

Knotty Behavior:

Effects of acute temperature changes on the unique feeding behaviors of *Gymnothorax mordax*

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Background

- Interannual variability - El Niño Southern Oscillation & Pacific Decadal Oscillation
- "The Blob" appeared off the coast of California in the winter of 2013 – 2014
- Shifts in Coastal Fish Distributions, (i.e. Largemouth Blenny (Love et al, 2016))
- Ectotherms are especially sensitive to thermal changes in environment
 - As temperature increases viscosity decreases → thermal dependence on mouth movements (Devries et al, 2006)
 - Rate of motion expected to double for every 10 °C increase in temperature” (Turingan et al, 2016)



Introduction

- Examine relationship between acute temperature changes and moray eel feeding behaviors
- Knotting is time intensive, and enables morays to handle larger prey items or eat in chunks (Diluzio, 2017)

Question:

- **Do acute changes in water temperature affect predatory behavior?**
- **Predictions:**
 - Increase in time intensive behaviors (knotting, spinning) at higher temperatures
 - Knotting and spinning behaviors will be faster at higher temperatures

Methods

- 6 *Gymnothorax mordax* (CA Morays) from Catalina Island, Ca
- Fed every two weeks, prey, (squid, n=5) 15% total body mass
- Exposed to 1 of 4 temperatures each feeding → trials randomized using a Latin Square Design
 - 15° C (Monterey Bay) 18° C (Winter Catalina) 21° C (Summer Catalina) 24° C (Summer Baja)
 - At least 3 trials at each temperature
- Acclimate in test tank 20 minutes before trial begins
- Film feeding at 120 FPS and analyze videos in iMovie
- Determine differences in prey handling behaviors across temperature treatments using ANOVAs in JMP Pro 14



Behavioral Results

Shaking



Ramming



Spinning



Knotting



Preliminary Results Using ANOVAs

- No difference between prey handling time and temperatures
- No difference between total shaking duration or total spinning duration and temperature
- **Number of knotting bouts differed significantly across temperatures**
 - # of knots was highest in summer Baja
- **Total time ramming prey differed significantly across temperatures**
 - Ramming time highest in Monterey Bay
 - Lowest in summer Baja

| Level | F-statistic | P-Value |
|---|---------------|---------------|
| Temp vs In trial duration | 0.452 | 0.7182 |
| Temp vs collective knotting | 1.7816 | 0.1764 |
| Temp vs In Collective time spent ramming | 3.1714 | 0.0417 |
| Temp vs In Collective time spent spinning | 0.122 | 0.9463 |
| Temp vs In Collective time spent shaking | 0.3748 | 0.7719 |
| Temp vs # Knots | 3.0573 | 0.0468 |
| Temp vs # Rams | 1.4698 | 0.2468 |
| Temp vs # Spins | 0.4576 | 0.7143 |
| Temp vs # Shakes | 0.1924 | 0.9006 |

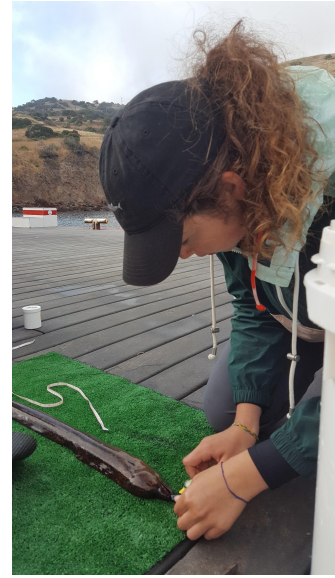
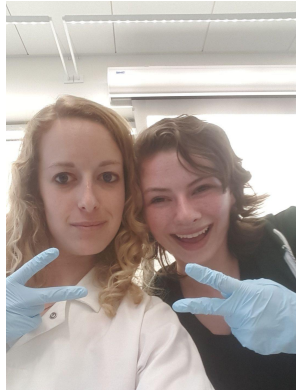
Future Directions

- Continue with feeding trials and behavioral analyses
- Examine feeding behaviors in the field
- Conduct trials where morays gradually transition into different temperature regimes



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Questions?

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