NATIONAL ACADEMIES Sciences Engineering Medicine

Workshop: The impact and control of Valley fever

Potential effects of climate change on Valley fever

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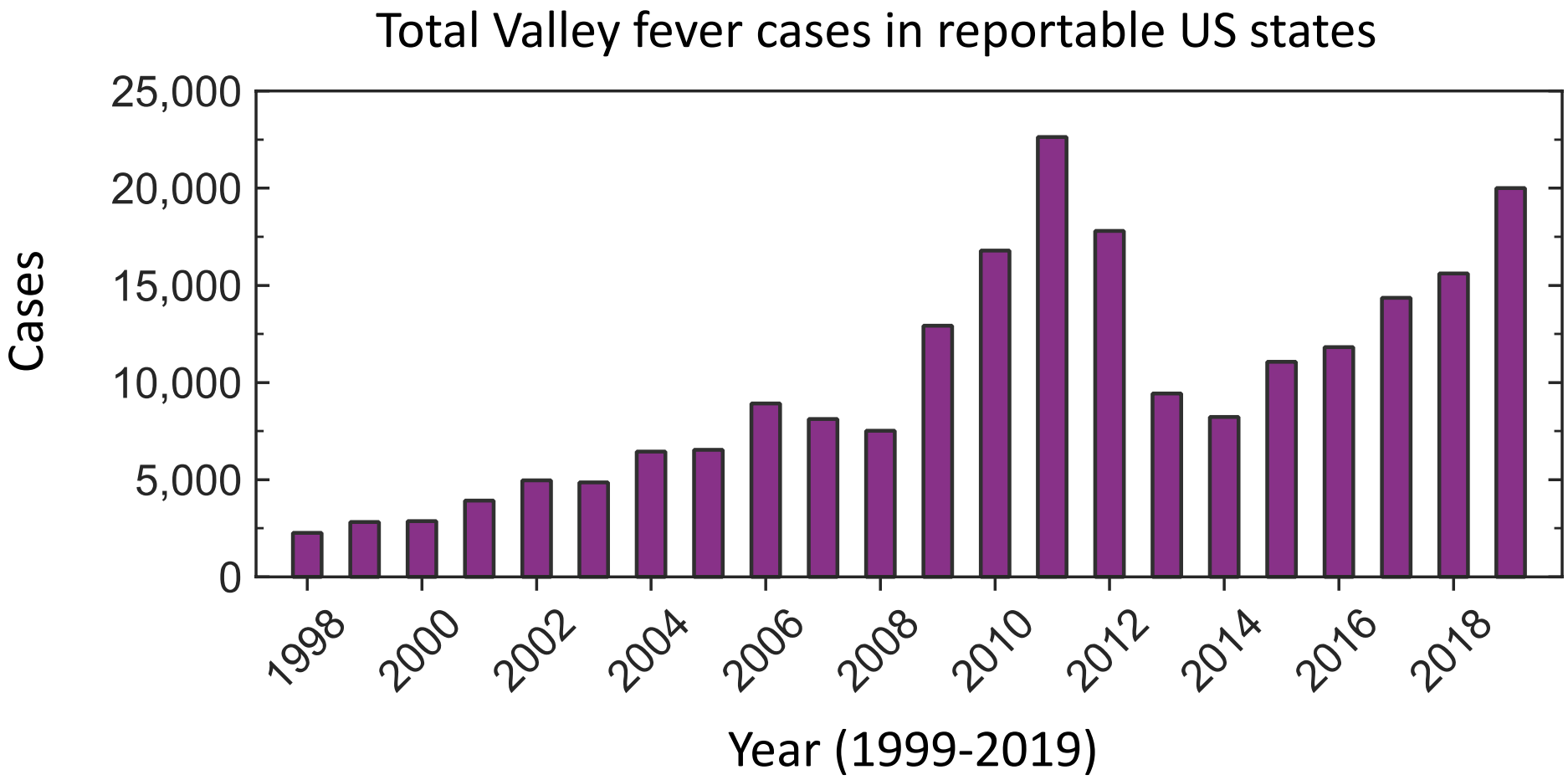
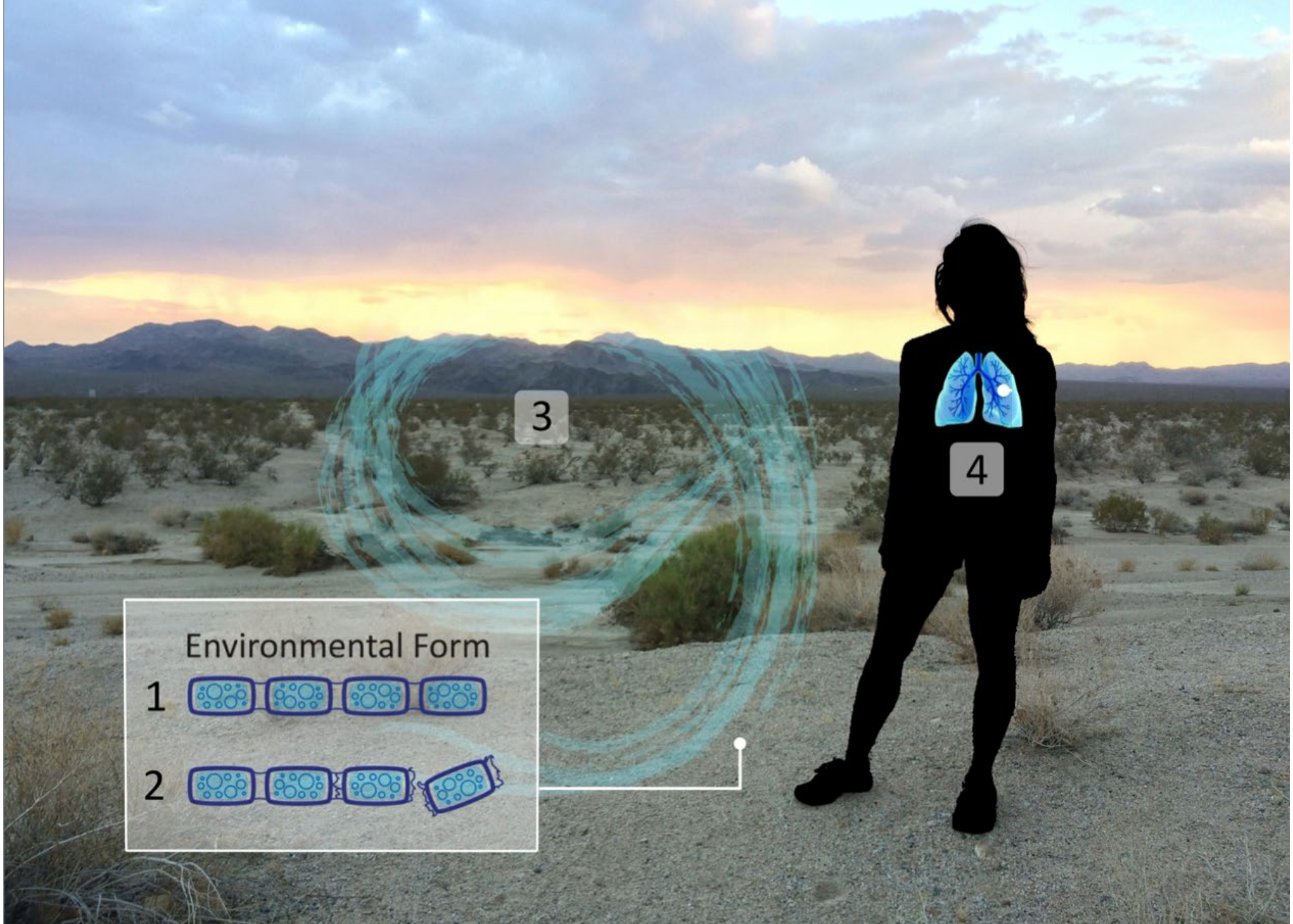
Valley fever cases are increasing:

Is this an early signal of climate change?

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Environmental Form
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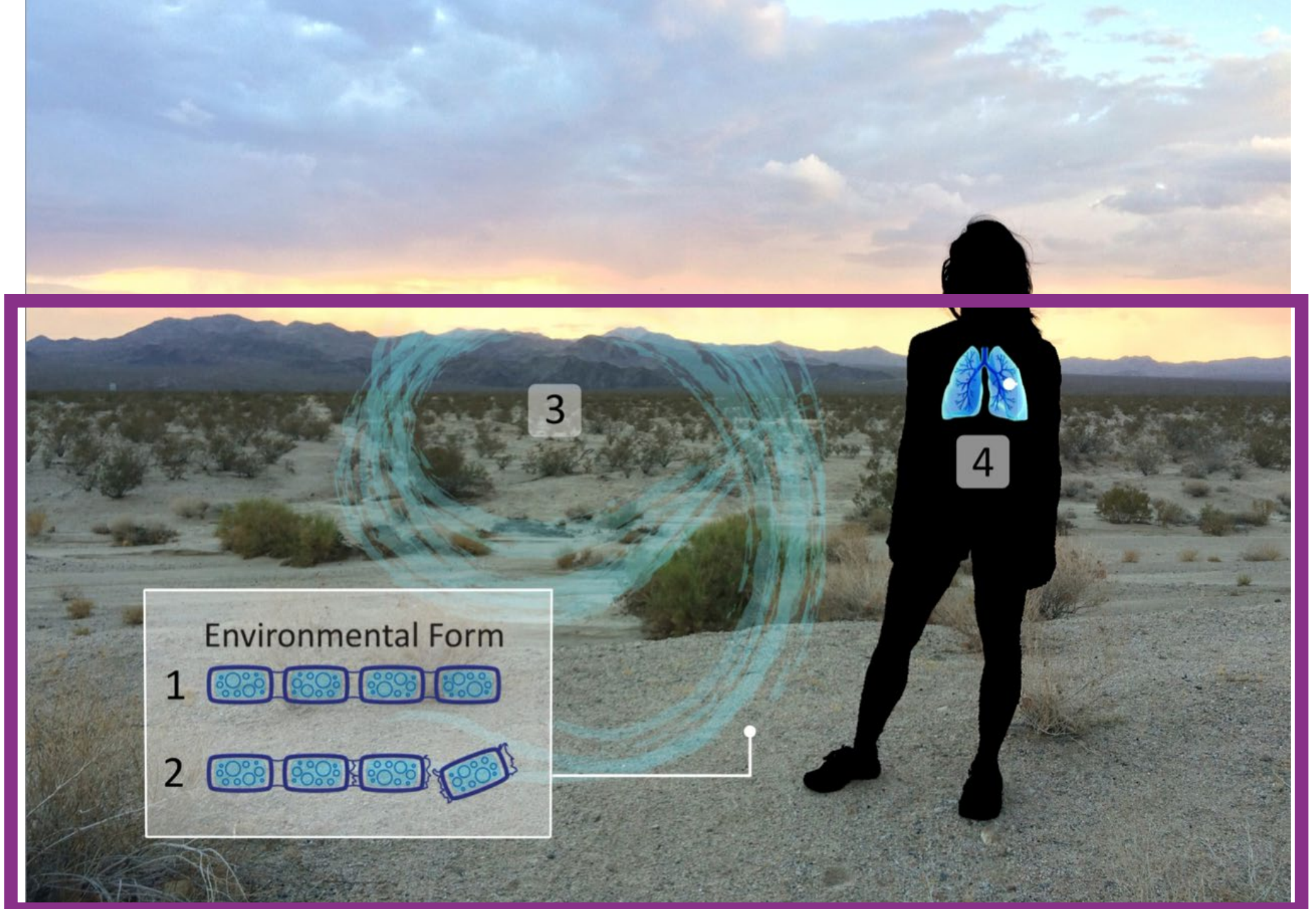
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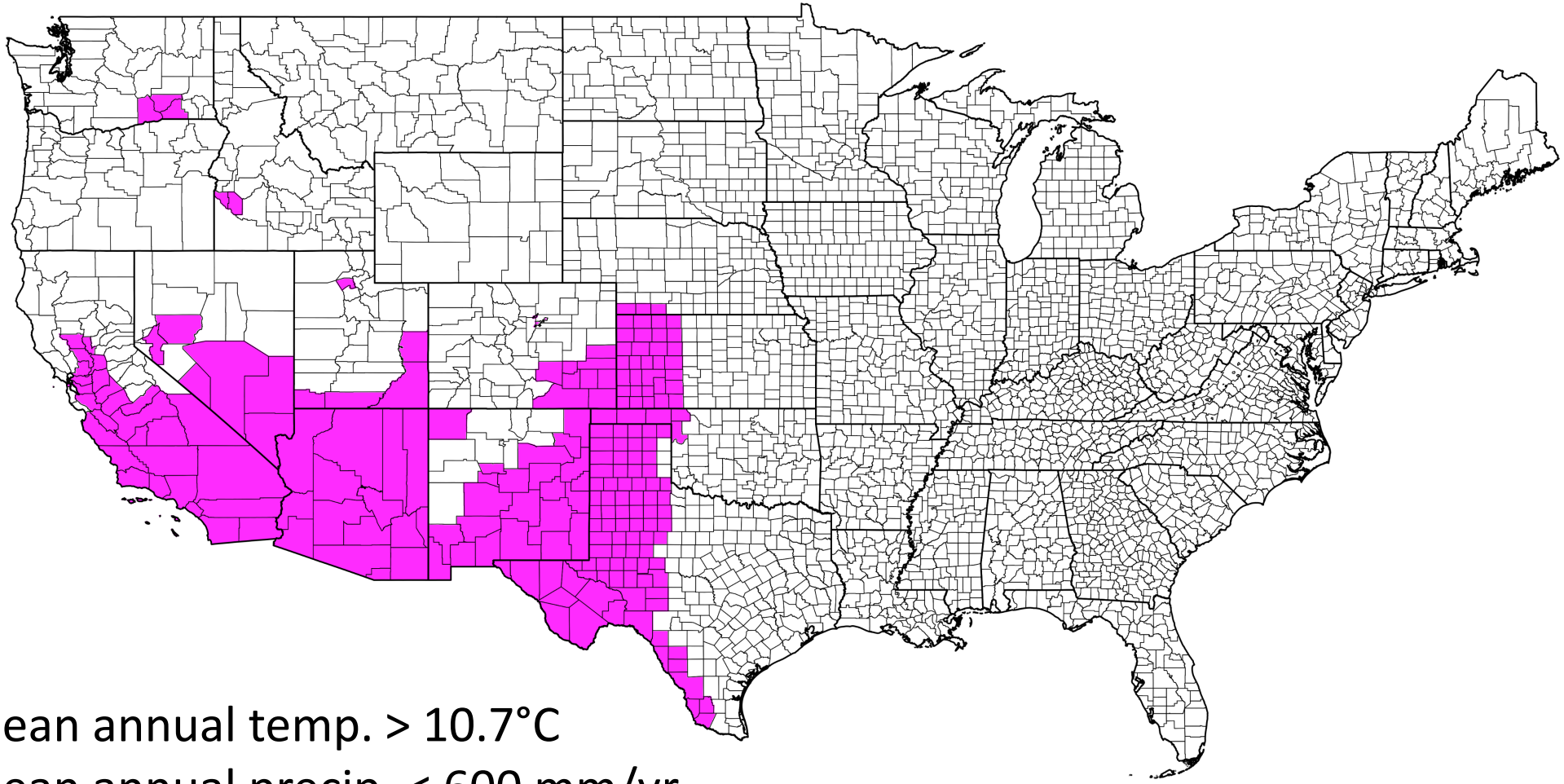
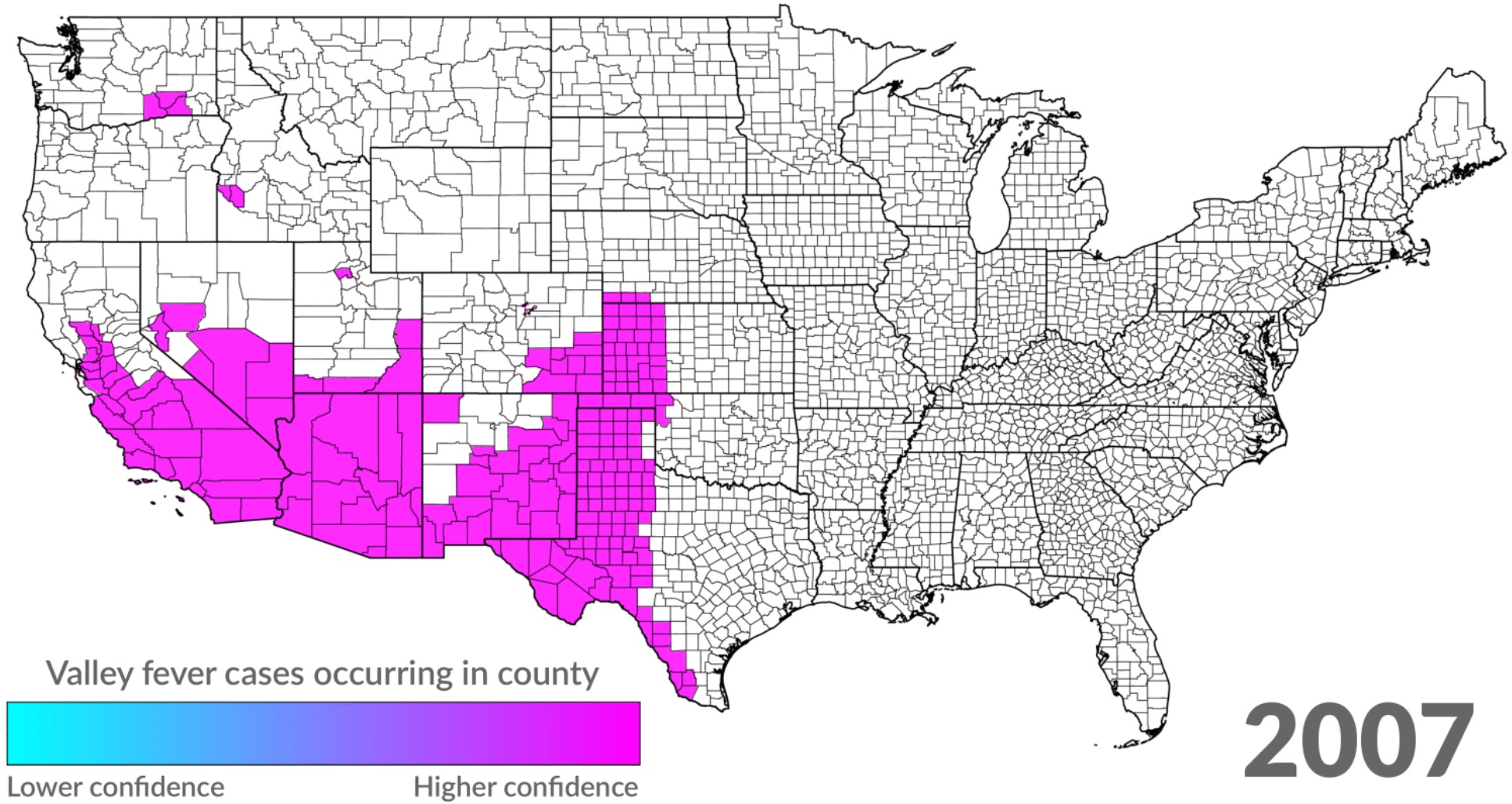
Climate-constrained estimate of Valley fever endemic area



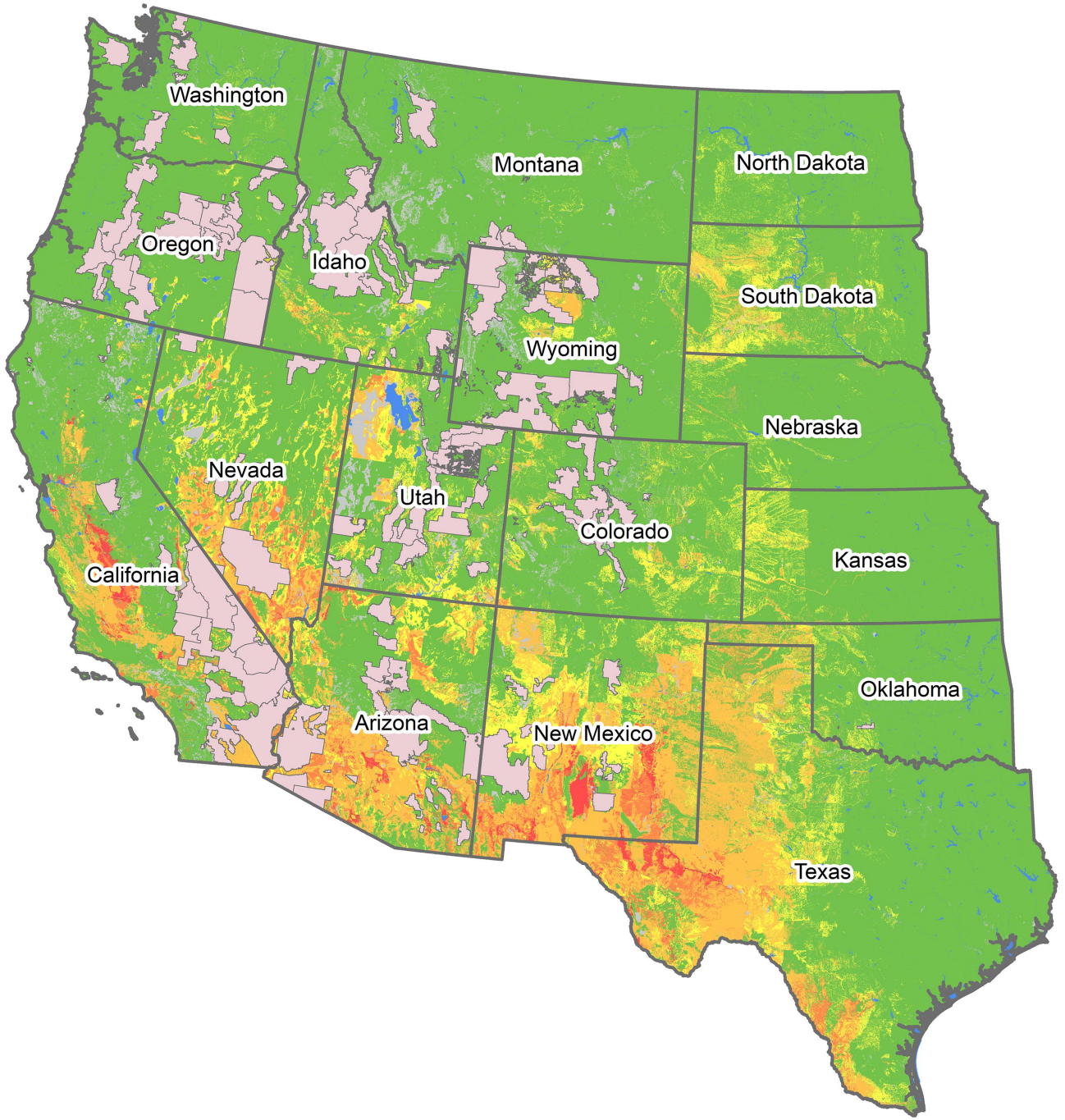
Mean annual temp. > 10.7°C
Mean annual precip. < 600 mm/yr

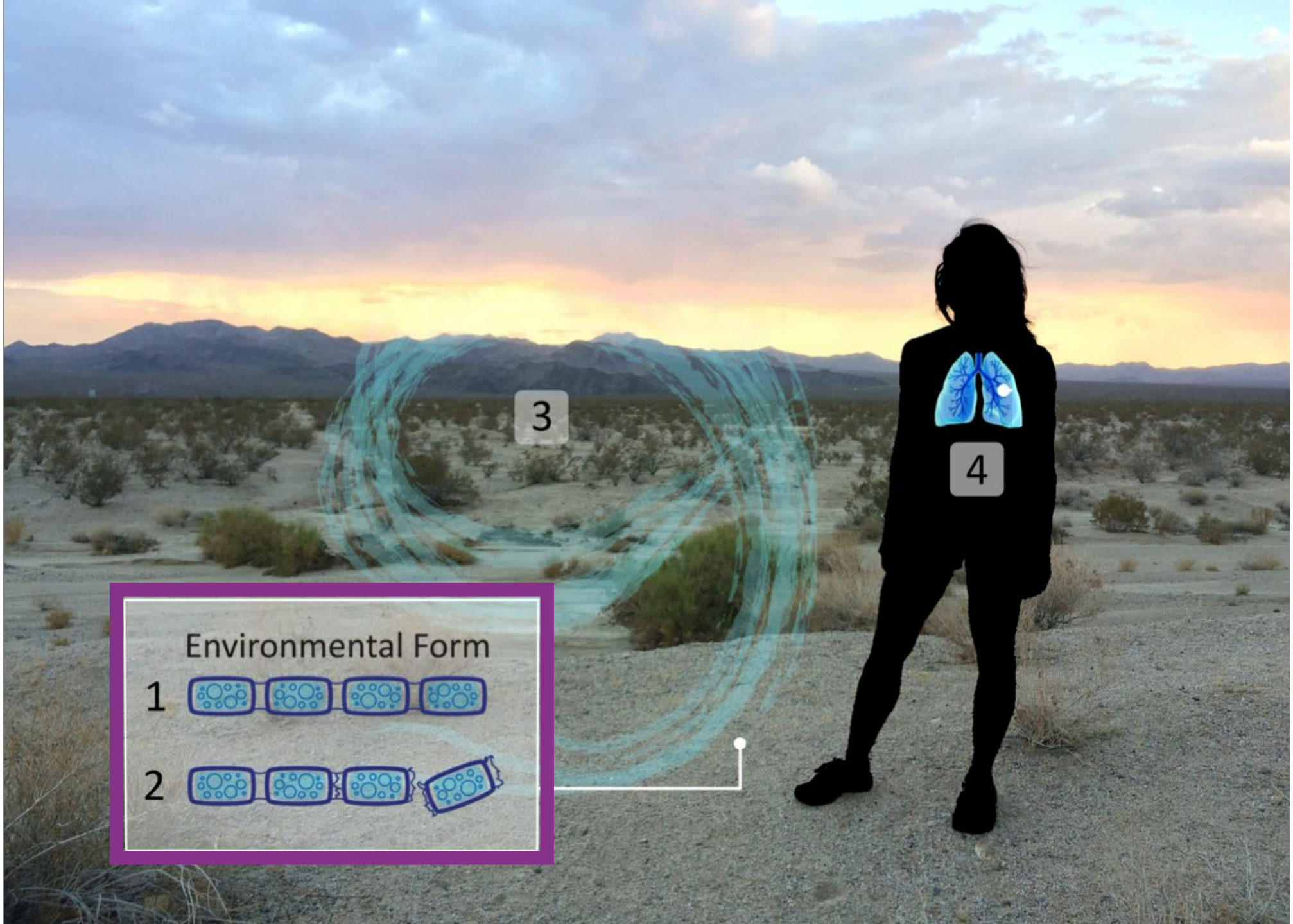
Expansion of Valley fever in the western US in response to high climate warming (RCP8.5)



Predicted *Coccidioides* habitat suitability index for the western US

Dobos, Benedict, Jackson, & McCotter (2021). PLOS ONE.

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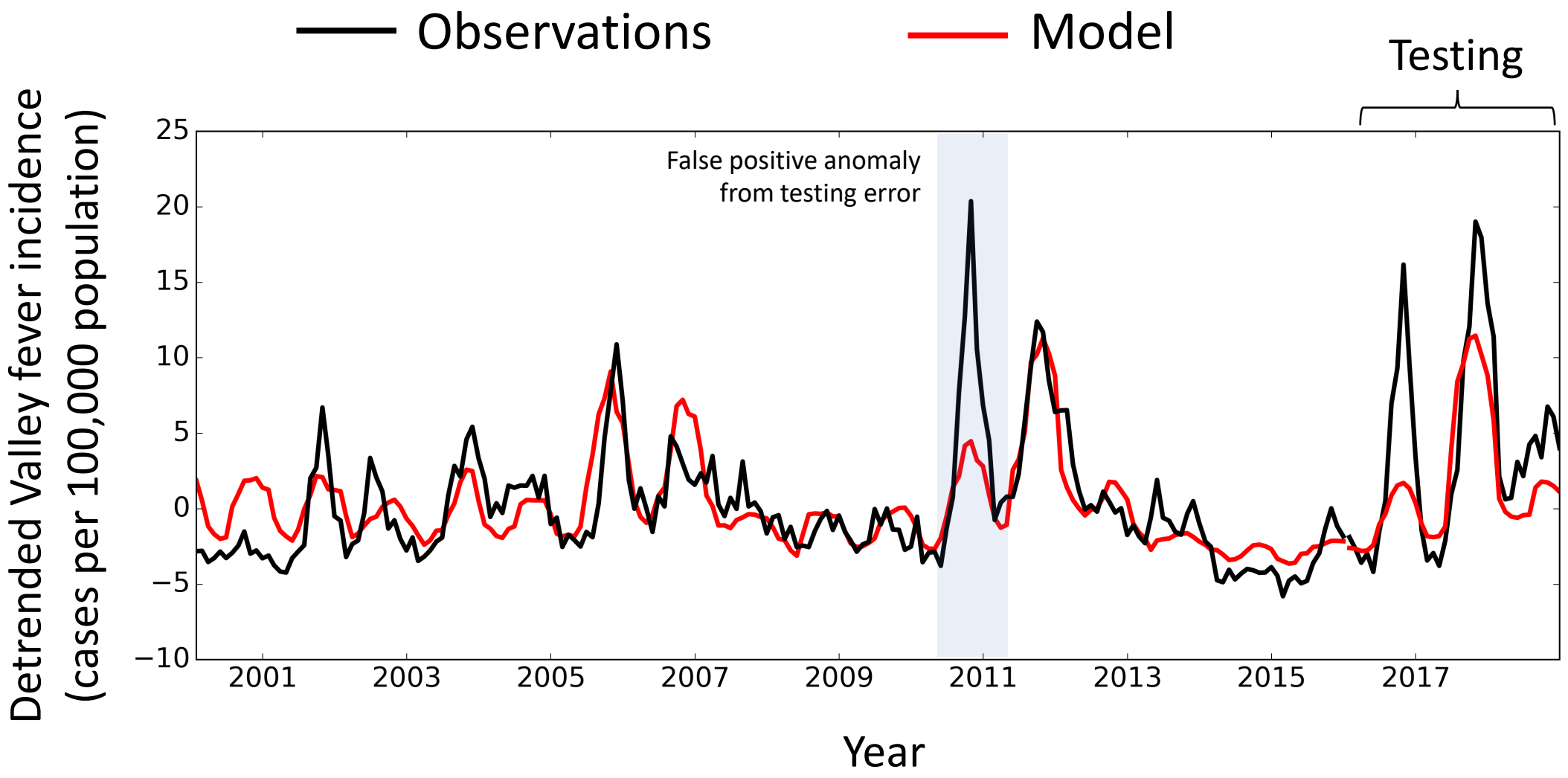
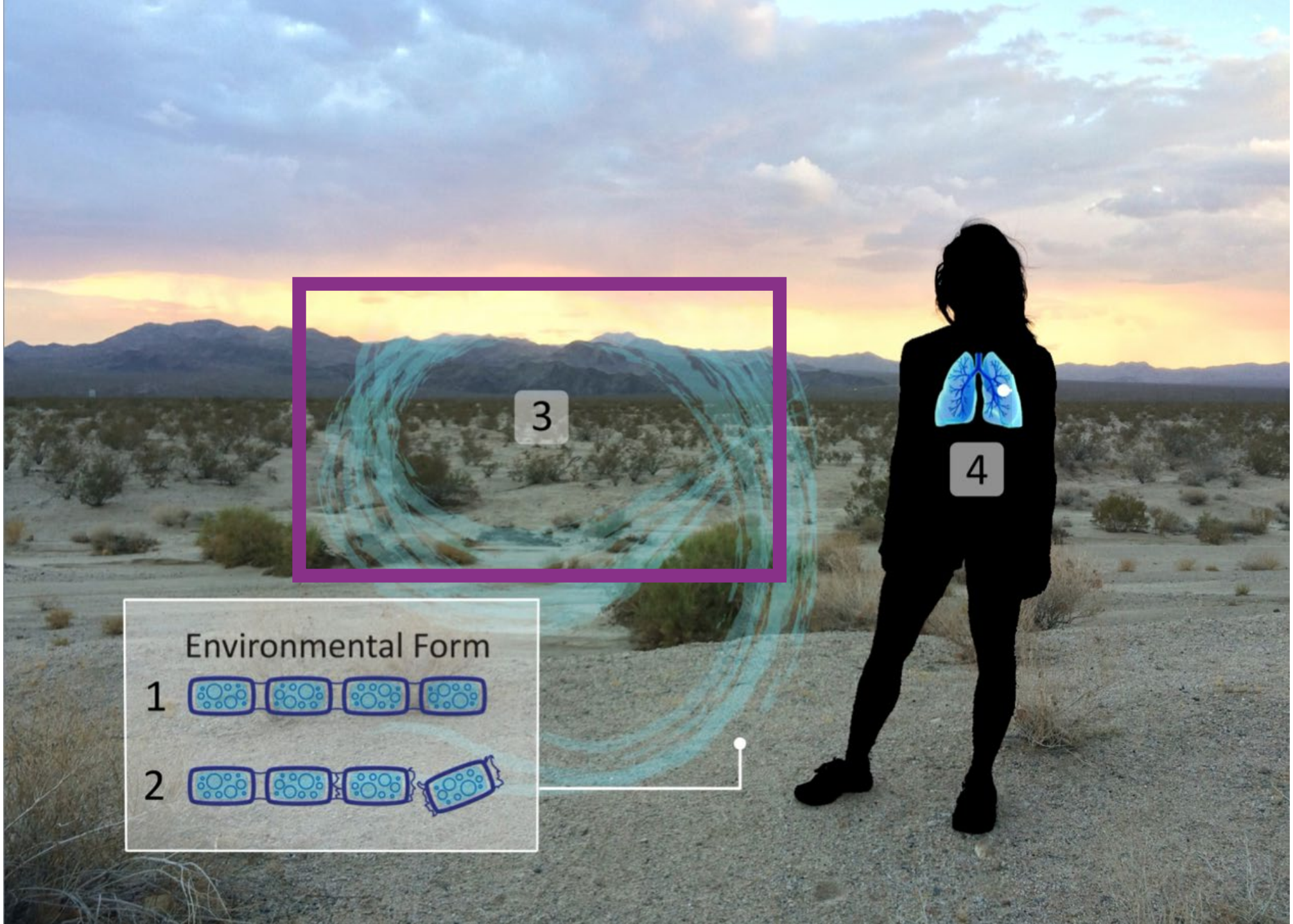
Rainfall can explain 65% of the monthly variance in cases
California San Joaquin Valley

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Environmental Form
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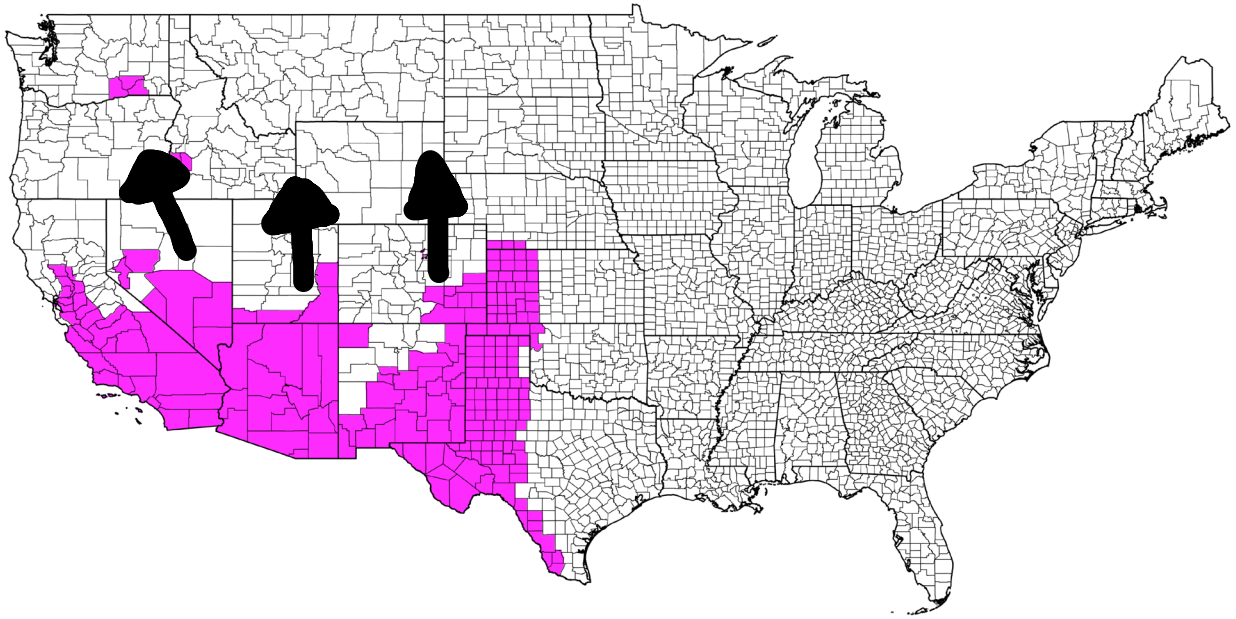
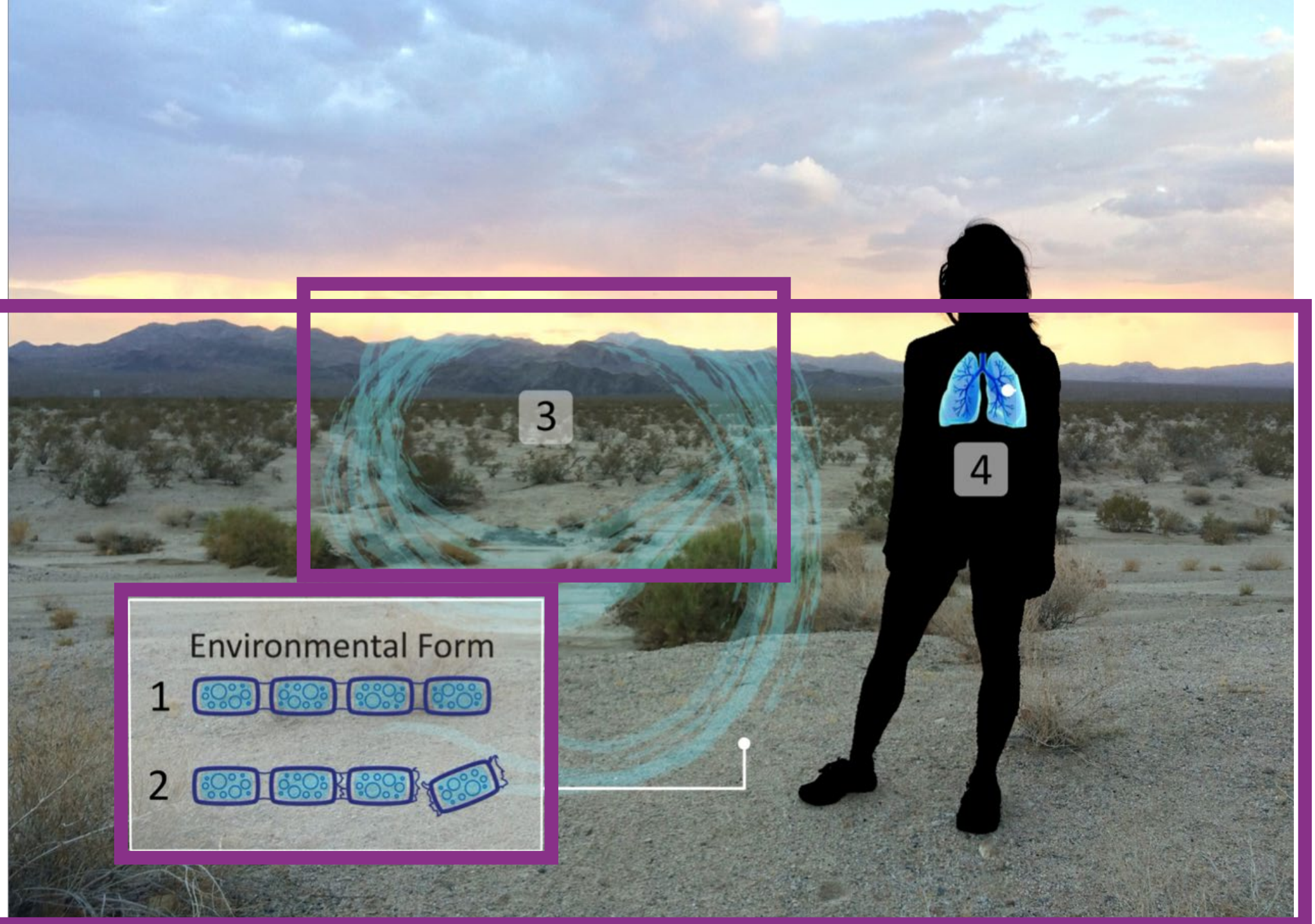
Endozoan, small-mammal reservoir hypothesis

Taylor and Barker (2019). Medical Mycology.



Airborne (dust) transport of *Coccidioides*

- Marine mammals become sick with Valley fever
- Climate change is causing longer, more intense droughts
- Climate change will increase the number of dust storms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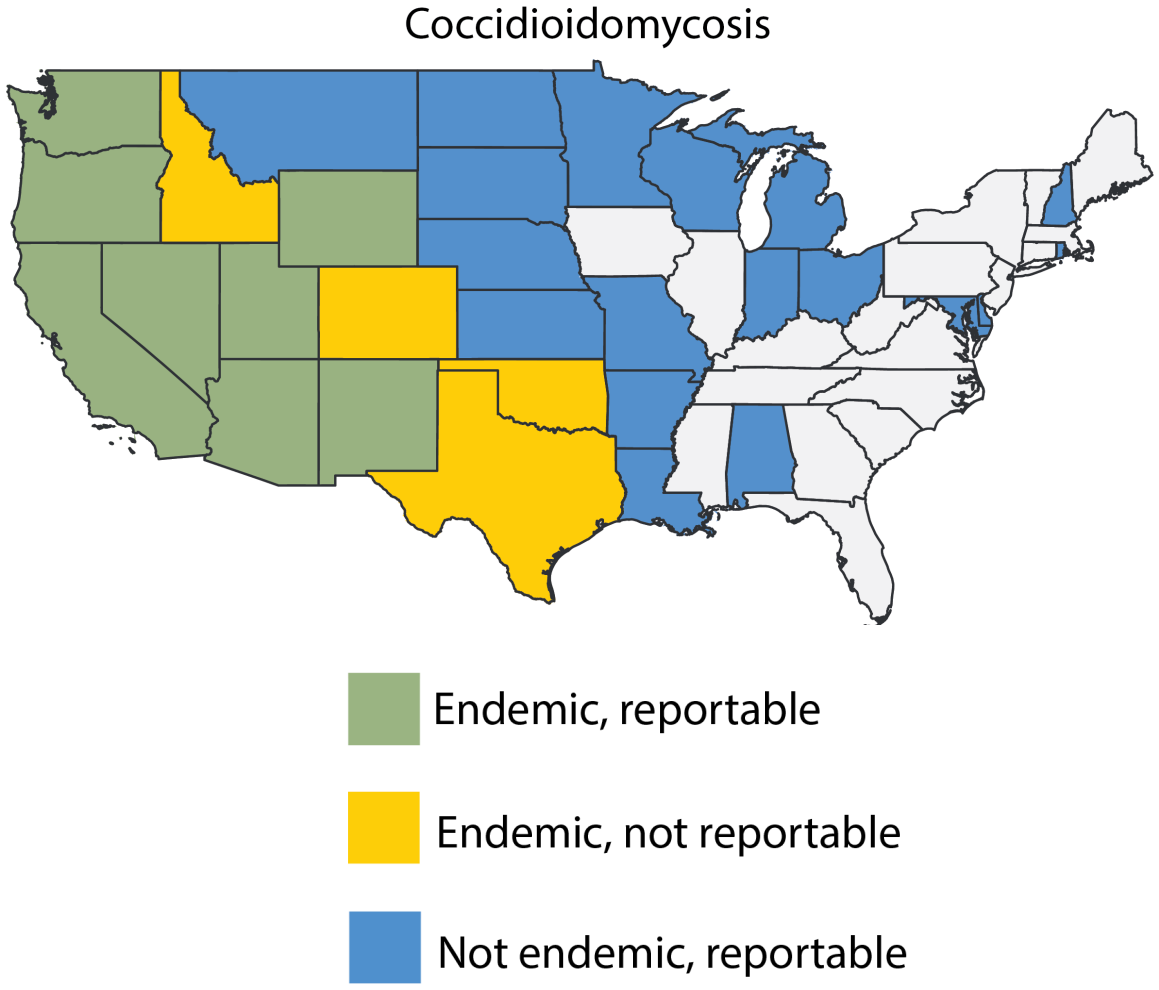
Disease surveillance programs

- Increase disease awareness → reduced time to diagnosis → increased chance of better outcomes
- Help promote vaccine development and eventual distribution
- Understand if the disease is spreading
- Estimate the health burden in endemic areas
- Texas: assuming the incidence rate is 10% that in AZ (14 cases per 100,000 population), about 4,200 cases go unreported annually



Gorris et al (2022). Submitted to Journal of Fungi.

Conclusions

- Cases are increasing:
  Is this climate change?
- Several aspects of the *Coccidioides* life cycle are connected to the environment
- Climate change may affect:
  - Where Valley fever is a health risk
  - The number of annual cases
  - Transmission, dust events, and case outbreaks

- Disease surveillance can help us understand who is at risk and mitigate negative health effects from Valley fever

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