Stuart R. Borrett, Ph.D.

Associate Provost for Research & Innovation
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APPOINTMENTS: ACADEMIC AND INDUSTRY

2018–present **Associate Provost for Research and Innovation**, University of North Carolina Wilmington (UNCW). Senior Research Officer, and leader of the Research and Innovation Services Team (RIST) comprised of 7 departments and 30 employees.

Leading a growing research university through an organizational and cultural transformation and facilitating the growth of its research and innovation impact.

Key Accomplishments

- Led growth in sponsored research and innovation. New award dollars **increased 139%** over 2013–2017 average (FY23 totaled $25.1 M). In FY23, UNCW filed 5 patents and **license revenue increased by 248%**.
- Chaired campus-wide initiatives that (1) identified the cultural and functional impacts of the transition to a Doctoral University with High Research Activity, and (2) assessed needs to sustain the transition. Recommendations are a blueprint for institutional development.
- Created a *Research Development Office* and programming to support faculty and increase institutional research competitiveness.
- Administered seed-funding programs offering $250,000/yr to campus researchers. Created new programs to encourage interdisciplinary team formation and increase proposal competitiveness.
- Created and initiated a new *Research Hub* seed funding program to accelerate the growth, impact, and competitiveness of UNCW in strategic areas. FY24 Funded hubs focus on brain health and maritime cybersecurity.
- Coordinated initial development of an interdisciplinary Ph.D. program in *Applied Coastal and Ocean Sciences* that couples an applied marine science research degree with training in innovation and entrepreneurship.
- Restructured and restaffed both the *Sponsored Programs and Research Compliance Office*, and the *Office of Innovation and Commercialization* to better serve researchers and support success.
- Led UNCW portion of a successful Phase 1 proposal for the Economic Development Administration Build Back Better Regional Challenge, "*Accelerating life science manufacturing to create economic resilience and promote equity in distressed North Carolina communities*."
- Consulted on science building major renovation following damage due to hurricane Florence.
- Directed transition to new electronic research administration software system (InfoEd Global).
- Leading revision of university research and sponsored program related policies and procedures to increase clarity, efficiency, and success for all faculty, staff, and students.

2018–present **President**, UNCW Research Foundation. UNCW associated non-profit organization supporting research and innovation.

Key Accomplishments

- Supervise the UNCW Center for Innovation and Entrepreneurship that nurtures emerging ventures and connects entrepreneurs to a startup service ecosystem. Supports community, student, faculty and staff entrepreneurs; leases offices; currently mentors over 100 ventures.

- Manage the Marine Biotechnology in North Carolina (MARBIONC) Development Group, LLC that supports the development and marketing of new products and technologies derived from living organisms found in the sea. Revenues of up to $180,000 per year.

2007–present **Professor, Quantitative Ecology**. Department of Biology and Marine Biology, UNCW.
Professor**,** 2018–Present.
Associate Professor, 2013–2018
Assistant Professor**,** 2007–2013

2013–2023 **Visiting Research Fellow**. Duke Network Analysis Center, Duke University.

2005–2007 **Visiting Scholar**. Computational Learning Laboratory, Center for the Study of Language and Information, Stanford University, Stanford, CA. *Computational Induction of Scientific Process Models.* Advisors: P. Langley and K.R. Arrigo.

2005–2007 **Postdoctoral Research Scientist**. Institute for the Study of Language and Expertise, Palo Alto, CA.

2003–2005 **Graduate Research Assistant**. Skidaway Institute of Oceanography, Savannah, GA. *Bio-feed back basis of self-organization in planktonic ecosystems using Phaeocystis as a model complex adaptive system.* PIs: P.G. Verity, M.E. Frischer, M.E. Hay, B.C. Patten.

1999–2002 **Graduate Research Assistant**. University of Georgia, Athens, GA. *Community values and the long-term ecological integrity of rapidly urbanizing watersheds.* PIs: M.B. Beck, B.G. Norton, B.C. Patten, K.G. Porter, T.C. Rasmussen, A. Steinmann.

1997–1998 **Assistant Staff Scientist**. ENTRIX, Inc. Houston, TX. Environmental impact assessment and environmental management plans, primarily for oil and gas exploration and development in the US Gulf Coast and Latin America (Bolivia, Ecuador, Venezuela).

EDUCATION

2005 **Ph.D.** Ecology, University of Georgia, Athens, GA. Dissertation: *Ecosystem organization and transformation: The role of network architecture in the development of indirect effects.* Advisor: Dr. Bernard C. Patten

1997 **B.A.** Biology, Austin College, Sherman, TX.

ADMINISTRATIVE SERVICE AND LEADERSHIP HIGHLIGHTS

College & University

2018–present. *UNCW F&A Review Committee* (Chair). Recommends annual budget investments for indirect costs UNCW recovers from sponsored programs. Budgeted $2.8 M for FY25.

2021–present. *Information Technology Steering Committee* (Co-chair, 2021–22). Committee to facilitate IT alignment with the university mission through an IT strategic plan, roadmap, and IT investments.

2021–present. *UNCW Corporate & Foundation Partnership Council*. Facilitating comprehensive and focused strategies for the university's major corporate and foundation prospects.

2021–present. *UNCW Data Governance Committee*. Administrative oversight of data governance policies and procedures, and serve as data trustee of UNCW mission critical data.

2018–present. *UNCW Faculty Senate Research Committee*. Ex-Officio Provost representative.

2021–2023. *UNCW Strategic Design and Planning Committee*. Crafted university 10 yr. strategic plan.

2020–2021. Co-chaired the search committee for the UNCW Executive Director of the Center for Marine Science that successfully recruited Dr. Ken Halanych (started Oct 2021). This was essential for UNCW research growth as 50-60% of UNCW sponsored research was marine science related.

2017–2018. *Faculty Fellow*, College of Arts & Science (CAS), UNCW. Initiated a project to strengthen faculty community and culture at UNCW that honors its diversity and strengths to effectively respond together to the changing landscape of higher education. Hosted lunches for small groups of faculty (3-8 individuals) to introduce them and build relationships. Hosted 109 faculty at 40 lunches, and recruited 2 volunteer cohosts.

2013–2018. *University Curriculum Committee* (Chair 2018), UNCW Faculty Senate. Accomplishments include reviewing and passing the Interdisciplinary Major to support the UNC Part Way Home Initiative and the BS in Coastal Engineering.

2014–2018. *Faculty Welfare Committee* (Chair 2017–2018), UNCW Faculty Senate. Initiated a monthly faculty reception to encourage faculty interaction, boost morale, and build a positive faculty culture.

2017–2018. *Provost Advisory Council*.

2014–2018. *Elected Delegate*, Faculty Assembly (UNC System). The University of North Carolina Faculty Assembly is a faculty advisory body to the UNC system president and the UNC Board of Governors. I helped formalize the delegate reporting process to the UNCW Senate to increase communication and transparency of the Assembly work.

2017. *Commencement Speaker*, College of Arts and Sciences, UNCW (December). *Hats and Shoes.*

2016. *Consultant*, College of Health and Human Services. Assessed College leadership structure, and recommended changes to enhance the College effectiveness and sustainability. By summer 2017, the college leadership had implemented many of the recommendations.

2015. *UNCW Strategic Planning.* Served on a leadership team to build a new campus strategic plan. Worked on a subcommittee that proposed goals, strategies, and assessments to attract and retain high quality students, staff, and faculty.

2010–2016. Advisory Board, *Center for Teaching Excellence*.

2009–2013. Advisory Board, *Center for the Support of Undergraduate Research and Fellowships*.

UNCW Dept. of Biology & Marine Biology

2013–2014 & 2016–2018. *Long Range Planning Committee*. In 2013–2014 this committee conducted a self-study of the department and crafted a strategic plan (10 yr.). Assessed plan progress in 2016–2017.

2013–2015. *Faculty Senator*. During this service the Senate substantially revised the Faculty Handbook, including a substantive review and revision to the *Policies of Academic Freedom & Tenure.*

2009–2013. *Undergraduate Assessment Committee* (Coordinator 2011–2013). Committee designed and implemented assessment of departmental learning objectives. As coordinator, I chaired the committee work, managed two artifact evaluation subcommittees, administered the assessment program, and analyzed and reported results to the department and college.

2010–2012. *Chair's Advisory Committee*. Assisted the Department Chair as needed on departmental policies and procedures. Reviewed and assessed all departmental faculty annual reports (~40).

2008–2015. *Faculty Search Committees*, Recruited 8 tenure-track faculty members.

Community

2020. *North Carolina Coastal Plain – A Biodiversity Hotspot*. North Carolina Coastal Land Trust. (Apr.)

2019. Invited Lectures. *Why do Universities do Research?* SEA & Coffee, Osher Lifelong Learning Institute at UNCW (Feb.), and Wilmington Cape Fear Rotary Club (March).

2019. Invited Lecture. *Reproducibility Crisis in Science*. Public Issues Forum, Osher Lifelong Learning Institute at UNCW.

2010–2016. Advisory Board. *Cape Fear Museum of Science and History*, New Hanover Co., NC (Chair 2015–2016, Assistant Chair 2014–2015). Appointed by County Commissioners. Key accomplishments during my service include (1) on-boarding a new museum director, (2) construction

of a new county park (Museum Park) affiliated with the museum as an outdoor exhibit, (3) development of a new board member recruitment plan to encourage membership diversity with respect to skills & talents, race & ethnicity, and community connections, and (4) hiring a consulting firm to conduct a self-assessment and new strategic plan.

2013–2014. Board of Directors. *Cape Fear Economic Development Council,* Wilmington, NC.

Professional

2023–present. Artificial Intelligence Working Group, Council on Research, Association of Public & Land-Grant Universities.

2017–present. Editorial Board, *Ecological Modelling* (International Journal of Ecological Modelling and Systems Ecology).

2017–present. Secretary of North American Chapter, International Society for Ecological Modelling.

2016. Scientific Advisory Board. *International Society for Ecological Modelling Global Conference*. Towson University, Baltimore, MD.

2013–2014. Guest Editor. Special Issue, *Ecological Modelling*, Volume 293. 17 papers.

2013. Organizing Committee (1 of 3). *Systems Ecology: A Network Perspective and Retrospective*. A two-day workshop in honor of the 45th anniversary of Professor Patten at the University of Georgia.

Reviewer

Manuscripts: Ecol. Model.; Env. Model. Soft.; Oikos; Ecol. Monogr.; Ecol. Lett.; Ecol. Ind.; Mar. Fresh Res.; Estuar. Coast. Shelf Sci.; Sci. Tot. Environ.; Environ. Manage.; Environmetrics; PLoS Comp. Biol.; Lands. Urban Plan.; Front. Earth Sci; Applied Ener.; Resourc., Cons. Recyc; Scientomet.

Proposals: NERC Science of the Environment UK (Sp 2021), NSF-GEO/OCE (F, Sp 2015), MD SeaGrant, NSF-BIO (Panel 2016, Panel 2023), National Research Foundation South Africa (2014), Dutch Research Council (2022).

Tutorials & Workshops. Systems Ecology & Ecological Network Analysis. Presented at 4 International Meetings (Austria, Germany, USA), 1 National Meeting (MD), 2 National Universities (AZ, KY).

RESEARCH & INNOVATION

As a systems ecologist, my research focuses on discovering the processes that create, constrain, and sustain ecological systems. My expertise includes ecological modeling, simulation, ecoinformatics, and network analysis, which I have used to investigate aquatic systems from the Ross Sea in Antarctica, to the Cape Fear River estuary in NC, to the ecological communities that form inside purple pitcher plants.

Publications

60 total publications, including 51 peer-reviewed papers. 12 papers coauthored with UNCW graduate students, 4 coauthored with undergraduates, and 3 coauthored with graduate students who visited my laboratory. 7 non-peer-reviewed articles or book chapters, 2 software packages. (Google Scholar Profile).
ORCID: 0000-0002-5759-3711

Peer Reviewed

* postdoc, ** graduate student, *** Undergraduate student

2021

51. Network construction, evaluation and documentation: A guideline
Scharler, U. M., Borrett, S.R.
Environmental Modelling & Software 140: 105020 https://doi.org/10.1016/j.envsoft.2021.105020

2020

50. Biodiversity increases multitrophic energy use efficiency, flow and storage in grasslands.
Buzhdygan, OY, Meyer, ST, Weisser, WW, Eisenhauer, N, Ebeling, A, Borrett SR, De Deyn, GB, Hines, J, Mommer, L, Petermann, JS.
Nature Ecology and Evolution, 3: 393-405 https://doi.org/10.1038/s41559-020-1123-8

49. Shifting levels of ecological network's analysis reveals different system properties
Niquil, N., Haraldsson, M., Sime-Ngando, T., Huneman, P., Borrett, S.R.
Philosophical Transactions of the Royal Society B – Biological Sciences, 375:20190326.
https://doi.org/10.1098/rstb.2019.0326

2019

48. Walk partitions of flow in Ecological Network Analysis: Review and Synthesis of Methods and Indicators.
Borrett, S.R., Scharler, U. M.
Ecological Indicators 106:105451 doi: 10.1016/j.ecolind.2019.105451

47. Beyond the Black Box: Promoting mathematical collaborations for elucidating interactions in soil ecology.
Bennett, Alison; Preedy, Katharine; Golubski, Antonio; Umbanhowar, James; Borrett, Stuart; Byrne, Loren; Apostol, Kent; Bever, James; Biederman, Lori; Classen, Aimee; Cuddington, Kim; de Graaff, Marie-Anne; Garrett, Karen; Gross, Lou; Hastings, Alan; Hrynkiv, Volodymyr; Karst, Justine; Kummel, Miroslav; Lee, Charlotte; Liang, Chao; Liao, Wei; Mack, Keenan; Miller, Laura; Ownley, Bonnie; Rojas, Claudia; Simms, Ellen; Walsh, Vonda; Warren, Matthew; Zhu, Jun
Ecosphere 10(7): e02799 doi: 10.1002/ecs2.2799

46. Combining scientific and fishers' knowledge to co-create indicators of food web structure and function.
Bentley, J.W., Hines, D.E., Borrett, S.R., Serpetti, N., Hernandez-Milin, G., Fox, C., Heymans, J.J., Reid, D.G.
ICES Journal of Marine Science, fsz121, https://doi.org/10.1093/icesjms/fsz121

45. Ecological Network Analysis Metrics: The need for an entire ecosystem approach in management and policy.
Fath, BD, Asmus, H, Asmus, R, Baird, D., Borrett, SR, de Jonge, VN, Ludovisi, A, Niquil, N, Scharler, UM, Schueckel, U, Wolff, M.
Ocean and Coastal Management 174: 1–14 https://doi.org/10.1016/j.ocecoaman.2019.03.007

44. Diet uncertainty analysis strengthens model-derived indicators of food web structure and function.
Bentley**, J.W., Hines, D.E., Borrett, S.R., Serpetti, N., Fox, C., Reid, D.G., Heymans, J.J.
Ecological Indicators 98: 239-250 https://doi.org/10.1016/j.ecolind.2018.11.008

2018

43. Bibliometric review of Ecological Network Analysis: 2010-2016.
Borrett, S.R., Sheble, L., Moody, J., Anway**, E.
Ecological Modelling 382: 63–82. doi: 10.1016/j.ecolmodel.2018.04.020

42. Seasonal dynamics and ecosystem functioning of the Sylt-Rømø Bight, Northern Wadden Sea
de la Vega**, C. Horne**, S., Baird, D., Hines, D., Borrett, S.R. Jensen, L., Schwemmer, P, Asmus, R., Siebert, U., Asmus, H.
Estuarine, Coastal and Shelf Science 203: 100-118

41. Uncertainty analyses for Ecological Network Analysis enable stronger inferences.
Hines**, D.E., Ray, S., and Borrett, S.R.
Environmental Modelling & Software 101: 117–127. doi: 10.1016/j.envsoft.2017.12.011

2017

40. Estimating the impact of oyster restoration scenarios on transient fish production .
McCoy**, E. Borrett, S.R., LaPeyre, M.K., Peterson, B.J.
Restoration Ecology 25(5): 798–809. 10.1111/rec.12498

39. Ecological Network Metrics: Opportunities for Synthesis
Lau, M.K., Borrett, S.R., Baiser, B., Gotelli, N.J., Ellison, A.M.
EcoSphere 8(8) e01900 10.1002/ecs2.1900 (BioRxiv preprint 10.1101/125781)

38. Comparative study of food webs from two different time periods of Hooghly Matla estuarine system, India through network analysis.
Rakshit, N, Banerjee, A, Mukherjee, J, Chakrabarty, M, Borrett, S.R., Ray, R.
Ecological Modelling. 356: 25–37. 10.1016/j.ecolmodel.2017.04.003

2016

37. The roles of weighting and indirect effects in identifying keystone species.
Zhao**, L., Zhang, H., O'Gorman, E.J., Wang, T., Ma, A., Moore, J.C., Borrett, S.R., Woodward, G.
Ecology Letters 19(9): 1032–1040 10.1111/ele.12638

36. Genotypic variation in foundation species generates network structure that may drive community dynamics and evolution.
Lau**, M.K., Keith, A., Borrett, S.R., Schuster, S., Whitham, T.
Ecology 97: 733–742. dx.doi.org/10.1890/15-0600.1

35. Six general ecosystem properties are more intense in biogeochemical cycling networks than food webs.
Borrett, S.R., Hines**, D.E., Carter***, M.
Journal of Complex Networks 4:575-603 doi: 10.1093/comnet/cnw001.

34. Evaluating control of nutrient flow in an estuarine nitrogen cycle through comparative network analysis.
Hines**, D.E, Singh, P., Borrett, S.R.
Ecological Engineering 89: 70–79. DOI: 10.1016/j.ecoleng.2016.01.009.

2015

33. Spatial heterogeneity in soil microbes alters establishment success of an introduced plant.
Abbott, K.C., J. Karst, L. Biederman, S.R. Borrett, A. Hastings, J.D. Bever, V. Walsh, L. Miller.
PLoS ONE 10(5): e0125788. doi:10.1371/journal.pone.0125788.

32. Estimating the effects of seawater intrusion on an estuarine nitrogen cycle by comparative network analysis.
Hines, D.E.**, J.A. Lisa**, B. Song, C.R. Tobias, S.R. Borrett
Marine Ecology Progress Series 524: 137–154 Preprint: **arXiv:1311.1171 [q-bio.QM]** doi: 10.3354/meps11187

2014

31. enaR: An R package for Ecosystem Network Analysis.
Borrett, S.R., M.K. Lau**
Methods in Ecology and Evolution 5: 1206-1213. DOI: 10.1111/2041-210X.12282.

30. The rise of network ecology: Maps of the topic diversity and scientific collaboration.
Borrett, S.R., J. Moody, J, A. Edelmann*.
Ecological Modelling 293: 111-127 doi: 10.1016/j.ecolmodel.2014.02.019 Preprint: **arXiv:1311.1785 [q-bio.QM]**

29. Comparison of network, neighborhood, and node levels of analysis in two models of nitrogen cycling in the Cape Fear River Estuary.
Hines, D.E. **, S.R. Borrett.
Ecological Modelling. 293: 210-220. doi: 10.1016/j.ecolmodel.2013.11.013

28. Indirect effects and distributed control in ecosystems. Comparative network environ analysis of a seven-compartment model of nitrogen storage in the Neuse River Estuary, USA: Time Series Analysis.
Whipple, S.J., B.C. Patten, S.R. Borrett.
Ecological Modelling 293:161-186. doi: 10.1016/j.ecolmodel.2014.08.025.

2013

27. Unique pattern of molt leads to low intra-individual variation in feather mercury concentrations in penguins.
Brasso**, R., B. Drummond***, S.R. Borrett, A. Chiaradia, M. Polito, A. Raya-Rey.
Environmental Toxicology & Chemistry. 32: 2331–2334. doi:10.1002/etc.2303

26. Throughflow centrality is a global indicator of the functional importance of species in ecosystems.
Borrett, S.R.
Ecological Indicators 32:182–196. doi:10.1016/j.ecolind.2013.03.014 Preprint: **arXiv:1209.0725 [q-bio.QM] .**

2012

25. A network model shows the importance of coupled processes in the microbial N cycle in the Cape Fear River Estuary.
Hines**, D.E., J.A. Lisa**, B. Song, C.R. Tobias, S.R. Borrett.
Estuarine, Coastal and Shelf Science. 20: 45–75. doi:10.1016/j.ecss.2012.04.018

24. Environ centrality reveals the tendency of indirect effects to homogenize the functional importance of species in ecosystems.
Fann***, S.L. and S.R. Borrett
Journal of Theoretical Biology 294: 74–86. doi:10.1016/j.jtbi.2011.10.030 arXiv:1110.5385v1 [q-bio.PE]

2011

23. Equivalence of the ecological network analysis realized input and output oriented indirect effects metric.
Borrett, S.R, M.A. Freeze, & A.K. Salas**.
Ecological Modelling 222:2142–2148. doi: 10.1016/j.ecolmodel.2011.04.003

22. Reconnecting environs to their environment.
Borrett, S.R. and M.A. Freeze.
Ecological Modelling 222: 2293–2403. doi: 10.1016/j.ecolmodel.2010.10.015

21. Evidence for dominance of indirect effects in 50 trophic ecosystem networks
Salas**, A.K. & S.R. Borrett.
Ecological Modelling 222: 1192-1204. arXiv:1009.1841v1 [q-bio.PE]; doi: 10.1016/j.ecolmodel.2010.12.002

2010

20. Rapid development of indirect effects in ecosystem networks.
Borrett, S.R., S.J. Whipple, & B.C. Patten.
Oikos 119: 1136–1148. doi: 10.1111/j.1600-0706.2009.18104.x

19. Evidence for resource homogenization in 50 trophic ecosystem networks,
Borrett, S.R. & A.K. Salas**.
Ecological Modelling 221: 1710–1716. doi:10.1016/j.ecolmodel.2010.04.004.

18. Ecosystem network analysis indicators are generally robust to parameter uncertainty in a phosphorus model of Lake Sidney Lanier, USA.
    Kaufman***, A.G. & S.R. Borrett.
    Ecological Modelling 221: 1230-1238 doi:10.1016/j.ecolmodel.2009.12.018

2007

17. Equivalence of throughflow– and storage–based environs.
    Bata, S.A., S.R. Borrett, B.C. Patten, S.J. Whipple, J.R. Schramski, & D.K. Gattie.
    Ecological Modelling. 206: 400–406 doi:10.1016/j.ecolmodel.2007.04.005

16. Extracting constraints for process modeling.
    Bridewell, W., S.R. Borrett, & L. Todorovski.
    Proceedings of the Fourth International **Conference on Knowledge Capture** (pp. 87-94). Whistler, BC.

15. Indirect effects and distributed control in ecosystems: Distributed control in the environ networks of a seven-compartment model of nitrogen flow in the Neuse River Estuary, USA: Time series analysis.
    Schramski, J.R., D.K. Gattie, B.C. Patten, S.R. Borrett, B.D. Fath, & S.J. Whipple.
    Ecological Modelling 206: 18-30. doi:10.1016/j.ecolmodel.2007.03.023

14. Indirect effects and distributed control in ecosystems: Comparative network environ analysis of a seven-compartment model of nitrogen flow in the Neuse River Estuary: Time series analysis.
    Whipple, S.J., S.R. Borrett, B.C. Patten, D.K. Gattie, J.R. Schramski, & S.A. Bata.
    Ecological Modelling 206: 1-17. doi:10.1016/j.ecolmodel.2007.03.002

13. Gaining integrated understanding of *Phaeocystis spp.* through model-driven laboratory and mesocosm studies.
    Whipple, S.J., B.C. Patten, P.G. Verity, M.E. Frischer, J.D. Long, J.C. Nejstgaard, J.T. Anderson, A. Jacobsen, A. Larsen, J. Martinez-Martinez, & S.R. Borrett.
    Biogeochemistry 83:293–309. doi:10.1007/s10533-007-9089-z

12. A method for representing and developing process models.
    Borrett, S.R., W. Bridewell, P. Langley, & K.R. Arrigo.
    Ecological Complexity 4: 1–12. doi:10.1016/j.ecocom.2007.02.017

11. Functional integration of ecological networks through pathway proliferation.
    Borrett, S.R., B.D. Fath, B.C. Patten.
    Journal of Theoretical Biology 245: 98–111. doi:10.1016/j.jtbi.2006.09.024

10. Environ indicator sensitivity to flux uncertainty in a phosphorus model of Lake Sidney Lanier, USA.
    Borrett, S.R. & O.O. Osidele
    Ecological Modelling 200: 371–383. doi:10.1016/j.ecolmodel.2006.08.011

2006

9. Learning process models with missing data.
    Bridewell, W., P. Langley, S. Racunas, & S.R. Borrett.
    Proceedings of the Seventeenth European **Conference on Machine Learning** (pp. 557-565). Berlin: Springer.

8. Plankton development and trophic transfer in sea water enclosures with added nutrients and *Phaeocystis pouchetii*.
    Nejstgaard, J.C., M.E. Frischer, P.G. Verity, J.T. Anderson, A. Jacobsen, M.J. Zirbel, A. Larson, J. Martínez-Martínez, A.F. Sazhin, T. Walters, D.A. Bronk, S.J. Whipple, S.R. Borrett, B.C. Patten, & J.D. Long.
    Marine Ecology Progress Series 321: 99–121

7. Indirect effects and distributed control in ecosystems: Network environ analysis of a seven-compartment model of nitrogen flow in the Neuse River Estuary, USA—Steady-state analysis.
   Gattie, D.K., J.R. Schramski, S.R. Borrett, B.C. Patten, S.A. Bata, & S.J. Whipple.
   Ecological Modelling 194: 162–177. doi:10.1016/j.ecolmodel.2005.10.017

6. Indirect effects and distributed control in ecosystems: Temporal variation of indirect effects in a seven-compartment model of nitrogen flow in the Neuse River Estuary, USA—Time series analysis.
   Borrett, S.R., S.J. Whipple, B.C. Patten, & R.R. Christian.
   Ecological Modelling 194: 178–188. doi:10.1016/j.ecolmodel.2005.10.011

5. Indirect effects and distributed control in ecosystems: Distributed control in the environ networks of a seven-compartment model of nitrogen flow in the Neuse River Estuary, USA—Steady-state analysis.
   Schramski, J.R., D.K. Gattie, B.C. Patten, S.R. Borrett, B.D. Fath, C.R. Thomas, & S.J. Whipple,
   Ecological Modelling 194: 189–201. doi:10.1016/j.ecolmodel.2005.10.012

4. A MATLAB® function for network environ analysis.
   Fath, B.D. & S.R. Borrett.
   Environmental Modelling & Software 21: 375–405. doi:10.1016/j.envsoft.2004.11.007

2005

3. Institutional perspectives on participation and information in water management.
   Cowie, G.M. & S.R. Borrett.
   Environmental Modeling & Software 20: 469–483. doi:10.1016/j.envsoft.2004.02.006

2003

2. Structure of pathways in ecological networks: Relationship between length and number.
   Borrett, S.R. & B.C. Patten.
   Ecological Modelling 170: 173–184. doi:10.1016/S0304-3800(03)00224-2

2002

1. Developing a concept of adaptive community learning: Case study of a rapidly urbanizing watershed.
   Beck, M.B., B.D. Fath, A. K. Parker, O.O. Osidele, G.M. Cowie, T.C. Rasmussen, B.C. Patten, B.G. Norton, A. Steinmann, S.R. Borrett, D. Cox, M.C. Mayhew, X.-Q. Zeng, & W. Zeng.
   Integrated Assessment 3:299–307.

Book Chapters, Reports, and Other Scholarly Publications

7. Vignette – enaR: Ecological Network Analysis with R
   Lau, M.K., Hines, D.E., Singh, P., Borrett, S.R.
   R software Vignette (2017) https://github.com/SEELab/enaR/blob/develop/vignettes/enaR-vignette.pdf.

6. Introduction to the special issue Systems Ecology: A Network Perspective and Retrospective
   Borrett, S.R., Fath, B.D., & Whipple, S.J.
   Ecological Modelling (2014) 293:1–3. doi: 10.1016/j.ecolmodel.2014.10.005.

5. Network Ecology (Revised)
   Borrett, S.R., R.R. Christian, R., & R.E. Ulanowicz
   In: A.H. El-Shaarawi and W.H. Piegorsch (Eds.). Encyclopedia of Environmetrics (2nd edition). John Wiley and Sons: Chinchester (2012). pp. 1767-1772. doi:10.1002/9780470057339.van011.pub2

4. Innovative construction of explanatory scientific models.
   Bridewell, W., S.R. Borrett, P. Langley.
   In: A.B. Markman and K.L. Wood (Eds.) Tools for Innovation. Oxford University Press, NY. (2009).

3. Complex adaptive hierarchical systems: Consensus (Chapter 4)
   Patten, B.C., B.D. Fath, J.S. Choi, S. Bastianoni, S.R. Borrett, S. Brandt-Williams, M. Debeljak, J. Fonseca, W.E. Grant, D. Karnawati, J.C. Marques, A. Moser, F. Müller, C. Pahl-Wostl, R. Seppelt, W.H. Seinborn, Y.M. Svirezhev
   In: R. Costanza and S.E. Jørgensen (Eds.). Understanding and Solving Environmental Problems in the 21st Century: Toward a New, Integrated Hard Problem Science. Elsevier Science, Ltd, Oxford (2002) pp. 95-99.

2. Complex adaptive hierarchical systems: Background (Chapter 3)
   Patten, B.C., B.D. Fath, J.S. Choi, S. Bastianoni, S.R. Borrett, S. Brandt-Williams, M. Debeljak, J. Fonseca, W.E. Grant, D. Karnawati, J.C. Marques, A. Moser, F. Müller, C. Pahl-Wostl, R. Seppelt, W.H. Seinborn, Y.M. Svirezhev
   In: R. Costanza and S.E. Jørgensen (Eds.). Understanding and Solving Environmental Problems in the 21st Century: Toward a New, Integrated Hard Problem Science. Elsevier Science, Ltd, Oxford (2002) pp. 41–94.

1. Foresight for Lanier: A Workshop. Summary of Results.
   Cowie, G.M., S.R. Borrett**,** and others.
   University of Georgia. January 25, 2001. Athens, GA.

Software

2. enaR: Tools for Ecological Network Analysis

   Lau, M. Borrett, S.R., and Hines, D.E.
   2012. R package version 1.01. http://CRAN.R-project.org/package=enaR.
   2015. Version 2.9 Released
   2017. Version 3.0 Released
   Development hosted on GitHub at https://github.com/SEELab/enaR.

1. NEA.m
   Fath, B.D. and Borrett, S.R.
   2004. Matlab Central File Exchange. http://www.mathworks.com/matlabcentral/fileexchange/5261-nea-m.

Presentations & Posters

117 presentations or posters (academic institutions, national & international meetings). 2 Keynote (Germany), 3 Plenary Presentations (India, Germany), 24 Invited, 31 with graduate student co-authors, 15 with undergraduate co-authors.

* postdoc, ** graduate student, *** Undergraduate student

117. Borrett, S.R. 2023. Engaging Research and Innovation for Diversity, Equity, and Inclusion. Courage Rising: Equity and Inclusion Symposium. University of North Carolina Wilmington. April.

116. Borrett, S.R. 2022. Importance of uncertainty in systems ecology and network analysis. Understanding genes to ecosystems ecology through modern research, 2022, Webinar Honouring the Superannuation of Prof S. Ray. Siksha Bhavana,Visva-Bharati, Santiniketan, India. Invited Presentation.

115. Borrett, S.R., Gribble, J. 2019. Indirect flows decentralize throughflow centrality in food webs. International Society for Ecological Modelling, Global Conference 2019. Salzburg, Austria.

114. Borrett, S.R., Scharler, U.M. 2018. Fundamental relationships among flow-based Ecological Network Analysis indicators. Ecological Network Analysis Workshop. Leibniz Centre for Tropical Marine Research (ZMT), Bremen, Germany. (Skype). Invited Presentation

113. Bentley, J., Hines, D.E., Borrett, S.R., Serpetti, N., Fox, C., Reid, D., Heymans, J.J. 2018. How can ocean observation data enhance ecosystem models: An example using long-term stomach records and fisher's knowledge. European Ocean Observing System Conference 2018. Brussels.

112. Bentley, J., Hines, D.E., Borrett, S.R., Serpetti, N., Fox, C., Reid, D., Heymans, J.J. 2018. Incorporating fisher's knowledge and uncertainty analysis into the development of ecosystem models. American Fisheries Society. Atlantic City, NJ.

111. Synan, H. Borrett, S.R. 2018. Identification of statistical dependencies among Ecological Network Analysis metrics used to characterize ecosystem structure and function. Undergraduate Research Showcase, University of North Carolina Wilmington, NC.

110. Brewster, S., Borrett, S.R. 2018. Estimating ecosystem effects of shrimp trawling in Core Sound, North Carolina, USA: using Ecological Network Analysis as an environmental impact analysis tool. Undergraduate Research Showcase, University of North Carolina Wilmington, NC.

109. Borrett, S.R., Moody, J, Sheble, L., Anway, E. 2018. Bibliometric Review and Synthesis of Ecological Network Analysis (2010–2016): A tool for understanding biodiversity. India Biodiversity 2018: Biodiversity, food security, and climate change. Indian Statistical Institute, Kolkata, India. (Skype). Invited Presentation.

108. Borrett, S.R. and Persuit, J. 2018. The EcoPhoto Project: Applied Learning in Ecology. 12th Conference on Applied Learning in Higher Education. Wilmington, NC.

107. Borrett, S.R. 2017. Reading the Webs of Life: Tools, Theory, and Applications of Ecological Network Analysis. Department of Biology and Marine Biology, University of North Carolina Wilmington, NC.

106. Borrett, S.R., Moody, J, Sheble, L., Anway, E. 2017. Bibliometric Review and Synthesis of Ecological Network Analysis (2010–2016). Workshop: Use of coastal and estuarine food web models in politics and management: The need for an entire ecosystem approach to prevent crises". Alfred Wegener-Institute Helmholtz-Zentrum fur Polar und Meeresforschung, Sylt, Germany. Invited Keynote Presentation.

105. Borrett, S.R. 2017. Ecological Network Analysis for Ecosystem Science, Assessment, & Management: Putting the Pieces Together. Department of Biology and Marine Biology, University of North Carolina Wilmington, Wilmington, NC.

104. Borrett, S.R. 2017. Network Ecology: Using Math to Study Ecosystems. Discrete Math Seminar, Kennesaw State University, Kennesaw, GA. Invited Presentation.

103. Borrett, S.R. 2017. Network Insights into Ecosystem Function: Food Web Organization and Estuarine Nitrogen Cycling. Duke Marine Laboratory, Duke University, Beaufort, NC. Invited Presentation.

102. Borrett, S.R. 2016. Network Insights into Ecosystem Function: Food Web Organization and Estuarine Nitrogen Cycling. Institute of Biology, Free University of Berlin, Berlin, Germany. Invited Presentation.

101. Borrett, S.R. 2016. Network Insights into Ecosystem Function: Food Web Organization and Estuarine Nitrogen Cycling. Leibniz- Institute of Freshwater Ecology and Inland Fisheries (IGB). Berlin & Neuglobsow, Germany. Invited Presentation.

100. Borrett, S.R. 2016. Applying Ecological Network Analysis to Understand Changing Coastal Ecosystems. ECSA 56 2016, Bremen, Germany. Invited Keynote Presentation.

99. Borrett, S.R. 2016. Review and synthesis of five flow decompositions techniques in Ecosystem Network Analysis. The International Society for Ecological Modelling Global Conference 2016, Towson, MD.

98. Borrett, S.R., Fath, B.D., Kazanci, C. 2016. Proposed changes in the mathematical notation used for Ecosystem Network Analysis for clearer communication. The International Society for Ecological Modelling Global Conference 2016, Towson, MD. (poster)

97. Hines**, D.E., Borrett, S.R. 2016. Sensitivity and uncertainty analysis for network flow models: a comparative ecosystem application. The International Society for Ecological Modelling Global Conference 2016, Towson, MD. (poster)

96. Hines**, D.E., Borrett, S.R. 2015. How what you don't know affects what you do know: Exploring an application of a linear inverse modeling uncertainty analysis on network models. 100th Annual Meeting, Ecological Society of America, Baltimore, MD.

95. Borrett, S.R., Hines**, D.E. 2015. Six general ecosystem properties tend to be more intense in biogeochemical cycling network than in trophic webs. 100th Annual Meeting, Ecological Society of America, Baltimore, MD.

94. Carrera***, L. Hines**, D.E., Borrett, S.R. 2015. Preliminary Food web of the Cape Fear River Estuary. Undergraduate Research Showcase, Center for Undergraduate Research and Fellowships. April.

93. Sosnowski**, A. C., Ghoneim, E., Burke, J. J., Borrett, S.R., Hines, E., Maddalena, D. 2015. Spatio-temporal analysis of flooding extent employing a MODIS vegetation proxy in the Sudd wetland of South Sudan. Association of American Geographers Annual Meeting, Chicago, IL.

92. Gomez**, E., Peterson, B., Borrett, S.R, La Peyre, M. 2015. A dynamic ecological and economic model linking oyster reef bioenergetics to final ecosystem services. 44th Benthic Ecology Meeting, Quebec City, Quebec, Canada.

91. Borrett, S.R. 2015. Tracing the connections in ecosystems with network analysis: theory and application. Department of Biology and Physics, Kennesaw State University, GA. (Jan. 28). Invited presentation.

90. Gomez**, E., Peterson, B., Borrett, S.R., Dvarskas, A., Posey, M., Alphin, T., Wilgins, E. 2014. A dynamic ecological and economic model linking oyster reef bioenergetics to final ecosystem services. A Community on Ecosystem Services, Dec. 8-12. Washington, DC.

89. Sterling***, A., Echevarria**, M., Borrett, S.R., Taylor, A. 2014. *Swimming under the influence: Effect of algal toxins on the behavior of the marine ciliate Favella sp*. 36th Southeastern Phycological Colloquy, Wilmington, NC.

88. Borrett, S. R. Hines**, D.E., Singh**, P., Lau*, M.K. 2014. *enaR: a tool for ecosystem network analysis*. Statistical and Applied Mathematical Sciences Institute workshop on Mathematical and Statistical Ecology. Research Triangle, NC. (Poster)

87. Borrett, S. R., Lau**, M.K., Hines**, D.E. 2014. *enaR: An R package that facilitates comparison of ecosystem structure and function with network analysis*. 43rd Benthic Ecology Meeting, Jacksonville, FL.

86. Hines**, D.E., Lisa**, J.A., Song, B., Tobias, C.R., Borrett. 2014. *A network model comparison predicts how seawater intrusion will alter coupling among estuarine nitrogen cycling processes.* 43rd Benthic Ecology Meeting, Jacksonville, FL.

85. Oxe**, E.A., Borrett, S.R., Hines**, D.E., Lisa**, J.A., Song, B., Tobias, C.R. 2014. *Comparison of process coupling in the nitrogen cycle between the New River and Cape Fear River estuaries.* 43rd Benthic Ecology Meeting, Jacksonville, FL.

84. Borrett, S. R., 2014. *Connecting the dots: Developments in ecosystem network theory and the impact of climate change on estuarine N cycling*. Department of Zoology, University of Calcutta, Calcutta, India. (Mar. 1) Invited presentation.

83. Borrett, S. R., Carter[***], M., Hines, D.E[**]. 2014. *Environ properties tend to be more intense in biogeochemical cycling models than in trophic networks*. Invited presentation. International Conference on Environmental Biology and Ecological Modelling, Visva-Bharati University, Santiniketan, India (Feb. 26).

82. Lau[**], M., Borrett, S.R. 2013. *enaR: Free, open-source tools for ecological network analysis.* Ecological Society of America Meeting (ESA), Minneapolis, MN, August 2013

81. Borrett, S.R., Moody, J. 2013. *Topics in network ecology and the scientific community that studies them.* Systems Ecology: A Network Perspective and Retrospective. University of Georgia. (April).

80. Hines[**], D.E., Borrett, S.R. 2013. *Node-level and whole-network indicators of the impacts of sea level rise on an estuarine nitrogen cycle.* Systems Ecology: A Network Perspective and Retrospective. University of Georgia. (April).

79. Oxe[**], E.A., Hines[**], D.E., Borrett, S.R. 2013. *Network mutualism and synergism in a model of nitrogen cycling in the Cape Fear River Estuary, NC.* Systems Ecology: A Network Perspective and Retrospective. University of Georgia. (April).

78. Whipple, S.J., Patten, B.C., Borrett, S.R. 2013. *Evaluation of model size, topology, and currency in systems analysis: comparative network environ analysis and nitrogen model time series of the Neuse River estuary, USA.* Systems Ecology: A Network Perspective and Retrospective. University of Georgia. (April).

77. Borrett, S.R. 2013. *Throughflow centrality reveals important species in ecosystems and environmental impacts of shrimp trawling in Core Sound, NC.* Duke Network Analysis Center, Social Science Research Institute, Duke University. (Feb. 26). Invited presentation.

76. Borrett, S.R. 2012. *Connecting the dots: Developments in ecosystem network theory and the impact of climate change on estuarine N cycling*. Department of Biology, University of North Carolina Charlotte. (Oct. 26). Invited presentation.

75. Mejaski[**], J., Borrett, S.R. 2012. *Network analysis of the urban water metabolism of Wilmington, North Carolina: Evaluating alternative recycling scenarios for city sustainability*. 4th International EcoSummit, Columbus, Ohio. (Poster, Oct, 4)

74. Hines[**], D.E., Lisa[**], J.A., Song, B., Tobias, C.R., Borrett, S.R. 2012. *Simulating the impact of sea level rise on the microbial nitrogen cycle in tidally influenced regions of the Cape Fear River Estuary, NC, USA*. 4th International EcoSummit, Columbus, Ohio. (Oct, 4)

73. Borrett, S.R., Lau[**], M.K. 2012. *An R package for Ecological Network Analysis*. 4th International EcoSummit, Columbus, Ohio. (Oct, 5)

72. Whipple, S.J., Patten, B.C., Borrett, S.R. 2012. *Evaluation of Model Size and Currency in Systems Analysis: Comparative Network Environ Analysis of Carbon and Nitrogen Model Time Series for the Neuse River Estuary, USA.* 4th International EcoSummit, Columbus, Ohio. (Oct, 5)

71. Borrett, S.R. 2012. *Connecting the Dots: Development in ecosystem theory and applications of ecosystem network analysis.* Department of Biology and Marine Biology, University of North Carolina Wilmington. (August 31)

70. Borrett, S.R., Deehr[**], R., Johnson, J.C., Luczkovich, J. 2012. *Centrality Analysis Shows Ecosystem Impact of Trawling in Core Sound, North Carolina, USA.* American Fisheries Society Annual Meeting, St. Paul, MN.

69. Beblo, J.[***], Borrett, S.R. 2012. *A network analysis comparison of energy flow through the Dublin Bay and Baie de Somme intertidal ecosystem*. Undergraduate Research Showcase, UNCW. (Poster) Winner of Biology and Marine Biology undergraduate poster award.

68. Hines[**], D.E., Lisa[**], J.A., Song, B., Tobias, C.R. and Borrett, S.R. 2012. *Environ analysis of a nitrogen mass balance network model*. 112th General meeting of American Society for Microbiology, San Francisco, CA

67. Hines[**], D.E., Lisa[**], J.A., Song, B., Tobias, C.R., Borrett, S.R. 2012. *Environ analysis of a nitrogen mass balance network model: quantifying microbial interactions in an estuarine nitrogen cycle*. UNCW Graduate Student Symposium, UNCW and Wilmington Information Technology Expo (WITX), Department of Computer Science, UNCW.

66. Borrett, S.R. 2012. *Connecting the dots: Developments in ecosystem theory and an application of ecosystem network analysis to investigate nitrogen cycling in the Cape Fear River Estuary, NC.* Department of Biology, Eastern Carolina University. (Feb. 23). Invited presentation.

65. Borrett, S.R. 2012. *Ecological network analysis: recent work and future opportunities at UNCW*. Department of Computer Science, UNCW. Invited presentation.

64. Borrett, S.R. 2011. *Undergraduate learning through biological research*, Center for Teaching Excellence, Teaching Celebration, UNCW.

63. Hines[**], D.E., Lisa[**], J.A., Song, B., Tobias, C.R., Borrett, S.R. 2011. *Modeling the effects of sea level rise on estuarine nitrogen cycle: examining the fate and transport of nitrogen in the Cape Fear River Estuary, NC, USA*. 21st Biennial Conference of the Coastal and Estuarine Research Federation. Daytona Beach, FL.

62. Hines[**], D.E., Lisa[**], J.A. Song, B., Borrett, S.R. 2011. *Sea level rise and the alternative fates of nitrogen in the Cape Fear River Estuary, NC, USA: a microbial view*. Biennial Meeting, International Society for Ecological Modelling, Beijing, China.

61. Carter[***], M., Borrett, S.R. 2011. *Indirect effects, network homogenization, and network aggradation are stronger in biogeochemical networks than in trophic ecosystem models.* Biennial Meeting, International Society for Ecological Modelling, Beijing, China. (Poster)

60. Borrett, S.R. 2011. *Node throughflow is a global centrality measure of species importance in ecosystem flow networks.* Biennial Meeting, International Society for Ecological Modelling, Beijing, China.

59. Missik[***], J.**,** Coates, K., Meier, A.J., Kessler, B., **Borrett, S.R.** 2011. *Influences of microbial networks on food webs*. Annual Meeting, Ecological Society of America. Austin, TX. (Poster)

58. Borrett, S.R. 2011. *Importance of indirect effects in ecosystems revealed by network analysis*. Northern Arizona University. Flagstaff, AZ. Invited presentation.

57. Borrett, S.R. 2010. *Network Analysis Exposes Hidden Relationships in Ecological Systems.* Duke Network Analysis Center, Duke University. Durham, NC. Invited presentation.

56. Himes, M., Metwally[***], A. Borrett, S.R., Bourdelais, A. Taylor, A.R. 2010. *Do algal toxins affect sensory behavior of marine ciliates?* Southeaster Phycologial Colloquy, UNCW Center for Marine Science, NC. (Poster)

55. Borrett, S.R., Whipple, S.J., Patten, B.C. 2010. *Rapid Development of Indirect Effects in Ecological Networks.* Statistical and Applied Mathematical Sciences Institute workshop on Complex Networks. Research Triangle, NC. (Poster)

54. Borrett, S.R., Salas[**], A.K. 2010. *Evidence for resource homogenization in 50 trophic ecosystem networks.* Annual Meeting, Ecological Society of America. Pittsburgh, PA.

53. Missik[***], J.E., Meier, A.J., Borrett, S.R., Ayers, K., Kessler, B. 2010. *Addition of microbial loops to food webs: Increases in connectivity, pathway proliferation, and dominant eigenvalues.* Annual Meeting, Ecological Society of America. Pittsburgh, PA. (Poster)

52. Borrett, S.R. 2009. *Resource roadmaps reveal how ecosystem connectivity influences species and whole –system functioning.* Biology Department, University of North Carolina Wilmington. Wilmington, NC.

51. Borrett, S.R. 2009. Network models for (soil) ecology. NIMBioS Investigative Workshop: New Soil Black Box Math Strategies, NIMBioS, Knoxville, TN. Invited presentation.

50. Borrett, S.R. 2009. *Dominance of indirect effects in ecological networks: Holoecology Emerging.* Institute of Marine Science, University of North Carolina Chapel Hill, Morehead City, NC. Invited presentation.

49. Borrett, S.R., Freeze, M.A., Salas[**], A. K. 2009. *Reconnecting environs to their environments.* Meeting of the International Society for Ecological Modelling, Quebec City, Canada.

48. Freeze, M.A., Borrett, S.R., Salas[**], A. K. 2009. *Sufficient conditions for threshold insensitivity of network environ analysis dominance of indirect indicators to boundary input.* Meeting of the International Society for Ecological Modelling, Quebec City, Canada.

47. Salas[**], A.K., Borrett, S.R. 2009. *Evidence for the dominance of indirect effects in trophically-based ecosystem networks.* Meeting of the International Society for Ecological Modelling, Quebec City, Canada.

46. Whipple, S.J., Borrett, S.R., Patten, B.C. 2009. *Storage-based comparative network environ analysis of a seven-compartment model of nitrogen flow in the Neuse River estuary, USA—Time series analysis.* Meeting of the International Society for Ecological Modelling, Quebec City, Canada.

45. Fann[***], S.L., Borrett, S.R. 2009. *Positional importance of species in ecosystems: considering direct and indirect effects through a network environ analysis approach.* Meeting of the International Society for Ecological Modelling, Quebec City, Canada.

44. Kaufman[***], A., Borrett, S.R. *Ecosystem network analysis indicators are generally robust to parameter uncertainty in a phosphorus model of Lake Sidney Lanier, USA.* Meeting of the International Society for Ecological Modelling, Quebec City, Canada. and UNCW CSURF Annual Showcase.

43. Borrett, S.R. 2009. *Network architecture and the development of indirect effects.* North Carolina State University, Biomath group, Raleigh, NC (April 16th). Invited presentation.

42. Fann[***], S.L. Borrett, S.R. 2009. *Quantifying species potential for controlling ecosystem dynamics.* UNCW CSURF Annual Showcase.

41. Fann[***], S.L. Borrett, S.R. 2009. *Measuring control in ecosystems: interpreting the eigenspectrum of the ecological network analysis flow intensity matrix.* CAA Undergraduate Research Conference Towson, MD.

40. Salas[**], A.K, Borrett, S.R. 2009. *Modeling indirect selective in a co-evolving community: preliminary work.* Darwin's Legacy: Evolution's Impact on Science & Culture: A multidisciplinary conference, Wilmington, NC.

39. Muzyczek[**], L.A., Borrett, S.R., Finelli, C.M. 2009. *Feeding behavior of Upogebia affinis: Food source partitioning and effects on benthic-pelagic coupling.* 38th Benthic Ecology Meetings, Corpus Christi, TX.

38. Borrett, S.R., Whipple, S.J., Patten, B.C. 2008. *Rapid development of indirect effects in ecological networks.* Annual Meeting, Ecological Society of America. Milwaukee, WI. and at UGA Ecological Network Analysis Meeting, Athens, GA.

37. Bowers[**], J.L., Meier, A.J., and Borrett, S.R. 2008. *Eigenvector analysis of connectivity in food webs.* Annual Meeting, Ecological Society of America. Milwaukee, WI.

36. Bowers[**], J.L., Meier, A.J., and Borrett, S.R. 2008. *Use of eigenvector and network environ analysis (NEA) in the quantification of keystone species.* Annual Meeting, Society for Conservation Biology. Chattanooga, TN.

35. Borrett, S.R. 2008. *Hidden links that sustain ecosystems: the rapid development of indirect effects in the Neuse River Estuary.* Eastern Carolina University, NC. Jan. 24th. Invited Presentation.

34. Borrett, S.R. 2007. *Network architecture determines the development of indirect effects in ecosystems.* Western Kentucky University, Bowling Green, KY. Nov. 30. Invited Presentation.

33. Borrett, S.R. 2007. *Searching for ecosystem models that explain phytoplankton dynamics in the Ross Sea.* University of Georgia, Athens, GA. Invited Presentation.

32. Borrett, S.R. 2007. *Searching for ecosystem models that explain phytoplankton dynamics in the Ross Sea.* USGS, Menlo Park, CA. Invited Presentation.

31. Borrett, S.R., W. Bridewell, P. Langley, K.R. Arrigo. 2007. *Value of information in modeling the Ross Sea ecosystem.* Polar Marine Science Gordon Research Conference. Ventura, CA.

30. Borrett, S.R. 2007. *Hidden links that sustain ecosystems.* University of North Carolina, Wilmington, NC. Invited presentation

29. Borrett, S.R., W. Bridewell, P. Langley, K.R. Arrigo. 2006. *Process sensitivity analysis for ecological modeling.* 5th International Conference on Ecological Informatics. Santa Barbara, CA.

28. Borrett, S.R., W. Bridewell, P. Langley. 2006. *Computational discovery of process models of aquatic ecosystems.* 91st Annual Meeting, Ecological Society of America. Memphis, TN.

27. Borrett, S.R., W. Bridewell, P. Langley, K.R. Arrigo. 2006. *A hierarchical process model of the Ross Sea ecosystem*. Eos Trans. AGU, 87(36), Ocean Sciences Meeting Supplement, Abstract OS43K-06.

26. Borrett, S.R. 2005. *Ecosystem organization and transformation: The role of network architecture in the development of indirect effects.* Dissertation Defense. Institute of Ecology, Athens, GA.

25. Borrett, S.R., O.O. Osidele, B.C. Patten, M.B. Beck. 2005. *Environ sensitivity to flux uncertainty in a phosphorus model of Lake Sidney Lanier, USA: Preliminary Results.* Annual International Meeting, Institute of Biological Engineering. Athens, GA.

24. Patten, B.C., S. Bata, S.R. Borrett, B.D. Fath, D.K. Gattie, J.R. Schramski, H.J. Turk, S.J. Whipple. 2004. *Indirect effects and distributed control in ecosystems 1. Environs and network environ analysis: Introduction and overview.* Fourth European Conference on Ecological Modelling. Bled, Slovenia.

23. Gattie, D.K., J.S. Schramski, S.R. Borrett, B.C. Patten, H.J. Turk. 2004. *Indirect effects and distributed control in ecosystems 2. Environ analysis of a seven–compartment model of nitrogen flow in the Neuse River Estuary, USA: The static case.* Fourth European Conference on Ecological Modelling. Bled, Slovenia.

22. Borrett, S.R., S.J. Whipple, B.C. Patten. 2004. *Indirect effects and distributed control in ecosystems 3. Temporal variation of indirect effects in a nitrogen flow model of the Neuse River Estuary, USA: time series analysis.* Fourth European Conference on Ecological Modelling. Bled, Slovenia.

21. Whipple, S.J., S.R. Borrett, B.C. Patten. 2004. *Indirect effects and distributed control in ecosystems 4. Comparative environ analysis of a seven-compartment model of nitrogen flow in the Neuse River Estuary, USA: the discrete time case.* Fourth European Conference on Ecological Modelling. Bled, Slovenia.

20. Schramski, J.S., D.K. Gattie, B.C. Patten, S.J. Whipple, S.R. Borrett, and B.D. Fath. 2004. *Indirect effects and distributed control in ecosystems 5. Distributed Control in the environ network of a seven-compartment model of nitrogen flow in the Neuse River Estuary, USA: static analysis.* Fourth European Conference on Ecological Modelling. Bled, Slovenia.

19. Borrett, S.R. and B.D. Fath. 2004. *Pathway proliferation in ecological networks*. Annual Meeting, Ecological Society of America. Portland, OR.

18. Gattie, D.K., J.S. Schramski, S.R. Borrett, B.C. Patten, H.J. Turk, S.J. Whipple. 2004. *Analysis of ecosystems as a network of environments.* Annual Meeting, American Ecological Engineering Society. Fayetteville, AR.

17. Borrett, S.R. 2004. *Biodiversity determines pathway proliferation in ecological networks: Preliminary results*. Graduate Student Symposium, Institute of Ecology, University of Georgia. Athens, GA.

16. Whipple, S.J., B.C. Patten, S.R. Borrett. 2003. *Phaeocystis: a biocomplex life-form on a biogeochemically complex planet: using conceptual modeling to guide team research.* Meeting of Phaeocystis SCOR Work Group. Savannah, GA.

15. Patten, B.C., S.R. Borrett, S.J. Whipple, R.R. Christian, C.R. Thomas. 2003. *Discrete-time dynamic environ analysis of indirect effects in ecological networks: basic considerations.* Annual Meeting, Ecological Society of America. Savannah, GA.

14. Borrett, S.R. 2003. *Development of environ indirect effects in ecological flow networks: initial lessons from the Neuse River Estuary*. Annual Meeting, Ecological Society of America. Savannah, GA.

13. Gattie, D.K. and S.R. Borrett. 2003. *Indirect effects in transport networks*. Annual Meeting, American Ecological Engineering Society. College Park, MD.

12. Gattie, D.K. and S.R. Borrett. 2003. *Network indirect effects in transport networks: integral elements of system complexity.* Annual International Meeting, Institute of Biological Engineering. Athens, GA.

11. Patten, B.C., S.J. Whipple, S.R. Borrett. 2003. *Pattern and process in the steady-state transport of energy and matter in model ecosystems: perspectives from the theory of environs.* Annual International Meeting, Institute of Biological Engineering. Athens, GA.

10. Borrett, S.R. 2003. *Network indirect transactions in the Neuse River Estuary*. Graduate Student Symposium, Institute of Ecology, University of Georgia. Athens, GA.

9. Borrett, S.R. 2002. *Investigating pathway proliferation in ecological networks.* Annual Meeting, Ecological Society of America. Tucson, AZ.

8. Borrett, S.R. 2002. *Introduction to environs.* Long Term Ecological Research Program Network Analysis Workshop. Sevilleta, NM.

7. Borrett, S.R. and B.C. Patten. 2002. *System size and connectance determine the relationship between pathway length and the number of pathways in ecological networks: preliminary results.* Graduate Student Symposium, Institute of Ecology, University of Georgia. Athens, GA.

6. Borrett, S.R. 2001. *Incorporating citizen knowledge into an ecosystem model of Flowery Branch Bay: an initial science-based model.* 3rd European Ecological Modelling Conference, International Society for Ecological Modelling European Chapter. Dubrovnik, Croatia.
5. Beck, M.B., A.K. Parker, T.C. Rasmussen, B.C. Patten, S.R. Borrett, B.G. Norton, A. Steinemann. 2001. *Community values and the long-term ecological integrity of rapidly urbanizing watersheds.* EPA-NSF Water and Watershed Grant Meeting. San Francisco, CA.
4. Borrett, S.R. 2001. *Sources of system complexity in the Lake Lanier ecosystem, Georgia.* Annual Meeting, Ecological Society of America. Madison, WI.
3. Borrett, S.R. 2001. *Exploring systems complexity.* Graduate Student Symposium, Institute of Ecology, University of Georgia. Athens, GA.
2. Borrett, S.R., B.D. Fath, B.C. Patten. 2000. *Incorporating stakeholder concerns into a lake ecosystem model: a heuristic tool for Lake Lanier.* Graduate Student Symposium, Institute of Ecology, University of Georgia. Athens, GA; also presented at 9th Annual Conference, Southeastern Division, North American Lake Management Society. Columbus, GA.
1. Borrett, S.R., B.D. Fath, B.C. Patten. 2000. *Incorporating stakeholder concerns into a lake ecosystem model: A heuristic tool for Lake Lanier*. Ecosummit2000. Halifax, Nova Scotia, Canada.

Research & Innovation Funding

Totals: Extramural: **$1,353,340** ($850,340 research specific); Intramural: **$65,506**

Extramural

Economic Development Administration, Build Back Better Regional Challenge Grant. *Accelerating Life Science Manufacturing to Create Economic Resilience and Promote Equity in Distressed North Carolina Communities*. **$500,000** Phase 1 Award. Cluster application led by North Carolina Biotechnology Center. Borrett co-led UNCW sub-project proposal titled: *Southeastern biopharmaceutical manufacturing workforce training and innovation center.* 2021. Phase 2 Cluster application was partially funded (~$25 M), but did not include the UNCW project.

North Carolina Biotechnology Center, *State of North Carolina Undergraduate Research and Creativity Symposium 2022*. Grove, N., McNulty, C., Borrett, S.R. **$3,000**, 2022.

NSF: Robert Noyce Teacher Scholarship Program—Capacity Building. *University of North Carolina Wilmington (UNCW) project INCISE (Integrated Certificate in STEM Education).* Moallem, M. (PI) with others. Borrett as supporting collaborator. **$299,929**. 2015–2017.

Duke-UNC Oceanography Consortium. *Proposal for 1-week of ship time in aid of research in Onslow Bay, NC*. Finelli, C., Freshwater, W., Long, Z., Borrett, S.R. Estimated **$50,000** value. 2013.

NSF: Collaborative Research: *Impact of sea level rise on sedimentary nitrogen removal processes in tidal freshwater ecosystem*. Song, B.K. (Lead PI), Borrett, S.R. (Co-PI Responsible for Modeling). **$500,411** for 2010–2013. Served as the PI after Dr. Song left the university.

NECSent Catalysis Meeting. *Ecological Models and Social Networks: How evolutionary forces shape networks and communities*. Duke Network Analysis Center (Moody, J. lead PI with 11 collaborators including Borrett, S.R.).

TEACHING

Courses

Graduate

Fundamentals of Ecological Modeling. Lecture and laboratory. UNCW & Stanford University.

Ecological Thought: Past to Present. Ph.D. Seminar course. UNCW & University of Georgia.

Readings in Ecology. Seminar course. UNCW.

Systems Ecology. 1-week intensive graduate course. Beijing Normal University, Summer 2013.

Systems Ecology and Ecosystem Network Analysis. Short course. UNCW.

Ecosystem Complexity in the Marine Environment – Seeking an Answer to the Question: What is Biocomplexity? Skidaway Institute of Oceanography: 2003. Three-week short course for undergraduate and graduate students. Co-instructors: P.G. Verity, M.E. Frischer, B.C. Patten, S.J. Whipple. Skidaway, GA.

Theory of Systems Ecology, Guest Lecturer and Teaching Assistant for graduate course. Institute of Ecology 2002. Professor: B.C. Patten. Athens, GA.

Undergraduate

Introduction to Ecology. Large lecture format with 36-190 students. UNCW.

Ecology Laboratory. Faculty coordinator responsible for curriculum. I also trained and managed 3-5 graduate Teaching Assistants per semester. UNCW.

Survey of Biological Research. Honors Seminar. UNCW.

Living in a Connected World: The Power, Beauty, Science, and Mathematics of Networks. Honors Seminar. UNCW.

Senior Seminar: Bringing the Biosphere Home. Senior seminar. UNCW.

Mentoring

Faculty

Lucas M. Layman. Assistant Professor, Department of Computer Science, UNCW (2017–2018)

Todd LaMaskin. Assistant Professor, Department of Geology and Geography, UNCW (2012–2016)

Graduate

Ph.D.

David E. Hines. PhD. Marine Biology, 2015. *Assessing the effects of seawater intrusion on an estuarine nitrogen cycle through network modeling*. Next Step: EPA Postdoctoral Fellow.

M.S.

Alicia Cheripka. M.S. Marine Biology, 2018. *Managing shifting species in MPA networks: disentan*gling the effects of climate velocity, interspecific competition, and MPA configuration. Initiated her project under the direction of Dr. J. Will White at UNCW. I agreed to serve as her local mentor to complete her degree at UNCW. Next Step: John A Knauss Marine Policy Fellow.

Evan Anway. M.S. Biology, 2018. *Higher Resource Availability Increases Average Body Size and Total Respiration Rate in Pitcher Plant Ecosystems.* Next Step: ERM: Environmental Resource Management, SC.

Emily Oxe. M.S. Biology, 2014. *A Comparison of Recycling and Process Coupling in the Nitrogen Cycle of Two North Carolina Estuaries.* Next Step: Lab Coordinator for VA Community College.

John Mejaski. M.S. Marine Biology, 2013. *Ecological Network Analysis, A tool for Urban Water Metabolism: Case Study of Wilmington, North Carolina*. Next Step: unknown.

Youri N. Nelson. M.S. Applied Mathematics, 2011. (Co-Advised with Dr. Feng) *Hierarchal inductive process modeling and analysis*. Next Step: Mormon Mission.

Andria K. Salas. M.S. Marine Science, 2010. *Indirect effects in trophic and evolutionary networks*. Next Step: Ph.D. program in Biology at the University of Texas at Austin.

15 Graduate Directed Independent Study students, 4 graduate research internships or short-term visitors to laboratory, advisory committee member: 9 PhD, 14 MS.

Undergraduate

Honors Theses

Lindsey Bockover, B.S. Biology, 2018. *Ammonium concentration and species composition inside the Sarracenia purpurea, the purple pitcher plant.*

Sarah Brewster, B.S. Marine Biology, 2018. *Estimating ecosystem effects of shrimp trawling in core sound, North Carolina, USA: Using Ecological Network Analysis as an environmental impact analysis tool.*

Sarah L. Fann, B.S. Marine Biology and Statistics, 2010. *Environ centrality quantifies the relative roles of species in generating ecosystem activity*. Next Step: Fulbright Scholarship in Australia.

Anthony G. Kaufman, B.S. Marine Biology, 2009. *Ecological network analysis indicators are robust to flux uncertainty in Lake Sidney Lanier, USA*. Next Step: Completed MS degree at the University of Maryland.

Supervised 26 undergraduate Directed Independent Studies, 5 student internships, and 4 teaching assistantships.

Teaching Grants & Fellowships

Received **$65,265** in intramural funding to support teaching innovations, curriculum development, and applied learning supplies.

Example projects

Ecological Modeling to Enhance Teaching and Learning. Borrett, S.R. **$3,500**. 2017–2018. Created a new laboratory exercise in which students in my graduate ecological modeling course created web-based applications for students in undergraduate ecology courses to use to learn classic population ecology models.

Classroom Enhancement Grant. UNCW Center for Teaching Excellence. Borrett, S.R. **$2,000.** 2017. Funds to purchase a camera lens to help bring the outside ecology world into the classroom.

Experience Research: Enhancing the *Center for the Support for Undergraduate Research and Fellowships* (CSURF) program to promote engagement in research as applied learning (*UNCW Quality Enhancement Plan Pilot Grant*). PIs: Bruce, K.E., Atwill, W.D., Kelley, P.H., Borrett, S.R. **$31,500**. 2011.

UNCW: Enhancing applied learning through explorations of the natural world. UNCW Quality Enhancement Plan Pilot Grant. PIs: Frampton, A., Emslie, S, Finelli, C, Van Tuinen, M., Long, Z, Pyott, S., Pabst, A. and Borrett, S.R. **$13,390.** 2011.

UNCW College of Arts and Sciences, *Summer Curriculum Development Initiative*. Revised the Ecology Laboratory to (1) better align the course activities and assessment with the departmental and university learning outcomes; (2) formalize the laboratory report format so that it is consistent across labs and makes use of a biological writing text recently adopted by the department; and (3) integrate the use of spreadsheets (e.g. Microsoft Excel) to teach the students to organize, manage, and analyze biological data, **$3,500.**

PROFESSIONAL DEVELOPMENT

2018–2021	UNCW Leadership Enhancement and Administrative Development (LEAD). Leadership development program at UNCW designed to assist senior administrators.
2017	Summer Leadership Institute, Project Kaleidoscope, MD. Intensive leadership development for STEM faculty, July 18–23. This program included a focus on diversity and inclusion, revealing implicit biases and the influence of power and privilege.
2015–2016	NextUp Leadership Development, UNCW Center for Faculty Leadership. Year-long professional development and leadership training. This directly led to a consulting project for Dean Hardy in which I assessed the leadership structure of the rapidly growing College of Health and Human Services and made recommendations for improvements to enhance college effectiveness and sustainability.
2012	Mentoring Camp. UNCW CTE. Focus on developing robust faculty mentoring programs for departments, colleges, and whole university.

HONORS & AWARDS

2009–2021	Recognized by one or more graduating seniors at UNCW as a person whose impact on them was significant. Annually 2009–2021.
2015	Research Reassignment, UNCW College of Arts and Science (competitive ~1.5%). 1 semester without teaching to focus on research, completed Spring 2016.
2011	Dept. Research Reassignment (competitive), Dept. of Biology and Marine Biology, UNCW (1 semester without teaching to focus on research, completed Spring 2013)
2009	Chancellor's *Discere Aude* Award for outstanding mentorship, UNCW.
2004	Dissertation Completion Award, University of Georgia.
1997	Austin College, *cum laude*
1997	βββ, Biology Honor Society
1997	Austin College, M.D. "Bud" Bryant Fellowship, Outstanding Biology Student
1993–1997	Austin College, Trustees Scholarship
1997	Austin College, Leadership Honor Society
1989	Eagle Scout, Troop 2, El Paso, TX

PROFESSIONAL MEMBERSHIPS

National Organization of Research Development Professionals

National Council of University Research Administrators

International Society for Ecological Modelling

American Association for the Advancement of Science