



TIP 233: Field Evaluation of the Service Life of Foul-Release Coatings in Columbia River

Context

The zebra mussel, *Dreissena polymorpha*, and the quagga mussel, *Dreissena rostriformis bugensis*, can cause economic and ecological damage. These foreign freshwater mussels can firmly attach to hard substrates using byssal threads. High levels of mussel recruitment and firm attachment occur on mild steel, concrete and PVC structures. They can clog screens and pipes and foul other hard substrates, which could lead to interference in the operation of hydropower facilities on the river. If they become established in the Columbia River Basin, management costs at hydropower facilities are expected to exceed \$23 million with annual costs estimated at about \$100,000 per facility.

Description

The effective service life of foul-release coatings will be evaluated relative to the protective coatings by the resistance of the coatings to damage caused by field deployment (i.e. abrasion, impact, immersion, and substrate adhesion) as well as the resistance to quagga mussel attachment. Concrete and mild steel panels will be immersed in the Columbia River for a period up to 36 months. Physical coating damage and fouling in the Columbia River as well as the resistance to quagga mussel attachment will be evaluated biannually for three years (0, 6, 12, 18, 24, 30, and 36 months) with five replicates per treatment. Treatments include two substrate materials (mild steel and concrete), three coatings and seven time periods of field deployment. Experimental controls are the coatings currently used to protect immersed concrete (Crystal Seal) and steel (Corps of Engineers V-766) as well as bare concrete.

The Portland State University (PSU) laboratory will evaluate the small panels to determine the physical coating damage. The large panels will be transported to the Nevada Department of Wildlife Lake Mead Fish Hatchery in order to evaluate the coatings' resistance to quagga mussel attachment. The 270 remaining panels (135 large and 135 small) deployed at U.S. Army Corps of Engineers' hydropower facilities will be left in the Columbia River to facilitate future coating evaluations over time periods greater than 36 months.

Why It Matters

Delay in implementation of a foul-release/anti-fouling technology could cause accrual of costs while project review is undertaken after the fact, or could lead to a decision to use an inferior or unacceptable product based on the need to react quickly to evidence of fouling impacts.

Goals and Objectives

The results from this project will be immediately applicable to BPA's management planning efforts for quagga/zebra mussel invasion of the Columbia River Basin. The outcome will inform risk and cost/benefit analyses on implementation of various quagga/zebra mussel management techniques at all hydropower and fish handling facilities in the basin.

Foul-release coatings may prove to be cost-effective for mitigation of macrofouling on Columbia River Basin facility components like trash racks, intake bays, intake tunnels, and pump wells compared to other control means such as manual cleaning and chlorination. It's also critical, however, to demonstrate the expected service life of these coatings under Columbia River conditions compared to the coatings currently used to protect steel and concrete in order to perform a detailed cost analysis. Non-toxic foul-release coatings offer promise of an environmentally sound control strategy.

Technology Innovation Project



Project Brief

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Project Start Date: October 2010

Project End Date: May 2014

Funding

Total Project Cost: \$319,677

BPA Share: \$249,939

External Share: \$ 69,738

BPA FY2012 Budget: \$ 73,632

Reports & References

Participating Organizations

Portland State University

Pacific States Marine Fisheries Commission (PSMFC)

Links

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