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Assistant Professor

Environmental Studies
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FIELD OF STUDY

Behavioral and community ecology, ecology of fishes and wetlands, ecology of biological invasions, effects of anthropogenic disturbance on species interactions such as predation and competition, particularly in freshwater and estuarine fishes.

Presently my research largely focuses on examining interspecific interactions in Everglades fishes in the context of hydrological disturbance and species invasions.

ACADEMIC POSITIONS

- 2008 - Present Assistant Professor, Environmental Studies, Florida International University, Miami, FL.
- 2006 - 2008 Assistant Professor, Oceanographic Center and Farquhar College of Arts and Sciences (joint appointment), Nova Southeastern University, Dania & Davie, FL.
- 2005 - 2006 Postdoctoral Fellow, U.S. Geological Survey and Florida International University, Everglades National Park Field Station, Homestead, FL.
Advisor: William F. Loftus.
- 2003 - 2004 Postdoctoral Fellow, Biological Sciences, Florida International University, Miami, FL.
Advisor: Joel C. Trexler.
- 2001 - 2003 Research Assistant, Environmental Science and Policy, University of California, Davis, CA.
Advisor: Andrew Sih.
- 1999-2002 National Science Foundation Fellow, Biological Sciences, University of Kentucky, Lexington, KY. Advisor: Andrew Sih.

EDUCATION

- Ph.D. Ecology, Evolution and Behavior Section, Biological Sciences, University of Kentucky
Lexington, KY, July 2003.

Dissertation: Traits underlying invasiveness: A comparison of widespread and endemic species in the genus *Gambusia* (Poeciliidae).

Advisor: Andrew Sih, University of California, Davis, CA.

B.S. Environmental Studies, Florida International University
Miami, FL, December 1995.
Minors in Biology and Chemistry.

A.A. Political Science, Honors Institute, Broward Community College
Davie, FL, June 1993.

FELLOWSHIPS AND AWARDS

Doctoral Dissertation Improvement Grant, National Science Foundation, 2002-2003.

Lyman T. Johnson Minority Fellowship, University of Kentucky Graduate School, 2002-2003.

National Science Foundation Graduate Research Fellowship, 1999-2002.

Doctoral Dissertation Qualifying Exam passed with distinction, Fall 2001.

National Science Foundation Graduate Research Training Fellowship, University of Kentucky, 1998 -1999.

Magna Kum Laude, Environmental Studies, Florida International University, 1995.

Scholar's Award Fellowship, Broward Community College and Florida International University, 1991-1995.

Honors Graduate, Broward Community College, 1993.

RESEARCH FUNDING

(are supervised graduate students)*

J.S. Rehage, and M.B. Robblee. U.S Army Corps of Engineers, Comprehensive Everglades Restoration Plan, Monitoring and Assessment Program. Fish community dynamics along the marsh-mangrove ecotone in coastal Florida, 2009 - 2010, \$ 317,845 (\$ 180,000 to Rehage Lab).

J.S. Rehage. South Florida Water Management District. Mangroves as habitat and dry-season refuges for freshwater fishes, 2008, \$ 69,904.00.

J.S. Rehage and K.L. Dunlop*. Nova Southeastern University President's Faculty Research and Development Grant. Cue recognition and prey responses to non-native Everglades fishes, 2008, \$ 10,000.

J.S. Rehage and L.M. McCarthy*. Nova Southeastern University President's Faculty Research and Development Grant. Distribution of Palaemonid shrimp along the Shark River Estuary, 2008, \$ 10,000.

J.S. Rehage. Cooperative Agreement under the South Florida -Caribbean Cooperative Ecosystem Studies Unit with U.S. Geological Survey, Florida Integrated Science Center (Collaborator: William F. Loftus): Methods testing for sampling fishes in mangrove zones, 2007, \$ 70,000.

W.F. Loftus, **J.S. Rehage**, and S.E. Liston. U.S. Geological Survey Park-Oriented Biological Support: An evaluation of the impact of two introduced cichlids on native fish communities in Everglades wetlands, 2006-2007, \$ 40,000.

W.F. Loftus, J.C. Trexler, and **J.S. Rehage.** U.S. Geological Survey and National Park Service Critical Ecosystem Studies Initiative: Introduced fishes in short-hydroperiod wetlands: evaluation of sampling, status, and potential effects. 2005, \$ 30,130.

A. Sih, P. Crowley, and **J.S. Rehage.** Doctoral Dissertation Improvement Grant, National Science Foundation: Traits underlying invasiveness: A comparison of widespread and endemic species in the genus *Gambusia*, 2002-2003, \$ 10,000.

E.C. and C.E. Raney Award, American Society of Ichthyologists and Herpetologists. 2001, \$ 200.

Endowment Research Award, North American Benthological Society, 2001, \$ 700.

National Science Foundation Doctoral Fellowship Research and Travel Funds, 1999-2002, \$ 1,500 yearly.

Ribble Research & Travel Grant, Biological Sciences, University of Kentucky, 1999-2002. \$ 1,000 yearly.

Graduate Student Support, Graduate School, University of Kentucky, 1999-2002. \$ 350 yearly.

R.A. Kuehne Research Grant, Biological Sciences, University of Kentucky. 2000, \$ 150.

National Science Foundation Training Fellowship Research Funds. 1998-1999, \$ 1,660.

RESEARCH PUBLICATIONS

(* are supervised graduate students)

1. Sih, A., D.I Bolnick, B. Luttbeg, J.L. Orrock, S.D. Peacor, L.M. Pintor, E. Preisser, **J.S. Rehage** and J.R. Vonesh, *In Review*. Predator-prey naivete, antipredator behavior, and the ecology of predator invasions. *Oikos*.
- 2.. **Rehage, J.S.** and W.F. Loftus. 2007. Seasonal fish community variation in mangrove creeks in the southwestern Everglades: an examination of their role as dry-down refuges. *Bulletin of Marine Science*. 80: 625–645.
3. **Rehage, J.S.** and J.C. Trexler. 2006. Assessing the net effect of anthropogenic disturbance on aquatic

communities in wetlands: Community structure relative to distance from canals. *Hydrobiologia* 569:359-373.

4. **Rehage, J.S.**, B.K. Barnett, and A. Sih. 2005. Foraging behavior and invasiveness: Do invasive *Gambusia* exhibit higher feeding rates and broader diets than their non-invasive relatives? *Ecology of Freshwater Fish* 14: 352-360.
5. **Rehage, J.S.**, B.K. Barnett, and A. Sih. 2005. Behavioral responses to a novel predator and competitor of invasive mosquitofish and their non-invasive relatives (*Gambusia* sp.). *Behavioral Ecology and Sociobiology* 57: 256-266.
6. **Rehage, J.S.** and A. Sih. 2004. Dispersal behavior, boldness and the link to invasiveness: A comparison of four *Gambusia* species. *Biological Invasions* 6: 379-391.
7. **Rehage, J.S.**, S.G. Lynn, J.I. Hammond, B.D. Palmer, and A. Sih. 2002. Effects of larval exposure to Triphenyltin on the survival, growth, and behavior of larval and juvenile *Ambystoma barbouri*. *Environmental Toxicology and Chemistry* 21: 807-815.

In Preparation:

1. Rehage, J.S. and K.L. Dunlop*. *Under revision*. Antipredator responses to predation threats of varying novelty: mosquitofish responses to two Everglades invasive cichlids. To be submitted to *Behavioral Ecology*.
2. Porter*, A., **J.S. Rehage**, W. F. Loftus and S.E. Liston. Multiple predator effects and native prey behavioral responses to two non-native Everglades cichlids. To be submitted to *Oecologia*.
3. **Rehage, J.S.**, E.F. Maurer and A. Sih. The role of abiotic and biotic factors in determining native and introduced distributions in two *Gambusia* species. To be submitted to *Journal of Animal Ecology*.
4. **Rehage, J.S.**, S.E. Liston, and W.F. Loftus. Assessing the potential impact of the African jewel fish (*Hemichromis letourneuxi*) in Everglades marshes: prey selectivity and antipredator response by naïve prey. To be submitted to *Biological Conservation*.
5. Loftus, W.F., **J.S. Rehage**, S.E. Liston, and J.C. Trexler. Evaluation of the role of karst solution holes as dry-down refuges in a short-hydroperiod wetland: sources or sinks? To be submitted to *Conservation Biology*.
6. Liston, S.E., K.J. Dunker, **J.S. Rehage** and W.F. Loftus. Examining the interacting effects of abiotic stress and predation by a non-indigenous predator on *Gambusia holbrooki*. To be submitted to *Freshwater Biology*.

Technical Reports:

1. Loftus, W.F. and **J.S. Rehage**. Role of Marsh-Mangrove Interface Habitats as Aquatic Refuges for Wetland Fishes and other Aquatic Animals. Final Report to US Army Corps of Engineers, Jacksonville District. Work Order No. 12 for the CERP-MAP Activity 3.1.4.7, October 2007.
2. Loftus, W.F., J.C. Trexler, **J.S. Rehage**, K. Dunker and S.E. Liston. Introduced Fishes in Short-

RECENT SEMINARS & PRESENTATIONS

Scientific Conferences (are supervised graduate students):*

- Rehage, J.S.** and W.F. Loftus. Spatiotemporal dynamics of the fish community of mangrove-marsh ecotonal habitats in Everglades National Park. Presentation to the RECOVER AT Meeting, CERP, August 2008.
- Rehage, J.S.** and W.F. Loftus. Predator-prey dynamics at marsh-mangrove ecotone, Greater Everglades Restoration Conference, Naples, FL, July 2008.
- Porter*, A., **J.S. Rehage**, W.F. Loftus and S.E. Liston. Interactions between two invasive cichlids and native biota in the Everglades aquatic community. Greater Everglades Restoration Conference, Naples, FL, July 2008.
- McCarthy*, L. and **J.S. Rehage**. Segregation of Caridean shrimp (*Palaemonetes* sp.) along a salinity gradient in Everglades National Park: implications for Everglades Restoration. Greater Everglades Restoration Conference, Naples, FL, July 2008.
- Dunlop*, K.L. and **J.S. Rehage**. Cue recognition and novel predator: antipredator responses to non-native jewel fish. Greater Everglades Restoration Conference, Naples, FL, July 2008.
- Rehage, J.S.** Invasions, behavior & predation: a tale of two cichlids, Ecological Society of America Annual Meeting, San Jose, CA, August 2007 (presenter & session co-organizer).
- Lorenz, J.J., **J.S. Rehage**, S.E. Liston, D. Green and W.F. Loftus. Consumer dynamics in the Greater Everglades Ecosystem. Presentation to the Everglades Restoration Assessment Team, Davie, FL, February 2007.
- Rehage, J.S.**, W.F. Loftus, S.E. Liston, J.C. Trexler, & J.J. Lorenz. A comparison of consumer dynamics and the influence of hydrology across multiple Everglades habitats. Florida Coastal Everglades Long-term Ecological Research All Scientists Annual Meeting, Miami, FL, March 2007.
- Rehage, J.S.** and W.F. Loftus. Seasonal fish dynamics in mangrove creeks of the coastal Everglades. South Florida and Caribbean Cooperative Unit Annual Meeting, Miami, FL, February 2007.
- Rehage, J.S.** and W.F. Loftus. Assessing the potential impact of African jewelfish *Hemichromis letourneuxi* in Everglades marshes: prey selectivity and antipredator response by native prey. Ecological Society of America Meeting, Memphis, TN, August 2006.
- Rehage, J.S.**, K.J. Dunker and W.F. Loftus. Seasonal and spatial variation in the fish community of the marsh-mangrove ecotone in southwestern Everglades National Park. Poster presentation at Greater Everglades Restoration Conference, Orlando, FL, June 2006.
- Rehage, J.S.**, S.E. Liston, and W.F. Loftus. Vulnerability to a novel invader: behavioral response of naïve prey

to the invasion of the African jewelfish *Hemichromis letourneuxi*. International Conference on Aquatic Invasive Species, Key Biscayne, FL, May 2006.

Rehage, J.S. and W.F. Loftus. Seasonal fish community dynamics along the marsh-mangrove ecotone in Everglades National Park. Mangroves as Fish Habitat Symposium, Rosenstiel School of Marine and Atmospheric Sciences, University of Miami, Key Biscayne, FL, April 2006.

Rehage, J.S. and J.C. Trexler. Assessing the net effect of anthropogenic disturbance on aquatic communities in wetlands: community structure relative to distance from canals. Ecological Society of America Meeting, Montreal, August 2005.

Rehage, J.S. and W.F. Loftus. Examining the role of marsh-mangrove ecotonal habitats as aquatic refuges for wetland fishes. U.S. Geological Survey All Florida Scientists Meeting, Orlando, FL, May 2005.

Rehage, J.S. and J.C. Trexler. Impact of anthropogenic disturbance on wetland communities: changes in patterns of fish and macroinvertebrate abundances as a function of distance from canals. National Conference on Ecosystem Restoration, Orlando, FL, December 2004.

Rehage, J.S. Towards a trait-mediated understanding of invasiveness: trait comparisons between invasive *Gambusia* and their relatives. Ecological Society of America Meeting, Portland, OR, August 2004.

Rehage, J.S., E.N. Fischer, and A. Sih. Life histories, abiotic tolerances and population performance in *Gambusia*: a comparison of congeners of varying invasiveness. Ecological Society of America Meeting, Tucson, AZ, August 2002.

Rehage, J.S., B.K. Barnett, A. Sih, and E.F. Maurer. Foraging behavior of invasive and non-invasive *Gambusia* species: foraging efficiency and diet breadth. Ecological Society of America Meeting, Snowbird, UT, August 2000.

Lynn, S.G., **J.S. Rehage**, A. Sih, and B. Palmer. Effects of Long-Term Exposure to Triphenyltin on the feeding, growth and survival of the streamside salamander, *Ambystoma barbouri*. Society of Environmental Toxicology and Chemistry Annual Meeting, Nashville, TN, November 2000.

Invited Seminars:

Environmental Studies, Florida International University, Miami, FL, "Examining species interactions in an anthropogenic context: Everglades native fish responses to hydrologic disturbance and invasion" October 2007.

Zoology, Weber State University, Ogden, UT, "The ecology of fish invasions: understanding the factors underlying invasiveness and impact" March 2006.

Oceanographic Center, Nova Southeastern University, Dania, FL, "Examining species interactions in an anthropogenic context: species invasions & hydrologic disturbance" February 2006.

Biological Sciences, Hobart & William Smith Colleges, Geneva, NY, "The ecology of invasions: understanding the factors underlying invasiveness and impact among fishes" December 2005.

Biological Sciences, Florida Atlantic University, Ft. Lauderdale, FL, "Understanding anthropogenic impact at

multiple scales: from traits affecting invasion success to community-level consequences of hydrological disturbance” April 2005.

Environmental Studies, Florida International University, Miami, FL, “Towards a trait-mediated understanding of invasiveness: Trait comparisons between invasive *Gambusia* and their relatives” January 2004.

Biological Sciences, Florida International University, Miami, FL, “The role of traits to understanding species’ invasiveness: A case study in a Poeciliid fish” November 2003.

Biological Sciences, University of Kentucky, Lexington, KY, “Traits underlying invasion ability: A comparison of widespread and endemic fishes in the genus *Gambusia*” July 2003.

Center for Population Biology, University of California, Davis, CA, “Traits underlying invasion ability: A comparison of widespread and endemic fishes in the genus *Gambusia*” April 2003.

TEACHING EXPERIENCE

Undergraduate Teaching:

Environmental Studies, Florida International University

EVR3011, Environmental Resources and Pollution, Fall 2008

EVR4026, Biotic Resources, Spring 2009

Farquhar College of Arts and Sciences, Nova Southeastern University:

Environmental Studies (for non-majors): Fall 2006, Winter 2007, Fall 2007

Environmental Issues (for Environmental Studies majors): Fall 2007, Fall 2006

Everglades Ecology & Conservation (Elective course for Environmental Studies, Marine Biology and Biology majors): Winter 2008

University of Kentucky:

Participant Instructor (one of several graduate students who designed and taught this course):

Undergraduate Ecology Laboratory, Spring 2000

Undergraduate Ecology Laboratory, Spring 1999

Graduate Teaching:

Oceanographic Center, Nova Southeastern University:

Wetland Ecology, Spring 2008

Ecology and Evolution of Invasive Species, Winter 2007

Marine Protected Areas, Summer 2006, 2007 & 2008, Akumal/Puerto Morelos, Mexico (jointly with Dr. L. Collado, Florida International University and Dr. Roberto Iglesias, Autonomous University of Mexico)

New Course Development

Everglades Ecology & Conservation, NSU Farquhar School of Arts & Sciences
Wetland Ecology, NSU Oceanographic Center
Ecology and Evolution of Invasive Species, NSU Oceanographic Center

STUDENT MENTORING

Graduate Students Supervised:

Thesis M.Sc Students at NSU Oceanographic Center

- Ashley Porter: Comparison of predatory effects of two non-native cichlid predators in Everglades marshes. Expected completion Fall 2008.
- Kate Dunlop: Examination of cue utilization and anti-predator responses by native Everglades taxa to a non-native predator, the African jewelfish. Expected completion Winter 2009.
- Lauren McCarthy: Segregation of Palaemonid shrimp species along a salinity gradient in Shark River, Everglades National Park. Expected completion Spring 2009.
- Megan Seese: Evaluation of the role of *Laurencia* spp in *Thalassia testudinum* beds in Abaco, Bahamas as habitat for juvenile fishes and macroinvertebrates. Expected completion Winter 2009.
- Tiffany Trent: Effects of periphyton nutrient content on the growth and survivorship of Florida apple snails in the Loxahatchee National Wildlife Refuge. Expected completion Winter 2009.

Non-Thesis M.Sc Students at NSU Oceanographic Center

- Deborah Zeyen: Evaluation of action plans to restore oysters to the Chesapeake Bay based on an assessment of possible outcomes. Expected completion Winter 2009.
- Dina Benes: The evidence for invasional meltdown: the Great Lakes as a case study. Expected completion Summer 2009.

Graduate Committees

- Lauren Yaeger (Ph.D. FIU Biology): Effects of seascape surrounding mangroves on the habitat value of mangrove regions for commercially and ecologically important reef fishes. Expected completion Spring 2011.
- Shannon Bayse (MS, NSU Oceanographic Center thesis track): Characterization of the catch by swordfish boy gear in southeast Florida. Expected completion Spring 2009.

- Nina Santos (MS, NSU Oceanographic Center, non-thesis track): Human impacts on the trophic structure of wetlands: The Florida Everglades as a case study. Expected completion Winter 2009.

Undergraduate Independent Studies Supervised (see publication and presentation lists for co-authorship):

Andrew Whitaker, Environmental Studies, Farquhar College of Arts and Sciences, Nova Southeastern University, Summer & Fall 2008. Intraguild predation among Everglades non-native cichlids.

Claudia McLeroy, Environmental Studies, Farquhar College of Arts and Sciences, Nova Southeastern University, Spring 2008. Assessment of the abundance of *Lygodium microphyllum* spores in tree islands in the Loxahatchee National Wildlife Refuge (collaboration with Laura Brandt, University of Florida, Ft Lauderdale Research and Education Center).

Elizabeth Bragger, Environmental Studies, Farquhar College of Arts and Sciences, Nova Southeastern University, Summer 2008. Pre-restoration assessment of the fish community of Rachel's Creek, Crane Point Hammock, Marathon, FL.

Beverly K. Barnett, Biological Sciences, University of Kentucky, 1999 - 2000.
Comparing the foraging plasticity and opportunism of invasive and non-invasive *Gambusia* species.

Ryan Holliday, Biological Sciences, University of Kentucky, 2000 - 2001.
Dispersal tendencies of four *Gambusia* species: influences of flow and group size.

Elizabeth N. Fischer, Biological Sciences, University of Kentucky, 2001-2002
Population performance and establishment success among *Gambusia* species of varying invasion success.

SERVICE & OUTREACH

Journal Reviewer for:

- Ecology of Freshwater Fish
- Bulletin of Marine Science
- Biological Invasions
- Oecologia
- Functional Ecology
- Archiv Für Hydrobiologie
- Copeia
- Southeastern Naturalist

Grant Proposal Reviewer for:

- National Science Foundation
- Florida Fish and Wildlife Conservation Commission Research Grants

Professional affiliations

- Florida Coastal Everglades LTER
- Ecological Society of America
- American Society of Ichthyologists and Herpetologists
- American Association for the Advancement of Science

SEEDS Program Mentor (for Minority Students), Ecology Society of America, 2007.

Session Co-organizer (along with K. Petren, University of Cincinnati) on Behavior & Invasions, Ecology Society Annual Meeting, August 2007.

University Service

- Member, Curriculum Committee, FIU Environmental Studies, Fall 2008.
- Member, Preserve Committee, FIU Environmental Studies, Fall 2008.
- Member, Internal Review Committee for Marine Environmental Sciences Master's degree, NSU OC, Fall 2007.
- Chair, Hiring committee for Coastal Environmental Science position, NSU OC, Fall 2007, Winter 2008.
- Member, Hiring committee for Environmental Sciences position, NSU FCAS, Winter 2008.
- Member, Research space committee, NSU OC, Spring 2006.