relative role of contrasting coastal environments on supplying methylmercury to the lower aquatic food web. We examined the cycling and sources of mercury to a southern semi-enclosed embayment of Lake Superior (Chequamegon Bay), where the water is relatively shallow and warm compared to the majority of the lake.
We sampled the Bay at several contrasting locations to evaluate the relative contributions of wetland- versus non-wetland dominated coastal zones to water, sediments, and the lower portion of the aquatic food web. The principal sites included 1) two small wetland-dominated tributaries, 2) a wetland coastal margin (no tributary), and 3) two reference locations. Water, sediment, zooplankton, benthic macroinvertebrates, and small prey fish were collected over a 3-year period from five locations, and analyzed for total mercury, methylmercury, and stable isotopes of carbon and nitrogen.
Our results indicate that the lower food web of the wetland-influenced tributaries were highest in total and methylmercury content, followed by the marginal wetland, and the reference sites. Methylmercury concentrations observed in filtered water (site mean 0.05-0.2 ng/L), sediment (0.03-0.43 ng/g dry weight), zooplankton (22-66 ng/g), benthic invertebrates (15-55 ng/g), and age-1 yellow perch (61-153 ng/g) indicate bioaccumulation through the lower food web. Analyses of stable carbon isotopes in benthic invertebrates indicated that the highest methylmercury concentrations correlated with terrestrial (watershed) carbon sources rather than from in-lake cycling. Observed levels of methylmercury contamination in the Bay are greater than the bulk of Lake Superior, but lower relative to small lakes typical of central North Americaup to six times lower in the small prey fish.
Our findings suggest that tributaries draining extensive wetland-dominated watersheds may lead to significant exposure of biota to methylmercury in localized estuarine mixing environments, which are typically regions of high productivity, trophic transfer, and fish harvest. Even Lake Superior, with its low temperature and mercury content, appears to favor elevated fish mercury in its largest and oldest fish due to these localized wetland-tributary influences.

San Francisco Bay mercury loads: scientific information development and management response

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The State of California lists San Francisco Bay as mercury-impaired and a fish consumption advisory was issued in 1994. In the 1990s, management solutions were hampered by poorly defined loads. In response, the Regional Monitoring Program for Water Quality in San Francisco Bay (RMP) methodically completed research to determine the magnitude of loads from key pathways. Now, after eight years, RMP program scientists and collaborators have provided quantitative load estimates of atmospheric mercury deposition to the Bay (27 kg/y) (Tsai and Hoenicke 2001), of the large rivers (261 kg) (David et al. 2008), of the mining impacted Guadalupe River (140 kg) (McKee et al. 2005), and of an industrial urban tributary for a dry year (results not yet available). In parallel, the Regional Water Quality Control Board (RWQCB) developed a series of draft Total Maximum Daily Load Reports (2000, 2003, and 2004) that collated knowledge about mercury in the Bay and incorporated RMP research information year-by-year. The RWQCB prepared a Basin Plan Amendment that prescribed waste load allocations designed to remove impairment within 20 years (25% reduction from the large rivers; 50% reduction from urban runoff; 98% reduction from Guadalupe River; 33% reduction from municipal and industrial wastewater) (Looker 2006). Then a first-of-its-kind mercury budget for urban stormwater was developed that indicated historic and ongoing atmospheric deposition was the largest source to urban stormwater (45%), that erosion of natural soil mercury accounted for 27%, and that mercury spilled or volatilized as it is moved into the waste-stream (transport to and processing in land fills and recycling facilities) accounted for 22% (McKee et al. 2006). Given little opportunity for improving waste management or recycling, it was concluded that mercury capture across large areas of the urban landscape would be most effective (street sweeping, drainage maintenance, and industrial area retrofit treatment). However, to achieve the prescribed waste load allocations in

20 years, perhaps wholesale stormwater treatment will be necessary in the absence of controlling atmospheric sources (Mangarella et al. 2006). Research is now beginning to focus on speciation (methyl and reactive mercury). This paper demonstrates the association between scientific information development and harmonizing a closely connected, highly urbanized, catchment-estuary system.

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Estimation of biomass resource from *Mytilus galloprovincialis* attached the vertical seawall at Osaka Bay in Japan

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The invasive mussel *Mytilus galloprovincialis* dominates at the vertical structure composing the coast in Japan. This species plays a role of water purification from taking the terrestrial polluting load. However, a lot of oxygen was consumed after dropping the feces of this species and mussel themselves to the bottom during the summer. This causes to the dissolved oxygen deficiency at the bottom.

In this study, we suggested that the harvesting of this species cut the load of mussel residue and improved the bottom condition. We estimated the standing stock of this species and examined the difference of attached biomass in relation to the environmental condition at Amagasaki Harbor, Osaka Bay, Japan. Amagasaki Harbor is a closed shape by the vertical seawall. Our previous results suggested that the dissolved oxygen deficiency occurred in the bottom of this Harbor during 7 months through the year. The seawall of Nishinomiya is a straight line form with 4 km long. The average depth is about 12 m. A large amount of mussels attaches on the surface of seawall. We investigated the standing stock of this mussel from 14 sites at Amagasaki Harbor and on Nishinomiya seawall on August 2007 and January 2008.

The Blue mussel *Mytilus galloprovincialis* and the Pygmy mussel *Xenostrobus secures* coexisted at Amagasaki Harbor in summer and no *M. galloprovincialis* was observed in winter. Therefore, it is considered that the mussels dropped out and died. The other side, three species: *M. galloprovincialis*, *X. secures* and the Green mussel *Perna viridis*, were found at the seawall of Nishinomiya even in winter.

We compared the difference in size of this mussel between at Amagasaki Harbor and Nishinomiya seawall. The mussel size at Amagasaki Harbor was larger than that in Nishinomiya seawall.

From this result, the larva of this mussel move into Amagasaki Harbor earlier than Nishinomiya seawall. The mussel size in Nishinomiya seawall grew by 30 mm from July to January.

When the annual harvesting time is made summer, the amount of biomass resource from Amagasaki Harbor and Nishinomiya seawall was Total Organic Carbon (TOC) 4.7 t and Total Nitrogen (TN) 830 kg, and this time is assumed winter, the quantity was TOC 87.6 kg and TN 13.8 kg.