National Weather Service Support for Ecological Restoration in the Ohio Valley and Lake Erie Drainage Basin

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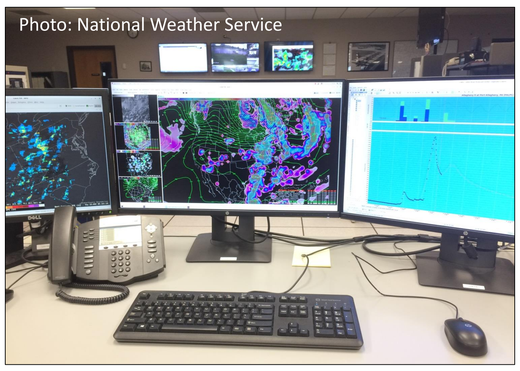


Photo: National Weather Service

How does the NWS support ecological restoration?

The National Oceanic and Atmospheric Administration's (NOAA) National Weather Service (NWS) is well known for producing daily weather forecasts across the country. Although it is less well known, NWS maintains expertise in operational hydrologic forecasting. Models executed at the NWS River Forecast centers can support a diverse range of stakeholder interests beyond traditional stage forecasting. This poster highlights three ways that ecological restoration stakeholders have leveraged river forecasting expertise at the Ohio River Forecast Center (OHRFC) by better linking our science to public decision-making.

The Runoff-Risk Advisory Forecasts

The Runoff-Risk Advisory Forecasts (RRAF) are tools being developed through agreements between state agencies and university researchers. These state tools provide farmers and other land managers with real-time forecasting guidance for fertilizer application to maximize nutrient retention on fields and to minimize non-point source pollution to aquatic ecosystems. RRAF are not regulatory; they are meant as beneficial tools to help farmers make informed decisions on the best time to apply fertilizer to their fields in order to keep more on fields and out of streams and lakes. Farmers in Wisconsin, Minnesota, Michigan, and Ohio are now using these tools, and there are plans for future state development in Indiana, Illinois, and the Lake Ontario watershed of New York. Relying on NWS modeling, on-farm research data, and multi-partner collaboration, these tools offer a science-based approach to nutrient application timing.

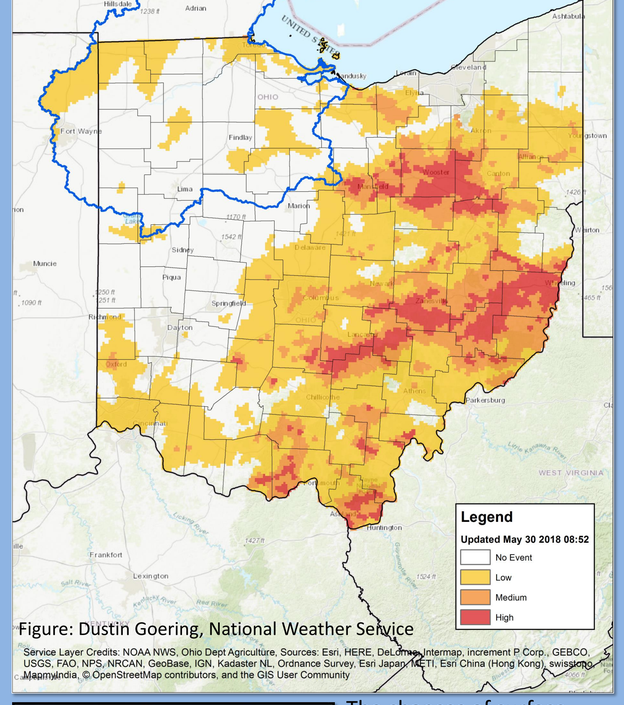
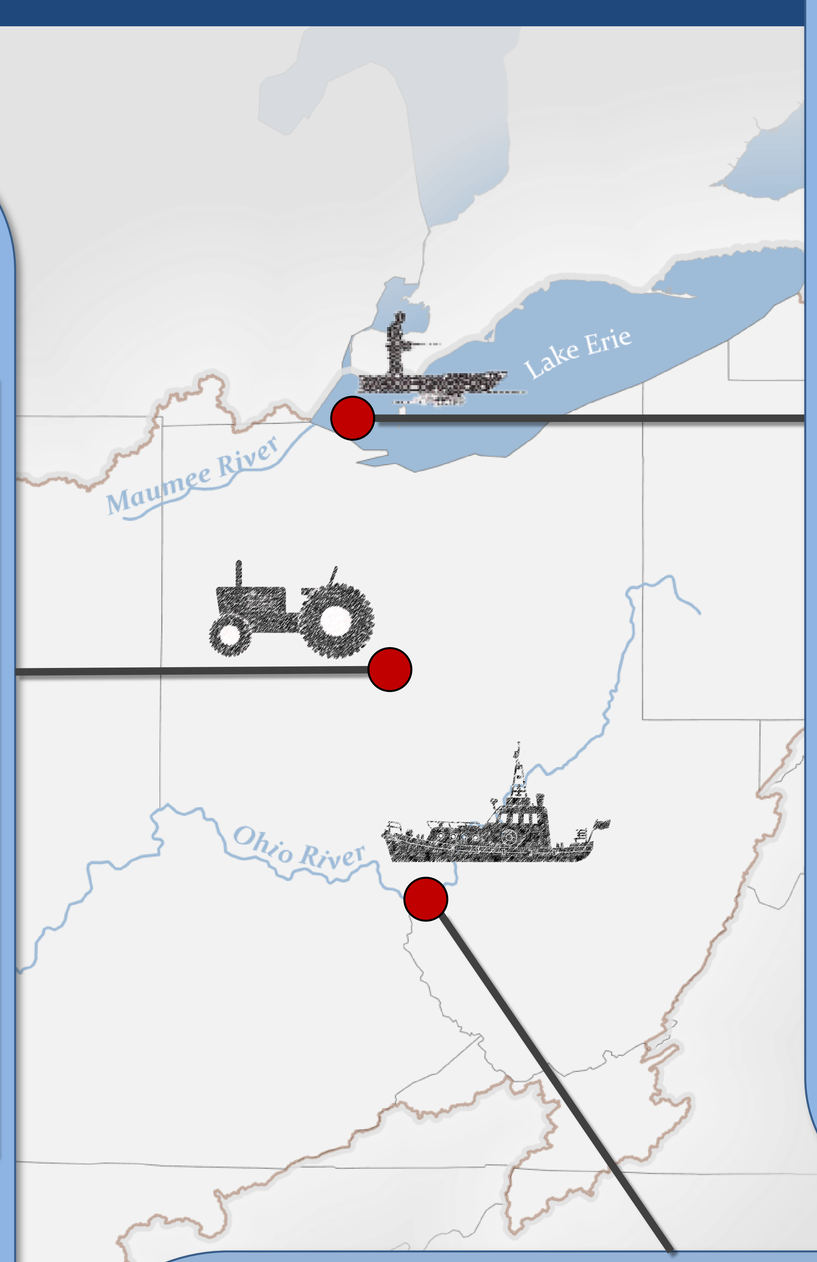


Figure: Dustin Goering, National Weather Service


Photo: National Weather Service

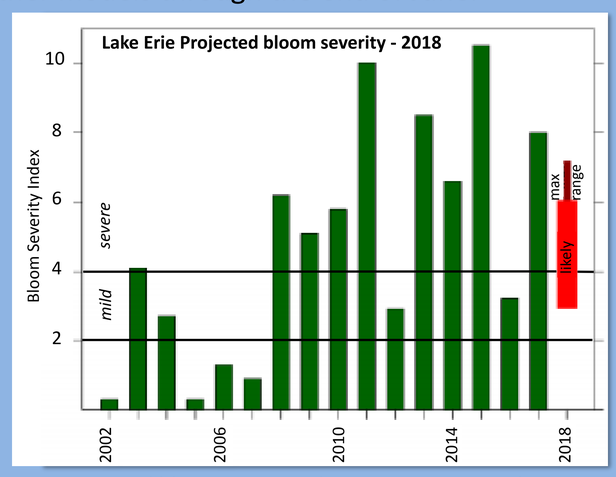
The chances of surface runoff are displayed on the overview map of Ohio, with risk categories of Low, Medium, and High.



Lake Erie HAB Projections

Implemented by NOAA's National Ocean Service and the Great Lakes Environmental Research Laboratory, these projections provide early warning to water treatment plant operators, environmental managers, and other users of Lake Erie in order to minimize negative impacts from toxins produced by harmful algal blooms (HAB). The severity of the western Lake Erie HAB depends on the input of bioavailable phosphorus, particularly from the Maumee River during the loading season (March – July). Starting in May, weekly projections give an estimate of potential bloom severity based on a combination of measurements, river forecasts, and past data. These projections are updated weekly with new data and weather models through the end of June.


Photo: Dan Engel (USGS)



Projected bloom compared to previous years. The wide red bar is the likely range of severity based on uncertainty in the weather forecasts. The narrow red bar is the maximum range of severity based on the models. Figure pulled from the 4th early season projection of 2018 (May 30, 2018)

Ohio River HAB Prediction Model

Currently being developed by the U.S. Environmental Protection Agency (EPA) and the Ohio River Valley Water Sanitation Commission (ORSANCO), this tool will use real-time hydrologic and water quality data from the Ohio River to forecast when conditions are suitable for harmful algal bloom (HAB) formation similar to the 2015 widespread toxic event. At full bloom, this 2015 event affected ~700 river miles and lasted from August to November. This HAB prompted five states to issue advisories or precautionary statements for contact recreation, led to water utility intake closures, and resulted in an estimated total cost for water treatment of $2M.

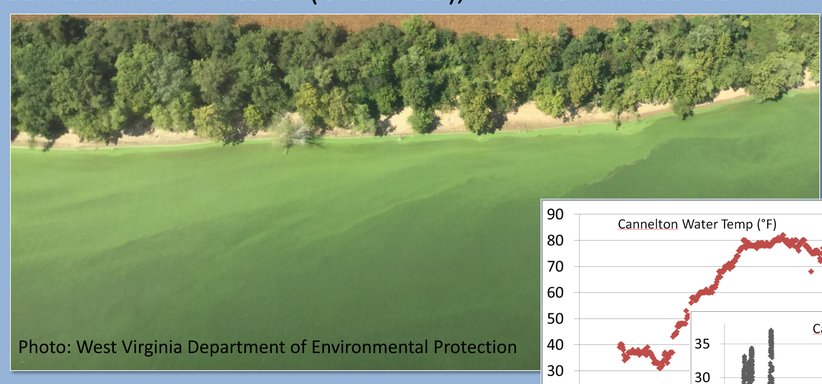
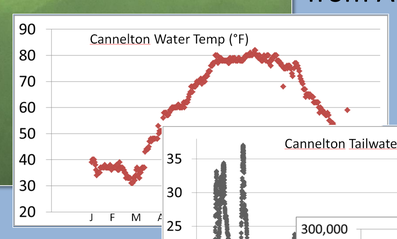
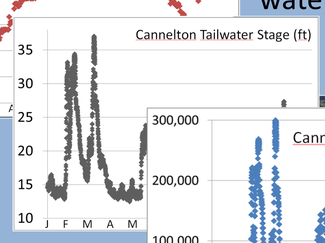


Photo: West Virginia Department of Environmental Protection





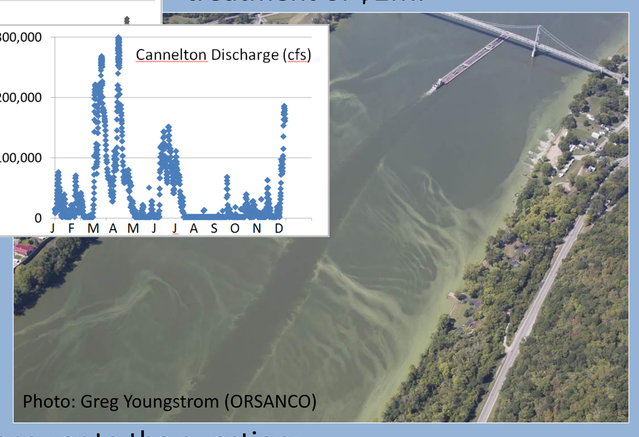


Photo: Greg Youngstrom (ORSANCO)

The NWS is helping development efforts by working with the EPA and ORSANCO to track down and process historic hydrologic and water quality data from locations along the Ohio River. These historic data (from 1995 through 2016) are being analyzed to determine if a HAB similar to the 2015 event can be predicted. Current analysis focuses on identifying significant correlations among variables, to find the most important HAB drivers. Along with improving how we monitor for HABs, this knowledge will help develop an Ohio River HAB Prediction Model. The end result will be a web-based ecological decision-support tool that graphically represents the answer to the question:

"How similar are today's conditions compared to those leading to the record 2015 HAB?"

The support provided for these Ohio Valley and Lake Erie drainage basin decision-making tools exemplifies how expertise in the NWS River Forecast Centers can further the ecological restoration efforts of our diverse partners and stakeholders.


Photo: National Weather Service

We acknowledge Dustin Goering (NWS) for work developing RRAF, Christopher Nietch (EPA) for work on the Ohio R. HAB Prediction Model, as well as Richard Stumpf (NOAA) for his part in developing the L. Erie HAB Projections. Credit is also due to Greg Youngstrom (ORSANCO) for his summary of the 2015 Ohio R. HAB. There are many other colleagues and partners integral to developing and improving these tools; to learn more, please contact the presenter.

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