Introduced in the pages that follow are the six finalists for the 2010 Franz Edelman Award.

Over the past several months these teams have demonstrated to the judges that their work is among the finest examples of operations research practice in the world. One of these organizations will be recognized as the best in class, the first-place recipient of the 2010 Franz Edelman Award.

Each finalist's work is described here in a shortened summary. Full papers will be published in the January/February 2011 issue of Interfaces, *the INFORMS journal dedicated to improving the practical application of operations research and the management sciences in today's organizations and industries.*

The Finalists for the 2010 Franz Edelman Award Are

Delaware River Basin Commission

Deutsche Post DHL

INDEVAL

New Brunswick Department of Transportation

Procter & Gamble

Sasol

Delaware River Basin Commission

Breaking the Deadlock: Improving Water Release Policies on the Delaware River with Operations Research

Project Summary

The *Binghamton Press & Sun Bulletin* headline read "Fishermen and Water Managers at Odds over Water Releases." The date was July 1972. The issue was how much water could be released over the summer from the Upper Delaware River reservoirs, which serve New York City, to sustain wild rainbow trout and American shad populations while still ensuring sufficient reserves in case of a drought.

The controversy raged without resolution for more than 30 years until, in 2006, a coalition of conservation organizations backed by a team of operations researchers worked with government authorities to implement a win–win solution.

The Delaware River, originating in New York's Catskill Mountains, travels nearly 400 miles to the sea via New York, Pennsylvania, New Jersey, and Delaware. The river is a physically and politically complex system with many stakeholders, including New York City households that rely on the river for half of their drinking water, river valley residents who fear flooding, shippers and boaters on New Jersey canals, and river life such as oysters that inhabit the Delaware Bay.

The Delaware's waters are administered under the terms of two U.S. Supreme Court decrees that gave New York City the right to build three dams on its headwaters and divert water for the city's own use, provided it maintained specified downriver flows. The Supreme Court also required unanimous agreement among the four impacted states and New York City about future changes in water release policy.

Three major issues weighed on the allocation and utilization of the Delaware's waters.

First, New York City's generally conservative water policy requires reservoir levels to ensure sufficient future supply. Second, environmentalists, concerned for the health of the wild fish population, wanted increased spring and summer releases and the elimination of unnatural fluctuations in currents to ensure sufficient and consistent cool water flows. Third, concerned Delaware River valley residents, who had suffered from serious flooding three times over four years, wanted flood protection by maintaining reservoir "voids."

An operations research solution based on adaptive inventory control helped balance these concerns. This solution expressed release policies as a function of the storage in the reservoirs and the season of the year. To establish these policies, the authors used experimental design to select a range of candidate release policies for evaluation, discrete event simulation to test the policies in detail, regression analysis to develop predictive relationships between release levels and policy outcomes, and quadratic programming to balance releases across reservoirs. Finally, cost–benefit trade-off analyses provided an objective basis for devising a balanced water release policy that met the conservationists' key objective of substantially increasing the upper river aquatic habitat while providing modest flood mitigation for valley residents—all with no increased risk to New York City's available water.

The simple structure and logic of the new program, called the Flexible Flow Management Policy (FFMP), made implementation easy and attractive to river administrators, and its ability to handle the drought of the century was an acid test of its feasibility.

Implemented in October 2007, the FFMP is estimated to increase trout and shad habitat by about 200% and provide a modest increase in flood-mitigating reservoir voids with a minimal impact on the risk of drought in New York City. The states of New York, New Jersey, Pennsylvania, and Delaware, along with New York City, unanimously approved the FFMP. The Delaware River Basin Commission and the U.S. Geological Survey Delaware River Master administer it. Three conservation organizations—Trout Unlimited, the Nature Conservancy, and the Delaware River Foundation—collaborated in the development of the FFMP, and operations research modeling and analysis was done at Columbia University.

Economic benefits include an estimated $163 million annual increase in fishing and boating income in the impoverished Upper Delaware River Valley and potential flood mitigation (losses from recent floods far exceeded $226 million). The ensuing collaboration between previously contentious adversaries in an interstate water resource dispute is seen in other U.S. regions as a possible model to emulate. As one high-ranking official involved in decision making stated, "FFMP broke the barrier on how to manage water flows efficiently."

Organizational Overview

In 1961, President John F. Kennedy and the governors of Delaware, New Jersey, Pennsylvania, and New York signed concurrent compact legislation into law that created a regional body with the force of law to oversee a unified approach to managing a river system without regard to political boundaries.

The members of this regional body, the Delaware River Basin Commission (DRBC), include the four basin state governors and the division engineer of the North Atlantic Division of the U.S. Army Corps of Engineers, who serves as the federal representative.

The DRBC worked on this project with the Nature Conservancy's Eastern U.S. Freshwater Program, the Eastern Lands Protection Program of Trout Unlimited, Columbia University, and the Delaware River Foundation.