

## **Project Profile:**

### **Boardman River Dam Removal (Grand Traverse and Kalkaska Counties, Michigan)**

The Boardman River Dams Committee considered the fate of four dams on the Boardman River in Grand Traverse and Kalkaska Counties Michigan. The dams were installed for the purpose of electricity generation and flood management, and, at the time of Veritas' evaluation, the electric utility decided not seek relicensing them for electricity production. As a result, the community had to determine the fate of the dams. The community's choices ranged from taking over and continuing the dams' operation to decommissioning and removing them. In between these extremes were a large number of other alternatives. An important input to informed decision-making is evaluating the socioeconomic impacts of the various dam management alternatives. Veritas Economics (Veritas) conducted socioeconomic analysis to help inform decision making regarding the various management alternatives for the four dams.

In their baseline state, the dams provided economic benefits associated with flood protection, recreational opportunities, and the ability to produce electricity from a renewable energy source. In addition to the costs of operating and maintaining the dams to provide these benefits, the dams' presence comes at the cost of forgone ecological production associated with the river's natural riparian and aquatic state. While removing the dams also comes at a cost, there are benefits associated with changes in the characteristics of the river. For example, both ecological production and recreational opportunities would change in newly open sections of free-flowing river that restore anadromous fish runs.

Properly evaluating the alternatives requires addressing the complexities associated with accurately measuring the socioeconomic impacts and trading off the incremental costs and benefits associated with each option: for example, comparing the costs of continuing to operate the dams and the resulting benefits (flood protection, recreation, and renewable energy production) to the costs associated with the dams' removal and restoration of the river's riparian and aquatic habitat and the resulting benefits (ecological production and recreation opportunities). Therefore, identifying which set of potential alternatives maximizes benefits to society requires accurately evaluating and comparing the benefits and costs associated with each alternative.

Veritas conducted a detailed quantification of the existing conditions on the Boardman River and developed mathematical linkages between existing conditions and usage to serve as the basis for evaluating alternatives. Veritas' quantification of existing conditions included

- Quantifying current usage levels for recreational activities, such as fishing, canoeing, camping, and hiking;
- Estimating the current level of expenditures in the local economy associated with current usage levels;
- Estimating the current value of properties around the impoundments; and
- Evaluating the benefits associated with providing renewable energy to support Michigan's renewable portfolio standard (RPS).

Veritas used the results of its existing conditions quantification to develop economic models that properly characterize the baseline conditions of leaving the dams installed. After developing the baseline models, Veritas conducted counterfactual (i.e., alternative scenario) analysis to evaluate the socioeconomic impacts of each management alternative. Veritas evaluated the socioeconomic impacts associated with alternative outcomes for the Boardman River dams by performing counterfactual experiments that simulated changes in the current dam and river conditions that arise from the various management alternatives. The simulations estimate changes in recreational usage and values for fishing, canoeing, and kayaking; tourism expenditures; property values; and electricity production and prices resulting from changes to one or more of the existing dams.

Based on the results of the analysis, the dam owners decided to remove the Sabin, Boardman, and Brown Bridge dams and modify the Union Street dam for fish passage. Environmental benefits included enhancing and restoring 3.4 miles of native cold water habitat, reconnecting 160 miles of high-quality river habitat, and restoring more than 250 acres of wetlands. See Bingham and Kinnell (2012) for a detailed description of Veritas' socioeconomic models and results.

#### **References:**

Bingham, M.F., and J.C. Kinnell. 2012. "The Role of Socioeconomic and Behavioral Modeling in an Integrated, Multidisciplinary Dam-Management Study: Case Study of the Boardman River Dams." In *Environmental Land Use Planning*, Seth Appiah-Opoku, ed. ISBN 978-953-51-0832-0. Rijeka, Croatia: InTech. Available at <http://www.intechopen.com/articles/show/title/the-role-of-socioeconomic-and-behavioral-modeling-in-an-integrated-multidisciplinary-dam-management->