



# DESERT POCKET MOUSE GENOMICS

## 2021-BEC-2095D

Presented by  
Co-Authors

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## Background and Need

### DCP is Pursuing an Amendment to the MSHCP

#### Amendment objectives include

- Revise list of covered species
- Revise conservation strategies to address newly Covered Species

#### *C. penicillatus* warrants Covered Species status

- Apparent affinity to unique, limited, potentially vulnerable habitat in the County

#### Conservation/Management Information Needs

- Distribution in the County
- Population status/condition
- Threats: Isolation, Connectivity, Habitat loss, Climate Change



# Previous Small Mammal Surveys



## 2019 Surveys in the BCCE

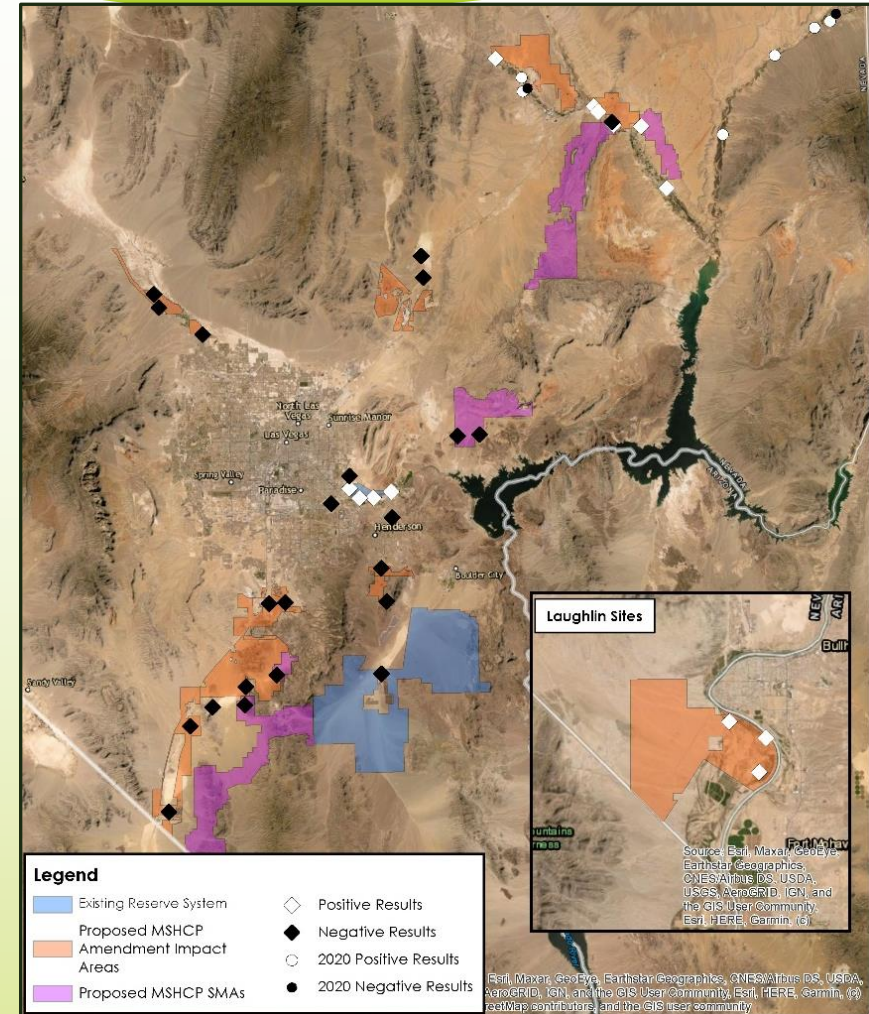
- Characterize small mammal community
- *C. p.* habitat targeted (marginal); *C. p.* not found

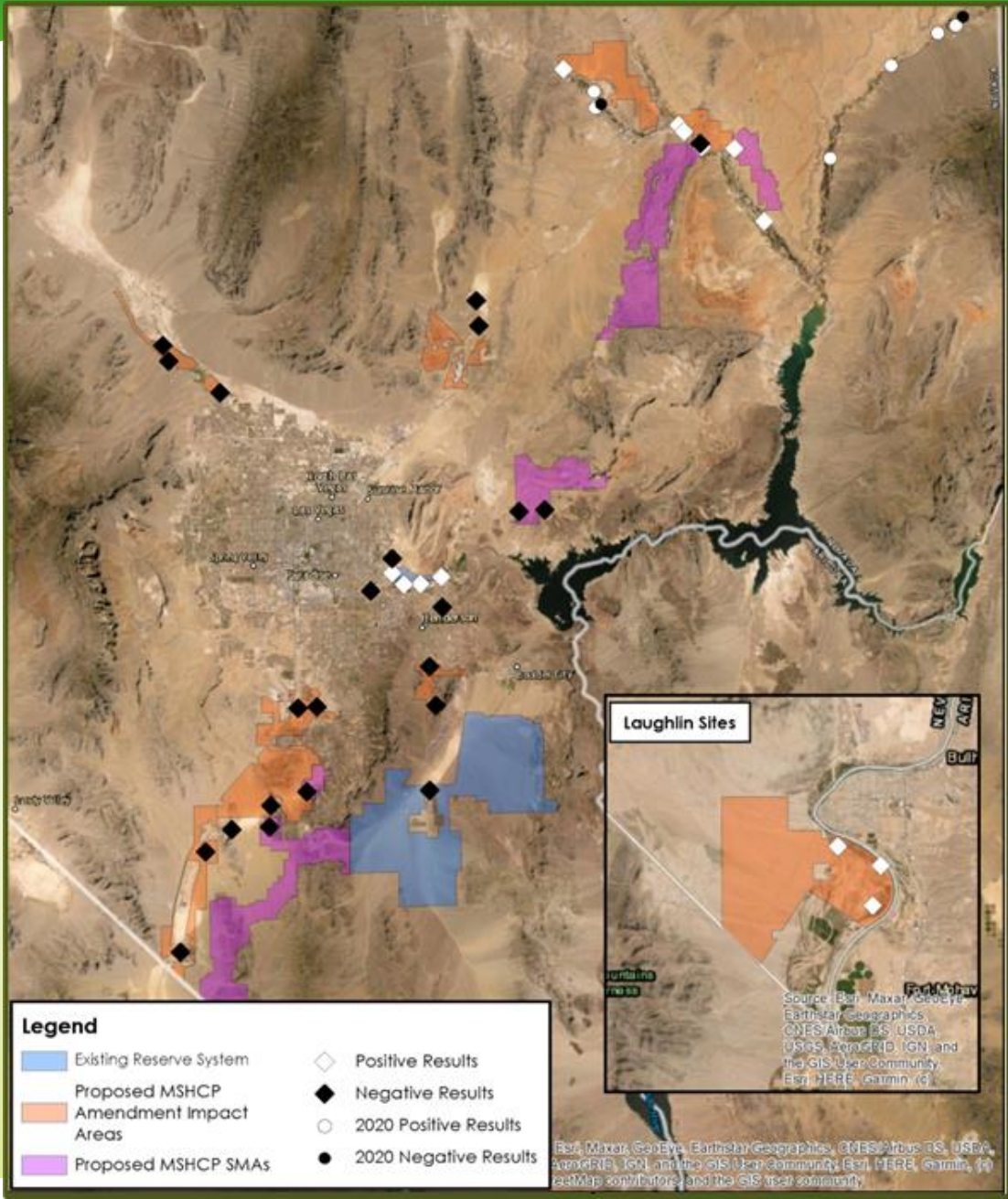
## 2020 Surveys in the Riparian Corridor

- Characterize small mammal community
- Abundant habitat; *C. p.* found throughout

## 2021 County-wide *C. p.* Surveys

- Distribution across County (potential habitat)
- Occupancy in potential development & conservation areas
- Occupancy in habitat modelled as highly suitable





# Introduction



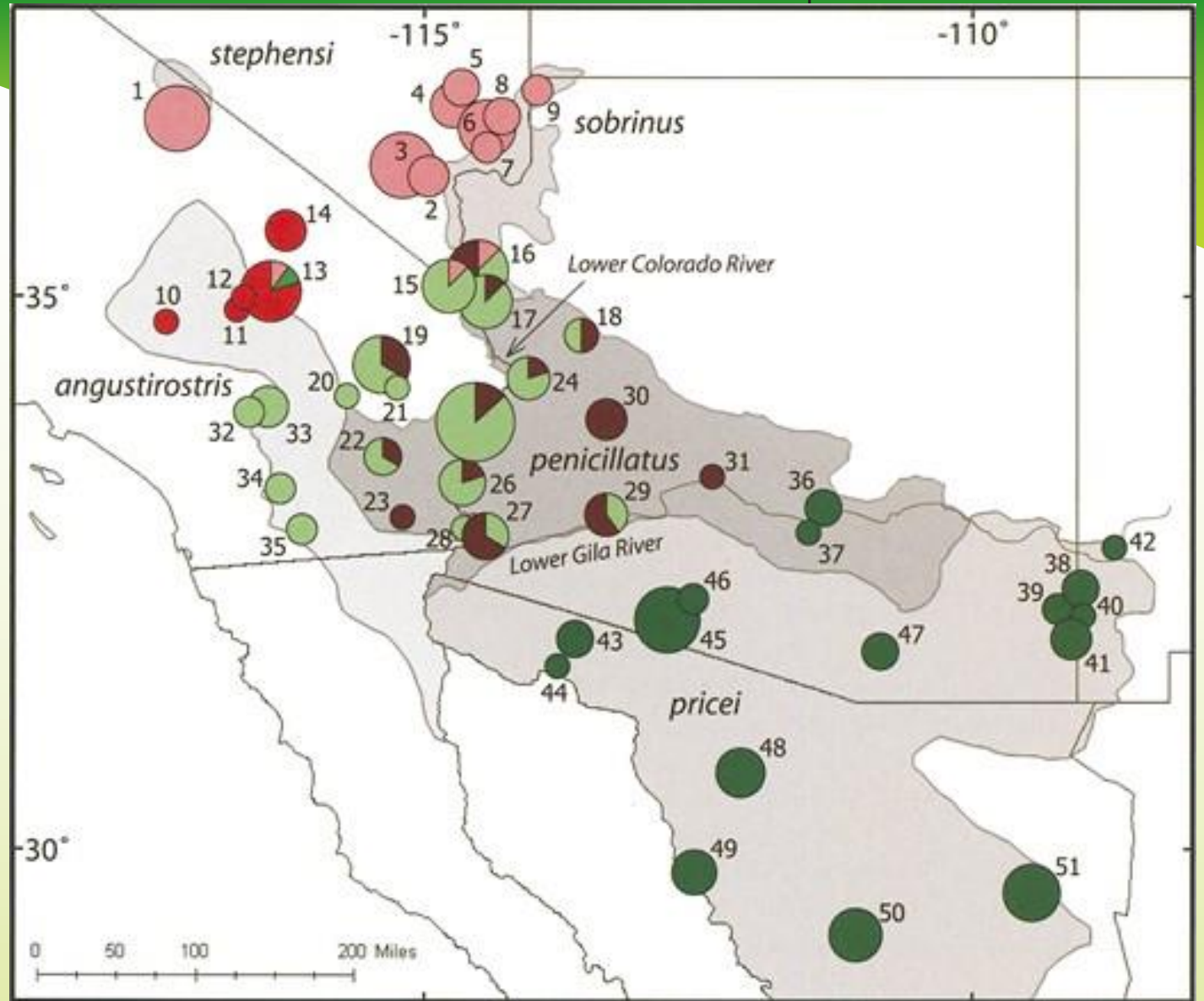
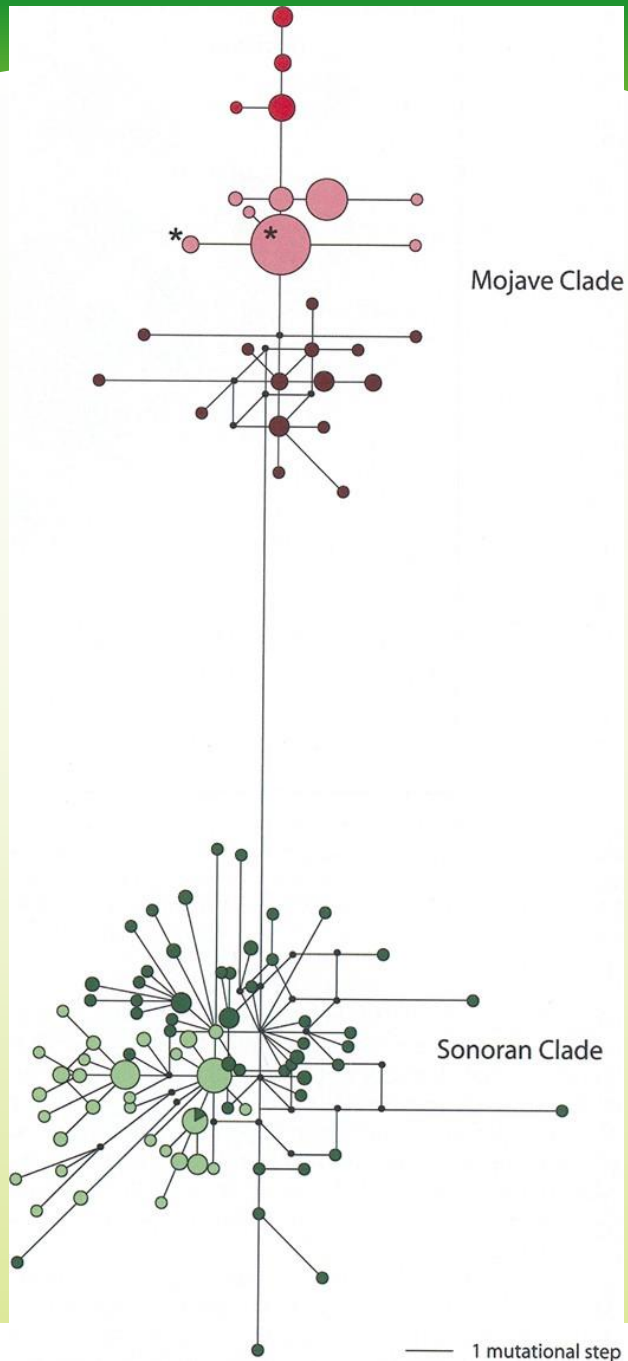
**Mammals of Nevada (1974)  
Hall** “as least as far south as  
Searchlight”

sobrinus distribution in Clark County ?

**Mammals of Arizona (1987)  
Hoffmeister** “as far south as  
near Davis”

Morphological data has led to several observations!

mtDNA  
adds some  
more  
complexity



Jezkova et al. 2009

# GOAL: Provide information on genetic structure and landscape connectivity

1. Document genetic diversity of *C. penicillatus* populations
2. Delineate the range of the subspecies, with particular focus on determining the extent of *C. p. sobrinus* range.
3. Estimate current and past effective population sizes.
4. Determine direction and extent of gene flow between populations.
5. Begin identification of potential threats to long-term viability of the *C. p. sobrinus* subspecies warranting further evaluation or management action



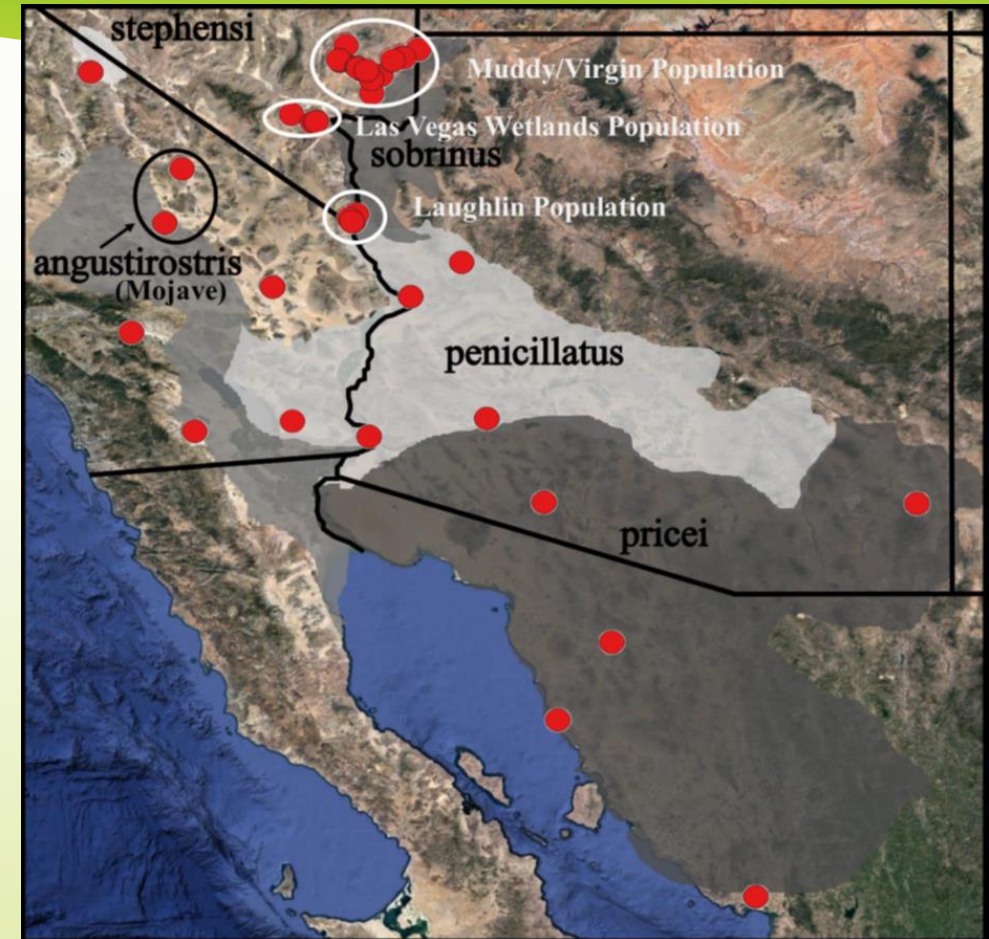
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desert conservation  
PROGRAM

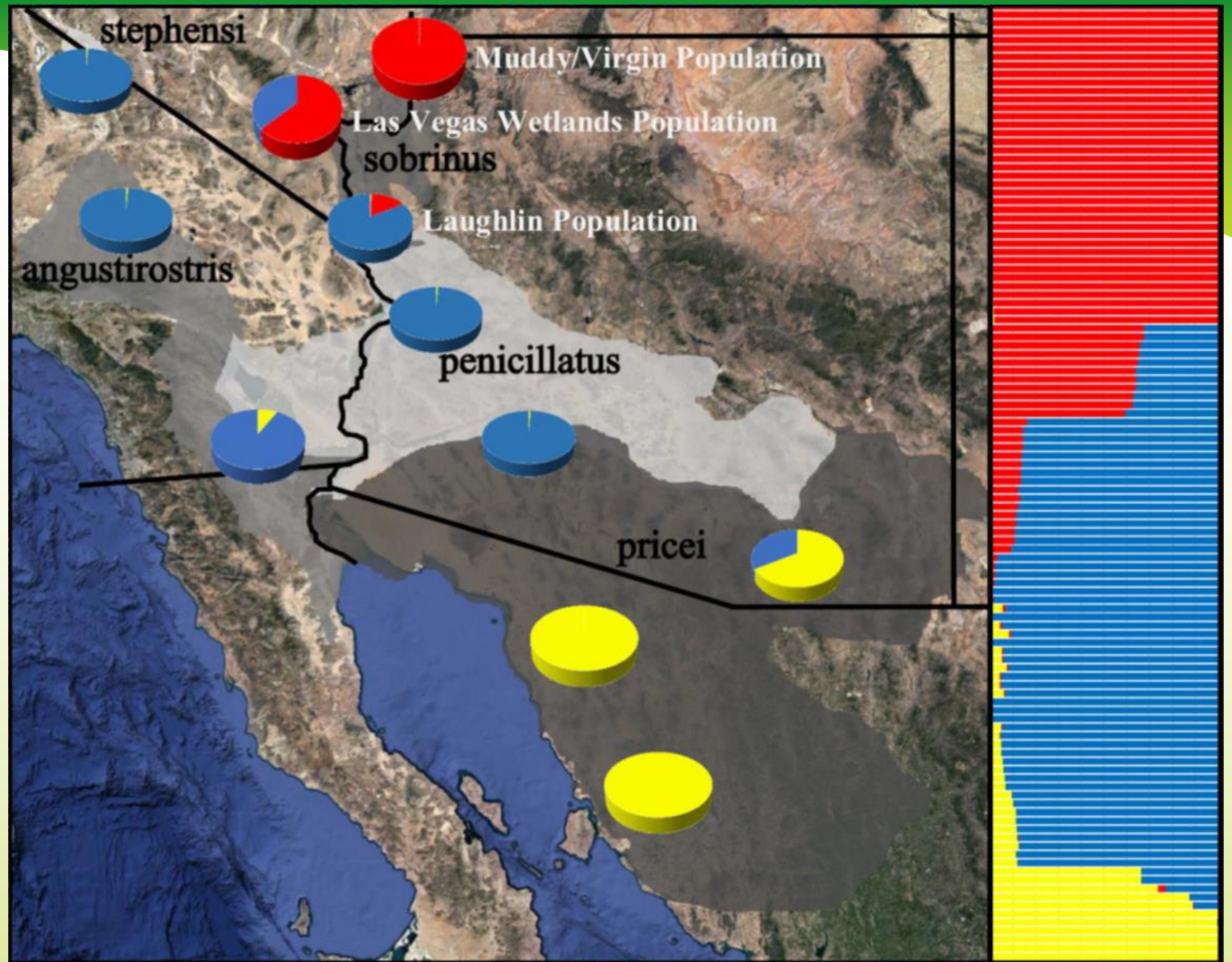
# Methods

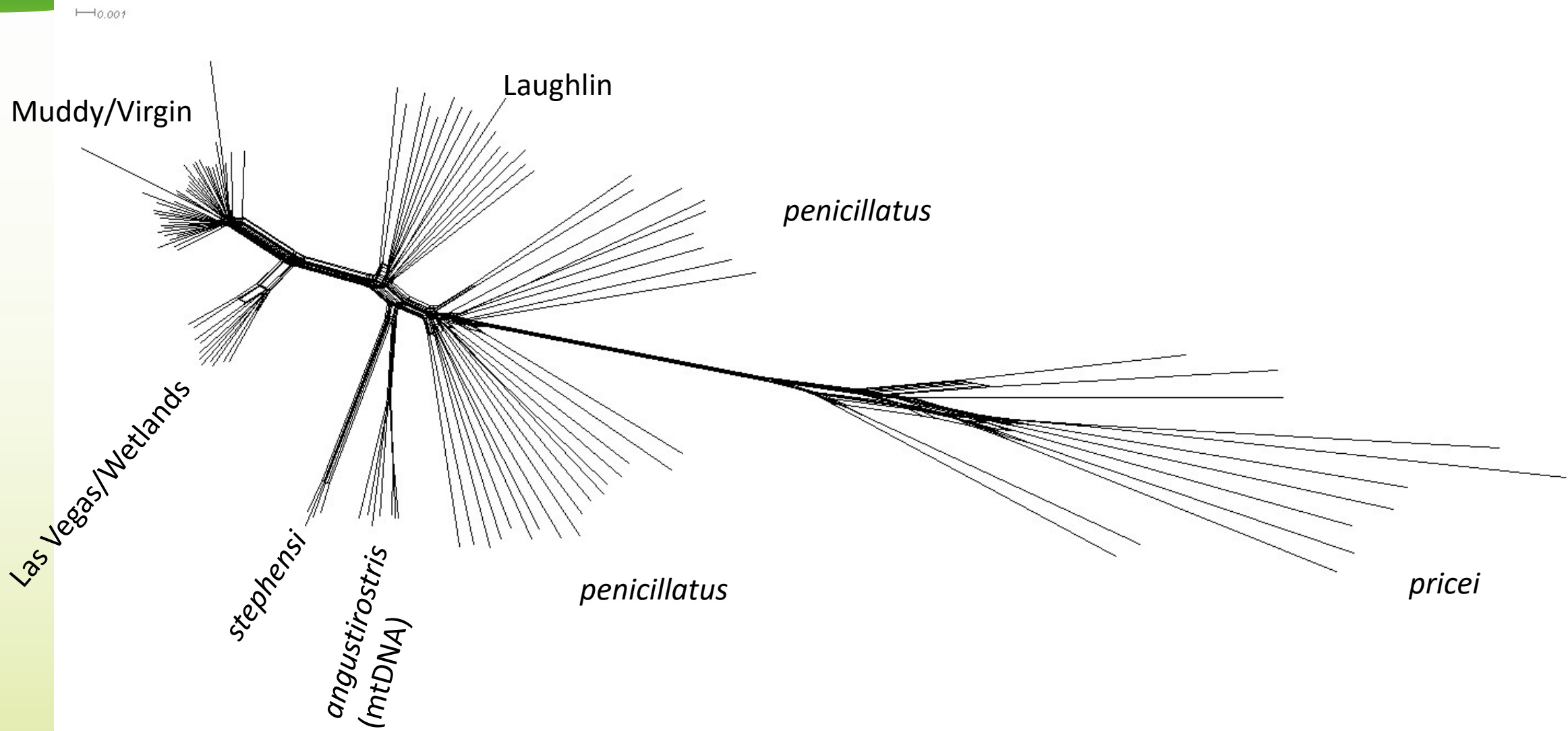
- ddRAD seq – 114 specimens
- Bioinformatic pipeline (Stacks software)
- K (Structure 2.3.4)
- Fu's F and Tajima's D (Arlequin 3.5.2.2)
- Phylogenetic Network (Splitstree)
- Historical Ne (SNeP v1.11)

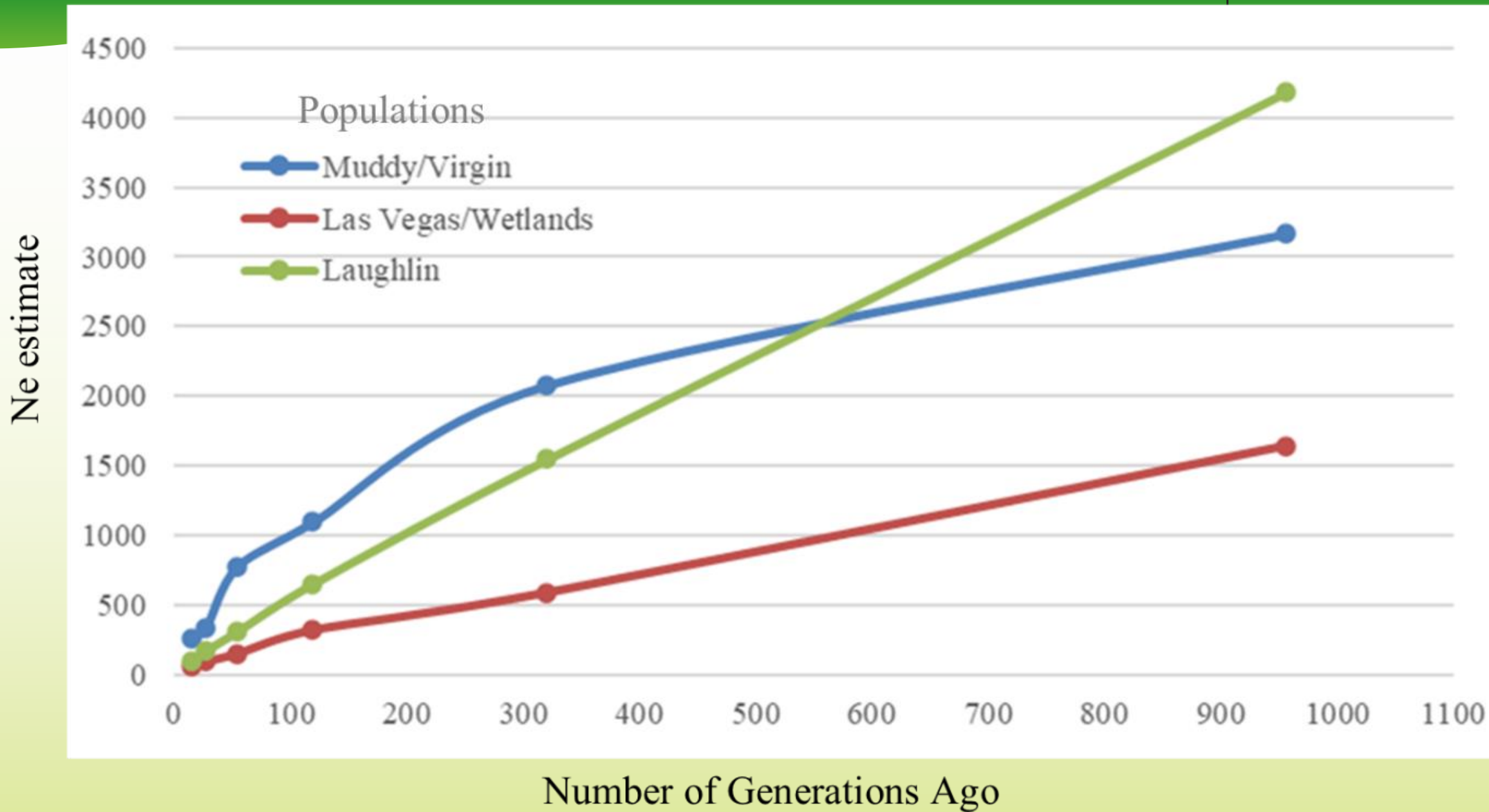




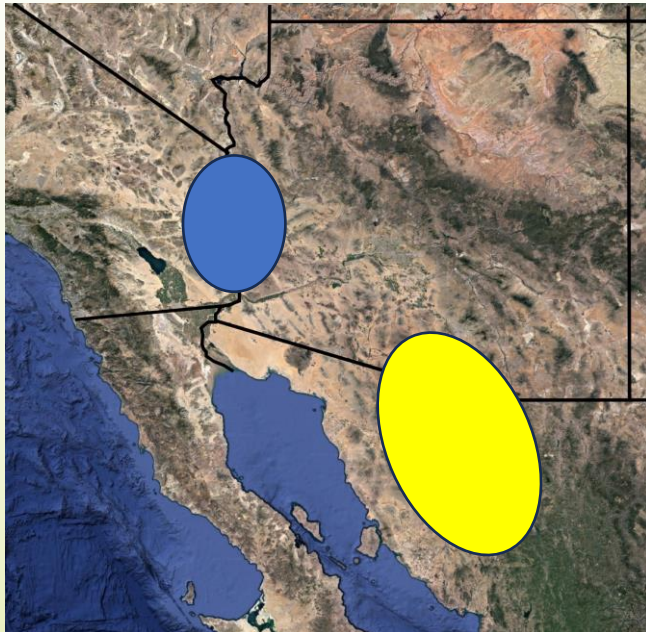
# Results



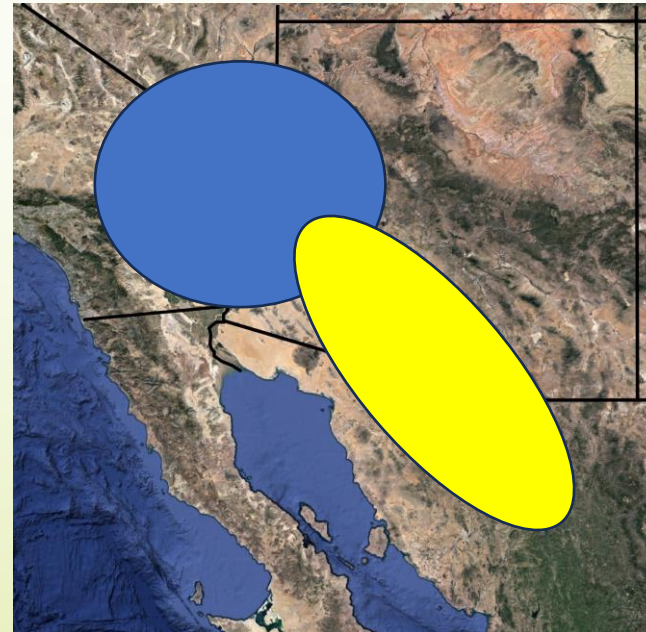




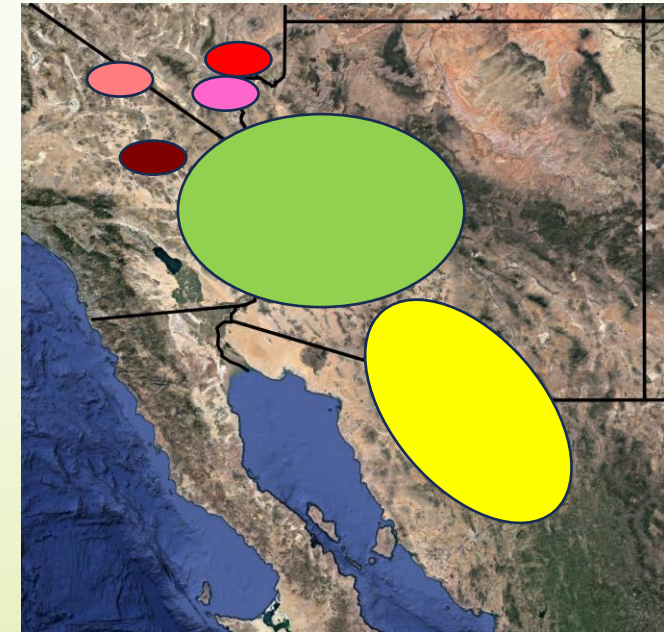
# Phylogeographic model for *C. penicillatus*



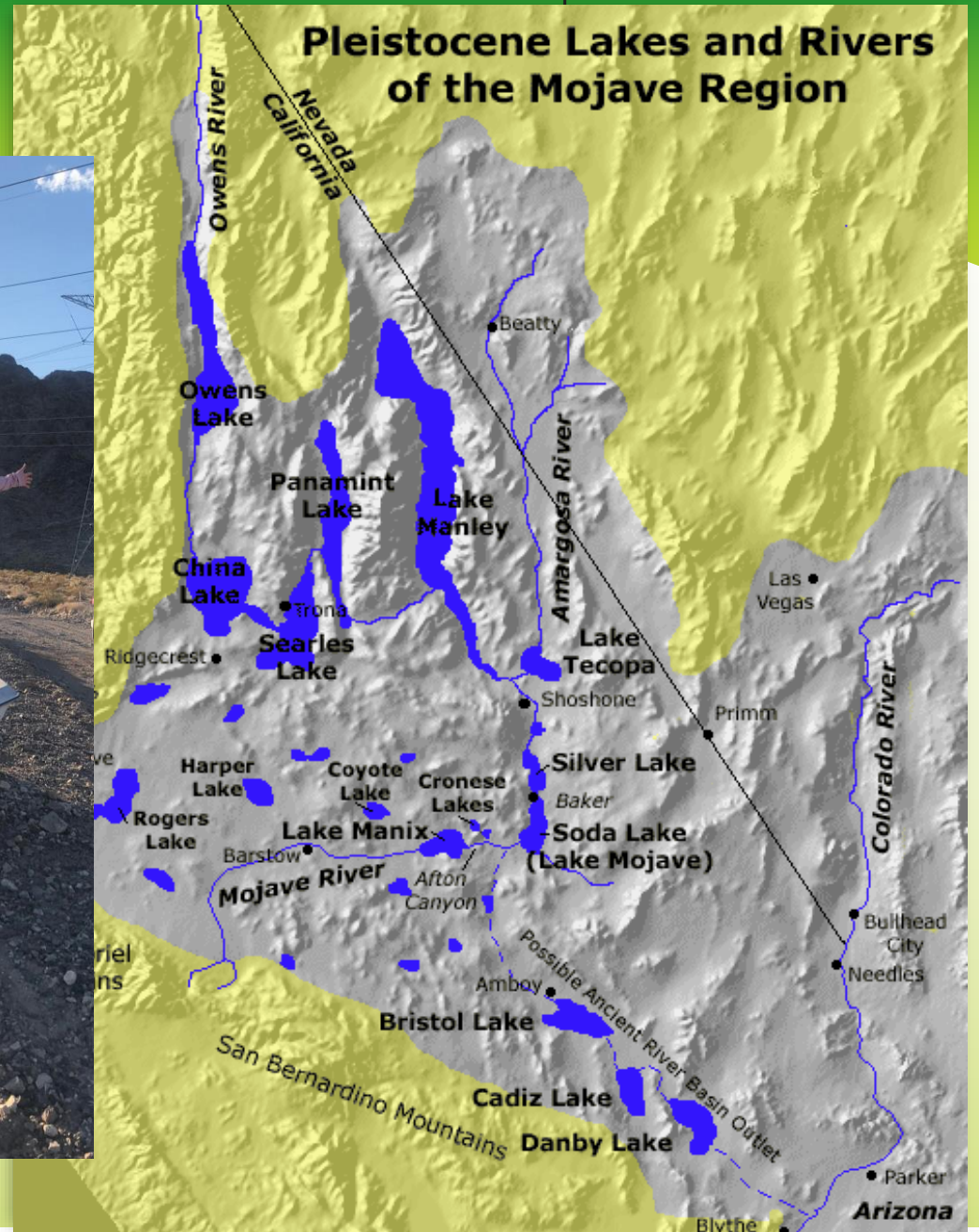
Pleistocene (0.5mya) –  
refugial populations “Mojave”  
and “Sonoran”



18 – 6 kya – Post LGM  
expansion



6k – present aridification and  
contraction with isolation in  
North



# What does it all mean for conservation??

- *C. p. sobrinus* distribution in Clark County
  - = 2 distinct (and very likely isolated) peripheral populations
- Effective Population sizes
  - within general guidelines for conservation
- Take home
  - Treat these as two separate units for conservation
  - Focus efforts on maximizing conditions in these areas



# Where do we go from here?



## Refine Habitat Preferences/Requirements and Population Dynamics

- Baseline population demographic data
  - Survival and Population Size
- Further define habitat requirements
  - Refine Habitat suitability models as appropriate
  - Inform development of habitat restoration plans/techniques
- Establish baseline for long term monitoring



## Evaluate Threats and Refine Conservation Approach

- Assess connectivity opportunities (Muddy/Virgin River Population)

# Where do we go from here?

## Evaluate Physiological Tolerances and Resilience to Climate Change

- Climate change and increased water use threaten habitat
- Increase stress on peripherally isolated populations
- Can populations tolerate or adapt to changing conditions? can't disperse
  - Lab-based studies
  - Additional analysis of genomic data

