

Thursday August 23 8:00 AM-noon:

Impacts of hypoxia on fishes and food webs in freshwater, coastal and oceanic ecosystems: a global perspective.

Hypoxia (dissolved oxygen ≤ 2 mg L⁻¹) is a widespread and expanding stressor across the world's lakes, coasts and open-ocean ecosystems. Systems with high nutrient loading, high productivity and stratifications are particularly vulnerable to hypoxia. Effects of hypoxia on fishes can occur through direct (e.g. fish kills, changes in spatial distribution, vital rates such as growth and consumption) or indirect (e.g. changes in spatial overlap of predator and prey, increased susceptibility to other stressors). Geographic, seasonal and inter-annual difference in temperature can dramatically impact the severity of hypoxia even at similar oxygen concentrations. Through trophic interactions, hypoxic stress on one functional group can have positive or negative effects on other functional groups in a food web. How well can we predict/forecast/assess how hypoxia-driven changes in habitat conditions will ultimately affect fish populations? Can we move beyond species-specific characterization to more unifying approaches or theory? This symposium will seek papers from a wide range of aquatic ecosystems across the globe such as lakes, estuaries, coastal oceans, and coral reefs as a basis for comparison on how well we understand the impacts of hypoxia in time and space on fishes and food webs.

Moderators: Stephen Brandt and Kim de Mutsert

- 1) Declining Oxygen in the Earth's Waters: An Overview of the Problem and Its Effects

Denise Breitburg

- 2) Assessing and Predicting the Effects of Reduced Nutrients and Hypoxia on Fishes in the Gulf of Mexico

Stephen Brandt, Arnaud Laurent, Cassandra Glaspie, Cynthia Sellinger, Kim de Mutsert

- 3) Using a Coupled Ecosystem Modeling Approach to Evaluate Effects of Reductions in Nutrients and Hypoxia on Living Marine Resources

Kim de Mutsert, Alexander Van Plantinga, Stephen Brandt, Cassandra Glaspie, Kristy Lewis, Arnaud Laurent, Joe Buszowski

- 4) Predicting Fish Population Responses to Hypoxia Using 2-D and 3-D Coupled Biophysical Models

Kenneth Rose, Dubravko Justic, Haosheng Huang, Kevin Craig, Klaus Huebert, Elizabeth LaBone, Ehab Meselhe, Jia Yang, Hoonshin Jung, Zuo Xue, Hanquin Tian

- 5) Assessing the Interactive Effects of Hypoxia and Fishing on Penaeid Shrimp in the Northern Gulf of Mexico

Kevin Craig, Rick A. Hart, Daniel Obenour, Rohith Matli, James Primrose, Kenneth Rose

- 6) Unraveling Hypoxia's Fingerprint on Populations and Food Webs

Tim Essington

- 7) Valuing Ecosystem Services at Risk from Deoxygenation of Oceans, Estuaries, and Coastal Seas

Karin Limburg, Denise Breitburg, Jack Cramer, Susan S. Ekoh, Anna Gårdmark, Yvette Heimbrand, Gregory Kronisch, Jennifer Le, Lisa A. Levin, Lillian R. McCormick, Stacy McNulty, Alessandro Orio, Melvin A. Samson, Scott Shatto, Kayla M. Smith

- 8) Redox-Sensitive Chemical Markers in Otoliths Reveal Evidence of Exposure, and Tolerance to Hypoxia in a Ubiquitous Demersal Fish

Matthew Altenritter, Benjamin Walther

- 9) A Freshwater Perspective on the Long-Term Effects of Hypoxia Exposure

Kayla Gilmore, Zoe Doubleday, **Bronwyn Gillanders**

- 10) Growth Rate Potential of Three Important Sport Fishes in Reservoirs Spanning a Productivity Gradient

Richard R. Budnik, Geoffrey Steinhart, Joseph D. Conroy, Richard D. Zweifel, Stuart A. Ludsin

- 11) Hypoxia Alters Spatial Overlap of Primary and Secondary Consumers in the Pelagic Food Web of Reservoirs

Rebecca A. Dillon, Joseph D. Conroy, Stuart A. Ludsin