RTI INTERNATIONAL | Center for Water Resources

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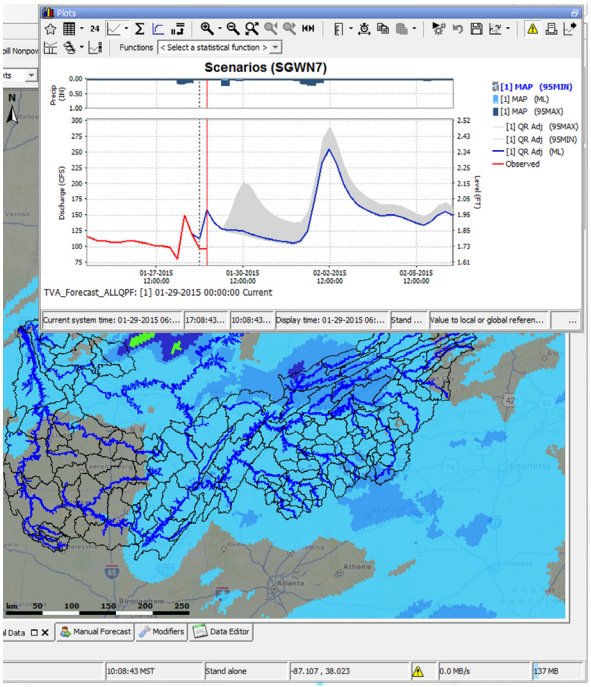
IN-HOUSE RIVER FORECAST SYSTEMS

WHAT IS AN IN-HOUSE FORECAST SYSTEM?

An in-house forecast system is operated and maintained by your organization's internal water resources experts with support from IT specialists. RTI International can design, build, and implement the system for you and provide your staff members with training and documentation on the final product.

The system can be hosted on your organization's existing infrastructure or in the cloud. It collects rainfall, water level, temperature, and flow data from public sources or your own monitoring networks. Your staff members operate and manage the system using weather forecasts *(which can extend months into the future)* to create flow or water-level forecasts where and when you need them.

With an in-house system, you control the data, model runs, and resulting products, and you can adjust the system as needed to adapt and improve your forecasts. Many users of in-house forecast systems also take advantage of related model outputs, such as real-time soil moisture, snow pack, and reservoir information. The calibrated models in the system can also be used for planning applications, for example, to simulate the impacts of land use or climate change scenarios in your river basin.



Example Forecast System Views

A RANGE OF OPTIONS

Forecast systems can vary greatly in functionality, resource requirements, and flexibility, creating a wide range of simple and sophisticated potential system designs. Examples include:

The simplest in-house systems download publicly available river forecasts and automatically process them into the information you need, such as local reservoir inflows. You can review the river forecasts in conjunction with weather forecasts and other local, contextual information (e.g., decision thresholds).

The most sophisticated systems integrate your preferred hydrometeorological data sources and rainfall-runoff, reservoir operations, or economic analysis models into a single multipurpose forecast system. You can review all data streams, quality control and modify model inputs, link your models in a variety of ways, and perform scenario analyses or operations optimization. This option offers maximum flexibility to create the information your organization needs.

Middle-ground options may include post-processing publicly available forecasts, integrating publicly available river forecasts with in-house reservoir models, or running a limited suite of custom models (e.g., rainfall-runoff only).

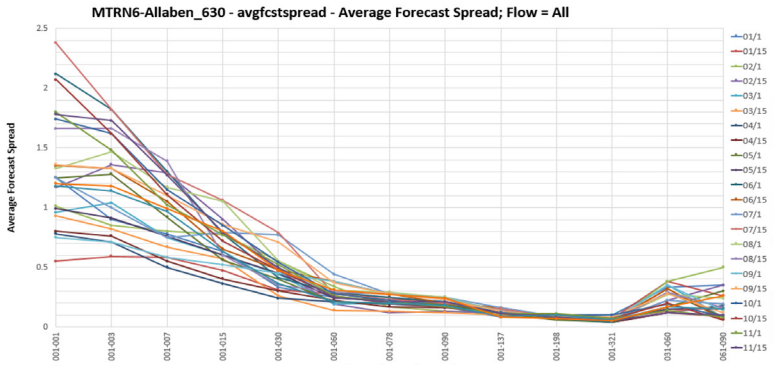
DESIGN CONSIDERATIONS

When designing your in-house forecast system, RTI collaborates with you to create a system that best aligns with your needs and objectives. There are many important factors to consider in the design, which may influence not only the choice of forecast source (e.g., publicly available forecasts versus custom modeling) but also details of the design specifications. Examples of factors and the associated design considerations include:

Design Consideration Factors	
Decision variable	What information affects your decision? Stream flow, water level, water temperature, water quality, or another variable? This factor will influence whether publicly available forecasts are an option and which models should be included in your system.
Basin characteristics	What are the size and characteristics of the basin area? This factor will influence the spatial resolution and type of models needed for your system. Also, in certain locations, public forecasts may not perform well and would not be recommended because of complex terrain, poorly represented regulation, coastal influences, or other factors.
Operational complexity	If your river basin includes some type of regulation (either operated by your organization or upstream of your location), how complex are the system operations? Systems with complex operations often warrant custom models to effectively account for the associated impact on streamflow in forecasts.
Existing models and processes	Does your organization have existing processes or models that should be integrated into a new forecast system? Examples include precipitation or streamflow monitoring networks, existing hydrologic or hydraulic models, reservoir/ operations models, optimization processes, etc. The nature and extent of such integration affect the system design and whether publicly available forecasts are an option.
Risk tolerance	How much forecast risk is acceptable for your organization and how significant are consequences that may result from inaccurate forecasts? In some cases, custom modeling is the best option because publicly available forecasts do not perform well at a specific location. In other cases, an organization may currently make decisions based on very little information and even rough estimates would be helpful to reduce operational risk.
Decision horizon or frequency	How far into the future are forecasts needed and how often must they be updated? User-specific decision horizons and required frequency may dictate whether publicly available forecasts will meet your needs or if custom-generated forecasts are a better option.

HOW USEFUL WILL THE FORECAST BE?

The decision to make an ongoing investment in an in-house river forecast system typically rests on the benefits it can bring to your organization and the public. However, judging how accurate and useful forecasts will be is often difficult until we start creating and using them. Even as forecasts are generated, it is difficult to track and evaluate all aspects of the forecast performance while also making decisions.



Forecast Bias Verification

Forecast verification can help in several ways:

- Before an in-house system is fully implemented, the system's models can be used to recreate past river forecasts, a process called "hindcasting," using archives of precipitation forecasts as input. The resulting hindcasts can be compared with historical observations to assess their accuracy and potential value to decision-making.
- Once the system is fully implemented, continuous forecast verification can show how well recent forecasts performed, and users can assess the extent to which decisions were improved through use of the forecasts.
- Together, hindcast verification and ongoing forecast verification can be used to adjust future forecasts, making them more accurate and reliable on average.

Reach out to our technical staff for a consultation and demo of our offerings.

CONTACT US

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