

University of Washington
Program on the Environment
School of Aquatic & Fishery Sciences
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Education

PhD, University of Washington, College of Ocean and Fishery Sciences, Seattle, Washington, 2006. Dissertation title: "Biotic resistance and other factors affecting the distribution, habitat use, and potential impacts of invasive European green crab, *Carcinus maenas*, in the northeastern Pacific."

BS, (Marine Biology), Western Washington University, Bellingham, Washington, 1997.

Teaching and Research Experience

2012-present **Instructor/Lecturer in Environmental Studies** – Program on the Environment, University of Washington, Seattle, Washington. Responsible for teaching Environmental Communications, Capstone courses and mentoring/advising Environmental Studies students conducting senior research and internships.

2012-present **Research Scientist in Aquatic & Fishery Sciences** – School of Aquatic and Fishery Sciences, University of Washington, Seattle, Washington. Implementing independent and collaborative research projects.

2006-2012 **Research Associate in Environmental Studies & Aquatic & Fishery Sciences** – Program on the Environment, School of Aquatic and Fishery Sciences, University of Washington, Seattle, Washington. Responsible for Environmental Studies Capstone courses. Research projects included:

- Evaluating the abundance and ecological roles of geoduck clams and sea cucumbers in Hood Canal, WA. PI – Dr. Timothy Essington
- Investigating the ecosystem effects of intertidal geoduck aquaculture techniques in Puget Sound, WA. PI – Dr. Glenn VanBlaricom.
- Literature review of European green crab impacts. PI – Dr. Jennifer Ruesink.

2006-2008 **Research Associate in Oceanography** – Shannon Point Marine Center, Western Washington University, Anacortes, Washington. Conduct on-site research and develop and teach marine science curricula. Courses include:

- *Oceanography* – a 6-credit undergraduate marine sciences unit for students participating in the NSF-funded, Multicultural Initiative in the Marine Sciences: Undergraduate Participation (MIMSUP) program.
- *Marine Ecology and Invasions* – a 5-credit undergraduate and graduate marine ecology course with a focus on marine bioinvasions.

1998-2006 **Graduate Teaching/Research Assistant**– School of Aquatic and Fishery Sciences, University of Washington, Seattle, Washington. Coordinated and executed weekly laboratory sections in FISH 210 and FISH 310. Assisted faculty with shellfisheries and aquaculture research.

Publications (peer review)

- Ryan, C, **PS McDonald**, DS Feinberg, LW Hall, JG Hamerly, and CW Wright. *submitted*. Digging deep: managing social and policy dimensions of geoduck aquaculture conflict in Puget Sound, Washington. *Ecology and Society*.
- Ferriss, BE, JC Reum, **PS McDonald**, DM Farrell, and CJ Harvey. 2015. Evaluating trophic and non-trophic effects of shellfish aquaculture in a coastal estuarine foodweb. *ICES Journal of Marine Science: Journal du Conseil* DOI:10.1093/icesjms/fsv173
- Reum, JC, BE Ferriss, **PS McDonald**, DM Farrell, CJ Harvey, T Klinger, and PS Levin. 2015. Evaluating community impacts of ocean acidification using qualitative network models. *Marine Ecology Progress Series* 536:11-24.
- Reum, JC, **PS McDonald**, BE Ferriss, DM Farrell, CJ Harvey, and PS Levin. 2015. Qualitative network models in support of ecosystem approaches to bivalve aquaculture. *ICES Journal of Marine Science: Journal du Conseil* 72(8), 2278-2288.
- McDonald, PS**, TE Essington, JP Davis, AWE Galloway, BC Stevick, GC Jensen, GR VanBlaricom, and DA Armstrong. 2015. Distribution, abundance, and habitat associations of a large bivalve (*Panopea generosa*) in a eutrophic, fjord estuary. *Journal of Shellfish Research* 34(1) 137-145.
- McDonald, PS**, AWE Galloway, KC McPeek, and GR VanBlaricom. 2015. Effects of geoduck (*panopea generosa* Gould, 1850) aquaculture gear on resident and transient macrofauna communities of Puget Sound, Washington. *Journal of Shellfish Research* 34(1) 189-202.
- VanBlaricom, GR, J Price, J Olden, and **PS McDonald**. 2015. Ecological effects of the harvest phase of geoduck clam (*Panopea generosa* Gould, 1850) 1 aquaculture on infaunal communities in southern Puget Sound, Washington USA. *Journal of Shellfish Research* 34(1) 171-187.
- McPeek, KC, **PS McDonald**, and GR VanBlaricom. 2014. Aquaculture Disturbance Impacts the Diet but not Ecological Linkages of a Ubiquitous Predatory Fish. *Estuaries and Coasts* 10.1007/s12237-014-9909-z
- McDonald, PS**. 2013. Dungeness crab. In: Miller, IM., C Shishido, L Antrim, and EC Bowlby. *Climate Change and the Olympic Coast National Marine Sanctuary: Interpreting Potential Futures*. Marine Sanctuaries Conservation Series ONMS-13-01. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, Office of National Marine Sanctuaries, Silver Spring, MD. 232 pp.
- McDonald, PS**, K Cardinal, E Timmins-Schiffman, and L Whitely Binder. 2012. Assessing vulnerability of Dungeness crab to Climate Change. In *Assessing Vulnerability of West Coast Fisheries to a Changing Climate*. Washington Sea Grant, University of Washington
- Mach, ME, CD Levings, **PS McDonald**, and KMA Chan. 2011. An Atlantic infaunal engineer is established in the Northeast Pacific: *Clymenella torquata* (Polychaeta: Maldanidae) on the British Columbia and Washington Coasts. *Biological Invasions*, DOI: 10.1007/s10530-011-0096-6

- Armstrong, DA, **PS McDonald**, GH Kruse, AH Hines, and JM Orensanz. 2010. A crab for all seasons: the confluence of fisheries and climate as drivers of crab abundance and distribution. In: GH Kruse, GL Eckert, RJ Foy, RN Lipcius, B Sainte-Marie, DL Stram, and D Woodby (eds.), *Biology and Management of Exploited Crab Populations under Climate Change*. Alaska Sea Grant, University of Alaska Fairbanks. doi:10.4027/bmecpcc.2010.05
- McDonald, PS**, and BL Bingham. 2010. Comparing macroalgal food and habitat choice in sympatric, tube-building amphipods, *Ampithoe lacertosa* and *Peramphithoe humeralis*. *Marine Biology* 157(7):1513-1524, DOI: 10.1007/s00227-010-1425-5
- Holsman, KK, **PS McDonald**, PA Barreyro, and DA Armstrong. 2010. Restoration through eradication? Removal of an invasive bioengineer restores some habitat function for a native predator. *Ecological Applications* 20(8):2249-2262
- Smith, R, and **PS McDonald**. 2010. Examining the effects of predator exclusion structures associated with geoduck aquaculture on mobile benthic macrofauna in South Puget Sound, Washington. *Northwestern Undergraduate Research Journal* 5(2009-2010): 11-16
- Banas, NS, **PS McDonald**, and DA Armstrong. 2009. A lagrangian modeling approach to investigate retention of larval green crab, *Carcinus maenas*, in Willapa Bay, Washington, USA. *Estuaries and Coasts* (2009) 32:893–905; DOI 10.1007/s12237-009-9175-7.
- Jensen, GC, **PS McDonald**, and DA Armstrong. 2007. Biotic resistance to green crabs in west coast bays. *Marine Biology* 151(6): 2231-2243; DOI 10.1007/s00227-007-0658-4.
- McDonald, PS**, KK Holsman, DA Beauchamp, BR Dumbauld, and DA Armstrong. 2006. Bioenergetics modeling to investigate habitat use by the nonindigenous crab, *Carcinus maenas*, in Willapa Bay, Washington, USA. *Estuaries and Coasts* 29(6B): 1132-1149.
- Holsman, KK, **PS McDonald**, and DA Armstrong. 2006. Patterns of intertidal migration and habitat use by subadult Dungeness crab (*Cancer magister* Dana) in a coastal estuary of the northeastern Pacific. *Marine Ecology Progress Series* 308: 183-195
- McDonald, PS**. 2006. The European green crab, *Carcinus maenas*. In *Invasive Species in the Pacific Northwest*. Eds. Boersma, PD, SE Reichard, and AN Van Buren. Seattle, University of Washington Press
- McDonald, PS**. 2006. The Siberian prawn, *Exopalaemon modestus*. In *Invasive Species in the Pacific Northwest*. Eds. Boersma, PD, SE Reichard, and AN Van Buren. Seattle, University of Washington Press
- Visser, E, **PS McDonald**, and DA Armstrong. 2004. The impact of yellow shore crabs, *Hemigrapsus oregonensis*, on early benthic phase Dungeness crabs, *Cancer magister*, in intertidal oyster shell mitigation habitat. *Estuaries* 27(4): 699-715
- Jensen, GC, **PS McDonald**, and DA Armstrong. 2002. East meets west: competitive interactions between green crab, *Carcinus maenas*, and native and introduced *Hemigrapsus spp.* *Marine Ecology Progress Series* 225: 251-262
- McDonald, PS**, GC Jensen, and DA Armstrong. 2001. The competitive and predatory impacts of the nonindigenous crab *Carcinus maenas* (L.) on early benthic phase Dungeness crab *Cancer magister* Dana. *Journal of Experimental Marine Biology and Ecology* 258(1): 39-54

Funds Awarded (total \$2,193,769 since 2006)

Using bioenergetics models to evaluate ecological and fishery impacts of climate change on Dungeness crab

Source: Washington Sea Grant College Program

Role: Principal investigator; co-wrote proposal

Amount: \$136,138 (2016-2018)

Cumulative Ecological Effects of Bivalve Aquaculture in Washington State

Source: Washington State Legislature

Role: Co-investigator; co-wrote proposal

Amount: \$295,833 (2014-2015)

Toward sustainable geoduck aquaculture management in Puget Sound: Assessing policy and social dimensions

Source: Washington Sea Grant College Program

Role: Co-investigator; co-wrote proposal

Amount: \$92,166 (2013-2015)

An ecosystem modeling approach to investigate direct and indirect effects of geoduck aquaculture expansion in Washington State

Source: Washington Sea Grant College Program

Role: Co-investigator; co-wrote proposal

Amount: \$100,162 (2013-2015)

Evaluation of effects of geoduck aquaculture operations on intertidal ecosystems in southern Puget Sound Washington

Source: Washington Northwest Indian Fisheries Commission

Role: Co-investigator; co-wrote proposal

Amount: \$55,000 (2013-2015)

Blue king crab, habitat, and the ecosystem: Data rescue from the 1980s

Source: North Pacific Research Board

Role: Co-investigator; co-wrote proposal

Amount: \$85,523 (2013-2015)

Multi-trophic implications of structure additions associated with intertidal geoduck aquaculture

Source: 2010 National Marine Aquaculture Initiative, NOAA

Role: Senior Personnel; co-wrote proposal with principal investigators

Amount: \$397,672 (2010-2014)

Ecological consequences of disturbances associated with geoduck aquaculture operations in Washington

Source: Washington Sea Grant College Program

Role: Senior Personnel; co-wrote proposal with principal investigators

Amount: \$164,563 (2010-2011)

Ecological effects of intertidal geoduck aquaculture operations in Puget Sound

Source: Washington Department of Ecology

Role: Collaborating Investigator; co-wrote proposal with principal investigators

Amount: \$19,989 (2010)

Geochemical and ecological consequences of disturbances associated with geoduck aquaculture operations in Washington

Source: Washington State Legislature/ Washington Sea Grant College Program

Role: Senior Personnel; co-wrote proposal with principal investigators

Amount: \$259,935 (2008-2010)

Evaluating the ecological role of geoducks and sea cucumbers in Hood Canal

Source: Hood Canal Salmon Enhancement Group / WA Department of Natural Resources

Role: Senior Personnel; co-wrote proposal with principal investigators

Amount: \$534,524 (2006-2009; distributed in two awards)

Green crab invasion modeling: Modeling recruitment dynamics and the potential for larval retention within a northeastern Pacific estuary

Source: National Sea Grant College Program

Role: Co-investigator; co-wrote proposal

Amount: \$52,264 (2006-2008)

Students supervised

Graduate student committee participation – School of Aquatic and Fishery Sciences, Seattle, Washington. Caroline Paulsen (MS, 2008); Jenny Price (MS, 2010); Kathleen McPeck (MS, 2014); Halley Froehlich (PhD, 2015)

Program on the Environment Capstone mentorship – 62 students (current); 331 students (Autumn 2010 – Autumn 2015)

Supervisor/mentor, Undergraduate capstone research projects – School of Aquatic and Fishery Sciences, Seattle, Washington. Jake Kvistad (2015); Katherine Armintrout (2011); Julia Eggers (2011); Hans Hurn (2011); Erika Pinney (2010); Robyn Redekopp (2006); Jesse Nitz (2005)

Supervisor/mentor, NSF Research Experience for Undergraduates (REU) program – Shannon Point Marine Center, Anacortes, Washington. Rachel Smith (2008); Lillian Hancock (2007)

Supervisor/mentor, NSF Multicultural Initiative in the Marine Sciences: Undergraduate Participation (MIMSUP) program – Shannon Point Marine Center, Anacortes, Washington. Robert Williams (2008); Pablo Barreyro (2007)

Selected Invited Seminars

Honoring the data: a review of recent studies on ecological consequences of geoduck aquaculture in southern Puget Sound. – *Shellfish and the Environment Research Symposium*, Lacey, Washington, December 2014.

Geoduck aquaculture and the environment: recent findings and future directions. – *South Sound Science Symposium 2014*, Shelton, Washington, October 2014.

Patterns in abundance of fish and macro-invertebrates associated with geoduck aquaculture. – *19th Conference for Shellfish Growers*, Union, Washington, March 2012.

Exposure and sensitivity of Dungeness crab to climate change. – *Assessing Vulnerability of West Coast fisheries to a changing climate workshop*, Washington Sea Grant, Seattle, Washington, May 2011.

Species- and community-level responses to agents of ecosystem change: perspectives on shellfish aquaculture and fisheries. – *Malaspina University-College*, Nanaimo, British Columbia, April 2008.

Alien invader from the sea: facilitation and biotic resistance affect the success of green crab on the West Coast. – *Duke University Marine Lab Seminar Series*, Beaufort, North Carolina, October 2007.

Invasion ecology and the marine environment. – *Shannon Point Marine Center*, Anacortes, Washington, December 2006.

Could *Spartina* tip the balance between native and non-native crabs in Willapa Bay, Washington? – *Hatfield Marine Science Center Seminar Series*, Newport, Oregon, February 2006.

Aliens from the deep: can they be stopped? – *Marine Sciences Lecture Series*, Highline Community College, Marine Science and Technology Center (MaST), Des Moines, Washington, November 2004.

Biotic resistance to invasion by a native crab guild in the northeastern Pacific. – *Exotic Species in Marine Ecosystems Invited Speaker*, The Evergreen State College, Olympia, Washington, April 2003.

Threat or threatened? Progression of the study of green crab, *Carcinus maenas*, in the northeastern Pacific. – *Washington Department of Fish and Wildlife Seminar Series*, Olympia, Washington, March 2002.

Selected Contributed Papers

Application of an ecosystem model to address stakeholder concerns about aquaculture expansion – *Coastal & Estuarine Research Federation, 23rd Biennial Meeting*, Portland, Oregon, 2015.

Ecological effects of clam (*Panopea generosa*) aquaculture on resident and transient macrofauna in an urban estuary. - *Western Society of Naturalists*, Tacoma, Washington, 2014.

Shellfish aquaculture at the confluence of science, policy, and conflicting stakeholder interests: lessons learned from geoduck farming in the northeastern Pacific. – *ICES Annual Science Conference 2014*, A Coruña, Spain, 2014

Evaluating spillover effects of geoduck aquaculture practices on selected resident invertebrates of southern Puget Sound – *National Shellfisheries Assoc. - Pacific Coast Section / Pacific Coast Shellfish Growers Assoc. Annual Meeting*, Marysville, Washington, 2013.

Crabs in hot water: assessing the Dungeness crab fishery's vulnerability to climate change. – *National Shellfisheries Association Annual Meeting*, Seattle, Washington, 2012.

The effects of geoduck Aquaculture practices on habitat and trophic dynamics of nekton and macroinvertebrates In Puget Sound. – *American Fisheries Society 141st Annual Meeting*, Seattle, Washington, 2011.

A fisheye perspective on habitat complexity: do structures associated with intertidal geoduck aquaculture affect trophic dynamics of nekton in unique ways? – *World Aquaculture Society/ National Shellfisheries Association, Aquaculture 2010 Meeting*, San Diego, California, 2010

Marine Stewardship Council certification for Dungeness crab as example of a “data-poor” fishery: easier said than done. – *Coastal & Estuarine Research Federation, 20th Biennial Meeting*, Portland, Oregon, 2009.

Distribution and abundance of subtidal geoduck clam (*Panopea abrupta*) and California sea cucumber (*Parastichopus californicus*) in Hood Canal, Washington. – *National Shellfisheries Assoc National Shellfisheries Assoc. - Pacific Coast Section / Pacific Coast Shellfish Growers Assoc. Annual Meeting*, Portland, Oregon, 2009.

Effects of geoduck aquaculture on ecosystem structure and function: a progress report..– **National Shellfisheries Assoc. - Pacific Coast Section / Pacific Coast Shellfish Growers Assoc. Annual Meeting**, Chelan, Washington, 2008.

The impact of cordgrass, *Spartina alterniflora*, on Dungeness crab, *Cancer magister*, in Willapa Bay, Washington. – **Estuarine Research Federation, 19th Biennial Meeting**, Providence, Rhode Island, 2007.

The impact of a highly abundant competitor on nonindigenous *Carcinus maenas* in Willapa Bay, Washington. – **Western Society of Naturalists, 87th Annual Meeting**, Redmond, Washington, 2006.

The curious case of *Carcinus maenas*: reconciling behavior with the results of a bioenergetics model. – **National Shellfisheries Assoc. - Pacific Coast Section / Pacific Coast Shellfish Growers Assoc. Annual Meeting**, Hood River, Oregon, 2005.

Between a rock and a hard place: the ecology of ovigerous green crab, *Carcinus maenas* (L.). – **National Shellfisheries Assoc. - Pacific Coast Section / Pacific Coast Shellfish Growers Assoc. Annual Meeting**, Portland, Oregon, 2003.

Evidence of biotic resistance to the introduction of European green crab, *Carcinus maenas*, in estuaries of the northeastern Pacific. – **Pacific Estuarine Research Society, 25th Annual Meeting**, Portland, Oregon, 2002.

Patterns of movement by the nonindigenous crab, *Carcinus maenas*: observations using ultrasonic telemetry. – **Western Society of Naturalists, 82nd Annual Meeting**, Ventura, California, 2001.

The potential impacts of *Carcinus maenas* introduction on juvenile Dungeness crab, *Cancer magister*, survival. – **92nd Annual Meeting of the National Shellfisheries Assoc.**, Seattle, Washington, 2000.

A study of nest-building ecology of two amphipod species. – **Western Society of Naturalists, 78th Annual Meeting**, Monterey, California, 1997.

Awards and Appointments

- Thurlow C. Nelson Award (honorable mention), NSA 98th Annual Meeting, 2006
- Heinle Award (best overall presentation), PERS 29th Annual Meeting, 2006.
- Best Student Poster Award (1st place), PERS 29th Annual Meeting, 2006.
- Best Student Paper Award (1st place), NSA/PCS-PCSGA Annual Meeting, 2005.
- Victor and Tamara Loosanoff Fellowship, 2005-2006
- Best Student Paper Award (1st place), NSA/PCS-PCSGA Annual Meeting, 2002.
- Best Student Paper Award (3rd place), PERS 25th Annual Meeting, 2002.
- SAFS Fisheries Memorial Research Scholarship, 2002-2003
- Best Student Poster Award (1st place), Western Society of Naturalists 81st Annual Meeting, 2000.
- William H. Pierre, Sr. Fellowship, 1999-2000.
- School of Fisheries Lead Teaching Assistant, 1999-2000.
- Best Student Paper Award (1st place), School of Fisheries Graduate Student Symposium, 1998.
- NSF Research Experience for Undergraduates, 1997.
- Activities Tuition Scholarship, Western Washington University, 1996.

Professional Affiliations

- American Fisheries Society (AFS)
- Coastal and Estuarine Research Federation (CERF)
- Pacific Estuarine Research Society (PERS)
- National Shellfisheries Association (NSA)
- Western Society of Naturalists (WSN)

Peer Reviewer

- Aquatic Biology (AB)
- Biological Invasions (BI)
- Journal of Animal Ecology (JAE)
- Journal of Crustacean Biology (JCB)
- Marine Biology (MB)
- Marine Ecology Progress Series (MEPS)
- Journal of Experimental Marine Biology and Ecology (JEMBE)

Selected Relevant Experience

National Shellfisheries Association/ Pacific Coast Section – Executive board, 2009-present. Organized annual meeting; facilitated student participation; assisted in fund-raising.

Curriculum Committee – School of Aquatic and Fishery Sciences, Seattle, Washington, 2004-2006. Addressed curriculum issues; represented student interests during meetings with faculty; interviewed faculty candidates.

Mentor/tutor, LINK Project – Western Washington University, Bellingham, Washington, 1996-1997. Mentored Native American youth; conducted cultural programs; tutored science topics.