

## **MAYA L. GRONER**

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## **EDUCATION**

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August 2006 – Dec 2011 **Ph.D.**, Biological Sciences at **University of Pittsburgh Pittsburgh, PA, USA.**  
Dissertation Title: *Effects of multiple stressors on the dynamics of a fungal pathogen associated with global amphibian declines*  
Major Advisor: Rick Relyea  
Committee: Andrew Blaustein, Stephen Tonsor, Brian Traw, Jeffrey Lawrence

August 2000 – May 2004 **B.A.**, Earth and Environmental Sciences at **Wesleyan University, Middletown, CT, USA.**  
Research Thesis Title: *Carbon dynamics in Long Island Sound*  
Research Thesis Advisor: Johan Varekamp

## **CURRENT POSITION**

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Jan 2016 - present **Postdoctoral Fellow**  
Departments of Fisheries Science and Aquatic Health Sciences  
Virginia Institute of Marine Sciences  
College of William & Mary, VA USA

## **RESEARCH INTERESTS**

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Parasites and pathogens are all around us. While the average infection may not have huge impacts on the infected population or the communities within which they exist, recent evidence suggests that the incidence of high-impact diseases is increasing. Shifting relationships between the host, pathogen and environment can create novel interactions resulting in increased pathogen virulence, reduced population resilience or altered disease ranges. I investigate how these shifts alter epidemiological patterns and quantify the impacts of disease on population- and community-level processes in marine and freshwater ecosystems. I examine these questions across multiple levels of biological organization from the genome to the community and I employ a wide variety of techniques, including field surveys, experiments in the lab and field, genomics and mathematical modeling. Much of my research has an applied focus, examining declining species, threatened ecosystems, impacts of climate change and toxins and interactions between wild and farmed fisheries.

## **RESEARCH EXPERIENCE**

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Jan 2016 - Current **Postdoctoral Researcher**  
**Virginia Institute of Marine Science**, Gloucester Point, VA, USA  
Advisors: John Hoenig, Jeffrey Shields

Jan 2012 - Dec 2015 **Postdoctoral Researcher**  
**Atlantic Veterinary College, University of Prince Edward Island**, Charlottetown, PE, Canada  
Advisors: Crawford W. Revie, Mark Fast

April 2015 - current **Visiting postdoctoral fellow**  
**Institute for Marine Environmental Technology**, University of Maryland-Baltimore, Baltimore, MD  
Advisor: Colleen Burge

Sept 2006 - Dec 2011 **Graduate Student**

- University of Pittsburgh**, Pittsburgh, PA  
Advisor: Rick Relyea
- Sept 2005- Sept 2006 **Monitoring Assistant**  
**Nooksack Salmon Enhancement Association**, Bellingham, WA  
Monitored spawning salmonid populations and water quality. Assisted with riparian restoration and education programs.
- June-Sept 2004, 2005 **Field Technician**  
**Northwest Fisheries Science Center**, Cascade, ID and Seattle, WA  
Dr. Beth Sanderson and Dr. Kate Macneale  
Stream ecosystem intern for studies of nutrient dispersal and interspecific competition among salmonids.
- May 2003-May 2004 **Independent Research/ Thesis**  
**Dept. of Earth and Environmental Sciences, Wesleyan University**, Middletown, CT  
Professor Johan Varekamp  
Analysis of geologic history of Long Island Sound over past 20,000 years

### AWARDS AND DISTINCTIONS

- Provost development fund**, *University of Pittsburgh*, USA, for minorities and women completing a doctorate, finalist 2010
- President's Award**, *North American Benthological Society*, USA, 2009
- Teaching award**, *University of Pittsburgh*, USA, For excellent teaching assistantship in the biological sciences, nominated 2008
- Ivy McManus Award**, *University of Pittsburgh*, USA, For outstanding 1<sup>st</sup> year graduate student in biology, 2007
- Mary K. Sease Award**, *Wesleyan University*, USA, For excellence in science outreach, 2004

### RESEARCH FUNDING AND FELLOWSHIPS

- 2015 **Seed Grant**, Model Support for Treatment Strategies in Managing Sea Louse Parasites and Evolution of Resistance on Atlantic Salmon Farms, *Canadian Excellence Research Chair in Aquatic Epidemiology at University of Prince Edward Island*, Canada, \$20,000
- Seed Grant**, Tipping the scales: Are marine opportunists pathogens an increasing threat in a changing climate?, *Canadian Excellence Research Chair in Aquatic Epidemiology at University of Prince Edward Island*, Canada, \$20,000
- Atlantic Innovation Fund**, Atlantic Eelgrass Monitoring Consortium, *Environment Canada*, Canada, \$200,000 (co-investigator on grant)
- 2014 **Seed Grant**, Resilience of coastal ecosystems to green crab introduction and removal, *Canadian Excellence Research Chair in Aquatic Epidemiology at University of Prince Edward Island*, Canada, \$20,000
- Seed Grant**, Use of eelgrass as a mitigation strategy for ocean acidification on oyster farms, *Canadian Excellence Research Chair in Aquatic Epidemiology at University of Prince Edward Island*, Canada, \$25,000
- Short term Research Placement Award**, *Canadian Excellence Research Chair in Aquatic Epidemiology at University of Prince Edward Island*, Canada, \$4970
- Early Career Development Grant**, *Canadian Excellence Research Chair in Aquatic Epidemiology at University of Prince Edward Island*, Canada, \$2000
- 2013 **Workshop Grant**, *NIMBioS Workshop on modelling the evolution of pesticide resistance*, Canada
- Early Career Development Grant**, *Canadian Excellence Research Chair in Aquatic Epidemiology at University of Prince Edward Island*, Canada, \$2500
- Research Exchange Grant**, *NSF Research coordination network on ecology of infectious marine diseases*, USA, \$1,000

- Research grant**, *Patricia L. Dudley Endowment, Friday Harbor Labs, University of Washington*, USA, \$2000
- 2012 **Early Career Development Grant**, *Canadian Excellence Research Chair in Aquatic Epidemiology at University of Prince Edward Island*, Canada, \$2500
- Course Stipend**, *NSF Research coordination network on ecology of infectious marine diseases*, USA, \$3500
- 2010 **Course Stipend**, *University of Washington Summer institute for statistics: modeling infectious disease*, USA, \$800
- Pape Award**, *University of Pittsburgh and Pymatuning Lab of Ecology*, USA, \$1400
- 2009 **Pape Award**, *University of Pittsburgh and Pymatuning Lab of Ecology*, USA, \$3050
- Student grants**, *Chicago Herpetological Society*, USA, \$1,000, 2009
- Gaige Fund**, *American Society of Ichthyology and Herpetology*, USA, \$500, 2009
- Lewis and Clark Grant**, *American Philosophical Society*, USA, \$2500, 2009
- Grants-in-aid-of-Research**, *Sigma Xi*, USA, \$400, 2009
- 2008 and prior **McKinley Grant**, *University of Pittsburgh and Pymatuning Lab of Ecology*, USA, \$3,500, 2008
- NSF Predoctoral Fellowship**, *National Science Foundation*, USA, \$121,000, 2007
- McKinley Grant**, *University of Pittsburgh and Pymatuning Lab of Ecology*, USA, \$4,000, 2007
- Howard Hughes Undergraduate Research Fellowship**, *Wesleyan University*, USA, 2003
- Course stipend for Yellowstone-Bighorn Research Association Geology Field Camp**, *Wesleyan University*, USA 2003

## **PUBLICATIONS**

### **Peer-reviewed publications**

Burge CA, Closek C, Friedman CS, **Groner ML**, Jenkins C, Shore A, Welsh JE. 2016. The use of filter-feeders to manage disease in a changing world. **Integrative and Comparative Biology** icw048.

**Groner ML**, McEwan G, Gettinby G, Rees EE, Revie CW. 2016. Quantifying the influence of temperature and salinity on the population dynamics of a marine ectoparasite. **Canadian Journal of Fisheries and Aquatic Sciences** 73: 1-11.

**Groner ML\***, Rogers LA\*, Bateman AW, Connors BM, Frazer LN, Godwin SC, Krkošek M, Lewis MA, Peacock SJ, Rees EE, Revie CW, Schlägel UE. 2016. Lessons from sea lice and salmon epidemiology. **Philosophical Transactions of the Royal Society (London)** B 1689: 20150203.

\*Co-lead authors

**Groner ML**, Burge CA, Kim CJS, Rees EE, Van Alstyne K, Yang S, Wyllie-Echeverria S, Harvell CD. 2016. Plant characteristics associated with widespread variation in eelgrass wasting. **Diseases of Aquatic Organisms** 118: 159-168.

Eisenlord ME\*. **Groner ML\***, Yoshioka RM, Elliot J, Maynard J, Fradkin S, Turner M, Pyne K, Rivlin N, van Hooidek R, Harvell CD. 2016. Demographic shifts and severe population declines from the sea star wasting disease epizootic in the northeast Pacific. **Philosophical Transactions of the Royal Society (London)** B 1689: 20150212.

\*Co-lead authors

**Groner ML\***, Maynard J\*, Breyta R, Carnegie RB, Dobson A, Friedman CA, Froelich B, Garren M, Gulland FMD, Heron SF, Noble RT, Revie CW, Shields JD, Vanderstichel R, Weil E, Wyllie-

Echeverria S, Harvell CD. 2016. Responding to marine disease emergencies in an era of rapid change. **Philosophical Transactions of the Royal Society (London) B** 1689: 20150364.

\*Co-lead authors

Maynard J, van Hooidonk R, Harvell CD, Eakin CM, Liu G, Willis BL, Williams GJ, **Groner ML**, Dobson A, Heron SF, Glenn R, Reardon K, Shields JD. 2016. Improving marine disease surveillance through sea temperature monitoring, outlooks and projections. **Philosophical Transactions of the Royal Society (London) B** 1689: 20150208.

McEwan, G, **Groner ML**, Fast M, Gettinby G, Revie CW. 2015. Modeling the effect of refugia on the evolution of chemical resistance in a marine parasite. **PLoS One** 10: e0139128.

**Groner ML**, Relyea RA. 2015. Predators reduce *Batrachochytrium dendrobatidis* infection loads in their prey. **Freshwater Biology** 60: 1699-1704.

Paige-Karjian, A, Norton TM, **Groner ML**, Gottdenker NL. 2014. Factors influencing survivorship of rehabilitating green sea turtles (*Chelonia mydas*) with fibropapillomatosis. **Journal of Zoo and Wildlife Medicine** 45: 507-519.

**Groner ML**, Gettinby G, Stormoen M, Revie CW and Cox R. 2014. Modelling the impact of temperature-induced life-history plasticity and mate limitation on the epidemic potential of a marine ectoparasite. **PLoS One** 9: e88465.

**Groner ML**, Burge CA, Couch CS, Kim CJS, Siegmund G-F, Singhal S, Smoot S, Jarrell A, Gaydos JK, Harvell CD, Wyllie-Echeverria S. 2014. Host demography influences the prevalence and severity of eelgrass wasting disease. **Diseases of Aquatic Organisms** 108: 165-175.

**Groner, ML**, Rollins-Smith, LA, Reinert, LK and Relyea RA. 2014. Effects of competitor and predator stress on life history traits and immune function in leopard frogs. **Journal of Experimental Biology** 217: 351-358.

Garcia-Vedrenne AE, **Groner ML**, Page-Karjian A, Siegmund G, Singhal S, Sziklay J, Roberts S. 2013. Development of genomic resources for a thraustochytrid pathogen and investigation of temperature influences on gene expression. **PLoS One** 8: e74196.

**Groner ML**, Buck JC, Gervasi S, Blaustein AR, Reinert LK, Rollins-Smith LA, Bier ME, Hempel J and Relyea RA. 2013. Lasting effects: Larval exposure to predators alters immune function and disease in post-metamorphic wood frogs. **Ecological Applications** 23: 1443-1454.

**Groner ML**, Cox R, Gettinby G and Revie CW. 2013. Use of agent-based modelling to predict benefits of cleaner fish in controlling sea lice (*Lepeophtheirus salmonis*) infestations on farmed Atlantic salmon. **Journal of Fish Diseases** 36: 195-208.

**Groner ML** and Relyea RA. 2011. A tale of two pesticides: How common insecticides affect aquatic communities. **Freshwater Biology** 56: 2391-2404.

**Groner ML** and Relyea RA. 2010. *Batrachochytrium dendrobatidis* is present in northwest Pennsylvania, with high prevalence in *Notophthalmus viridescens*. **Herpetological Review** 41:462-465.

Turner AM, Cholak EJ and **Groner ML**. 2010. Expanding American Lotus and Dissolved Oxygen Concentrations of a Shallow Lake. **American Midland Naturalist** 164: 1-8.

Varekamp JC, Thomas E, and **Groner ML**. 2005. The late Pleistocene - Holocene History of Long Island Sound, **Seventh Biennial LIS Research Conference Proceedings** (2004), p. 27-32.

#### Other publications

**Groner ML**, Breyta R, Dobson A, Friedman CA, Froelich B, Garren M, Maynard J, Gulland F,

Weil E, Wylie-Echeverria S, Harvell CD. 2015. Emergency response for marine diseases. *Science* 347: 1210.

Harvell CD, Groner ML. 2015. Tipping back the balance toward healthy oceans. The Hill. July 9, 2015. <http://thehill.com/blogs/pundits-blog/energy-environment/247263-tipping-back-the-balance-toward-healthy-oceans>

## **TEACHING EXPERIENCE**

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### **Guest lecturer**

Ecology of Infectious Marine Diseases  
Coastal Field Ecology  
Population Biology  
Ecology  
Veterinary student rotation in Marine Disease  
Conservation Genetics

January 2012 - Dec 2013

### **Symposium Leader**

*Epidemiological modeling group, Atlantic Veterinary College, PE, Canada*

June 2010

### **High School Science Project leader**

*Butler High School, Butler, PA*

Led evolution experiments with *Daphnia pulex* in three high school biology classes

### **Teaching Assistant**

*University of Pittsburgh, Pittsburgh, PA*

Autumn 2011

Vertebrate Morphology Laboratory

Summer 2011

Ornithology

Spring 2008

Genetics Recitation

Autumn 2007

Ecology Lab

Sept 2004-Sept 2005

### **Environmental Educator**

*Padilla Bay National Estuarine Research Reserve, Mt Vernon, WA*

Taught estuarine science in English and Spanish to grade school children and adults

Coordinated seminar series

### **Undergraduate course assistant**

*Wesleyan University, Middletown, CT*

Autumn 2002

History of Life on Earth

Spring 2003

Our Dynamic Earth

## **MENTORSHIP**

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### **Undergraduate students:**

Allegra Cohen, *Stanford University*, Summer 2016

Jessie Champion, *University of Prince Edward Island*, Summer 2014

Vivian Chen, *University of Prince Edward Island*, Summer 2014

Silei Peng, *University of Prince Edward Island*, Summer 2014

Junshi Dong, *University of Prince Edward Island*, Summer 2014

Shane Gilbert, *University of Prince Edward Island*, Summer 2014

Akanksha Singh, *University of Prince Edward Island*, Summer 2014

Diane Ayala, *Fresno State University, Fresno, CA*, Summer 2013

Aissa Yazzie, *Northwest Indian College, Bellingham, WA*, Summer 2013

Holly Williams-Moxley, *Northwest Indian College, Bellingham, WA*, Summer 2013

Lindsay Skovira, *University of Pittsburgh, Pittsburgh, PA*, Autumn 2011- Spring 2012

Caitlin Newcamp, *University of Pittsburgh, Pittsburgh, PA*, Summer 2010

Abhinav Mitthal, *University of Pittsburgh, Pittsburgh, PA*, Summer 2009

## SELECTED INTERNATIONAL CONFERENCES

**Groner, ML**, Burge, CA, Yang, S, Van Alstyne, K, Rees, EE, Harvell, CD, Wyllie-Echeverria, S. Identification of demographic and environmental risk factors associated with eelgrass wasting disease in the Salish Sea. **2014. Salish Sea Ecosystem Conference, Seattle, WA, USA.** Invited oral presentation.

**Groner, ML**, St. Hilaire, S. Effects of climate change of disease in aquaculture. **2014. Climate change and aquaculture symposium, University of Prince Edward Island. Charlottetown, PE, Canada.** Invited oral presentation.

**Groner, ML**, Burge, CA, Yang, S, Wyllie-Echeverria, S, Harvell, CD. Local and climatic factors affecting the prevalence of eelgrass wasting disease. **2014. Ocean Science Meeting, Honolulu, HI, USA.** Oral Presentation.

**Groner, ML**, Cox, R, Fast, M, Gettinby, G, Revie, CR. Understanding the evolution of resistance to chemotherapeutants in a marine ectoparasite. **NIMBioS Investigative Workshop: Modelling the evolution of pesticide resistance. 2013. Knoxville, TN, USA.** Oral presentation.

**Groner, ML**, Cox, R, Revie, CW and Gettinby, G. Modeling resistance to chemotherapeutants in salmon ectoparasites: the influence of treatment regimens and temperature. **2013. European Society of Evolutionary Biology, Lisboa, Portugal.** Poster presentation

**Groner, ML**, Cox, R, Gettinby, G, Stormoen, M and Revie, CW. Influence of temperature on the life history and epidemic potential of a marine ectoparasite of salmon. **2013. Ecology and Evolution of Infectious Diseases 2013, State College, PA, USA.** Poster presentation.

**Groner, ML**, Couch, C, Kim, C, Siegmund, GF, Singhal, S, Smoot, S, Harvell, CD and S Wyllie-Echeverria. Ecology and etiology of wasting disease in *Zostera marina* of the San Juan Islands, WA, USA. **2012. 10th International Seagrass Biology Workshop, Buzios, Brazil.** Oral presentation.

**Groner, ML** and Revie, CW. Elastograms and Individual-based models: comparing approaches to understanding effects of life history variation on the evolution of resistance to insecticides in sea lice (*Lepeophtheirus salmonis*). **2012. Evolution, Ottawa, ON, Canada.** Poster presentation.

**Groner, ML**, Cox, R, Gettinby, G and Revie, CW. Understanding the role of wrasse in controlling sea lice using individual-based models. **2012. Sea Lice 2012, Bergen, Norway.** Oral presentation.

**Groner, ML** and Relyea, RA. Healthy Herds and Peaked Packs: How infection alters inducible defenses against predators. **2011. Ecological Society of America: Earth stewardship: preserving and enhancing earths life-support systems, Austin, TX, USA.** Oral presentation.

**Groner, ML**, Buck, JC, Blaustein, AR, Rollins-Smith, LA, Reinert, LK and RA Relyea. Scared sick? Effects of sublethal exposure to predators and pesticides on life history traits, immune function and disease susceptibility in wood frogs. **2010. North American Benthological Society: Aquatic Sciences: Global changes from the center to the edge, Santa Fe, NM, USA.** Oral presentation.

**Groner, ML**, Buck, JC, Blaustein, AR, Rollins-Smith, LA, Reinert, LK and RA Relyea. Scared sick? Effects of sublethal exposure to predators and pesticides on life history traits, and disease susceptibility in wood frogs. **2010. Ecological Society of America: Global Warming: The legacy of our past, the challenge for our future, Pittsburgh, PA, USA.** Oral presentation.

## INVITED PRESENTATIONS

**Groner, ML**, Harvell CD, Hoenig, JM, Landers DF, Maynard J, Shields JD. 2016. Managing marine diseases despite large knowledge gaps: A case study of epizootic shell disease in the American Lobster. Ecological Society of America: Novel Ecosystems in the Anthropocene, Fort Lauderdale, FL, USA. Invited oral presentation.

**Groner, ML.** 2015. Using data-driven models to explore sea louse infestations on wild and

farmed salmon. Old Dominion University, VA, USA

**Groner, ML.** 2015. Impacts of global change on marine diseases: case studies with eelgrass wasting disease and salmon lice. Virginia Institute of Marine Science, VA, USA

**Groner, ML.** 2015. Understanding marine diseases in a changing climate. Institute for Marine and Environmental Technology, MD, USA

**Groner, ML, Revie, CW.** 2015. Using data-driven models to explore sea louse infestations on wild and farmed salmon. University of St. Andrews, Scotland, UK

**Groner ML.** 2014. Are marine diseases increasing? Case studies using eelgrass wasting disease and sea louse parasites of salmon. University of Prince Edward Island, PE, Canada

**Groner ML.** 2011. Effects of multiple stressors on the dynamics of a pathogen associated with amphibian population declines. University of Prince Edward Island, PE, Canada

## **SERVICE**

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May 2015	<b>Workshop organizer</b> Using drones for environmental research, University of Prince Edward Island, PE, Canada
August 2007-August 2010	<b>Symposium Coordinator</b> Graduate student invited speaker symposiums Department of Biological Sciences, University of Pittsburgh, Pittsburgh, PA, USA
January 2008-May 2008	<b>Prospective Graduate Student Visit Coordinator</b> Department of Biological Sciences, University of Pittsburgh, Pittsburgh, PA, USA
August 2007-Spring 2008	<b>Symposium Coordinator</b> Ecology and evolution seminar series Department of Biological Sciences, University of Pittsburgh, Pittsburgh, PA, USA
January-May 2007	<b>Reading Group Founder and Coordinator</b> Applications of molecular methods to ecology and evolution Department of Biological Sciences, University of Pittsburgh, Pittsburgh, PA, USA
May 2004, 2005	<b>Student Mentor/Event Judge</b> 'Amazing Aquifers': Western Washington regional science fair for middle school students, Mt. Vernon, WA, USA
Autumn 2002 - Spring 2004	<b>Group Leader and educator</b> Action Science Kids: Supporting 5th grade science education for girls Wesleyan University, Middletown, CT, USA

## **WORKING GROUPS**

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Autumn 2013	Modeling the evolution of pesticide resistance National Institute for Mathematical and Biological Synthesis Knoxville, TN
August 2012- present	Research Coordination Network on the Ecology of Infectious Marine Diseases Funded by the National Science Foundation

## **PEER REVIEW**

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*Aquaculture Environment Interactions*  
*Biology Letters*  
*Diseases of Aquatic Organisms*  
*Ecological Modeling*  
*Environmental Science and Pollution Research*  
*Environmental Science and Technology*  
*Evolutionary Ecology*  
*Fish and Fisheries*  
*Herpetological Review*

*Herpetologica*  
*Journal of Evolutionary Biology*  
*Journal of Experimental Marine Biology*  
*Philosophical Transactions of the Royal Society (London) B*  
*PLoS one*  
*Proceedings of the Royal Society B*

## **PROFESSIONAL SOCIETY MEMBERSHIPS**

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American Society of Naturalists  
Graduate Women in Science  
Ecological Society of America  
American Society for Limnology and Oceanography

## **CURRENT COLLABORATIONS**

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**Factors associated with epizootic shell disease in American Lobsters:** Dr. Jeffrey Shields (Virginia Institute of Marine Science), Dr. John Hoenig (Virginia Institute of Marine Science)

**Climate change as a driver of eelgrass wasting disease:** Dr. Drew Harvell (Cornell University), Dr. Colleen Burge (University of Washington), Dr. Sandy Wyllie-Echeverria (University of Washington), Dr. Kathy Van Alstyne (Western Washington University)

**Genetics and epigenetics of resistance to chemotherapeutants in sea lice:** Dr. Mark Fast (University of Prince Edward Island), Dr. Crawford Revie (University of Prince Edward Island), Gregor McEwan (University of Prince Edward Island)

**Dynamics of sea lice infestations in wild salmon:** Dr. Crawford Revie (University of Prince Edward Island), Dr. Sophie St. Hilaire (University of Prince Edward Island), Dr. Erin Rees (University of Prince Edward Island), Dr. Ruth Cox (University of Prince Edward Island)

**Use of eelgrass as a mitigation strategy for effects of ocean acidification on oyster farms:** John Bucci (University of New Hampshire), Colleen Burge (University of Washington), Carolyn Friedman (University of Washington), Sandy Wyllie-Echeverria (University of Washington)