Waterpower XII Abstract

# Non-Structural Approaches for Addressing Dissolved Oxygen Concerns at Hydropower Facilities.

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Low dissolved oxygen (DO) concentrations pose a common water quality problem downstream of hydropower facilities. In recent years, engineering improvements (e.g. installation of weir dams or aerating turbines) have dramatically improved water quality at some facilities. However, even with these improvements, many hydropower projects are unable to meet state water quality standards for DO. With numerous dams across the nation coming up for relicensing and recent regulatory changes to more watershed-based approaches [like the Total Maximum Daily Load (TMDL) program], it is increasingly important that the hydropower industry understand its options for addressing DO issues. In addition to engineering controls (structural measures), hydropower facilities may consider operational changes and watershed management techniques. On behalf of the DOE Hydropower Program, we summarized the major non-structural approaches for addressing the DO problem that are potentially available to hydropower facilities.

Operational improvements to raise downstream DO concentrations include: (1) fluctuating the timing and duration of flow releases, (2) spilling or sluicing water, (3) maintaining minimum flows, and (4) mixing of generation and auxiliary flows. An advantage of watershed management approaches to regulating water quality is that hydropower impacts (both positive and negative) could be considered together with other point and nonpoint discharges at the watershed scale. For example, in the case of watershed-based pollutant trading, it is conceivable that an upstream industry could pay for DO improvements at the downstream dam in lieu of more expensive in-plant source reductions. A watershed management approach may also substitute biological or ecological criteria for strict DO standards for meeting water quality goals, or conduct riparian or aquatic habitat improvements. Depending on the site-specific situation and the relative cost-benefits, hydropower facilities may need to use a combination of structural, operational, and watershed management approaches to adequately address the DO issue.

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