Species Distribution Modeling of *Xantusia vigilis*

Presenters: Daniel Furman and Sarah Halvorsen
Advisors: Stephen Adolph, PhD and
Tanja Srebotnjak, PhD
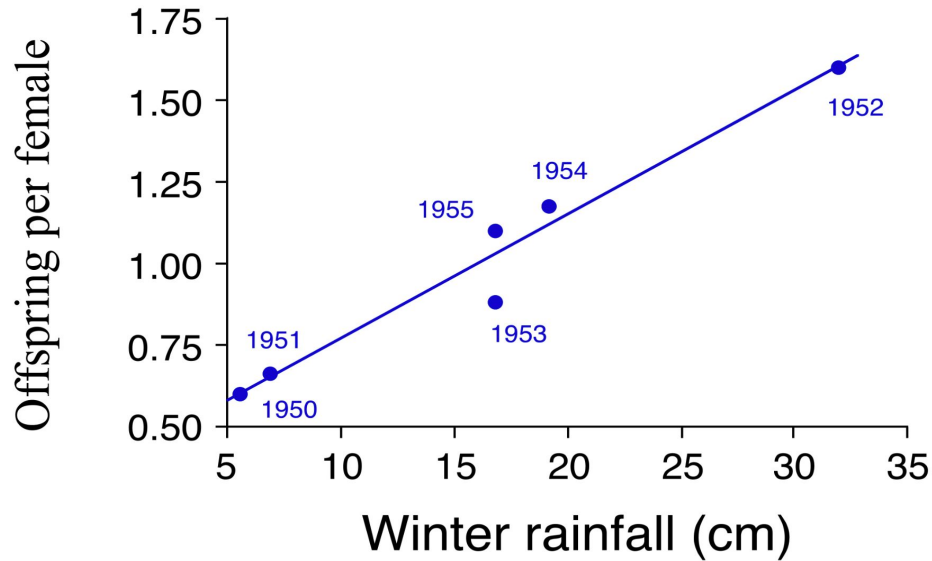November 23, 2019

Background

Research Questions

1. What is the set of climate conditions that defines *X. vigilis's* geographical distribution?

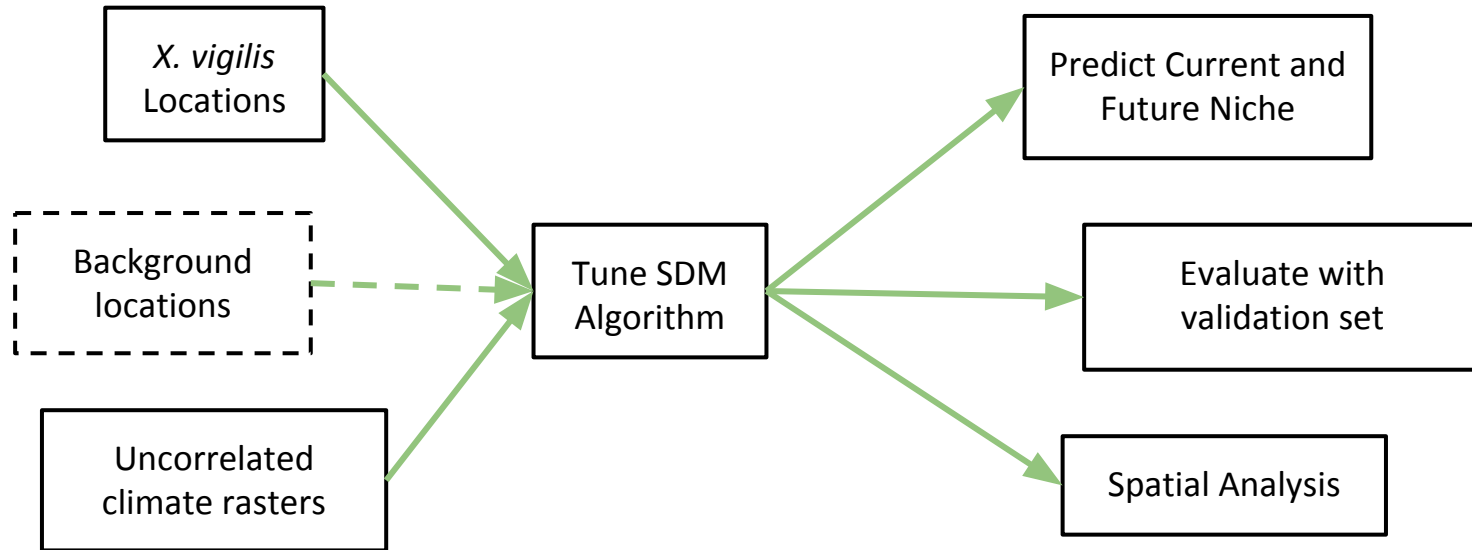2. How will the distribution shift as climate changes?

X. vigilis and climate

Xantusia Fecundity and Rainfall at Fort Tejon
(Zweifel and Lowe, 1966)

Rapid climate changes could alter the suitability of an ecosystem for *X. vigilis*.

Species Distribution Models

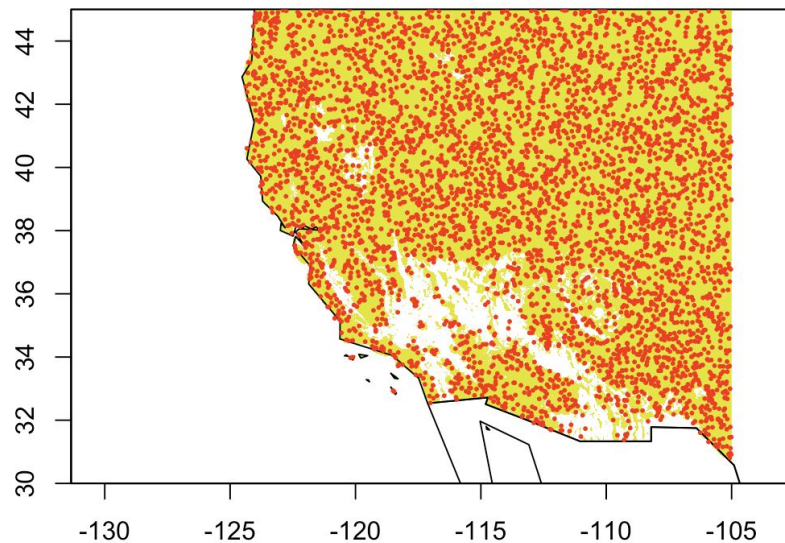- Estimates geographical niche of an organism
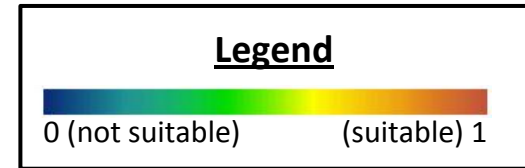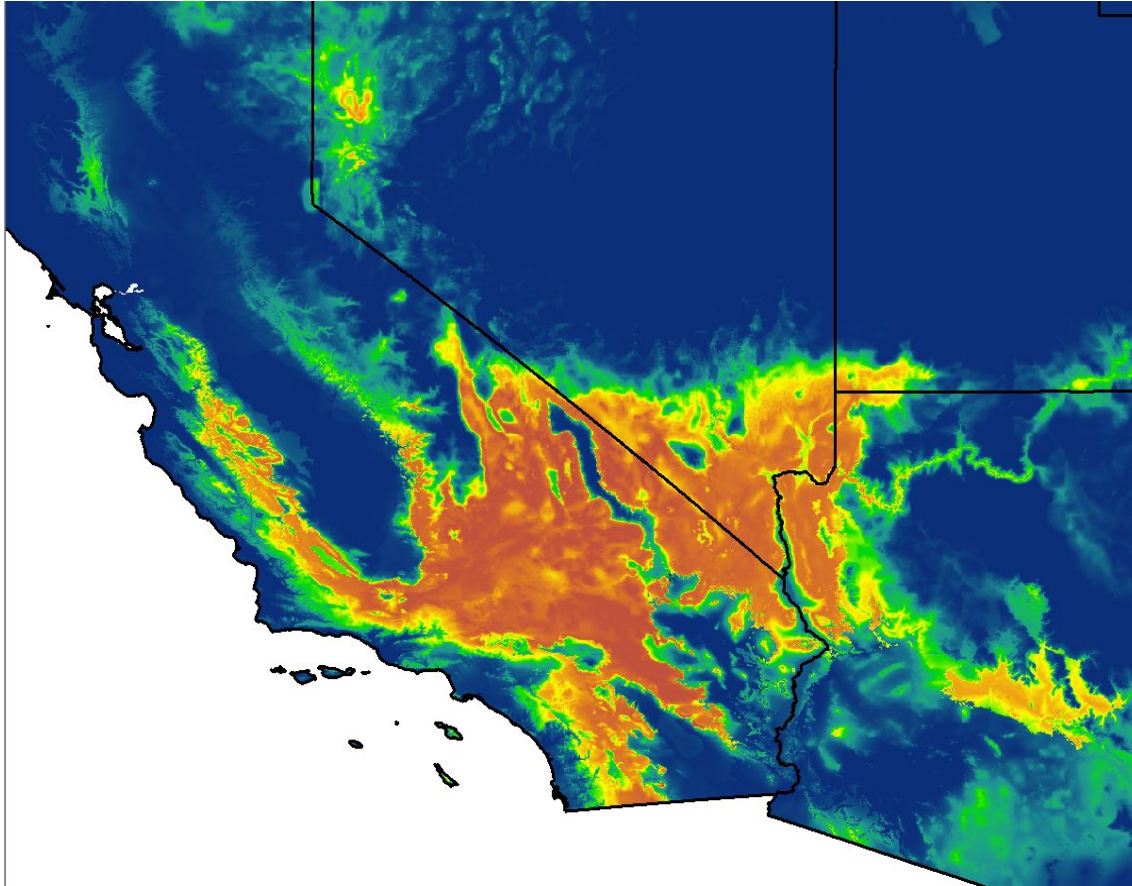- Correlates organism locations with climate variables

Occurrence Points
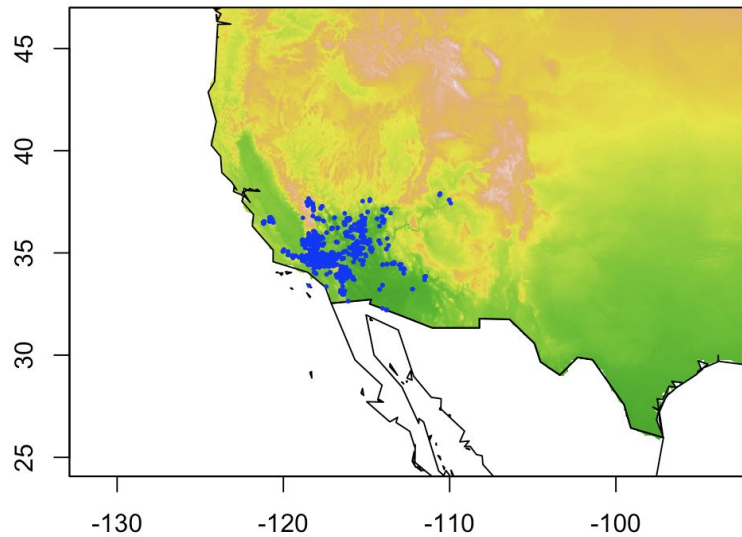
Background Points

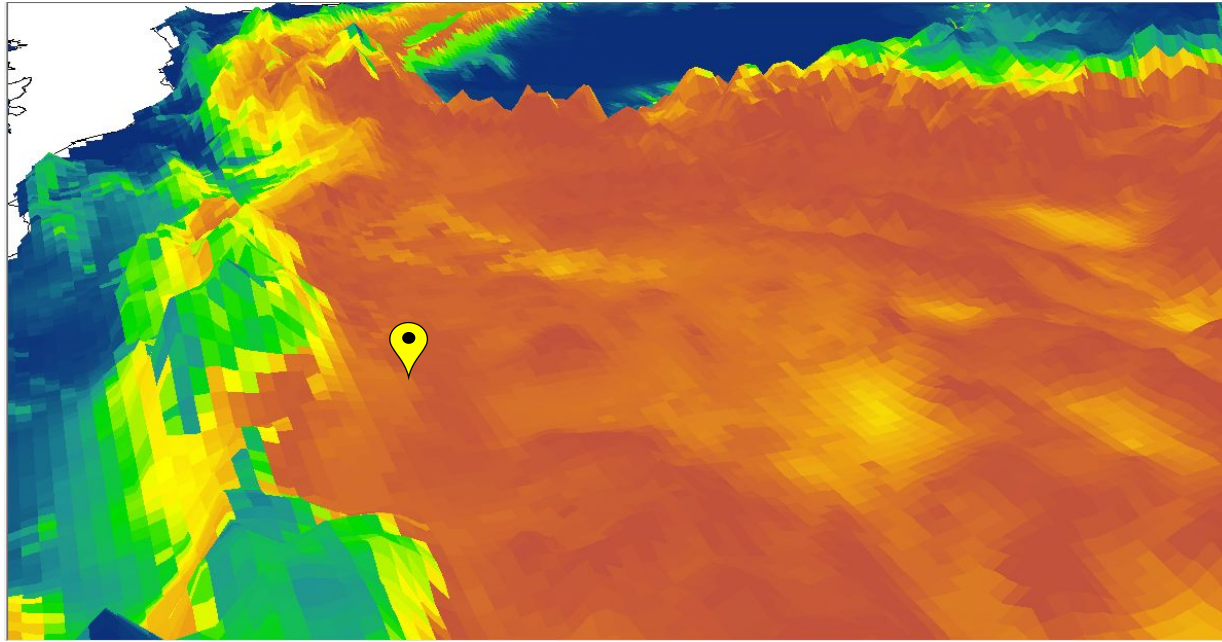Maxent Distribution

Legend

0 (not suitable)   (suitable) 1

Maxent Distribution

Legend

0 (not suitable)   (suitable) 1

N

8
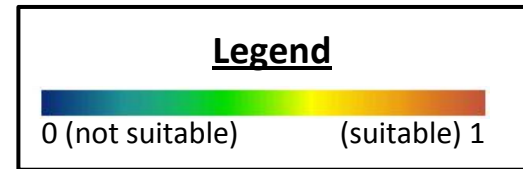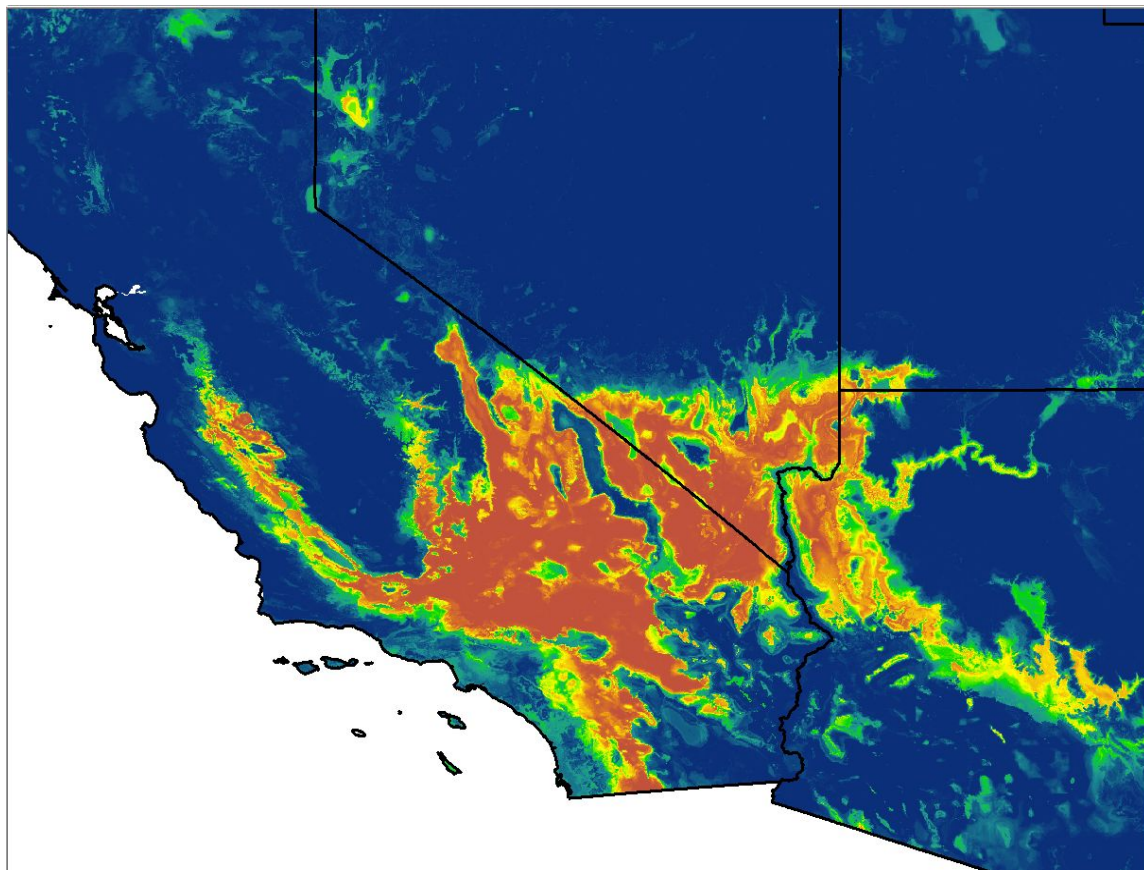
Random Forest Distribution

Legend

0 (not suitable)   (suitable) 1
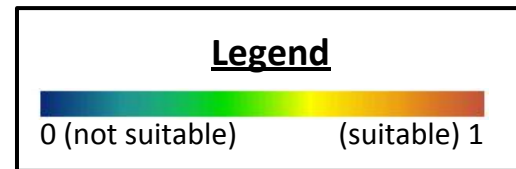
General Logistic Regression Distribution

Legend

0 (not suitable)   (suitable) 1

■ Presence Location

Model Overlap
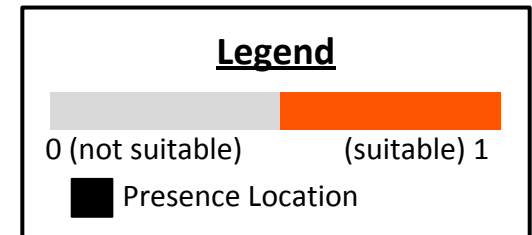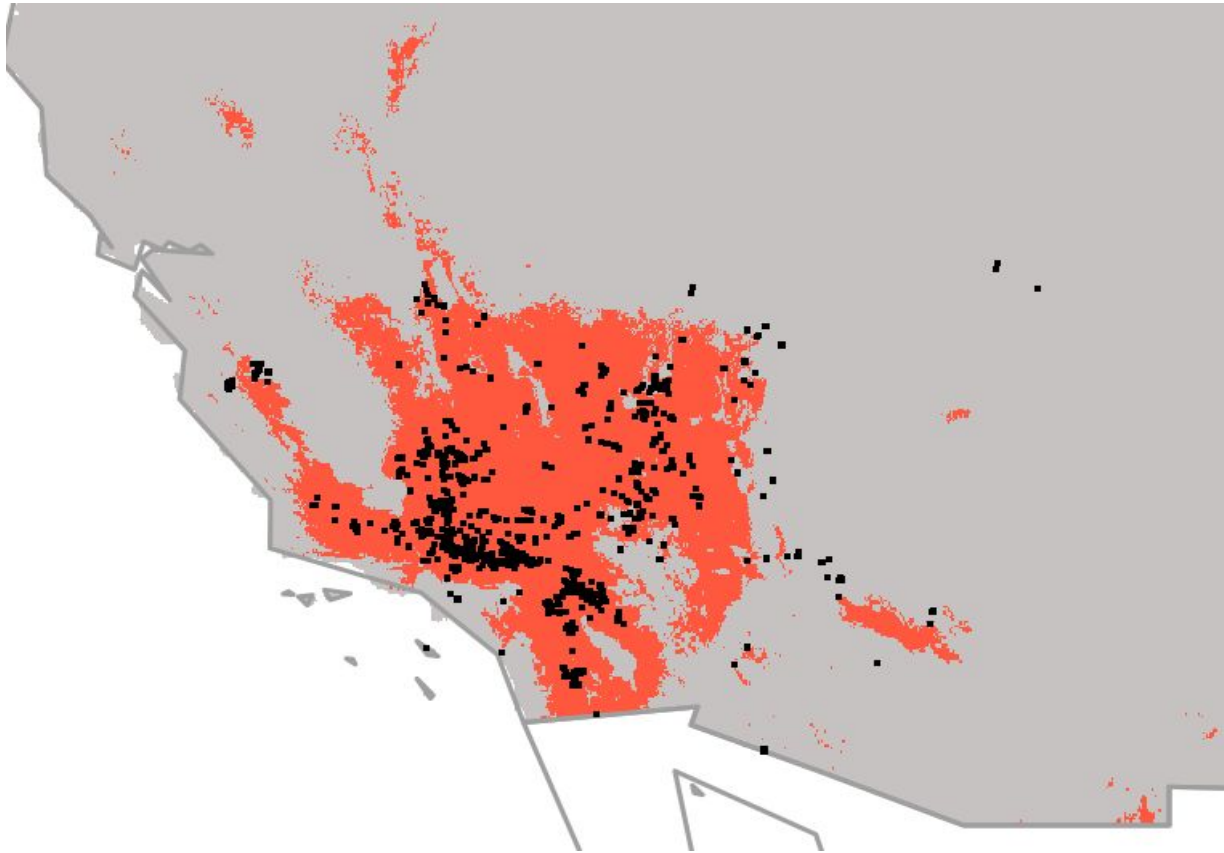
Legend:
- zero model overlap
- one model presence
- two model overlap
- three model overlap

N
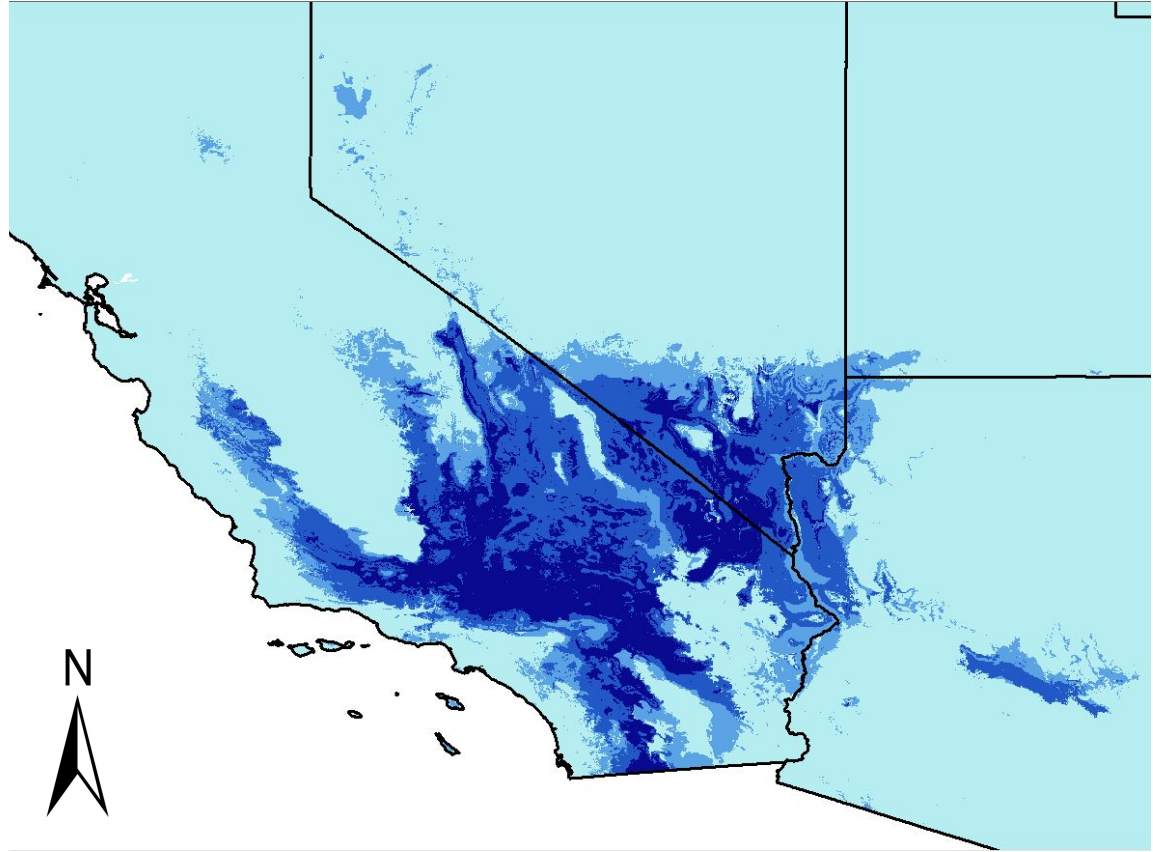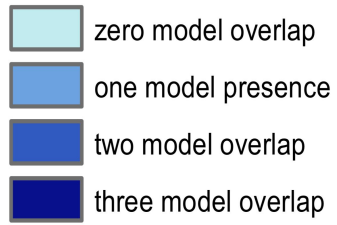
Three Model Overlap

Variable Name	Average (1970-2000)
Precipitation driest month	2.59 mm
Min temp coldest month	-1.62 ℃
Elevation	1003 m

N

three model overlap

Known Geographic Range

Presence Locations
Species Distribution

N

Bezy, 1982
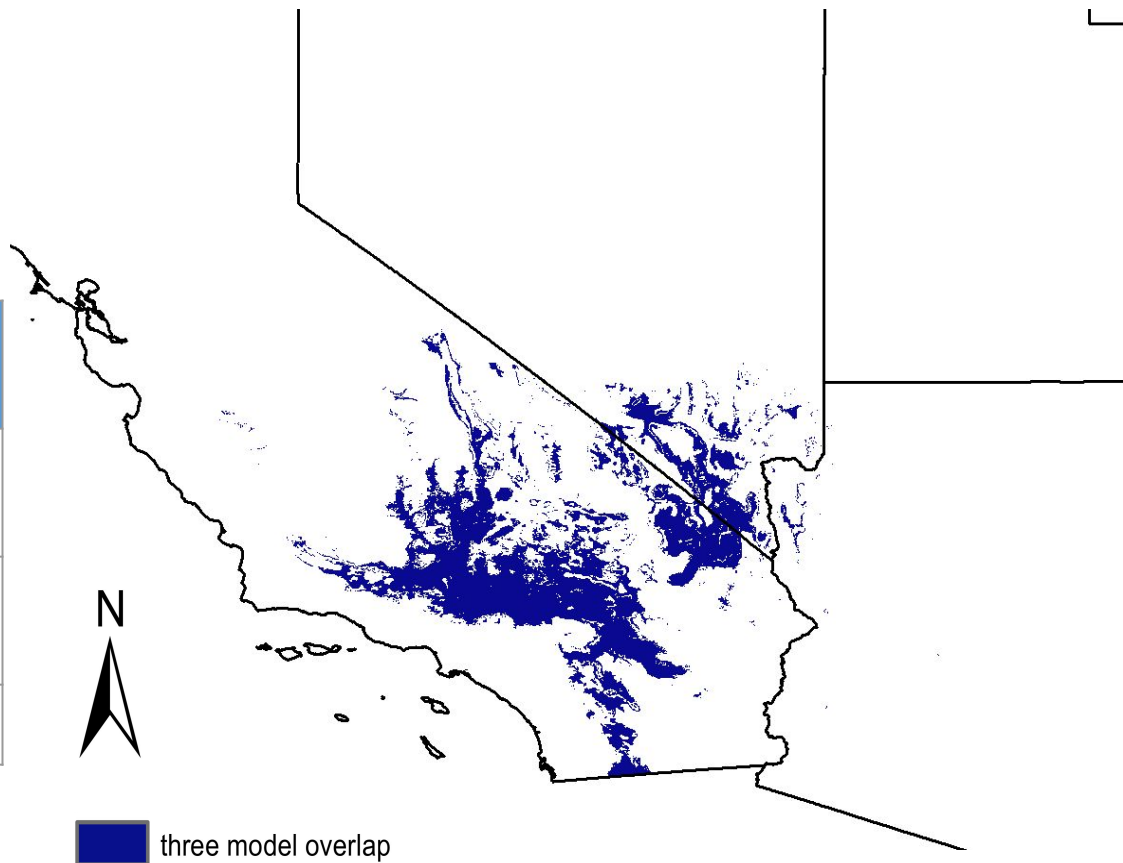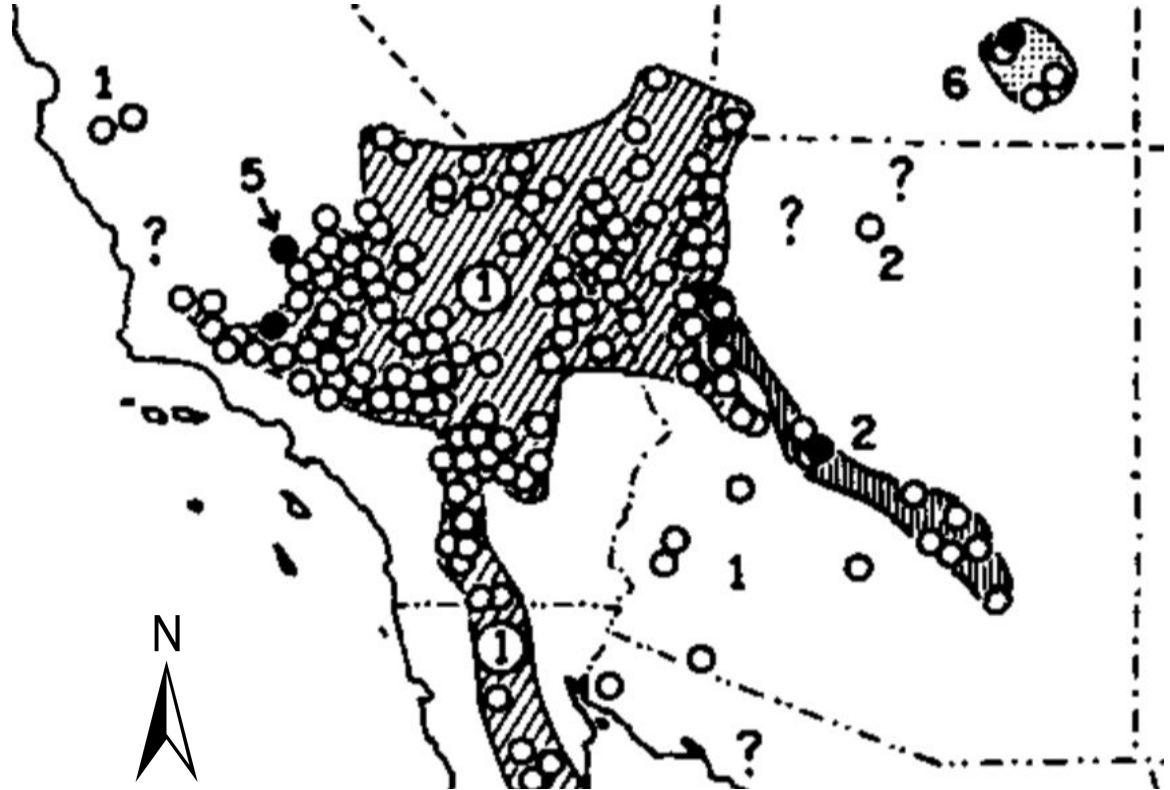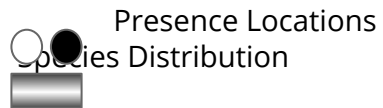
Conservative Range vs. Accepted Range
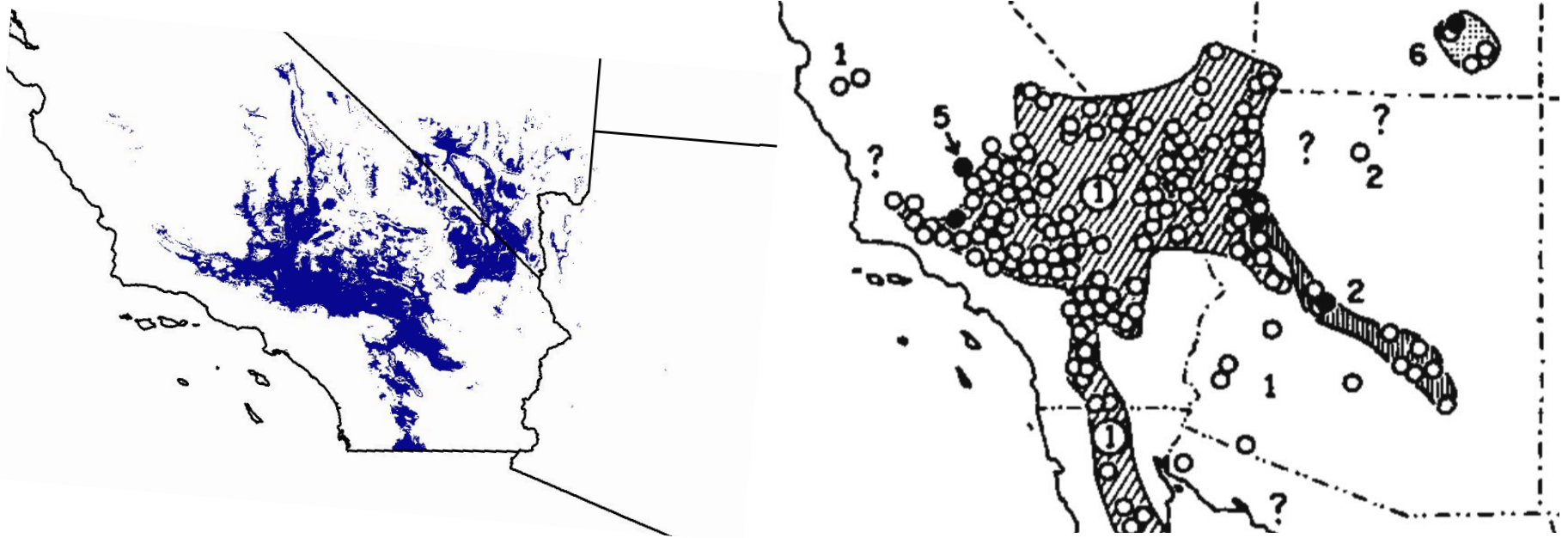
Projection
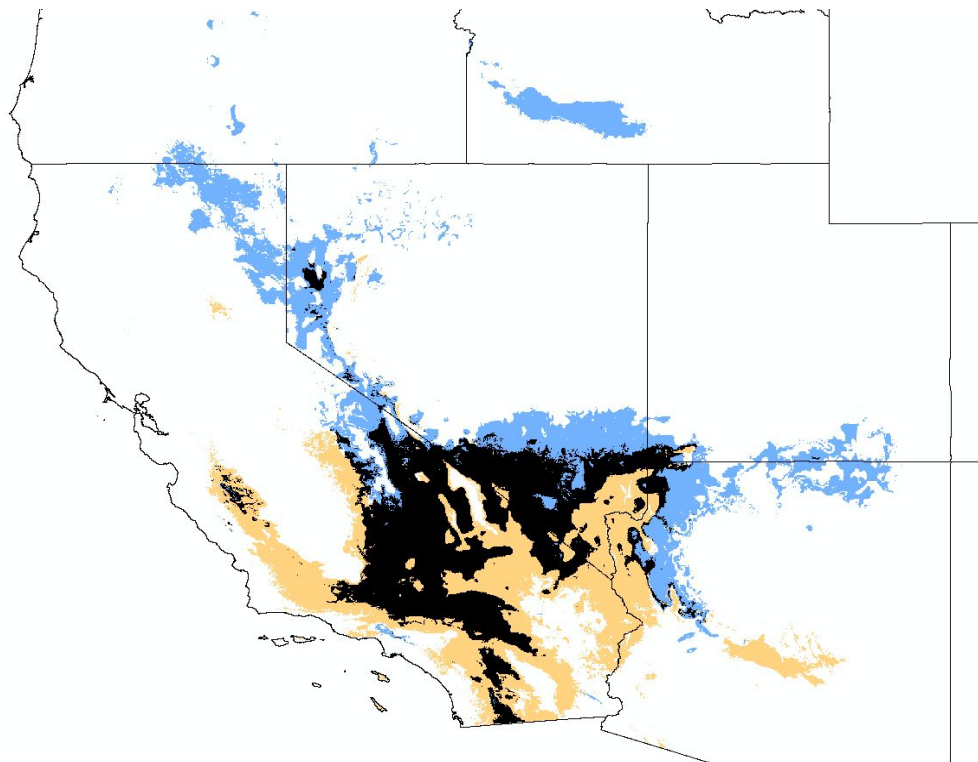
Future prediction is
50.3%
of current distribution
(using 2070 CNRM-CM5,
4.5 rcp climate model)

projected distribution

current distribution

overlap
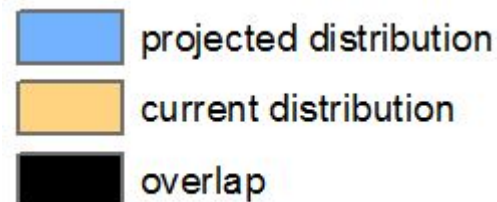
Conclusions

Conclusions

- All models show high agreement with previous range estimates.
- Models show climatic suitability, but tell us nothing about *X. vigilis*'s abundance or long-term movements.
- Future Work:
  - More rigorous testing of model parameters
  - More projections to future climates
  - Test *X. vigilis*'s response to new environmental conditions

Acknowledgments and References

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Overlap with *Y. brevifolia:* Environmental Space

- Method: Principal component analysis
- Convex hull volumes
  - *X. vigilis:* 531
  - *Y. brevifolia*: 517

Yucca brevifolia

Xantusia vigilis