INTEGRATED WATER RESOURCES SCIENCE AND SERVICES (IWRSS)

SUMMIT TO SEA

WHAT IS IWRSS?

IWRSS is a new business model for interagency collaboration in the information age consisting of a consortium of federal agencies with complementary missions in water science, observation, management and prediction. Its overarching objective is to enable and demonstrate a broad, integrative *national water resources information system* to serve as a reliable and authoritative means for adaptive water-related planning, preparedness and response activities. After the leaders of NOAA, the U.S. Army Corps of Engineers, and the U.S. Geological Survey formalized the partnership in May 2011, the agencies began working to align programs and set up management mechanisms to begin IWRSS implementation, guided by the roadmap.

Improving the interoperability of data and systems is a high priority in all three agencies. Current information exchange mechanisms between each water agency are not standardized. Often, critical information is passed through unreliable means such as emails and phone calls. IWRSS will focus on seamless data and information exchange across partner agencies. System interoperability will enable efficient inter-agency communication and establishment of a common operating picture, facilitating improved forecasts and coordinated and timely actions to protect lives and property.

IWRSS: A CROSS-CUTTING, MULTI-DISCIPLINARY SYSTEMS APPROACH TO ADDRESSING COMPLEX WATER PROBLEMS COLLABORATIVELY

Focusing and aligning our collective efforts to develop and deliver flood inundation mapping is another key focus area. Today, flood forecasts are commonly communicated in the form of a hydrograph depicting future water levels at a river gauge observation site. Stakeholder feedback shows more information is needed to readily communicate flood impacts in local communities. Inundation maps showing the spatial extent and depth of forecast flood water are needed.

WHY IWRSS?

The need for IWRSS-style collaboration is even more apparent during difficult economic times, when leveraging capabilities across agencies can result in significant resource savings. However, inter-agency collaboration can be challenging. Achieving a well-integrated governance model for IWRSS requires significant investment in consistent socialization at many levels within each agency, but will ultimately yield significant dividends.

The IWRSS concept sprung from discussions among partners about what was preventing us from working together more effectively. Certain problems seem to be perennially unresolved, and important but complex water resource issues are beyond the reach or scope of any single agency. As key roadblocks were identified, a design emerged for a new way of approaching coordination and collaboration.

CASE STUDY: NEW YORK CITY DEPT. OF ENVIRONMENTAL PROTECTION

NYC Department of Environmental Protection is implementing a $5M water resources management decision-support system in an effort to improve turbidity control and optimize multiple operating objectives, including providing drinking water for a population of 9 million, flood control for a population of 20 million, and environmental and ecosystem needs. The system requires comprehensive hydrologic and water resources information and forecasts, including quantification of uncertainty, to better anticipate and manage conditions affecting water quality.

The alternative? If strict water quality thresholds are exceeded, NYC faces $8-10 billion in construction costs and hundreds of millions in annual operating costs for filtration plants, new multilevel reservoir intakes, and other structures.

IWRSS will capitalize on the efforts of NOAA, USGS and USACE to routinely produce forecast inundation maps and link them to societal impacts. Dynamic inundation maps, created in real-time, will better communicate flood risk and enable emergency managers to make more informed decisions about mitigative actions. Better static inundation map libraries, created for projected flood scenarios, will allow for the development of more effective emergency action plans and inform water resources and development decisions. Furthermore, new hydrographs showing forecast uncertainty and linked to these new inundation maps will also more effectively communicate risk and better inform water supply and availability decisions.

IWRSS will also leverage federal capabilities to produce new summit-to-sea high-resolution water resource analyses, forecasts and services, a subset of which are being generated for snowpack information. Since the inception of river and flood forecasts, information provided has been limited to water in major rivers, and only at certain points. In addition, forecast information has stopped short of the coastal regions where tides and surge influence river flows. These areas are where over a third of the U.S. population lives and nearly half of the U.S. economic output occurs. Coupling freshwater, estuarine, and ocean interactions, this new short- through climate-range water resources guidance and information will inform water management decisions supporting agriculture, recreation, flood control, energy generation, water quality, river commerce and ecosystem management by providing new, more expansive, high resolution parameters, including precipitation, evapotranspiration, soil moisture, and groundwater, among others.

High-level dialogue among IWRSS partners, the National Science Foundation and the academic community has resulted in a conceptual "National Water Modeling System." This concept, still very formative, would be an Earth-system based modeling and data services framework to combine modeling assets to enable simulation of hydrologic processes and the water budget at very high resolution over continental scales. This "summit-to-sea" approach will help stakeholders address changing needs in an uncertain future, across scales ranging from hillslopes to watersheds, in events from droughts to floods.

Many additional gaps have been identified where improved interagency collaboration is needed. Some of these include: enterprise GIS, improving observational capacity, more effective leveraging of R&D investments across agencies, better integration and use of meteorological and climate-scale information, and coordinated outreach and stakeholder engagement.

NATIONAL WATER CENTER

Enhancing federal collaboration and leveraging resources via the IWRSS consortium

Located on the campus of the University of Alabama in Tuscaloosa, the National Water Center (NWC) will be a 65,000 square foot LEED gold certified facility with a capacity of 200 people. This first-in-the world facility will enable NOAA and its federal water partners to introduce new data capabilities, models, and decision-support tools and produce the comprehensive information needed to support next-generation adaptive water planning, preparedness, and response activities. The NWC will serve as a cornerstone for Integrated Water Resources Science and Services and provide a central hub to integrate and advance regional field operations and services.

The building has been designed from the ground up with unique features to support a new, highly collaborative and comprehensive water program to address the needs of stakeholders and help build more resilient communities. At the core of the NWC is the Operations Center, a collaborative "nerve center" for day-to-day national situational awareness that will house staff from multiple agencies and support a Common Operating Picture for water resources. State-of-the-art multi-media communications technology will bring the Operations Center to the field as well as to stakeholders. Together with adjacent situation rooms, this facility will enable full hydrologic *impact-based decision support services* at a national level. The Geo-Intelligence Laboratory will support geospatial data and information needs across the enterprise and improve our Geographic Information System (GIS) capabilities. The Collaborative Science and Software Engineering Studio will strengthen research and development activities in conjunction with the NWC Proving Ground, a technology facility dedicated to testing and integrating new systems and capabilities before delivery to the field. The new Information Technology Laboratory will unify IT resources and facilitate enterprise high-performance computing. The NWC Distance Learning facility will provide a unique state-of-the-art training and education resource with the same communications technologies as the Operations Center, bringing the classroom to the student and providing expertise to anyone, anywhere. These features are key ingredients, providing the new information needed by decision makers and strengthening collaborative relationships, both within the NWS and NOAA and with federal partners and stakeholders.

This new infrastructure sets the stage for an exciting future as staffing and operations begin at the NWC and new and stronger relationships are formed. Construction began in February 2012 with building occupancy scheduled for July 2013. Planning is underway to achieve "Initial Operating Capability" by mid-2014.

IWRSS National Water Center, University of Alabama, Tuscaloosa, 2013