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### Does Artificial Light at Night Influence Amphibian Development and Color Changing Abilities?

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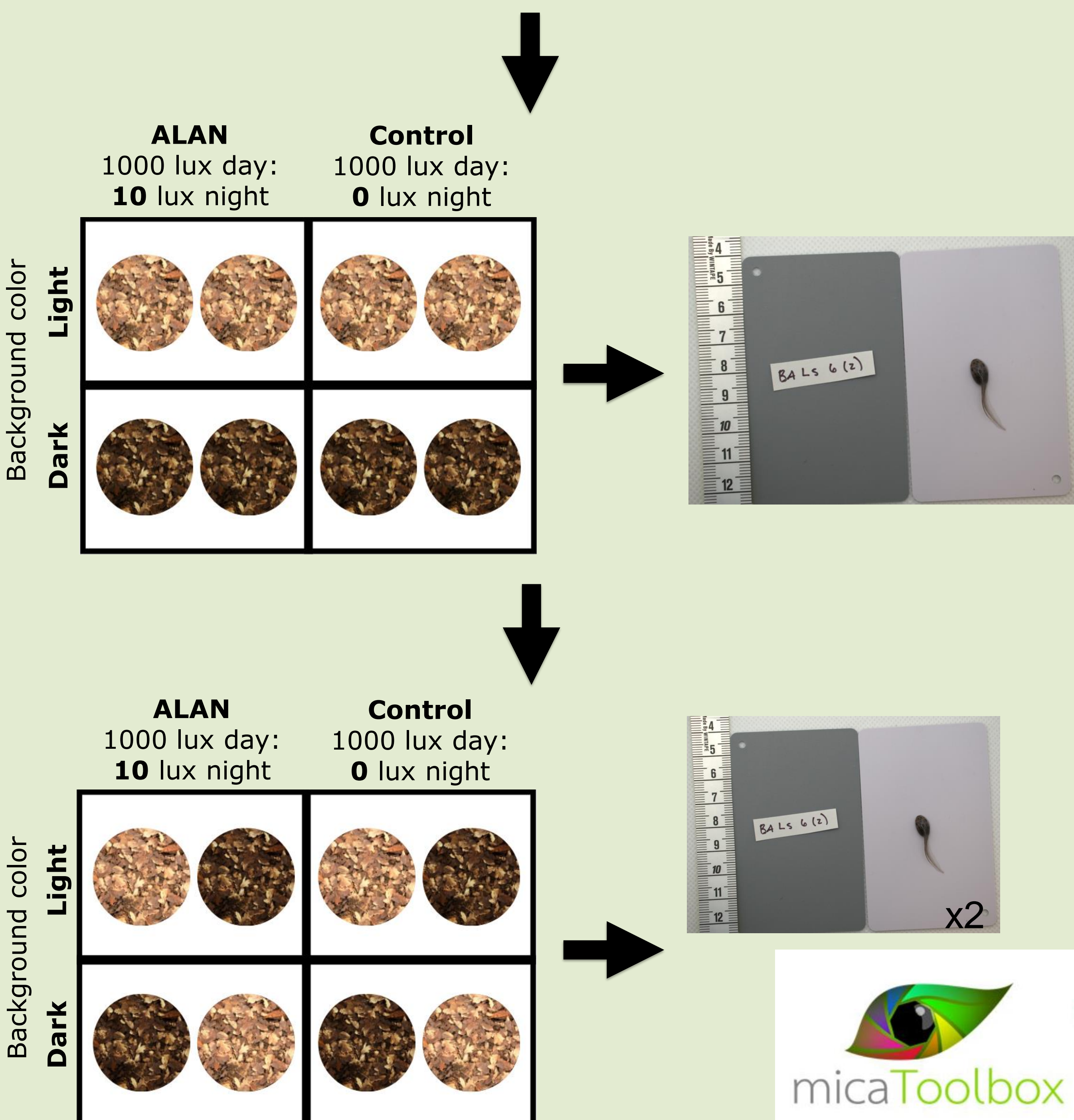
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## BACKGROUND

- **Artificial Light at Night (ALAN)** – excess anthropogenic light present at times inconsistent with Earth’s natural day/night cycle<sup>1</sup>
- ALAN is known to alter circadian rhythms, development, & hormone levels in amphibians<sup>2,3</sup>
- Growth & skin pigmentation affect tadpole survival by influencing their susceptibility to predation<sup>4,5</sup>
- **Background adaptation** – the process through which tadpoles change their coloration to match their surroundings and avoid being spotted by predators<sup>6</sup>
- This research strives to determine how ALAN influences local wildlife by asking:

1. Do ALAN & background color influence amphibian background adaptation abilities?
2. Do ALAN & background color influence amphibian growth/development?

## METHODS



Mass, developmental stage, & snout-to-vent length recorded

## RESULTS – BACKGROUND ADAPTATION (Q1)

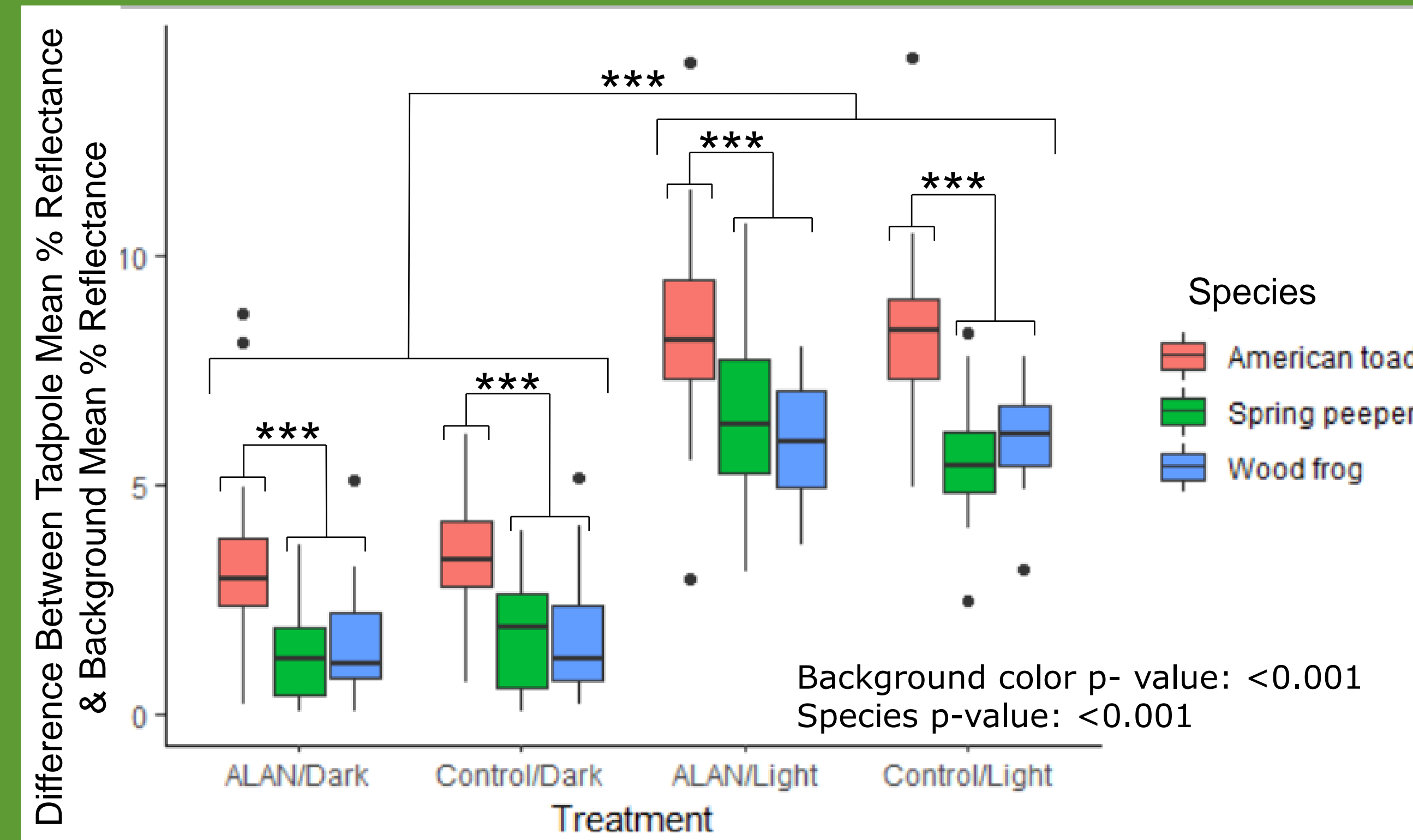


Figure 1. Pigmentation Matching of All Three Species to Their Background. Rearing background color had a significant effect on how well tadpoles matched their background. Species also had a significant effect on how well tadpoles matched their background.

Light treatment did not have a significant effect ( $p=0.3641$ ) on how well tadpoles matched their background.

Tadpoles raised on **dark** backgrounds matched their background **more** than tadpoles raised on light ones.

**Wood frogs and spring peepers** matched their background **more** than American toads.

## REFERENCES

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## RESULTS – DEVELOPMENT (Q2)

### Wood frogs

Background color had a **significant** effect ( $p=0.049$ ) on mass. Tadpoles raised on light backgrounds were larger than those raised on dark backgrounds. Neither light treatment ( $p=0.670$ ) nor background color ( $p=0.963$ ) had a significant effect on tadpole development.

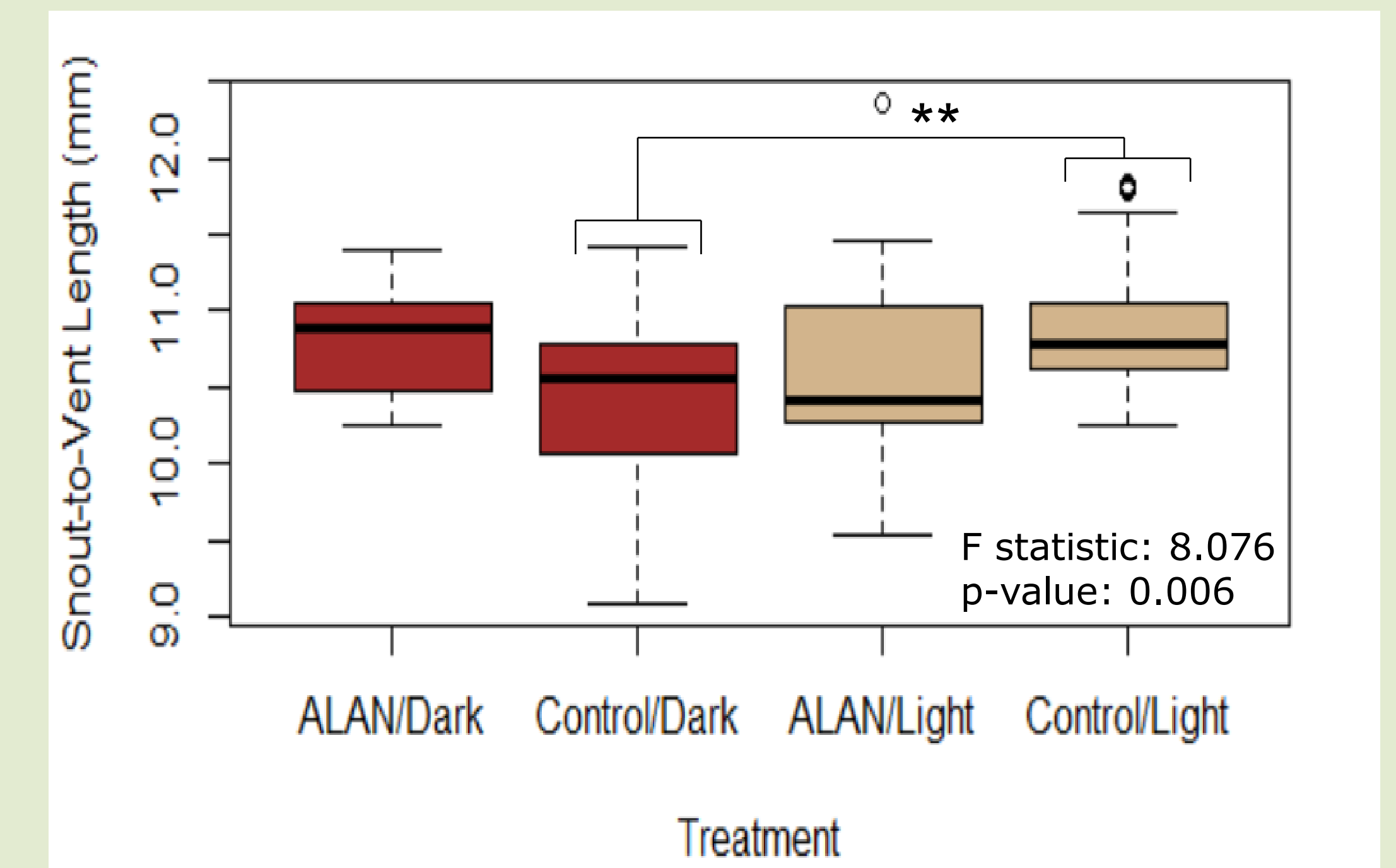


Figure 2. Snout-to-Vent Length of Wood Frogs by Treatment. In control light, tadpoles raised on light backgrounds were longer than those raised on dark backgrounds; this was not seen with exposure to ALAN.

### Spring peepers & American toads

Neither light treatment nor background color had a significant effect on any growth/development metrics.

#### Spring peepers

Mass: light treatment ( $p=0.125$ ), background color ( $p=0.167$ )  
SVL: light treatment ( $p=0.131$ ), background color ( $p=0.116$ )  
Stage: light treatment ( $p=0.776$ ), background color ( $p=0.431$ )

#### American toads

Mass: light treatment ( $p=0.681$ ), background color ( $p=0.989$ )  
SVL: light treatment ( $p=0.479$ ), background color ( $p=0.752$ )  
Stage: light treatment ( $p=0.770$ ), background color ( $p=0.808$ )

## CONCLUSIONS AND FUTURE WORK

- Tadpoles may be **better** at matching **dark** backgrounds because their natural habitats are filled with dark sediments and leaf litter
- **Wood frogs** and **spring peepers** may match backgrounds **better** because they have greater pigmentation plasticity than American toads
  - Toads may rely more on other defensive strategies<sup>7</sup>
- Tadpoles raised in **control** light grow **larger** on **light** backgrounds, which prevents them from being eaten despite being more visible<sup>4</sup>
  - This trend is not seen with tadpoles exposed to ALAN, making them more vulnerable to predators
- Further analyses will investigate how ALAN affects tadpoles' skin pigmentation and short-term background adaptation abilities