



A tale of toads in Rocky Mountain National Park

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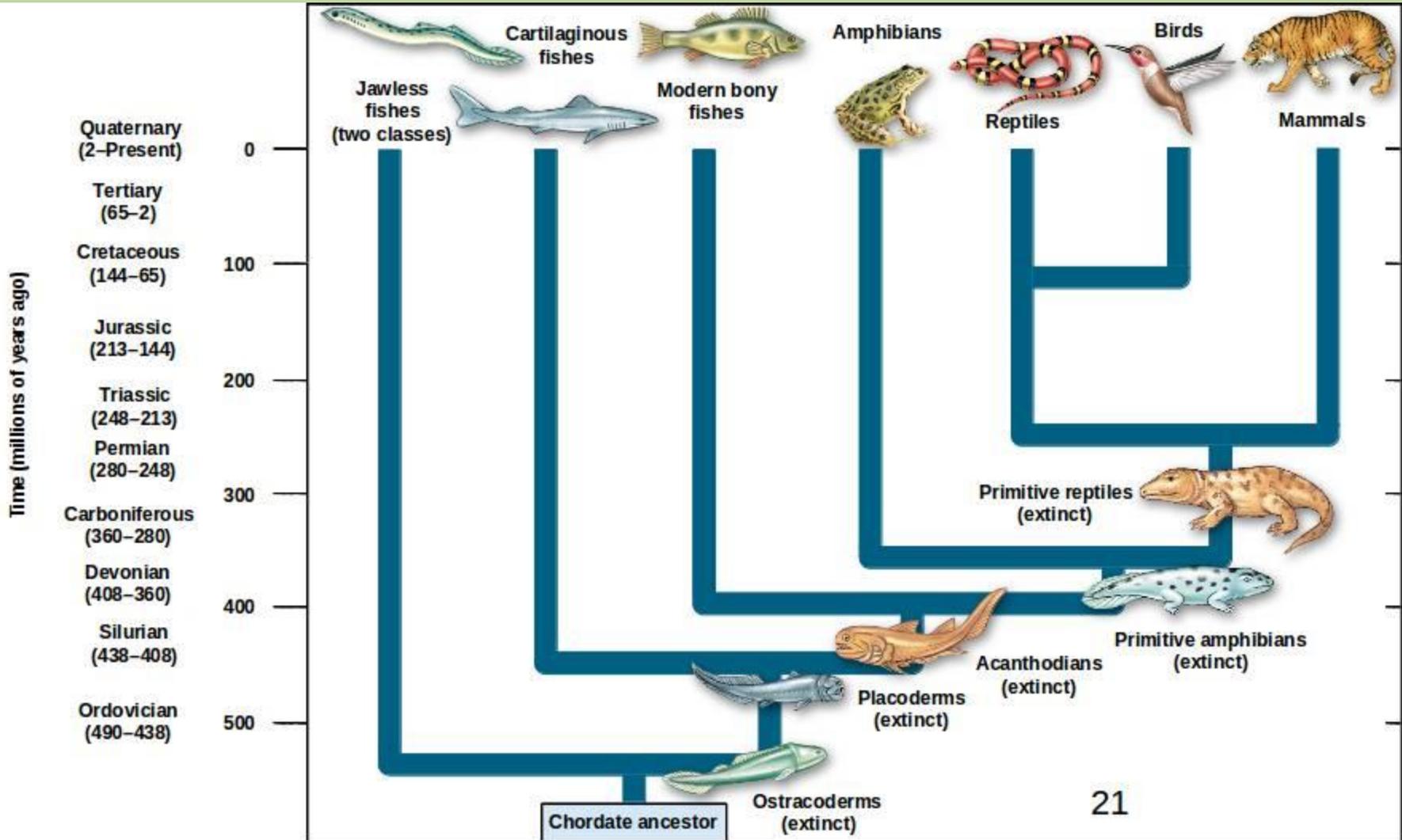
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Frequently Asked Questions

- Does toad pee give you warts?
- What is the difference between frogs and toads?
- Are fish (or turtles, or snakes) amphibians?
- If I kiss a frog or toad, what will happen?

What is an Amphibian?



Amphibians

- Gymnophiona: Caecilians
- Caudata: salamanders and newts
- Anura: frogs and toads
- Not amphibians: fish, snakes, turtles



Amphibians Worldwide

- 7,000 species worldwide
- Many of these are newly discovered
- An extremely diverse group



Worldwide Amphibian Declines

- 40% of the world's 7,000 species of amphibians are in decline
- Drivers: global climate change, invasive species, habitat degradation, toxins, over-exploitation, and emerging infectious diseases



Amphibians in Rocky Mountain National Park

- Originally:
 - Northern leopard frogs, wood frogs, boreal toads, boreal chorus frogs, and tiger salamanders



Boreal Toads

in Rocky Mountain National Park

- Boreal toads
 - Of 24 historic breeding sites, only 5 remain viable
- Research
 - Population Dynamics
 - Disease
 - Introduced Fish
 - Reintroductions



The Boreal Toad

What does it look like?

Aquatic



Terrestrial

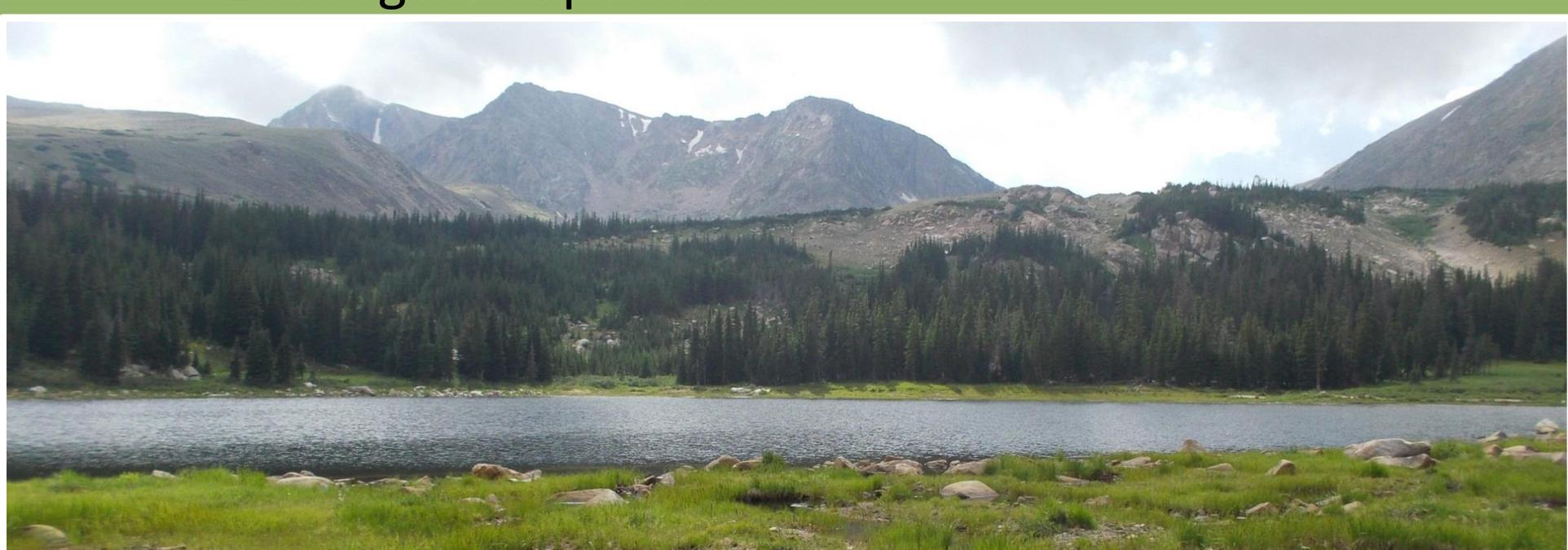
The Boreal Toad

The Southern Rocky Mountain Population

– Colorado, Wyoming, & New Mexico

Conservation Status

– Under consideration for federal listing under The Endangered Species Act



The Boreal Toad

Where does it live?

- High-elevations (8,000-12,000 feet)
- Summer: ponds, lakes, wet meadows
- Winter: upland burrows
- Dormant for much of the year



The Boreal Toad

How do we study it?

- Observing in the field
- Implementing lab studies
- Collaborating across state boundaries



The Boreal Toad

Why do we care about it?

- indicators of ecosystem health
- play a role in ecosystem function
- they are **supposed** to be here!

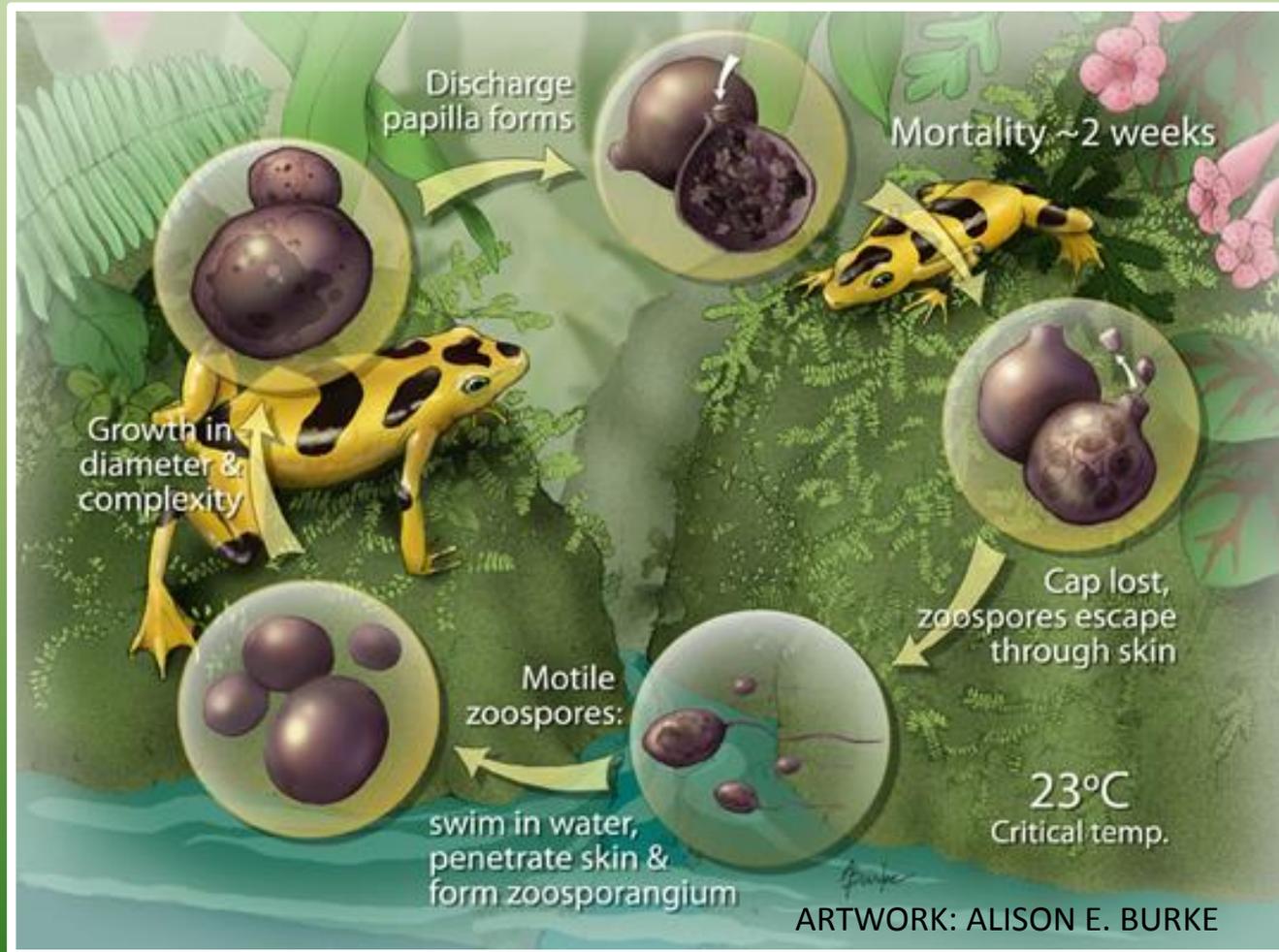


There's a Fungus Among Us

- *Batrachochytrium dendrobatidis* (Bd)
- Causes the disease chytridiomycosis
- Detected on all continents except Antarctica

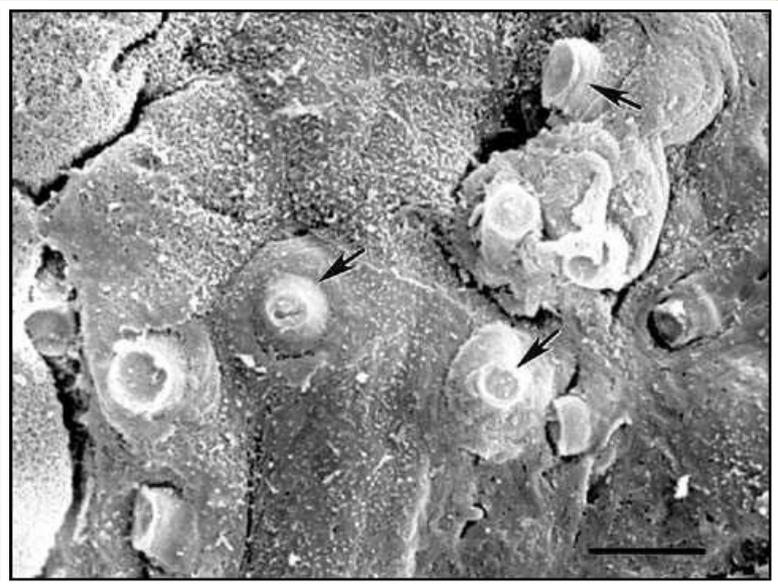
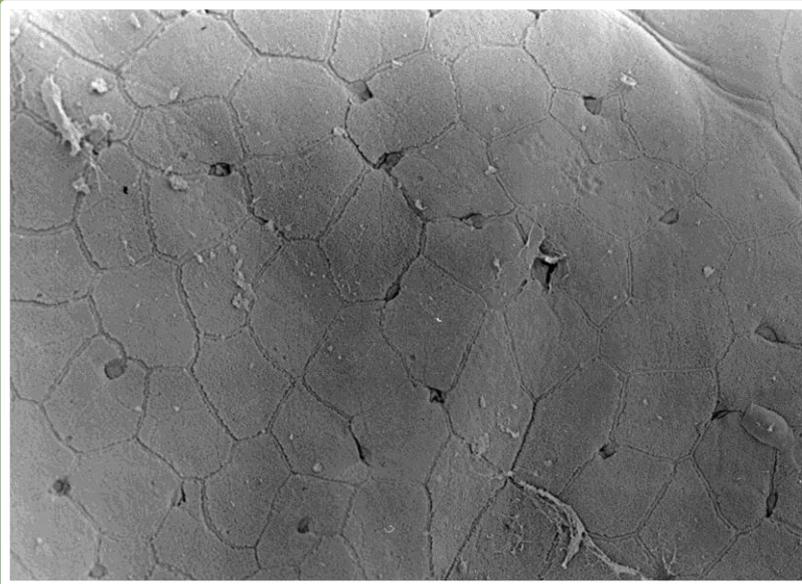


Bd Life Cycle



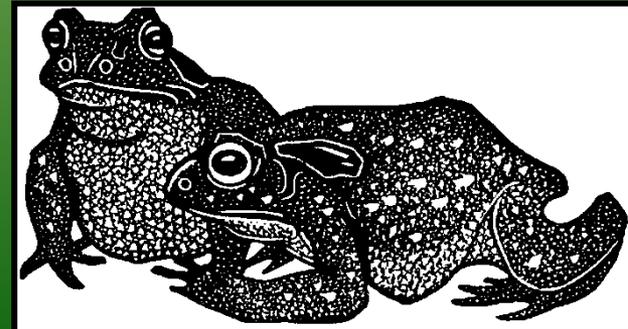
The Disease: Chytridiomycosis

- Aquatic fungal spores attach to amphibian skin and encyst
- Skin chemistry changes, sometimes causing death



Bd and Boreal Toads

- First detected in Colorado in 2000
 - Now has been detected at > 30 of 90 sites
- Toads seem to be among the most susceptible hosts
- In Colorado, population declines generally follow first detection of *Bd*

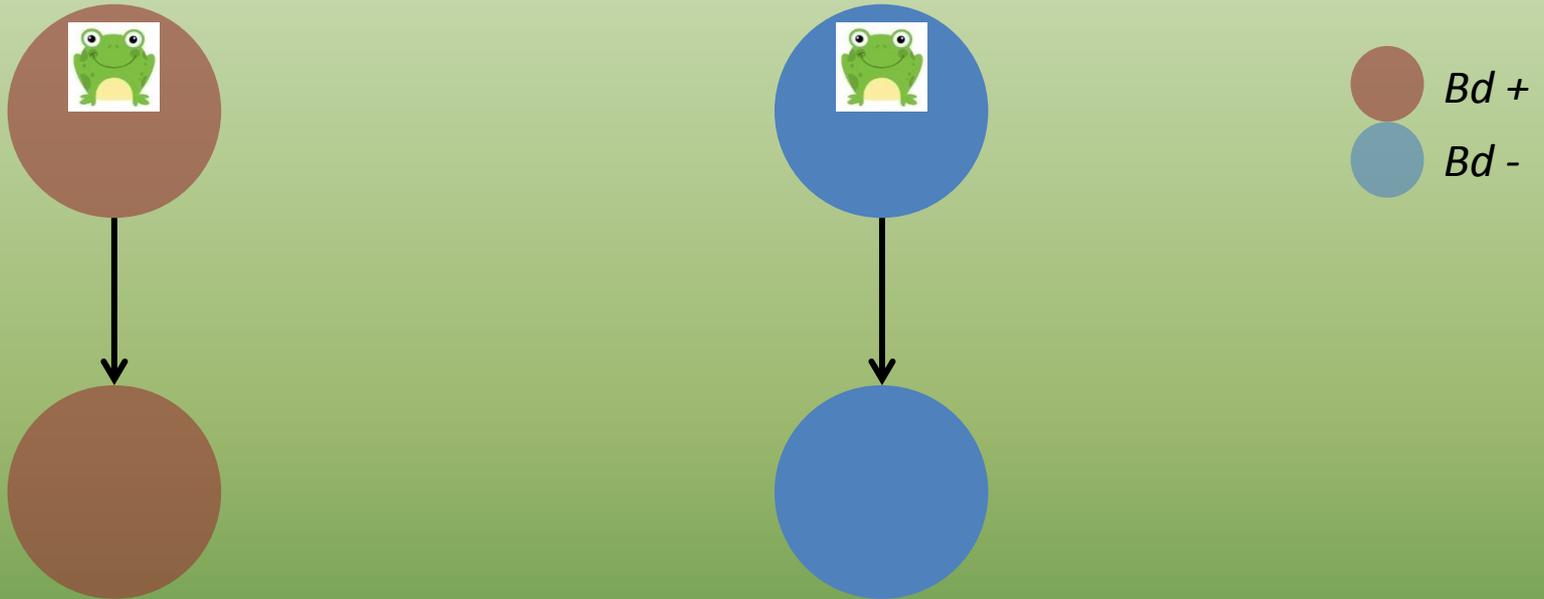


My Research

- How does *Bd* affect boreal toad extinction probability?
- How can we detect *Bd* to help Rocky Mountain National Park and others conserve boreal toads?

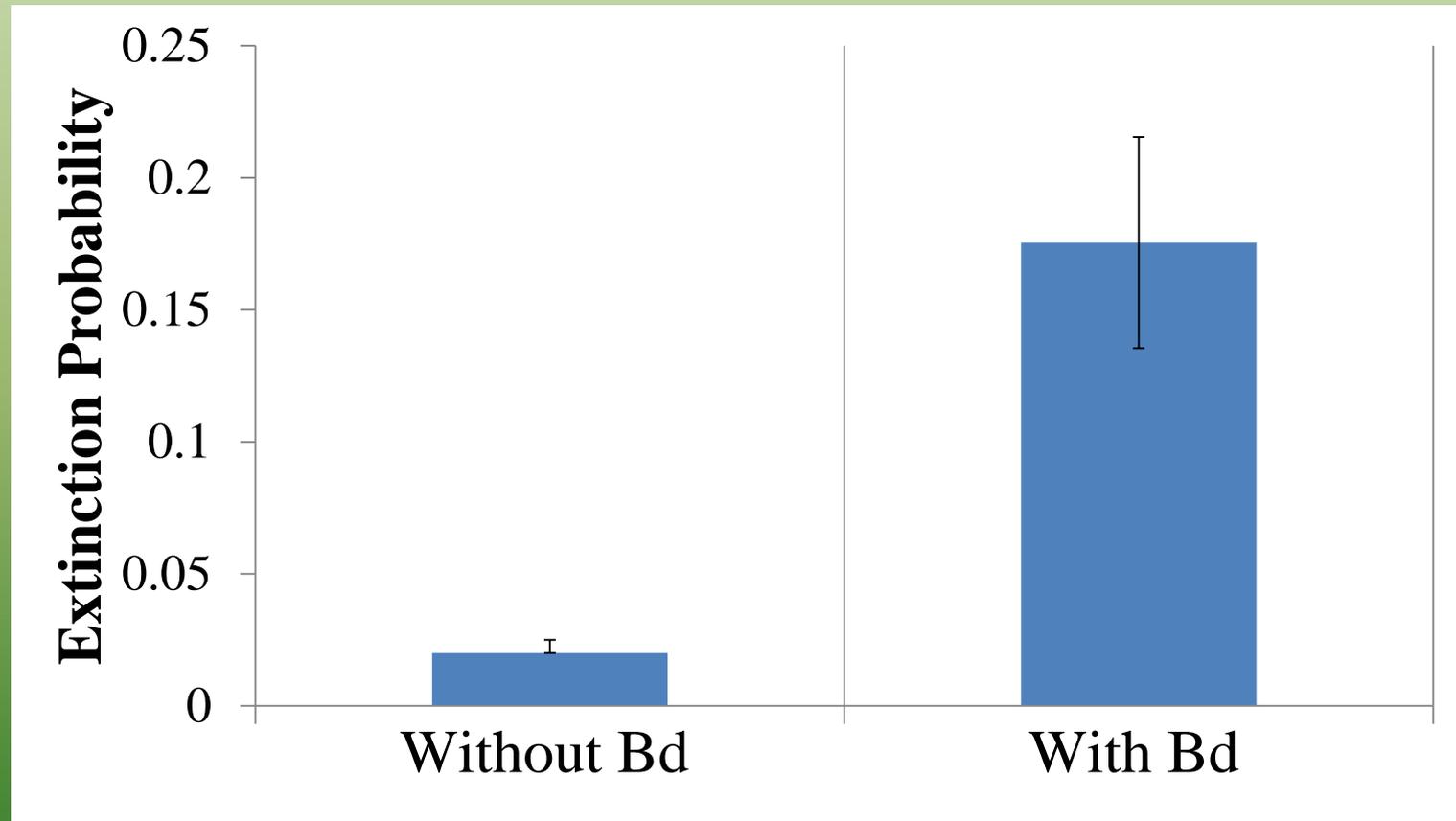


Bd and Boreal Toads

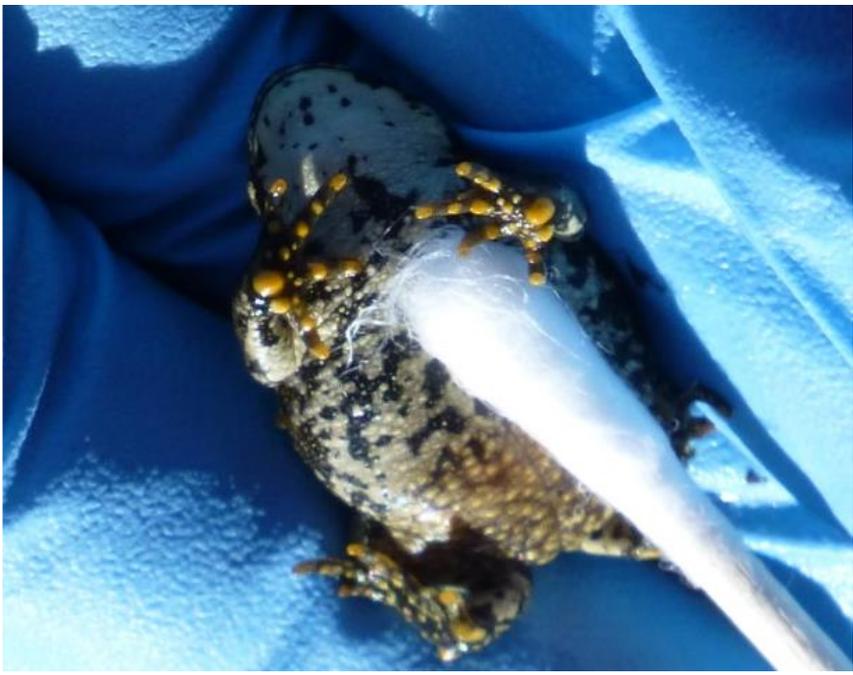
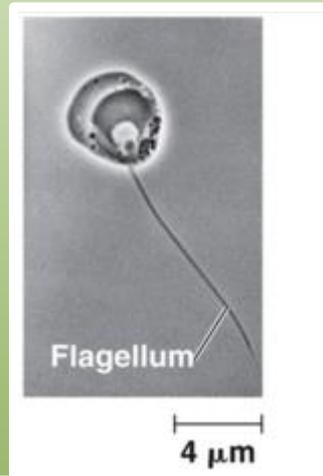


- Is extinction of toads more likely at sites with *Bd*?

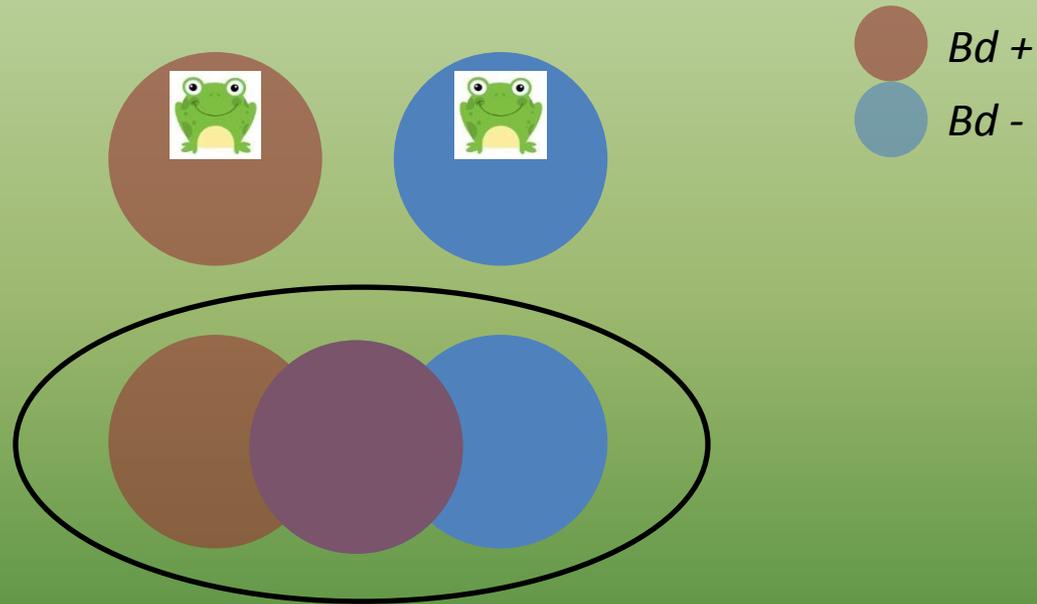
Preliminary Findings



How Do We Study *Bd*?

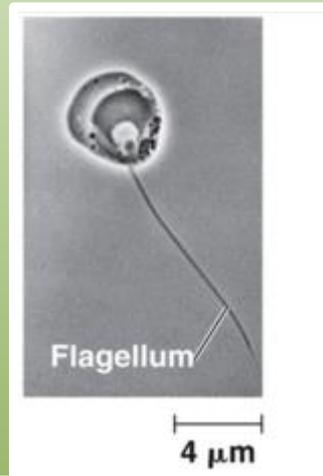


How Do We Study *Bd*?



Reintroductions are often attempted at these sites.

How Do We Study *Bd*?



Moving Forward

- Designed and implemented a lab study to see if filtration could work
- Last summer, we collected filters in CO and WY at historic boreal toad sites



Spruce Lake

- Very low prevalence of *Bd*, but still toads are in decline here
- Historically fishless
- Greenback cutthroat trout stocked in 1991-1992



Greenback Cutthroat Trout

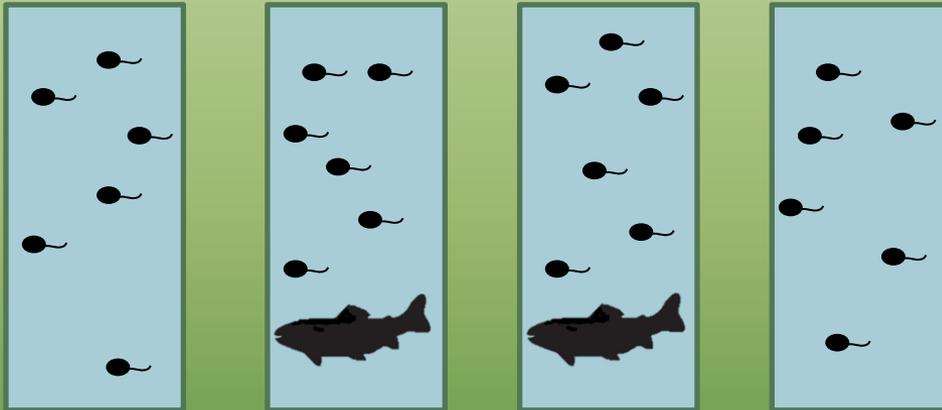
- Colorado's State Fish
- Currently a federally "threatened" species
- Stocked throughout CO for conservation and recreation



Joe Tomelleri

An Experiment

- Do trout influence tadpole survival or growth?



- Measured: survival, days to metamorphosis, and size.

Findings

- Trout-exposed tadpoles had 20% lower survival
- Trout-exposed tadpoles also took 6 days longer to metamorphose



Conclusions: Trout and Toads

- Both species of concern
- Conservation implications
 - Reintroduction sites for both species
 - Informed management where the two currently occur together



What is Rocky Mountain National Park Doing?

- Support research
- Participate as a member of the Boreal Toad Recovery Team
- Support maintenance of a captive population
- Attempt reintroductions when reasonable

Reintroductions

- Site selection
 - Good toad habitat
 - At least 5k from other toad sites
 - Pathogens at low or undetectable levels
 - Fish-free
- First reintroduction attempted in 2007

Objective

- Measure tadpole (and subsequent) survival



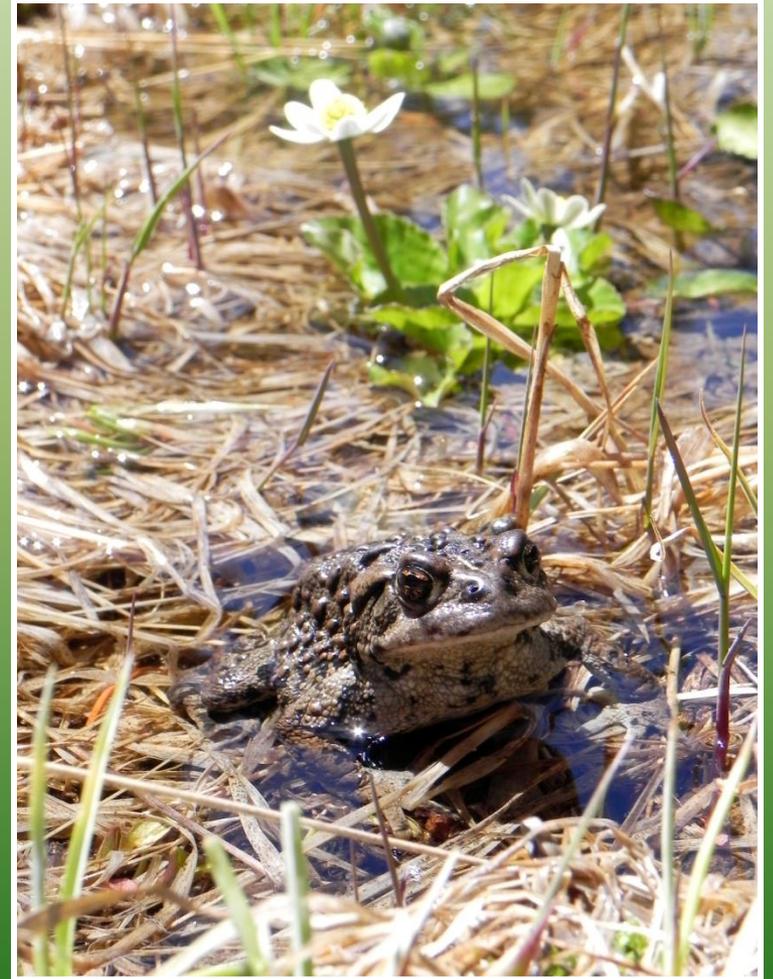
How Many?

| YEAR | NUMBER OF TADPOLES | ESTIMATED SURVIVAL |
|------|--------------------|--------------------|
| 2010 | 1250 | 0.04 |
| 2011 | 3464 | 0.08 |
| 2012 | 4307 | 0.48 |
| 2013 | 1967 | 0.22 |

- First sub-adult seen in 2013
- First adult seen in 2014; died at pond

Findings

- Evidence of size-dependent survival
- Highlights areas for more research
- Has informed other boreal toad reintroductions





Thank you!

- Wendy Lanier
- Dr. Kate Huyvaert
- Dr. Larissa Bailey

Boreal Toad Recovery Team

- Rocky Mountain NP



Questions?

