

Bringing Environmental Considerations into Water-use Optimization

How can the US develop sustainable hydropower?

Conventional hydropower provides the bulk of renewable energy in the US. Popular support for building dams has waned due to concerns about environmental effects. Because future growth in waterpower production depends on public trust, an important challenge will be to ensure that future hydropower meets sustainable production standards that protect aquatic ecosystems downstream. This can best be secured through practices and regulatory standards will improve energy security without causing environment damage.



This project seeks to define conditions that promote the long-term economic and environmental viability of waterpower. We are developing quantitative, science-based approaches to meet this challenge. The methods developed at ORNL will quantify relationships between seasonal flow releases and health of fish populations.

Linking flow and fish population health

A movement in ecology claims that flow regimes following “natural” patterns are required for the ecological health of rivers because species evolved to these highly variable flow conditions and the diversity of river habitats that it creates. Our goal is to identify which features of flow regime are most important to biota and how these can be developed into quantifiable tools for shaping future flow regimes in practice. ORNL is focusing on the role of pulse flows and floodplain inundation as it relates to prey available to fishes (salmon) below New Don Pedro Dam, California.



Ecological valuation

Our long-term goal is to bring ecological considerations into the equations used to make decisions guiding the operation of hydropower projects. To advance this goal, we will develop and apply ecological valuation methods that facilitate comparisons between energy and ecological objectives. These methods will identify places where bioenergy can be produced using suitable crops or residues that enhance or protect biodiversity.



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