

APPENDIX I: EDUCATIONAL ACTIVITIES

MIDDLE AND HIGH SCHOOL STUDENTS

Schoolyard LTER Program

Approximately 1000 students and 40 teachers every year have participated in the Schoolyard LTER Program which is conducted through the Massachusetts Audubon Society's Salt Marsh Program. The program provides ongoing professional development for teachers in the greater Boston area (Danvers, Dorchester, East Boston, Essex, Gloucester, Natick, Ipswich, Newbury, Newburyport, Revere, Rockport, Rowley, Salem, and Salisbury).

Below are people who have worked on curriculum with the Schoolyard LTER Program.

Striped Bass Curriculum Team

Pautzke, Sarah (University of Massachusetts-Amherst, MS Student)

Mather, Martha (University of Massachusetts at Amherst, Research Associate Professor and Assistant Unit Leader)

Muth, Robert (University of Massachusetts at Amherst, Associate Professor)

Ferry, Kristen (MA Division of Marine Fisheries, Aquatic Biologist)

Finn, Jack (University of Massachusetts at Amherst, Professor)

Educators

Duff, Elizabeth (Massachusetts Audubon Society, Coastal Educator/Education Coordinator)

Harcourt, Pat (Massachusetts Department of Environmental Management, Waquoit Bay National Marine Reserve, Community Educator)

Newman, Sharon (Massachusetts Audubon Society, intern; Wesleyan University student)

School Teachers

Farley, Maureen (Triton Regional School District)

Halloran, John (Newburyport Public Schools, Science Teacher)

Kravitz, Bernie (Swampscott High School)

Leaf, Heather (Gloucester Teacher)

Senechal, Elaine (Tewksbury Memorial High School, Science Teacher)

Videographer

Fitzpatrick, Kevin

Governor's Academy

The following students are from the Governor's Academy, South Byfield, MA and have been involved in research projects at the Plum Island LTER with Governor's Academy teacher Susan Oleszco-Szuts.

Angles, Taylor (2007)

Coombs, Allison (2005)

Correia, Kelsey (2004)

Hasler, Angela (2006)

Murphy, Caroline (2006)
Noblitt, Carl (2003)
Rushford, Laura (2006)
Szuts, Tobi (2003)

UNDERGRADUATE STUDENTS

Research Experience for Undergraduates (REUs)

Agnew, Aislinn (Gordon College)

- Agnew, A M., D.H. Shull, and R. Buchsbaum. 2003. Growth of a salt marsh invertebrate on several species of marsh grass detritus. *Biological Bulletin*. 205: 248-249.

Aldrich, Stephen (Clark University)

- Fedorko, E., R.G. Pontius, S.Aldrich, L. Claessens, C. Hopkinson, and W. Wollheim. 2005. Spatial Distribution of Land Type in Regression Models of Pollutant Loading. *Journal of Spatial Hydrology* 5: 60-80

Brace, Greg (University of Massachusetts-Lowell).

- 2006 NEERS Poster Presentation
- 2006 MBL Young Scientists Symposium. Effects of haying on nitrogen acquisition and sediment biogeochemistry in *S. patens* and *S. alterniflora*.

Cavatorta, Jason (Amherst College)

- Johnston, M. E., J. R. Cavatorta, C. S. Hopkinson and V. Valentine. 2003. Importance of metabolism in the development of salt marsh ponds. *Biological Bulletin* 205: 248-249.
- Cavatorta, J., M. Johnston, C.S. Hopkinson, and V. Valentine. 2003. Patterns of sedimentation in a salt marsh-dominated estuary. *Biological Bulletin* 205: 239-241.

Connors, John (Clark University)

- Quantifying Categorical Associations Using Subpixel Mapping BA Honors Thesis.

Del Vecchio, Kate (Clark University).

- 2006 MBL Young Scientists Symposium. Understanding the environmental and social impacts of suburban development in Ipswich, Massachusetts.

Gedenberg, Dawn (Clark University)

- Project: Suburban drought in relation to climate, land-use-planning, lawn irrigation, and demographics in the town of Ipswich, Mass.

Hill, Troy (Clark University)

- Hill, T. and C. Polsky. 2006. Adaptation to Drought in the Context of Suburban Sprawl and Abundant Rainfall. *Geographical Bulletin* 47: 85-100.

Holden, Matthew (Clark University)

- Holden, M.T., C. Lippitt R.G. Pontius, and C. Williams. 2003. Building a database of historic land cover to detect landscape change. *Biological Bulletin*, 205: 257-258.

Huffaker, Diana (Clark University)

- Huffaker, D. 2003. The scale at which land change models are accurate. Clark University: Worcester. BA Thesis.
- Johnston, Morgan (Pennsylvania State University)
- Johnston, M. E., J. R. Cavatorta, C. S. Hopkinson and V. Valentine. 2003. Importance of metabolism in the development of salt marsh ponds. *Biological Bulletin* 205: 248-249.
 - Cavatorta, J., M. Johnston, C.S. Hopkinson, and V. Valentine. 2003. Patterns of sedimentation in a salt marsh-dominated estuary. *Biological Bulletin* 205: 239-241.
- Kerry, Jenn (Gordon College)
- Kerry, J., D. Boorse, and R. Buchsbaum. 2004. The effect of nutrient enrichment and salinity on salt marsh invertebrates in the Plum Island Estuary. *Biological Bulletin* 207: 174.
- Levitt, Joe (Tulane University, Virginia Institute of Marine Science)
- Project: Sediment accretion rates on marsh surface.
- Lippitt, Chris (Clark University)
- Holden, M.T., C. Lippitt R.G. Pontius, and C. Williams. 2003. Building a database of historic land cover to detect landscape change. *Biological Bulletin* 205: 257-258.
- Malizia, Nicholas (Clark University)
- Pontius Jr., R.G., A.J. Versluis, and N.R. Malizia. 2006. Visualizing certainty of extrapolations from models of land change. *Landscape Ecology* 21: 1151-1166.
 - Versluis, A.J., R.G. Pontius Jr., and N.R. Malizia. 2004. Visualizing the rate at which the accuracy of a land change prediction decays. in Conference proceedings of the meeting of the University Consortium for Geographic Information Science. Silver Spring, MD.
- Randall, Julia (Middlebury College)
- The effects of nutrient enrichment and predator removal on algal communities in a New England salt marsh. BA Thesis.
- Rao, Nagraj (Clark University)
- Project: Suburban drought in relation to climate, land-use-planning, lawn irrigation, and demographics in the town of Ipswich, Mass.
- Sutera, Catherine (Louisiana State University)
- Project: Taxonomic analysis of gut contents of *F. heteroclitus* feeding on the marsh surface.
- Wilson, James (Clark University)
- 2007 MBL Young Scientists Symposium: Towards a Sub-1 meter Land-Cover Classification of Ipswich, Massachusetts

Summer Research Assistants

Bethoney, Christina (University of Massachusetts-Amherst)

Bigelow, Talia (Smith College)

Brear, Andrea (Connecticut College)

Chase, Rachel (Connecticut College)

Driscoll, Erin (College of Charleston)

Greenfield, Erin (Tufts University)

Hoover, Megan (Connecticut College)

- 2006 MBL Young Scientists Meeting. Plant productivity responses to nutrient enrichment in a New England salt marsh.

Jackson, Ben (Colorado School of Mines)

Jessen, Britta (Wellesley College)

Jones, Randy (Connecticut College)

Luciano, Katie (College of William and Mary, Virginia Institute of Marine Science)

Lucy, Kim (Rollins College).

- 2006 MBL Young Scientists Meeting. *Fundulus* growth in natural and nutrient enriched salt marsh environments.

Madson, Hannah (Middlebury College)

- 2006 MBL Young Scientists Meeting. The effects of nutrient addition on algal productivity in a salt marsh.

Matias, Bev (Connecticut College)

Miller, Erin (Connecticut College)

- Drake DC, Peterson BJ, Deegan LA, Harris LA, Miller EE, Warren RS. *In Press*. Plant N Dynamics in Fertilized and Natural New England Salt Marshes: A Paired ¹⁵N Tracer Study. *Marine Ecology Progress Series*
- Deegan, L.A., J.L. Bowen, D. Drake, J.W. Fleeger, C.T. Friedrichs, K.A. Galván, J.E. Hobbie, C.S. Hopkinson, M. Johnson, D.S. Johnson, L.E. Lemay, E. Miller, B.J. Peterson, C. Picard, S. Sheldon, M. Sutherland, J. Vallino, and R.S. Warren. 2007. Susceptibility of salt marshes to nutrient enrichment and predator removal. *Ecological Applications* 17:S42-S63.

Shields, Erin (Connecticut College)

- Poster at 2005 Estuarine Research Foundation: Nitrogen Content & C/N Ratios in *Spartina alterniflora* and *Spartina patens* in Response to Nitrogen and Phosphorus Fertilization in a Northern Massachusetts Salt Marsh.

Swig, Merrill (Connecticut College)

- 2006 MBL Young Scientists Meeting. Nutrient enrichment of a northern New England salt marsh: plant community composition responses.

Tago, Franck (Grambling State University)

- Project: Development and implementation of the estuarine model.

Thurman, Carter (Sewanee University)

Tommaso, Danielle (Syracuse University)

- 2006 MBL Young Scientists Meeting. *Fundulus* growth in natural and nutrient enriched salt marsh environments.

Trescott, Adam (University of Vermont)

Wheeler, Aaron. (Connecticut College)

- 2006 MBL Young Scientists Meeting. Nutrient enrichment of a northern New England salt marsh: plant community composition responses.

Wolfskehl, Sarah (Colorado College)

Young, Ashley (Wheaton College)

Semester in Environmental Science

The following students did research projects drawing on knowledge gained from PIE-LTER studies.

- Alexander-Ozinskas, Marselle (Bates College)
- The role of sphagnum in the acid-base chemistry of bog waters. 2003.
- Bernhardt, Beth A. (Lawrence University)
- Sulfate Reduction and alkalinity generation in aquatic ecosystems. 2003.
- Bowie, Jacqueline (Bates College)
- Possible effects of copper on *Mya arenaria* behavior and benthic-pelagic coupling. 2003.
- Brunie, Lisa (Mount Holyoke College)
- Atlantic white cedar swamp: Effects of temperature and water table position on decomposition. 2004.
- Burnett-Penn, Angela (Brandeis University)
- The effects of historically restricting tidal flow on productivity, decomposition and nutrient cycling in the Great Sippewissett Salt Marsh system. 2006.
- Crosby, Gareth W. (Mount Holyoke College)
- Effects on phosphorous cycling in fresh and marine sediments with iron and sulfate addition. 2003.
- Daniels, Will (Lawrence University)
- The effects of metal and nutrient addition on ribbed mussels, *Geukensia demissa*, in the Great Sippewissett Salt Marsh and Eel Pond. 2006.
- Fichman, Michael A. (Haverford College)
- Effects of nitrogen on tannin concentrations in oaks and on palatability of oak forests. 2003.
- Foster, Sarah (Hampshire College)
- Sediment respiration and nitrogen cycling along a eutrophic gradient in a shallow coastal estuary. 2004.
- Gasarch, Eve I. (Bates College)
- Components of ecosystem metabolism in cranberry bog influenced streams. 2003.
- Gocke, Timothy A. (Lafayette College)
- Upland land-use and the effects on upper trophic level dynamics and structure. 2003.
- Harrold, Katie (Middlebury College)
- Long-term retention and loss of heavy metals from experimental salt marsh plots. 2005.
- Hayn, Melanie K. (Cornell University)
- Effect of changes in salinity and sulfate concentration on potential nitrification in freshwater and marine sediments. 2003.
- Hicks, Caitlin E. (Middlebury College)
- Nutrient limitations on peat decomposition in Atlantic white cedar swamps. 2003.
- Kingland, Kevin (Beloit College)
- The effects of riparian alterations on stream food webs. 2004.
- Korth, Jennifer A. (Dickinson College)

- N and P limitation along a salinity gradient and algal populations' response to changing nutrient loading. 2003.
- Kumai, Yusuke (Vassar College)
- The effect of temperature on fish species composition and fish metabolic rate. 2006.
- Levy, Natalie (University of California, Berkeley)
- The effects of nutrient load on habitat structure and feeding behavior of mummichogs. 2005.
- Longo, Will (Haverford College)
- The effects of benthic organic matter quality on aerobic and anaerobic sediment metabolism. 2005.
- Lucey, Kaitlyn (Wellesley College)
- Permeable reactive barriers as long-term solutions for groundwater remediation. 2006.
- Moreau, Sabrina (Hampshire College)
- Influence of NITREX barrier on groundwater flow paths, dissolved organic carbon and nitrate concentrations. 2005.
- Morrell, Kimberly (Carleton College)
- Cranberry bogs: The effect of cultivation and restoration on habitat distribution, benthic invertebrate communities, and food webs in stream ecosystems. 2006.
- Myers, Kendra J (Middlebury College)
- The impact of fertilization on rates of N₂ fixation in cranberry bogs and salt marshes. Middlebury College. 2003.
- Nolan, Kate (Bates College)
- A comparison of the filtering and oxygen consumption rates in three bivalve species for possible addition to West Falmouth Harbor. 2004.
- O'Reilly, Lindsay (Bard College)
- A comparison of microbial diversity and rates of nitrification across nutrient and salinity gradients in the Backus and Quashnet Rivers. 2003.
- Oleksyk, Stephanie (Clark University)
- The rate of accretion and spatial distribution of sediments in the Great Sippewisset Salt Marsh. 2006.
- Phillips, Rose (Mount Holyoke College)
- Effects of eutrophication on concentrations and speciation of copper, zinc and lead in West Falmouth Harbor. 2004.
- Pincus, Susan (Mount Holyoke College)
- Effects of adding sewage sludge and urea-phosphate fertilizers to salt marshes on heavy metals and microbial N-cycling. 2006.
- Reimer, Jennifer (Clark University)
- Nitrogen dynamics in flow-through microcosms of NITREX[®] reactive media. 2005.
- Robins, Lucy (Vassar College)
- The effect of cranberry cultivation and restoration on nutrient uptake, cycling, and decomposition in three streams on Cape Cod. 2006.
- Ross, Noam (Brown University)

- The effects of organic and inorganic nitrogen loading on microplankton trophic structure: A microcosm experiment. 2004.
- Sampson, Emily (Mount Holyoke College)
- The effects of moisture and organic matter lability on carbon dioxide and methane production in an Atlantic white cedar swamp. 2004.
- Smith, Hilary (Ripon College)
- Microcosm analysis of the impact of nutrients and allochthonous carbon on microbial production of autotrophic and heterotrophic biomass. 2005.
- Sue, Marissa C. (Wellesley College)
- Secondary indirect effects of cupramine on mummichogs (*Fundulus heteroclitus*) and its implications on benthic-pelagic coupling. 2003.
- Travis, Nicole (Brown University)
- Affects of nutrient load on habitat structure and foraging behavior of Grass Shrimp, *Palaemonetes pugio*. 2005.
- Vincent, Angela (Grinnell College)
- The effects of seawater intrusion on microbial nitrate and sulfate reduction within a NITREX™ permeable reactive barrier designed to mitigate groundwater N-pollution. 2006.
- Yaindle, Chad (Lafayette College)
- An analysis of the nutrient removal capacity of agriculturally impacted vs. restored riparian wetlands. 2004.

RESEARCH ASSISTANT INTERNS

Duchett, Jon (Ecosystems Center, MBL)

- Presently working on tidal creek fertilization project.

Gaines, Emily (Ecosystems Center, MBL)

- Presently WEST Fellow, MS Student (Sustainability), University of Utah
- Logan, J., H. Haas, L. A. Deegan and E. Gaines (2006). Turnover rates of nitrogen stable isotopes in the salt marsh mummichog, *Fundulus heteroclitus*, following a laboratory diet switch. *Oecologia* 147: 391-395.

Keeler, Bonnie (Ecosystems Center, MBL)

- Presently at the Heinz Center for Science, Economics and the Environment.
- MS from University of Minnesota, 2007. (Hobbie Lab).

Kennedy, Cristina (Ecosystems Center, MBL)

- Presently working on tidal creek fertilization project.

Lee, William McDonald (Ecosystems Center, MBL)

- Presently Laboratory Specialist, Dept. of Biology, Virginia Commonwealth University.
- Lee, W.M. 2004. Factors affecting sedimentation patterns of a tidal marsh in Plum Island Sound Estuary, Massachusetts. In Department of Geology College of William and Mary.

Lawrence, Corey (Ecosystems Center, MBL)

- Presently Ph.D. Student in Dept. of Geological Sciences, University of Colorado, Boulder. (Neff Lab).

Maki, Christina (Ecosystems Center, MBL)

- Presently PIE LTER research assistant.

Strong, Aaron (Ecosystems Center, MBL)

- Presently PIE LTER research assistant.

GRADUATE STUDENTS

Agrawal, Aditya (Clark University, MA 2001)

- Pontius Jr., R.G., A. Agrawal, and D. Huffaker. 2003. Estimating the uncertainty of land-cover extrapolations while constructing a raster map from tabular data. *Journal of Geographical Systems* 5: 253-273.
- Pontius Jr., R.G., A. Agrawal, and D. Huffaker. 2002. Uncertainty Analysis in Land Change Modeling: Constructing a Gridded Map from Tabular Data. in Conference Proceedings, The Second International Conference on Geographic Information Science: Boulder, CO. p. 141-142.
- Agrawal, A. 2001. Uncertainty analysis of land-use change modeling in GIS. Clark University: Worcester. MA Thesis.

Briggs, Martin (Colorado School of Mines, MS Student)

- American Geophysical Union Fall Meeting Poster Presentation, Fall 2006. Briggs, M, M Gooseff, and B. McGlynn. Scaling of transient storage parameter estimates with increasing reach length in a mountain headwater stream.

Charles, Heather (University of Massachusetts-Boston, MS Student)

- Charles, H. and J. Dukes. 2007. Effects of warming and altered precipitation on plant and nutrient dynamics of New England salt marshes. Poster presentation at Ecology Society of America.

Connors, John (Clark University, MA Student)

- Quantifying Categorical Associations Using Subpixel Mapping BA Honors Thesis.

Denman, Kevin (Clark University, MA 2002)

- Pontius Jr., R.G., D. Huffaker, and K. Denman. 2004. Useful techniques of validation for spatially explicit land-change models. *Ecological Modeling* 179: 445-461.

Fedorko, Evan (Clark University, MA 2004)

- Pontius Jr., R.G. and E. Fedorko. 2005. Spatial distribution of land type in regression models of pollutant loading. in Conference Proceedings of the meeting of the American Society for Photogrammetry and Remote Sensing. Baltimore MD.
- Fedorko, E., R.G. Pontius, S. Aldrich, L. Claessens, C. Hopkinson, and W. Wollheim. 2005. Spatial Distribution of Land Type in Regression Models of Pollutant Loading. *Journal of Spatial Hydrology* 5: 60-80.

Frank, Holly (University of Massachusetts-Amherst, MS Student)

- Ipswich River-Herring Project

Galván, Kari (Louisiana State University, Ph.D Student)

- Johnson, D.S., J.W. Fleeger, K.A Galván and E.B. Moser. 2007. Worm Holes and Their Space-time Continuum: Spatial and Temporal Variability of Macroinfaunal Annelids in a Northern New England Salt Marsh. *Estuaries and Coasts*. 30: 226-227.
- Deegan, L.A., J.L. Bowen, D.Drake, J.W.Fleeger, C.T.Friedrichs, K.A. Galván, J.E. Hobbie, C.S. Hopkinson, M.Johnson, D.S. Johnson, L.E. Lemay, E. Miller, B.J. Peterson, C. Picard, S. Sheldon, M. Sutherland, J. Vallino, and R.S. Warren. 2007. Susceptibility of salt marshes to nutrient enrichment and predator removal. *Ecological Applications* 17:S42-S63.

Huffaker, Diana (Clark University, M.A.)

- Pontius Jr., R.G., D. Huffaker, and K. Denman. 2004. Useful techniques of validation for spatially explicit land-change models. *Ecological Modeling* 179: 445-461.
- Pontius Jr., R.G., A. Agrawal, and D. Huffaker. 2003. Estimating the uncertainty of land-cover extrapolations while constructing a raster map from tabular data. *Journal of Geographical Systems* 5: 253-273.
- Huffaker, D. 2003. The scale at which land change models are accurate. Clark University: Worcester. BA Thesis.
- Huffaker, D. and R.G. Pontius Jr. 2002. Reconstruction of Historical Land Cover in the Ipswich Watershed. *Biological Bulletin* 203: 253-254.
- Pontius Jr., R.G., A. Agrawal, and D. Huffaker. 2002. Uncertainty Analysis in Land Change Modeling: Constructing a Gridded Map from Tabular Data. in *Conference Proceedings, The Second International Conference on Geographic Information Science: Boulder, CO*. p. 141-142.

Johnson, David (Louisiana State University, Ph.D Student)

- Johnson, D.S., J.W. Fleeger, K.A Galván and E.B. Moser. 2007. Worm Holes and Their Space-time Continuum: Spatial and Temporal Variability of Macroinfaunal Annelids in a Northern New England Salt Marsh. *Estuaries and Coasts*. 30: 226-227.

Koop-Jakobsen, Ketil (BUMP/Ecosystems Center, MBL, Ph.D Student)

- Koop-Jakobsen, K. (2003). Ammonium dynamics in tidal salt marshes - an experimental study of ammonium adsorption, tidal flushing and ammonium volatilization, Roskilde University: 63.
- Koop-Jakobsen, K. and A. E. Giblin (2002). Tidal flushing of ammonium from intertidal salt marsh sediments - the relative importance of adsorbed ammonium. *Biological Bulletin* 203: 258-259.

LeMay, Lynsey (Virginia Institute of Marine Science, MS Student)

- Deegan, L. A., J. L. Bowen, D. Drake, J. W. Fleeger, C. T. Friedrichs, K. A. Galván, J. E. Hobbie, C. S. Hopkinson, M. Johnson, D. S. Johnson, L. E. Lemay, E. Miller, B. J. Peterson, C. Picard, S. Sheldon, M. Sutherland, J. Vallino, and R. S. Warren. 2007. Susceptibility of salt marshes to nutrient enrichment and predator removal. *Ecological Applications* 17: S42-S63.

Lightbody, Anne (Massachusetts Institute of Technology, Ph.D 2007)

- Lightbody, A. F., and H. M. Nepf. 2006. Prediction of velocity profiles and longitudinal dispersion in emergent salt marsh vegetation. *Limnology and Oceanography* 51: 218-228.

Malizia, Nicholas (Clark University, MA Student)

- Pontius Jr., R.G., A.J. Versluis, and N.R. Malizia. 2006. Visualizing certainty of extrapolations from models of land change. *Landscape Ecology* 21: 1151-1166.
- Versluis, A.J., R.G. Pontius Jr., and N.R. Malizia. 2004. Visualizing the rate at which the accuracy of a land change prediction decays. in Conference proceedings of the meeting of the University Consortium for Geographic Information Science. Silver Spring, MD.

Morse, Nat (University of New Hampshire, MS Student)

- Project: Nutrient stoichiometry of detritus, algae, and invertebrates in urban vs. non-urban streams and impacts of urbanization on higher trophic levels.

Pate, Whitney (University of South Carolina, MS Student)

- Project: Dimethylsulphonicpropionate (DMSP) in *Spartina alterniflora* as a feeding deterrent for *Littoraria irrorata*.

Pautzke, Sarah (University of Massachusetts-Amherst, MS Student)

- Project: Spatially Defining Predator Impacts on Estuarine Food Webs: Assessing Striped Bass Movements via Acoustic Tracking

Pellerin, Brian. (University of New Hampshire, Ph.D 2004)

- Oczkowski, A.J., B.A. Pellerin, C.W. Hunt, W.M. Wollheim, C.J. Vorosmarty, and T.C. Loder. 2006. The role of snowmelt and spring rainfall in inorganic nutrient fluxes from a large temperate watershed, the Androscoggin River basin (Maine and New Hampshire). *Biogeochemistry* 80: 217-234.
- Wollheim, W., B. Pellerin, C. Vorosmarty, and C. Hopkinson. 2005. N retention in urbanizing headwater catchments. *Ecosystems* 8: 871-884.
- Pellerin, B.A., W. Wollheim, C. Hopkinson, W. McDowell, M. Williams, C. Vorosmarty, and M. Daley. 2004. Role of wetlands and developed land use on dissolved organic nitrogen concentrations and DON / TDN in northeastern U.S. rivers and streams. *Limnology and Oceanography* 49: 910-918.
- Pellerin, B.A. 2004. The influence of urbanization on runoff generation and stream chemistry in Massachusetts watersheds. University of New Hampshire. Ph.D Dissertation

Priest, Brant (University of South Carolina, MS Student)

- Project: Sediment accretion and responses of *Spartina* to changes in the relative elevation of the marsh surface.

Rodriguez, Diana (University of South Carolina, MS 2004)

- Rodriguez, D. 2004. *Spartina alterniflora* response to experimental varying of the salt marsh platform relative to mean sea level and mean high water. MS Thesis, University of South Carolina.

Scott, Siobhan (University of South Carolina, MS Student)

- Project: Sediment accretion and responses of *Spartina* to changes in the relative elevation of the marsh surface.

Smith, Joe (University of Massachusetts-Amherst, Ph.D Student)

- Project: Developing Flow Sensitive Indices of Biotic Integrity (FS-IBI) To Assess the Health of Riverine Ecosystems and Maintain Benefits for Adjacent Human Communities.

Stewart, Rob (University of New Hampshire, MS Student)

- Project: Using river network models to explore the scaling of hydrological and N cycle processes throughout river networks.

Thouin, Joe (University of New Hampshire, MS Student)

- Project: Spatial analysis of land-use and water quality: the role of distance on stream chemistry.

Versluis, Anna (Clark University, MA, PhD Student)

- Pontius Jr., R.G., A.J. Versluis, and N.R. Malizia. 2006. Visualizing certainty of extrapolations from models of land change. *Landscape Ecology* 21: 1151-1166.
- Versluis, A.J., R.G. Pontius Jr., and N.R. Malizia. 2004. Visualizing the rate at which the accuracy of a land change prediction decays. in Conference proceedings of the meeting of the University Consortium for Geographic Information Science. Silver Spring, MD.

Wang, Weihong (University of South Carolina, Ph.D Student)

- Project: Investigating background carbon dynamics in a Salt Marsh Ecosystem Using Carbon Stable Isotopes and Modelling.

Wollheim, Wilfred (University of New Hampshire, Ph.D 2005)

- Oczkowski, A.J., B.A. Pellerin, C.W. Hunt, W.M. Wollheim, C.J. Vorosmarty, and T.C. Loder. 2006. The role of snowmelt and spring rainfall in inorganic nutrient fluxes from a large temperate watershed, the Androscoggin River basin (Maine and New Hampshire). *Biogeochemistry* 80: 217-234.
- Wollheim, W.M., C.J. Vorosmarty, B.J. Peterson, S.P. Seitzinger, and C.S. Hopkins. 2006. Relationship between river size and nutrient removal. *Geophysical Research Letters* 33.

- Wollheim, W., B. Pellerin, C. Vorosmarty, and C. Hopkinson. 2005. N retention in urbanizing headwater catchments. *Ecosystems* 8: 871-884.
- Pellerin, B.A., W. Wollheim, C. Hopkinson, W. McDowell, M. Williams, C. Vorosmarty, and M. Daley. 2004. Role of wetlands and developed land use on dissolved organic nitrogen concentrations and DON / TDN in northeastern U.S. rivers and streams. *Limnology and Oceanography* 49: 910-918.

Plum Island Ecosystems LTER Affiliated Graduate Students

These students have been advised by PIE LTER scientists or have done comparative research related to the Plum Island Ecosystems.

Argow, Brittna (Boston University)

- Project: Effects of ice rafting on sediment movement in salt marsh estuary.

Benoit, Jennifer (Massachusetts Institute of Technology)

- Thompson, J.R., S. Pacocha, C. Pharino, V. Klepac-Ceraj, D.E. Hunt, J. Benoit, R. Sarma-Rupavtarm, D.L. Distel, and M.F. Polz. 2005. Genotypic diversity within a natural coastal bacterioplankton population. *Science* 307: 1311-1313.

Hunt, Dana (Massachusetts Institute of Technology)

- Thompson, J.R., S. Pacocha, C. Pharino, V. Klepac-Ceraj, D.E. Hunt, J. Benoit, R. Sarma-Rupavtarm, D.L. Distel, and M.F. Polz. 2005. Genotypic diversity within a natural coastal bacterioplankton population. *Science* 307: p. 1311-1313.
- Acinas, S.G., K. Klepac-Ceraj, D.E. Hunt, C. Pharino, C. Ceraj, D.L. Distel, and M.F. Polz. 2004. Fine-scale phylogenetic architecture of a complex bacterial community. *Nature* 430: p. 551-554.
- Polz, M.F., S. Bertilsson, S.G. Acinas, and D. Hunt. 2003. A (r)Ray of hope in analysis of function and diversity of microbial communities. *Biological Bulletin* 204: p. 196-199.

Klepac-Ceraj, Vanja (Massachusetts Institute of Technology)

- Bahr, M., B.C. Crump, V. Klepac-Ceraj, A.P. Teske, M.L. Sogin, and J.E. Hobbie. 2005. Molecular characterization of sulfate-reducing bacteria in a New England salt marsh. *Environmental Microbiology* 7: p. 1175-1185.
- Thompson, J.R., S. Pacocha, C. Pharino, V. Klepac-Ceraj, D.E. Hunt, J. Benoit, R. Sarma-Rupavtarm, D.L. Distel, and M.F. Polz. 2005. Genotypic diversity within a natural coastal bacterioplankton population. *Science* 307: p. 1311-1313.
- Klepac-Ceraj V., M. Bahr, B.C. Crump, A.P. Teske, J.E. Hobbie, and M.F. Polz. 2004. Large-scale analysis of 16S rRNA gene sequences reveals high diversity and unexpected dominance of δ -proteobacterial SRB-like sequences in salt marsh sediment. *Environ. Microbiol.* 6:686-698.
- Acinas, S.G., K. Klepac-Ceraj, D.E. Hunt, C. Pharino, C. Ceraj, D.L. Distel, and M.F. Polz. 2004. Fine-scale phylogenetic architecture of a complex bacterial community. *Nature* 430: p. 551-554.

Mozdzer, Thomas (University of Virginia)

- Project: Assimilation of dissolved organic nitrogen by the macrophytes *Spartina alterniflora* and *Phragmites australis*

Preheim, Sarah (Massachusetts Institute of Technology)

- Project: Ecology of *Vibrio* in a salt marsh estuary.

Thompson, Janelle (Massachusetts Institute of Technology)

- Thompson, J.R., S. Pacocha, C. Pharino, V. Klepac-Ceraj, D.E. Hunt, J. Benoit, R. Sarma-Rupavtarm, D.L. Distel, and M.F. Polz. 2005. Genotypic diversity within a natural coastal bacterioplankton population. *Science* 307: 1311-1313.

Xue, Hong (Massachusetts Institute of Technology)

- Project: Ecology of *Vibrio* in a salt marsh estuary.

POST-DOCTORAL ASSOCIATES

Bowen, Jennifer (Ecosystems Center, MBL)

- Deegan, L.A., J.L. Bowen, D. Drake, J.W. Fleeger, C.T. Friedrichs, K.A. Galván, J.E. Hobbie, C.S. Hopkinson, M. Johnson, D.S. Johnson, L.E. Lemay, E. Miller, B.J. Peterson, C. Picard, S. Sheldon, M. Sutherland, J. Vallino, and R.S. Warren. 2007. Susceptibility of salt marshes to nutrient enrichment and predator removal. *Ecological Applications* 17:S42-S63.

Crump, Byron (Ecosystems Center, MBL)

- Judd, K. E., B. C. Crump, and G. W. Kling. 2007. Bacterial responses in activity and community composition to photo-oxidation of dissolved organic matter from soil and surface waters. *Aquatic Sciences* 69:96-107.
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- Klepac-Ceraj, V., M. Bahr, B.C. Crump, A.P. Teske, J.E. Hobbie, and M.F. Poltz. 2004. High overall diversity and dominance of microdiverse relationships in salt marsh sulfate-reducing bacteria. *Environmental Microbiology* 6: 686-698.
- Zwart, G., E.J. van Hannen, M.P. Kamst-van Agerveld, K. van der Gucht, E.S. Lindstrom, J. Van Wichelen, T. Lauridsen, B.C. Crump, S.K. Han, and S. Declerck. 2003. Rapid screening for freshwater bacterial groups using reverse line blot hybridization. *Applied Environmental Microbiology* 69: 5875-5883.

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Drake, Deanne (Ecosystems Center, MBL)

- Drake DC, Peterson BJ, Deegan LA, Harris LA, Miller EE, Warren RS. *In Press*. Plant N Dynamics in Fertilized and Natural New England Salt Marshes: A Paired ¹⁵N Tracer Study. *Marine Ecology Progress Series*
- Deegan, L.A., J.L. Bowen, D. Drake, J.W. Fleeger, C.T. Friedrichs, K.A. Galván, J.E. Hobbie, C.S. Hopkins, M. Johnson, D.S. Johnson, L.E. Lemay, E. Miller, B.J. Peterson, C. Picard, S. Sheldon, M. Sutherland, J. Vallino, and R.S. Warren. 2007. Susceptibility of salt marshes to nutrient enrichment and predator removal. *Ecological Applications* 17:S42-S63.
- Drake, D.C., R.J. Naiman and J.S. Bechtold. 2006. Fate of nitrogen in riparian forest soils and trees: A ¹⁵N tracer study simulating salmon decay. *Ecology*. 87:1256-1266

Haas, Heather (Ecosystems Center, MBL)

- Logan, J., H. Haas, L.A. Deegan, and E. Gaines. 2006. Turnover rates of nitrogen stable isotopes in the salt marsh mummichog, *Fundulus heteroclitus*, following a laboratory diet switch. *Oecologia* 147: 391-395.
- Freeman, C.J., H. Haas, S. Warren, L.A. Deegan, and J. Logan. 2004. What makes mummichogs grow? The relationship between growth rates and gut contents of *Fundulus heteroclitus* held in enclosures along a salinity gradient in a New England salt marsh. in New England Estuarine Research Society (NEERS). Burlington, Vermont.

Harris, Lora (Ecosystems Center, MBL)

- Project: Applying thermodynamic first principles to predict how *Spartina* responds to changes in sea level rise and sediment input by adjusting plant morphology and shoot density to a location-specific set of environmental conditions such as flow, sediment input, and elevation
- Drake DC, Peterson BJ, Deegan LA, Harris LA, Miller EE, Warren RS. *In Press*. Plant N Dynamics in Fertilized and Natural New England Salt Marshes: A Paired ¹⁵N Tracer Study. *Marine Ecology Progress Series*
- Harris LA, CM Duarte, SW Nixon. 2006. Allometric laws and prediction in estuarine and coastal ecology. *Estuaries and Coasts*. 29: 340-344.

Marshall, Helen (University of South Carolina)

- Marshall, H.L. and J. Morris. Xanthophyll pigments and their application to remote sensing of environmental quality. Abstract of presentation made at the winter meeting of the American Society of Limnology and Oceanography, February, 2004, Salt Lake City.
- Project: Detection of pigment changes due to variations in nitrogen and phosphorus in *Spartina alterniflora* (Loisel) and *Spartina patens* (Ait.) Muhl, at Plum Island Estuary (MA). Development of a xanthophyll pigment reflectance index.

Valentine, Vinton (Ecosystems Center, MBL)

- Cavatorta, J., M. Johnston, C.S. Hopkinson, and V. Valentine. 2003. Patterns of sedimentation in a salt marsh-dominated estuary. *Biological Bulletin* 205: p. 239-241.
- Johnston, M.E., J.R. Cavatorta, C.S. Hopkinson, and V. Valentine. 2003. Importance of metabolism in the development of salt marsh ponds. *Biological Bulletin* 205: 248-249.

Zhao, Liuzhi (University of Massachusetts-Dartmouth)

- Project: Tidal flushing and eddy formation modeling.

Plum Island Ecosystems LTER Affiliated Post-Doctoral Associates

These post-docs have been advised by PIE LTER scientists or have done comparative research related to the Plum Island Ecosystems.

Acinas, Silvia (Massachusetts Institute of Technology)

- Acinas, S.G., K. Klepac-Ceraj, D.E. Hunt, C. Pharino, C. Ceraj, D.L. Distel, and M.F. Polz. 2004. Fine-scale phylogenetic architecture of a complex bacterial community. *Nature* 430: 551-554.
- Polz, M.F., S. Bertilsson, S.G. Acinas, and D. Hunt. 2003. A (r)Ray of hope in analysis of function and diversity of microbial communities. *Biological Bulletin* 204: 196-199.

Boucher, Yan (Massachusetts Institute of Technology)

- Focus: microbial evolution, molecular evolution, molecular phylogenetics, Bioinformatics, environmental microbiology.

Dulaiova, Henrieta (Woods Hole Oceanographic Institution/MIT)

- Research Interests: Submarine groundwater discharge and non-point source pollution in coastal waters using naturally occurring radionuclides, radon and radium isotopes, as tracers to understand coastal hydrological and mixing processes, and flushing rates in estuaries.

Hughes, Zoe (Boston University)

- Project: Near shore hydrodynamics, wave-current interactions, and sediment transport.

Kirkup, Benjamin (Massachusetts Institute of Technology)

- Research Interests: Microbial Ecology with emphasis on structure function relationships in microbial communities; ecology of antagonism and communication; ecology of symbionts and pathogens.

Lim, Eelin (Massachusetts Institute of Technology)

- Thompson, J.R., M.A. Randa, L.A. Luisa, A. Tomita-Mitchell, E. Lim and M. F. Polz (2004) Diversity and Dynamics of a North Atlantic Coastal *Vibrio* Community. *Applied and Environmental Microbiology* 70: 4103-4110

Marcelino, Luisa (Massachusetts Institute of Technology)

- Ecology of *Vibrio* in a salt marsh estuary.

Wildschutte, Hans (Massachusetts Institute of Technology)

- Research Interests: environmental genomics with emphasis on diversity among species; Protozoan predation and its effects on *Vibrio* populations.