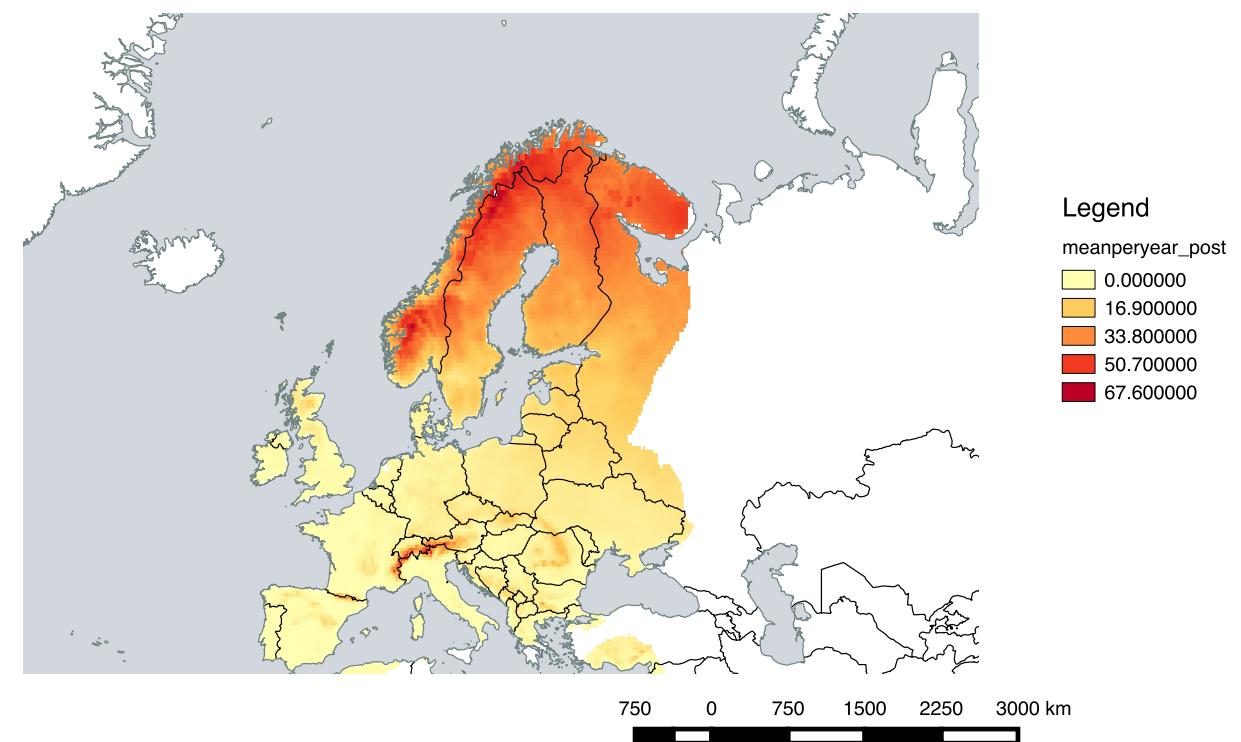


Comparison of the two...

Mean Number of False Spring events per year: 1950-1983



Mean number of False Spring events per year: 1984-2016



NEXT STEPS...

1. Finish Rethinking Manuscript
2. Finalize Buds Model and prepare seeds
3. Finish Building the Field Freezer and begin testing
4. Finish determining number of false spring events per decade for each species
 1. Prepare data for Stan model
 2. Make more maps with PEP725 data