

# Development of phototaxis in Longfin Inshore squid hatchlings



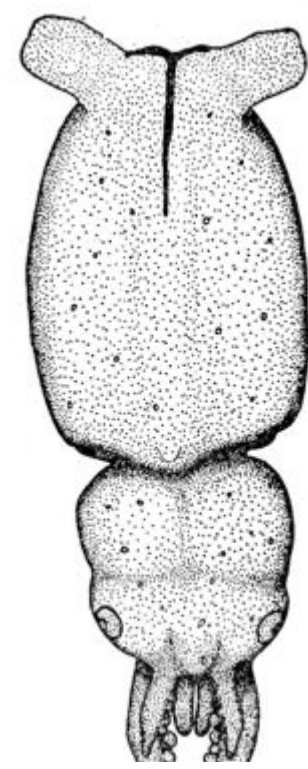
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## Background

Very little is known about the early life of the Longfin Inshore squid and the methods that they use to survive past the paralarval developmental stage. It is suspected that they navigate to optimum feeding locations using light indicators, as they demonstrate phototaxis.

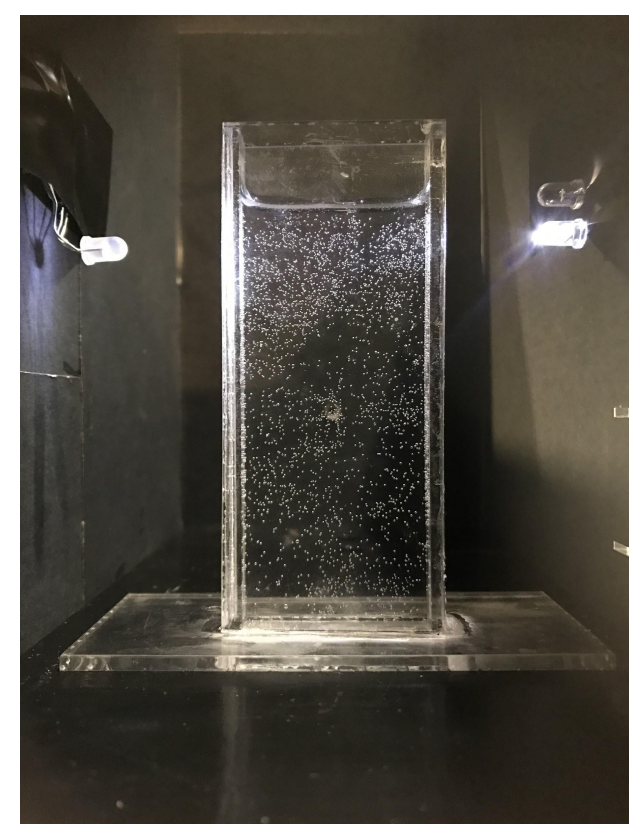
We seek to quantify and study this behavior to reveal insight into the mechanisms of survival for the squid in their first hours of life.



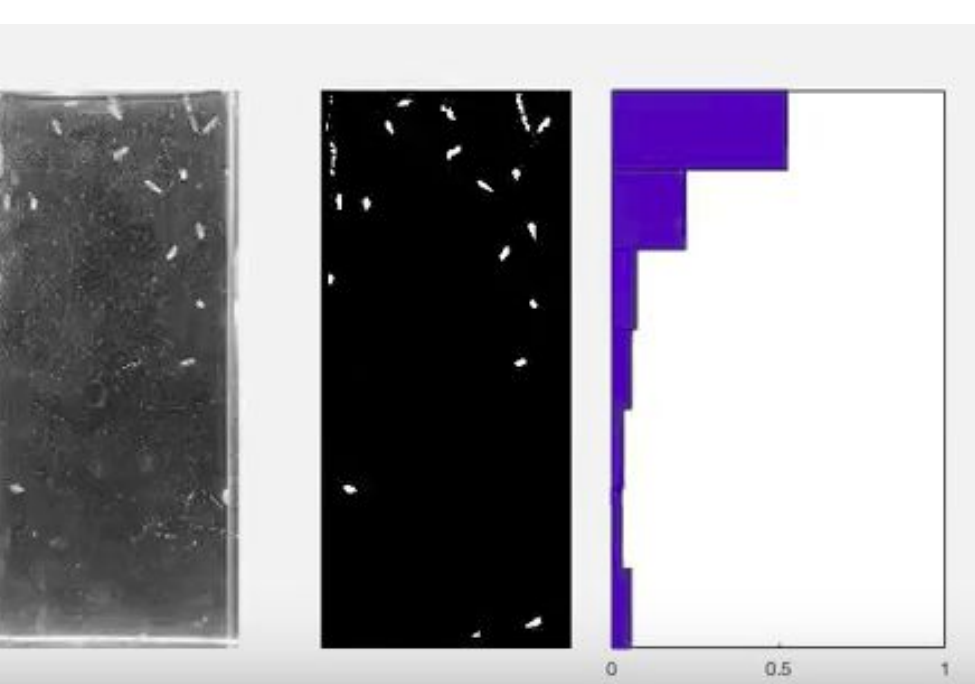
## Methods



**Squid environment:** The squid were raised in a bucket of artificial sea water. Eggs were kept in individual bottles so that hatchlings of different ages would be separate.

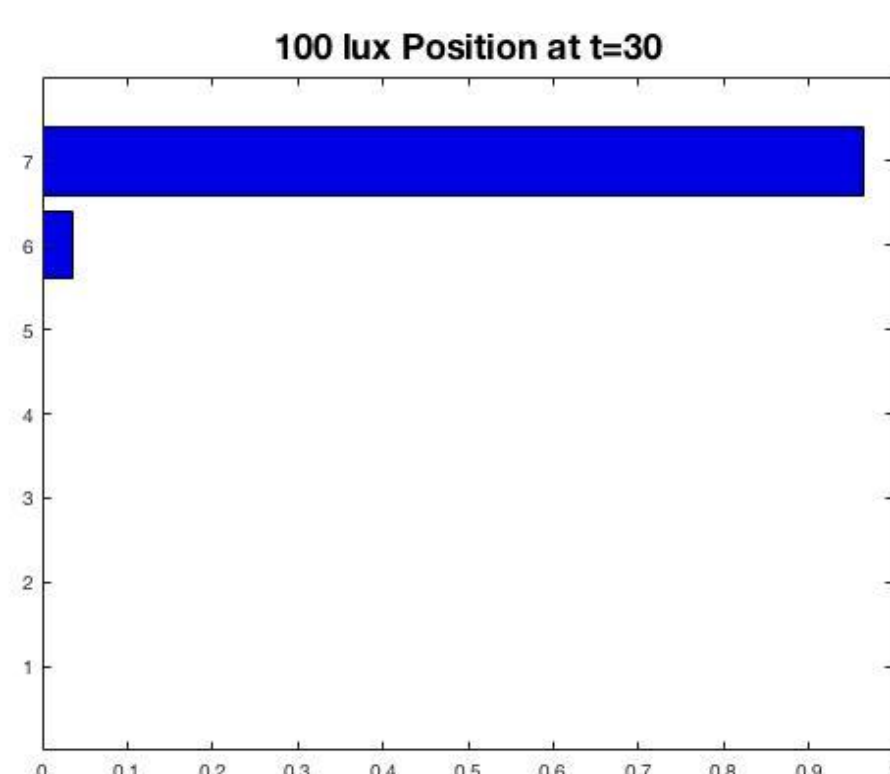
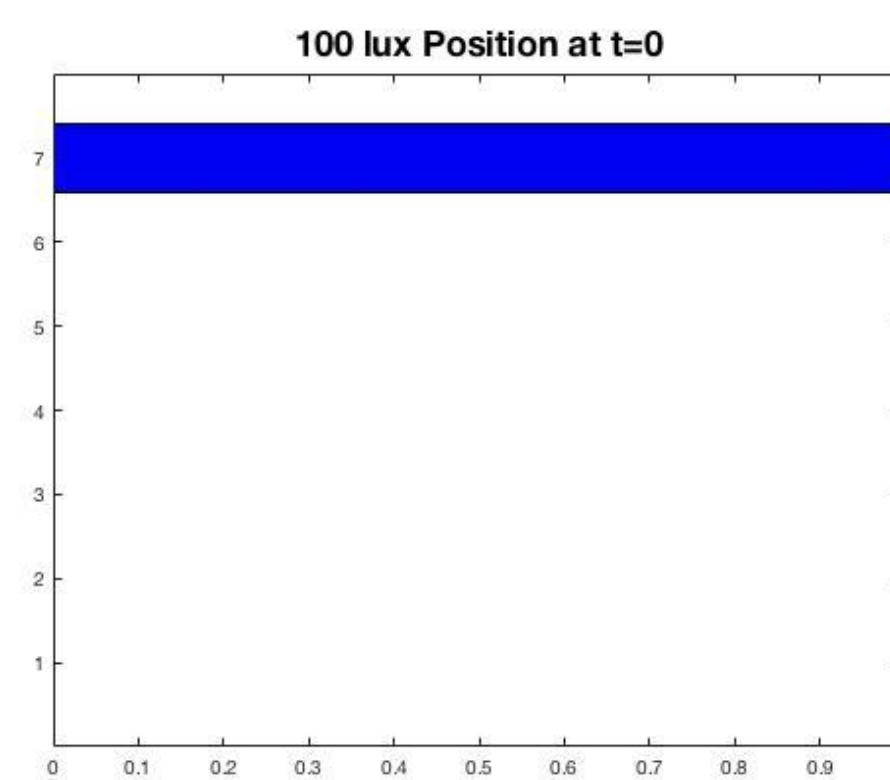


**Recording setup:** Squid were placed into a small experimental tank in a dark recording box. LEDs on the right and left of the tank tested the squid in different conditions.

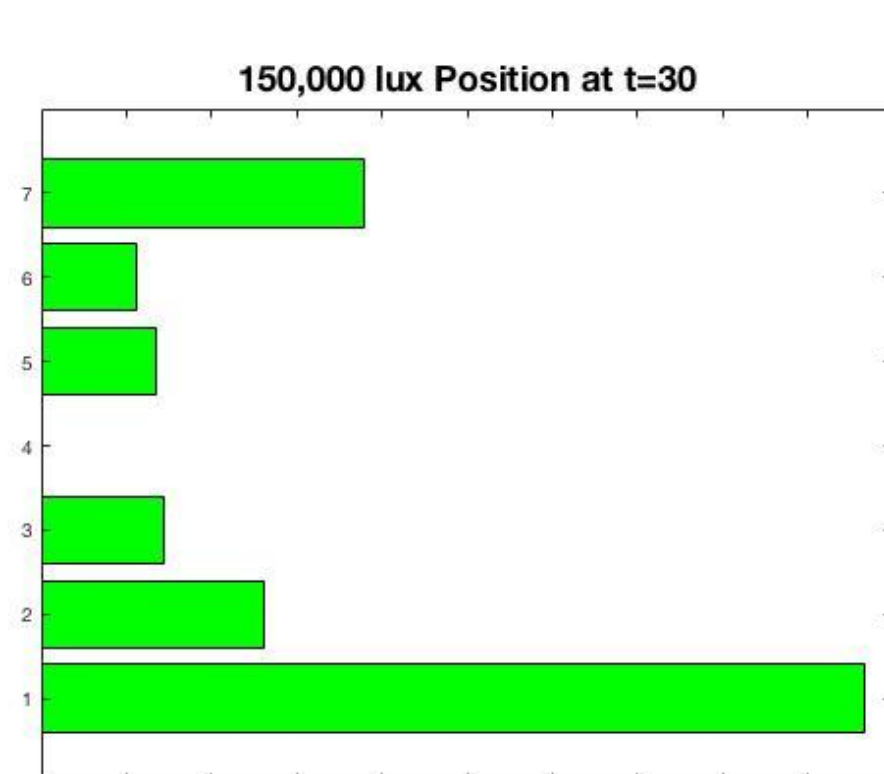
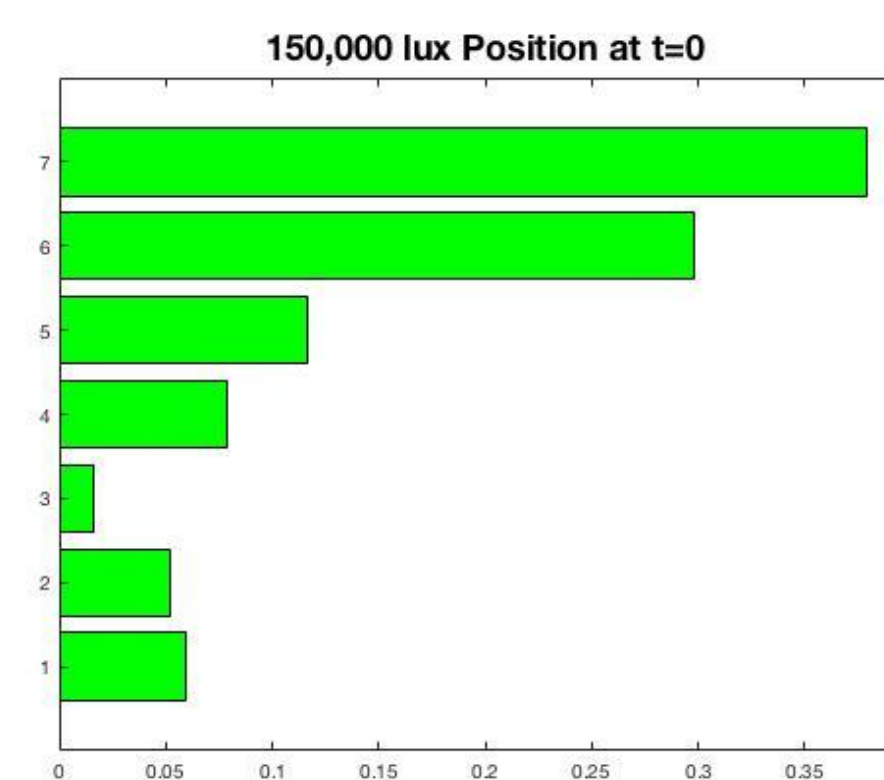


**Processing:** The original video (far left) underwent background subtraction and dilation to produce the middle image. The white values are graphed on the far right. Falling was detected as the top bar decreased in value and the bottom bar increased.

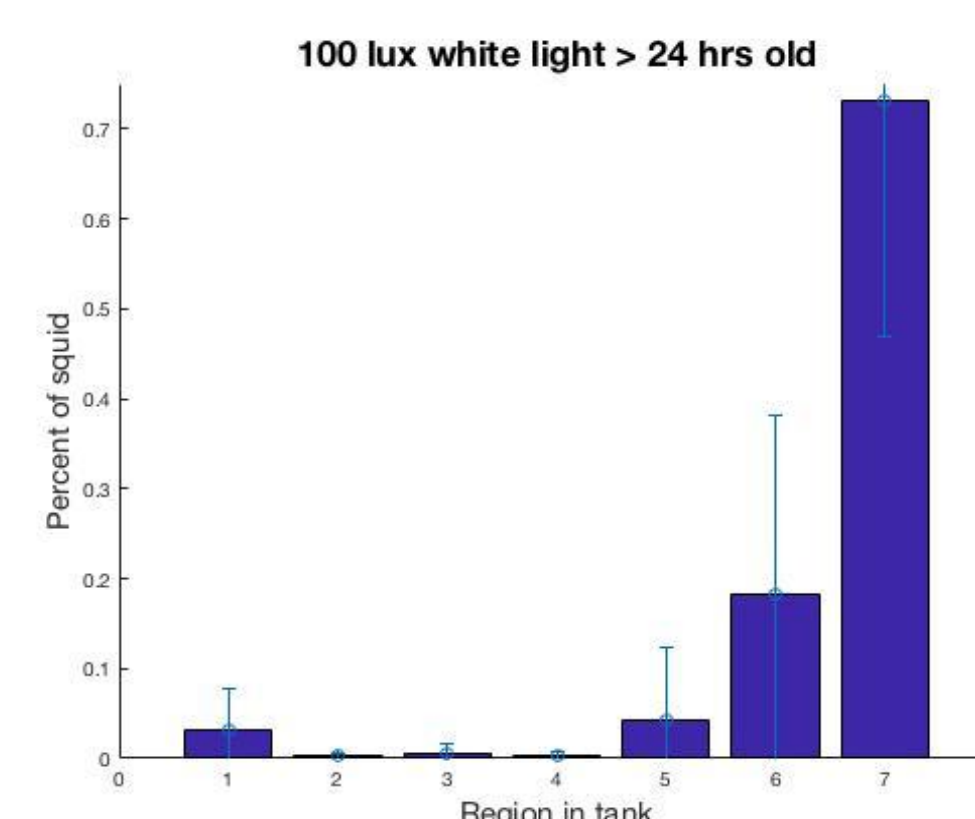
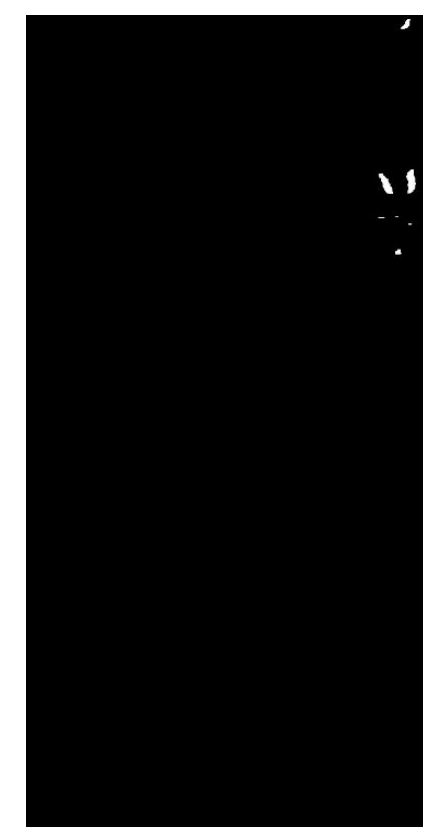
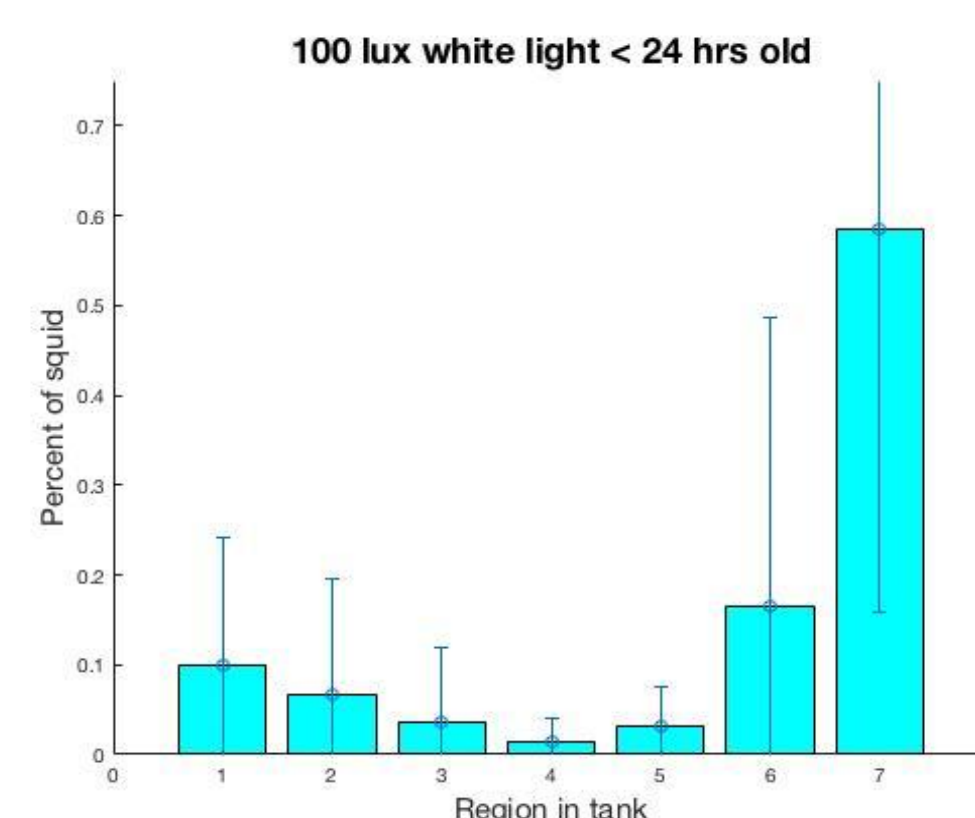
## Both age groups stay towards the surface under 100 lux light



## Both age groups drop down under stimulated sunlight.

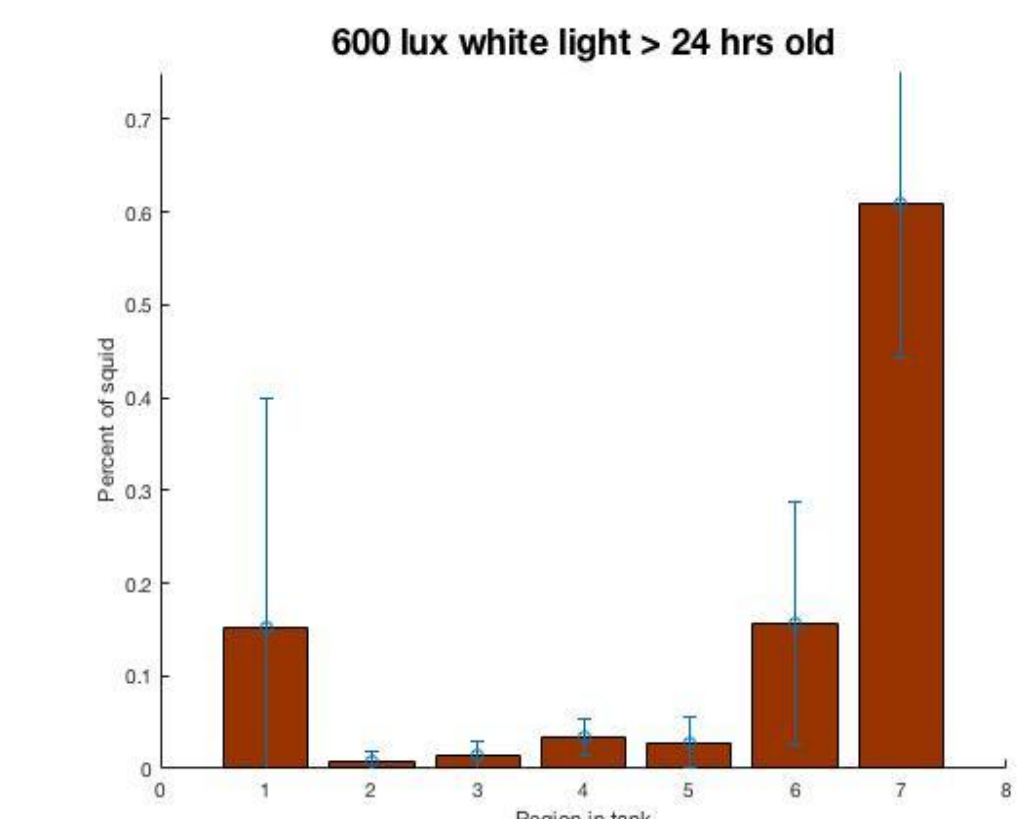
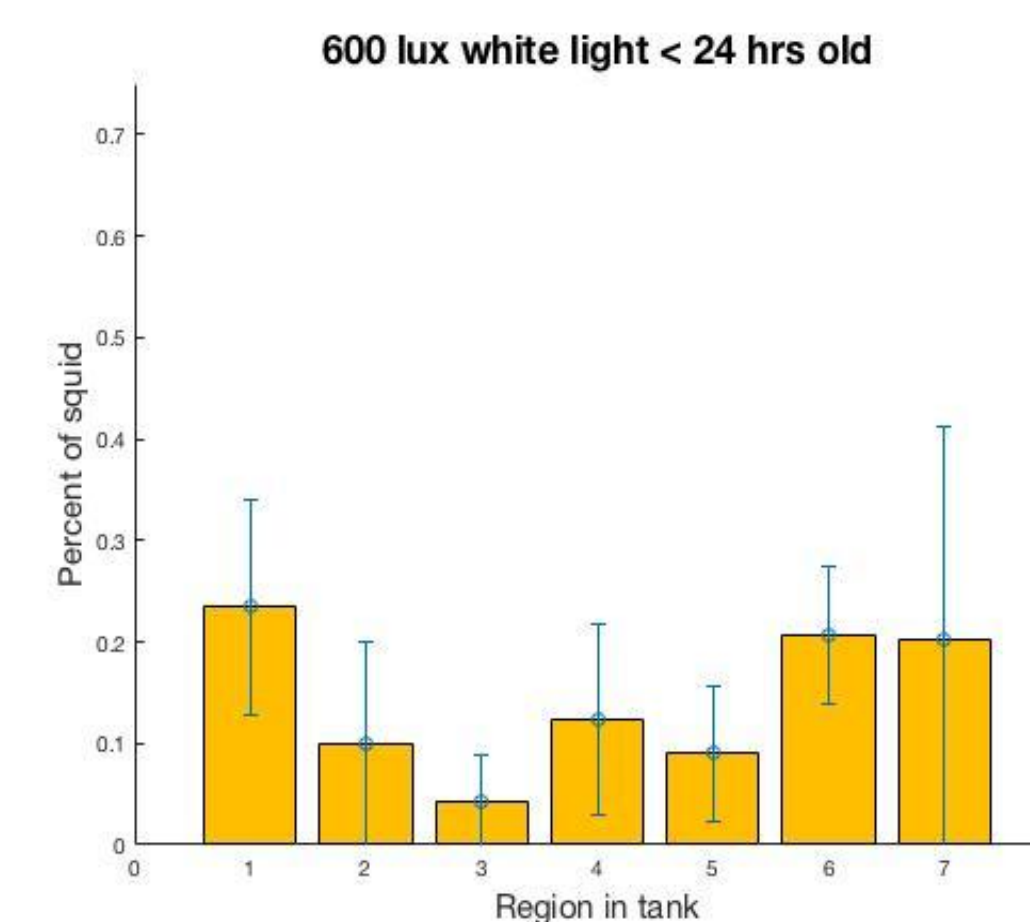


## Hatchlings in both age groups show phototaxis for 100 lux light



Average position over a 60 second video

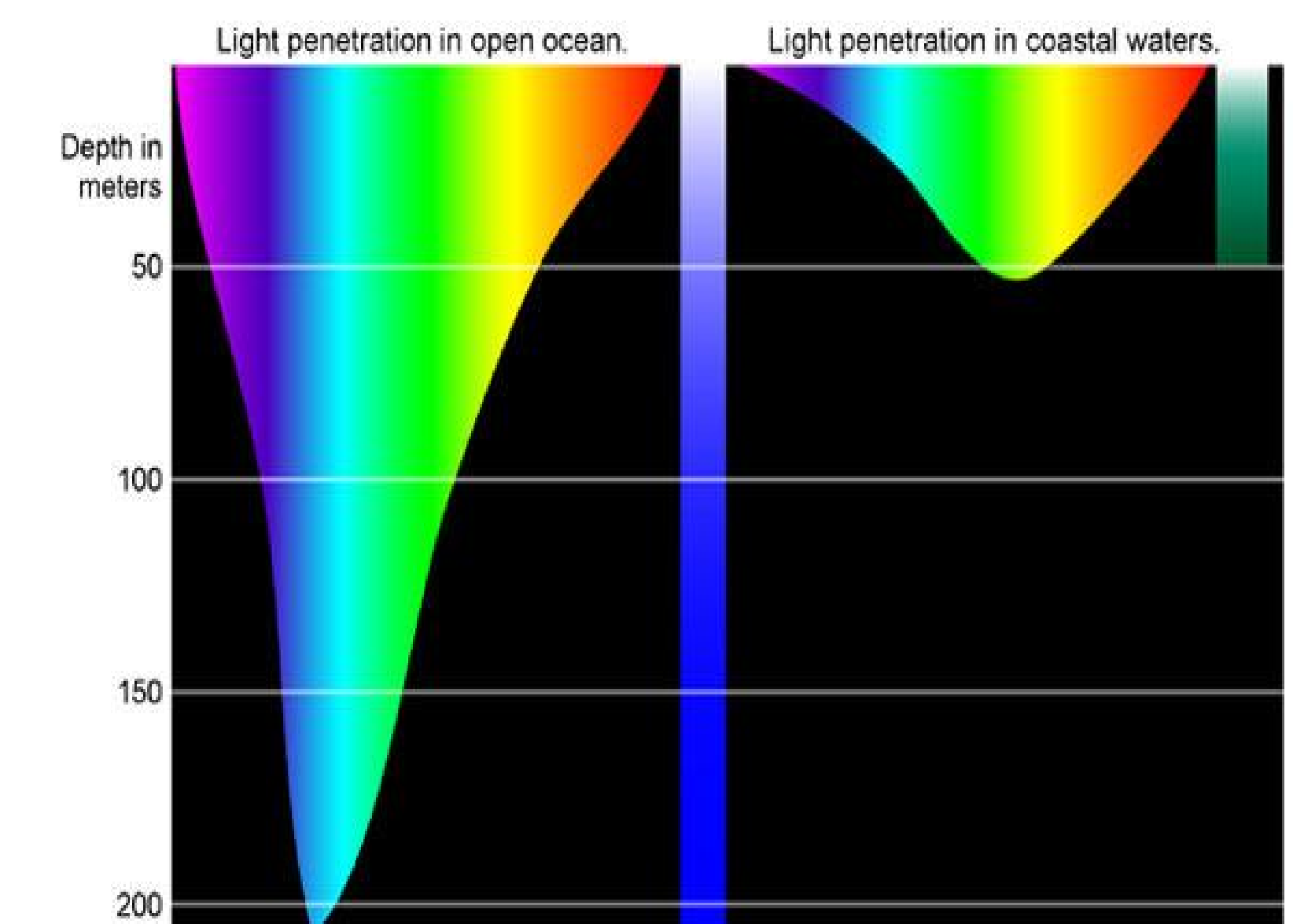
## Only older hatchlings show phototaxis for stronger light.



Average position over a 60 second video

## Discussion

Light is filtered differently in water at different locations in the ocean. The water along the coastal shelf is murkier than the water in the open ocean, so light penetrates less deeply. Since newborn squids are often found along the coastal shelf, their perception of what light level corresponds to what depth level should be different than squid who are a few days older and are moving towards the open ocean. For both age groups, 100 lux represents a safe, moderately deep location in the water and 150,000 lux represents dangerous exposure at the surface of the water. The differentiation of response at 600 lux could be because on the coastal shelf, 600 lux represents being just 10 meters deep, whereas in the open ocean it represents 40 meters in depth.



## References

TM F/NE-193: Essential Fish Habitat  
Source Document: Longfin Inshore Squid, *Loligo pealeii*, Life History and Habitat Characteristics (2nd edition), by LD Jacobson. September 2005. NTIS Access No PB2005110684.

Arnold, John M. "Normal Embryonic Stages Of The Squid, *Loligo Pealii* (Lesueur)." *The Biological Bulletin* 128.1 (1965): 24-32. Web.

"Light in the Ocean." *UCSB Science Line*. N.p., n.d. Web. 28 July 2017.

## Acknowledgements

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