



Daniel G. MacDonald

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Research Interests

Stratified hydrodynamics, turbulence and frontal dynamics, with specific emphasis on estuarine flows, river plumes, and industrial discharges; marine renewable energy; coastal and environmental engineering.

Current and Recent Research

National Science Foundation. Collaborative Research: Sediment transport and storage in tidal floodplain water bodies. **D. MacDonald** (Collaborative Partners: J. Woodruff, UMass Amherst; Anna Martini, Amherst College). **\$69,782 (\$355,710 total)**. 2012-2015.

National Science Foundation. Collaborative research: Creation of a coastal current – the transition of an energetic river discharge from buoyant jet to geostrophic plume. **D. MacDonald** (PI, UMassD), R. Hetland (Co-PI, Texas A&M) and A. Horner-Devine (Co-PI, U. Washington). **\$499,416.00 (\$1,134,688.00 total)**. Mar. 2009 – Feb. 2012.

Other ongoing research includes the development of alternative outfall designs for thermal discharges associated with fossil fuel and nuclear power plant operations, and the analysis of transport and mixing in a large, multi-basin New Hampshire lake.

Selected Recent Publications

- MacDonald, D. G.**, and F. Chen, 2012. Enhancement of turbulence through lateral spreading in a stratified-shear flow: Development and assessment of a conceptual model. *J. Geophys. Res.* **117**, C05025, doi:10.1029/2011JC007484.
- Pappal, A.L., R.A. Rountree, and **D.G. MacDonald**, 2012. Relationship between body size and habitat complexity preference in age-0 and age-1 winter flounder *Pseudopleuronectes americanus*. *Journal of Fish Biology* **81**(1), 220-229. doi: 10.1111/j.1095-8649.2012.03328.
- MacDonald, D. G.**, 2009. Enhanced surface cooling as an alternative for thermal discharges. *J. Environ. Eng.-ASCE* **135**(12), 1326-1337.
- Chen, Fei, **Daniel G. MacDonald**, and Robert D. Hetland, 2009. Lateral spreading of a near-field river plume: Observations and numerical simulations. *J. Geophys. Res.*, **114**, C07013, doi:10.1029/2008JC004893.
- MacDonald, D. G.**, and A. R. Horner-Devine, 2008, Temporal and spatial variability of vertical salt flux in a highly stratified estuary. *J. Geophys. Res.* **113**, C09022, doi:10.1029/2007JC004620.
- Hetland, R. D., and **D. G. MacDonald**, 2008. Spreading in the near-field Merrimack River plume. *Ocean Model.* **21**, 12-21, doi:10.1016/j.ocemod.2007.11.001.
- MacDonald, D. G.**, L. Goodman, and R. D. Hetland, 2007. Turbulent dissipation in a near-field river plume: A comparison of control volume and microstructure observations with a numerical model. *J. Geophys. Res.* **112**, C07026, doi:10.1029/2006JC004075.
- Chen, F., and **D. G. MacDonald**, 2006. Role of mixing in the structure and evolution of a buoyant discharge plume, *J. Geophys. Res.* **111**(C11002), doi:10.1029/2006JC003563.
- MacDonald, D. G.**, and R. A. Rountree (eds.), 2006. *Natural and Anthropogenic Influences on the Mt. Hope Bay Ecosystem. Northeastern Naturalist* **13**, Special Issue 4.
- MacDonald, D. G.**, 2006. Estimating an estuarine mixing and exchange ratio from boundary data with application to Mt. Hope Bay (Massachusetts/Rhode Island). *Estuar. Coast. Shelf S.* **70**(1-2): 326-332.
- MacDonald, D. G.**, and W. R. Geyer, 2005. Hydraulic control of a highly stratified estuarine front. *J. Phys. Oceanogr.* **35**(3): 374-387.
- MacDonald, D. G.**, and W. R. Geyer, 2004. Turbulent energy production and entrainment at a highly stratified estuarine front, *J. Geophys. Res.* **109**, C05004, doi:10.1029/2003JC002094.