Amphibians

Bio-indicators of Ecosystem Health

Why Amphibians?

1. Amphibians are considered good bio-indicators because of the permeability of their skins which makes them sensitive to contaminants and their dual aquatic and terrestrial life phases which makes them reliant to two very different ecosystems.

2. Amphibians play important roles in most temperate and tropical ecosystems as both predators and prey, in overall system energy flow, and as major components of biodiversity.

Amphibian Malformations and Decline

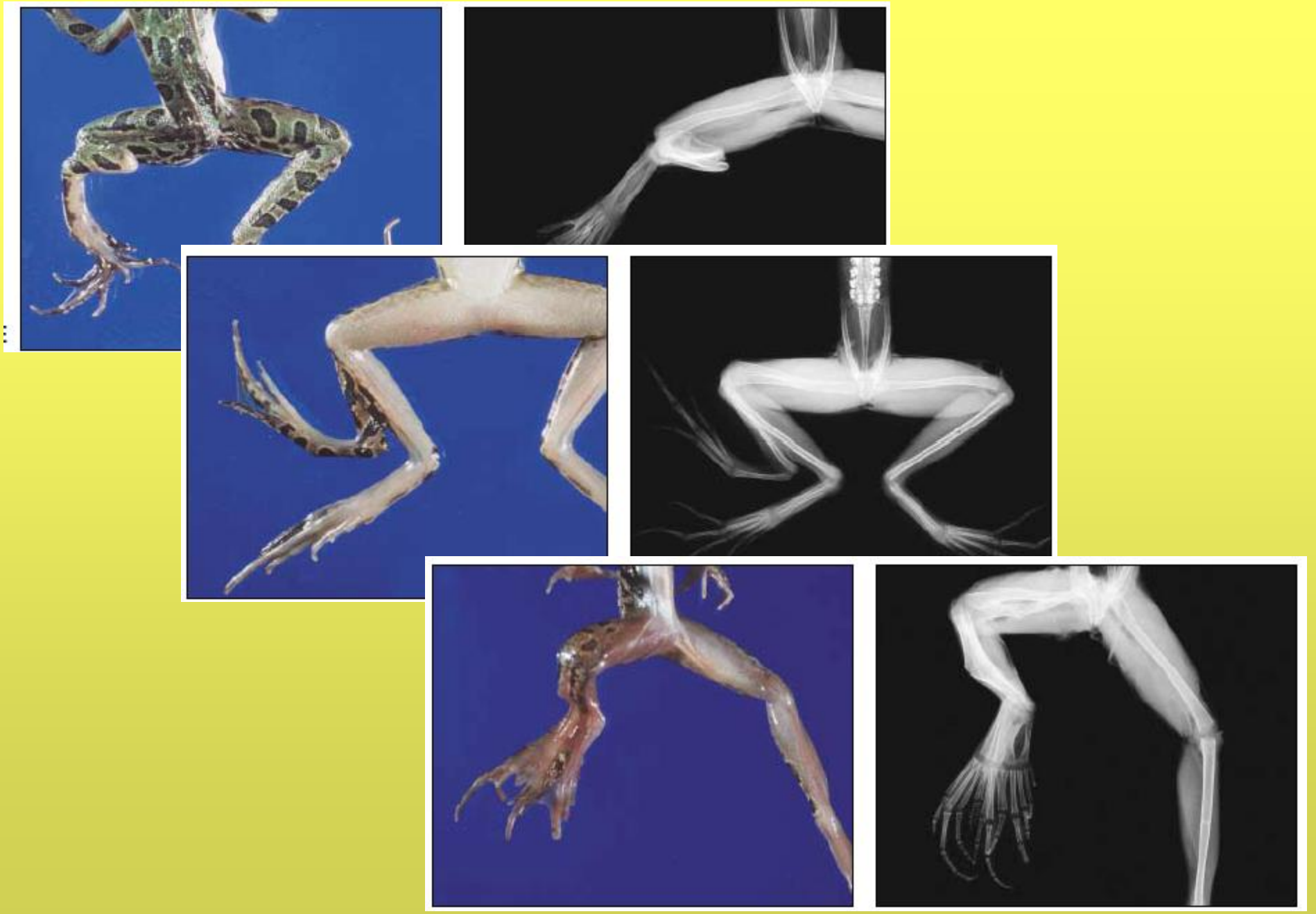
In the summer of 1995, middle school students in Minnesota discovered large numbers of frogs with misshapen, extra, or missing limbs.

Pacific Tree Frog

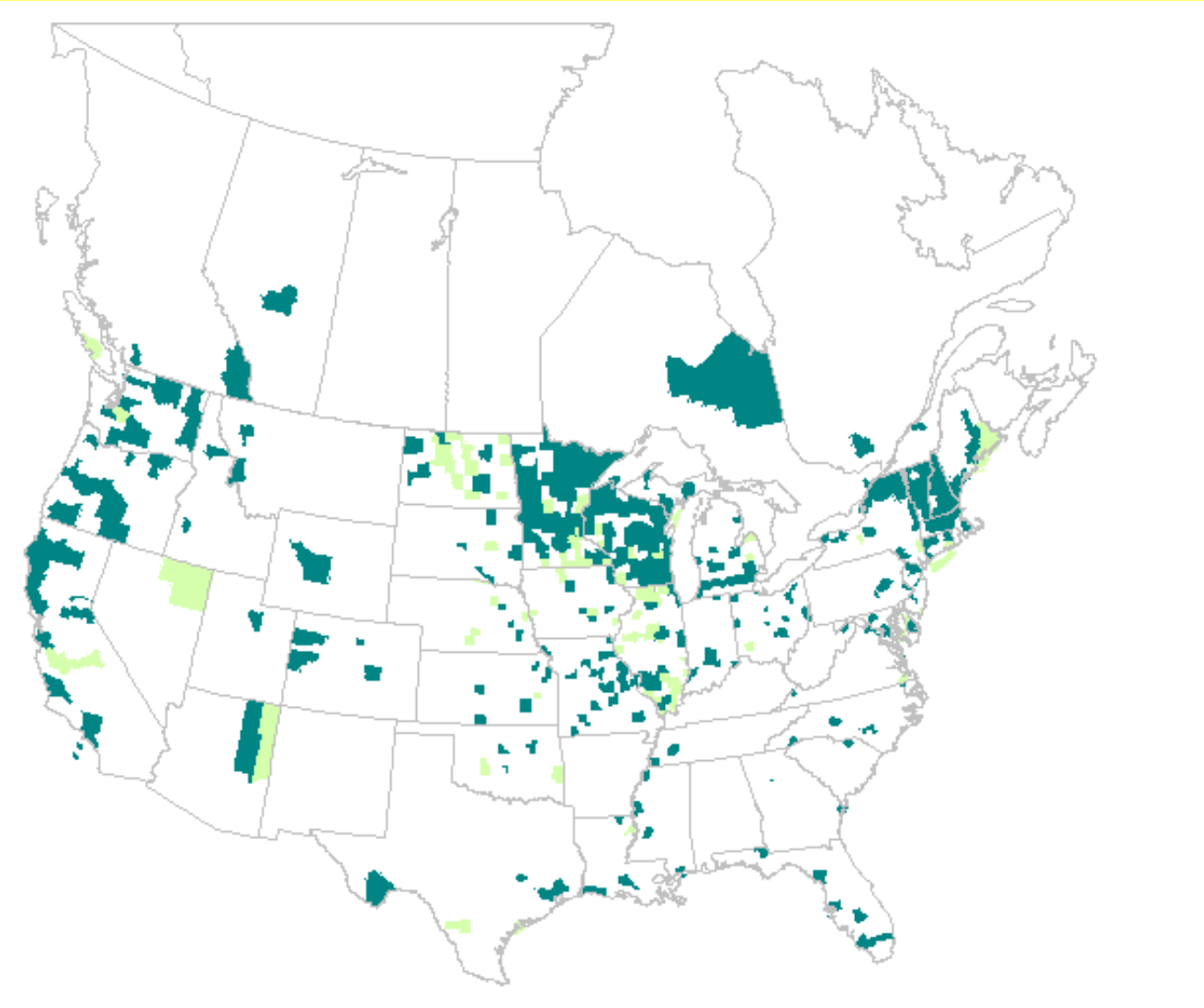
About 50% of the northern leopard frogs they caught that day were malformed.

Northern Leopard Frog

Leopard Frogs



Reported U.S. and Canada malformation locations



Over 200 species have been reported to have malformations.






Possible Causes

Occasional occurrences of malformations appear to be normal, since reports of malformed frogs exist from 1740. (Genetics)

A naturally occurring parasite (trematodes) can alter limb development in amphibians.

They form cysts in amphibian limb buds that can disrupt limb development, potentially causing a range of deformity types such as missing eyes.

2. Malformations may also occur as a result of xenobiotic chemicals (chemicals humans add to the environment)

3. Increased UV radiation is responsible for breaking down non-toxic chemicals into toxic ones.

4. Factors may interact. For example, animals stressed by xenobiotic chemicals in their breeding habitat may be more susceptible to diseases or parasites.

Abnormal mandible

Amphibian Decline

Over the last 50 years, many species of amphibians throughout the world have declined.

Some species have gone extinct.

Some declines are a direct response to the impact of human activities.

For example, a 54% reduction in wetland areas in the US alone since 1700s.

Reasons for Decline

1. UV radiation

Cascades frogs (pictured on the left) have declined dramatically

Research has revealed that the eggs of Cascades frogs and are being damaged by UV-B radiation.

2. Pathogens

Diseases are being transmitted trans-continentally in the exotic animal pet trade.

Golden Toad (*Bufo periglenes)*

3. Introduction of exotic competitors and predators

- Fish introductions play a major role
- These impacts may be direct (predation) or indirect (competition)

4. Acid Rain and Soil

-Water and soil pHs below level 4 to 5 can be lethal for amphibian embryos and tadpoles

Without a clear understanding of causes of amphibian malformations, the link between malformations and widespread amphibian declines remains uncertain.

Why do Amphibian Declines Matter?

1. As a measure of environmental health

2. Ecological - Amphibians are an important part of the ecological balance of many habitats.

3. Biomedicinal - The skins of amphibians are yielding drugs useful to medicine

4. Aesthetic- they are beautiful animals and people love them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GEORGIA SALAMANDERS

FROGS

Photos by

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