HOW A DISTURBANCE EVENT IMPACTED MOVEMENT AND RESIDENCY IN COMMON SNOOK

Jessica Noble, Lauren Kircher, Joy Young, John Baldwin

GEER 2017


Nature World News


Norwegian Broadcasting Corporation

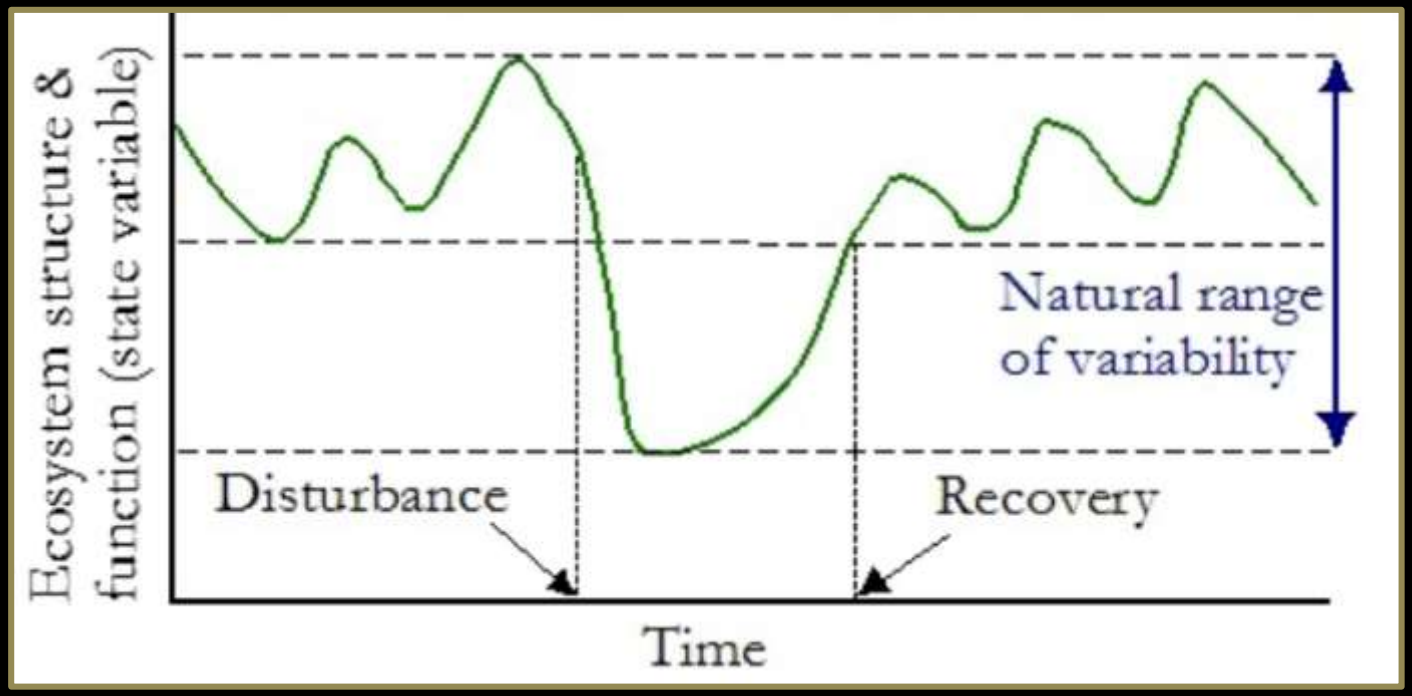
Disturbance


National Geographic

Missouri Department of Conservation

Disturbance on the Ecosystem

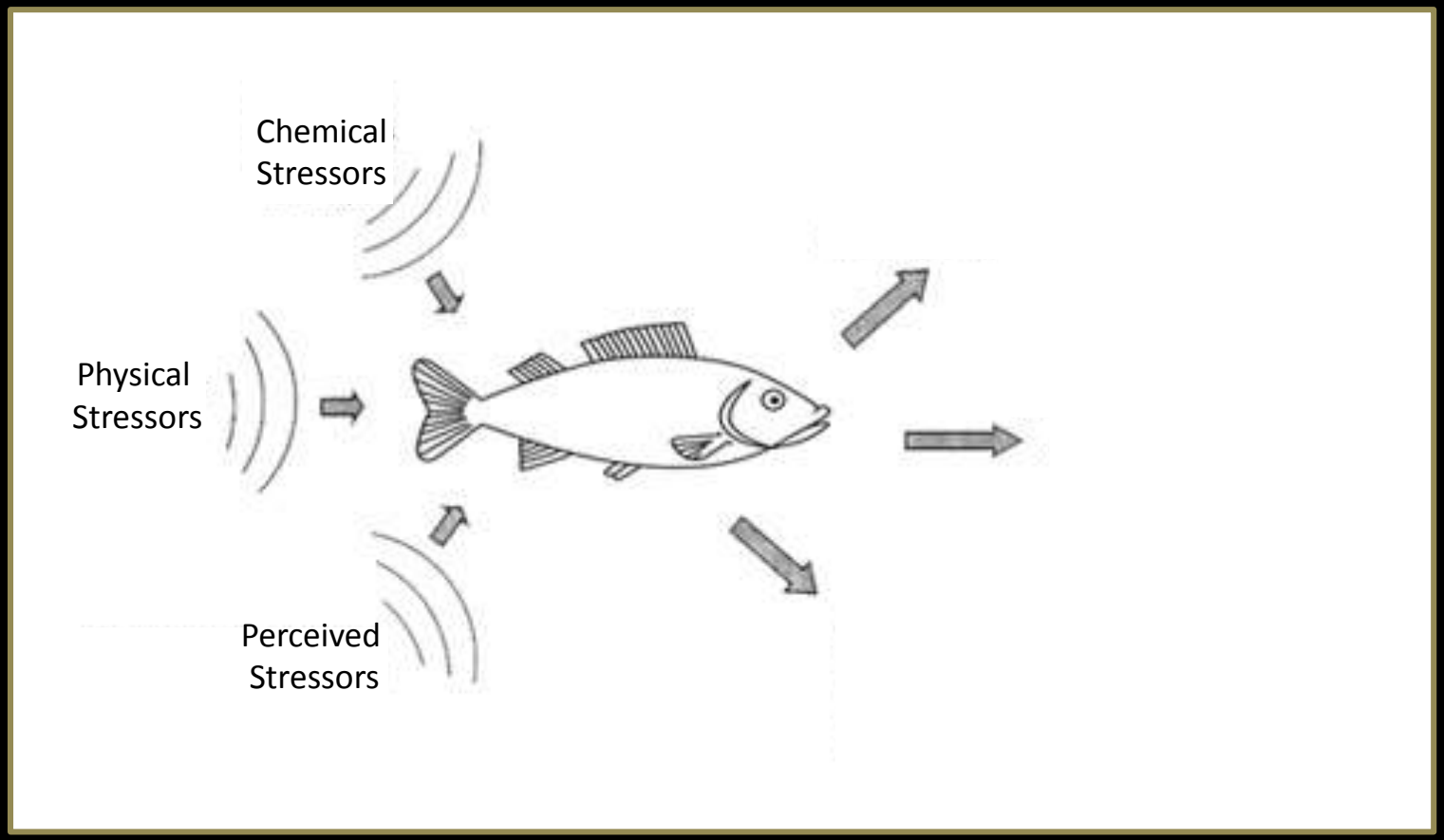
Regime vs. Event



K. McGarigal Lecture Notes

Disturbance on the Individual

Stress Exposure and Response



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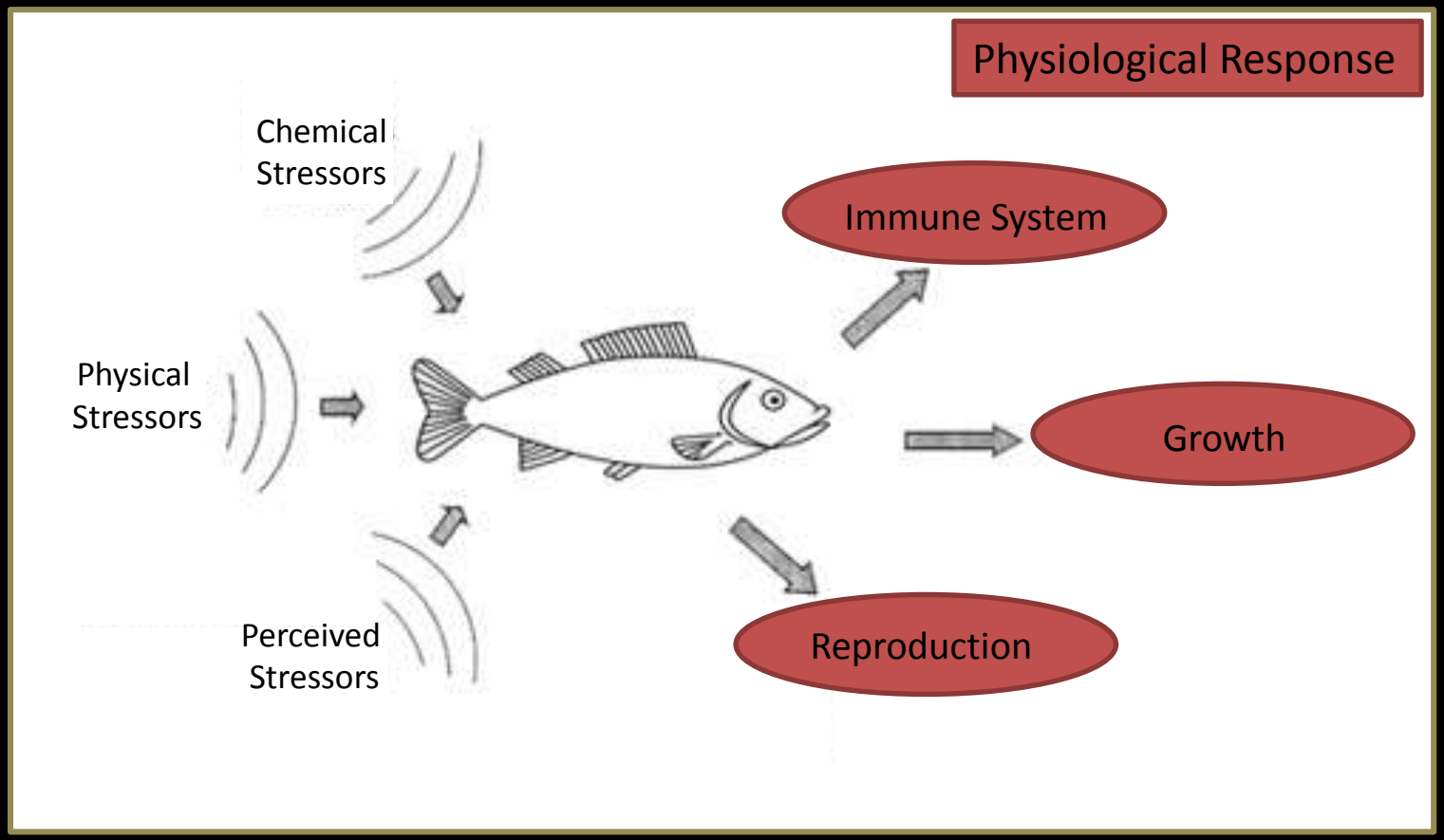
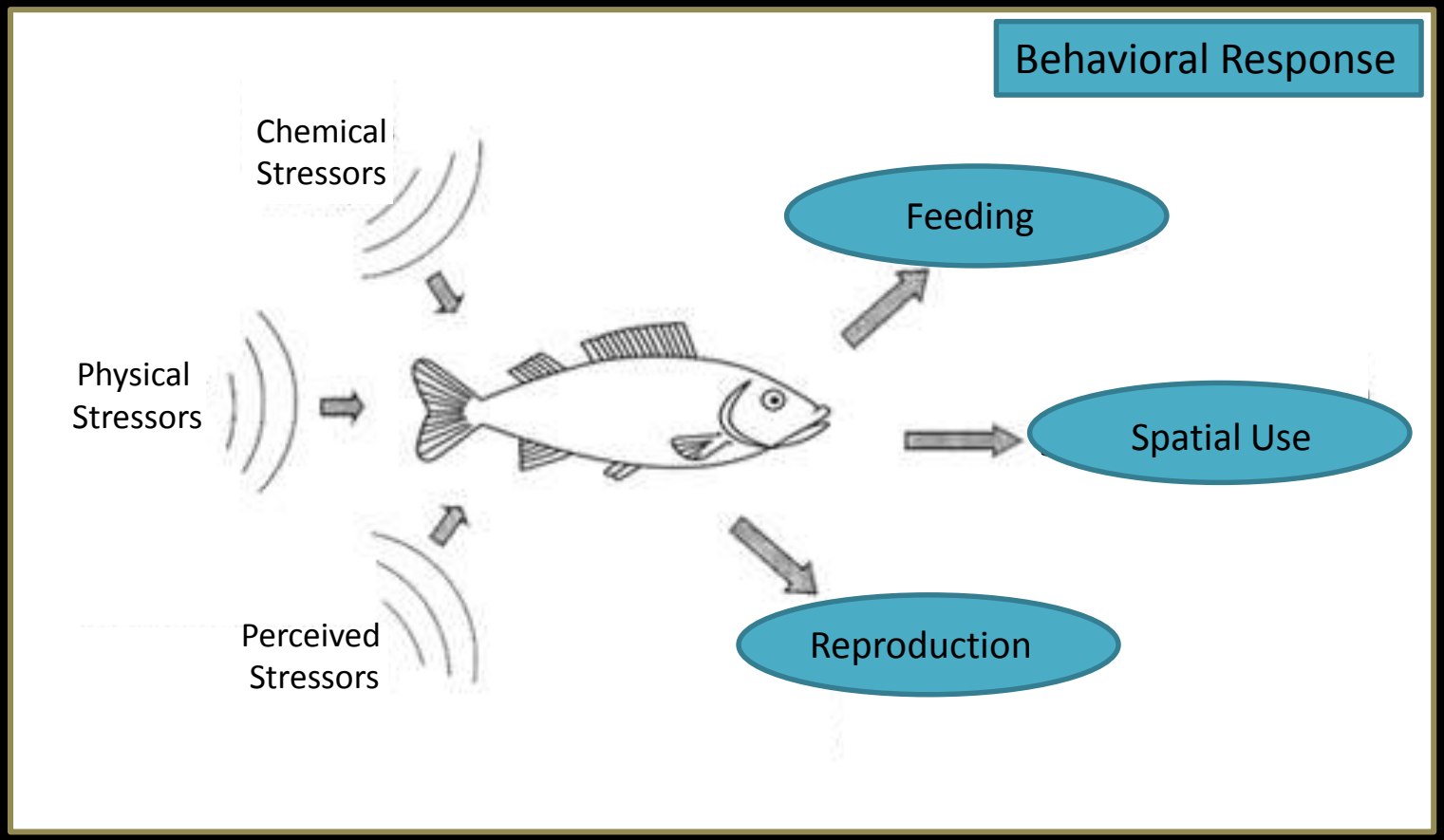
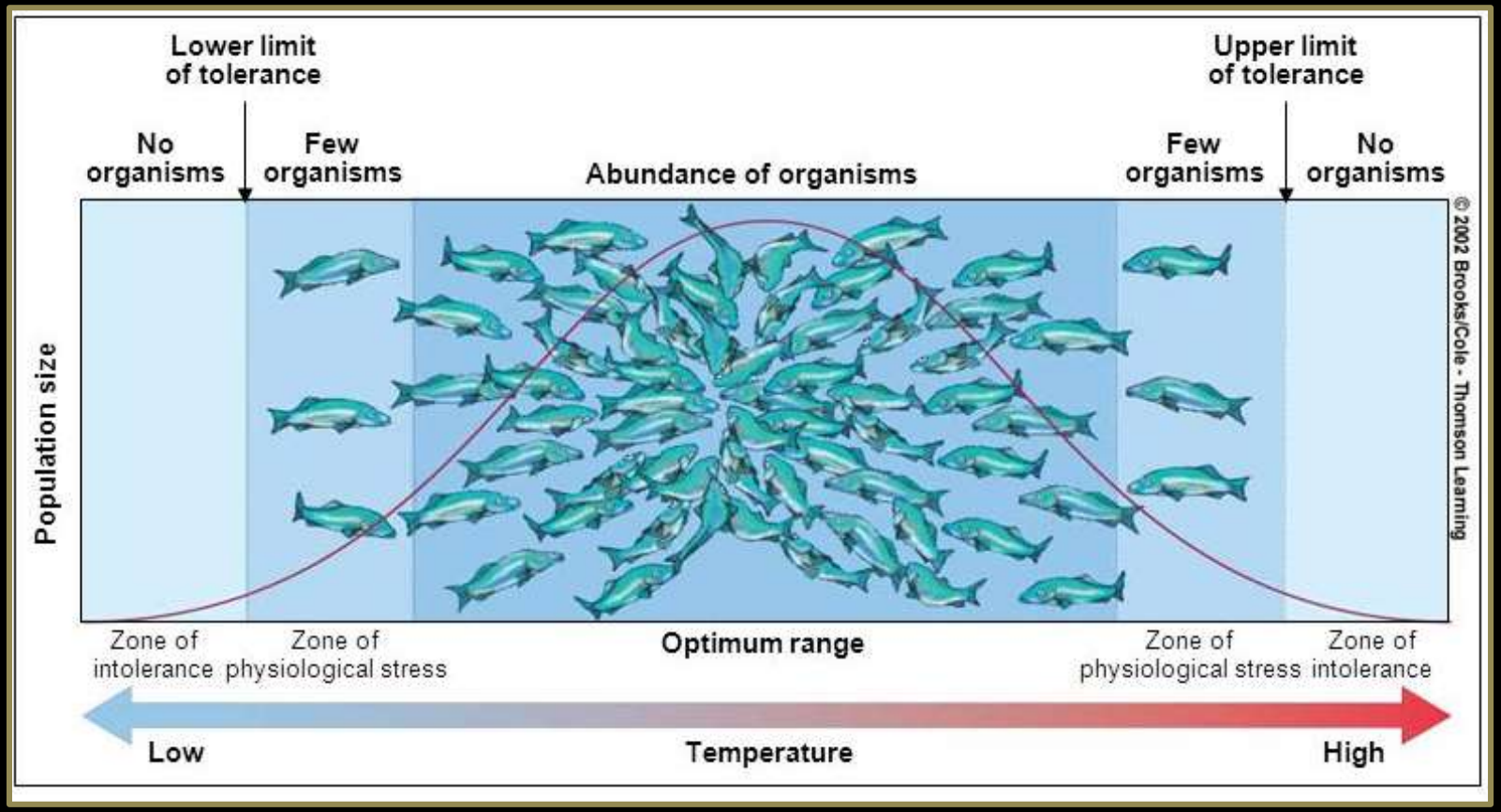


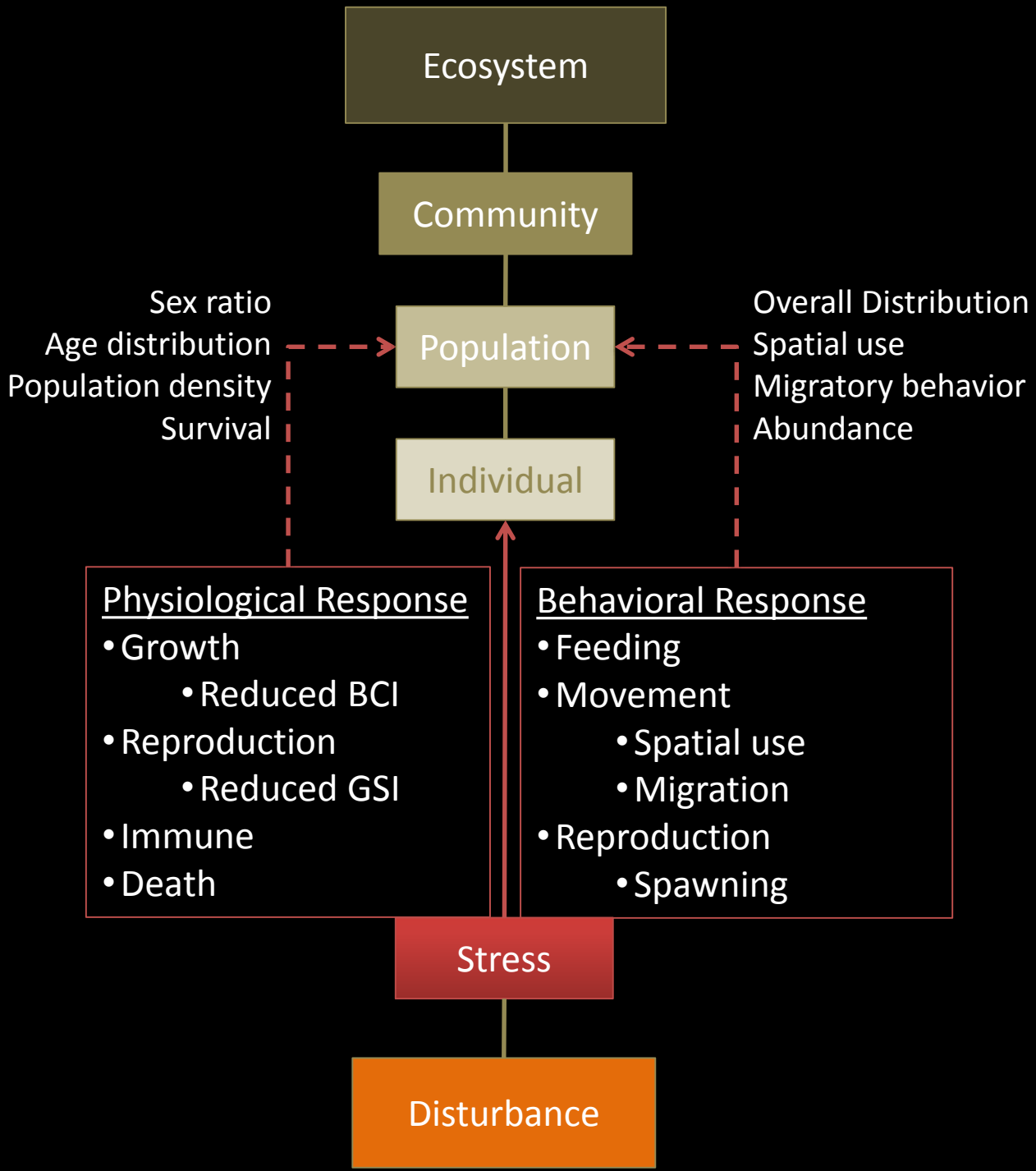
Disturbance on the Individual

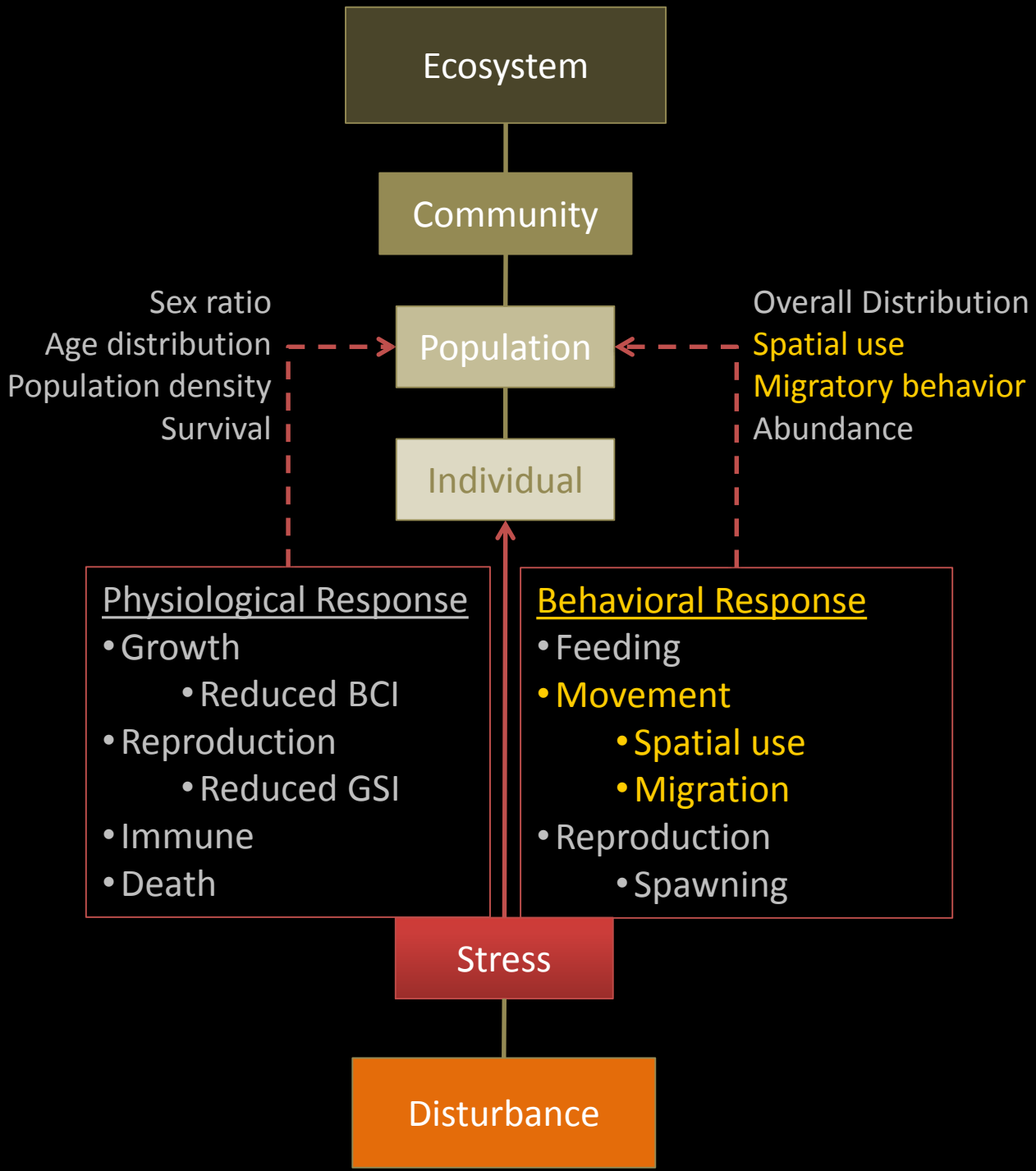
Stress Exposure



Thermal Stress




Ecosystem
Community
Sex ratio
Age distribution
Population density
Survival
Population
Overall Distribution
Spatial use
Migratory behavior
Abundance
Individual
Physiological Response
• Growth
• Reduced BCI
• Reproduction
• Reduced GSI
• Immune
• Death
Behavioral Response
• Feeding
• Movement
• Spatial use
• Migration
• Reproduction
• Spawning
Stress
Disturbance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Stress
Disturbance

Common Snook

- *Centropomus undecimalis*
- Important Sportfish
  - Tropical and subtropical estuarine systems
  - Three genetically separate populations
- Protandric hermaphrodites
  - Long lived
  - Mature between 4 and 6 years
  - Transition between 1 and 7 years

Eric Lion

Common Snook

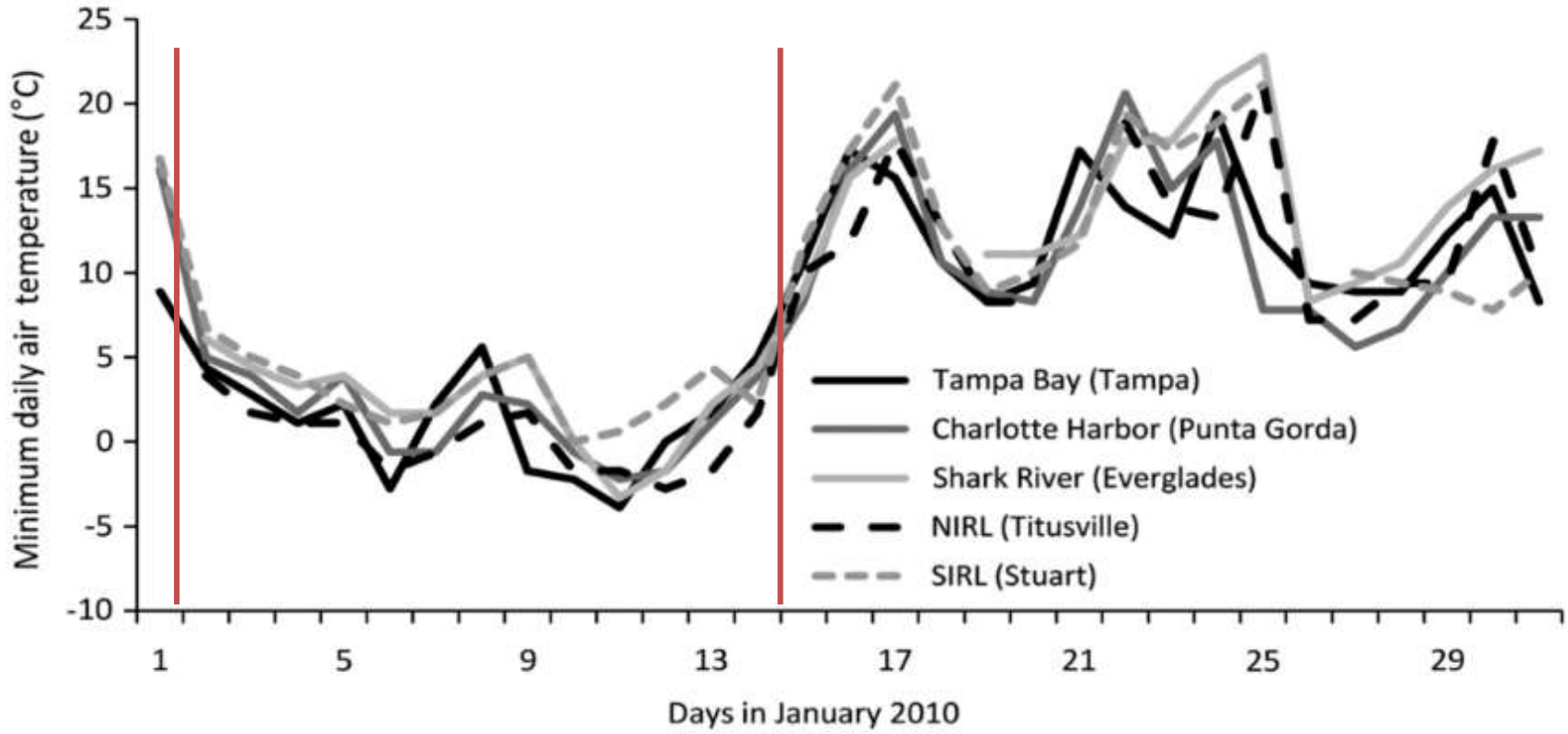
- Spawning
  - April 15 through October 15
  - Inlets and estuaries
- Overwintering
  - Migrate to freshwater rivers and canals
- Northern limit → 15° C winter isotherm
  - Critical Temperatures:
    - Juveniles 9-14° C
    - Adults 6-13° C

TampaBaySoundings.com
Blewett et al 2009
IUCN Red List

2010 Cold Event

- January 2-13, 2010
- Historic in magnitude and duration
  - 12-day average air temperature of 9° C
  - Average water temperature of 6° C
- Massive die-offs of multiple species
- Severe ecological and economic impact

2010 Cold Event



Stevens et al 2016

2010 Cold Event

Impact on Common Snook

Abundance

-76% Charlotte Harbor
-52% Tampa Bay
-94% Shark River estuary
-IRL → No initial decrease

Survival

- Dropped by 97% in Charlotte Harbor
- 90% in IRL

Fish Length Frequency

- No impact in Charlotte Harbor
- FIM data showed lower catch rates for smaller individuals

Habitat Use

-Increased movement into inlets

Management

-Moratorium

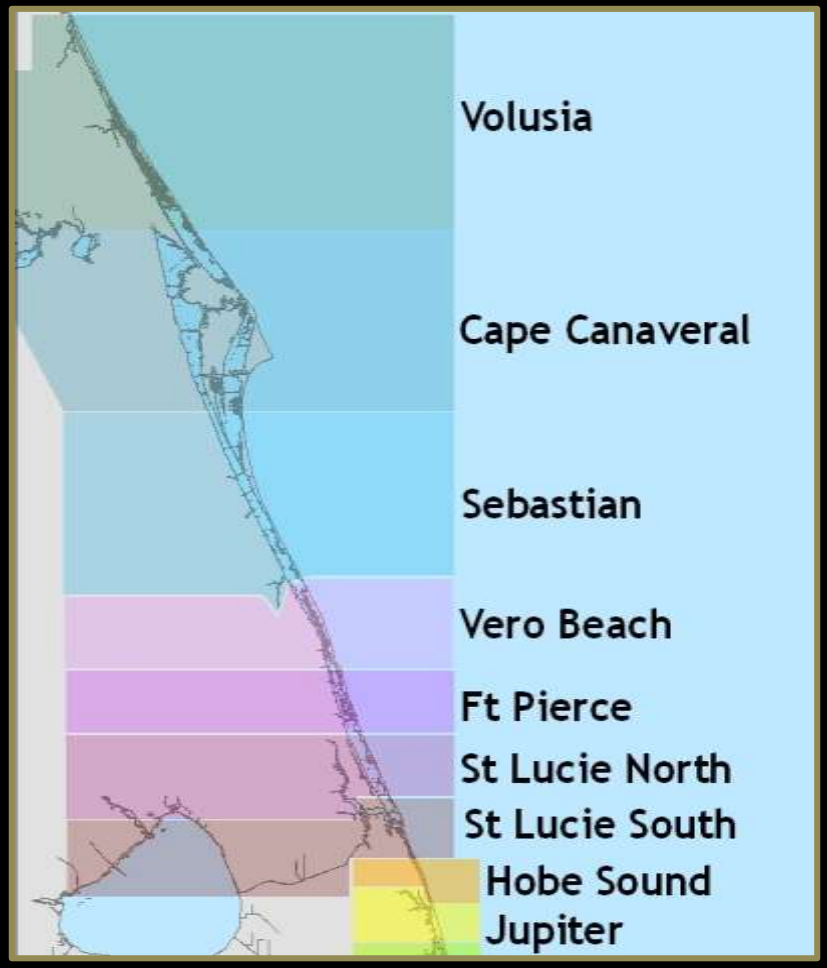
Diane Peebles

Identify changes in movement during the cold event and the effect on residence patterns

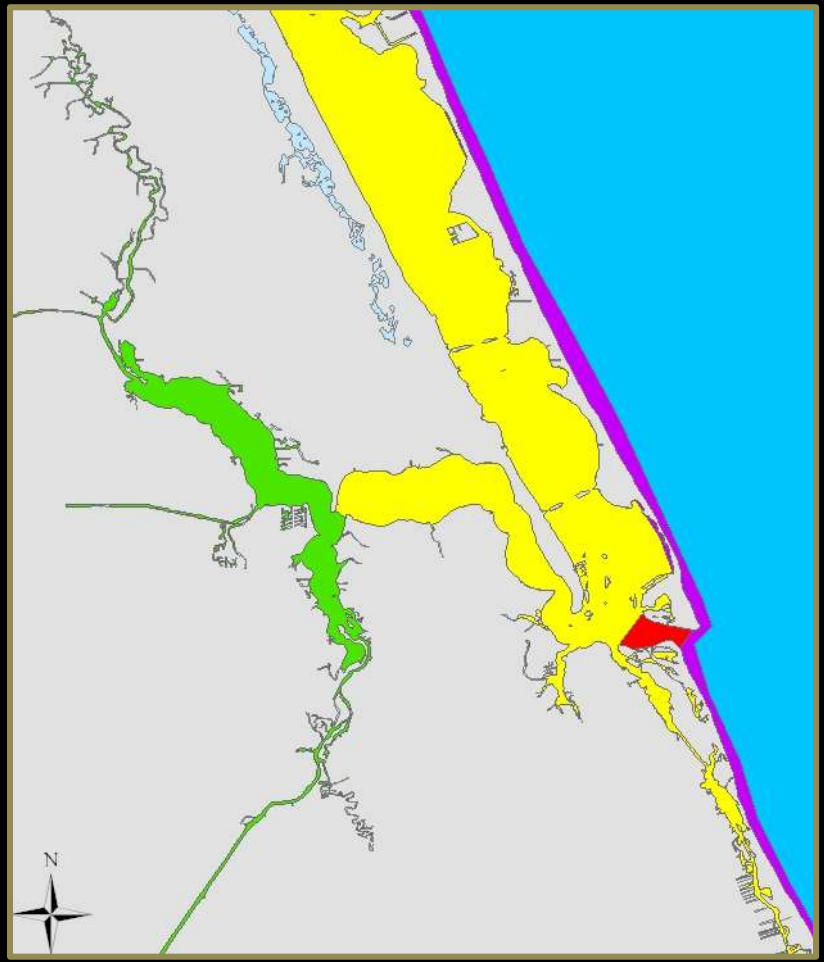
Sport Fishing Magazine

Materials and Methods

Regions



Systems

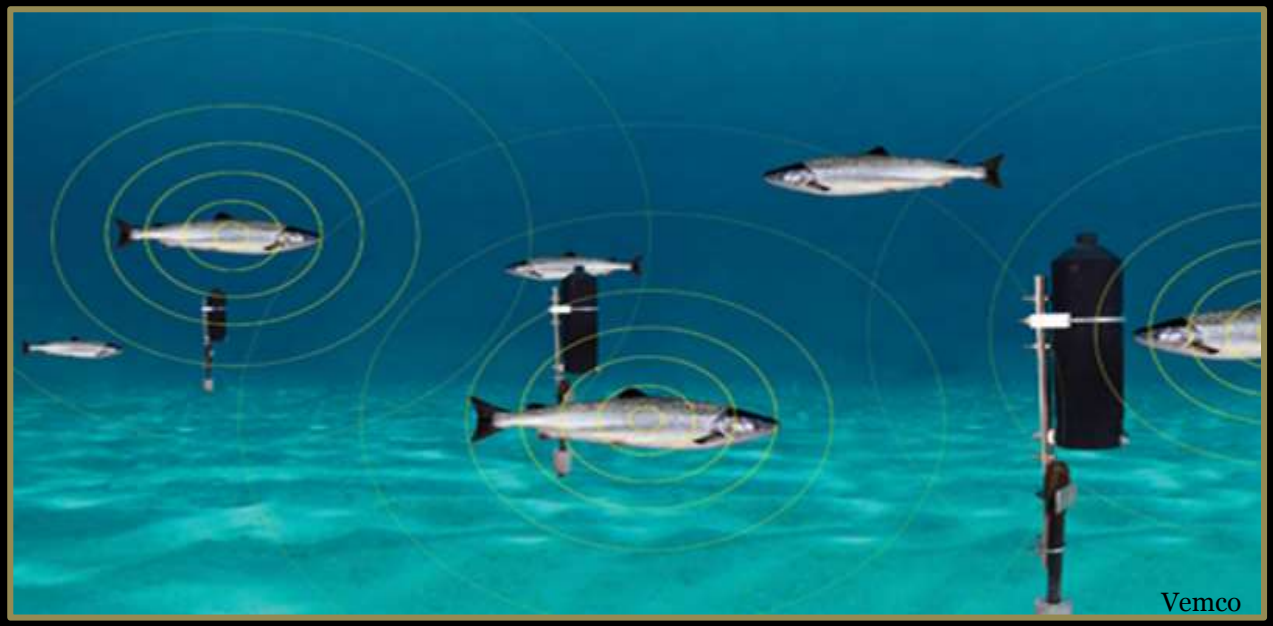


River Estuary Inlet

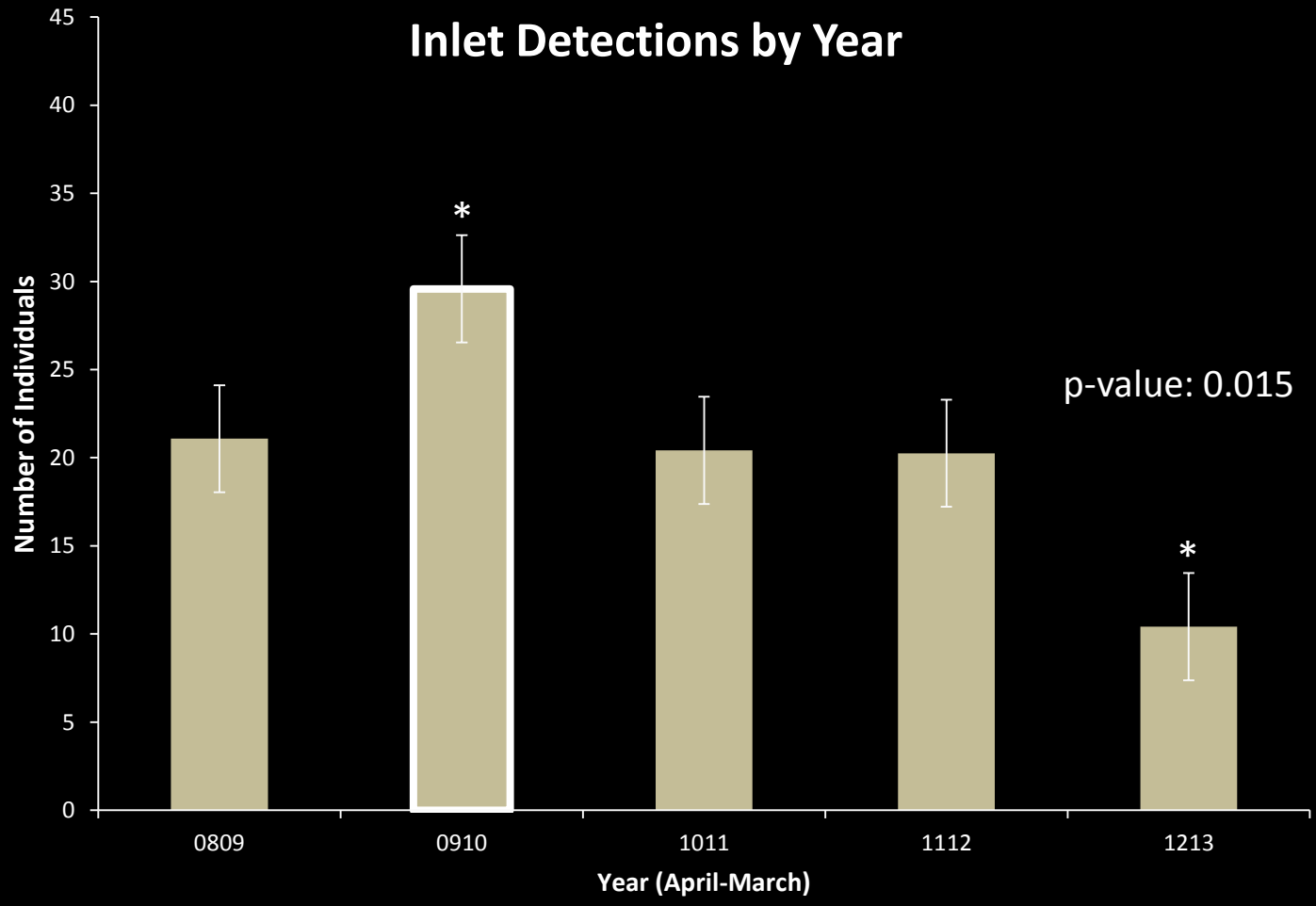
Joy Young

FACT Acoustic Array

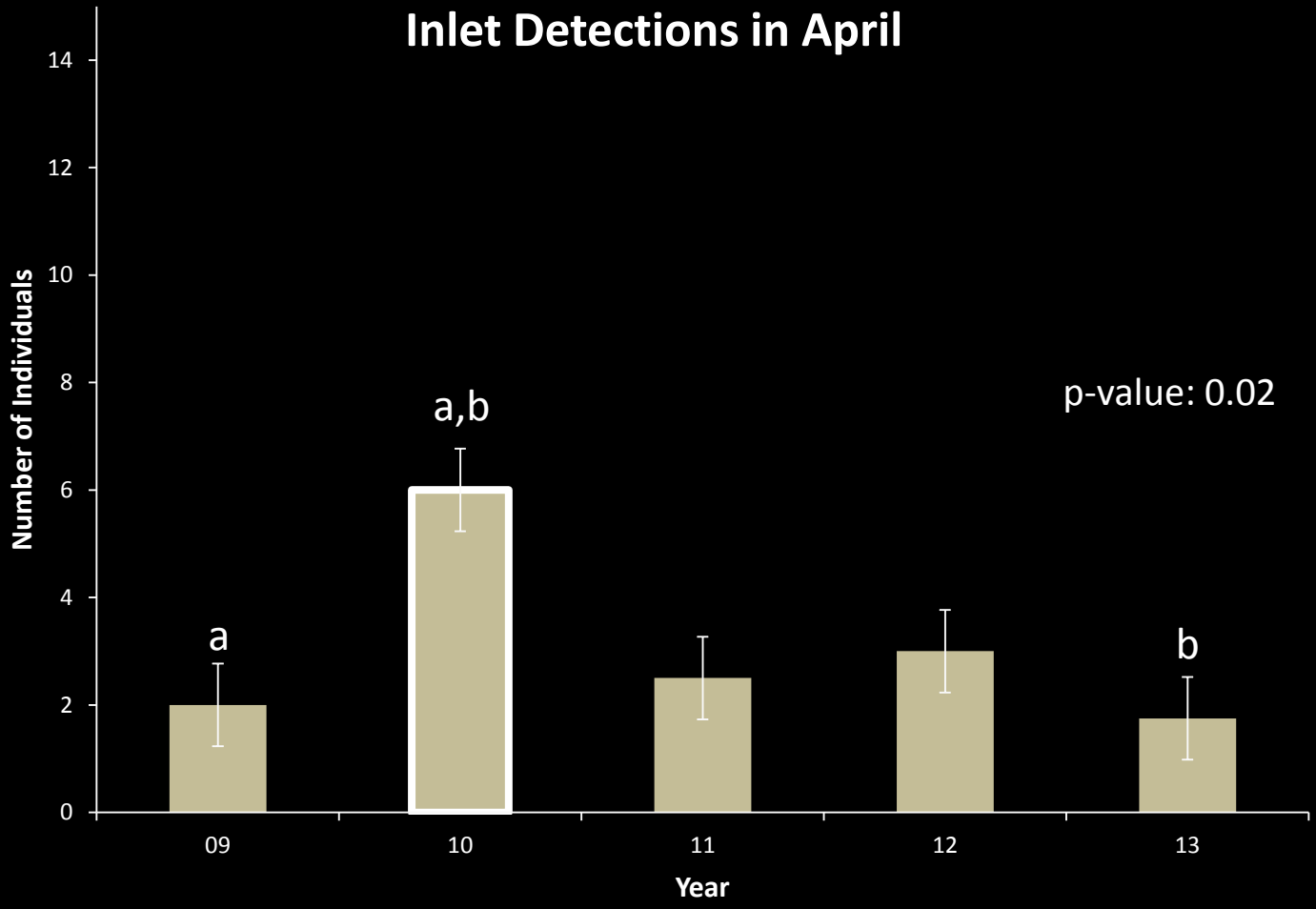
- 87 tagged individuals detected from December 17, 2009-January 27, 2010
- Tagged in all habitat types



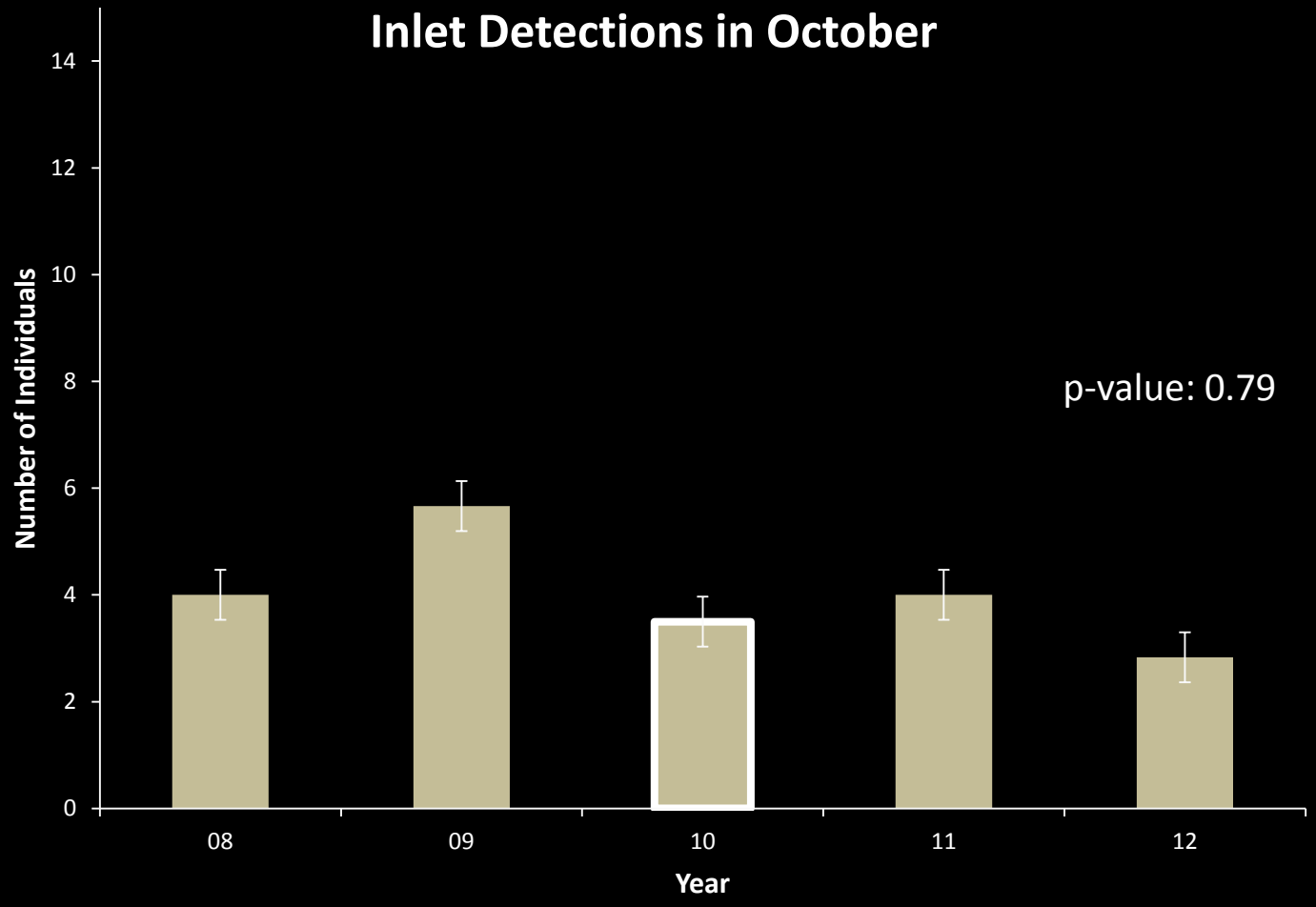
Residency


Inlet Detections by Year
Number of Individuals
45
40
35
30
25
20
15
10
5
0
*
*
p-value: 0.015
0809
0910
1011
1112
1213
Year (April-March)

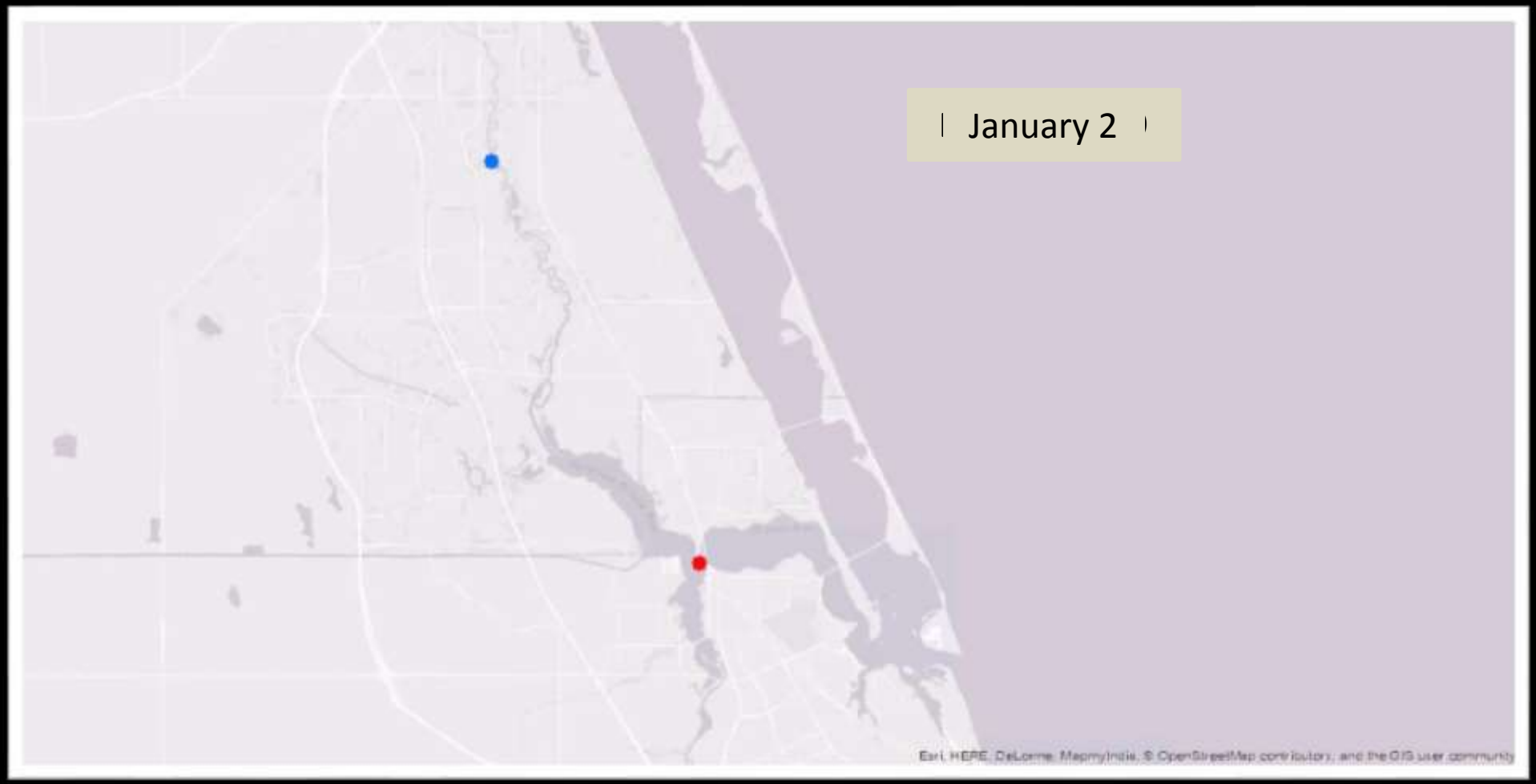
Residency


Inlet Detections in April
Number of Individuals
0
2
4
6
8
10
12
14
a
a,b
b
p-value: 0.02
09
10
11
12
13
Year

Residency


Inlet Detections in October
Number of Individuals
0
2
4
6
8
10
12
14
08
09
10
11
12
Year
p-value: 0.79

Movement



Fish 9776:

08-09 09-10

Preliminary Conclusions

- Residency:
  - Longer spawning season?
- Movement:
  - Increased use of back water systems
  - Some outside receiver coverage
  - Less active?
  - Thermal refuges?

Future Work

- Correlate movement with temperature data
  - Determine use of thermal refuges
- Determine home ranges for nonspawning season using KDE analysis
- Utilize FIM data:
  - recruitment rates in the years following the 2010 cold event
  - Abundance, BCI, GSI, sex ratio, FLF, age class frequency following 2010 cold event

Acknowledgements

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Contact information: JNoble9@fau.edu