Provisional Climate-Based Seed Transfer Guidelines for California

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Forest Seed Policy of U. S. Department of Agriculture

1. To use only seed of known locality of origin and nursery stock grown from such seed.

2. To require from the vendor adequate evidence verifying place and year of origin for all lots of seed or nursery stock purchased, such as bills of lading, receipts for payments to collectors, or other evidence indicating that the seed or stock offered is of the source represented. When purchases are made from farmers or other collectors known to operate only locally, a statement capable of verification will be required as needed for proof of origin.

3. To require an accurate record of the origin of all lots of seed and nursery stock used in forest, shelterbelt, and erosion-control planting, such records to include the following minimum standard requirements to be furnished with each shipment:

(1) Lot number.
(2) Year of seed crop.
(3) Species.
(4) Seed origin:
    State
    County
    Locality
    Range of elevation
(5) Proof of origin.

1939

4. To use local seed from natural stands whenever available unless it has been demonstrated that seed from another specific source produces desirable plants for the locality and uses involved. `Local seed means seed from an area subject to similar climatic influences and may usually be considered as that collected within 100 miles of the planting site and differing from it in elevation by less than 1,000 feet.

5. When local seed is not available, to use seed from a region having as nearly as possible the same length of growing season, the same mean temperature of the growing season, the same frequencies of summer droughts, with other similar environment so far as possible, and the same latitude.

6. To continue experimentation with indigenous and exotic species, races, and clones to determine their possible usefulness, and to delimit as early as practicable climatic zones within which seed or planting stock of species and their strains may be safely used for forest, shelterbelt, and erosion control.

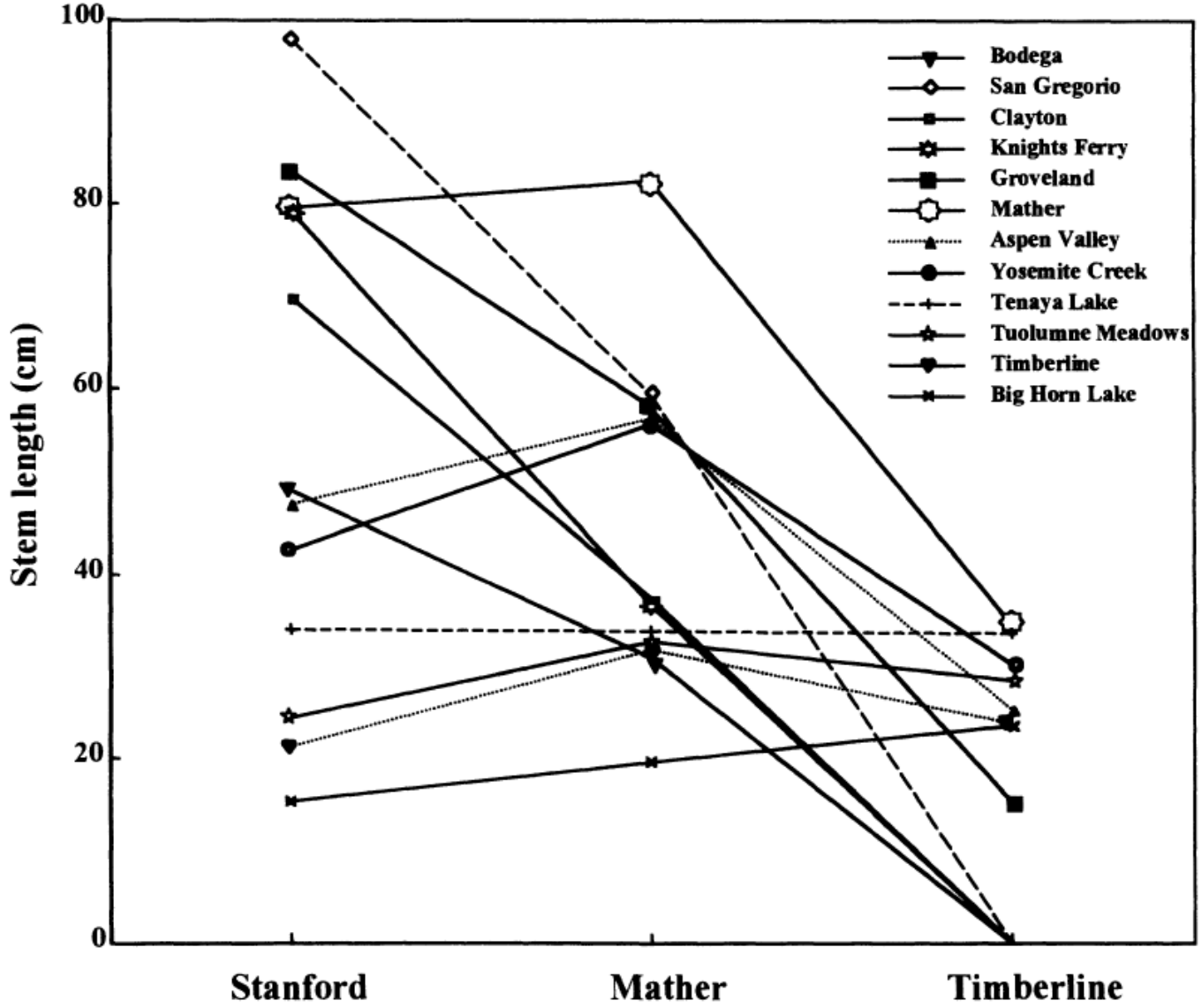


FIGURE 3.

Reaction norms for stem length (the longest stem) of clones of various different populations of *Achillea* (*borealis* and *lanulosa*) at the three transplant stations along a transect from the coast to the Sierra Nevada in Central California (data from Table 19 of Clausen et al. 1948). Some clones did not survive at Timberline.

Clausen, Keck and Heissey

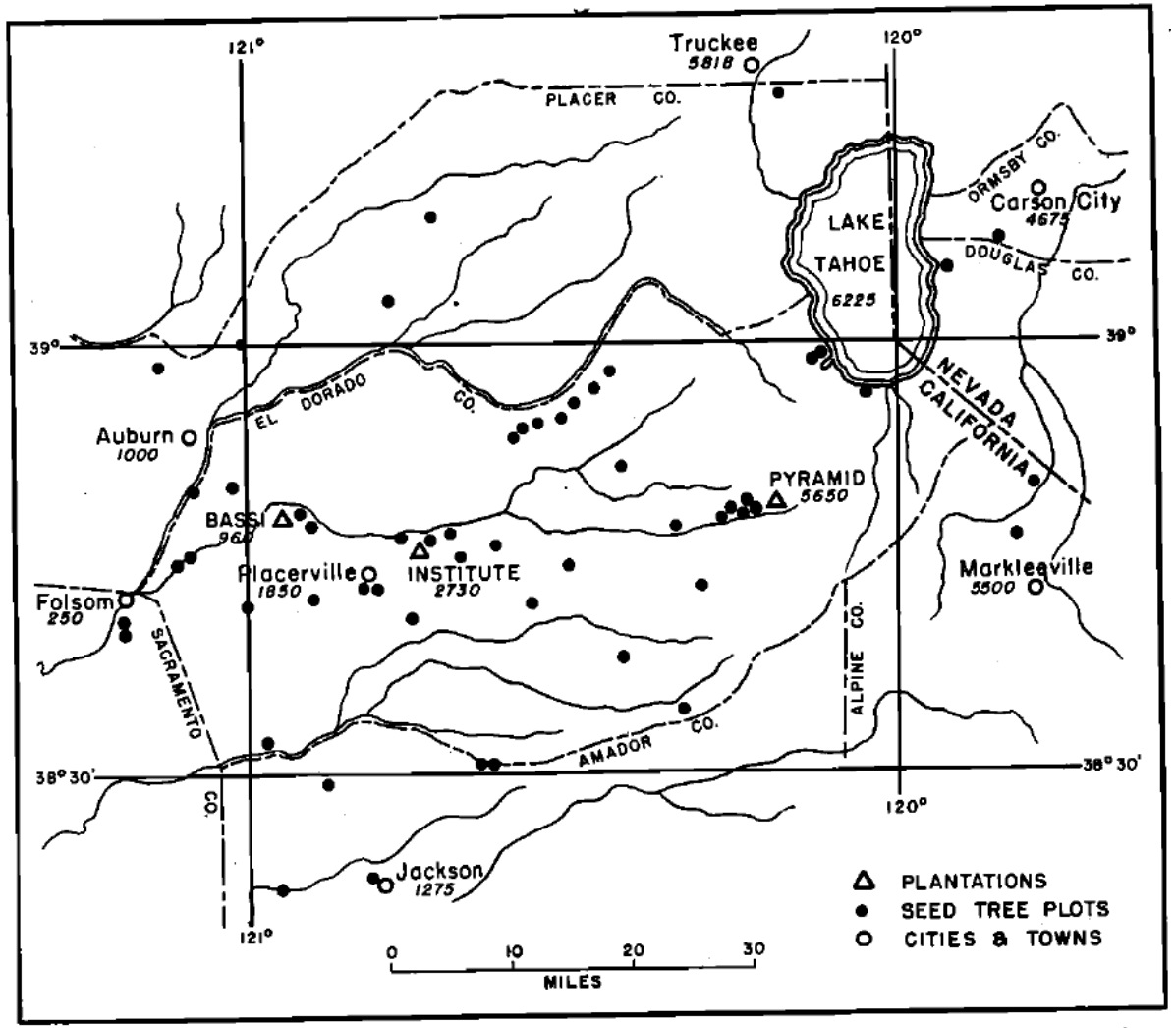
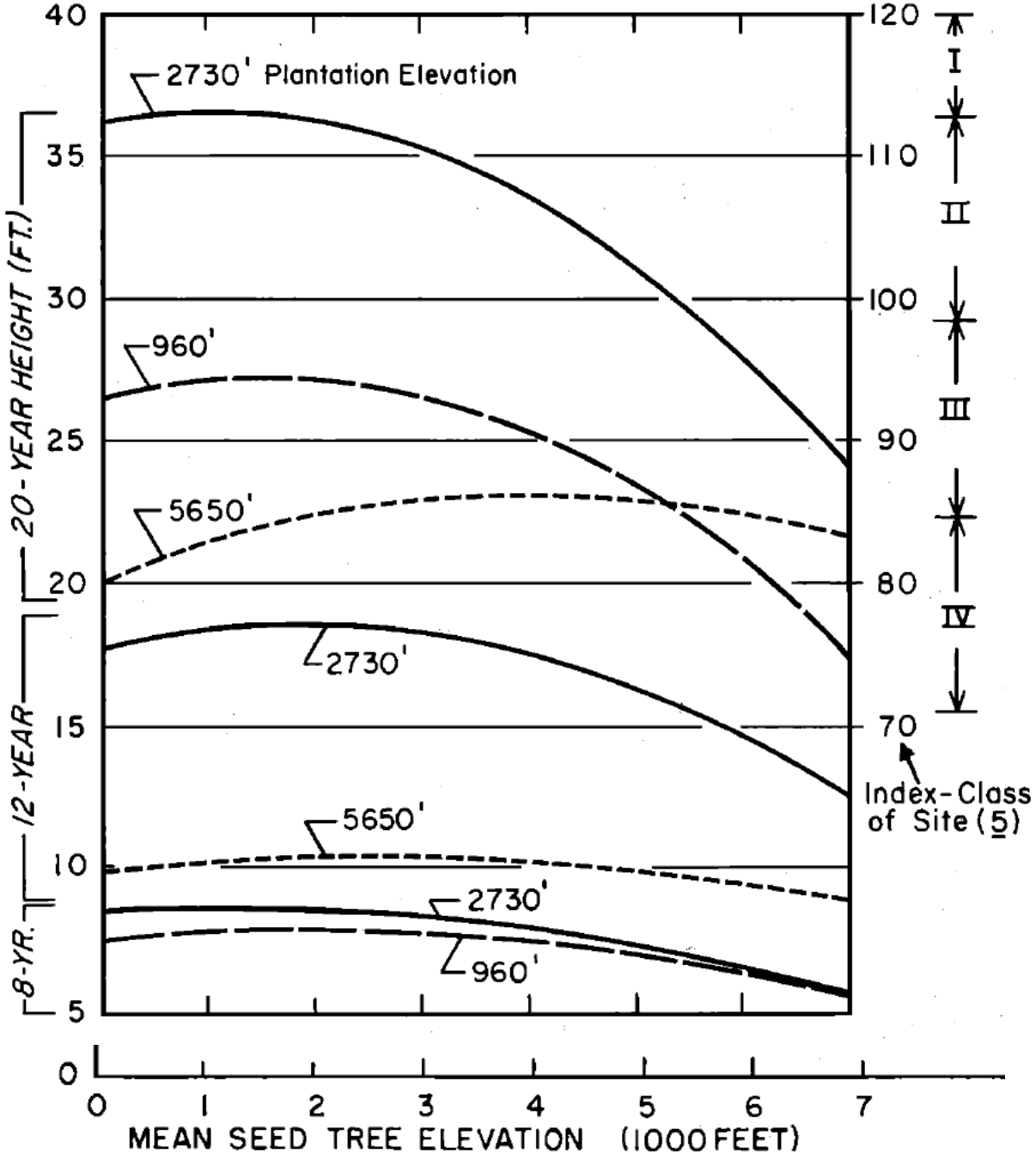


FIG. 1.—Map of El Dorado County, California and adjacent territory, showing distribution of seed tree plots, plantation sites, altitudes, and drainages.



FOREST RESEARCH NOTES

U.S.DEPARTMENT OF AGRICULTURE
FOREST SERVICE
CALIFORNIA FOREST AND RANGE
EXPERIMENT STATION *

STEPHEN N. WYCKOFF, Director

DONATED TO THE BOARD OF TRUSTEES
OF THE INSTITUTE OF FORESTRY
F. I. RIGHTER

No. 51 September 16, 1946

FOREST TREE SEED COLLECTION ZONES IN CALIFORNIA

By

H. A. Fowells, Silviculturist 1/

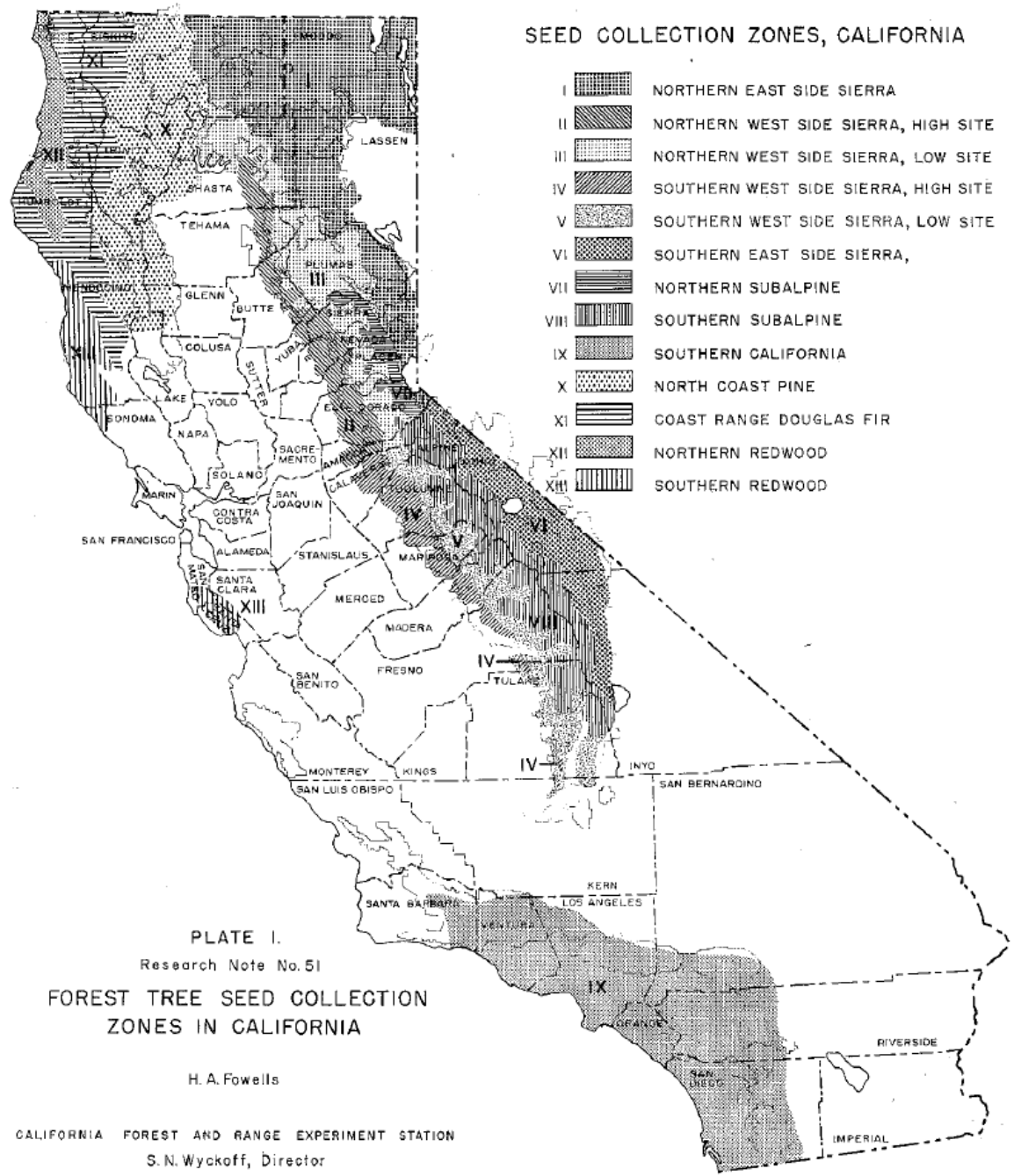


PLATE I.

Research Note No. 51

FOREST TREE SEED COLLECTION ZONES IN CALIFORNIA

H. A. Fowells

CALIFORNIA FOREST AND RANGE EXPERIMENT STATION
S. N. Wyckoff, Director

FOREST SERVICE - U. S. DEPARTMENT OF AGRICULTURE

Schubert 16.H.
UNPUBLISHED REPORT
1966

1615 Continental Street
Redding, California 96001

4000 (4100)
February 9, 1966

LOCAL TREE SEED COLLECTION ZONES FOR CALIFORNIA

By

Gilbert H. Schubert[1/]

Frequently the variation within these broad zones is greater than the variation between two adjacent zones. Even so, nursery studies have indicated consistent differences in the performance of planting stock from several seed zones grown at the Federal and State nurseries

This variation is presently being masked by the practice of lumping all the seed collected within each zone which in extreme instances may involve seed collected over a range of 200 to 250 miles and elevations of 2,000 to 3,000 feet.

A partial solution to the seed origin dilemma

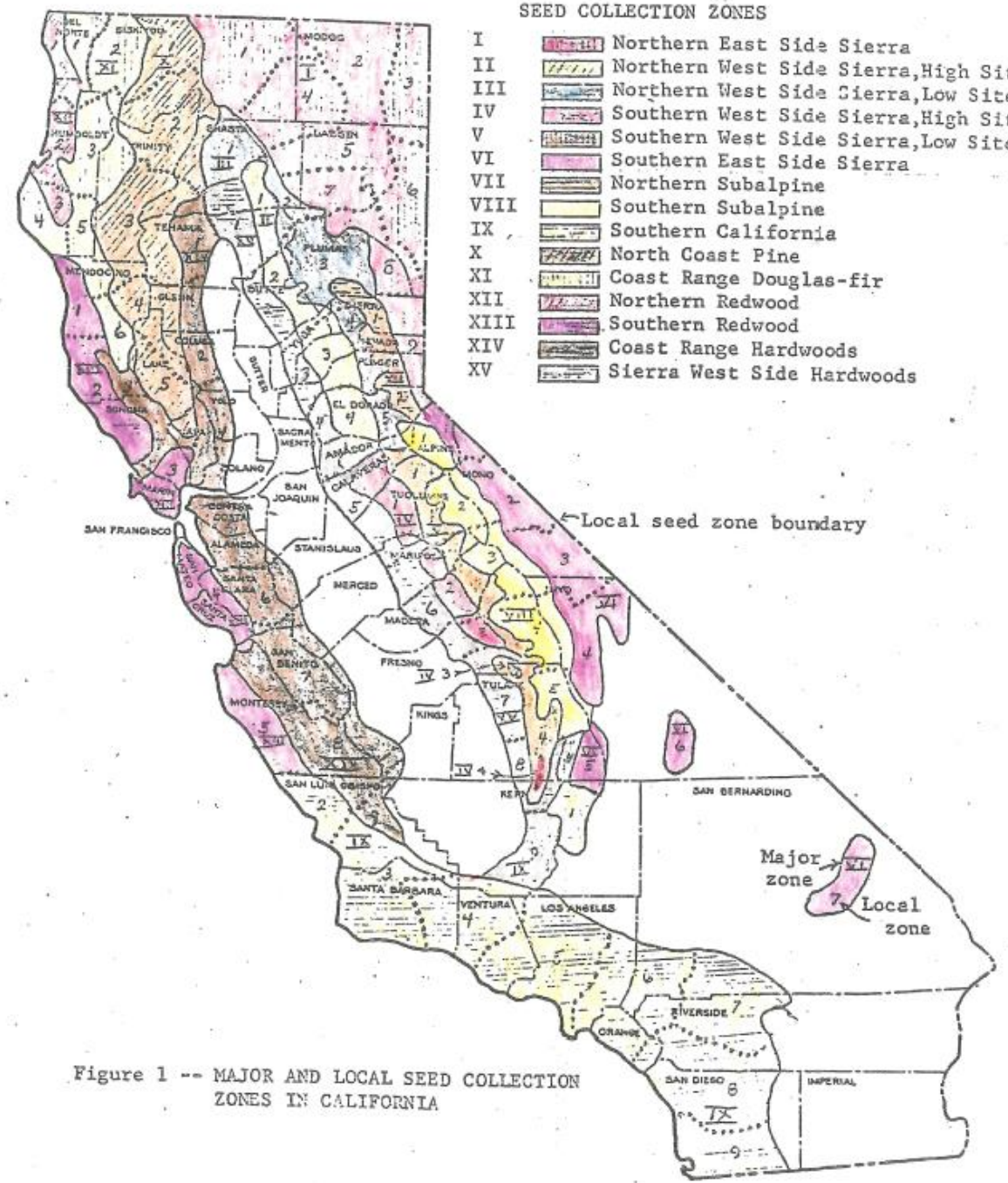
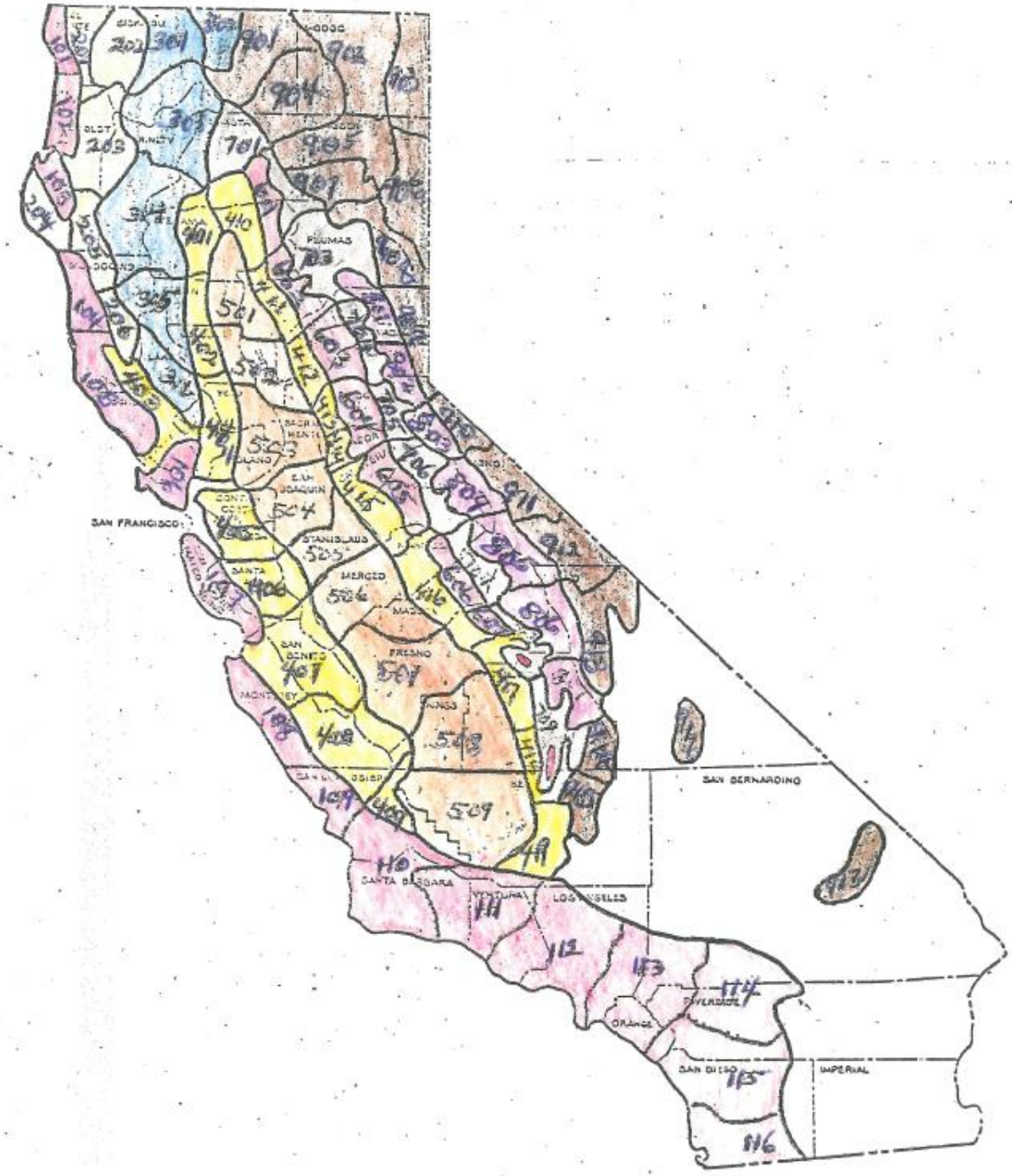


Figure 1 -- MAJOR AND LOCAL SEED COLLECTION ZONES IN CALIFORNIA


SAN FRANCISCO
SAN BERNARDINO
SANTA BARBARA
VENTURA
LOS ANGELES
ORANGE
RIVERSIDE
SAN DIEGO
IMPERIAL
FRESNO
MERCED
STANISLAUS
SAN BENITO
MONTEREY
KINGS
PLUMAS
SUTTER
YUBA
YOLO
SOLANO
NAPA
LAKE
MENDOCINO
HUMBOLDT
DEL NORTE
SISKIYOU
MODOC
LASSEN
SHASTA
TRINITY
TEHAMA
GLENN
COLUSA
PLACER
EL DORADO
AMADOR
CALAVERAS
TUOLUMNE
MARIPOSA
MADERA
INYO
MONO
ALPINE
SAN JOAQUIN
CONTRA COSTA
ALAMEDA
SAN MATEO
SANTA CRUZ
SAN LUIS OBISPO

CALIFORNIA TREE SEED ZONES

by

John M. Buck, Ronald S. Adams, Jerrold Cone,
M. Thompson Conkle, William J. Libby, Cecil J. Eden,
and Michael J. Knight

California forest tree seed zones were established originally by Fowells (1946), with revisions proposed by Roy (1963) and Schubert (1966). The Forest Tree Seed Committee[1/] of the Northern California Section, Society of American Foresters, has revised the original zones and updated the recording system described in the earlier reports. Fowells' (1946) Research Note should be reviewed for background material. Portions of Schubert's (1966) proposals were incorporated in the new system.

Seed collection zones are limited to about 50 miles in latitude. Where possible, boundaries have been chosen to follow natural features, such as crests of mountain ranges, ridgetops, and rivers, or physical features, such as highways, canals, and railroads.

Zone number = XYZ
Physiographic and climatic region = X
Physiographic and climatic subregion = Y
Zone = Z

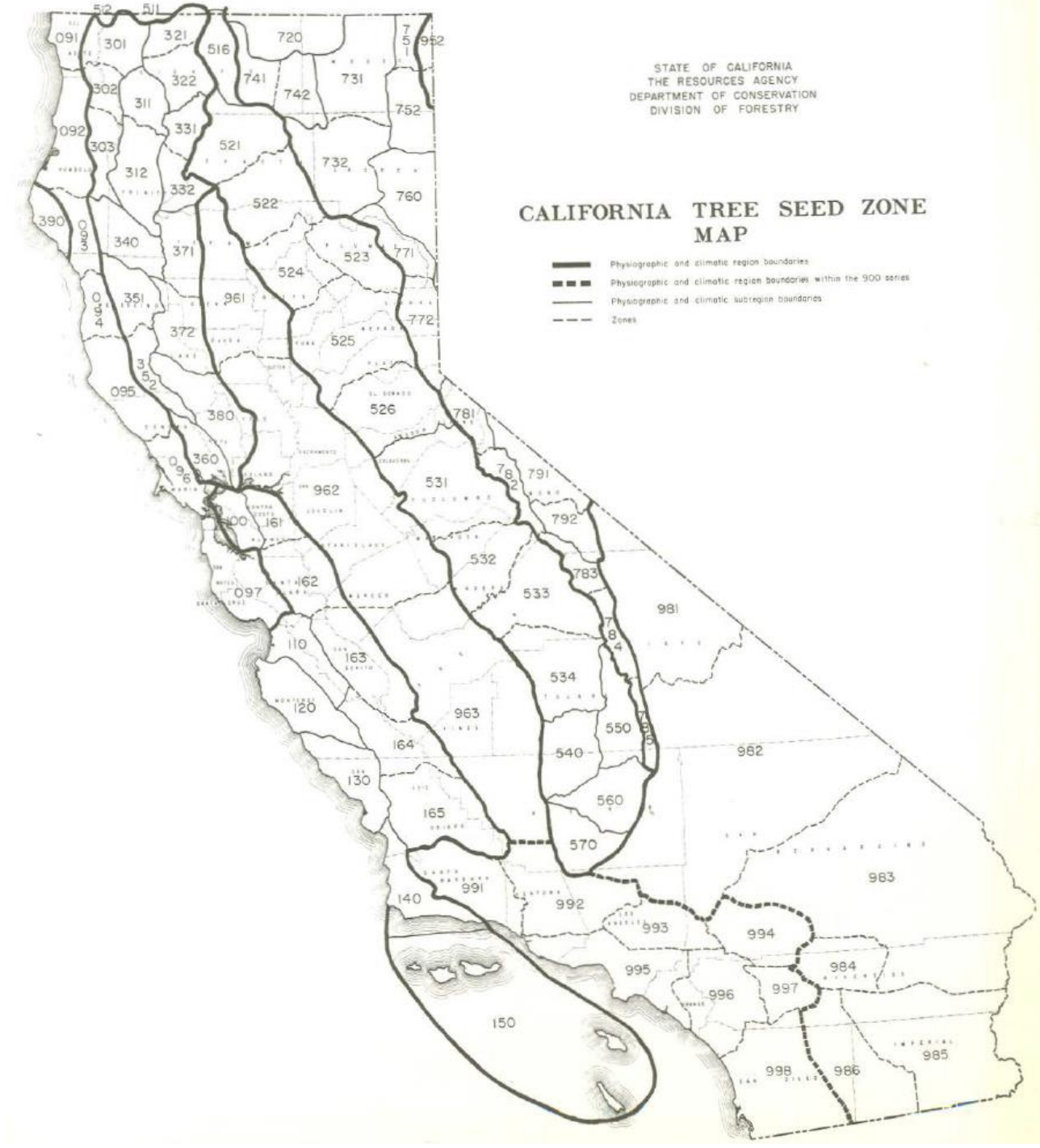
If the zone number (Z) is zero (0), the zone is unique, and is considered a subregion. If the zone number is from one through nine, the zone is an arbitrary breakdown of the subregion to keep zones about 50 miles long in latitude. Examples of this designation are:

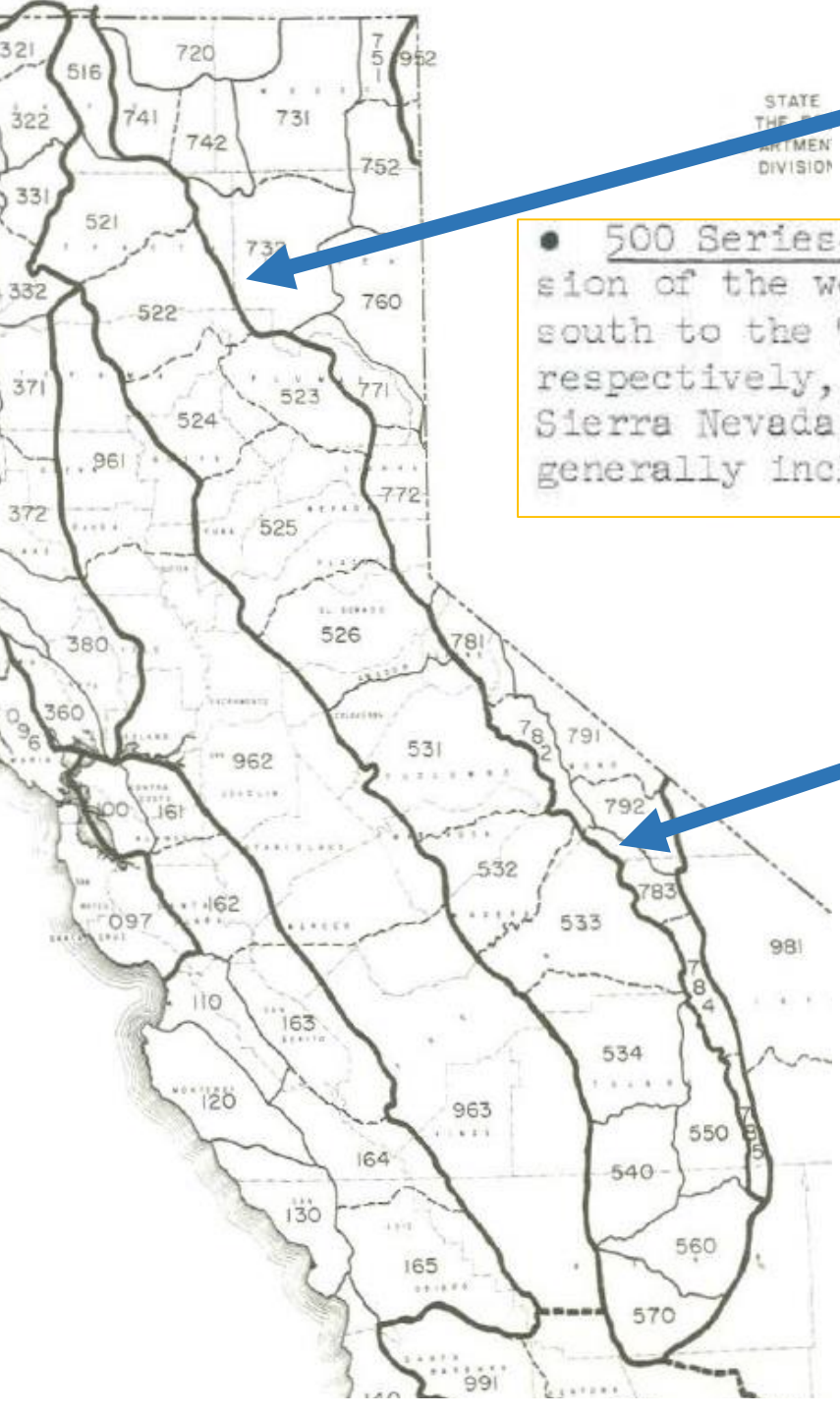
A. Zone 390.--3YZ represents the 300 Series, or North Coast Interior physiographic and climatic region. 39Z represents one of the 10 subregions of this region. 390 is an unique zone. It is, in effect, a subregion, since there are no other 39Z zones.

B. Zone 525.--5YZ represents the 500 Series, or West Slope Cascades-Sierra physiographic and climatic region. 52Z represents one of the seven subregions of this region. 525 is a zone, an arbitrary unit of the subregion. Other zones in the subregion are 521, 522, 523, 524, and 526.

STATE OF CALIFORNIA
THE RESOURCES AGENCY
DEPARTMENT OF CONSERVATION
DIVISION OF FORESTRY

CALIFORNIA TREE SEED ZONE MAP





• 500 Series--West Slope Cascades-Sierra: This region is an extension of the west slope Cascade mountain region in Oregon and extends south to the Tehachapi Mountains. Its west and east boundaries are, respectively, the Central Valley and the crest of the Cascades and the Sierra Nevada. Fowells' Zones II, III, IV, V, VII, and VIII are generally included in this enlarged region.

Seeds Zones- information not being used

- Climate Variation within zones
- Climate Change
- Species distributions
- Variation among species
- Variation within species

Seedlot Selection Tool

Purpose | Instructions | More Information | People | News & Updates | Report an Issue | Account

About | Tool | Saved Runs

4 Select climate scenarios

Which climate are the seedlots adapted to?

1961 - 1990

When should trees be best adapted to the planting site?

1961 - 1990

5 Select transfer limit method

Custom | Zone

6 Select climate variables

Units: Metric | Imperial

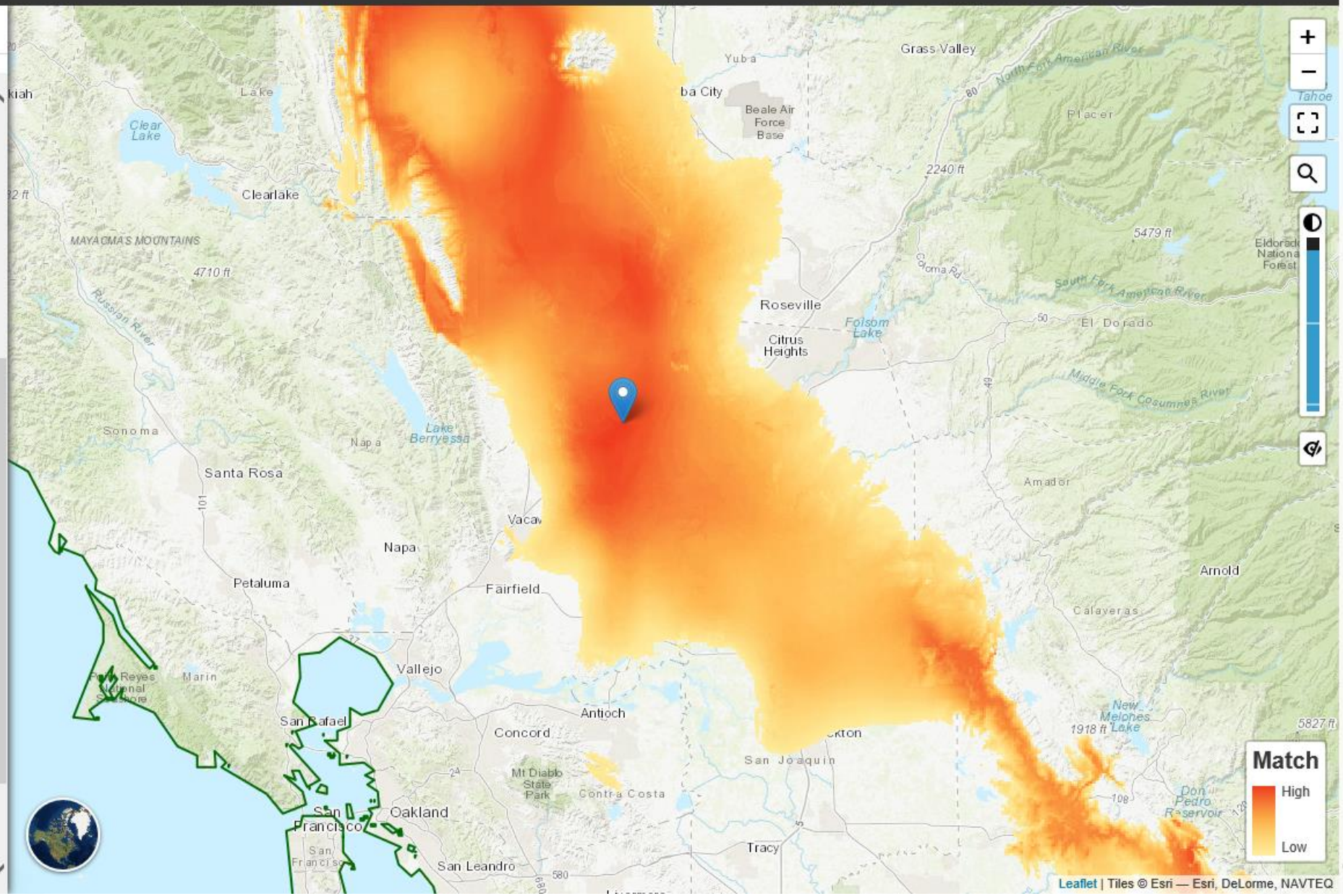
	Name	Center	Transfer limit (+/-)	
⊗	MCMT	7.2 °C	2.00 °C	👁
⊗	MAP	458 mm	100 mm	👁
⊗	CMD	1043 mm	100 mm	👁

Add a variable...

7 Apply constraints

Add a constraint...

8 Map your Results



About | Tool | Saved Runs

Region: Western US

4 Select climate scenarios

Which climate are the seedlots adapted to?

1961 - 1990

When should trees be best adapted to the planting site?

2011 - 2040 | RCP4.5

5 Select transfer limit method

Custom | Zone

6 Select climate variables

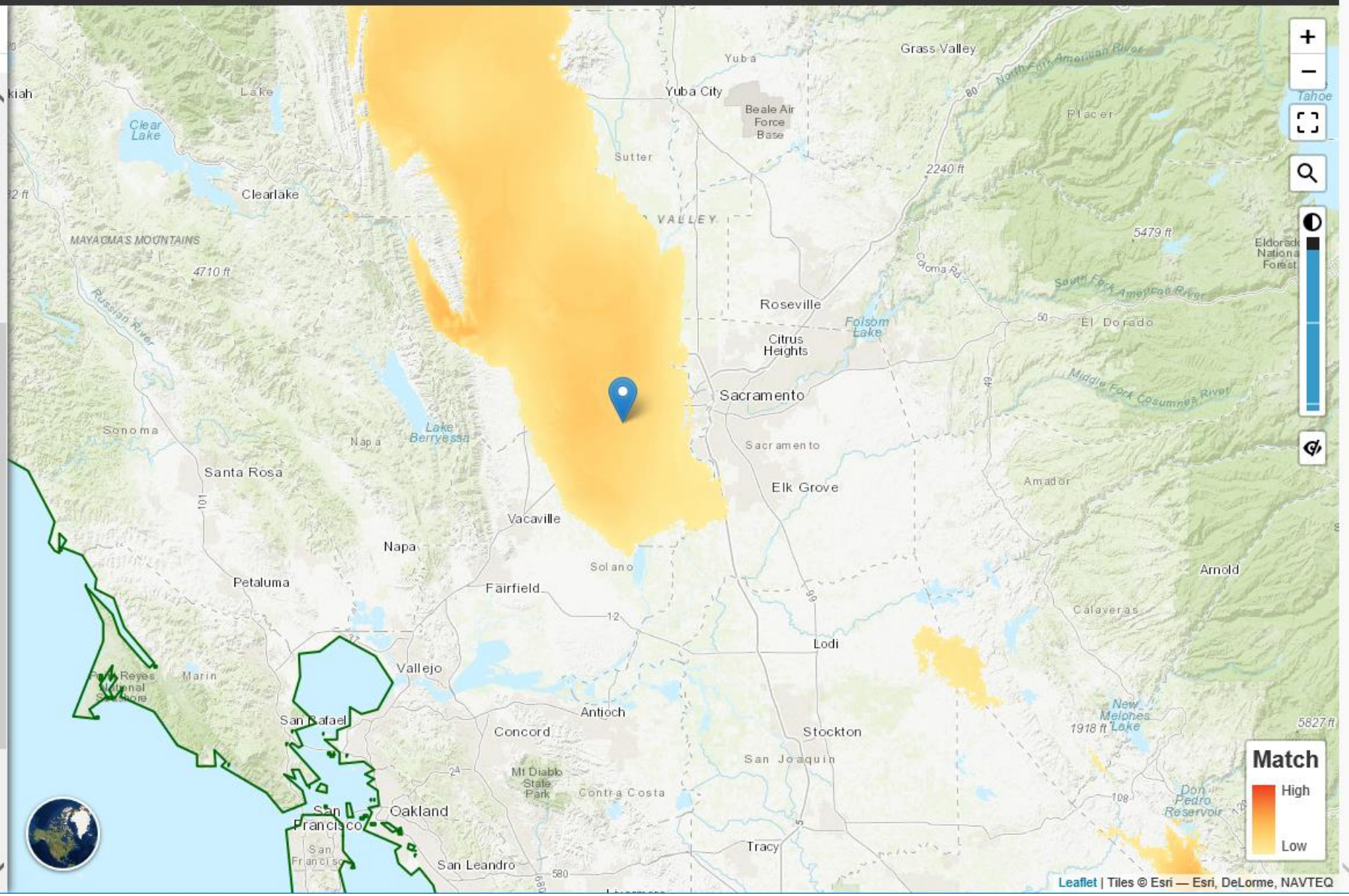
Units: Metric | Imperial

	Name	Center	Transfer limit (+/-)	
⊗	MCMT	8.2 °C	2.00 °C	👁
⊗	MAP	467 mm	100 mm	👁
⊗	CMD	1097 mm	100 mm	👁

Add a variable...

7 Apply constraints

Add a constraint...



4 Select climate scenarios

Which climate are the seedlots adapted to?

1961 - 1990

When should trees be best adapted to the planting site?

2041 - 2070 RCP4.5

5 Select transfer limit method

Custom Zone

6 Select climate variables

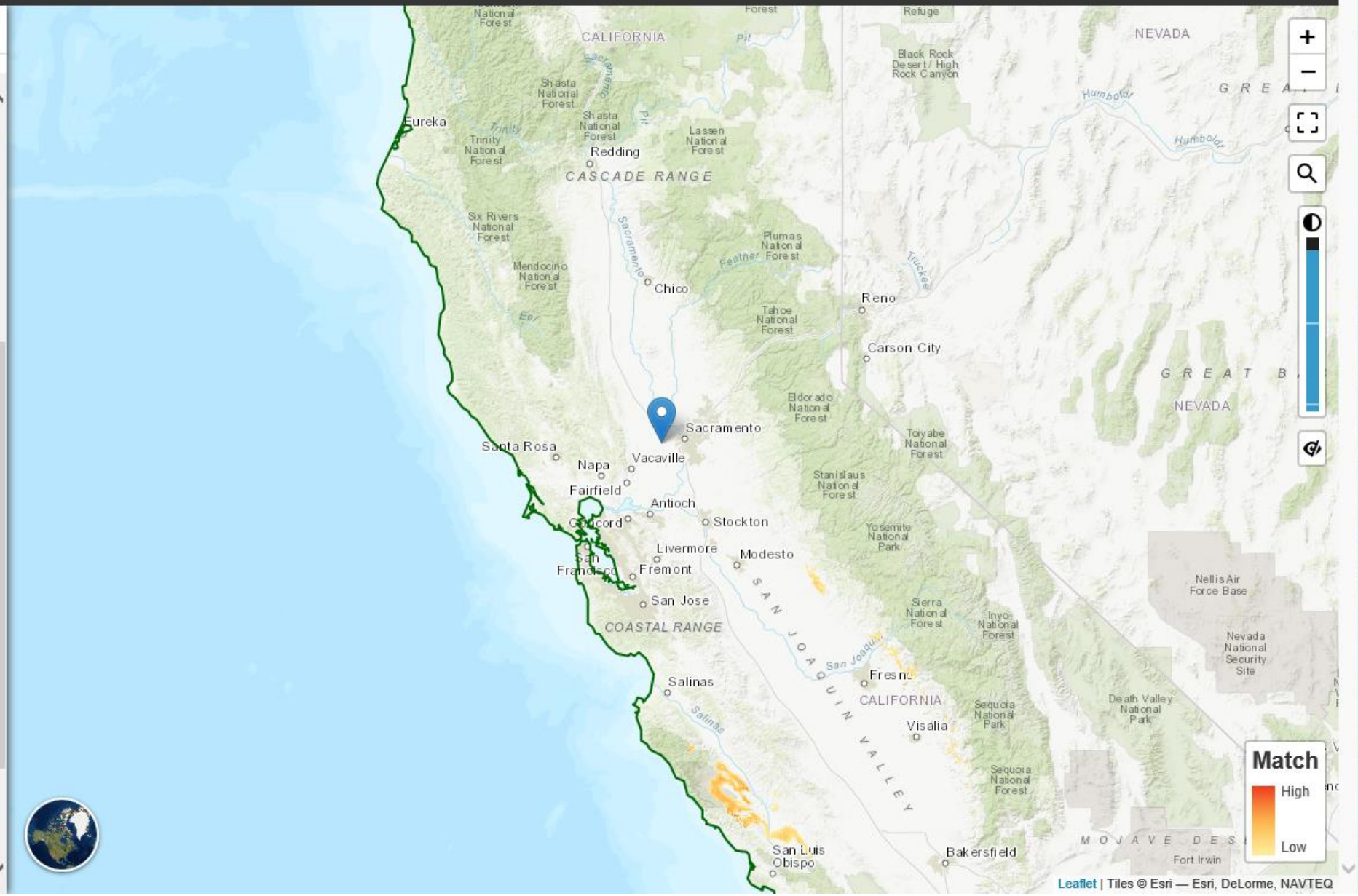
Units: Metric Imperial

	Name	Center	Transfer limit (+/-)	
⊗	**MCMT**	9.0 °C	2.00 °C	👁
⊗	**MAP**	465 mm	100 mm	👁
⊗	**CMD**	1137 mm	100 mm	👁

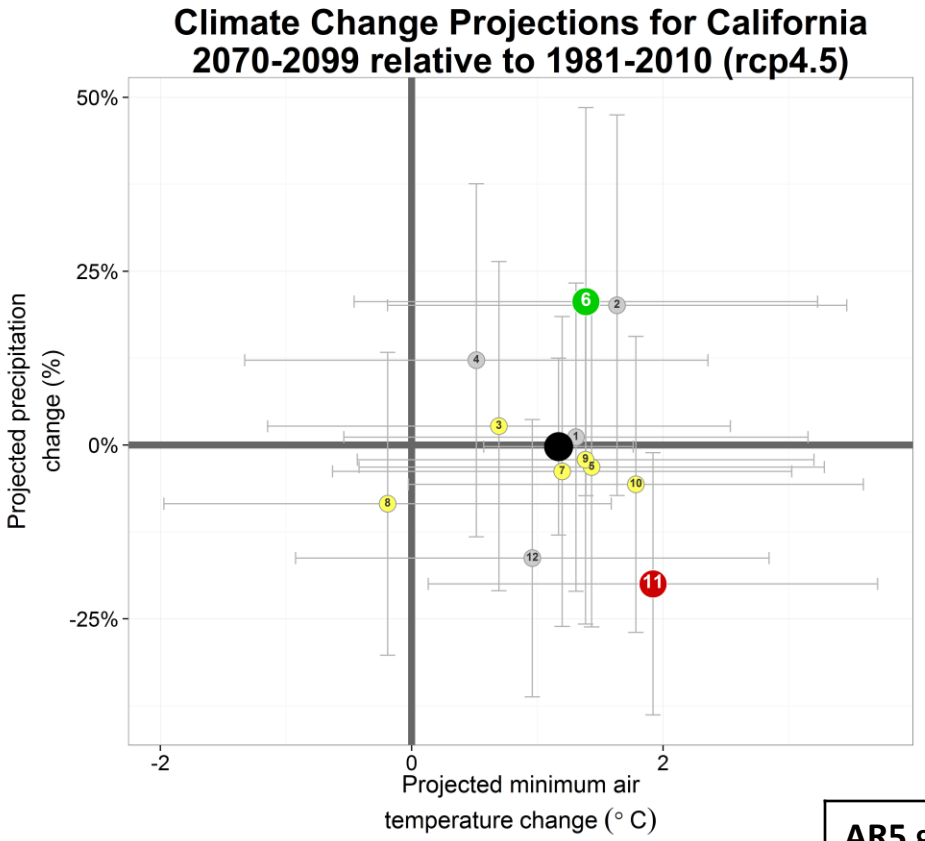
Add a variable...

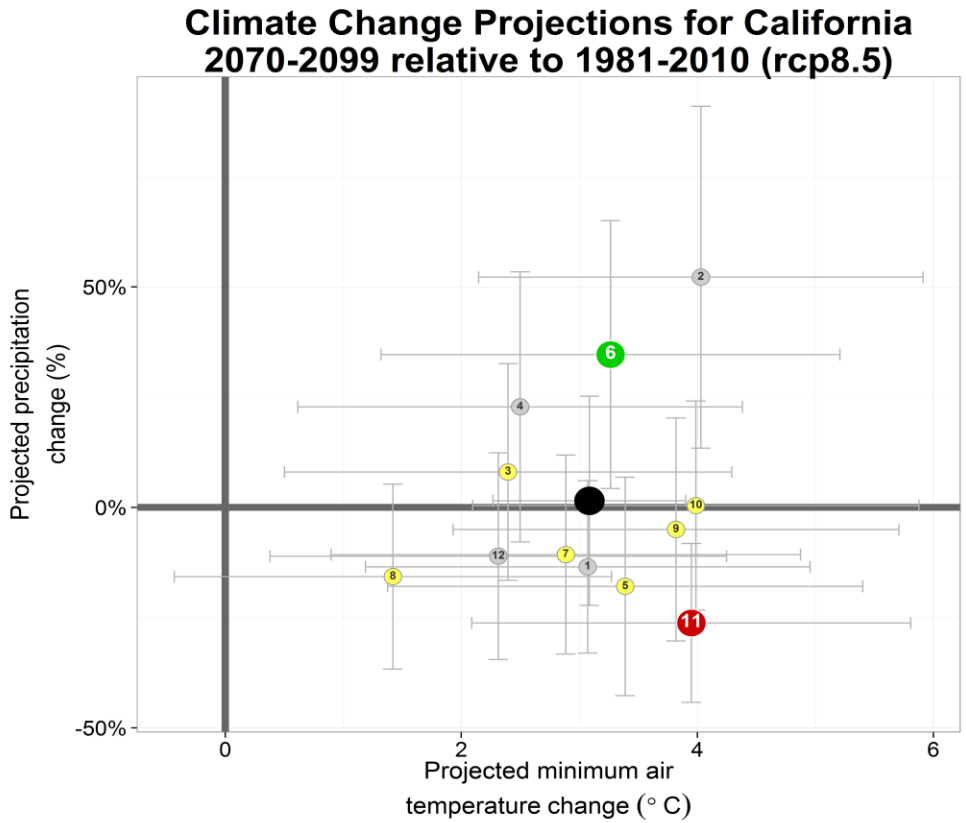
7 Apply constraints

Add a constraint...



Evaluation of data and climate change models





GCM

- 1 = access1_0
- 2 = canesm2
- 3 = ccsm4
- 4 = cesm1_bgc
- 5 = cmcc_cm
- 6 = cnrm_cm5
- 7 = gfdl_cm3
- 8 = gfdl_esm2m
- 9 = hadgem2_cc
- 10 = hadgem2_es
- 11 = miroc_esm
- 12 = miroc5
- = ensemble mean

AR5 global warming increase (°C) projections

Scenario	2046-2065 Mean and *likely* range	2081-2100 Mean and *likely* range
RCP2.6	1.0 (0.4 to 1.6)	1.0 (0.3 to 1.7)
RCP4.5	1.4 (0.9 to 2.0)	1.8 (1.1 to 2.6)
RCP6.0	1.3 (0.8 to 1.8)	2.2 (1.4 to 3.1)
RCP8.5	2.0 (1.4 to 2.6)	3.7 (2.6 to 4.8)

Seeds Zones- information not being used

- Climate Variation within zones
- Climate Change
- **Species distributions**
- **Variation among species**
- Variation within species

2. Analysis of Vegetation Climate Exposure

2015 Vegetation Map

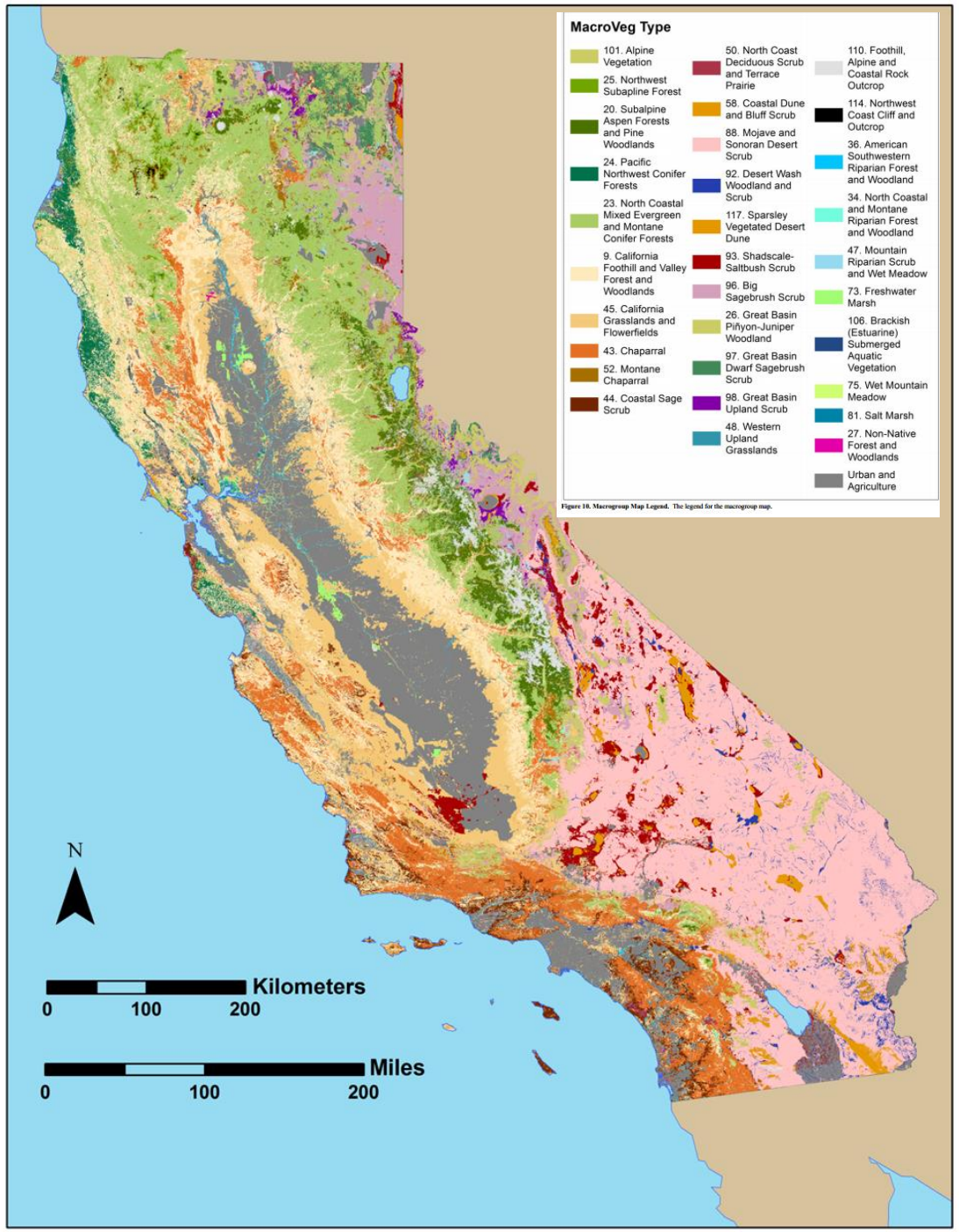
+

Maps of Climate Change

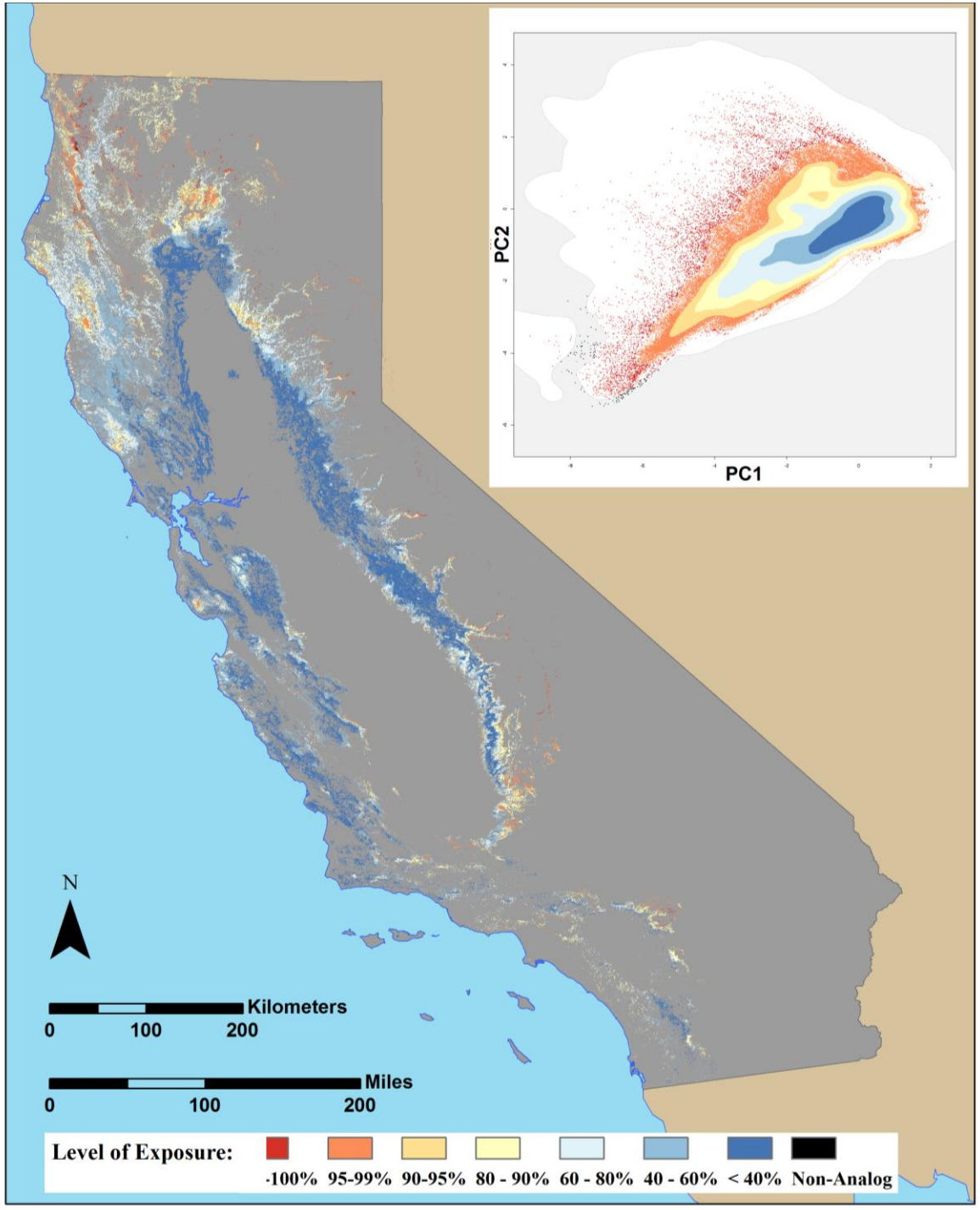
Combine the most recent vegetation map of California with climate data.

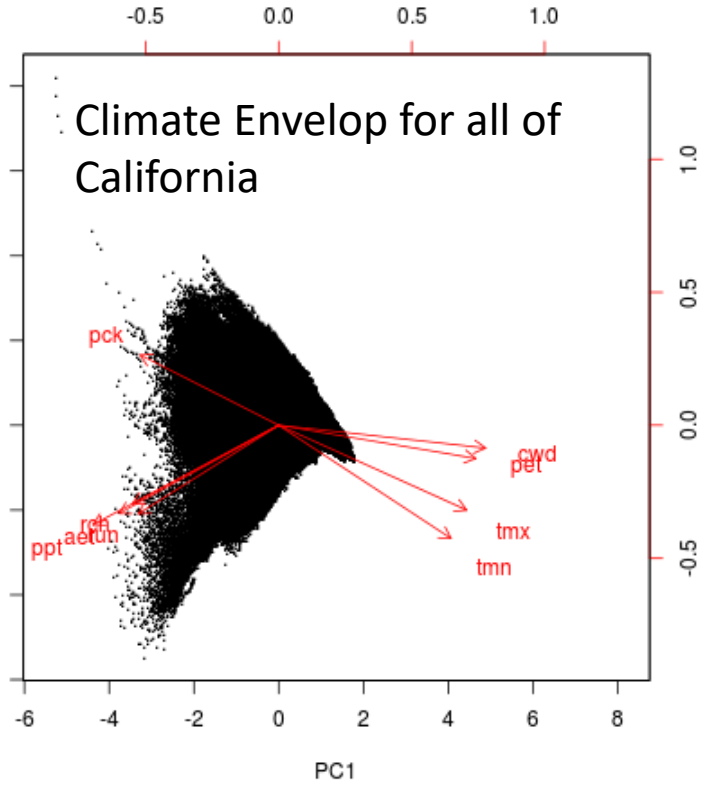
This allows leverage of as much as we know about the distribution of the vegetation.

FRAP 2015 map

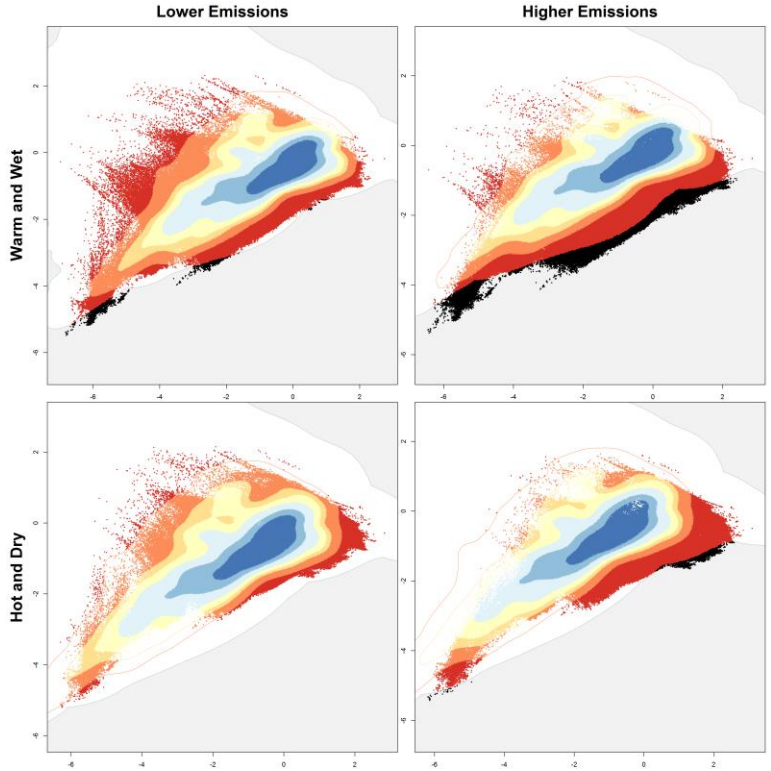


Current Time Climate Classification (1981-2010) for the Vegetation Type Pine Oak





3. Analysis of Vegetation Climate Exposure

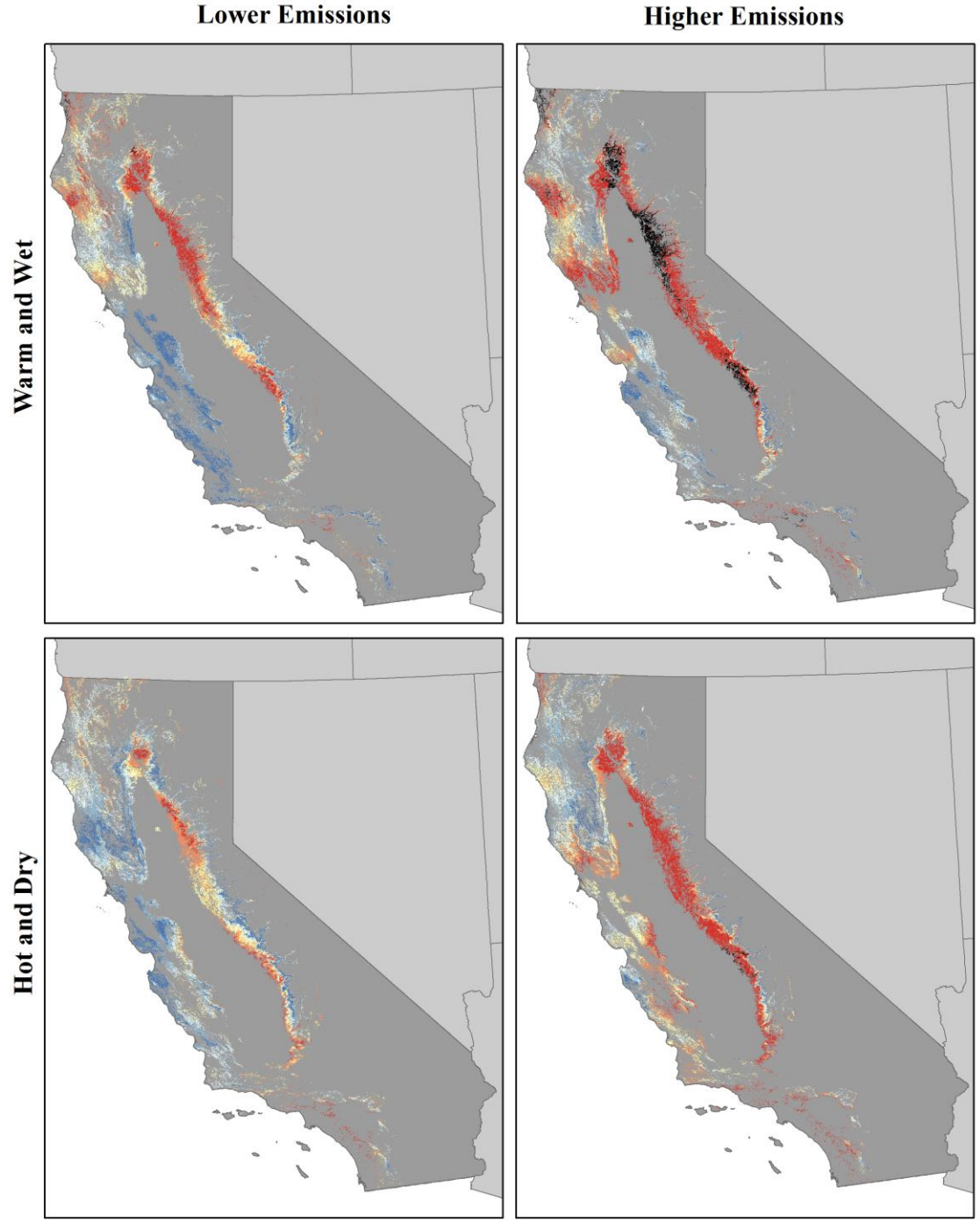


Level of Exposure:

80 - 90% 60 - 80% 40 - 60% < 40%

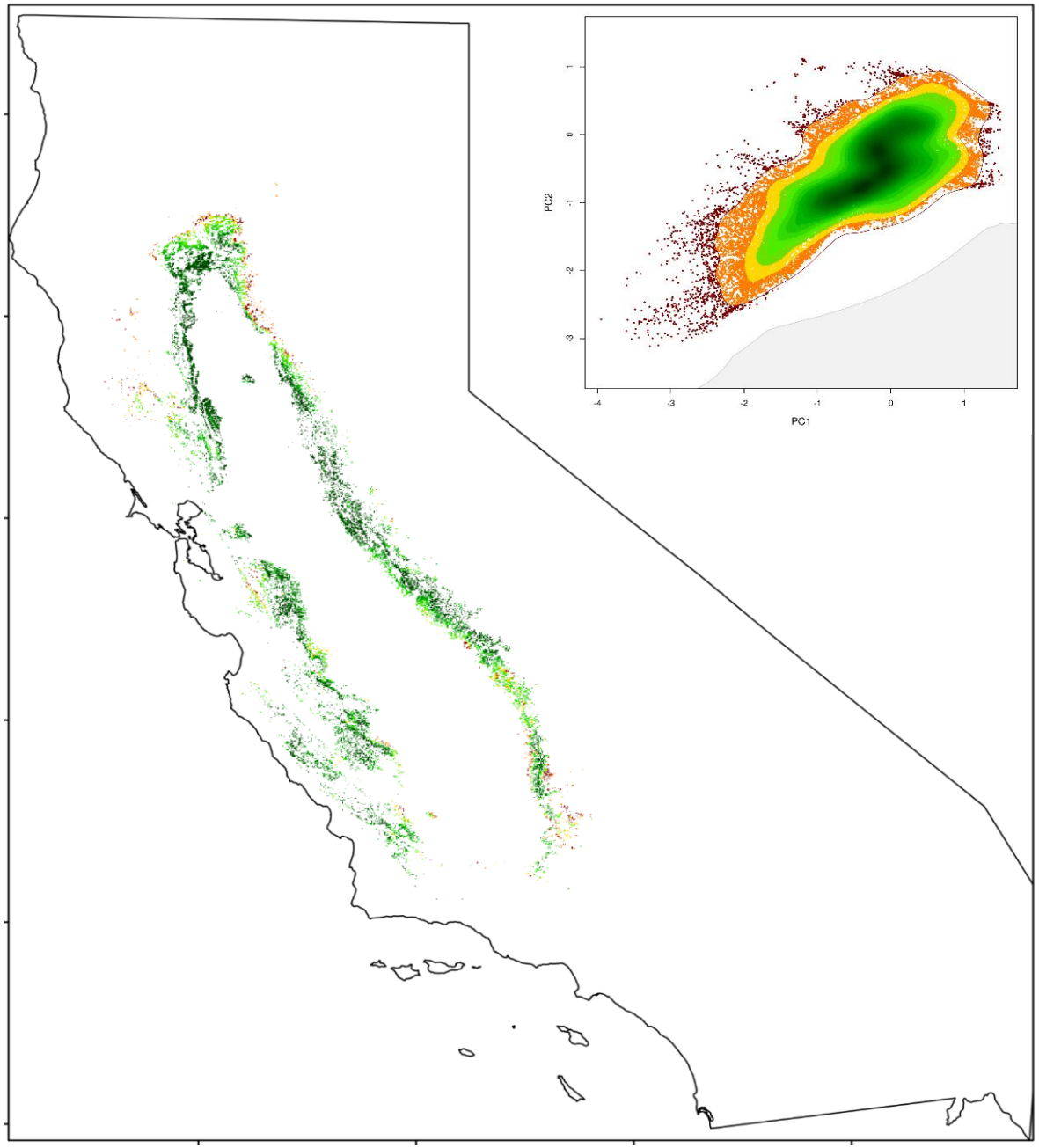
99-100% 95-99% 90-95%

Non-Analog

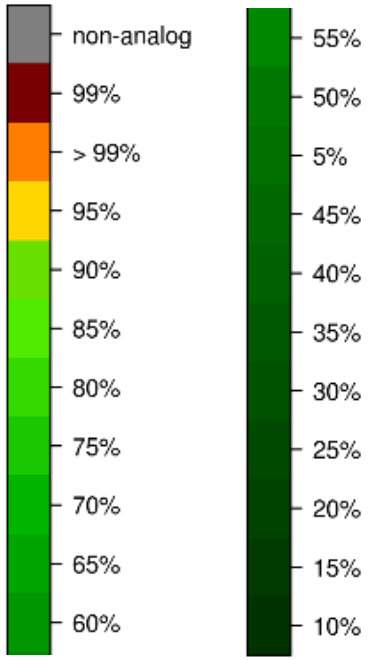


4 Applications:

A. A Study Through Time



Blue Oak Woodlands Current Time Classification



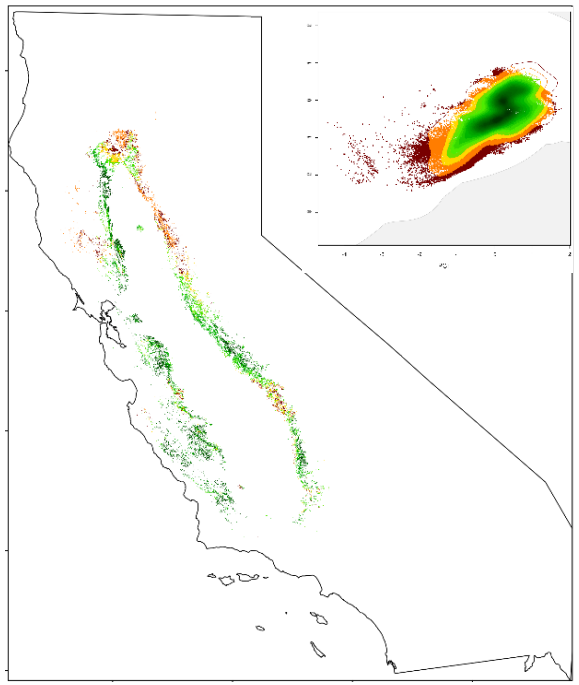
Blue Oak Woodlands 2010 - 2039

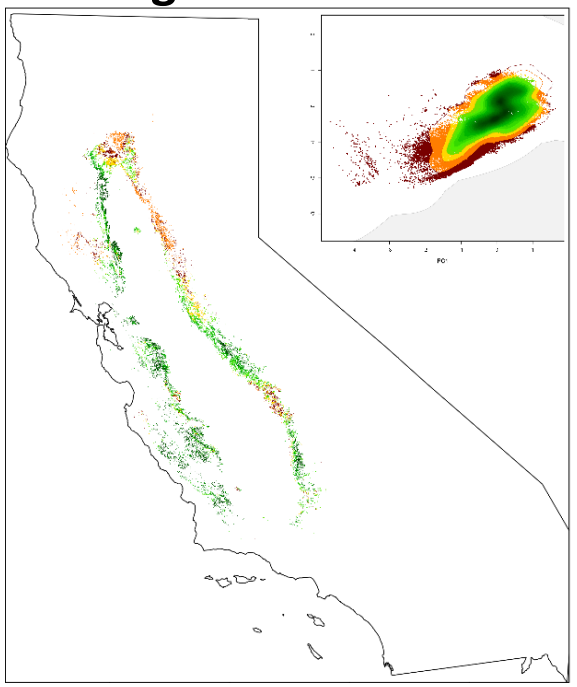
Lower Emissions

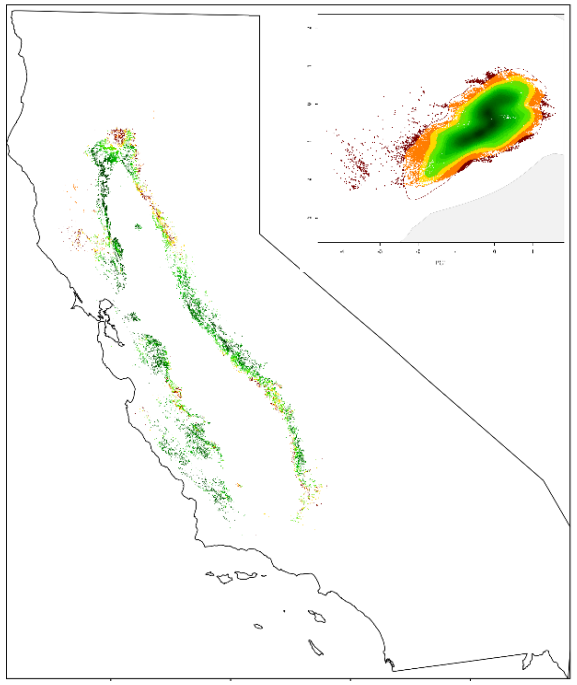
Higher Emissions

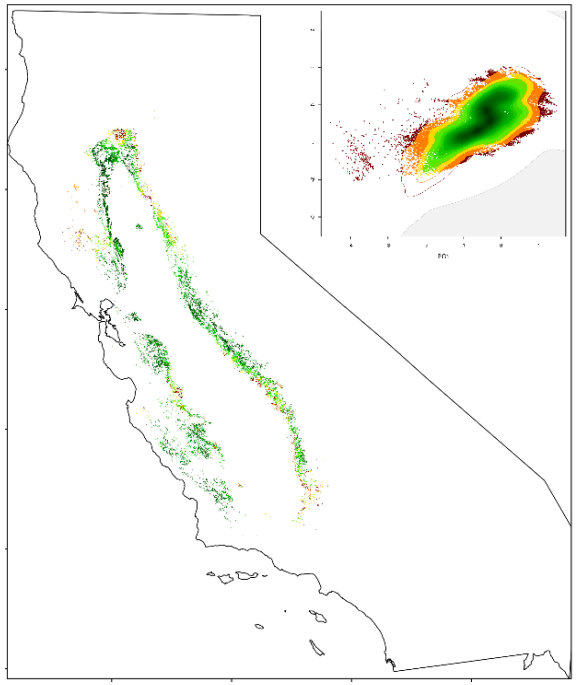
Warm and Wet

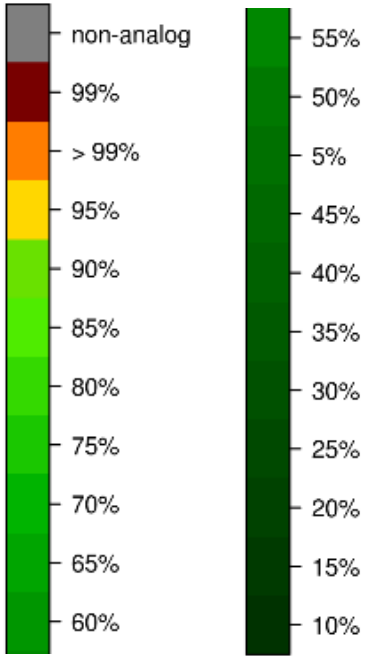
Hot and Dry











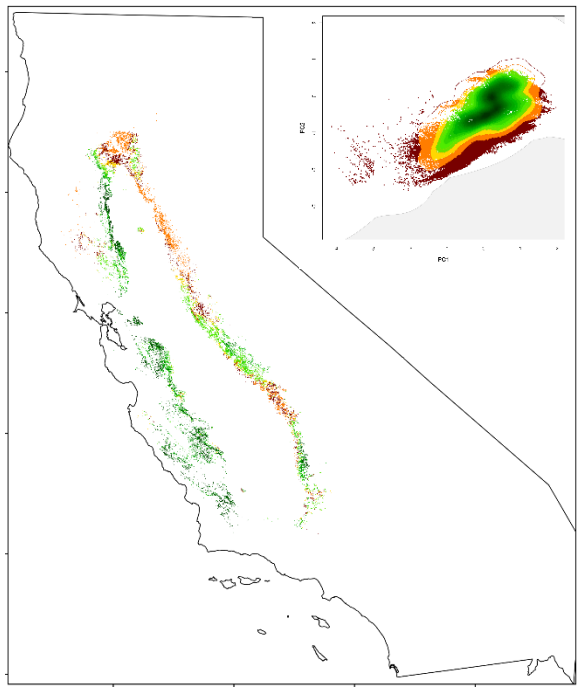
Blue Oak Woodlands 2040 - 2069

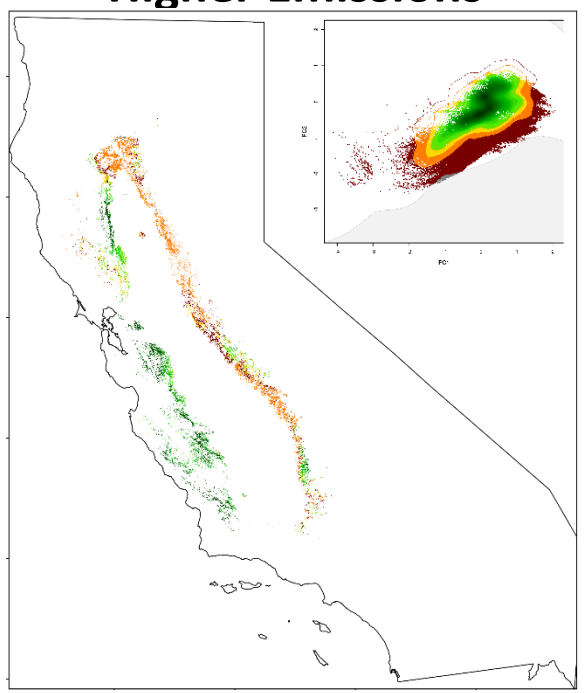
Lower Emissions

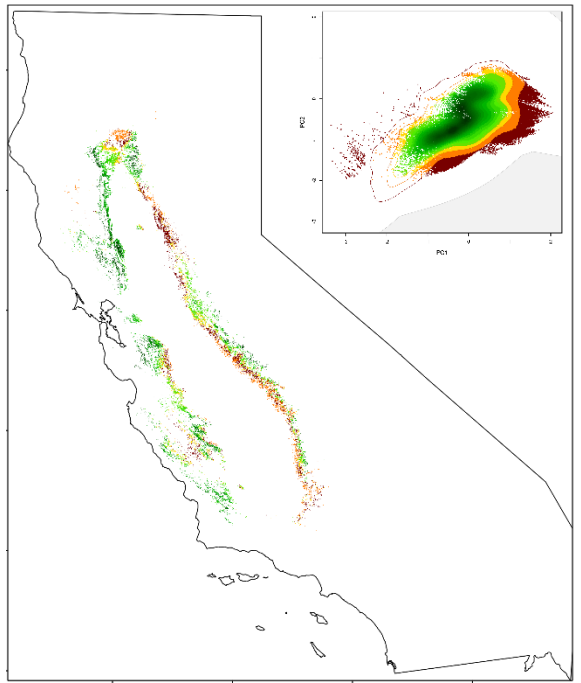
Higher Emissions

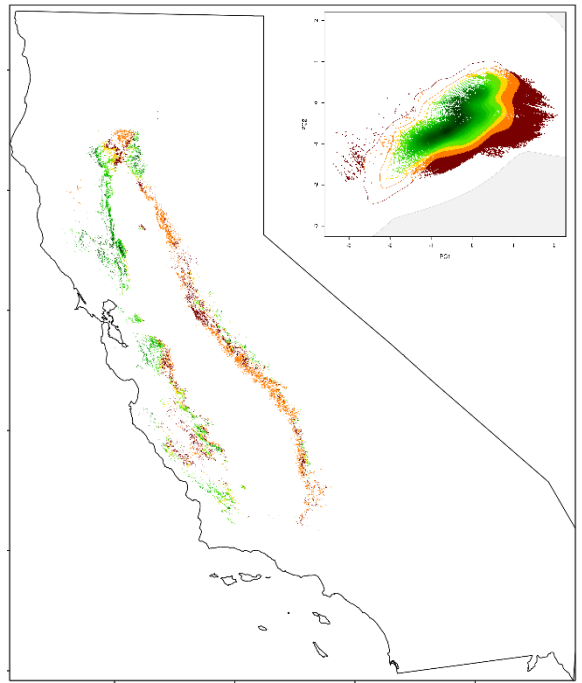
Warm and Wet

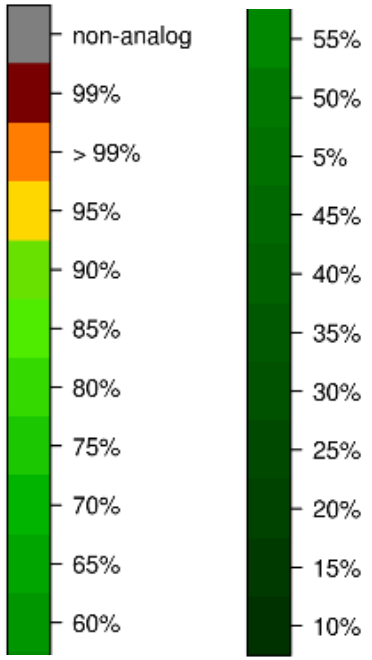
Hot and Dry











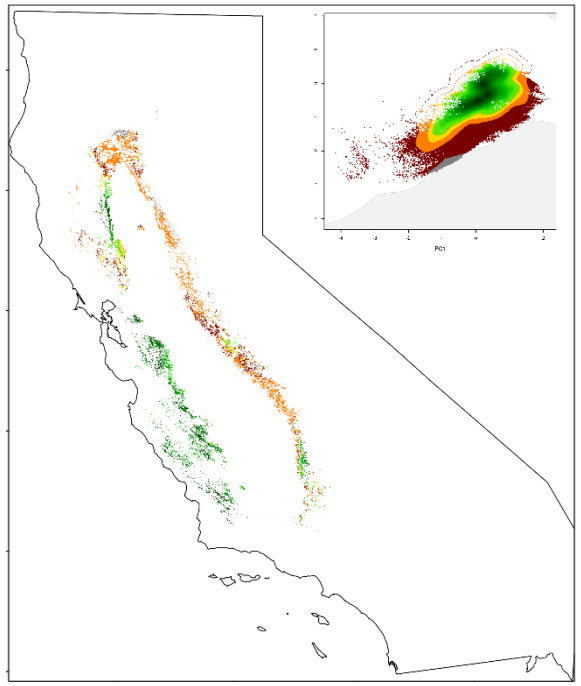
Blue Oak Woodlands 2070 - 2099

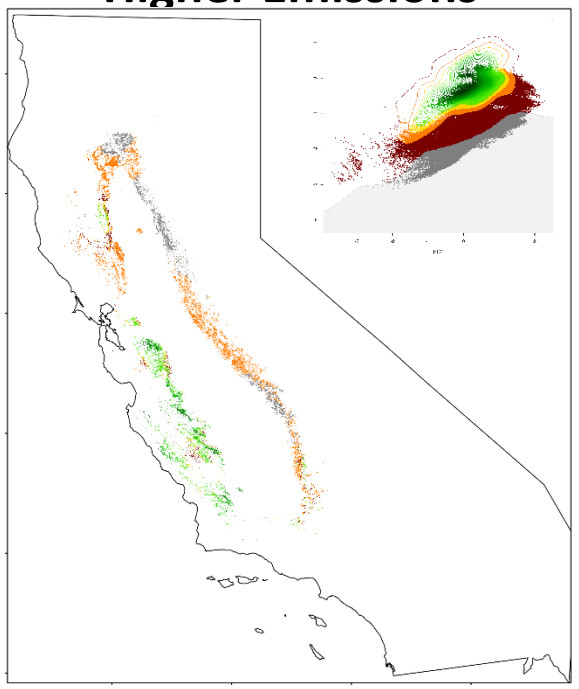
Lower Emissions

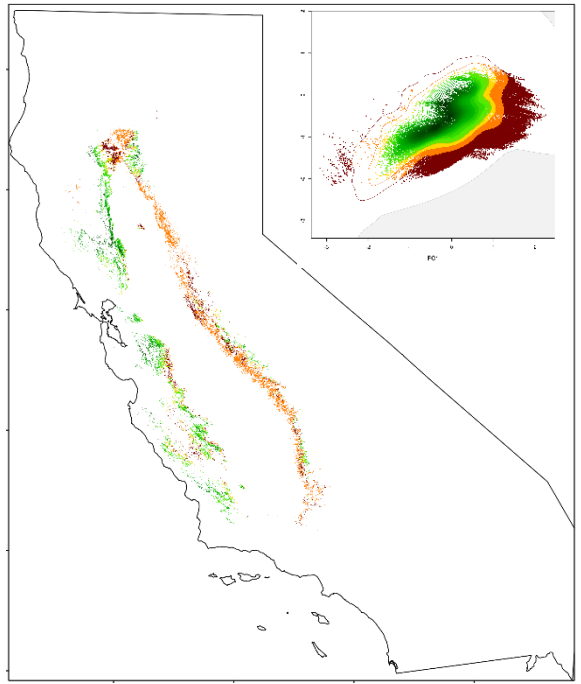
Higher Emissions

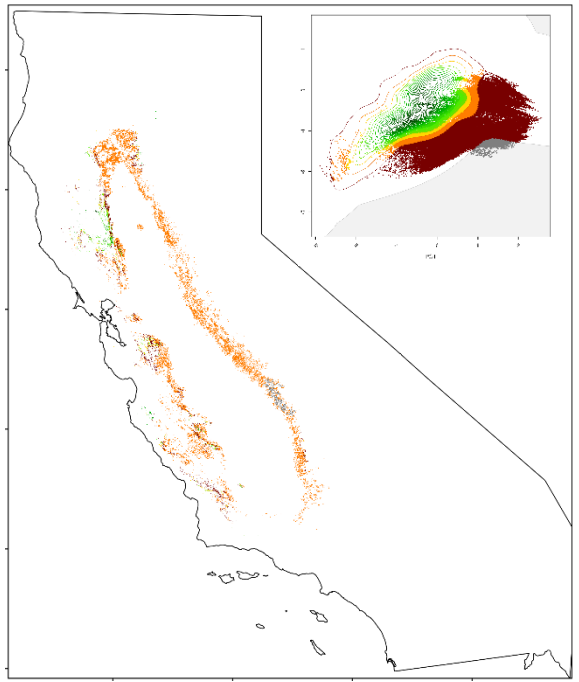
Warm and Wet

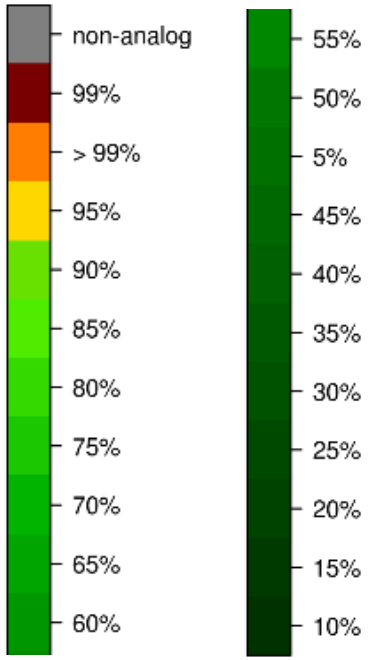
Hot and Dry



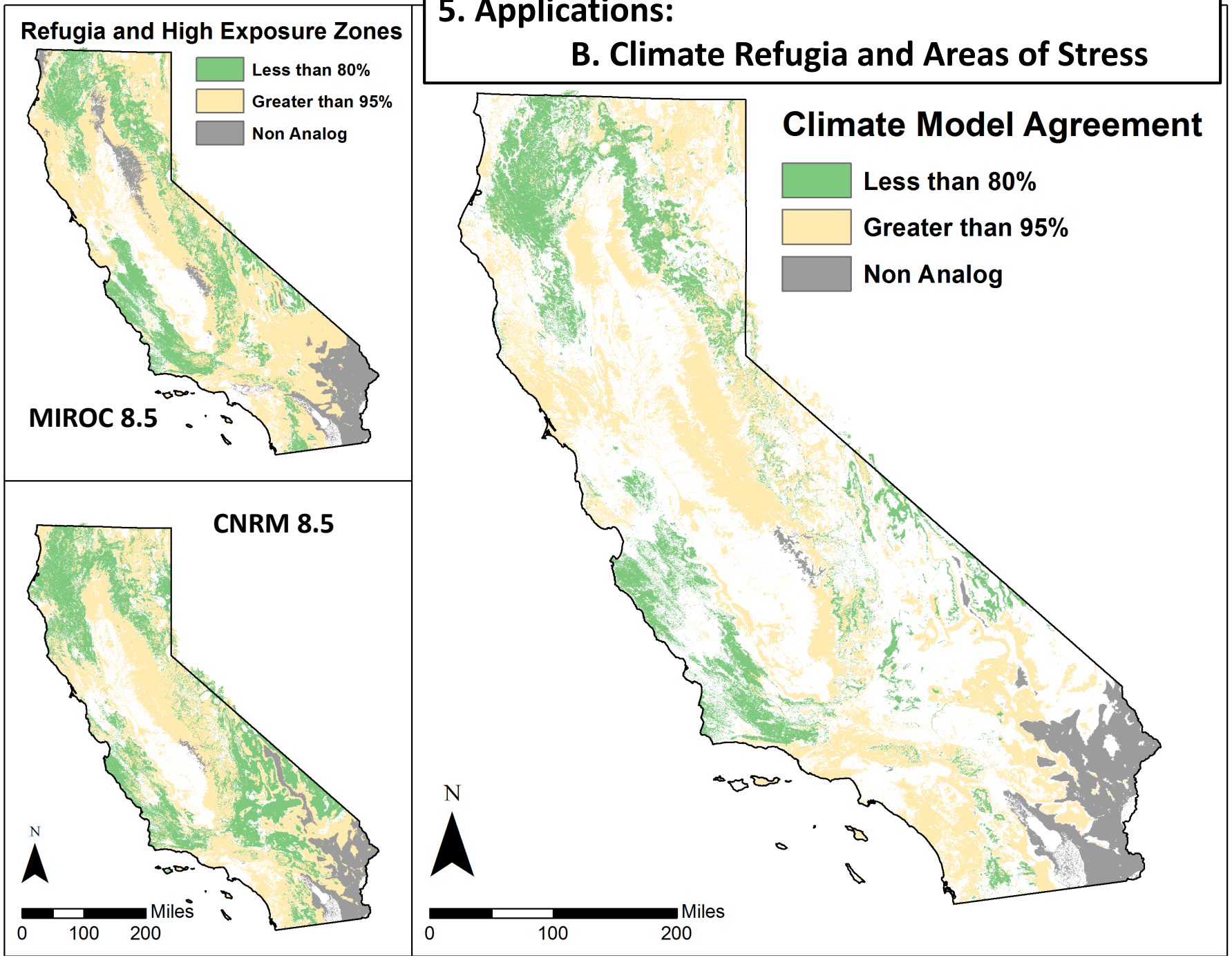








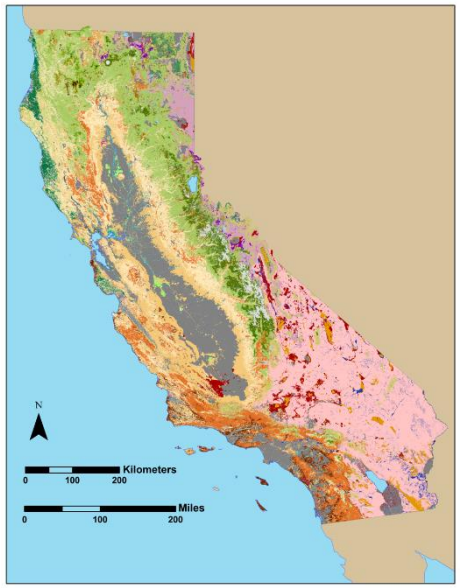
5. Applications:
B. Climate Refugia and Areas of Stress

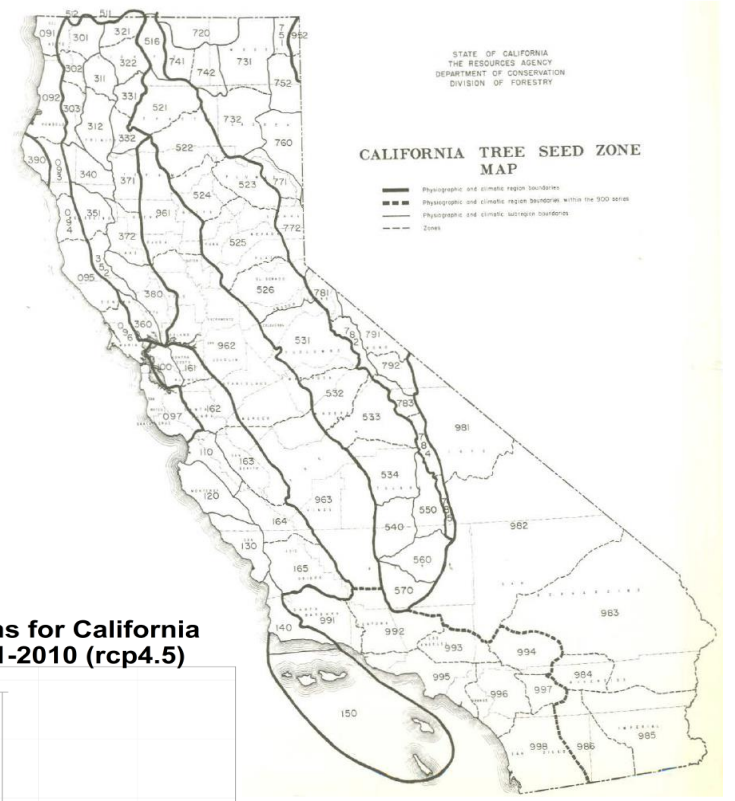


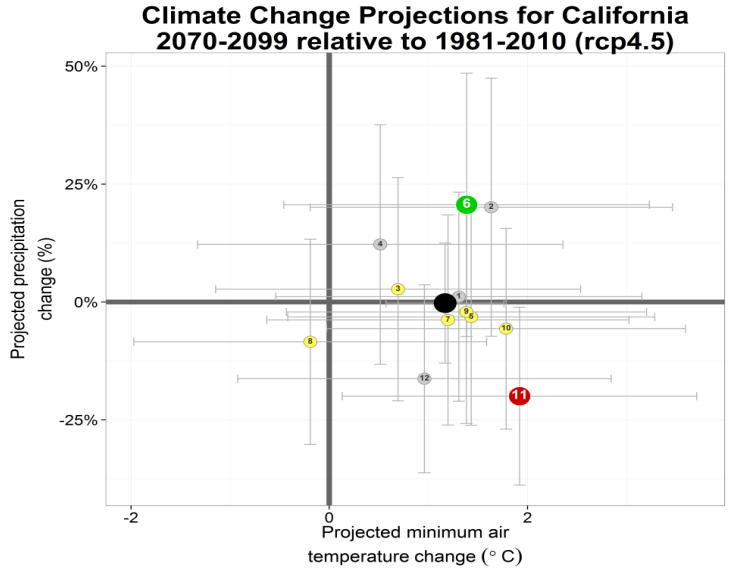
A Partial Solution to the Seed Origin Dilemma!

- Integrate all available information
  - Climate Modeling
    - Current and future
  - Vegetation map data
    - Species distributions
  - Variation among species
    - Does one map for all tree species work?
    - Species trait data
  - Variation within species
    - Available genetic data
      - Molecular
      - Provenance test

- Funded by CALFIRE

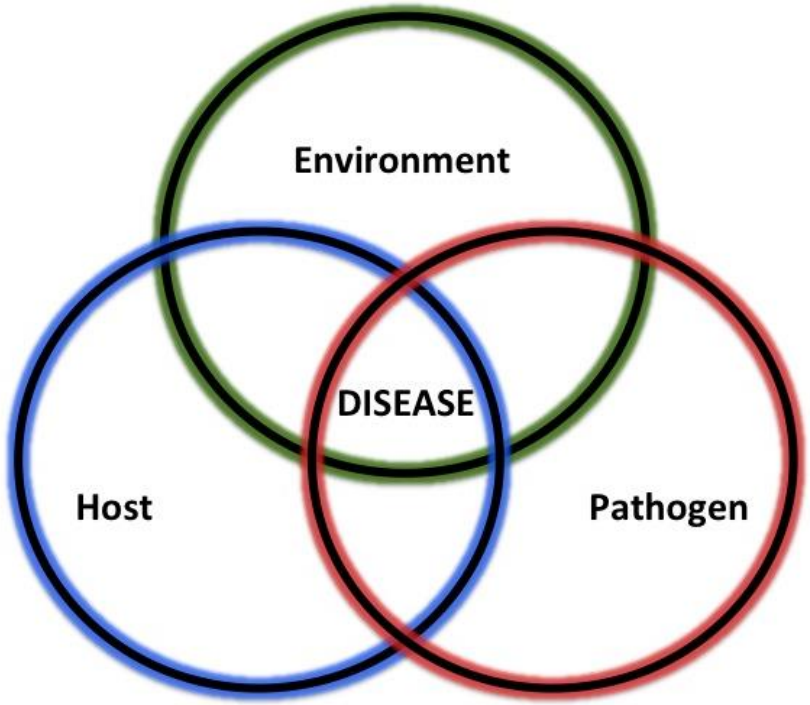






Shifts in Disease Dynamics in a Tropical Amphibian Assemblage Are Not Due to Pathogen Attenuation

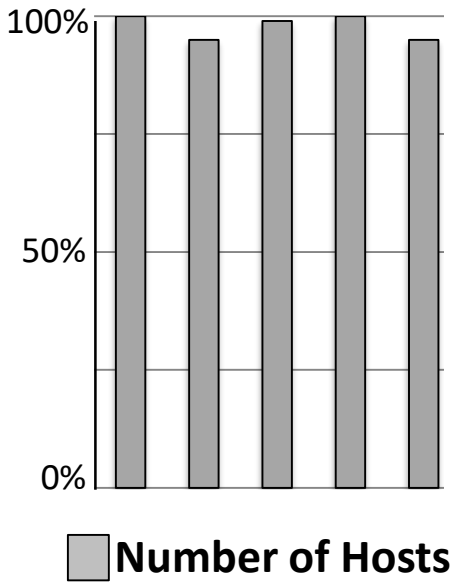
Jamie Voyles
University of Nevada, Reno



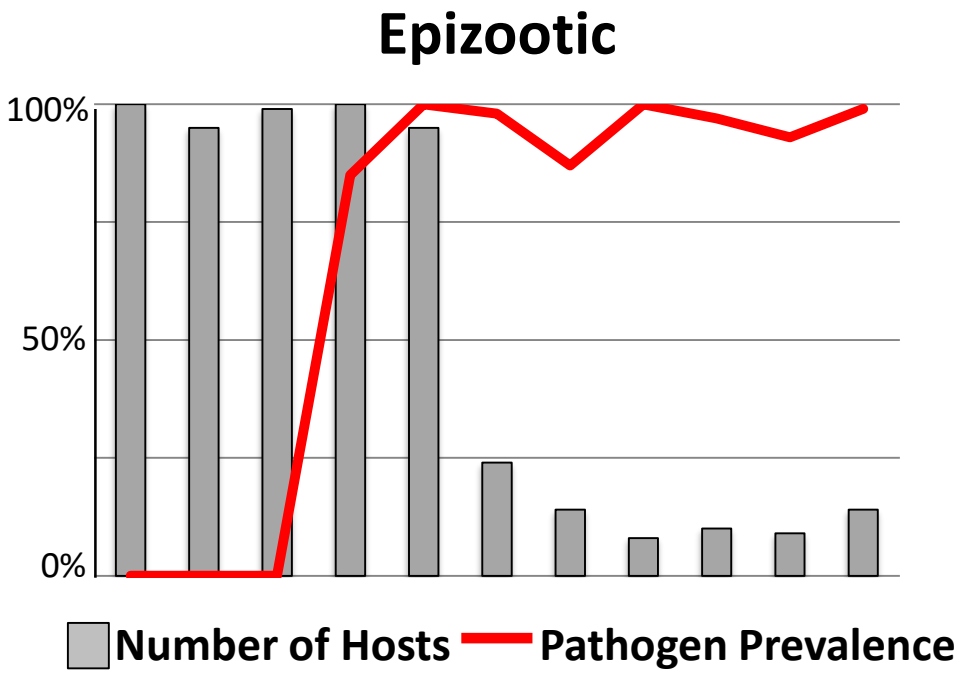
Disease: a dynamic interaction that depends on the host, the pathogen and their shared environment.

Disease rarely ends in host extinction

Disease rarely ends in host extinction



Disease rarely ends in host extinction



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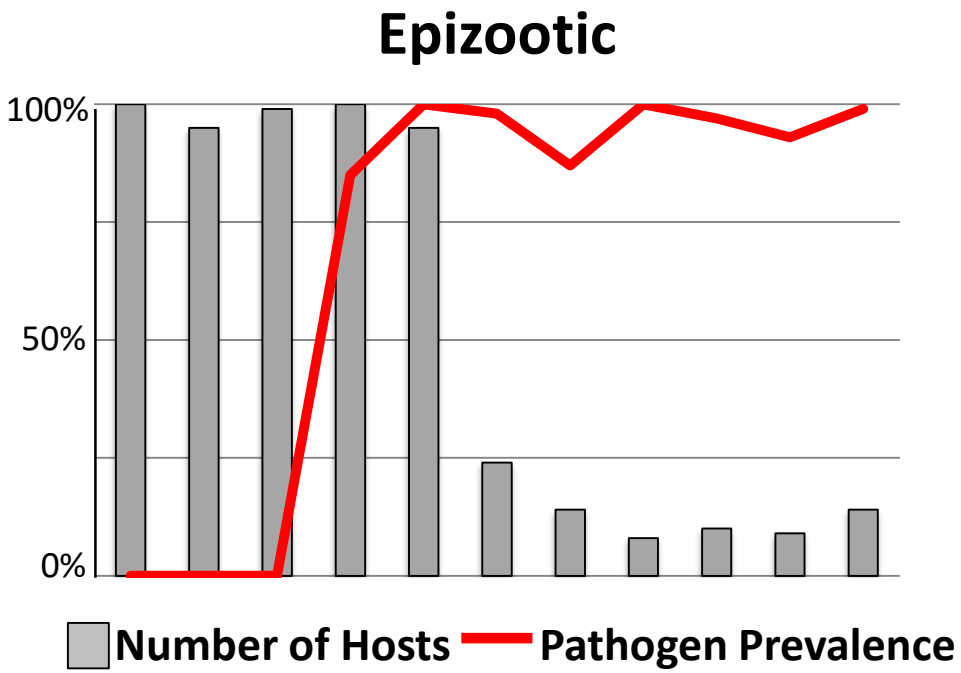
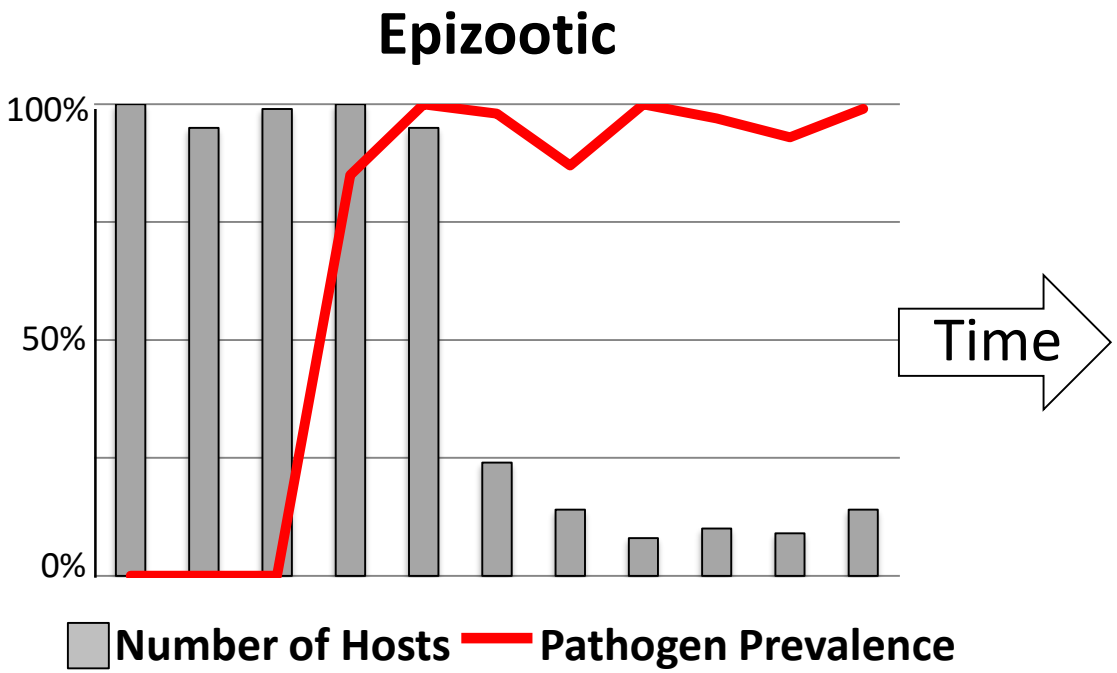


Epizootic- phase of rapid increase in pathogen prevalence and spread of disease in wildlife hosts

Disease rarely ends in host extinction



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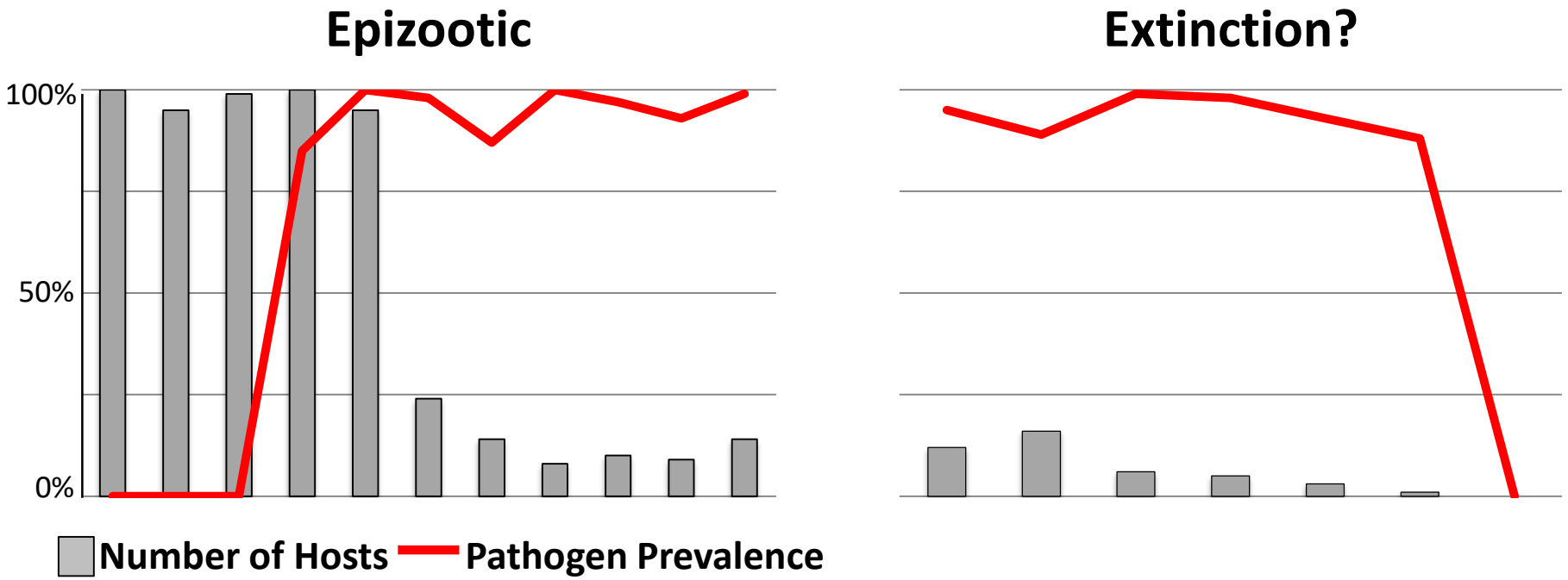

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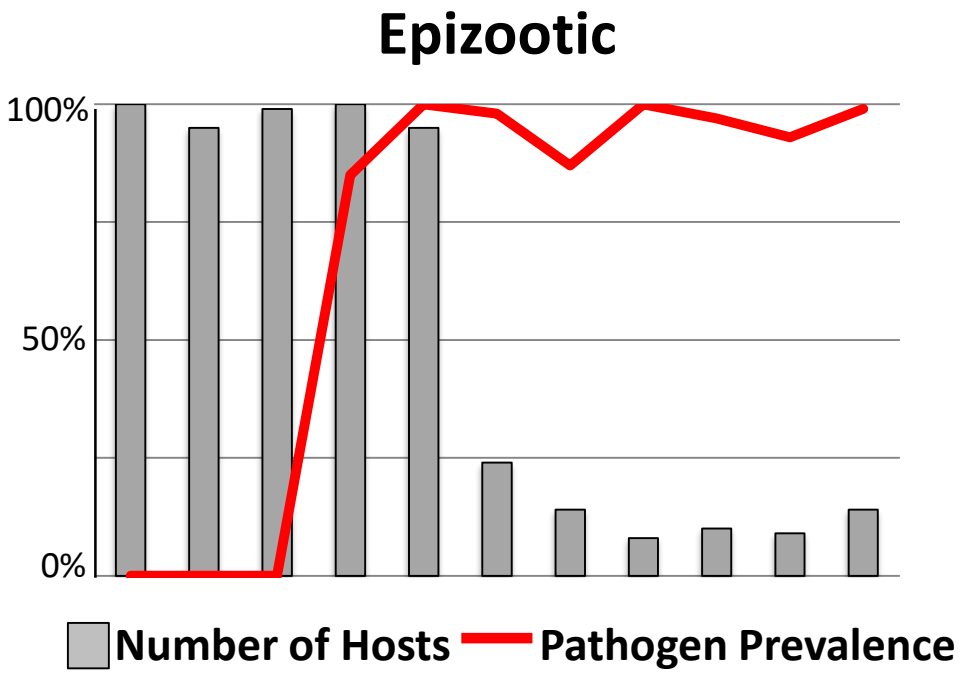
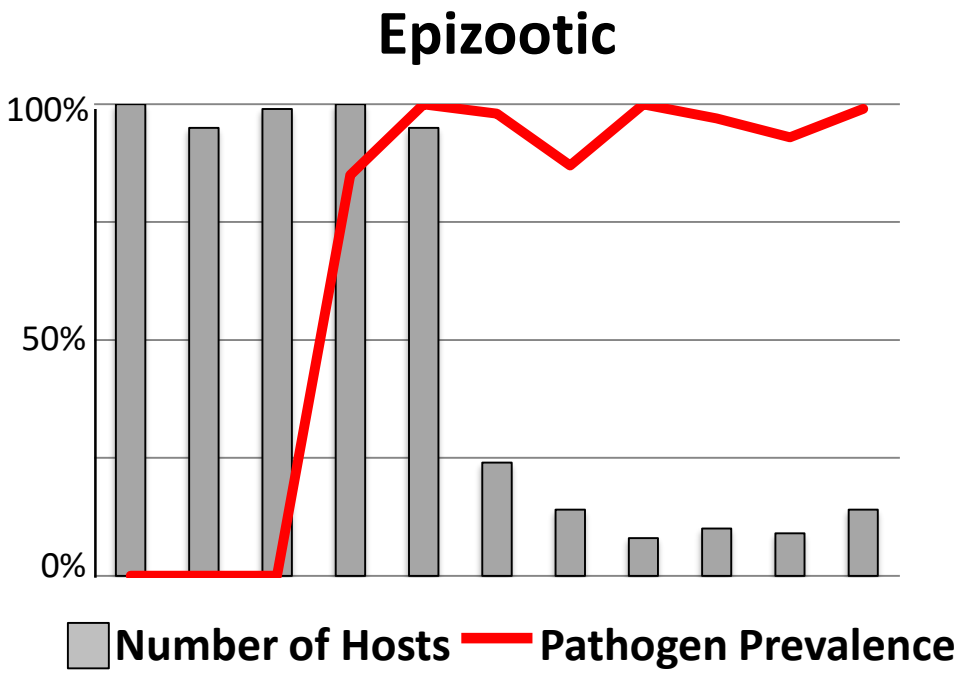


Or Recovery?

Disease rarely ends in host extinction



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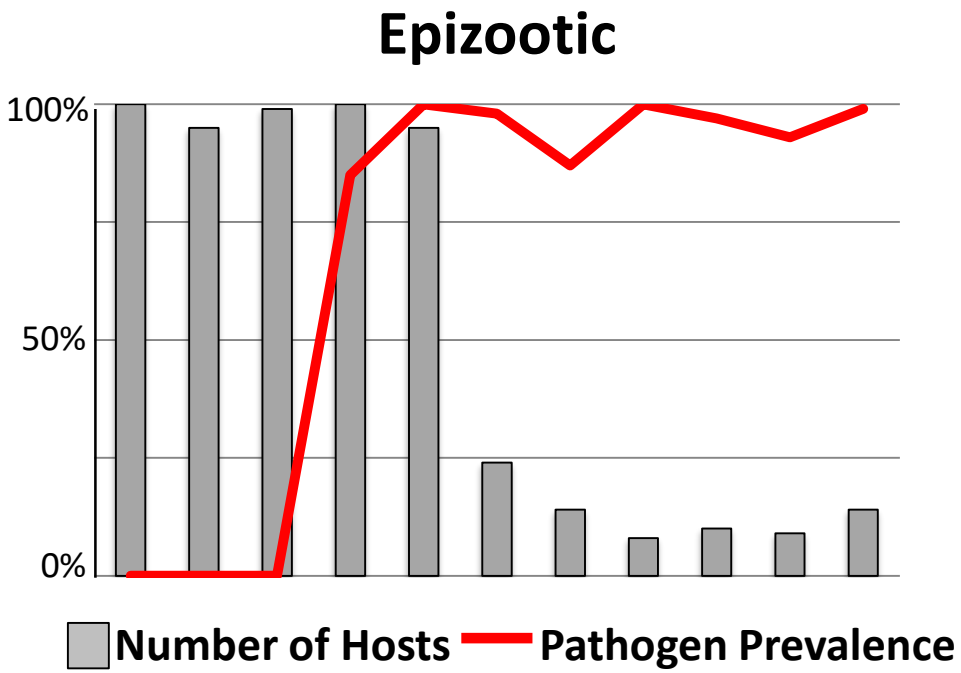
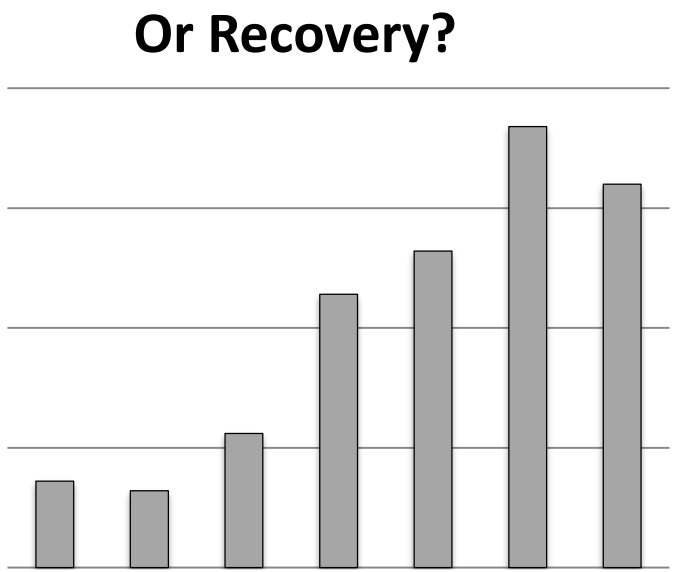
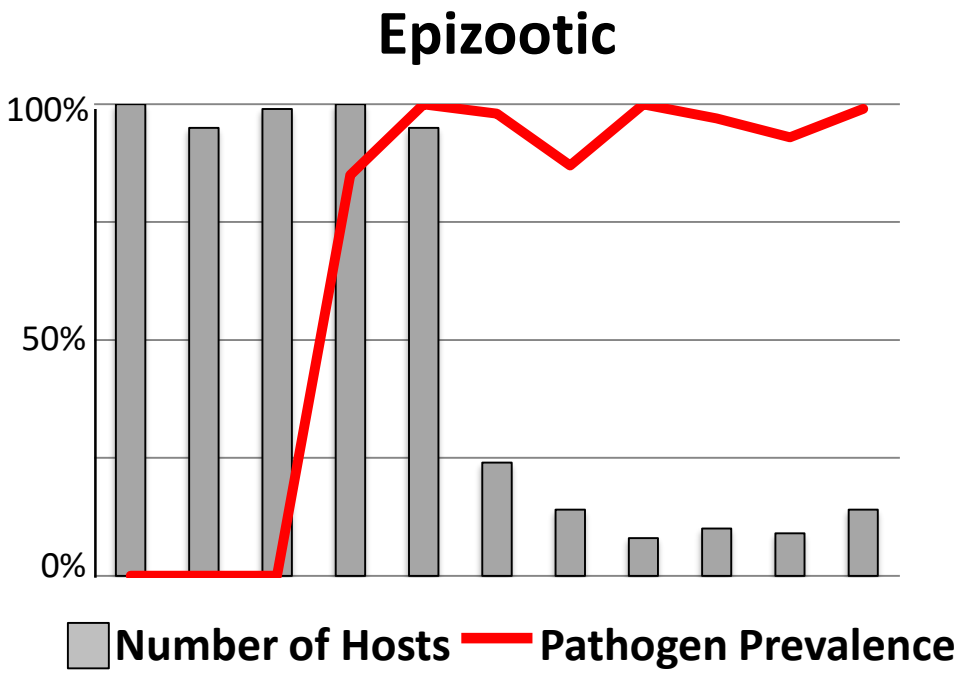
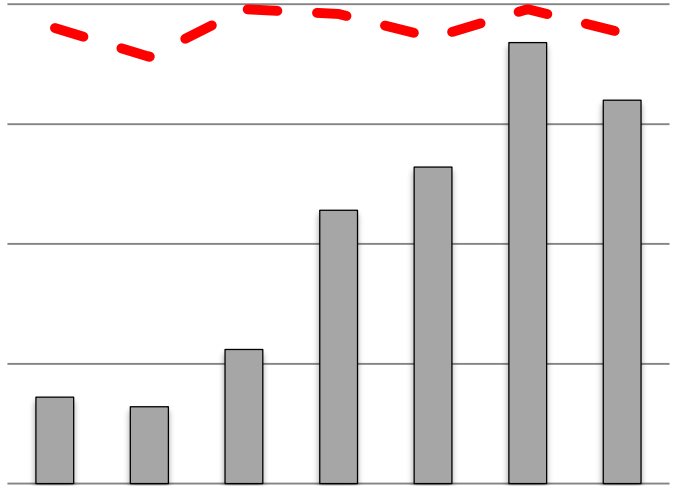




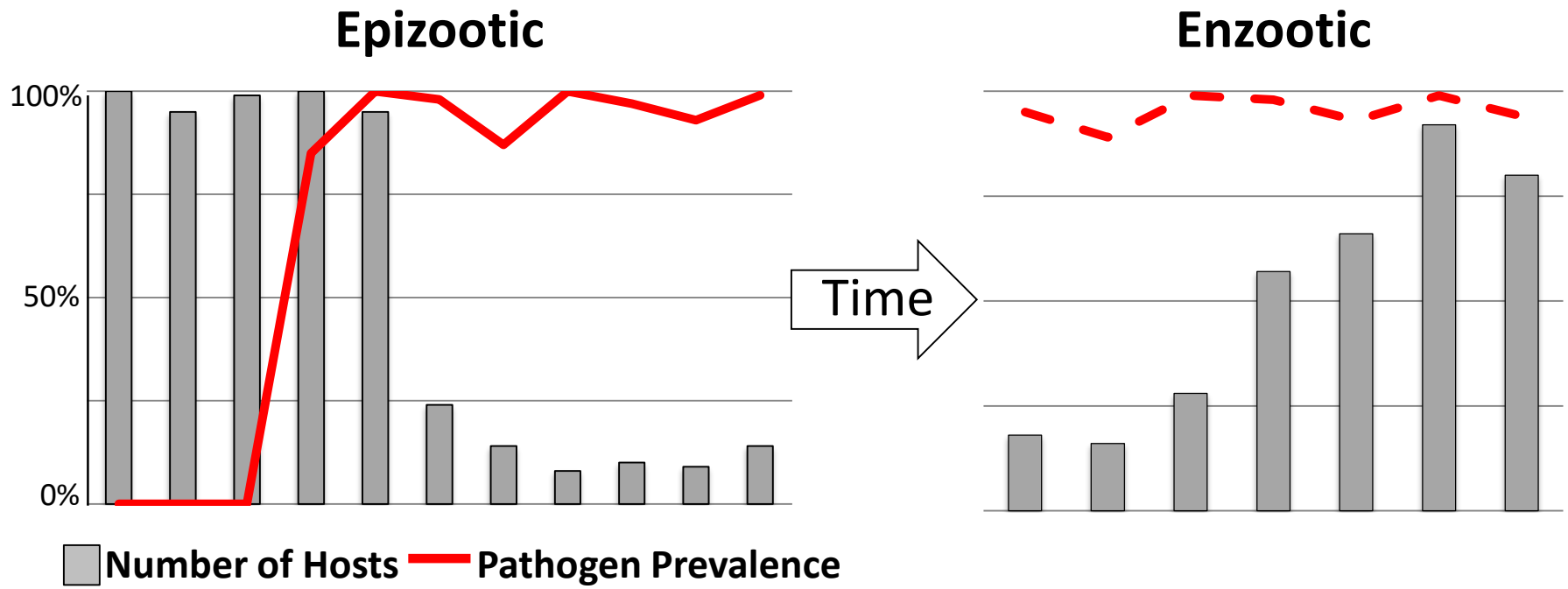
Disease rarely ends in host extinction





Enzootic- phase where the pathogen is constantly present but disease only occurs in a small number of hosts.

Disease rarely ends in host extinction

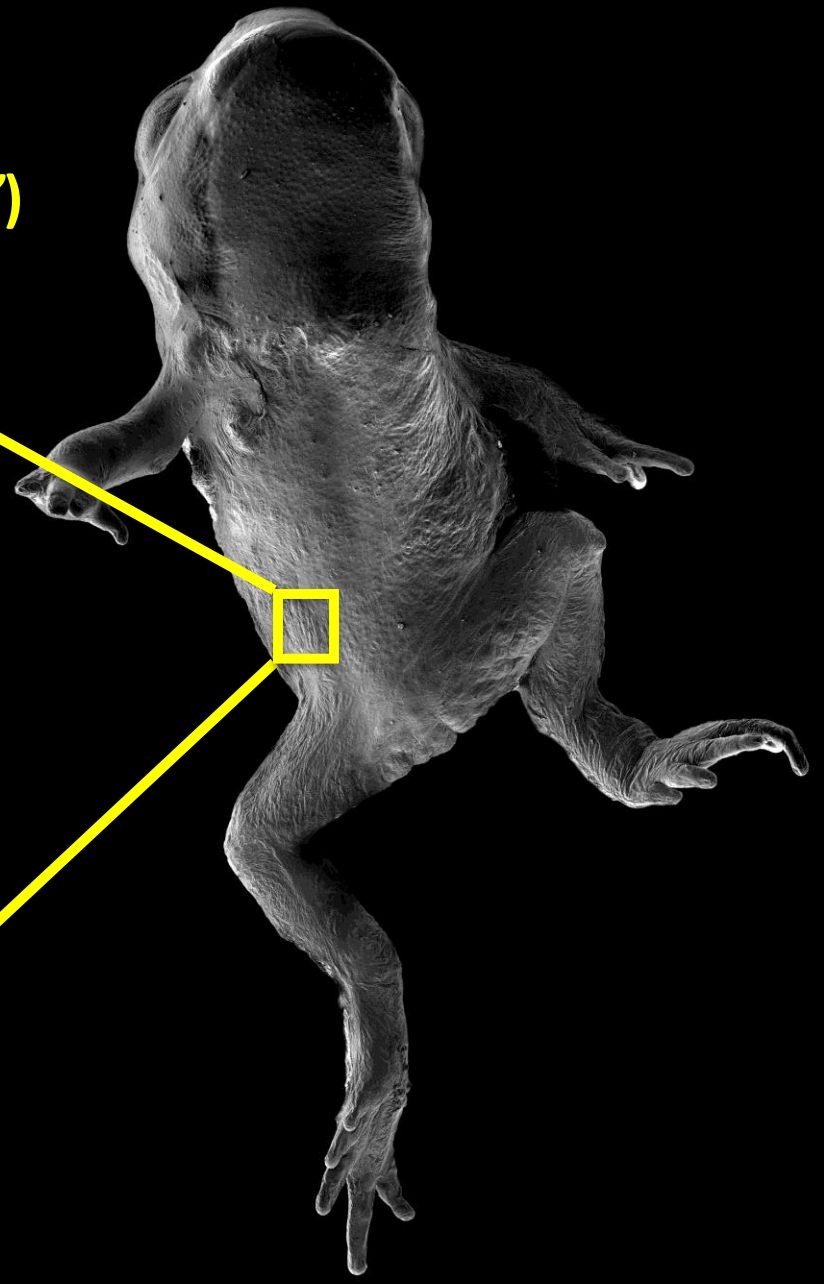


Chytridiomycosis

***Batrachochytrium dendrobatidis* (*"Bd"*)**

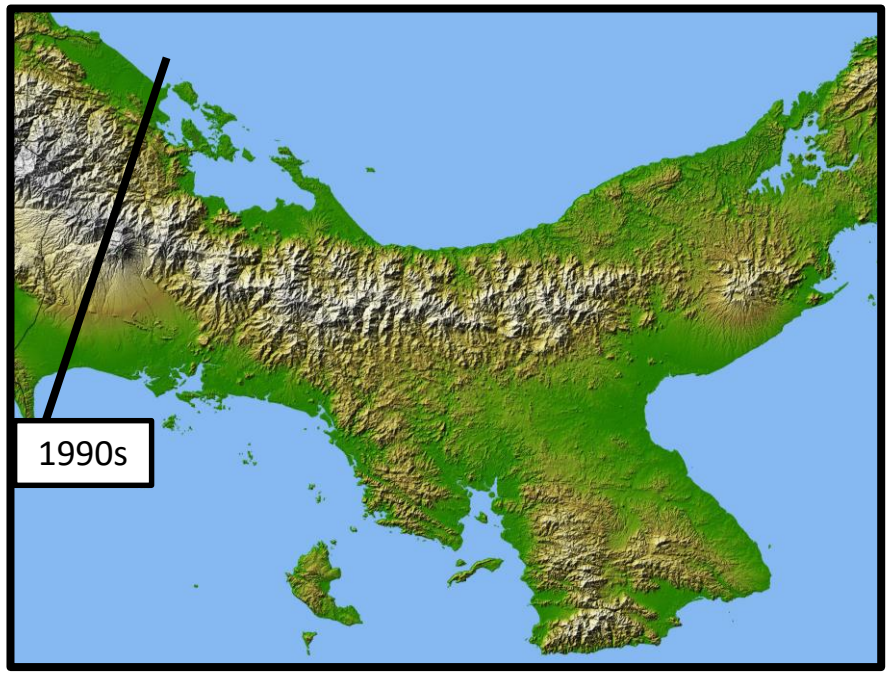
Chytridiomycosis

***Batrachochytrium dendrobatidis* (“Bd”)**

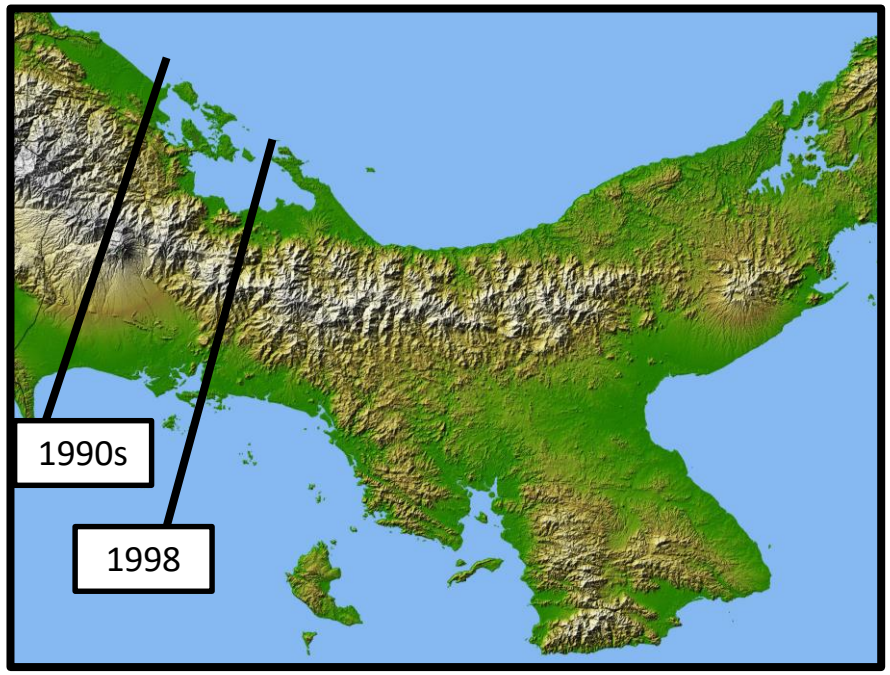


Amphibian Declines in Western Panama

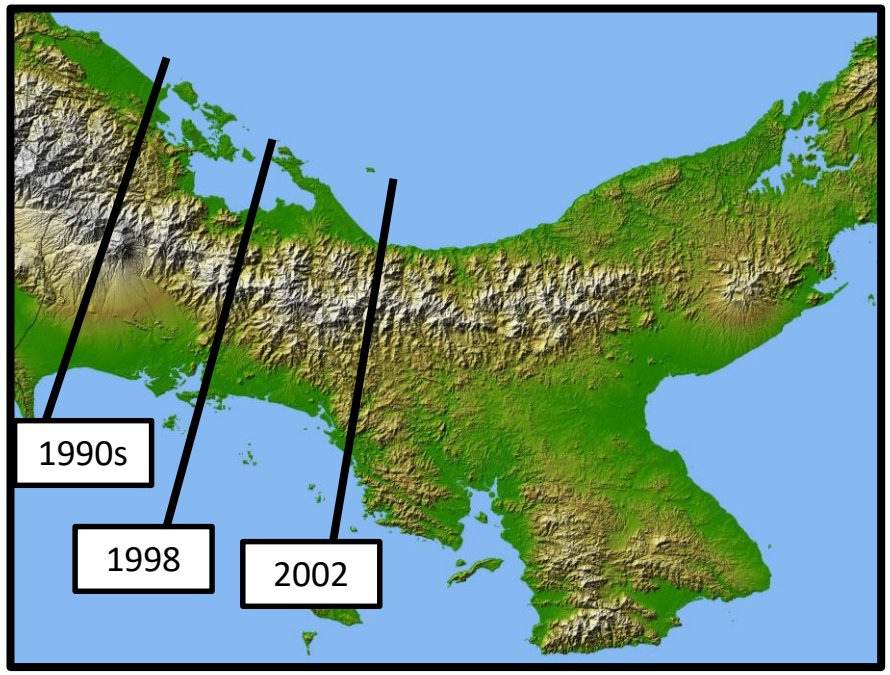
Amphibian Declines in Western Panama



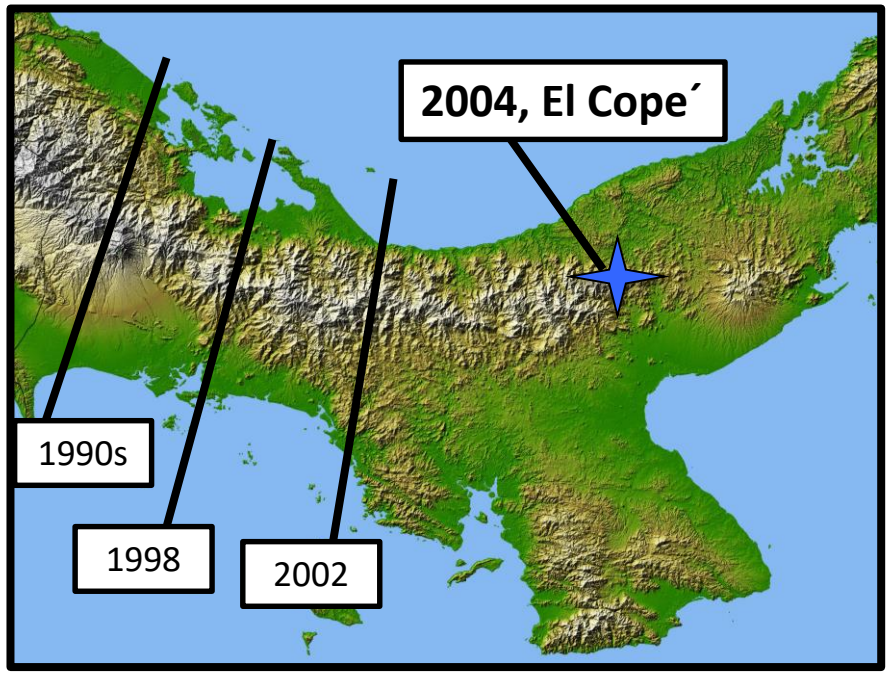
Amphibian Declines in Western Panama



Amphibian Declines in Western Panama



Amphibian Declines in Western Panama



Panama in 2004

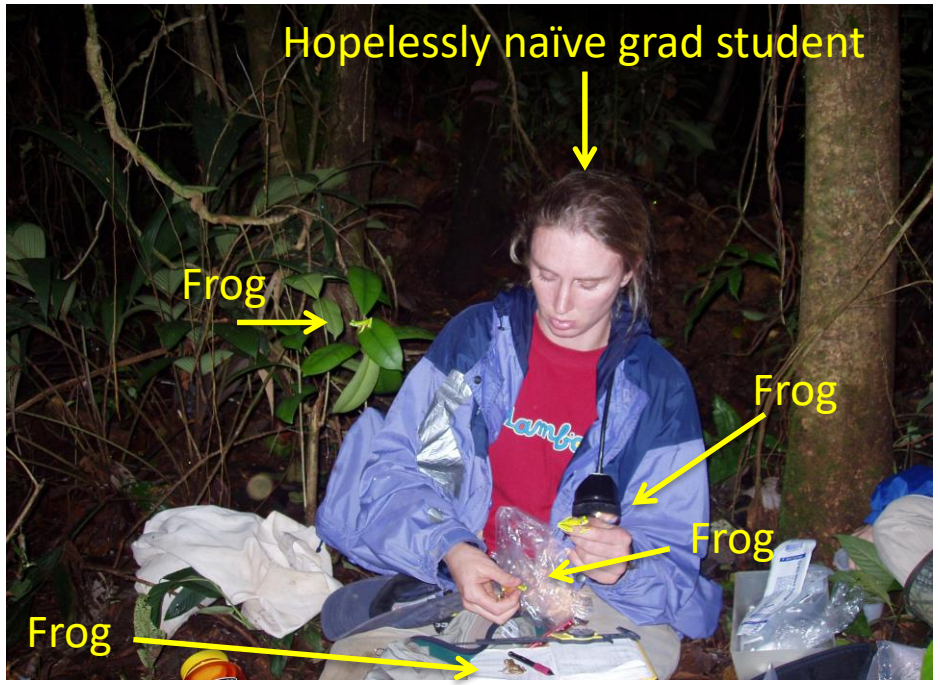
High species diversity

High abundance

Panama in 2004

High species diversity

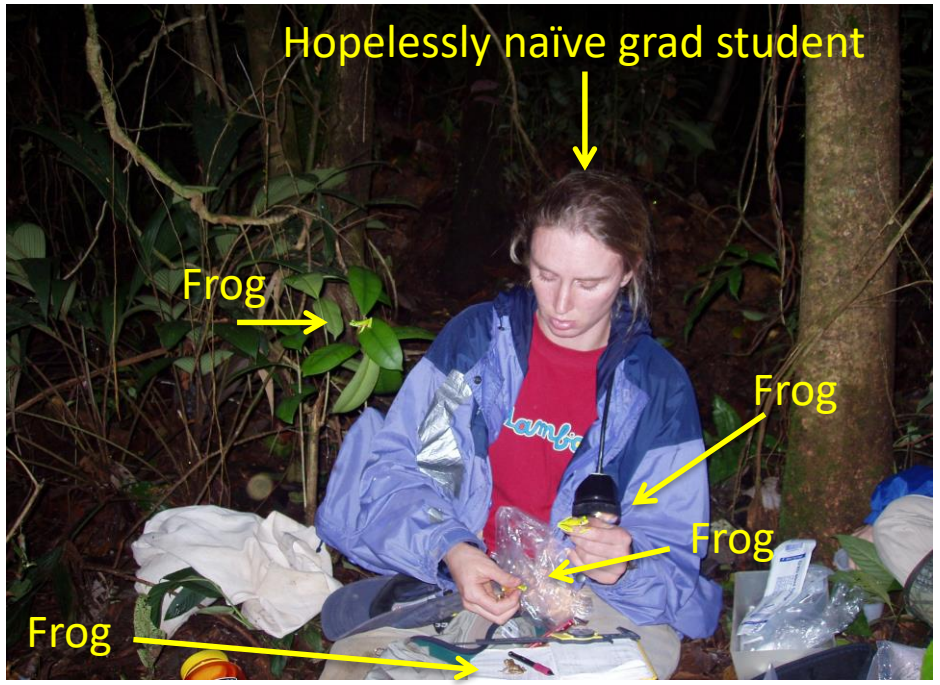
High abundance



Panama in 2004

High species diversity

High abundance

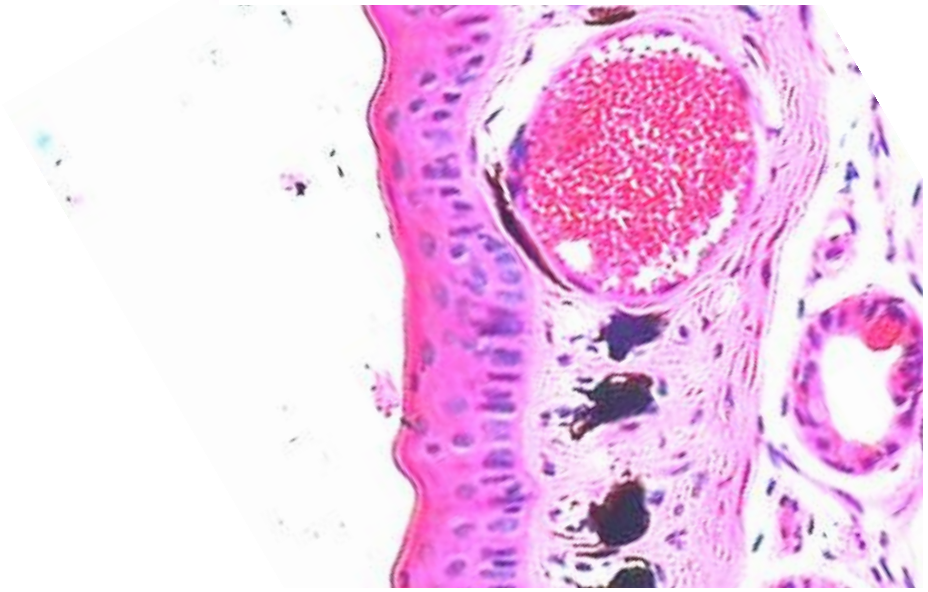


Two objectives

1. Screen for disease
2. Profile immune defenses

Amphibian skin:
Provides critical immune defenses

epidermis dermis



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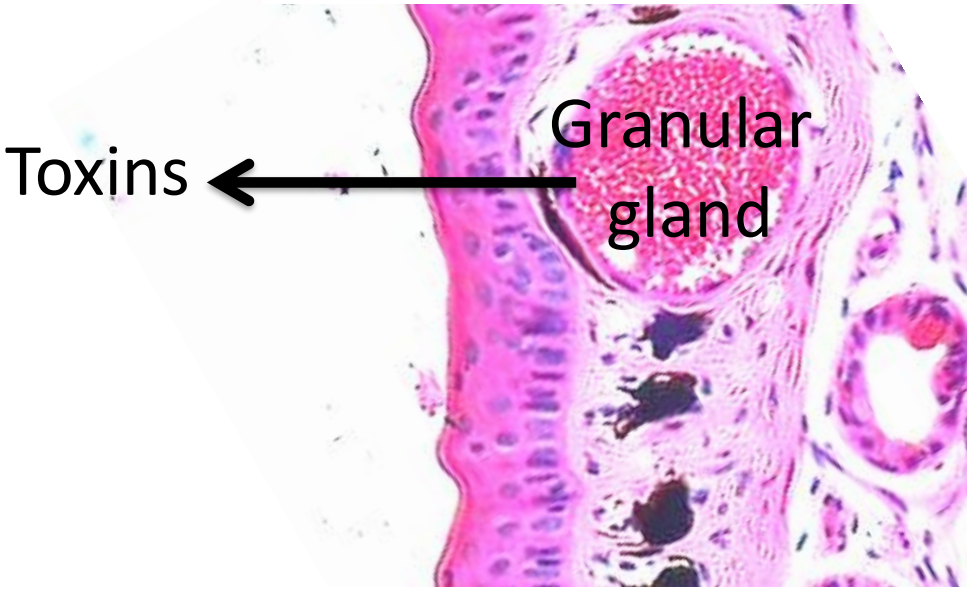
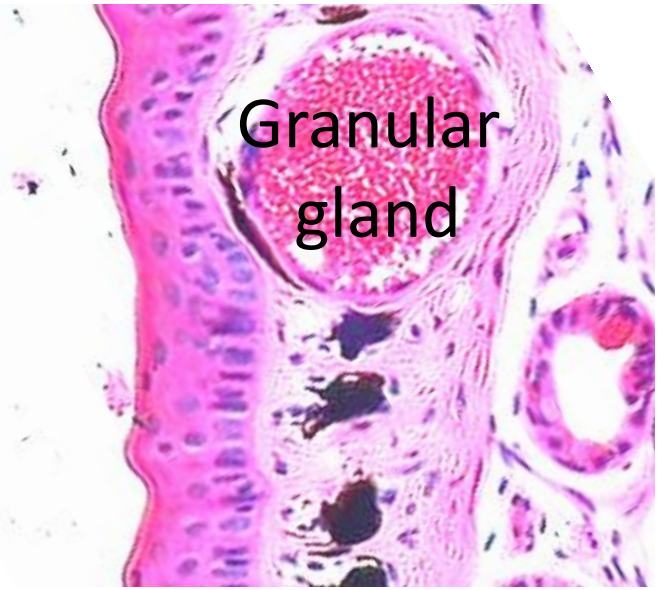


Amphibian skin:
Provides critical immune defenses

epidermis dermis

-Skin secretions from granular glands provide non-specific defenses against cutaneous pathogens



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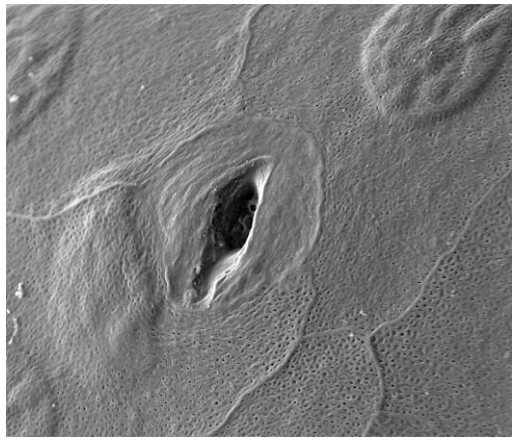

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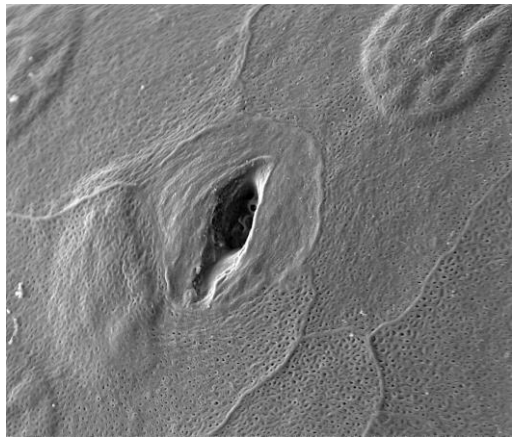
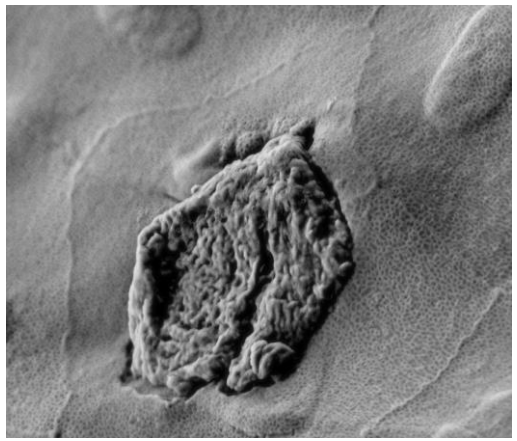
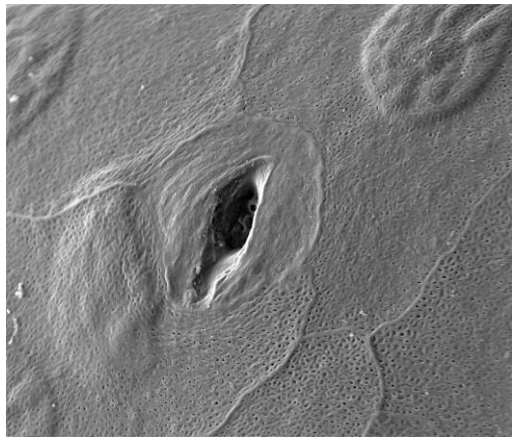


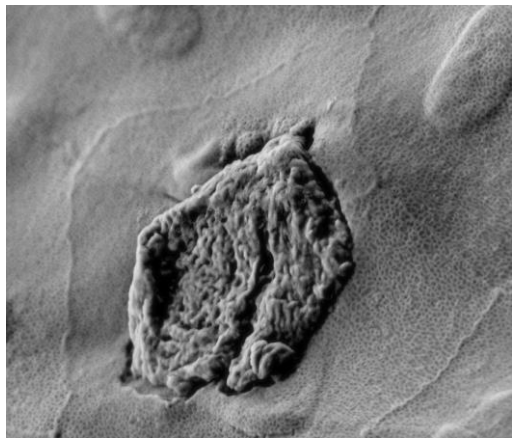


Amphibian skin:
Provides critical immune defenses

-Skin secretions from granular glands provide non-specific defenses against cutaneous pathogens

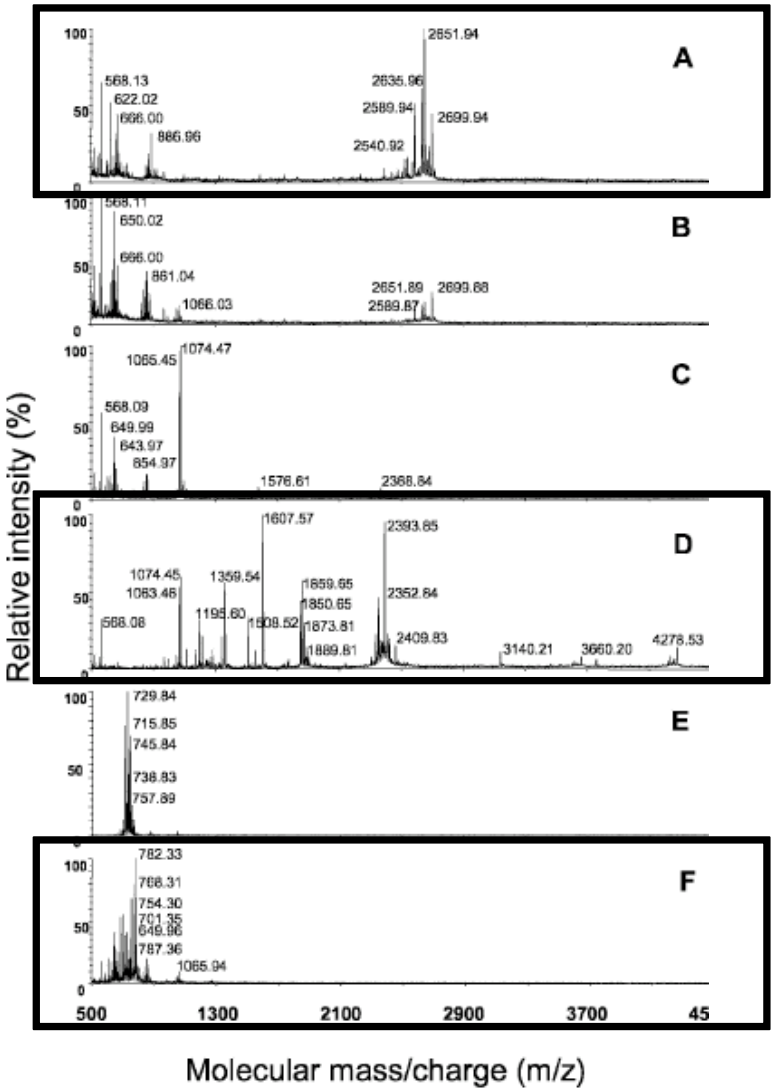
- Secretions contain antimicrobial peptides (AMPs) that differ among species





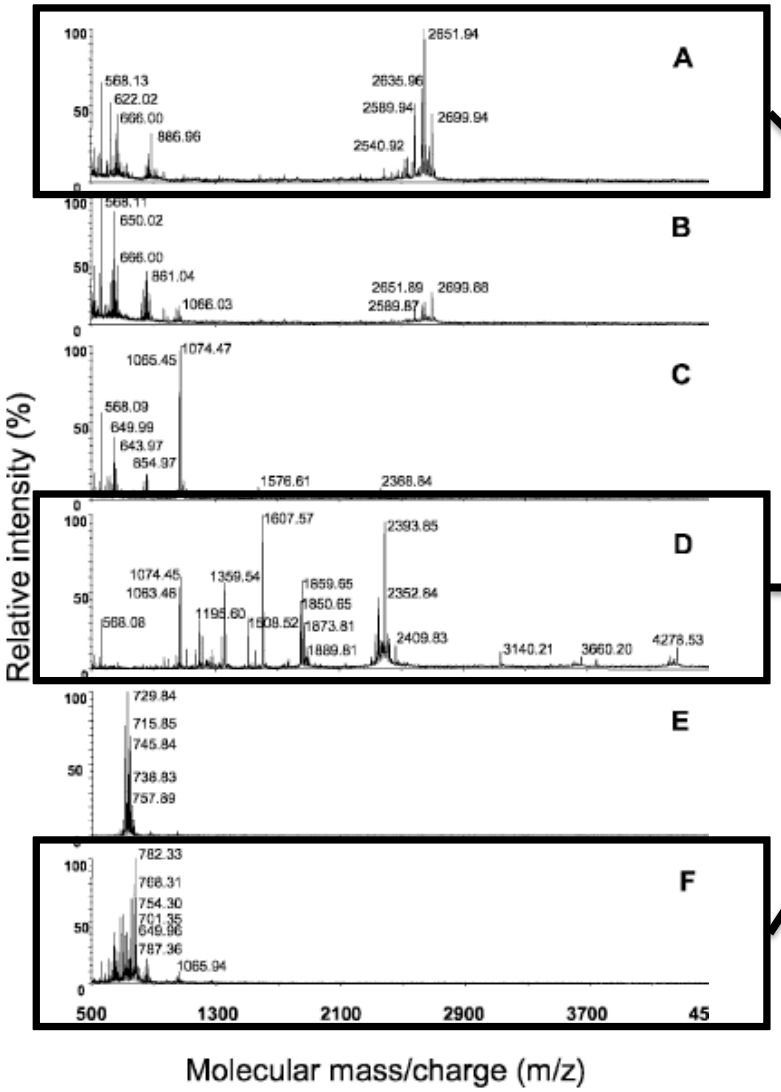
Frog defenses: skin secretions

Frog defenses: skin secretions



Woodhams, Voyles et al. *J. Wildlife Diseases* 2006

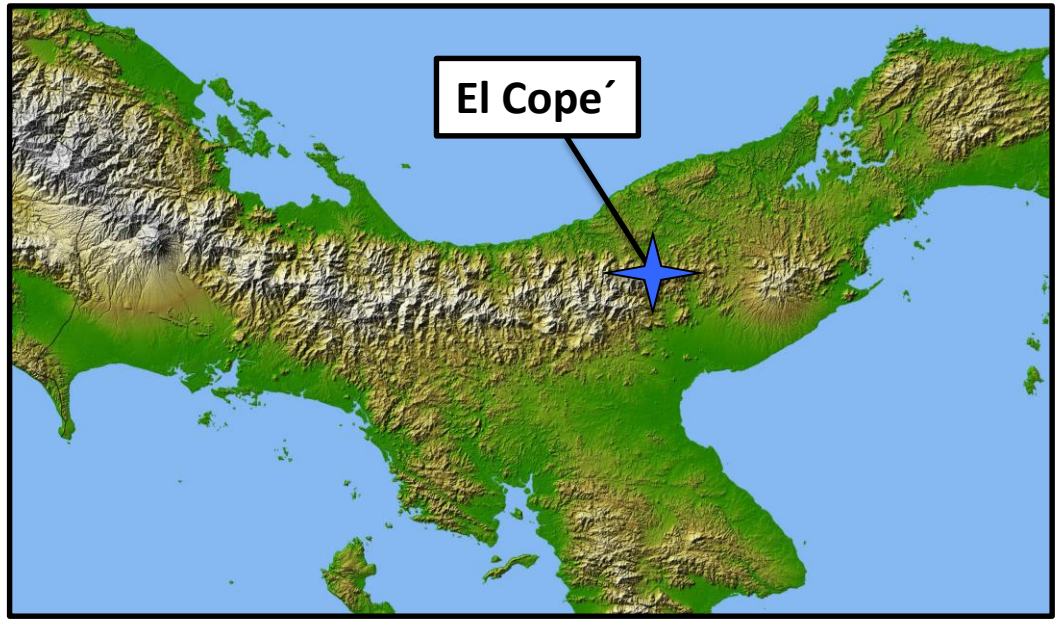
Frog defenses: skin secretions

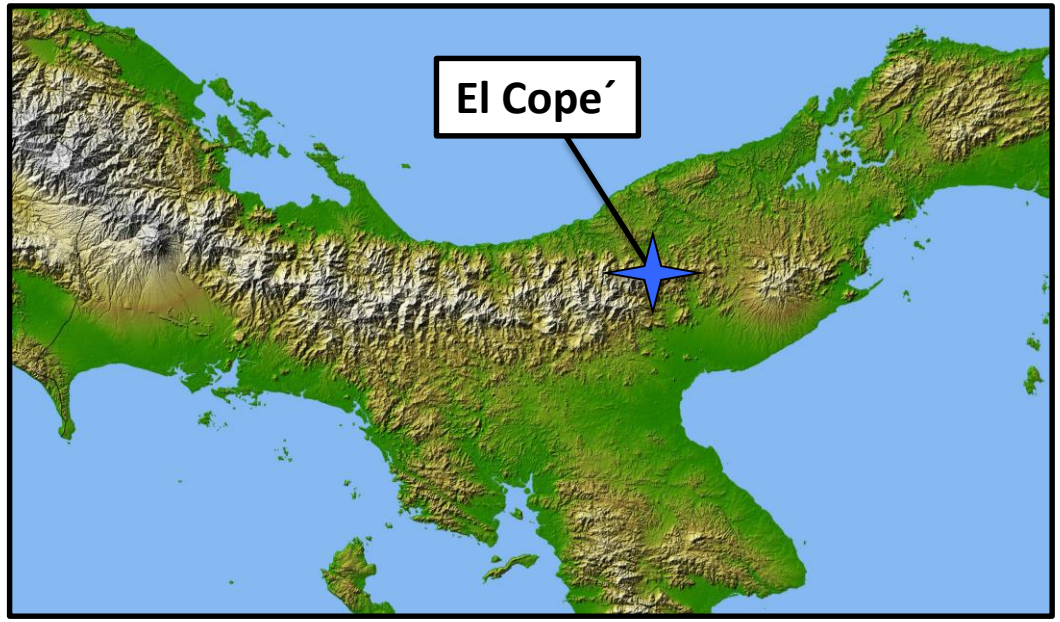


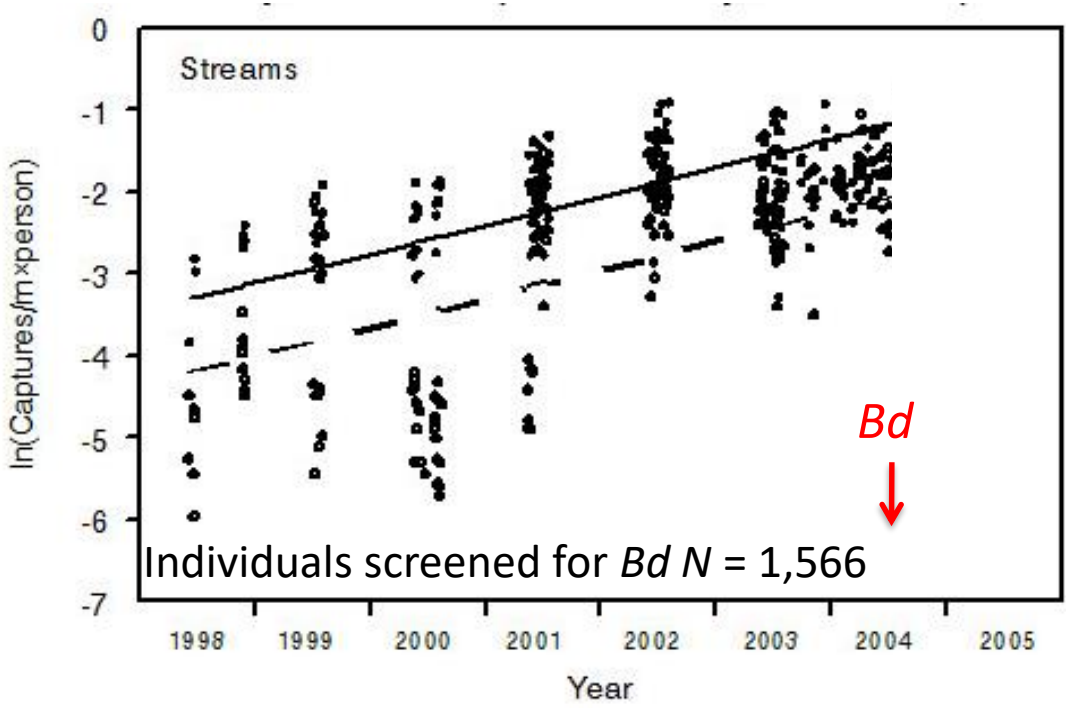
Challenge assay

Test for inhibition of pathogens

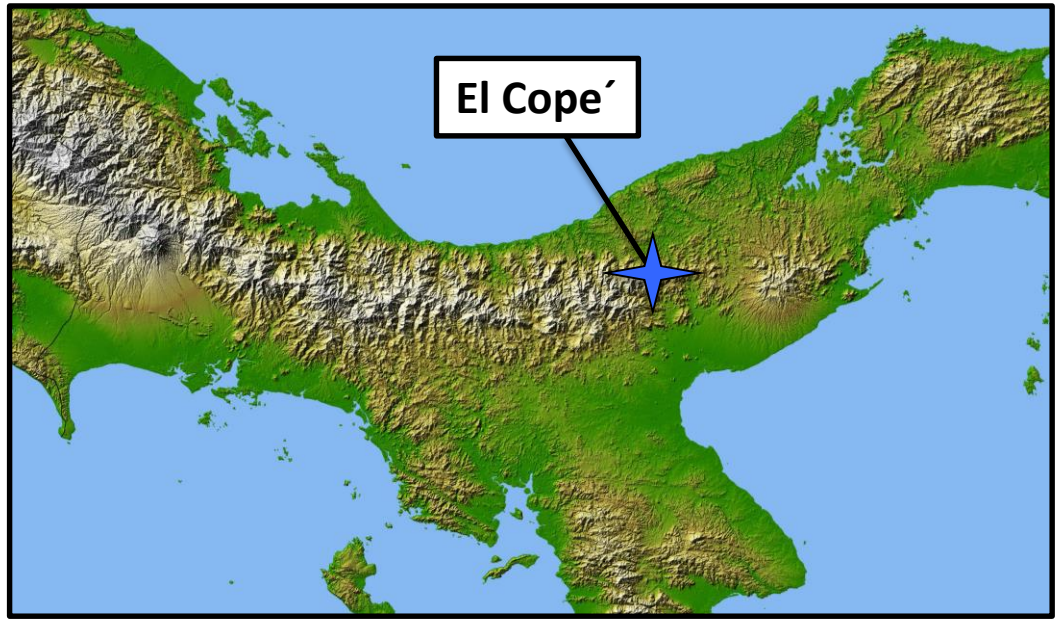
Woodhams, Voyles et al. *J. Wildlife Diseases* 2006

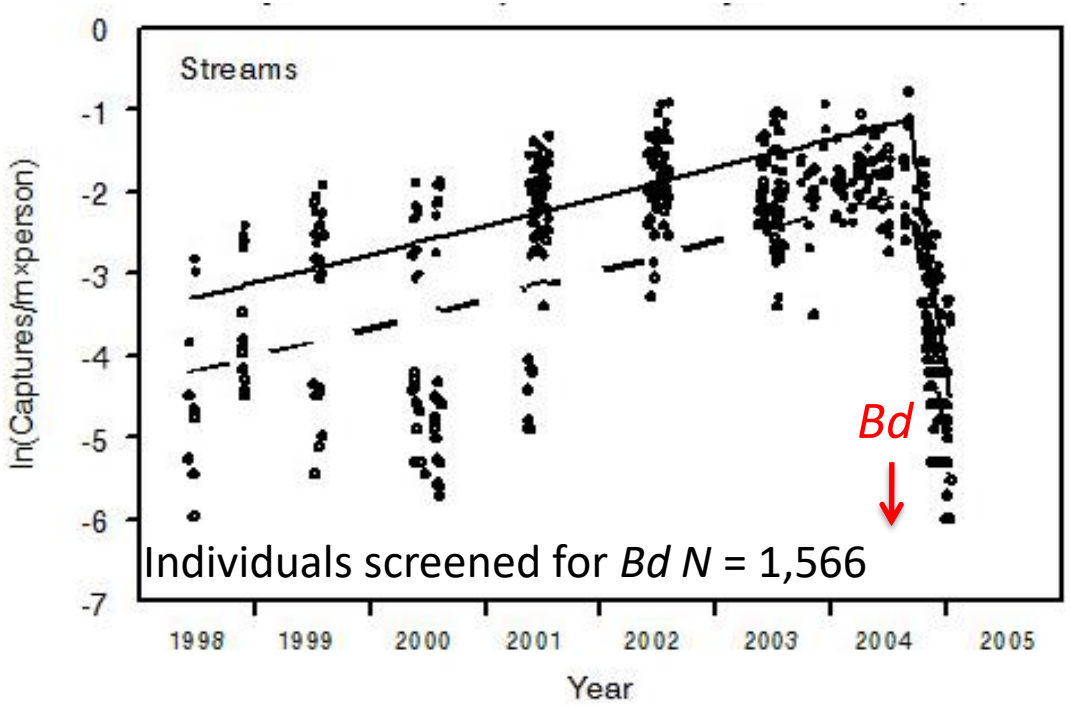

El Cope´





Lips et al. *PNAS* 2006





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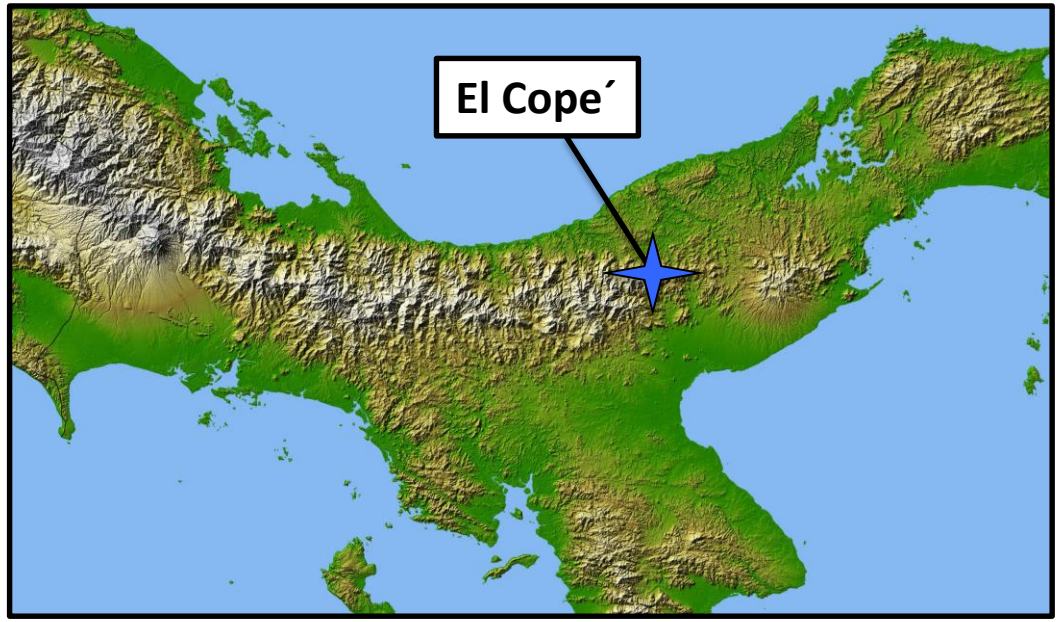

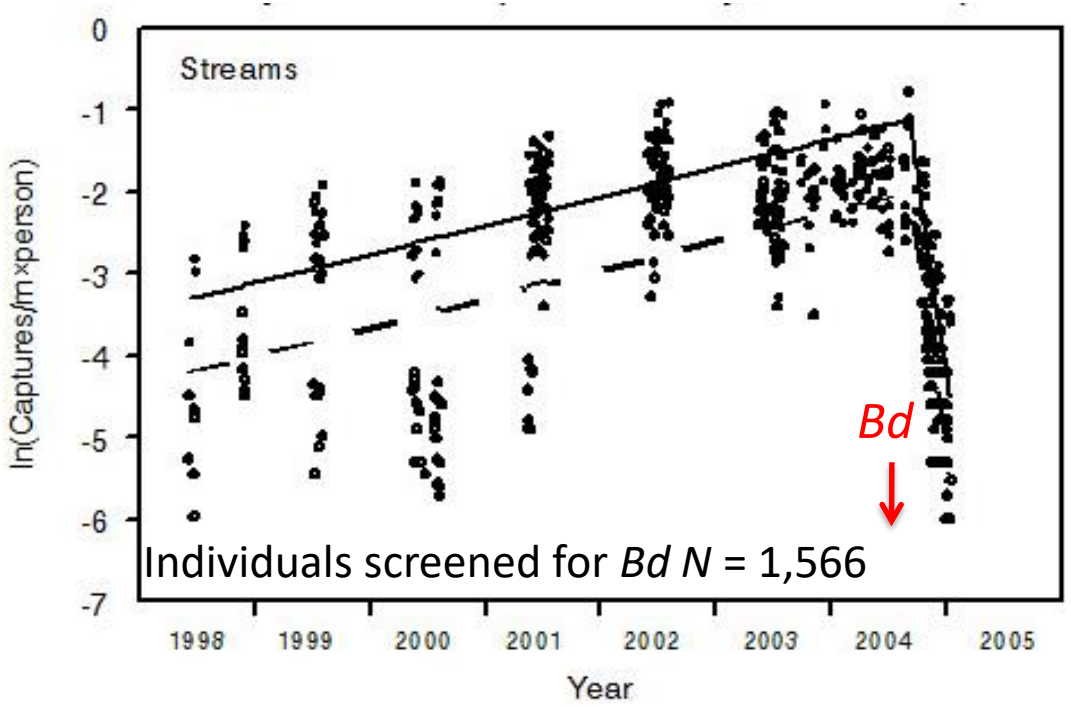

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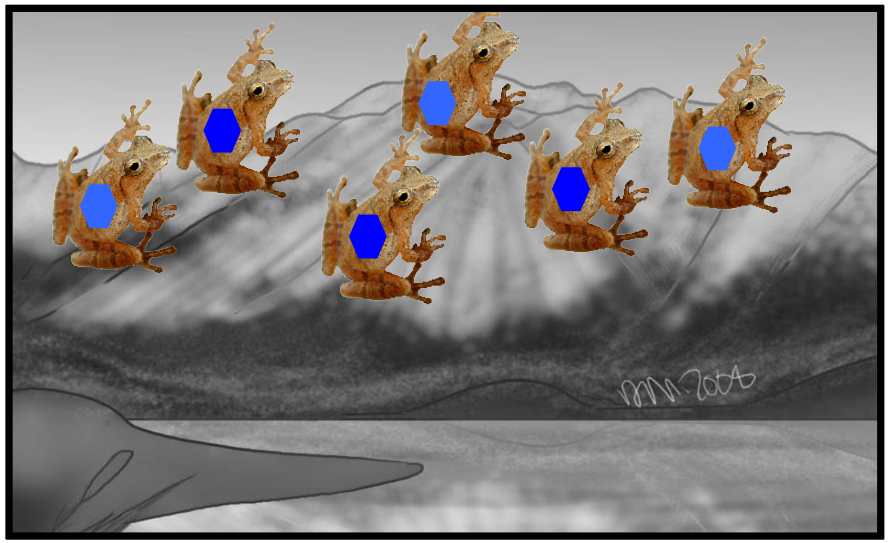
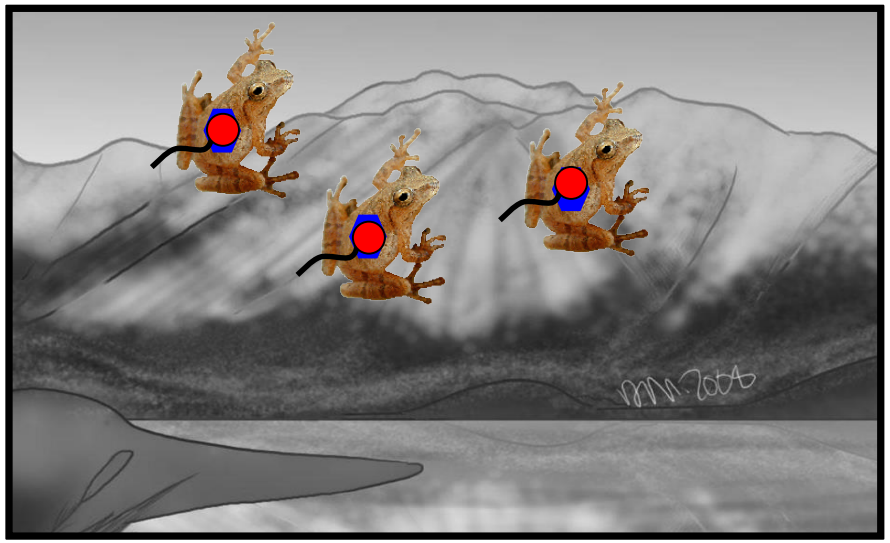


- Highly pathogenic *Bd*



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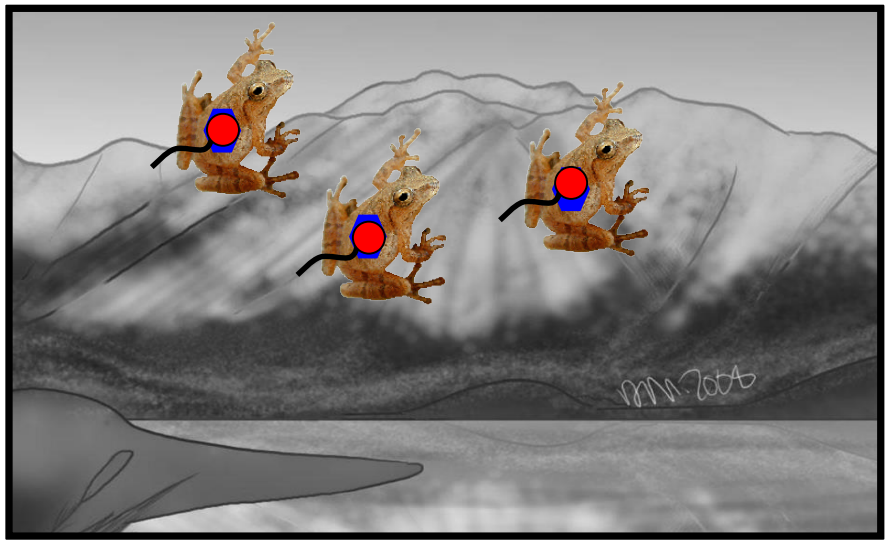
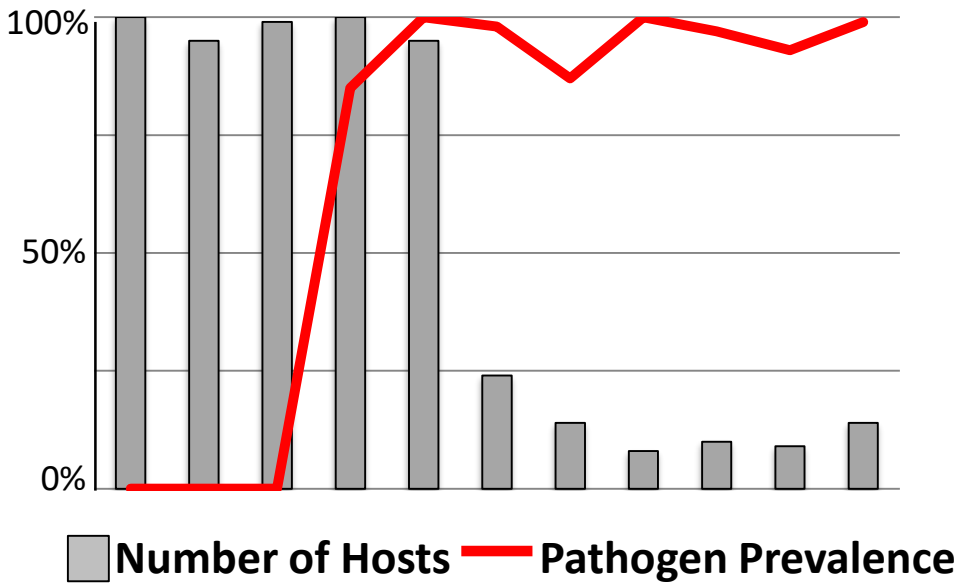


2004



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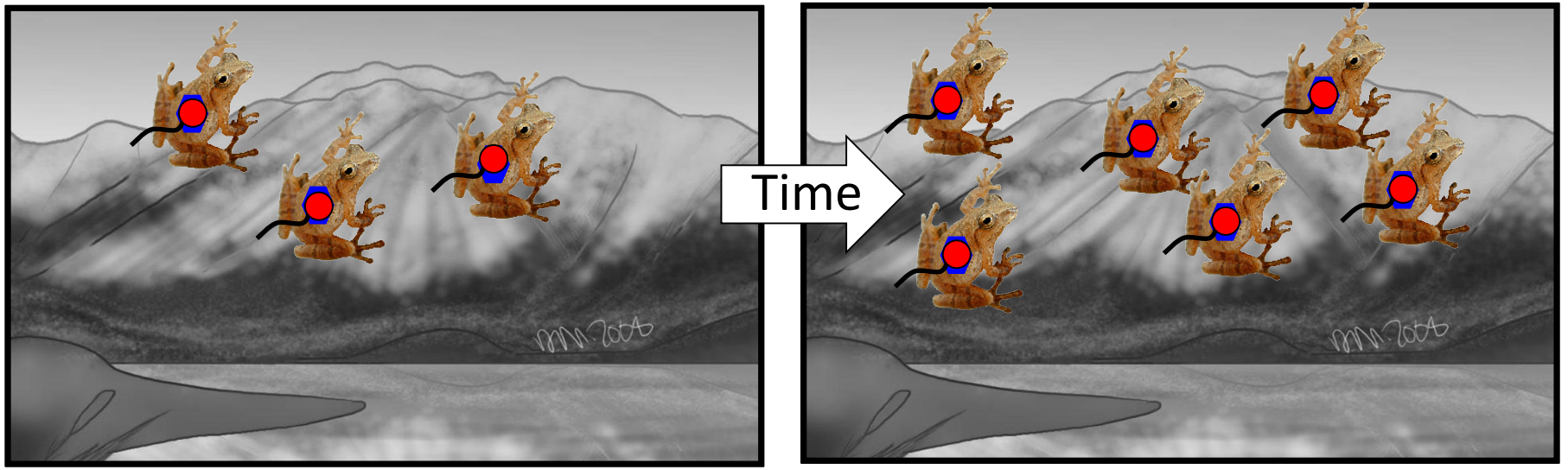
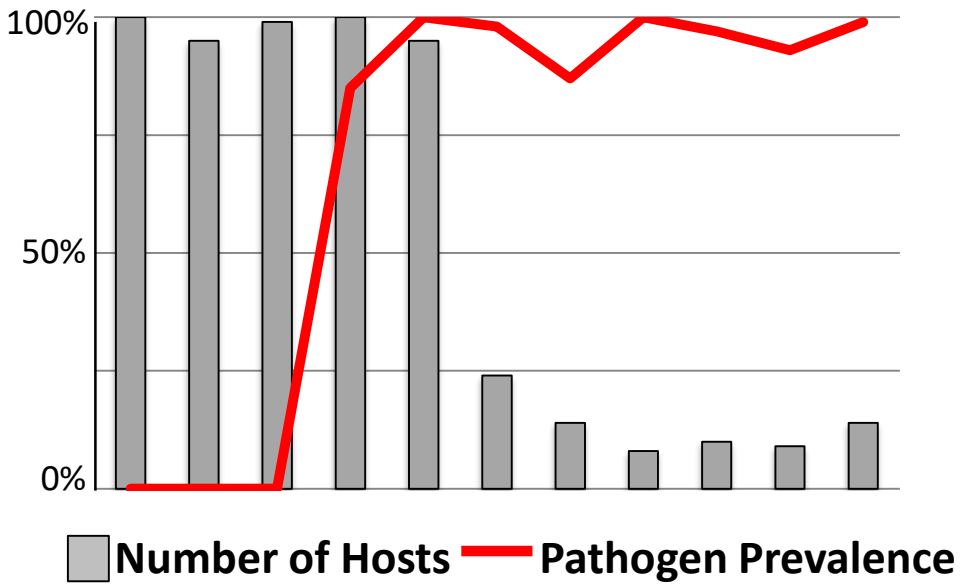


2004 2017



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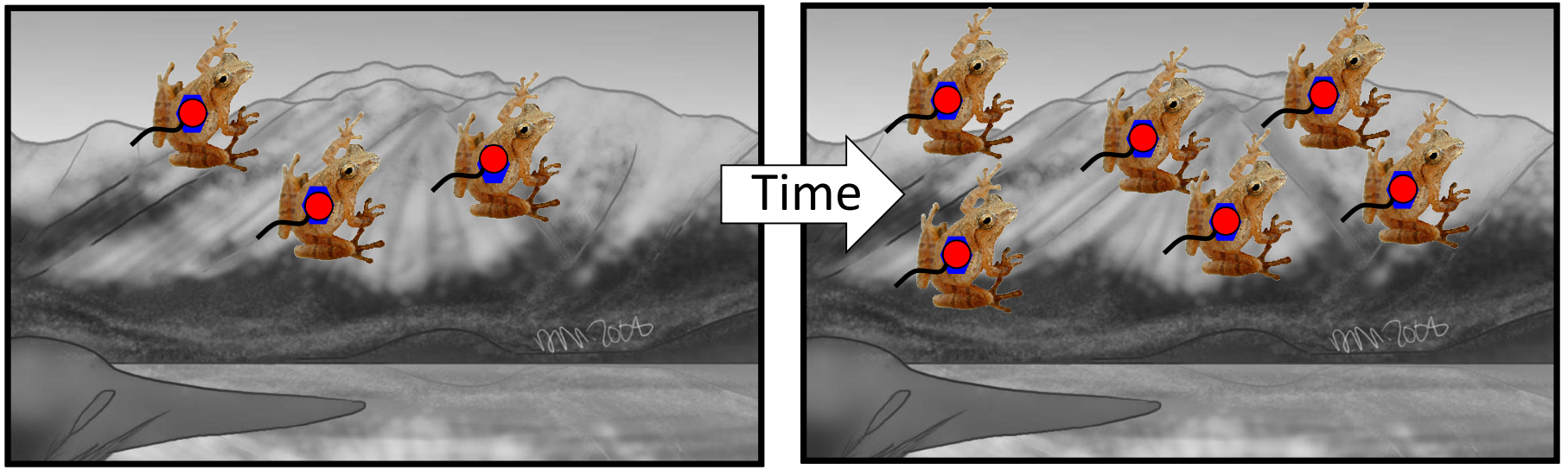
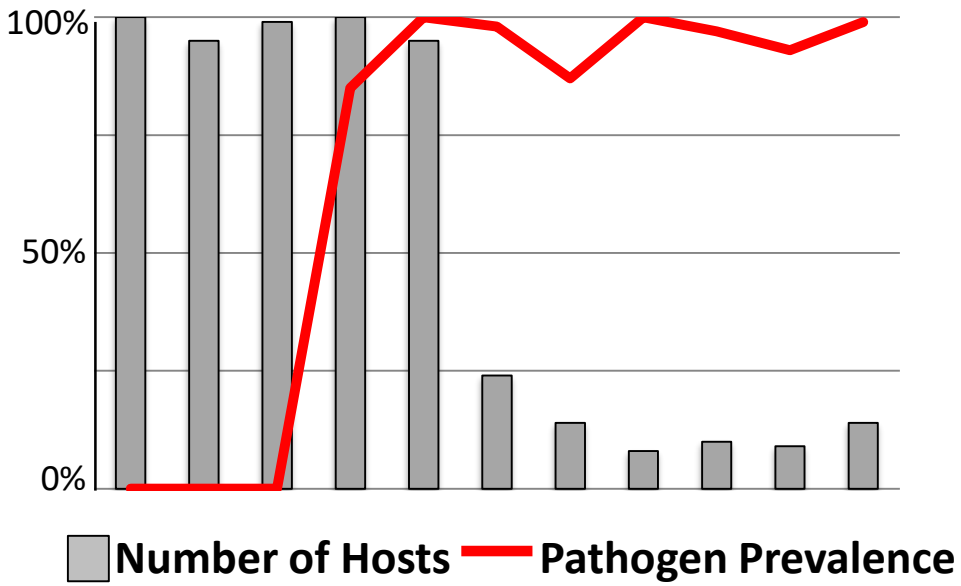
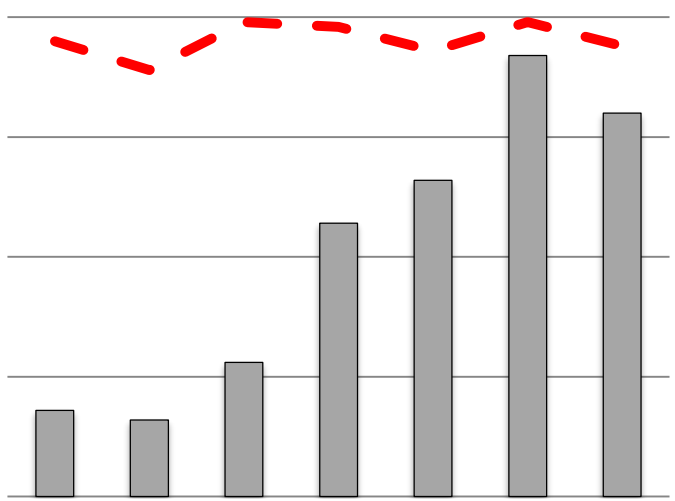
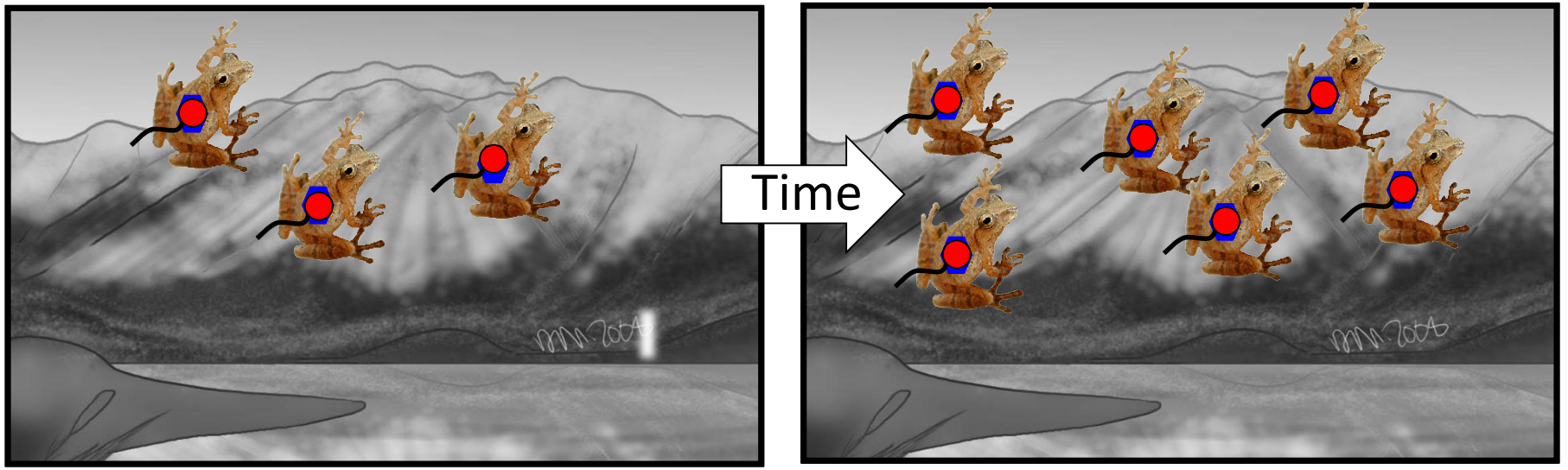


2004

2017

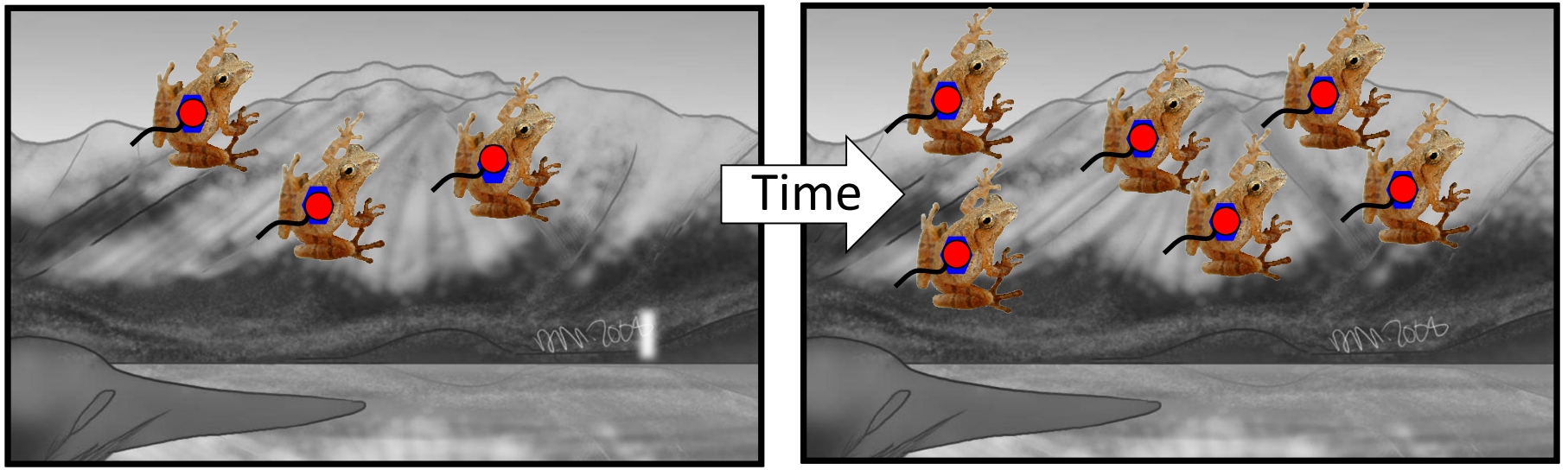






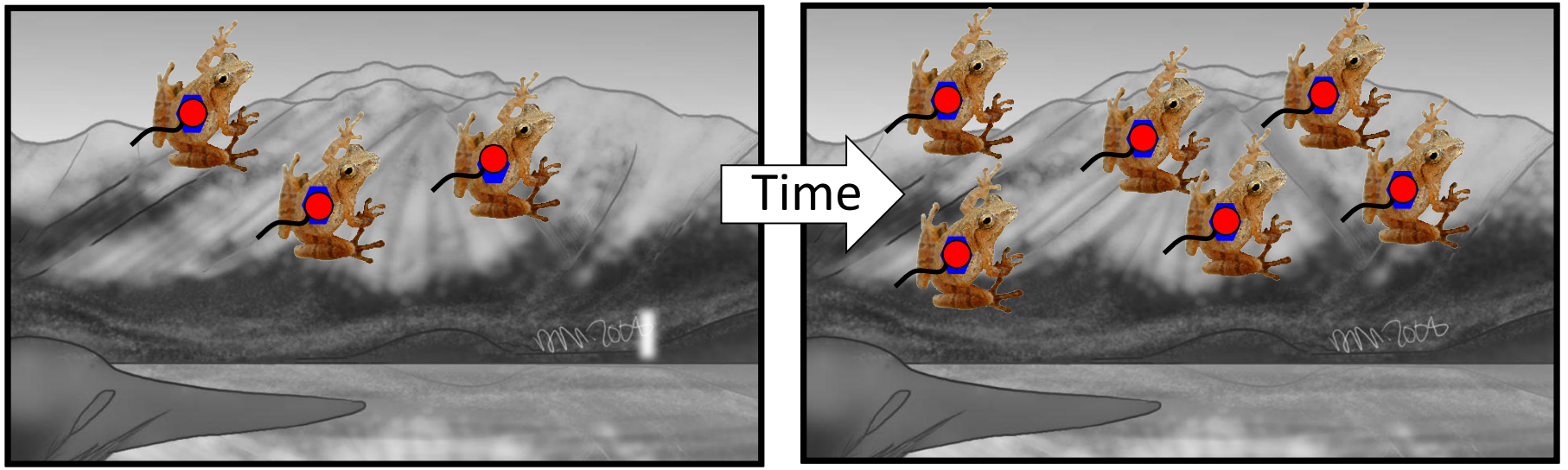
2004 2017

Host recovery?



Host recovery?

Lower pathogen virulence?

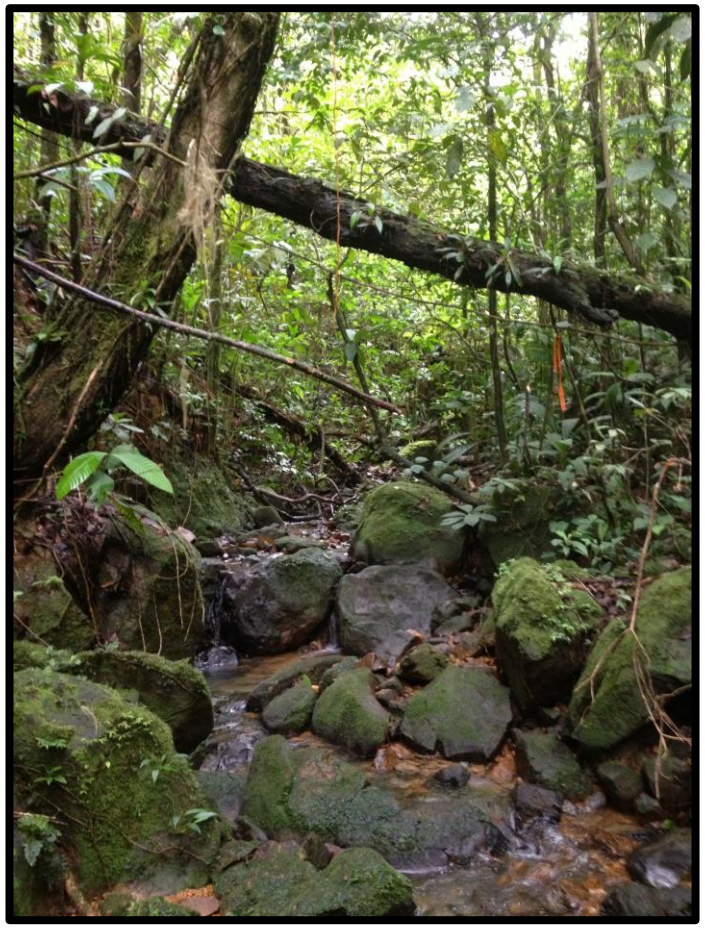


Host recovery?

Lower pathogen virulence?

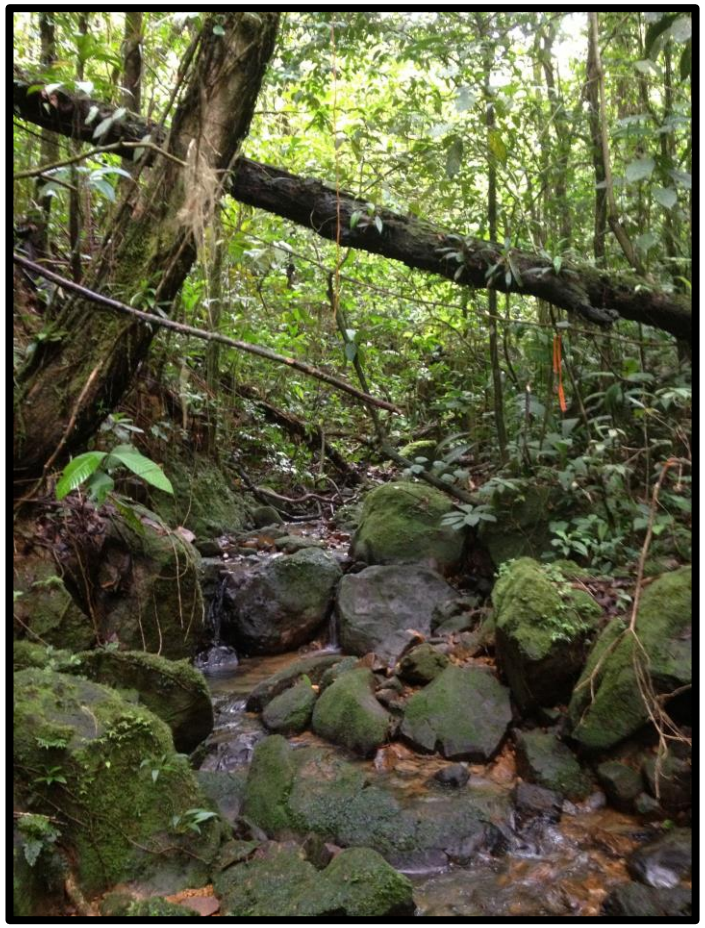
Increased host resistance?

Methods



- Long-term field surveys
- Established transects

Methods



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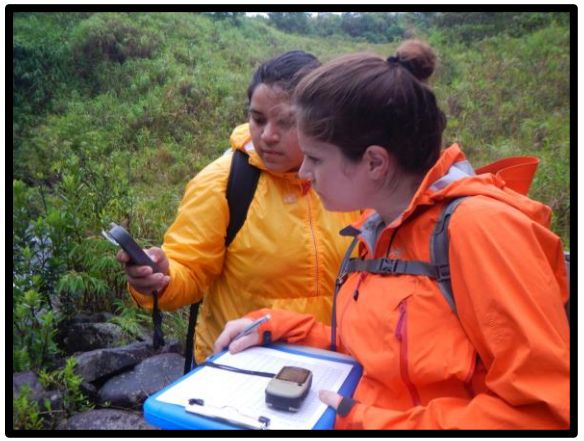
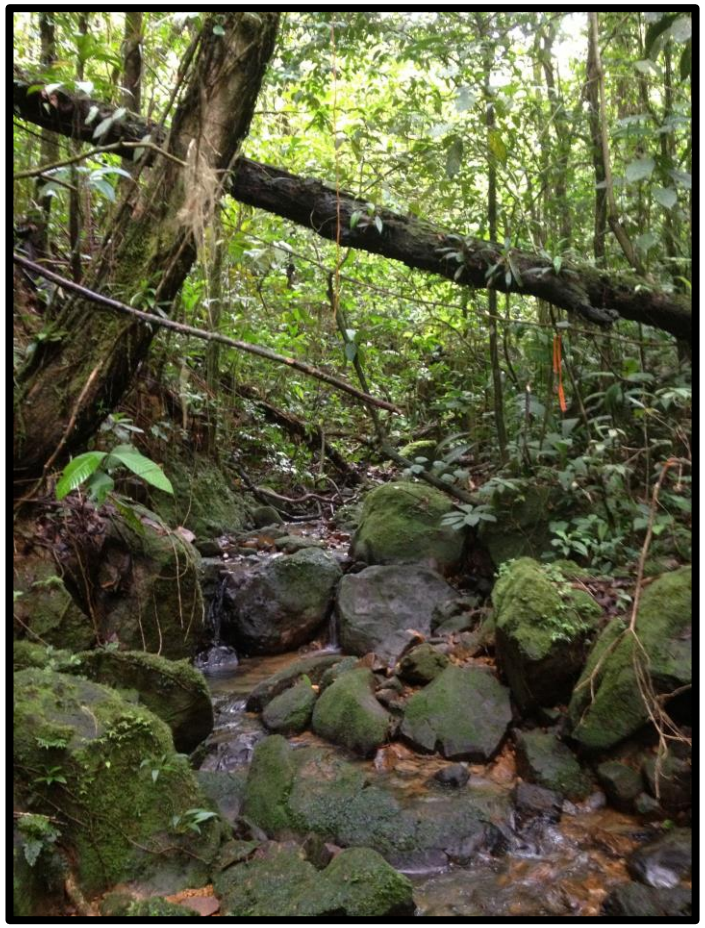


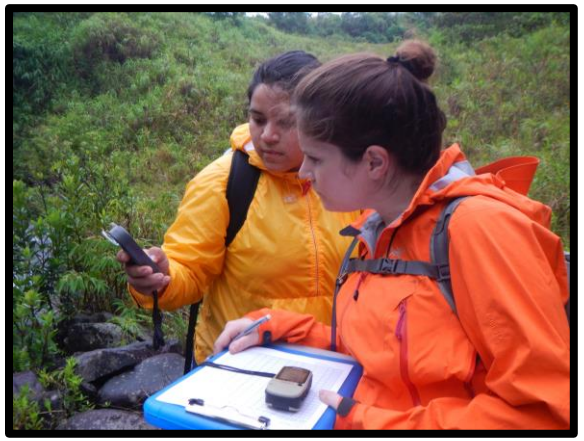
- Record a range of ecological variables

- Record species, sex, mass, SVL, body temperature, microhabitat use

Methods

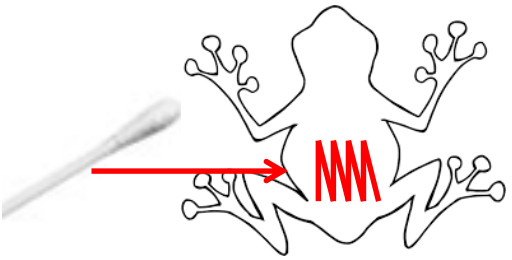


- Long-term field surveys
- Established transects



- Record a range of ecological variables

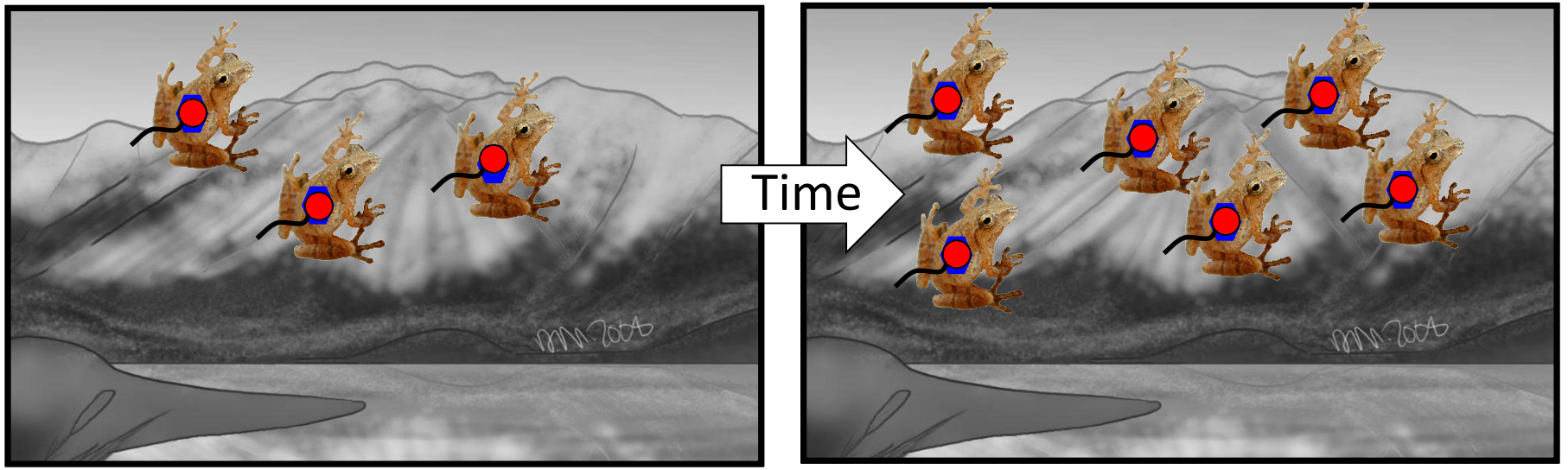
- Record species, sex, mass, SVL, body temperature, microhabitat use



- *Bd* diagnostic sample
- Skin secretion sample

- Post-mortem, isolate *Bd*

- Highly pathogenic *Bd*



2004

2017

Infection patterns

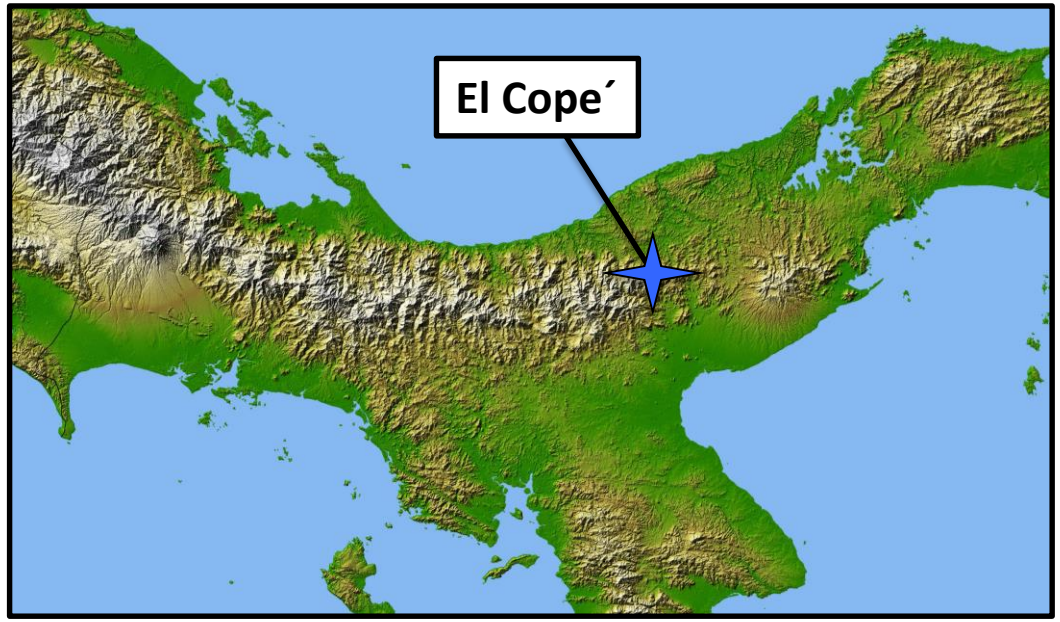
Historic *Bd*

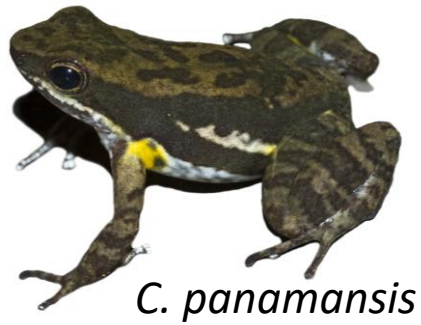
Historic secretions

Infection patterns

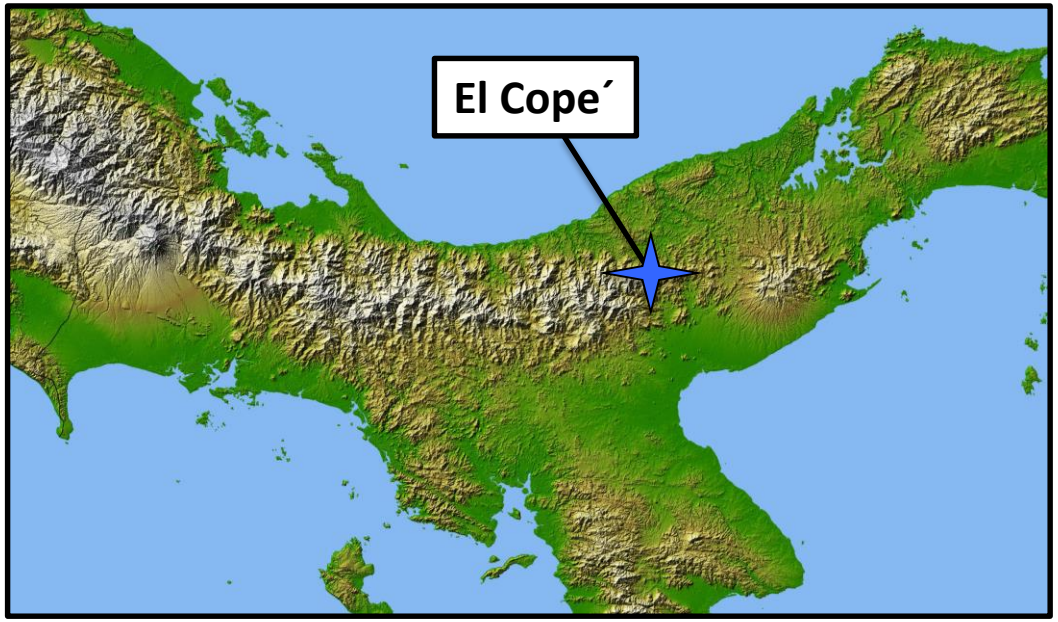
Contemporary *Bd*

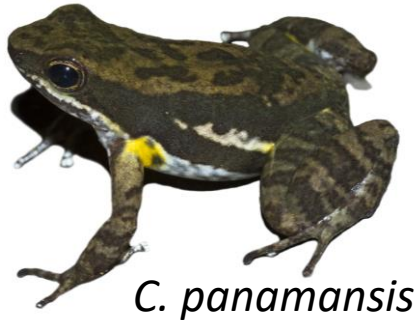
Contemporary secretions





C. panamansis





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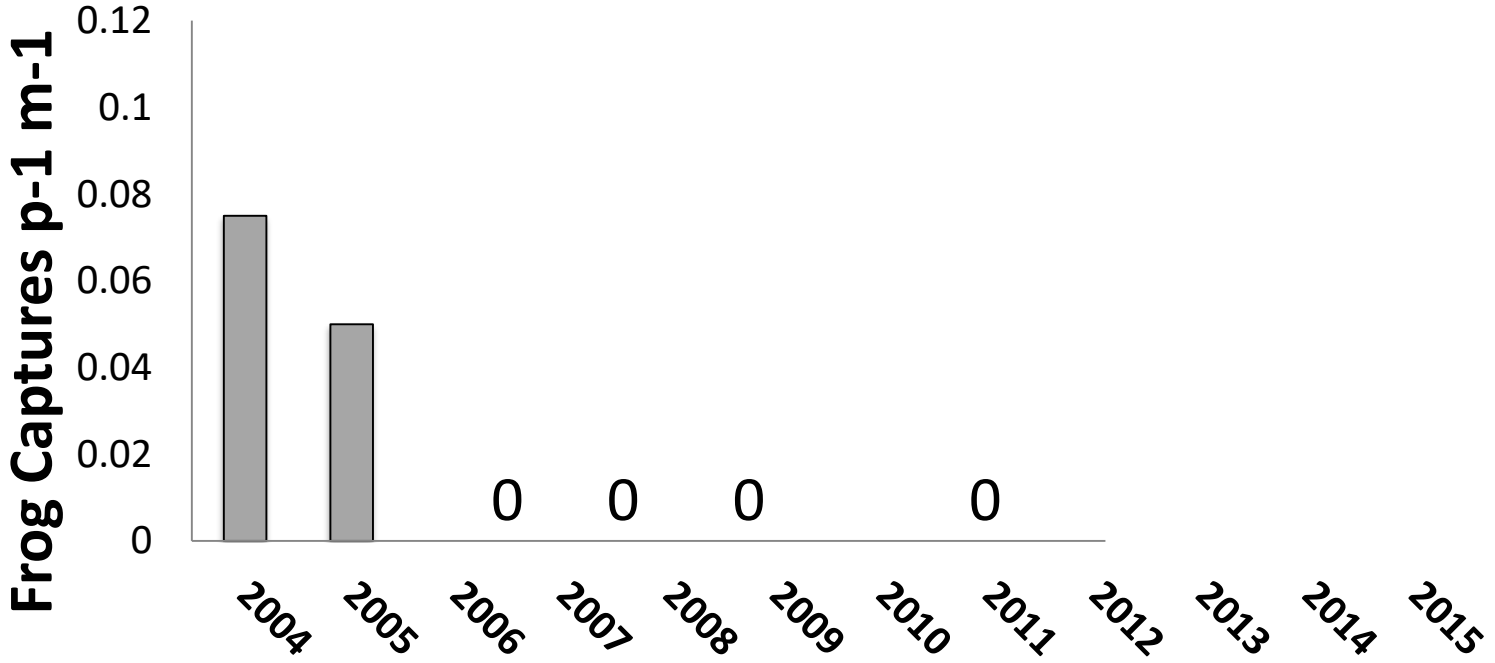

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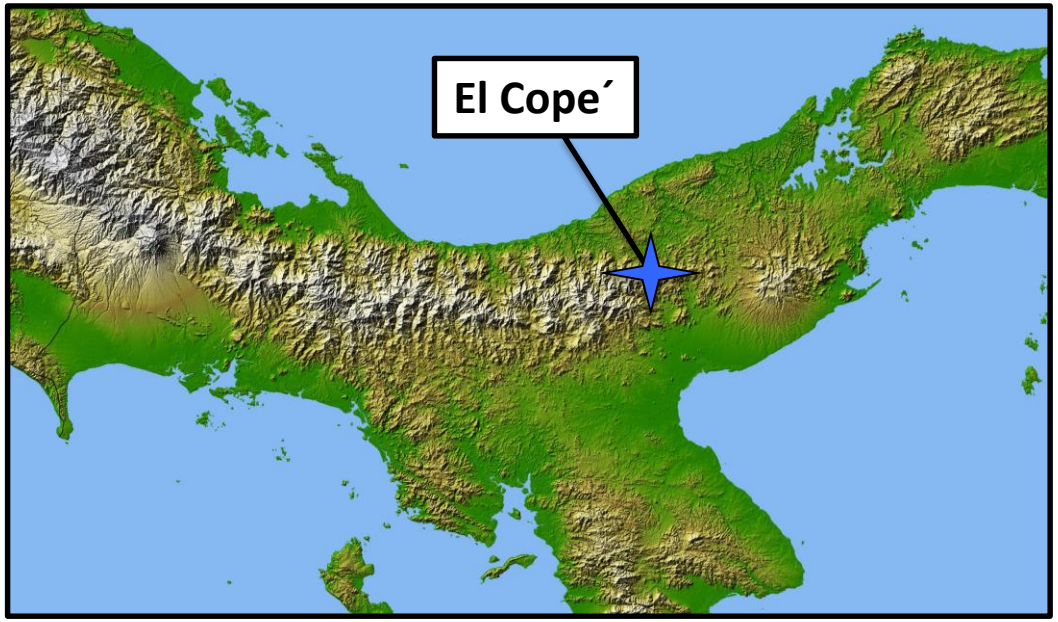

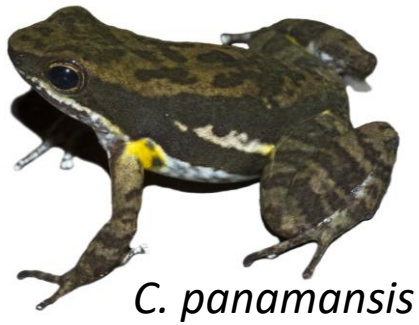

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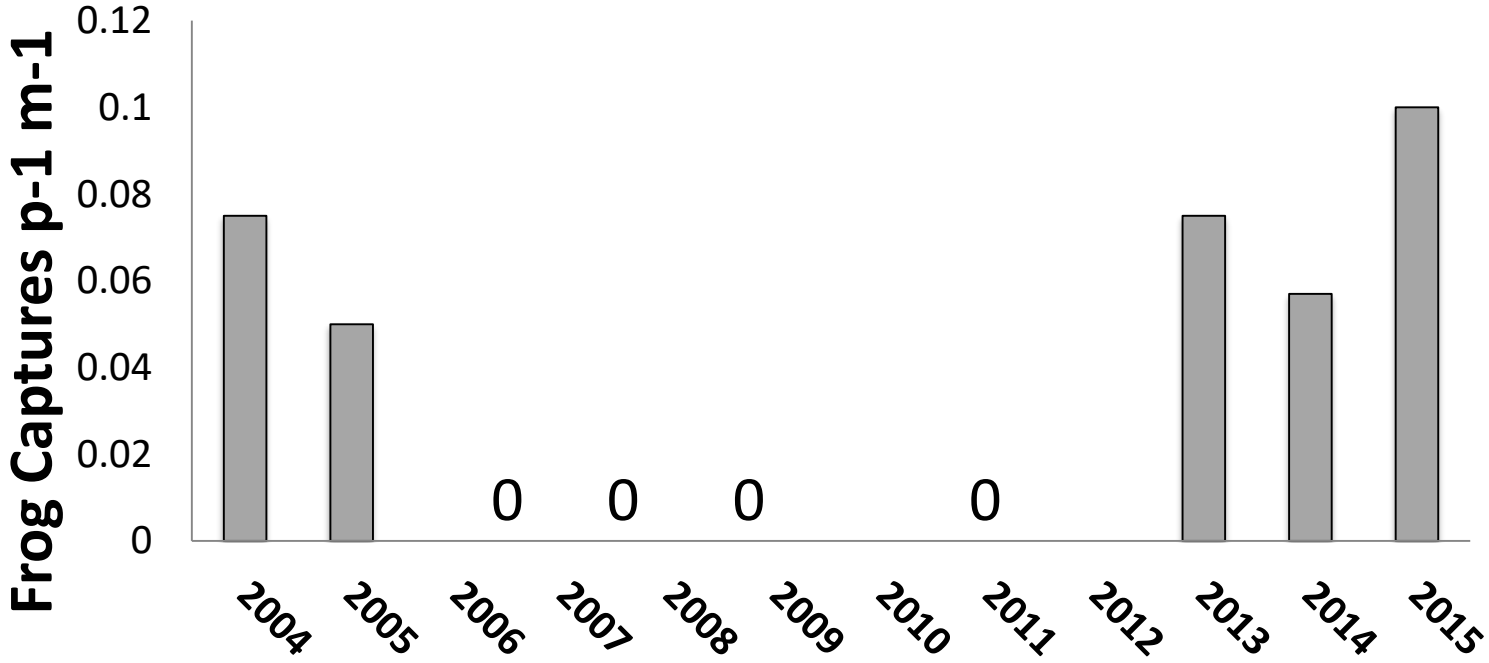

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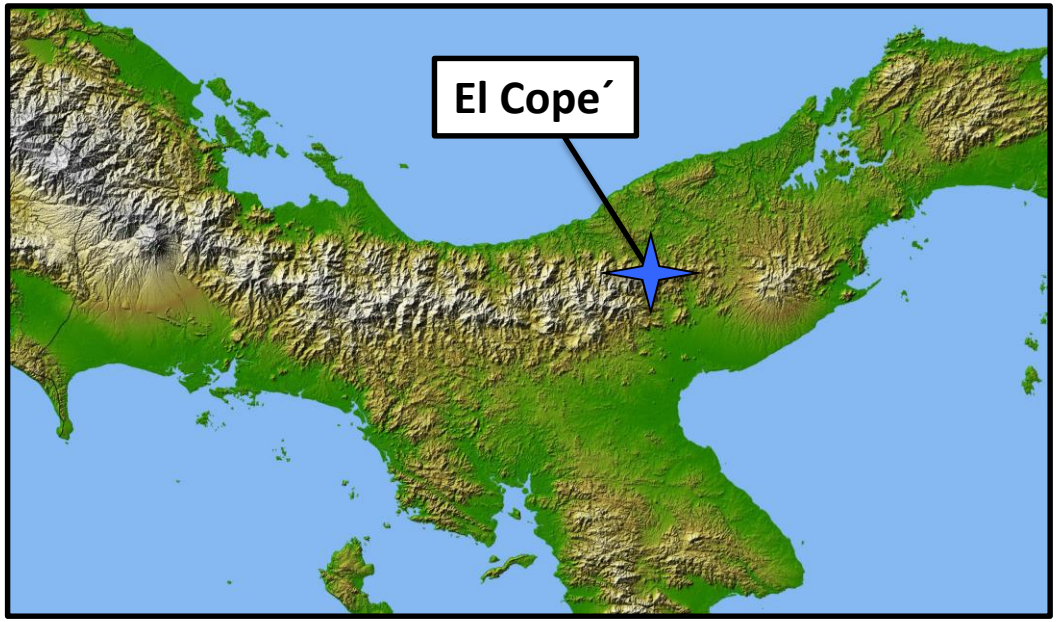

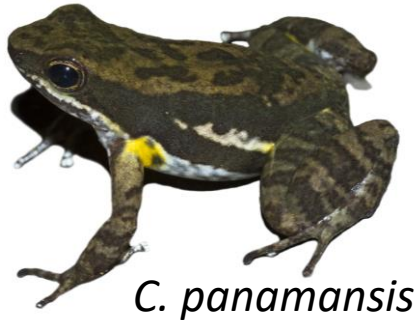

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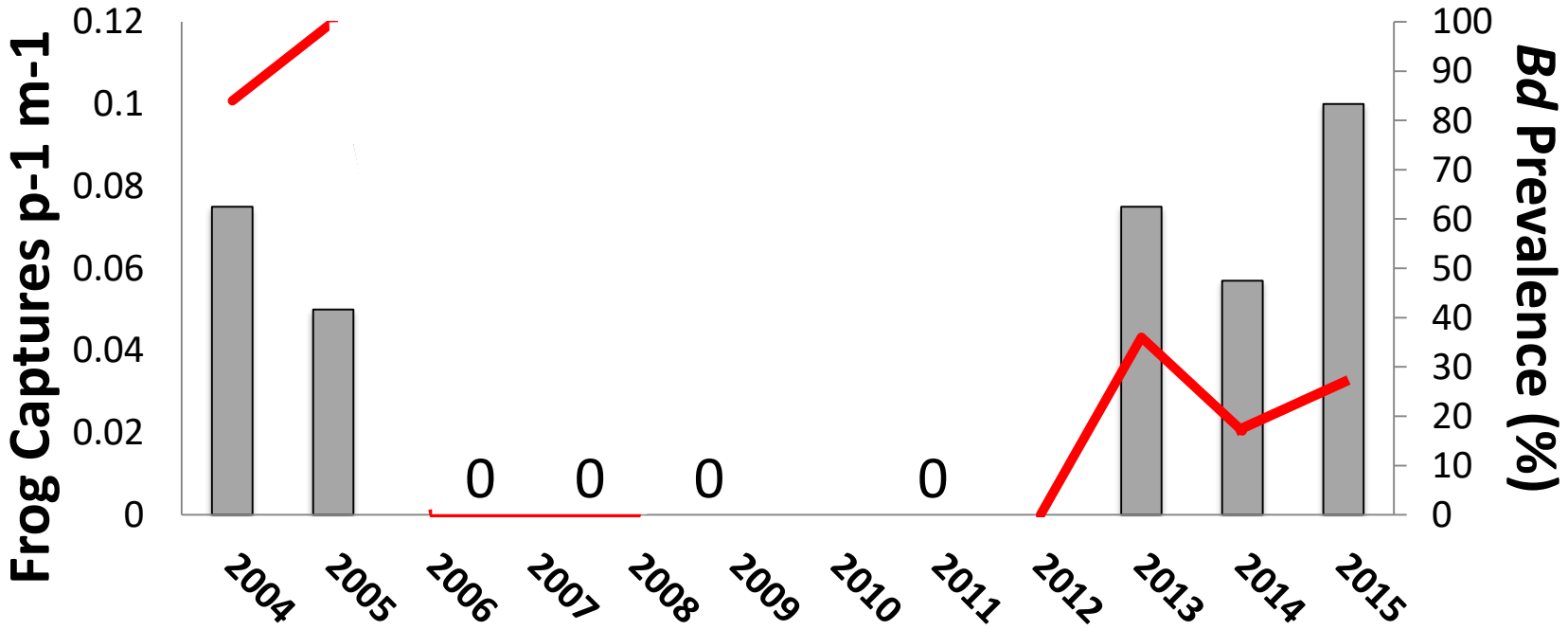

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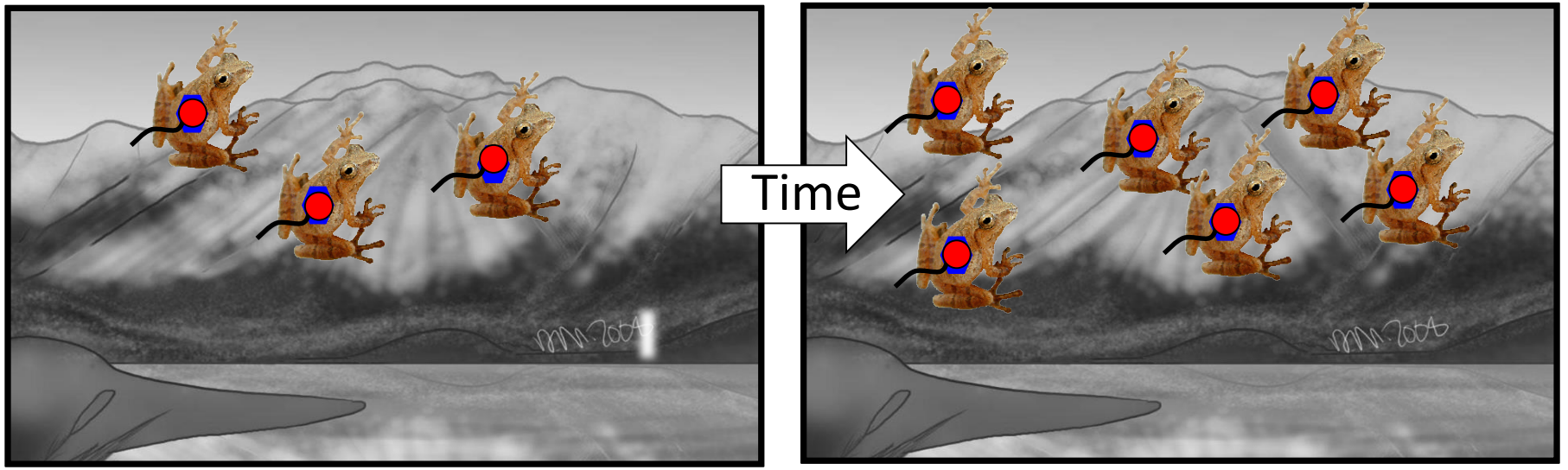
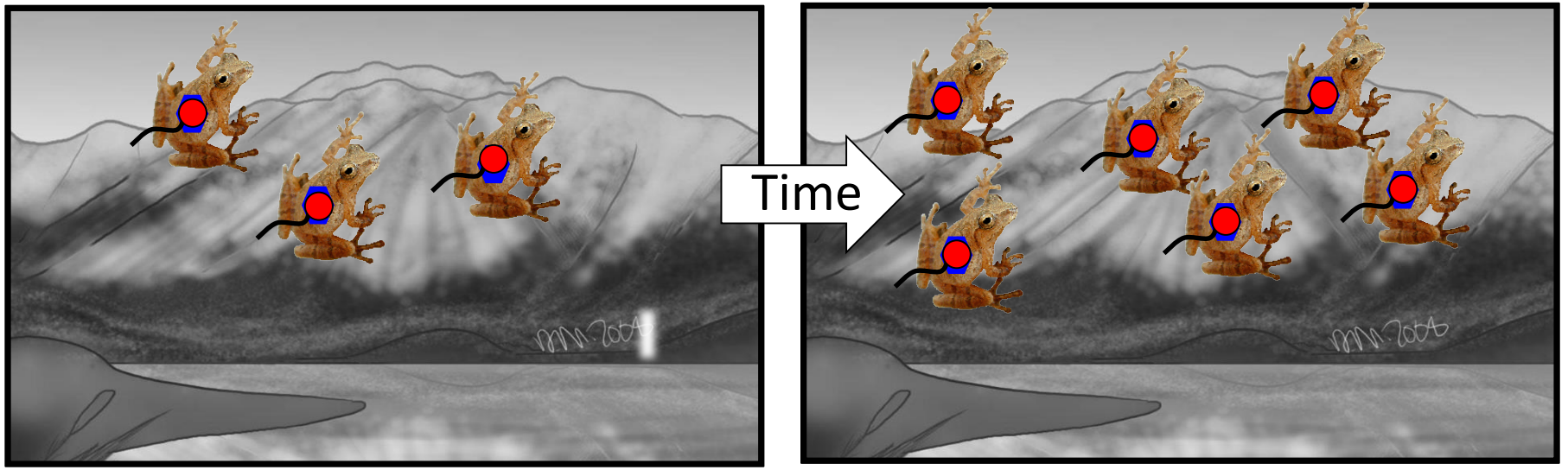


Host recovery

Lower pathogen virulence?

Increased host resistance?



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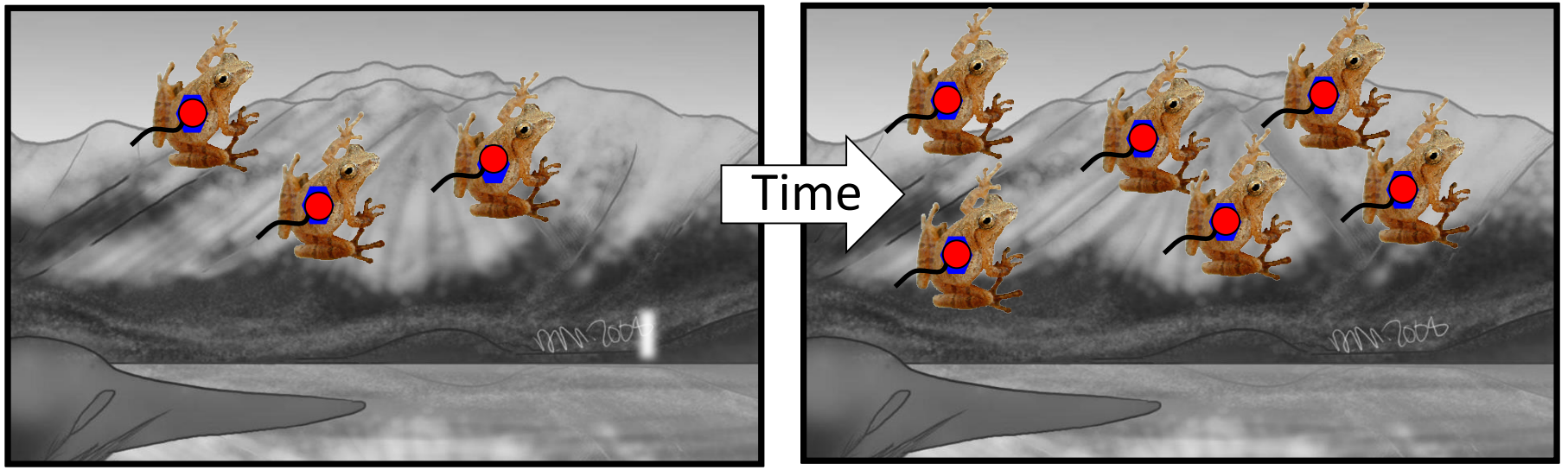


✓ **Host recovery, low *Bd* prevalence**

Lower pathogen virulence?

Increased host resistance?

Infection patterns

Historic *Bd*

Historic secretions

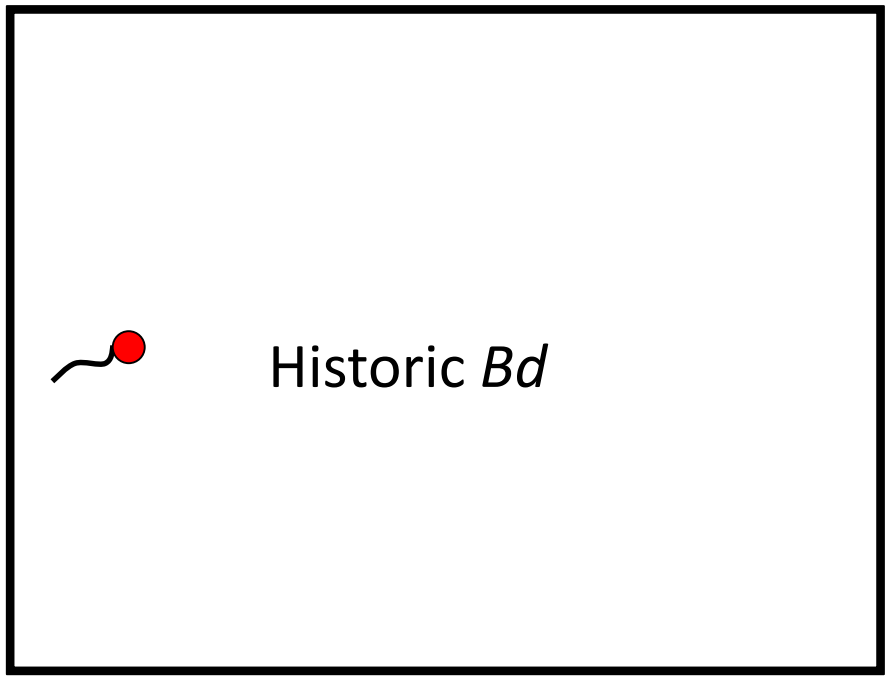
2004

Infection patterns

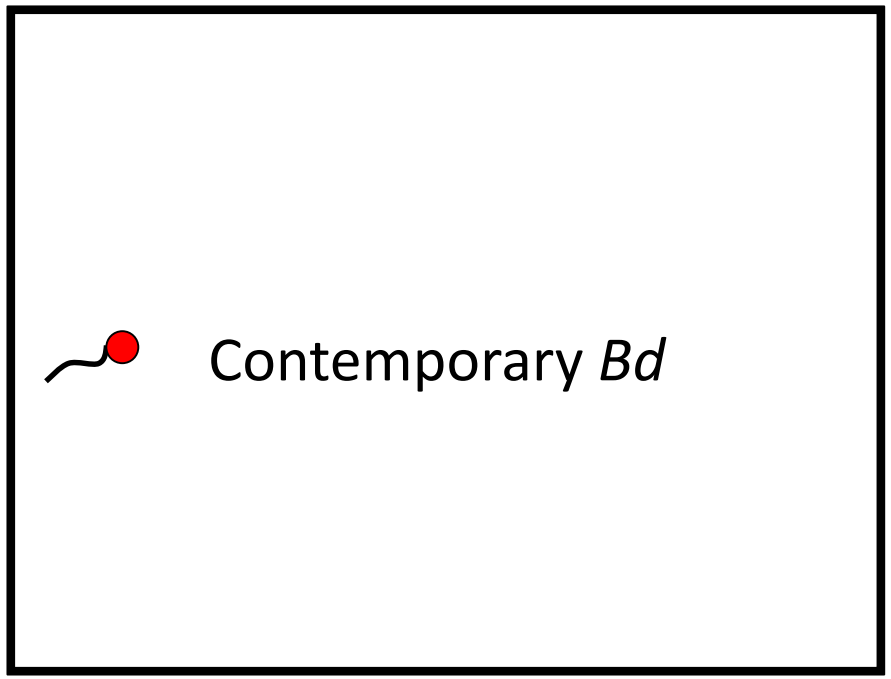
Contemporary *Bd*

Contemporary secretions

2017



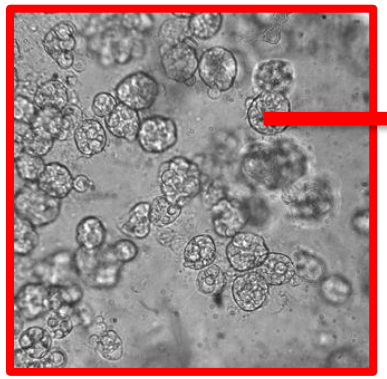
2004



2017

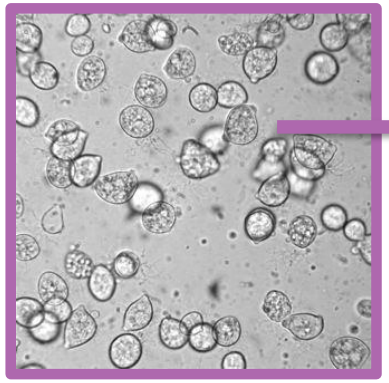
Are Contemporary *Bd* isolates less pathogenic?

3 Historic *Bd* Isolates



N = 10 frogs
per group

3 Contemporary *Bd* Isolates



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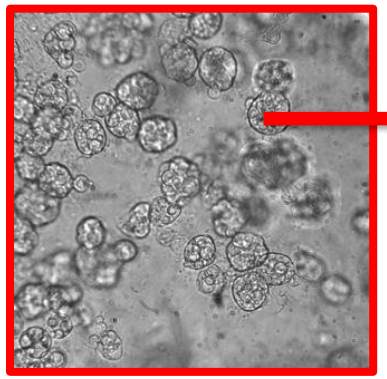

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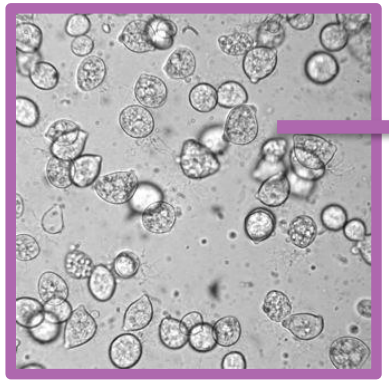

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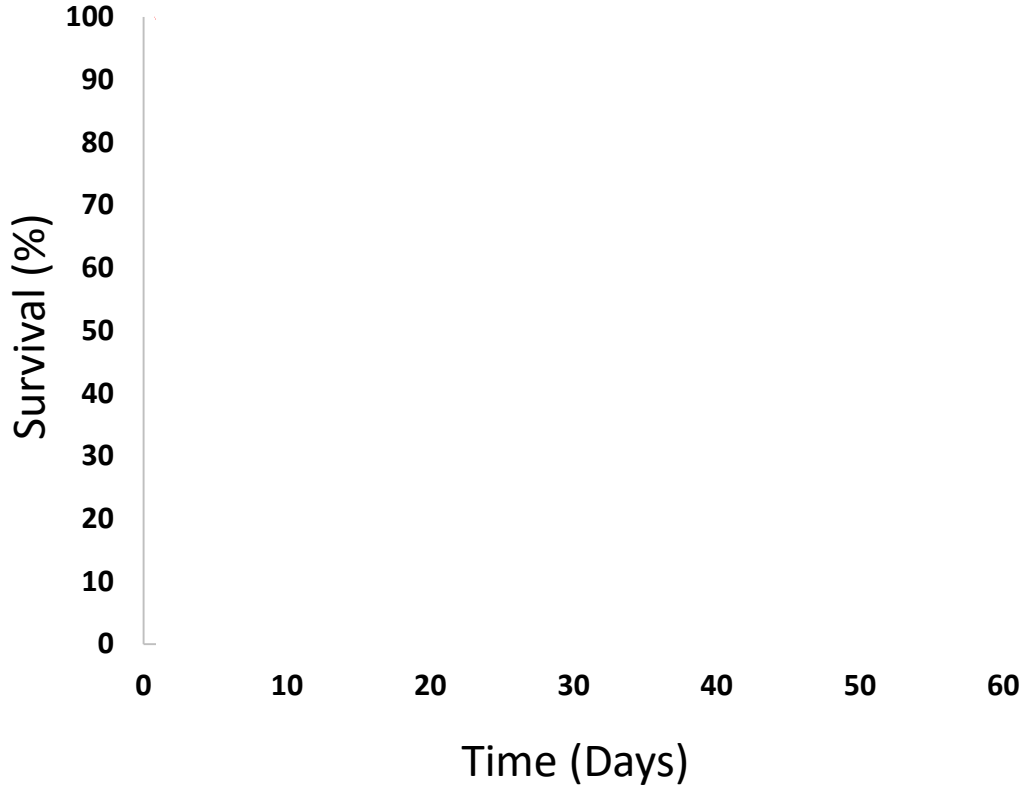

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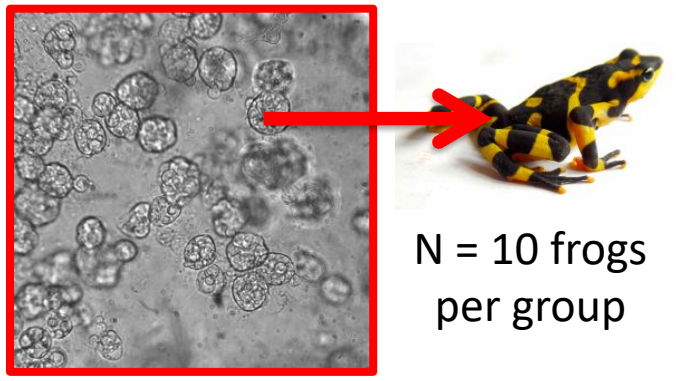

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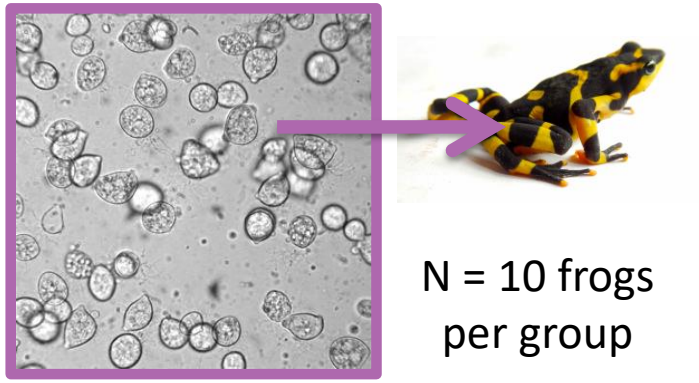

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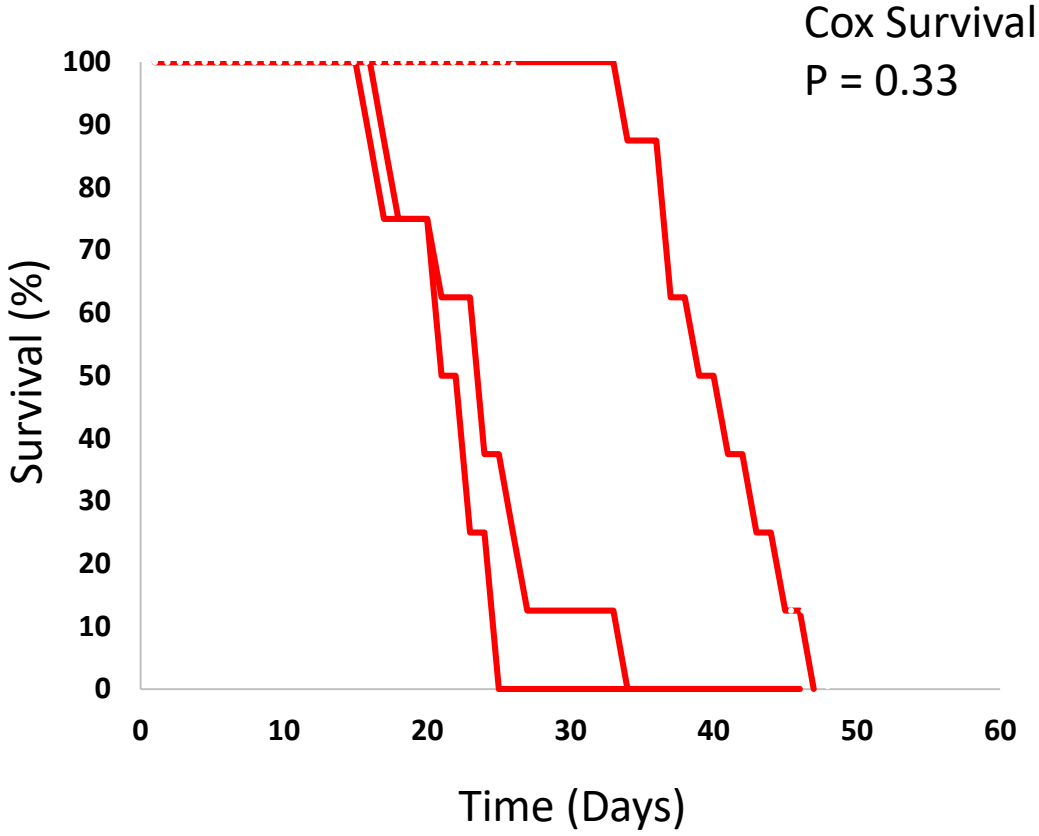

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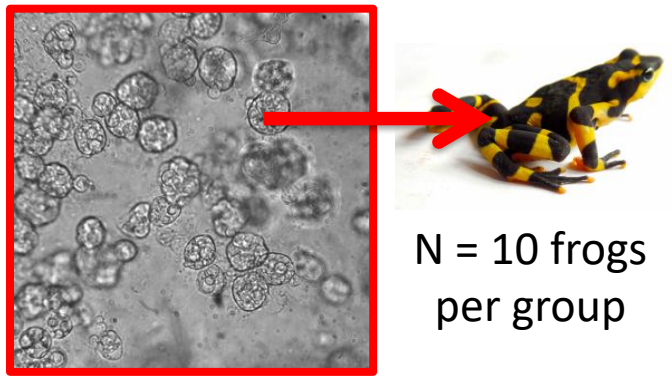

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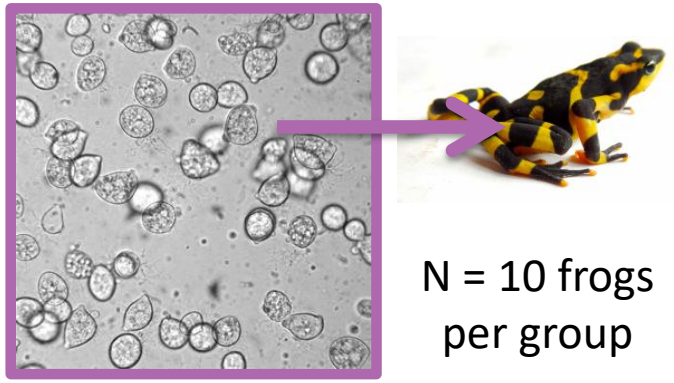

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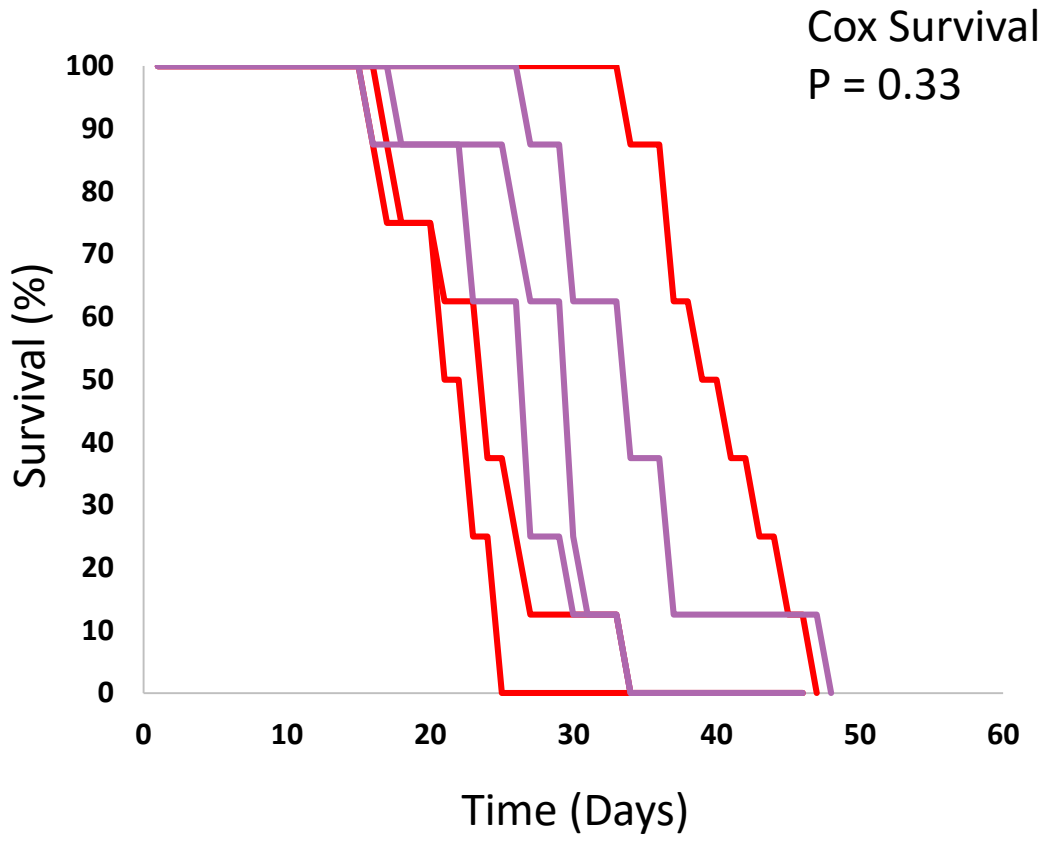

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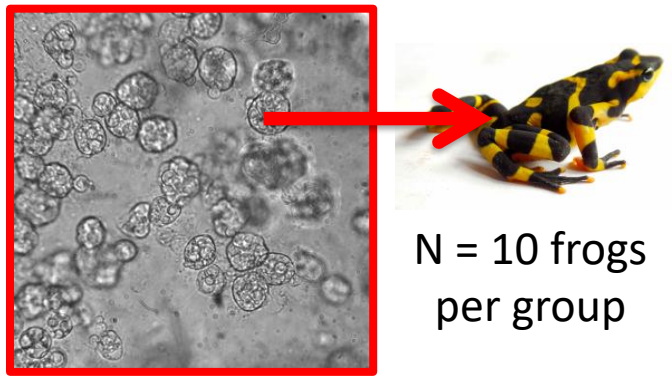

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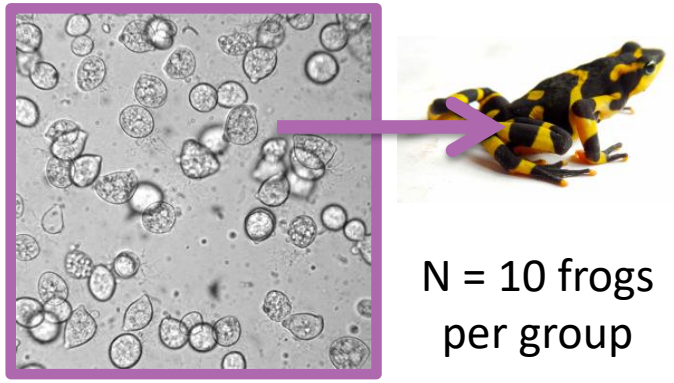

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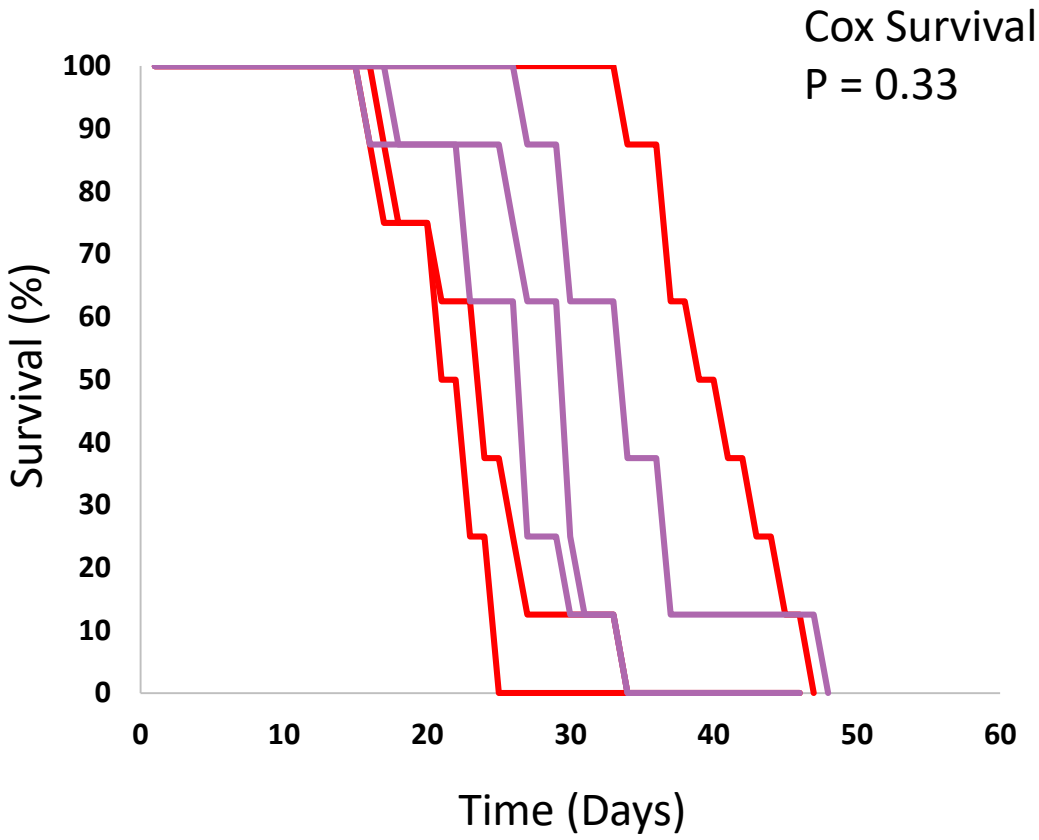
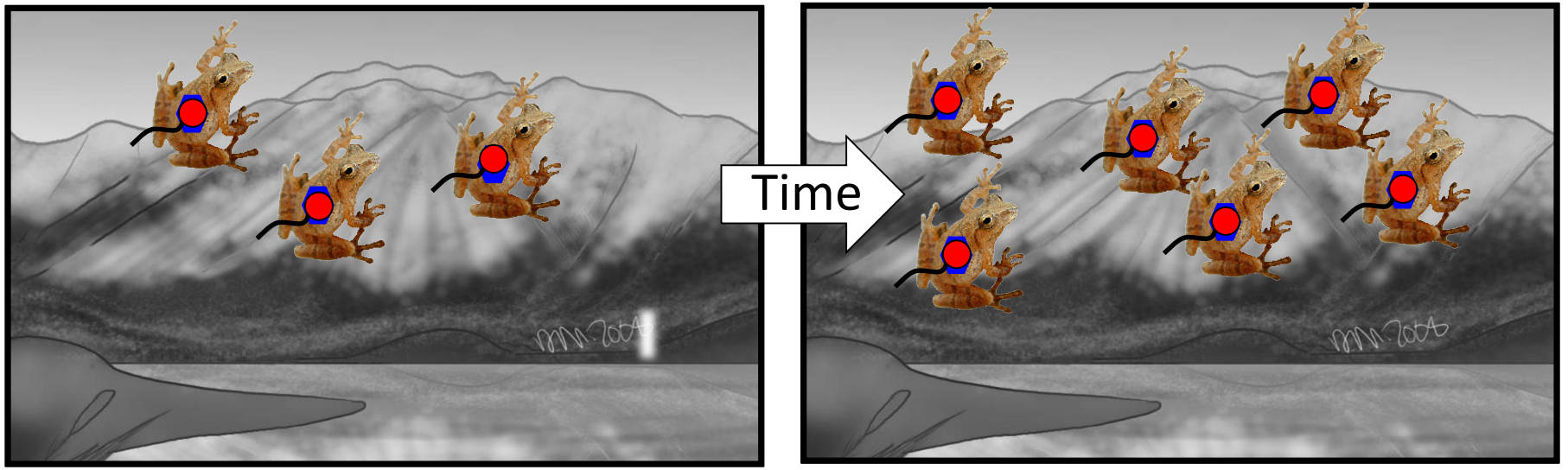


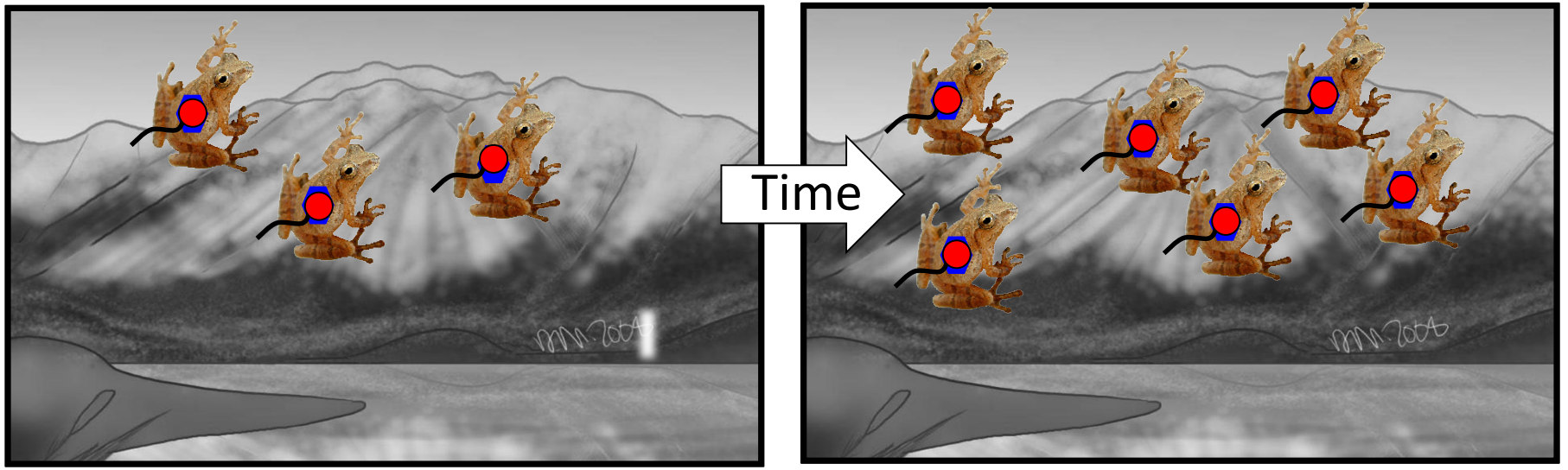
No differences between Historic and Contemporary *Bd*



✓ **Host recovery, low *Bd* prevalence**

Lower pathogen virulence?

Increased host resistance?



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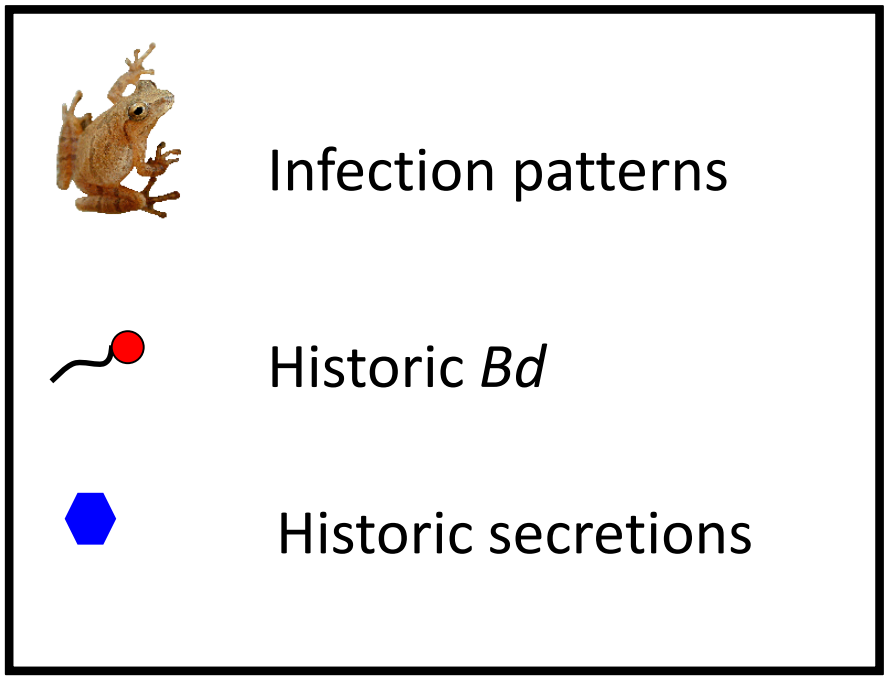
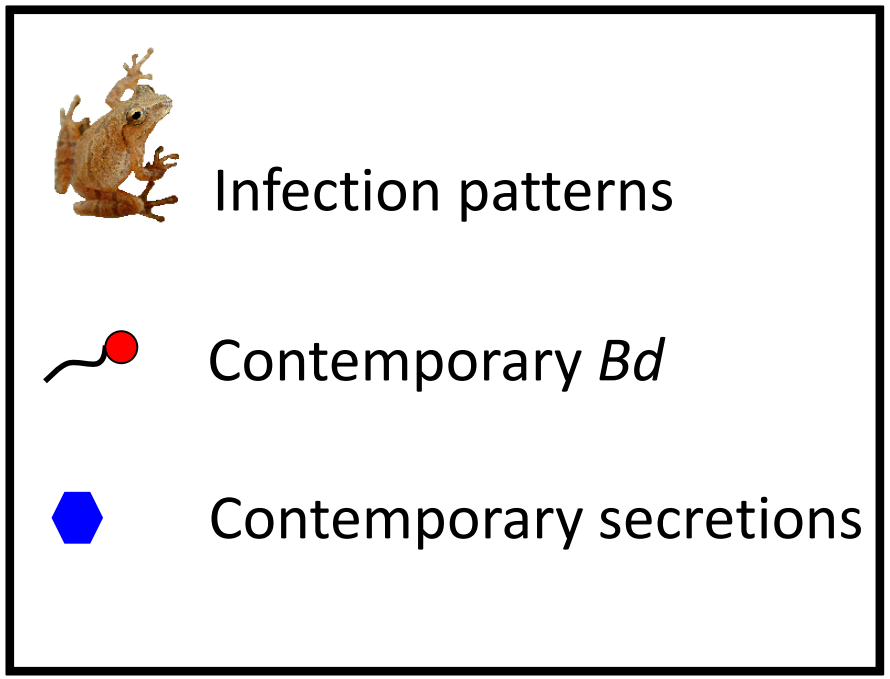
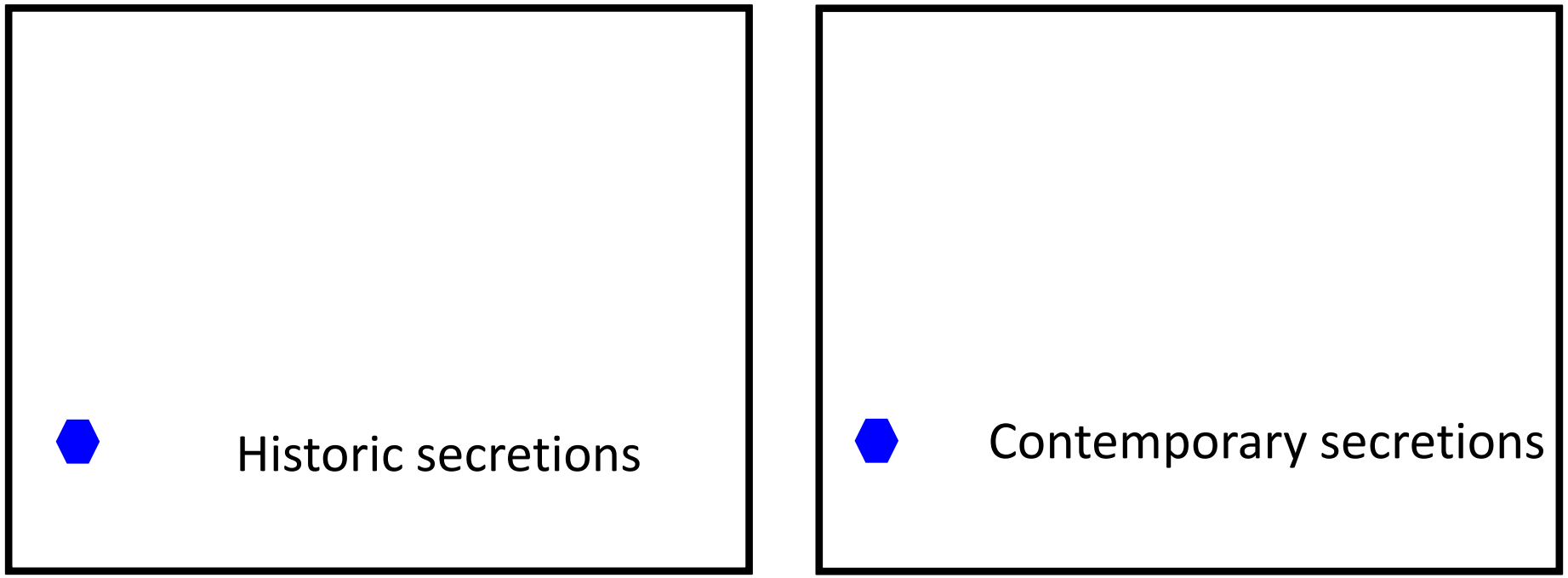

Infection patterns
Historic *Bd*
Historic secretions

2004


Infection patterns
Contemporary *Bd*
Contemporary secretions

2017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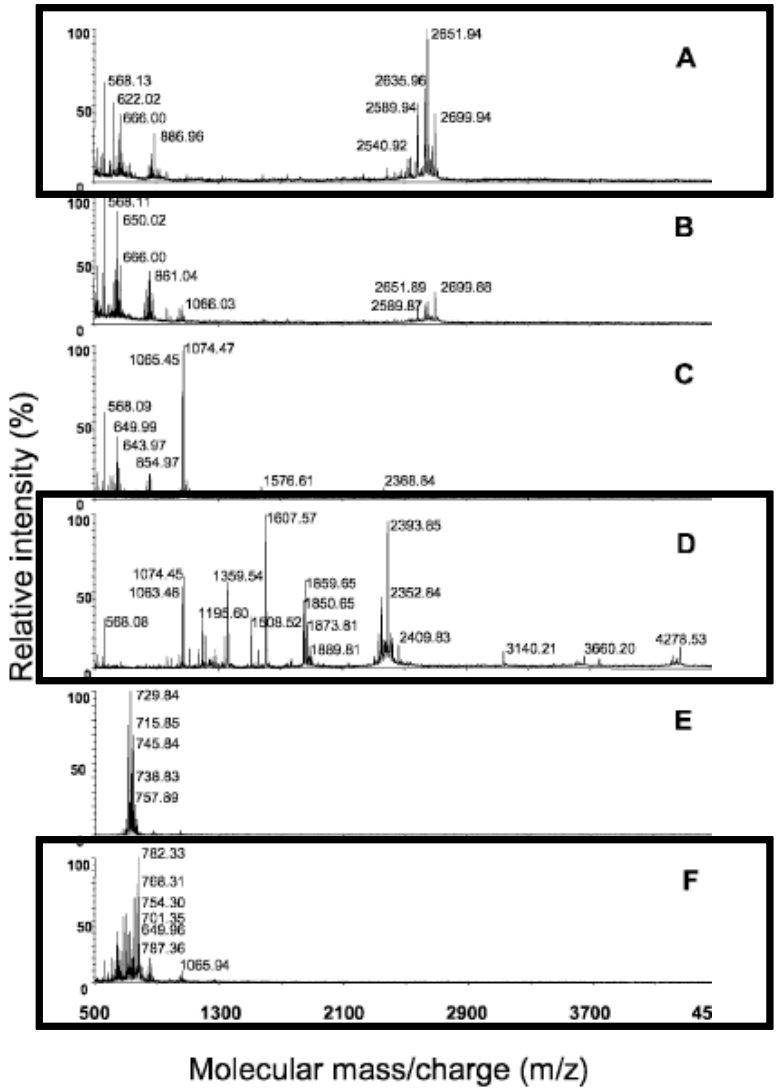
Frog defenses: Antimicrobial Peptides (AMPs)



Woodhams, Voyles et al. *J. Wildlife Diseases* 2006

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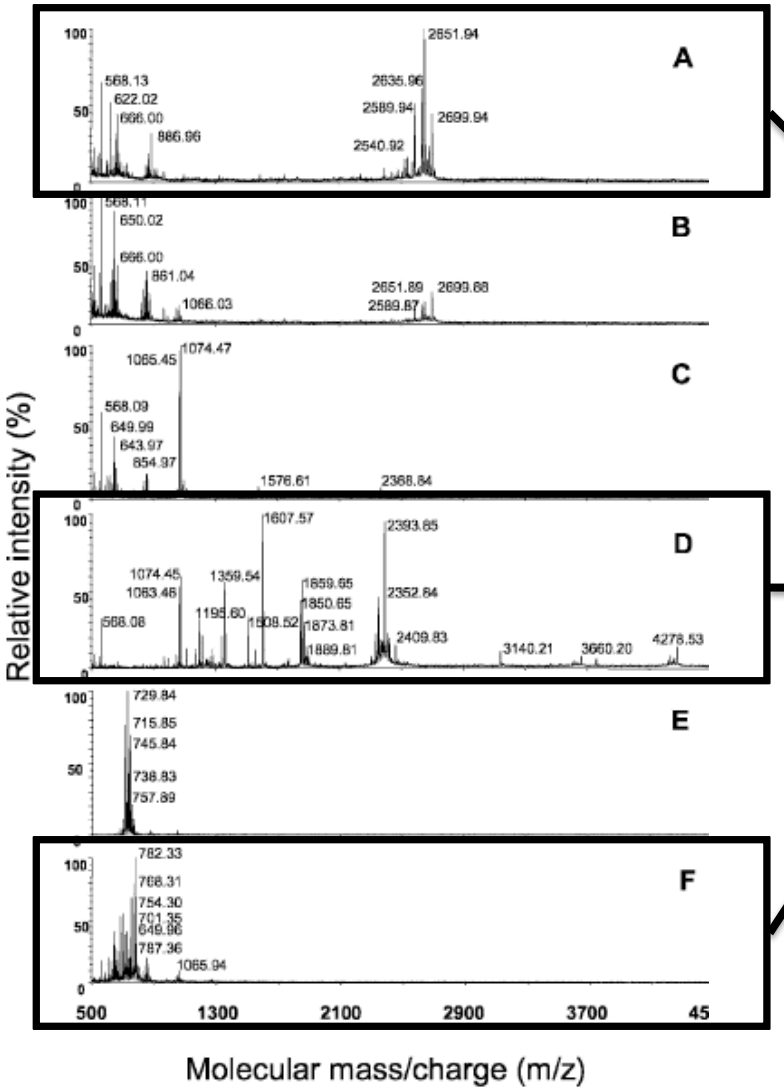


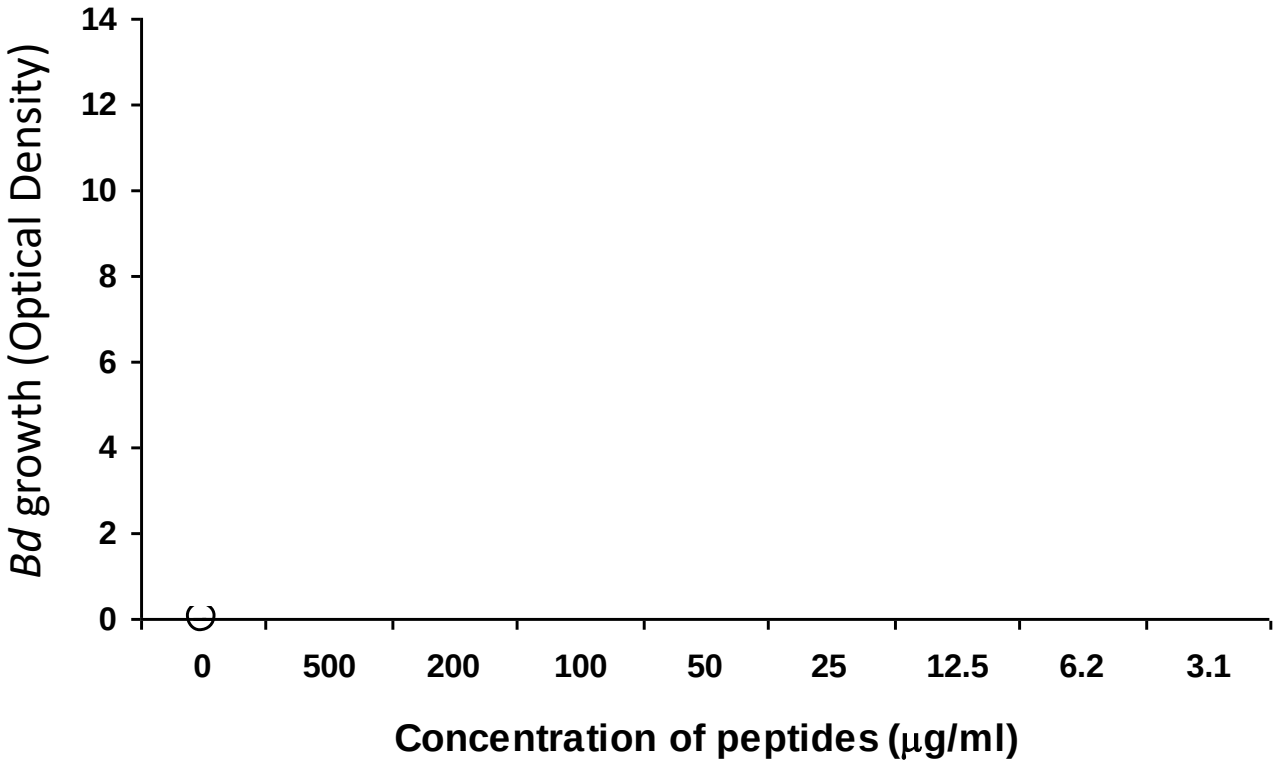
Challenge assay

Test for inhibition of *Bd* growth

Peptide effectiveness

Woodhams, Voyles et al. *J. Wildlife Diseases* 2006

C. prosoblepon



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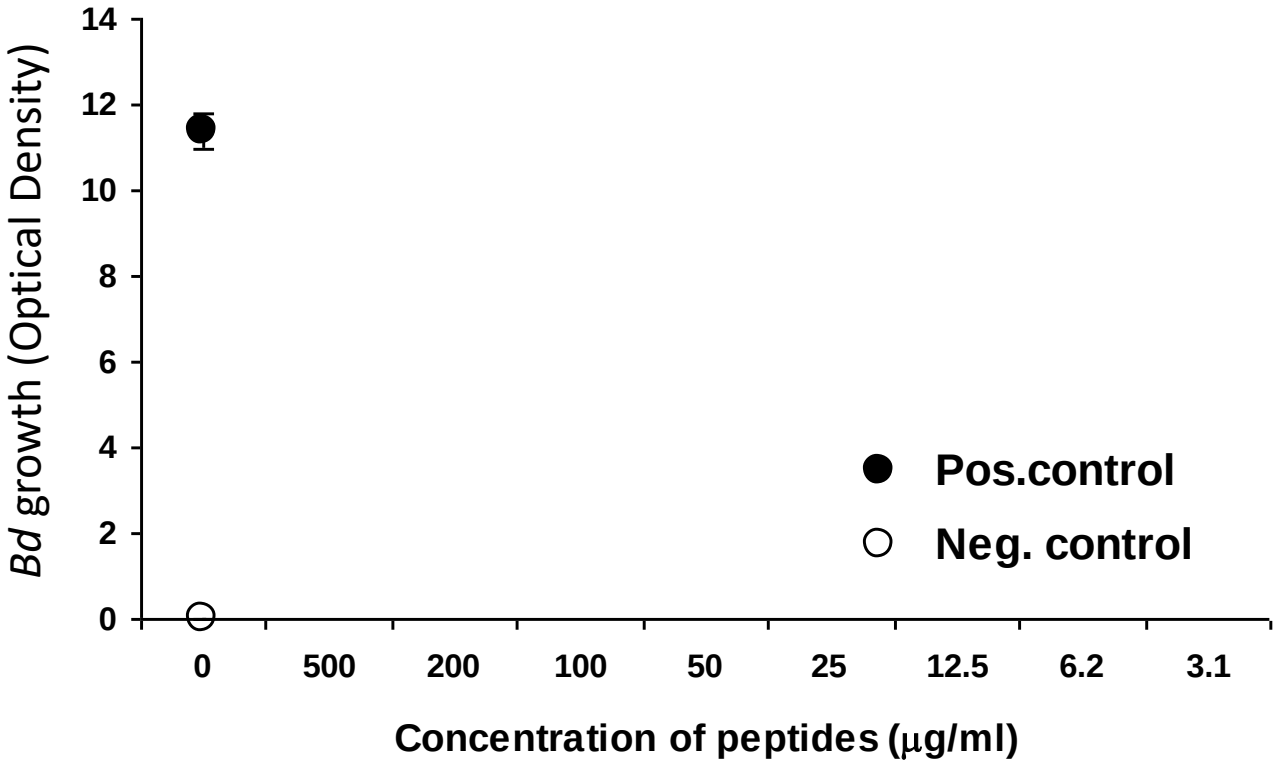

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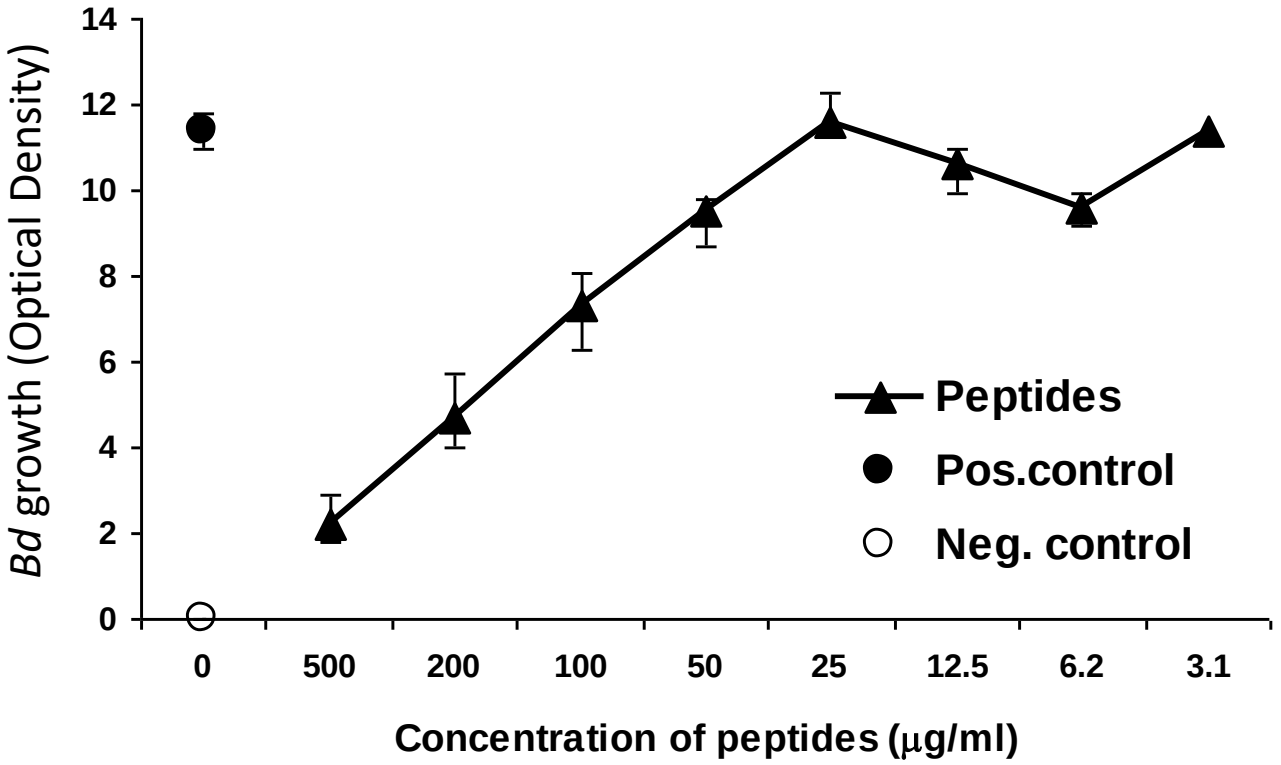
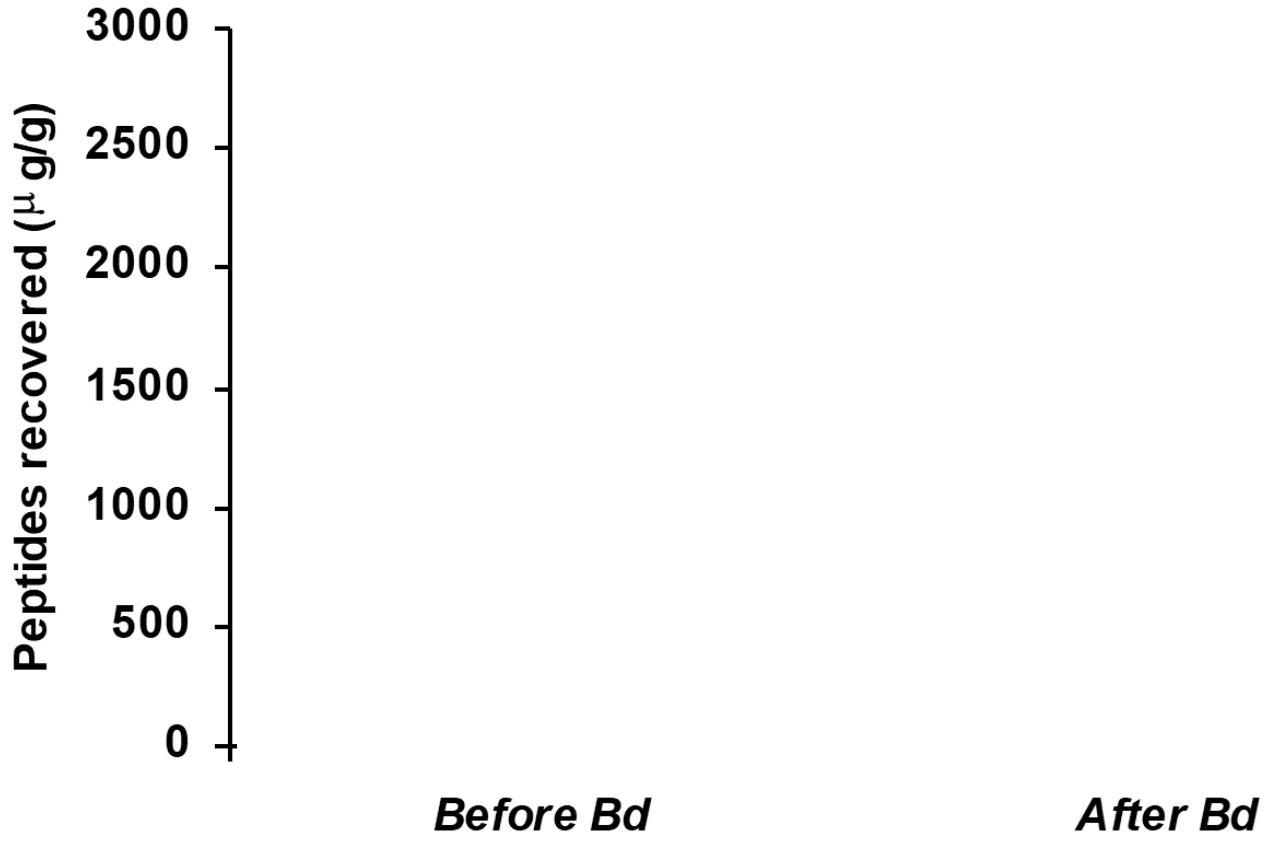


Changes in the amount of AMPs produced?



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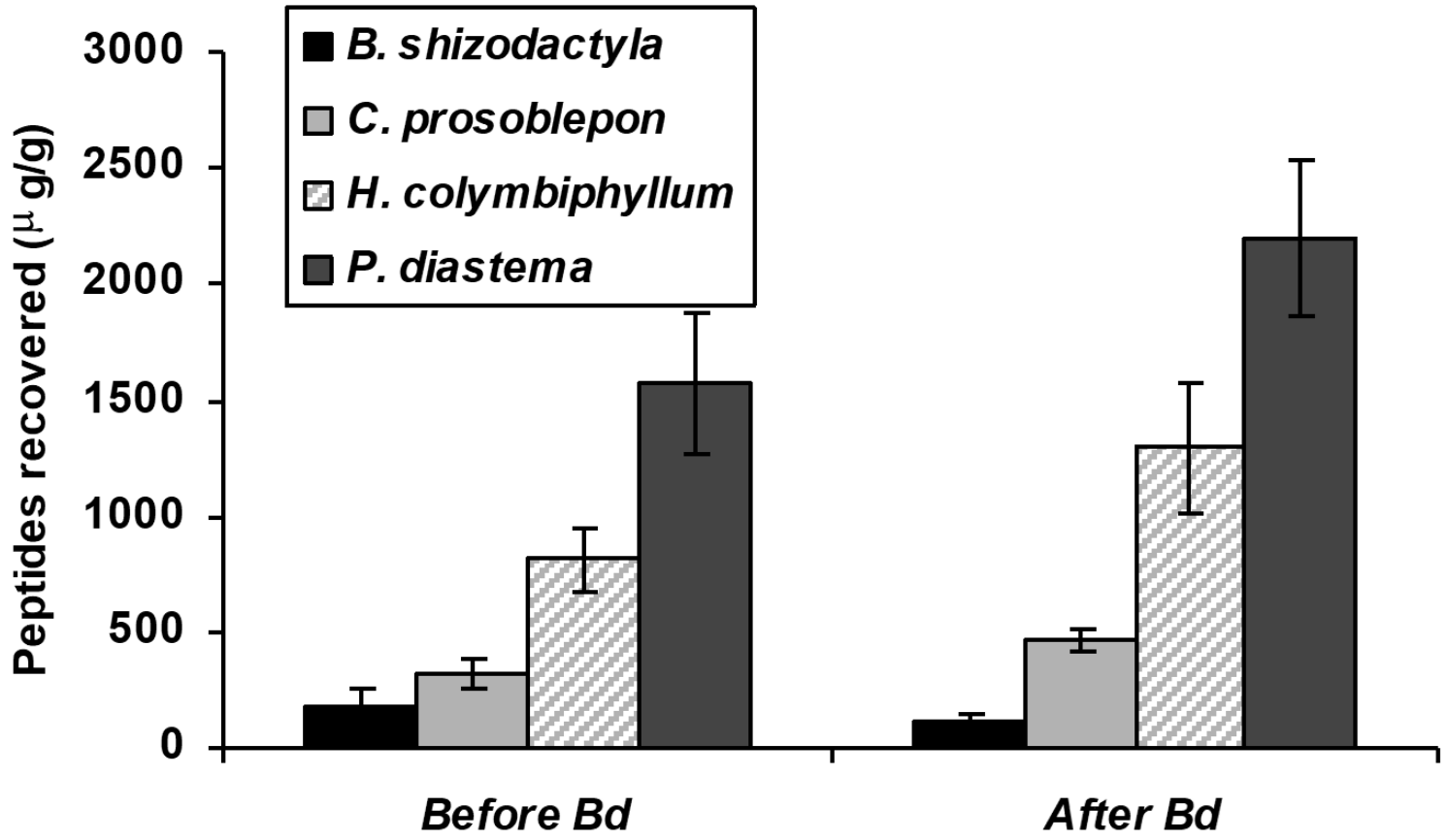

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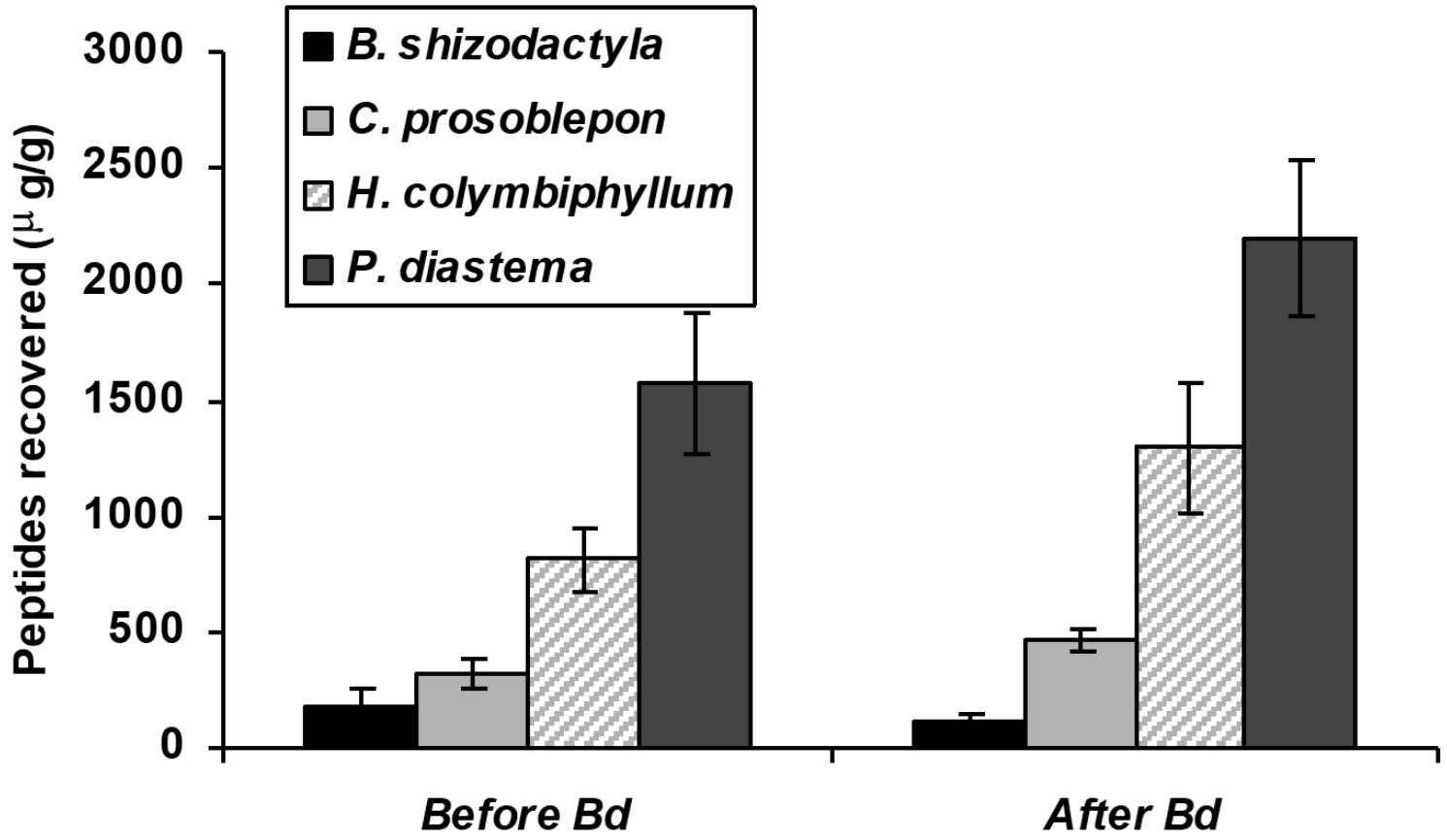
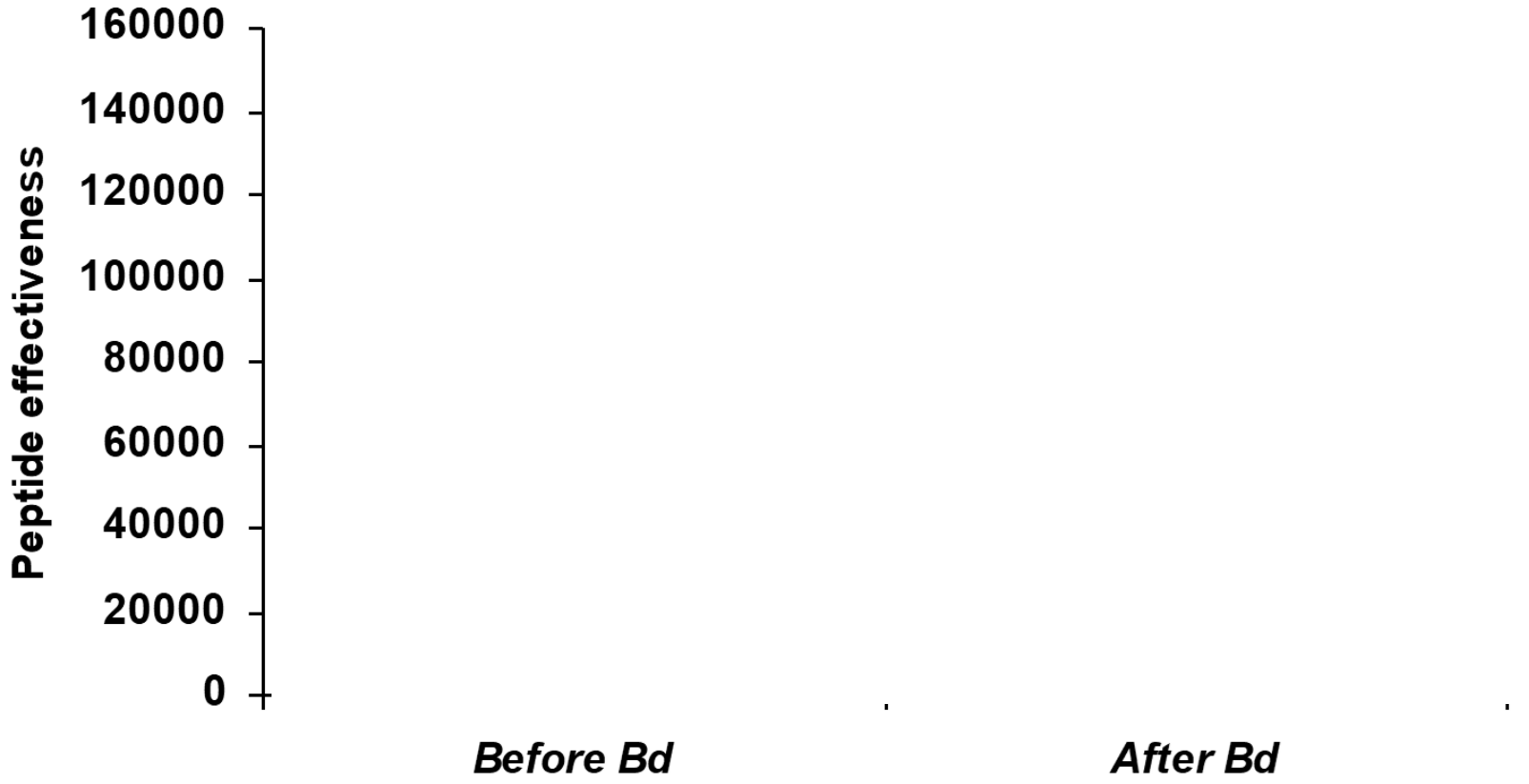
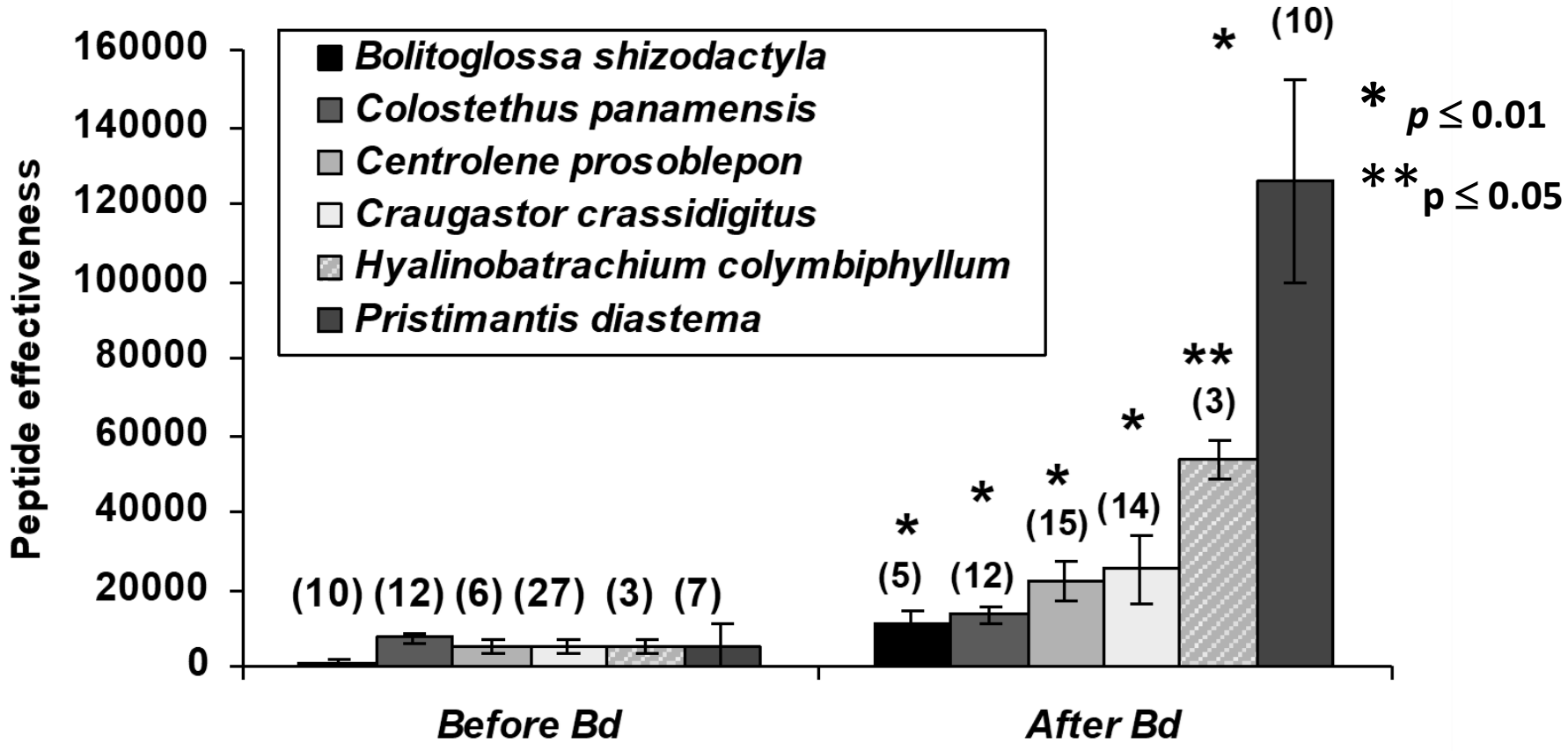


No differences in the amount of AMPs produced

Changes in AMP effectiveness against Bd?

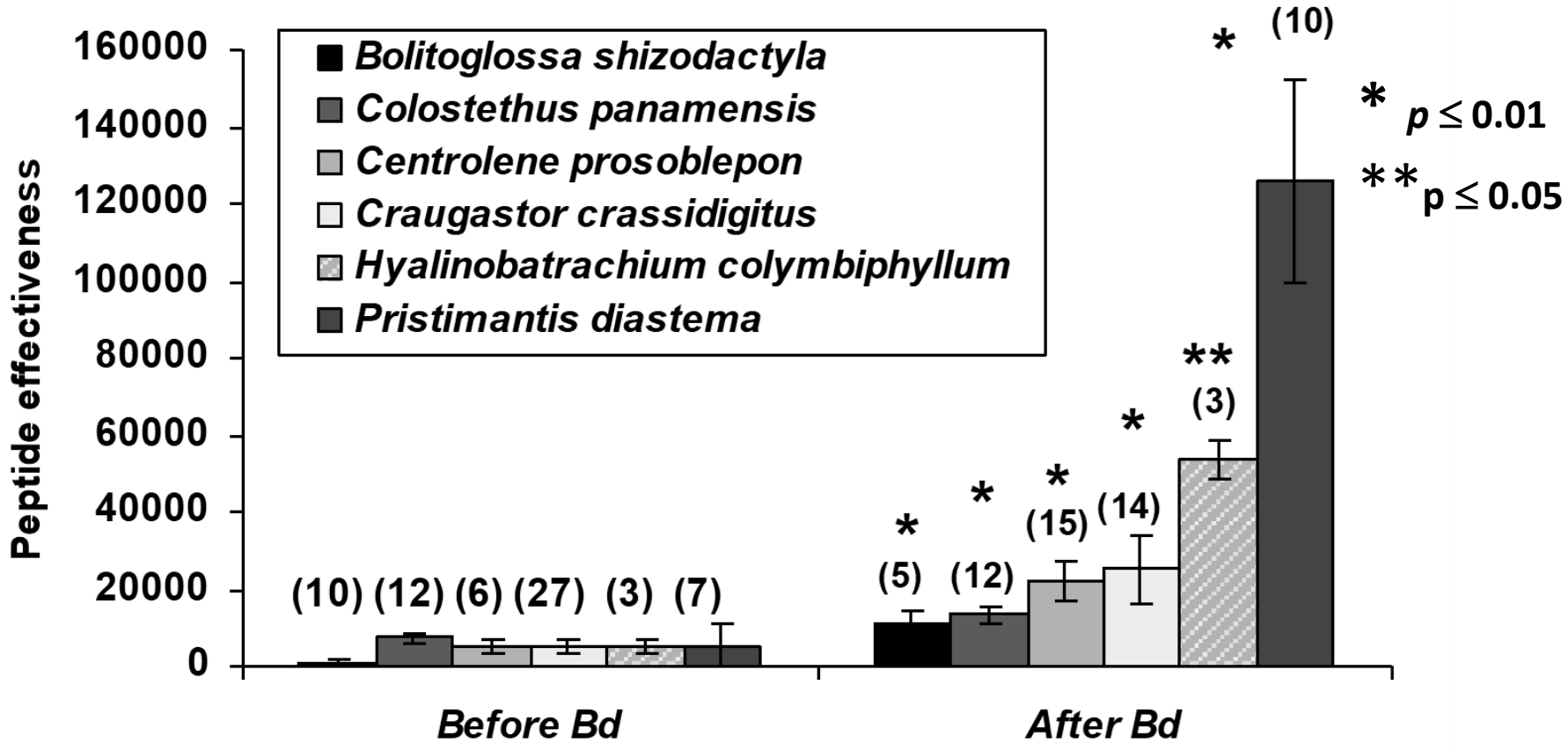


Changes in AMP effectiveness against Bd?



Voyles et al. 2018 *Science*

Changes in AMP effectiveness against Bd?



Significant differences AMP effectiveness against *Bd*

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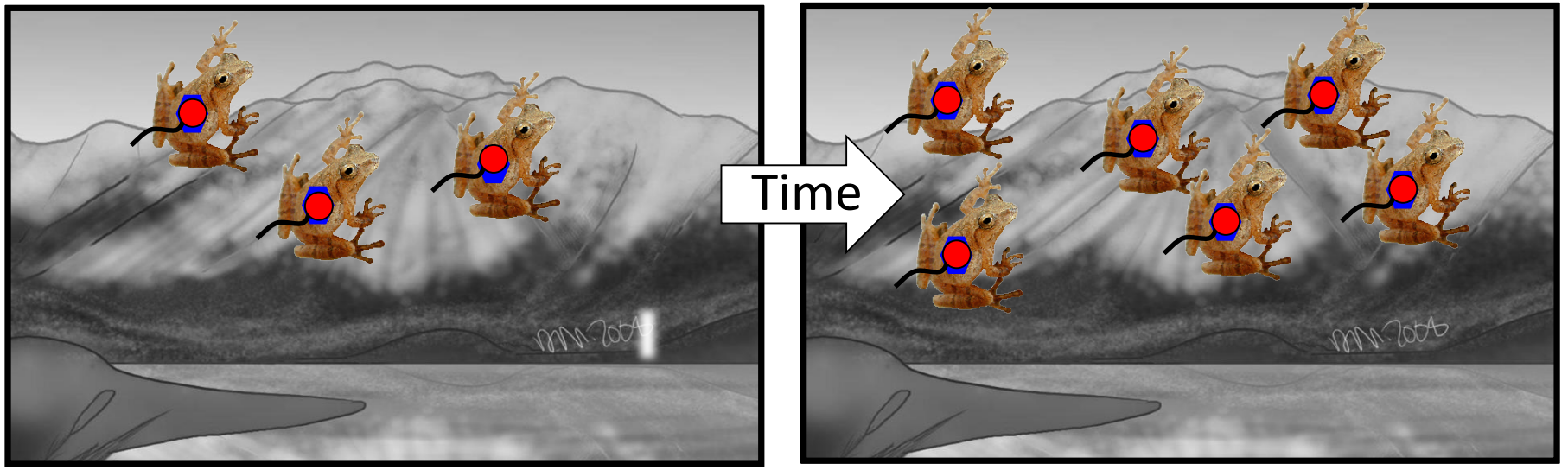
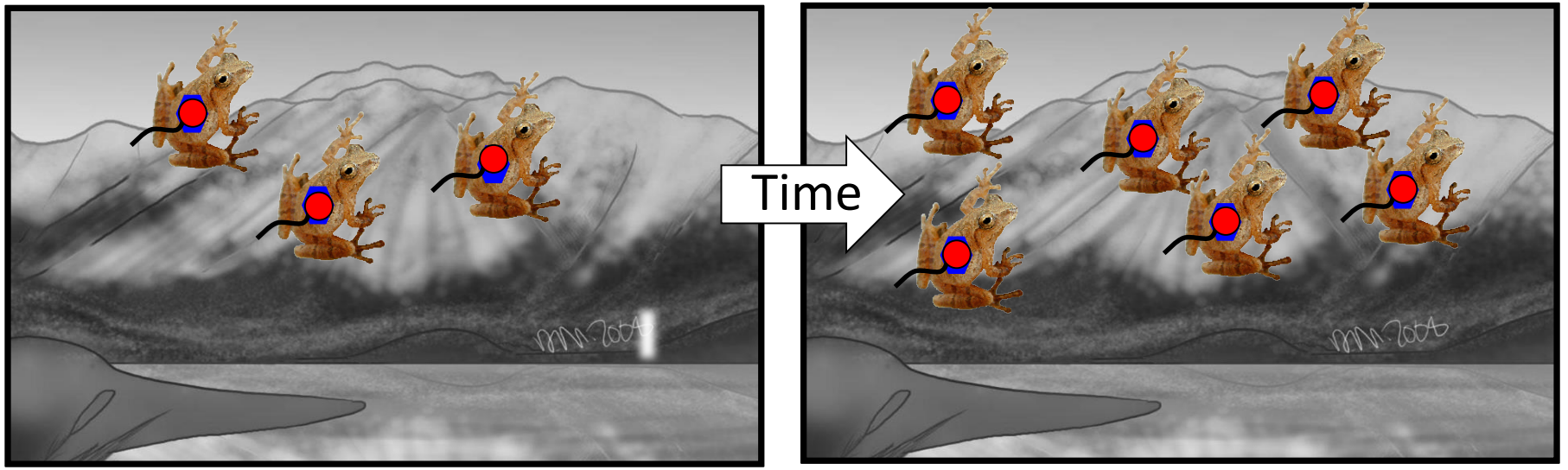


✓ **Host recovery, low *Bd* prevalence**

X **Lower pathogen virulence**

Increased host resistance?



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Disease rarely ends in host extinction

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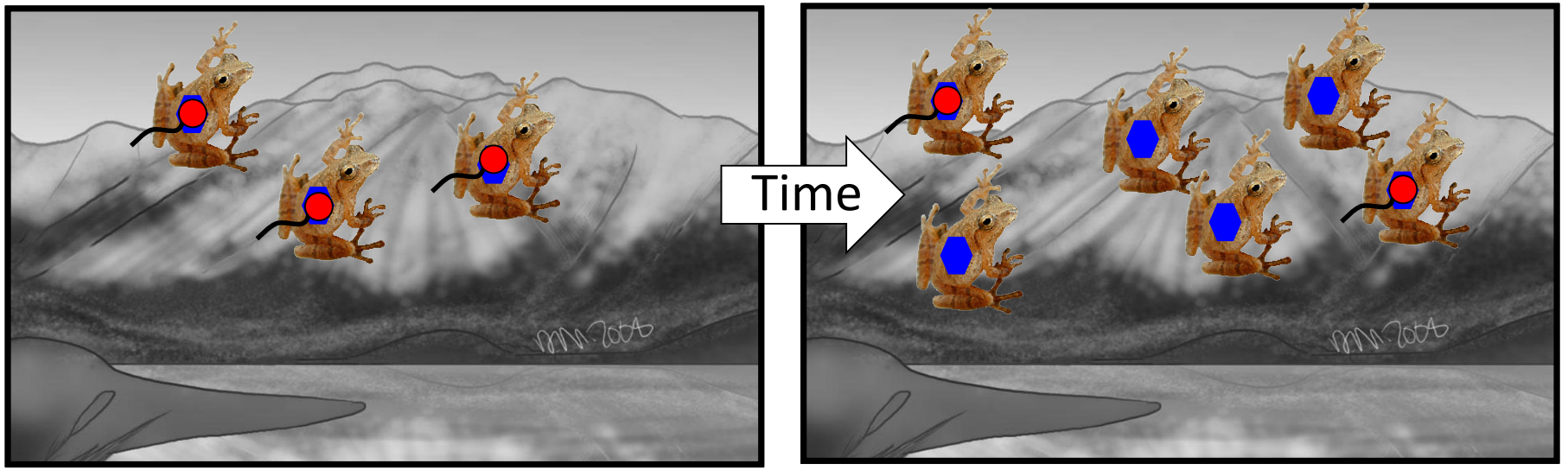
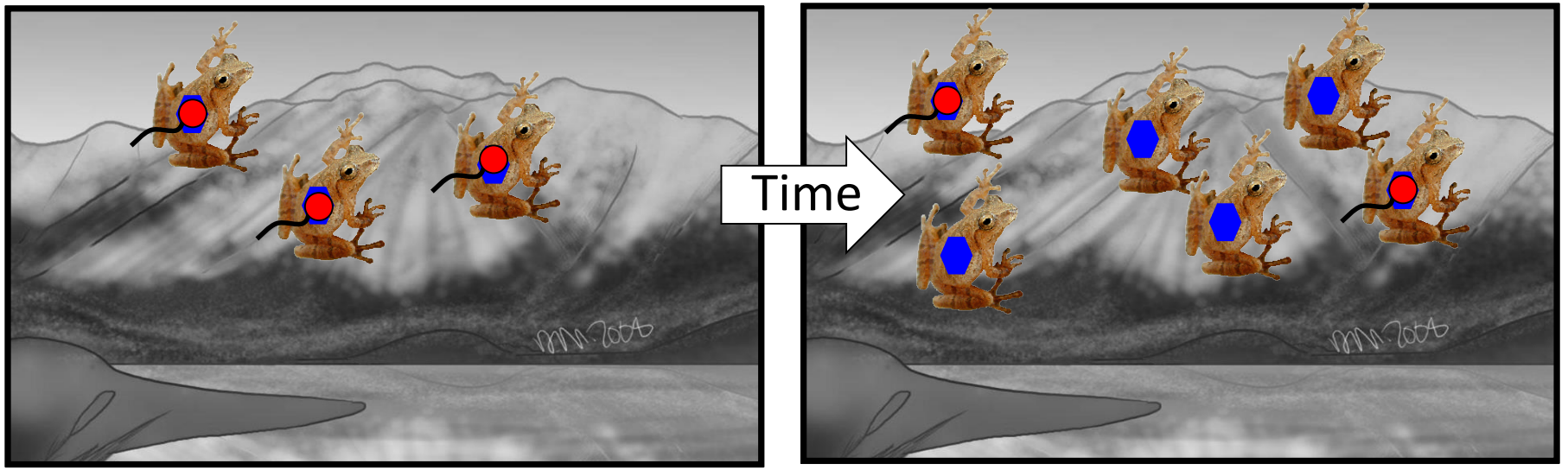


Some host species are recovering

Disease rarely ends in host extinction



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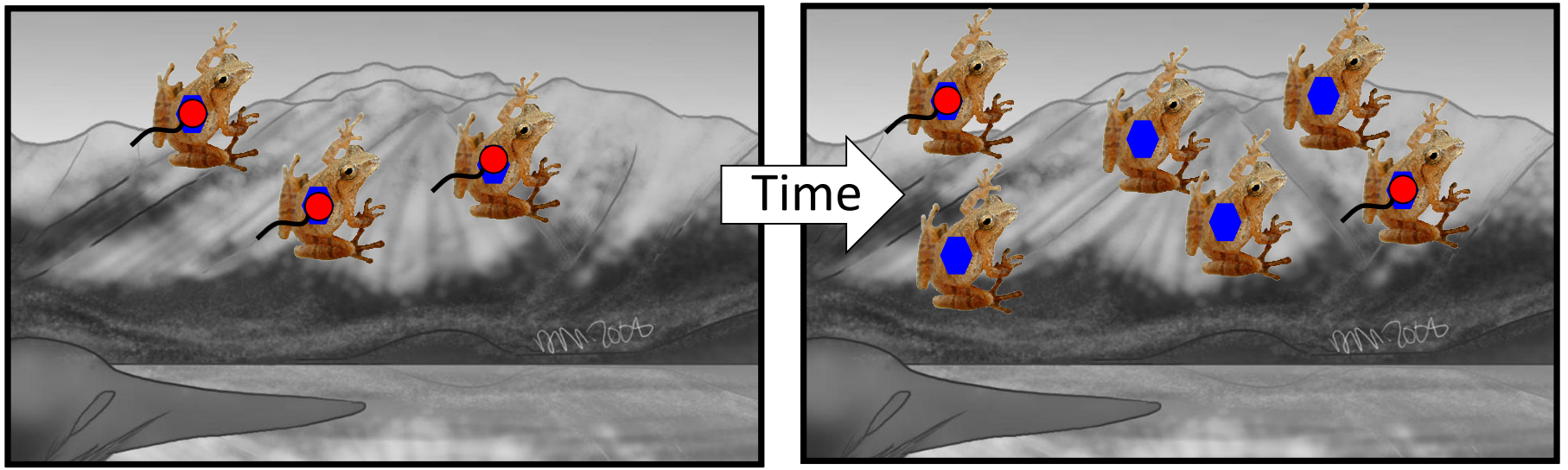
Bd is equally pathogenic today

Disease rarely ends in host extinction



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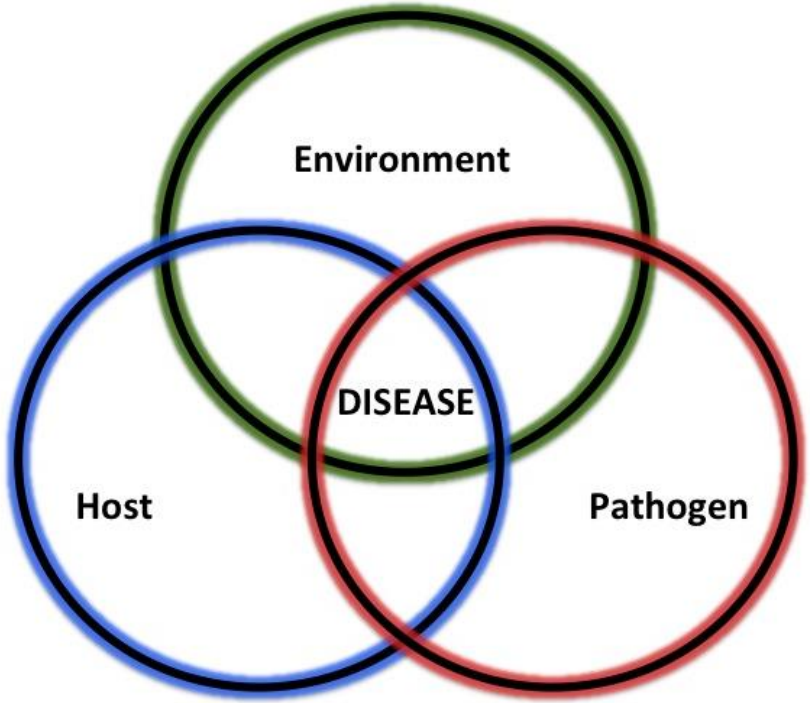
Bd is equally pathogenic today

Shift in host responses

Disease rarely ends in host extinction



Some host species are recovering

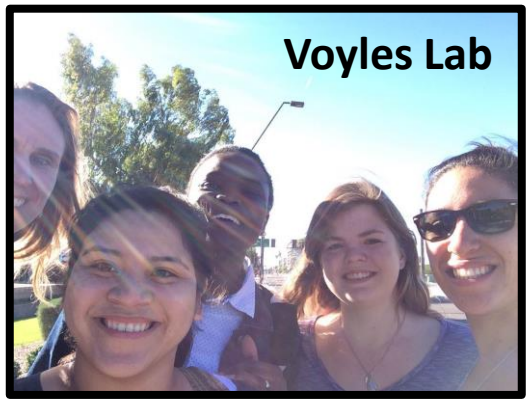
Bd is equally pathogenic today

Shift in host responses

Thank You

Students

Rachel Perez
Carley Barron
Cecelia Ugunro
Gabi Rios-Sotelo
Allison Byrne
John Morgan
Mateo Robak
Veronica Saenz
Maggie Unkfor
Daniel Medina
Angie Estrada



Collaborators

Cori Richards-Zawacki
Bree Rosenblum
Doug Woodhams
Roberto Ibanez
Louise Rollins-Smith
Edgardo Griffith
Heidi Ross
Eric Flores
Goncalo Rosa
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Funding& Support

DEB Award: 1501132

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Discovery and Management of Invasive Nutria in California

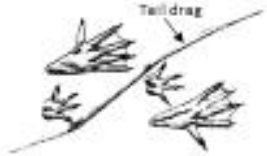
Valerie Cook Fletcher
Invasive Species Program

Nutria (*Myocastor coypus*)

- **Large, semi-aquatic rodent**
  - **Fresh and brackish waters**
- **Native to South America**
- **Introduced for fur trade**
- **Declared eradicated in 1970s**

Identification

Identifying Nutria (*Myocastor coypus*)

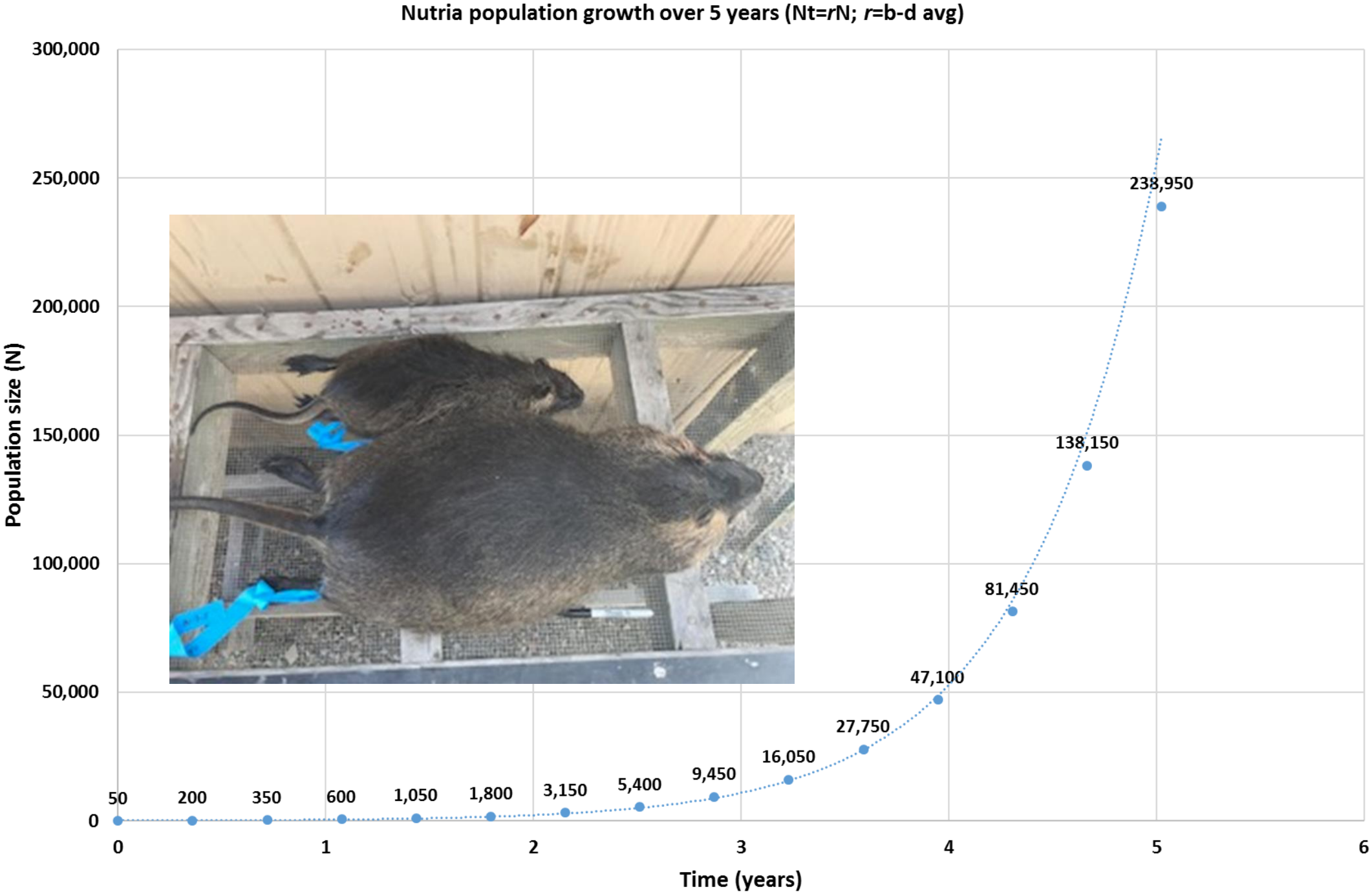
	Nutria *Invasive*	Beaver *Native*	Muskrat *Native*
Whiskers/ head	 *Photos courtesy of Tony Northrup and Joyce Gross*	 *Photos courtesy of Alaska DFG and Cheryl Reynolds*	 *Photos courtesy of N. Carolina State Parks and Merle Ann Loman*
	• Conspicuous **white whiskers** • Muzzle often white	• **Black whiskers**	• Fine, **black whiskers** • Muzzle may be white
Tail			 *Drawings courtesy of Danielle M. Crosier*
	• Tail **rounded**, rat-like, and sparsely covered in coarse hair • Tail still while swimming; body propelled by feet	• Tail **broad and flat**. • Tail flattened top-to-bottom • Slap water with tail when disturbed	• Tail **flattened side-to-side** • Tail used for swimming with rapid side-to-side serpentine motion
Body			 *Silhouettes courtesy of USFWS*
	• Adult size: 10-20 pounds; body length to 2 feet, with 1 foot tail • Juveniles similar in size to muskrats • Hunched appearance on land	• Adult size averages 40 pounds • Length to over 3 feet, including tail	• Adult size: 2-5 pounds; body length up to 1 foot
Hind feet	 *Photo courtesy of M. Enos*	 *Photo courtesy of Ann Wee Nguyen*	 *Photo courtesy of USFWS*
	• Partially webbed; one free toe	• Fully webbed	• No webbing
Tracks	 Tail drag *Photo courtesy of Peggy A. Dutton*	 *Photo courtesy of Ohio DNR Division of Wildlife*	 *Photo courtesy of WDFW*
	• 5 front toes; 4 visible in tracks • Rear track to 6 inches in length • Narrow tail drag may accompany tracks	• 5 visible toes on front track • Rear track to 6 inches in length • Tracks may be accompanied by a broad tail drag	• Rear track is 2-3 inches in length

If nutria are found in CA, immediately contact the CDFW Invasive Species Program to report your sighting at Invasives@wildlife.ca.gov or by calling (866) 440-9530

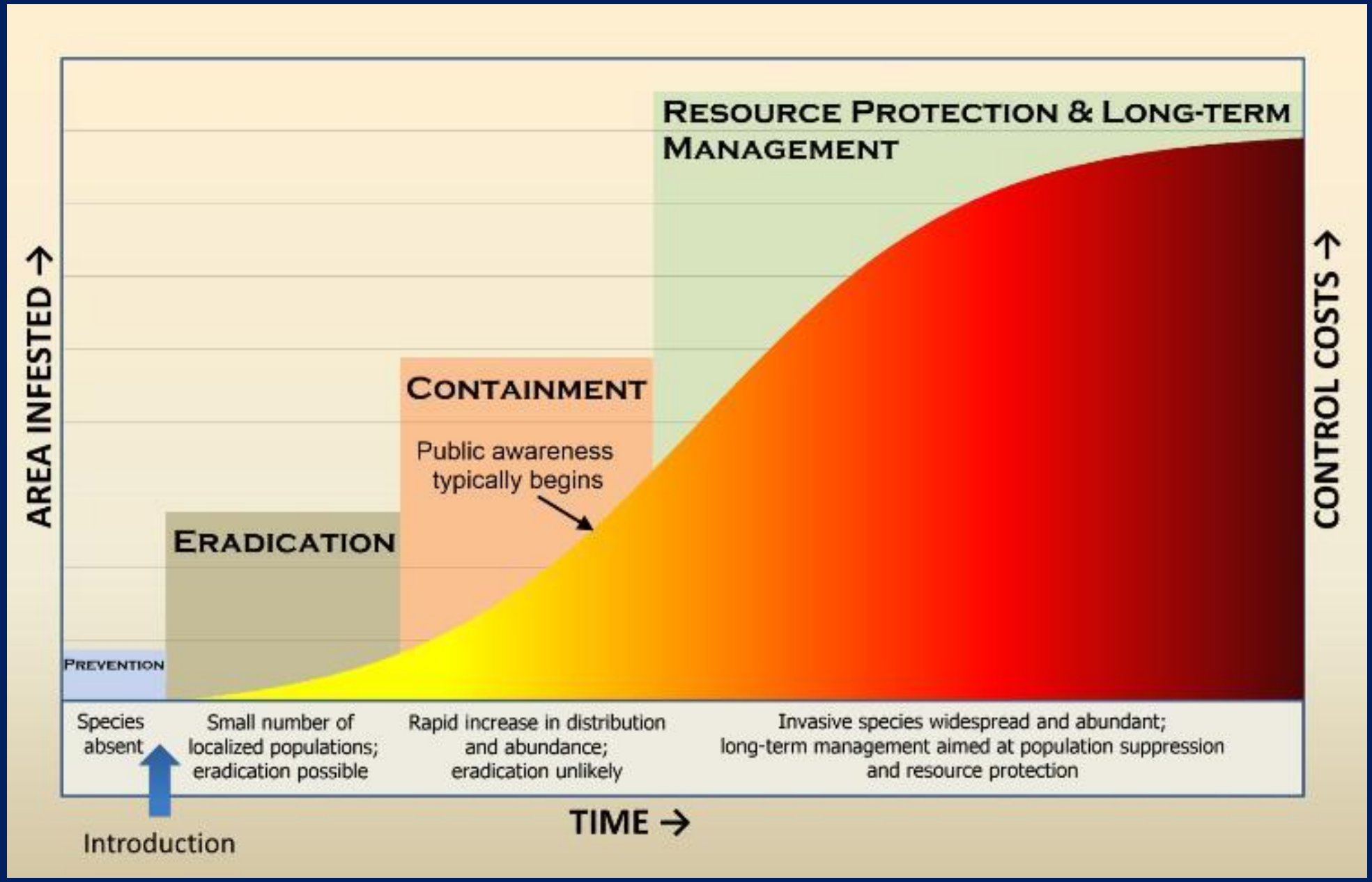
Biology/Ecology

Urban Dallas/Fort Worth – photos Chris Jackson

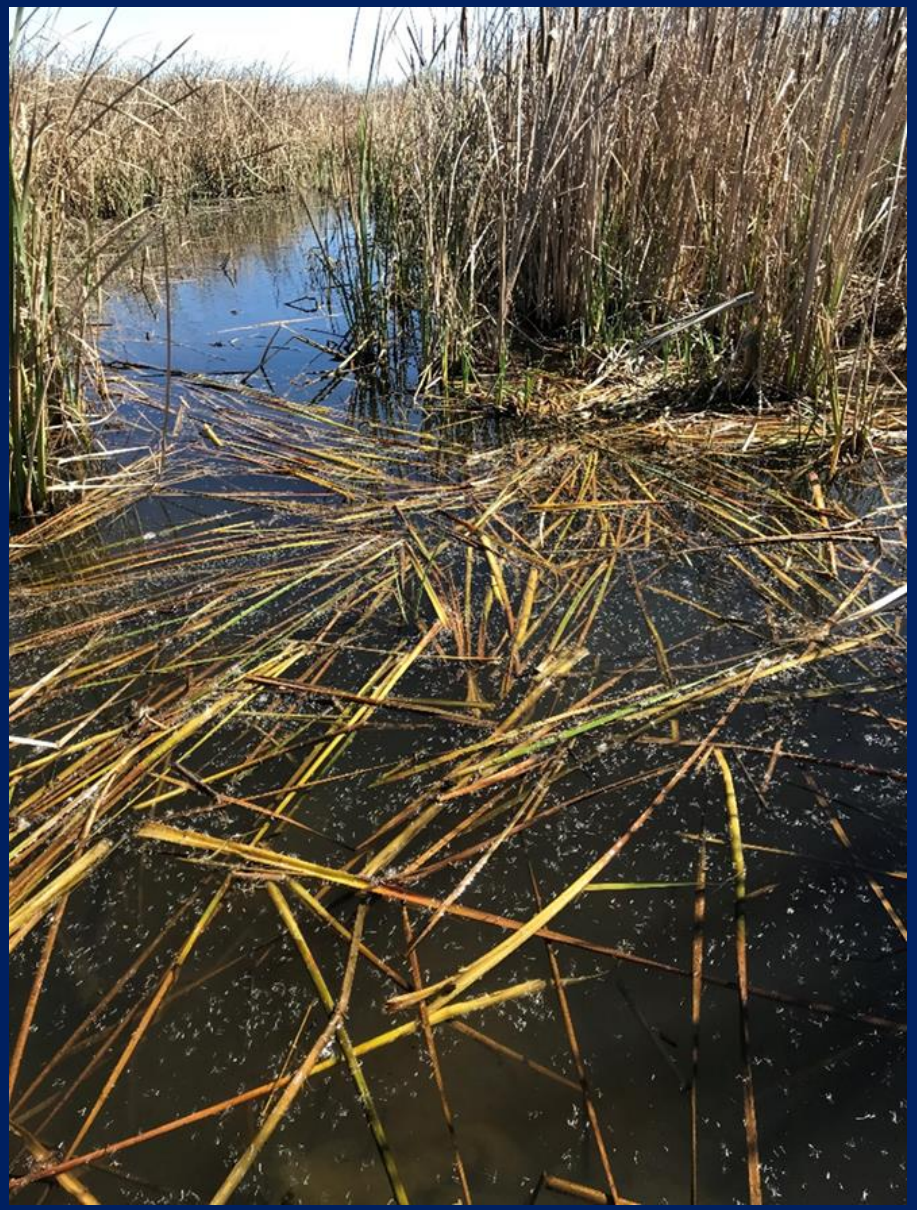
- **Reproductive by 4-6 months**
  - **≤ 3 litters/13 months**
- **Live in social groups**
  - **Dispersal ≤ 50 mi**
- **Avg. home range size < 25 acres**
  - **Movement 2 miles from den**


Nutria population growth over 5 years (Nt=rN; r=b-d avg)
300,000
250,000
200,000
150,000
100,000
50,000
0
Population size (N)
50
200
350
600
1,050
1,800
3,150
5,400
9,450
16,050
27,750
47,100
81,450
138,150
238,950
0
1
2
3
4
5
6
Time (years)

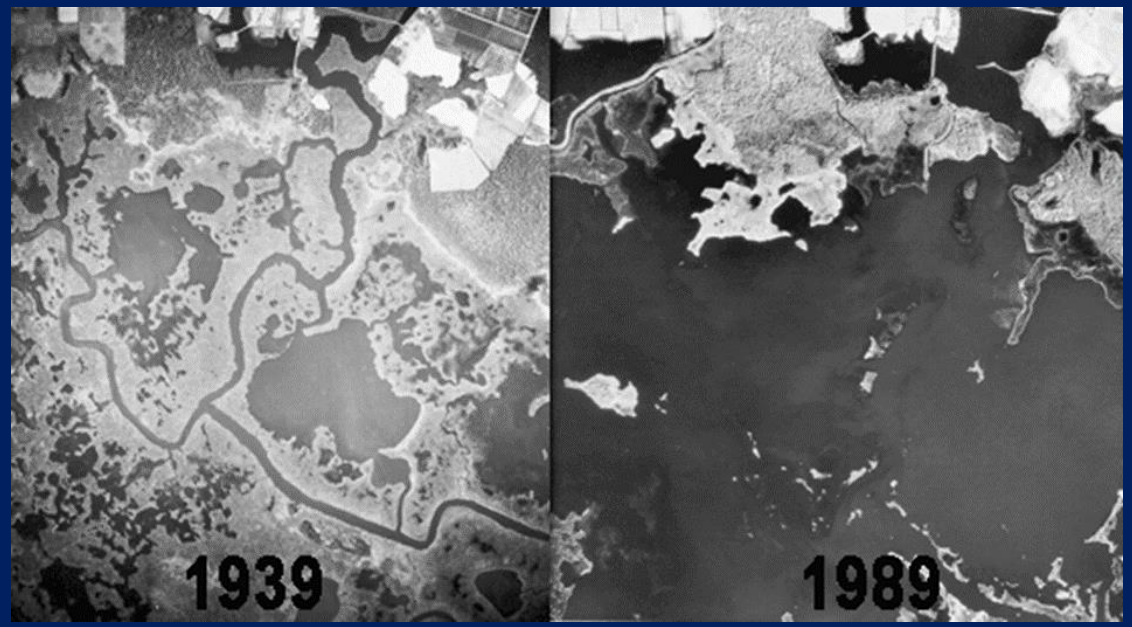
Response in California



Impacts



- **Consume ≤ 25% of their weight each day**
- **Prefer basal portion of emergent vegetation**
  - **Destroy up to 10x the amount consumed**
- **Severe erosion, conversion to open water**



SKY JONES-LEWEY, RESOURCE PROTECTION AND EDUCATION DIRECTOR, NUECES RIVER AUTHORITY

Who's Stealing the Water?

Battling the Big Cane and the Little River Rat

Riparian Landowners Band Together to Combat Perfect Storm of Invasives on the Nueces and Sabinal Rivers

In the water-rich, riparian environment of the Nueces and Sabinal floodplains, arundo, also called river cane or giant reed, is spreading like wildfire as the downed, floating stalks take root from its multiple joints. Gnawed stalk ends point to part of the problem. A water-centric, rat-like animal called nutria is cutting the stalks and exacerbating the spread of the already prolific arundo colonies along the upper reaches of these floodplains.

"It appears that nutria and arundo, both non-native species, have crossed paths to create a perfect storm of invasive damage," according to Sky Jones-Lewey of the Nueces River Authority.

Arundo donax is an aggressive, non-native plant considered an invasive species in these river bottoms. Technically a grass, arundo forms thick colonies that can grow to more than 20 feet in height. It sprouts from nodes at joints of the stalk, forming a compact mass of interconnected fibrous roots and dense stalks, often creating an impenetrable wall of vegetation.

The genotype of *Arundo donax* colonizing the upper Nueces basin is native to the Seville area of Spain. The plant was considered useful by Spanish colonists and initially propagated on upland sites for its value as building material, as livestock forage, and even used for piping water because of its hollow center. First reported on the Nueces River headwaters in 1996 in the Montell area, arundo is now rapidly colonizing sections of the Nueces and Sabinal rivers in Bandera, Uvalde and Zavala counties. It is estimated that arundo covers as much as 59 percent of the floodplain in these headwaters.

Photos courtesy of Sky Jones-Lewey, Nueces River Authority

Impacts

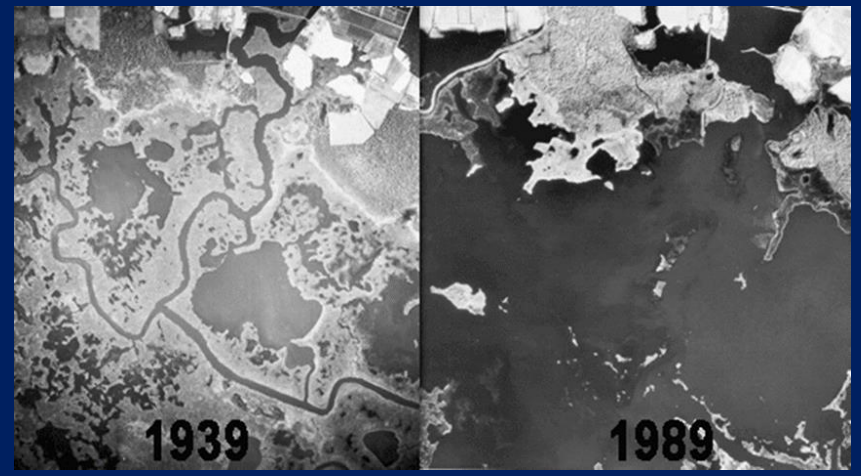
- **Burrowing damages infrastructure and levees**
  - **3-18’ deep, may extend ≤ 150’ into bank**

Impacts - Louisiana

- **Coastwide Nutria Control Program**
  - **Incentives - $5/tail, 250 – 350 trappers**
  - **Since 2002, 5 M harvested ($24 M)**
  - **Estimated > 100K coastal acres damaged**

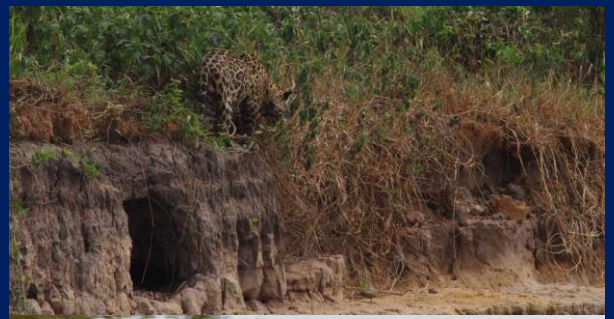
Impacts – Chesapeake Bay

- **Chesapeake Bay Nutria Eradication Project (CBNEP)**
  - **Led by USDA-Wildlife Services and USFWS**
  - **$15.8 M over 15 years**
  - **Over 14K nutria removed**



Population Control

Native range




Louisiana

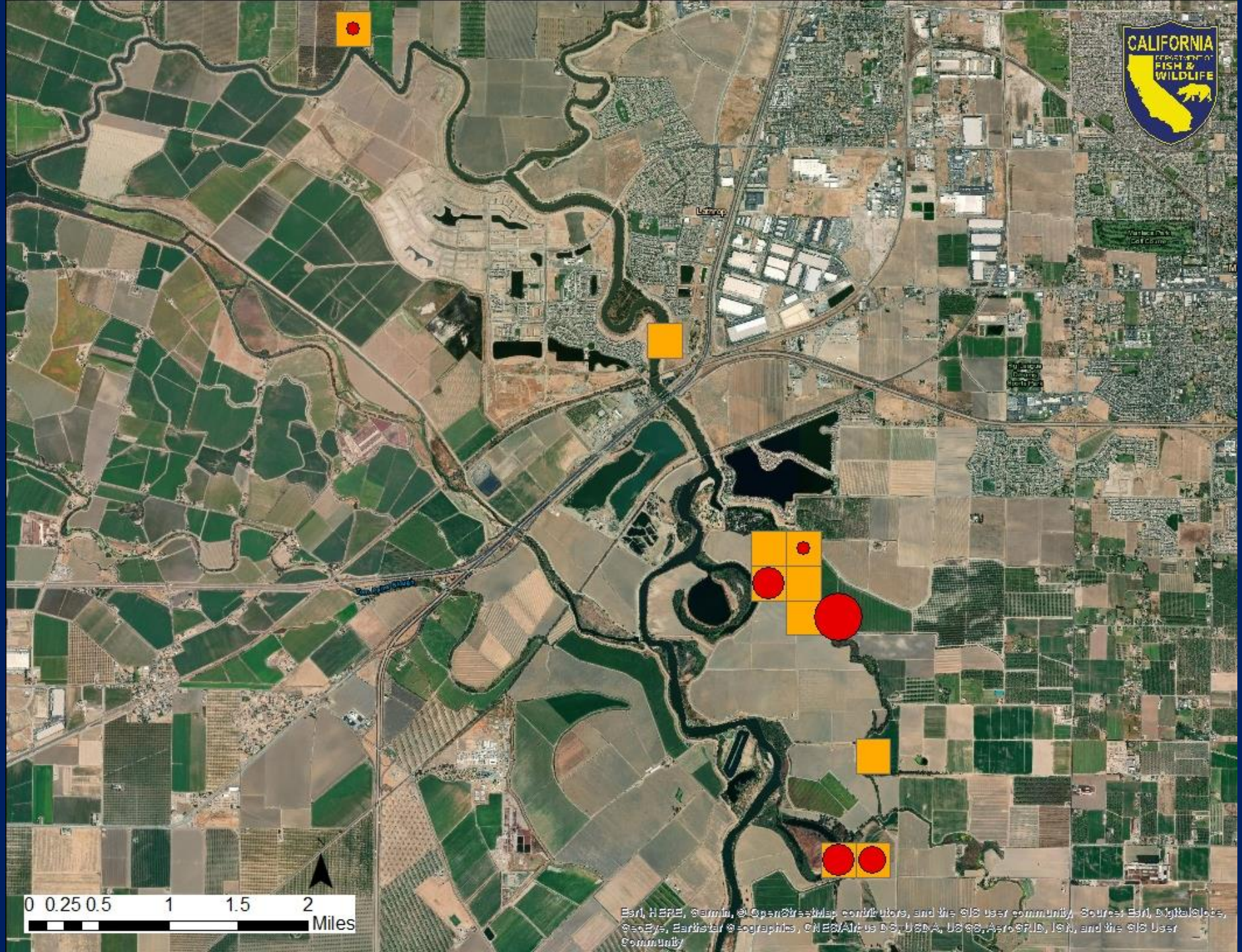



Chesapeake Bay



California?



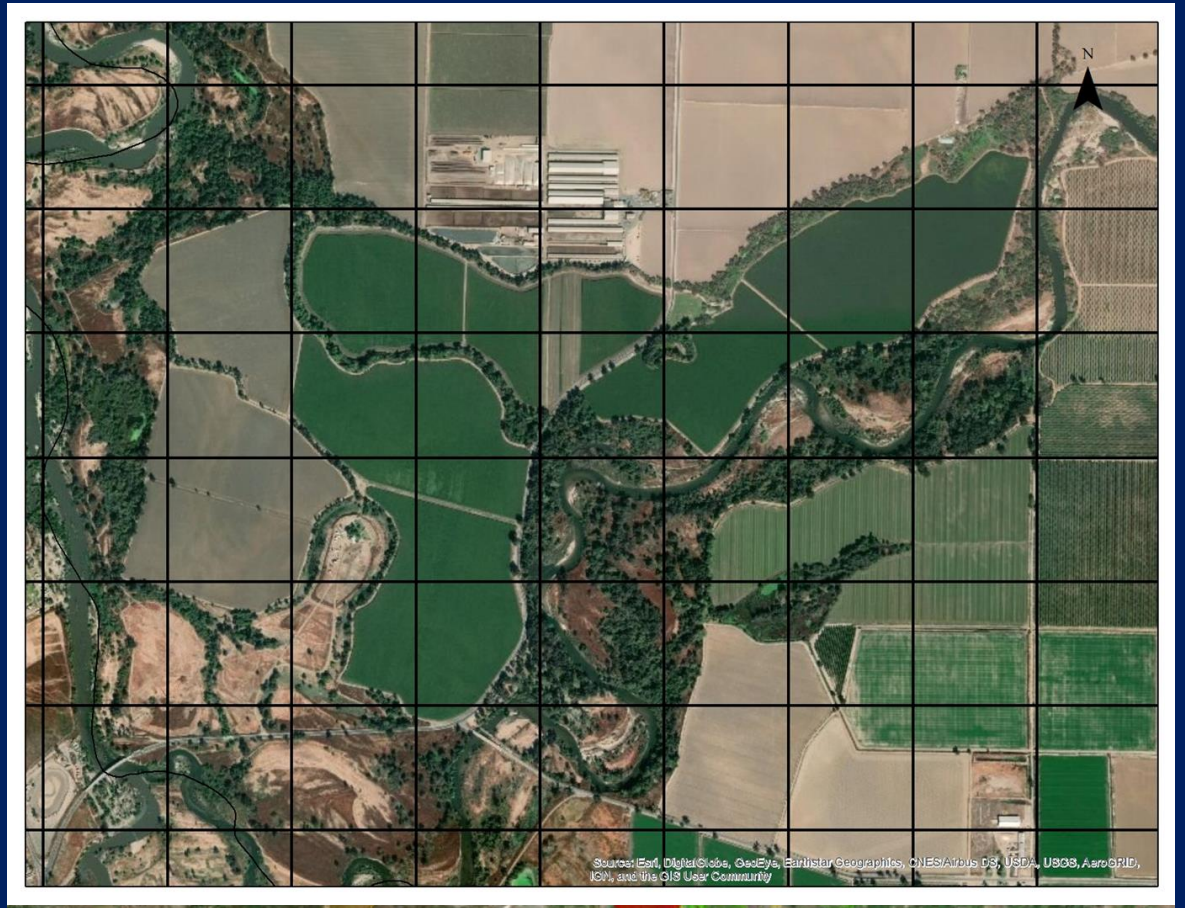

CALIFORNIA
DEPARTMENT OF
FISH & WILDLIFE
Lathrop
0 0.25 0.5 1 1.5 2
Miles
Esri, HERE, Garmin, © OpenStreetMap contributors, and the GIS user community, Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

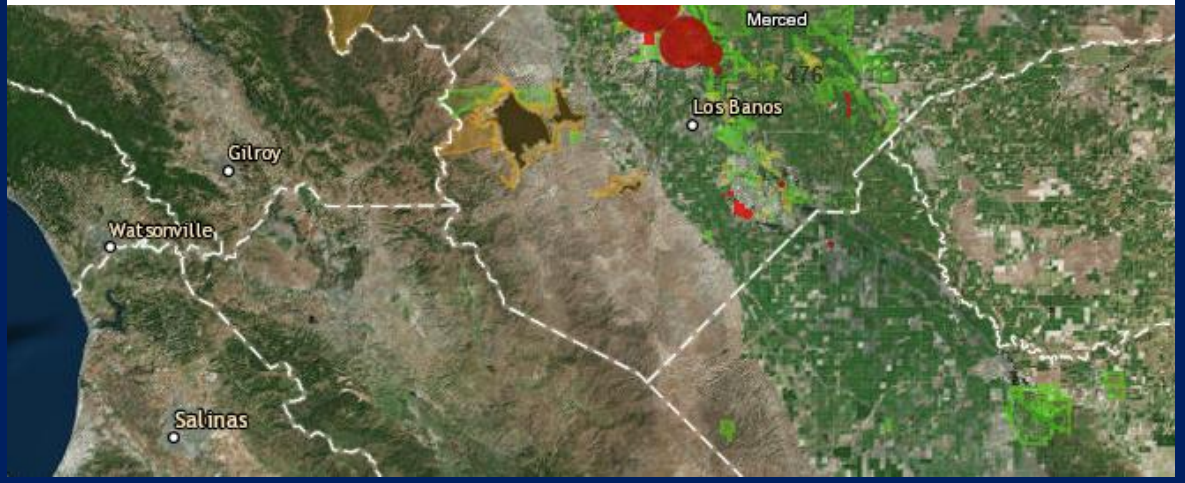
Response in California

- **CDFW survey/trapping teams**
  - **San Joaquin Valley (3)**
  - **Delta (2)**
- **Wildlife Service trappers (3*)**
- **CDFA survey teams (3- N Delta)**
- **Other CDFW efforts**
  - **Access agreements**
  - **Outreach**
  - **Interagency coordination**

CBNEP Eradication Strategy

- 40-acre grid
- Access permits
- 5-phase strategy:
  - *Survey*
    - Classifying habitat suitability
    - Confirmed/potential sign
    - Cameras/monitoring platforms
  - *Knock-down*
  - *Mop-up*
  - *Verification*
  - *Surveillance*





Response in California

- Gaps in property access
- Long-term funding
- Grants
  - Wildlife Conservation Board
  - State Wildlife Grant (USFWS)
  - SSJ Delta Conservancy Prop 1 grants
- Next steps:
  - Judas nutria/telemetry
  - Detection dogs

Questions?

Report sightings to:

(866) 440-9530

OR

invasives@wildlife.ca.gov

Additional information:

www.wildlife.ca.gov/nutria

Valerie.Cook-Fletcher@wildlife.ca.gov


CFPC Business Meeting

California Forest Pest Council

2018 Annual Business Meeting

Agenda

1. **Approve 2017 Minutes – Kim Corrella**
2. Treasurer's Report – Steve Jones
3. Election of Council Officers
4. Appointments
5. Don Dahlsten Memorial Scholarship
6. Chairman's Report
7. Report of Task Forces: PCTF (Kim) FWTF (Curtis), OMTF (Chris)
8. New Business / Resolutions

California Forest Pest Council

2018 Annual Business Meeting

Agenda

1. Approve 2017 Minutes
2. **Treasurer's Report** – Steve Jones / Audit: Kim C. & Chris Lee
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California Forest Pest Council

2018 Annual Business Meeting

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3. Election of Council Officers:

- Members at Large (3) - one year term (current: Susan Frankel, Akif Eskalen, Mark Stanley

2019:

California Forest Pest Council

2018 Annual Business Meeting

Agenda

4. Appointments:

- Council Treasurer –
  - ***Steve Jones***
- Audit Comm.: ***Chris Lee &*** _____
- Editorial Comm. Chair *(CAL FIRE)*
  - ***Tom Smith***
  - Editor-in Chief –
-

California Forest Pest Council

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7. Report of Task Forces: PCTF (Kim) FWTF (Curtis), OMTF (Chris)
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IN APPRECIATION

2018 Insect & Disease Committee Field Tour


2018 Weed Committee
Field Tour

6. Chairman's Report

July 17 & 18, 2019

CFPC Weed Committee Field Tour:

Fort Bragg – Lynn Webb

California Forest Pest Council

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