USGS NSF GRIP Opportunity

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USGS Center:	New England Water Science Center
Project Title:	Solute exchange (silica, nitrogen, phosphorus, mercury) between a salt marsh and the ocean
Project Hypothesis or Objectives:	The New England Water Science Center project entitled "Water-quality, the controlling factor on the herring run, aquaculture, and blue carbon at the Herring River salt-marsh restoration, Cape Cod National Seashore" is examining the effects of restoring greater tidal flow to areas of the Herring River estuary that have been diked off from the sea for more than 100 years. The driving concerns for the project are water-quality effects that result from restored tidal flow and that may impact the Herring Run or extensive shellfish aquaculture seaward from the estuary. Concentration and fluxes of nutrients, sediment, greenhouse gases are being monitored to create a before-restoration baseline data set for comparison with post restoration conditions. Whereas the concentration and flux data are being collected for adaptive management direction of the restoration, their more general interpretation in terms of impact of salt marshes on coastal geochemical cycles is open for interpretation by the NSF/USGS intern. Questions such as whether salt marshes are sources or sinks for nitrogen, silica, carbon, etc. are currently not well known. At the intern's discretion, mercury and methylmercury could be added to the sampling with analysis through collaboration with the mercury laboratory at Harvard University. The role of salt marshes as a mercury source for coastal marine fisheries is not known.
Duration:	12 months
Internship Location:	Northborough, MA
Field(s) of Study:	Hydrology, biogeochemistry, marine chemistry, restoration ecology,

Expected Outcome:	The project will extend the interpretation of solute concentration and flux data that are currently being collected principally to guide a future restoration of the Herring River salt marsh. Intern interpretation will address the fundamental questions of biogeochemical cycling of nutrients, carbon, and sediments in the coastal environment. The role of salt marshes in providing mercury and methylmercury to the coastal ocean will also be better understood.
Special skills/training Required:	Background in aquatic chemistry, mathematics, statistics.
Duties/Responsibilities:	We have good capture of our data in accessible databases, for example, http://waterdata.usgs.gov/nwis/uv?site_no=011058798. The intern will compute loads by processing data with, for example, Excel macros, R, or MATLAB. Some field work collecting samples would be necessary and an advantage to better understand the details of how samples are obtained. If mercury and methylmercury are added, field-technician-assisted intern installation of sampling equipment modification would be necessary--teflon sampling lines--and protocol development for non contaminating sampling would need to be developed.