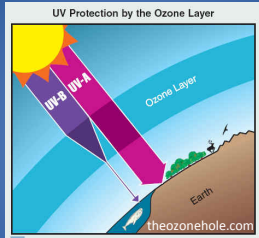


## UV-B RADIATION



Michael Barnes  
University of Tennessee, Knoxville  
WFS 433

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## Objective

To inform the class on the severity of amphibian declines in relation to UV-B radiation

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## Summary

- What is UV-B Radiation?
- How is it affecting amphibians?
  - Case studies
- Why is this important?
  - Ozone depletion?
- What are the implications?
  - Other organisms? Us?

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### What is UV-B Radiation?

- Three types of ultraviolet radiation:
  - UV-A
  - UV-B
  - UV-C

biology.duke.edu

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### What is UV-B Radiation?

- 280-315 nm in length (Blaustein, 2004)
- Environmental stressor to aquatic organisms (Haeder et. al, 2010)
- Absorbed by the stratosphere

theozonehole.com

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### How is this affecting amphibians?

- Damages DNA
- Cyclobutane pyrimidine dimers
- Transcription
- Translation

Blaustein & Belden, 2003

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### How is this affecting amphibians?

- Perch selection
- Increase in embryo mortality
- Tadpole size
- Susceptibility to predation
- Enhance negative effects of hypoxia
- Avoidance of UV-B and sunlight

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### Perch Selection

- Study done on the strawberry poison dart frog (*Oophaga pumilio*)
- Males calling at higher perches are more successful at mating
- Slight increase in UV-B levels influenced perch selection



Kats et. al, 2012

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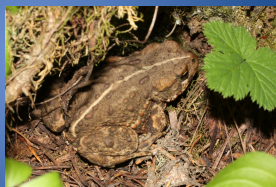
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### Increase in embryo mortality

- Study done on the western toad (*Bufo boreas*)
- 50% to 100% egg mortality in the Oregon Cascade Range
- Eggs showed much higher hatching success when shielded from UV-B radiation



Walter Siegmund

Kiesecker & Blaustein, 1995

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### Tadpole size

- Study done on the striped marsh frog (*Limnodynastes peronii*)
- Exposing individuals to high amounts of UV-B radiation decreased tadpole size in low density populations



Mitchell et. al, 2012

LiquidGhoul

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### Susceptibility to predation

- Study done on the striped marsh frog (*Limnodynastes peronii*)
- Exposure to a 3 to 6 percent increase in UV-B reduced survival by 22 to 28 percent
- UV-B radiation has the potential to reduce tadpole fitness



Alton et. al, 2011

www.knox.vic.gov.au

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### Enhance negative effects of hypoxia

- Study done on the striped marsh frog (*Limnodynastes peronii*)
- Embryos were exposed to varying degrees of UV-B and oxygen levels
- When exposed to both UV-B and hypoxia, an increase in mortality and other negative factors occurred



Bernal et. al, 2011

Kerry Kriger

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### Avoidance of UV-B and sunlight

- Study done on wood frog (*Lithobates sylvaticus*)
- Wood frogs tadpoles were found mostly under a UV-B blocking filter or under shade
- They may be minimize UV-B radiation by avoiding it or by choosing shade



Connolly et. al, 2011

Brian Gratwicke

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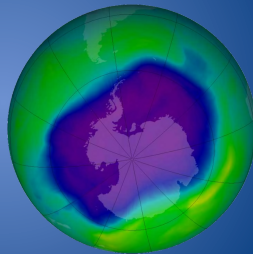
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### Why is this important?

- Ozone depletion
  - Anthropogenic factors?
  - As ozone depletion continues, levels of UV-B radiation will increase
  - Increases in UV-B radiation will only increase the negative effects on amphibians



[http://www.epa.gov/ozone/science/q\\_a.html](http://www.epa.gov/ozone/science/q_a.html)

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### What are the implications?

- Where does it stop?
  - Not only will amphibians continue to decline, but if ozone depletion continues, humans and other animals could be affected



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## Questions?

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