Continued from previous page

development to address the interrelated energy-water-environment issues for several government agencies. For example, INL has an active role with the U.S. Army Corps of Engineers to establish protocol, and implementation of in situ, remote sensing tools and environmental data acquisition systems—for real-time monitoring of the health of dams and levees as part of the critical infrastructure protection efforts of DHS.

INL supports the U.S. Climate Change Technology Program by providing economic analyses related to energy and water impacts, and policies.

Water and Climate

INL conducts research to understand and adapt to changes in water resources and the effects of climate variability. INL also supports the U.S. Climate Change Technology Program by helping to assess and develop national energy strategies, national climate change policies, strategic planning, and emerging international science and technology issues. Additionally, INL focuses on developing tools and technologies to analyze climate, energy and water resource issues, and the potential impacts of climate change on energy and water resources.

INL has a long history of innovating leading-edge remote sensing and GIS methods and tools to conduct assessments related to environmental changes and to develop advance predictions of mountain snowpack runoff. INL has worked closely with NASA, the Pacific Northwest Collaboratory and the North Olympic Peninsula to develop decision support tools. These tools increase our understanding of various stresses on natural resources and assess opportunities to minimize the impacts or increased use of water resources in the Columbia River Basin and on the Olympic Peninsula in Washington state.

INL's expertise includes extensive characterization of land and water resources at various sites in Idaho and other regions of the U.S. This includes characterization, modeling and managing groundwater resources, and using systems dynamic models to better assess complex scientific and engineering problems. These include assessing the dynamics and feedback associated with complex socioeconomic, energy and water resources systems and issues.

The goal of INL's climate change work is to collaborate with state, regional and federal agencies, universities and other researchers and stakeholders to develop a better understanding of the probabilities, vulnerabilities and potential impacts of projected climate change and variability. It is also to develop strategies to either avoid or adapt to negative impacts or to take advantage of positive impacts relative to water resources. Furthermore, it is INL's goal to conduct such evaluations in a systematic and interdisciplinary manner, and to develop a holistic understanding and comprehensive response to potential vulnerabilities and impacts on the region's energy and natural resources.

For more information

Mountain West Water Institute

Greg Stormberg
Manager, Earth & Water Resource Science Department
(208) 526-1241
gregory.stormberg@inl.gov

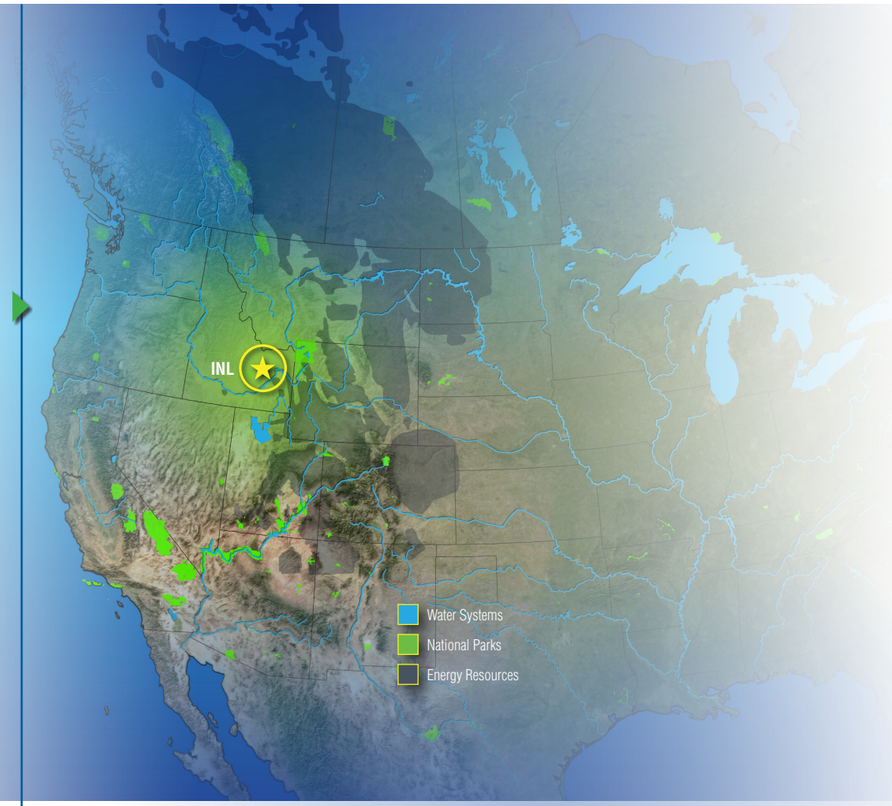
INL Water Program

Richard Rankin
Program Director
Energy & Environment
(208) 526-3049
richard.rankin@inl.gov

A U.S. Department of Energy National Laboratory

09-GA50082-08R3 R6-11

INL is centrally located in the Western Energy Corridor, where it shares a common vision for energy and water resources.



The Energy of Innovation

Idaho National Laboratory

INL Water Program

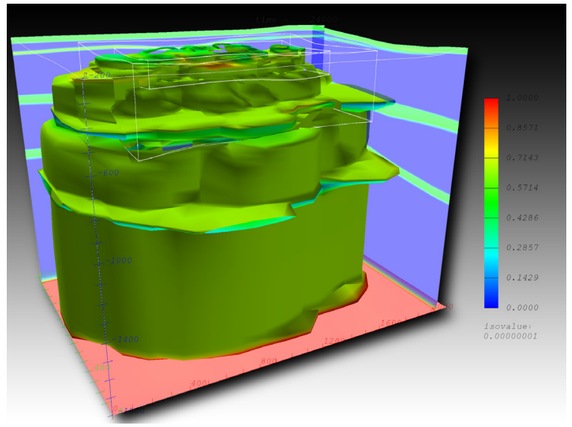
Sharing a Vision for Energy and Water

INL is centrally located in one of the nation's richest energy resources – the Western Energy Corridor. This region also hosts natural beauty, sensitive environmental systems and major life-supporting water systems. Here, INL shares a common vision for energy and water resources, and partners with state and federal land managers to sustain the region's natural resources and economy.

The Mountain West—as well as the nation—is faced with emerging critical management challenges associated with increasing and competing demands for limited water resources to meet growing demands for energy production, agriculture, industry, domestic use and for sustaining our environment. Drivers for these challenges are many, and include: climate change, population increases and migration patterns, changes in land use, changing resource uses associated with energy production, industrial development, domestic consumption, agriculture initiatives, transportation fuels, recreational demands, and ecosystem protection and sustainability.

Given the Mountain West's snowpack-dominated hydrological system, adapting to these changes requires reliable projections of future demands and conditions, and the resulting impacts on the region's water systems. Meeting these challenges within individual states, regions, and across regions will require increasingly

Continued next page



The Mountain West Water Institute provides the science, predictive tools and technologies needed to assess, monitor and adapt to changes in water resource conditions.

Continued from previous page

sophisticated and integrated data collection, modeling, and decision analysis tools. Together, these processes will aid in understanding complex earth system processes at a variety of spatial and temporal scales, and provide the tools to model the likely outcomes of alternative adaptive management strategies used to address climate variability.

The Mountain West Water Institute

The Mountain West Water Institute (MWWI) is a federal/state collaboration that provides the science, predictive tools and technologies that the region's water stewards and users need to assess, monitor and adapt to changes in water resource conditions.

It is a regional science and technology research institution created to deliver science-based solutions for sustainable water resource management in the Mountain West region. The Institute will provide scientific tools and technology to:

- address water quality concerns,
- enable more accurate projections of water availability for both short- and long-term use,
- increase water-use efficiency,
- improve water resources management, and
- enhance understanding of climate change impacts on water availability and energy production in the Mountain West region.

The Institute's mission is to to help the Mountain West's energy and water stewards and users to rapidly and effectively assess and monitor – and proactively adapt – to changes in resource conditions. In so doing, the Institute will provide consistent data and technology to local, state and federal parties that are not currently available.

Institute researchers work with others to provide scientific basis and decision-support systems that improve water resource management and policy at watershed and regional scales. In the long term, the Institute will establish a legacy of excellence in collaborative resource management for the Mountain West. The organization can help the region achieve sustainable water management policies and practices in the face of uncertainties in population growth, development and climate variability.

Water and Energy

INL leads research into the sustainability of energy and water resources and in developing solutions to energy-water challenges. Some examples of INL's technical and programmatic activities relevant to water and energy are highlighted in the following paragraphs.

Water and Nuclear Power— INL is DOE's lead laboratory for nuclear power research and development. The generation of nuclear power, like the production of most sources of energy, requires large, reliable sources of clean water for cooling and power generation. INL's Nuclear Energy Program includes finding ways to reduce the amount of water necessary to generate nuclear power including alternatives to water use.

Water and Energy Efficiency and Technology Programs— INL has long been involved in research and technology development programs for fossil energy, hydropower, wind, geothermal, industrial energy efficiency, and water treatment programs that address the relationship between a power source or industrial process use and water use. INL conducts systems modeling research to predict water balances on a basinwide level, to more efficiently manage watersheds.

Biotechnology and Water— INL has been a leader in advancing biogeochemical sciences for many years. The current INL program is directed toward cleanup of impacted surface and subsurface water sources using biogeochemical and microbiological processes.

Water Treatment/Reuse Technology— INL has successfully developed advanced water treatment technologies for a wide variety of applications. Its leading-edge technology has been successfully demonstrated for the treatment of wastewater from metal plating operations, pulp and paper operations, and groundwater contaminated with arsenic and heavy metals, and volatile organic compounds.

Water Security

INL is advancing science and technology to protect the nation's drinking water and its water storage and distribution systems.

INL has established—and continues to expand—its research and development testing and evaluation portfolio for mitigation of environmental impacts associated with water security threats on the nation's population and drinking water infrastructure. Collaborating with the U.S. Environmental Protection Agency (USEPA), INL has developed the Water Sample Concentrator that transforms a laboratory-scale sample concentration process into a luggage-sized automated system for use at virtually any location. This concentrator, along with INL and USEPA research collaborators, was awarded R&D Magazine's 2009 R&D 100 Award for technical innovation.

INL also leverages crosscutting collaborations with EPA, DHS, the Centers for Disease Control (CDC), and the Department of Defense Joint Program Executive Office for Chemical and Biological Defense—to establish testing infrastructure to conduct independent validation/evaluation of various decontamination protocols and vendor systems capabilities.

Additionally, in support of the DHS mission to protect critical infrastructure in the U.S., INL provides research and

Continued next page

INL has long been involved in fossil energy, hydropower/water smoothing, wind, geothermal, industrial energy efficiency, and water treatment technology development programs.

INL has developed autonomous systems to monitor the condition and safety of dams, levees and impoundments.

INL has established—and continues to expand—its research and development, testing and evaluation portfolio for mitigation of environmental impacts associated with water security threats.

ENERGY AND ENVIRONMENT