Runoff Risk: A Decision Support Tool for Nutrient Applications

Current & Proposed Ecosystem IDSS Utilizing NWS Modeling to Help Improve the Nation’s Water Quality

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2.2 million farms cover 20% U.S. land area
$200 billion/year industry and employs 1/6 civilian workforce

Significant contributor to non-point source nutrient pollution
- Affecting 50% U.S. streams, 78% coastal areas, 64% shallow wells
- Creating and intensifying harmful algal blooms and hypoxic zones
- Impacting human health, the environment, and the economy
Nutrient Pollution Increasingly Identified as an Ecological Concern

Building a Weather-Ready Nation
Runoff Risk: What is it?

- Decision support tool for agricultural nutrient applicators
- Identifies threat of significant future runoff in both space and time
- Produced multiple times daily while modeling 10 days into future
- Developed in collaboration with states and partners to incorporate state specific application rules and guidelines
- States make an investment (time/website/management) and act as the tool owner and presenter to the public
- Fulfills strong desire/need for web/mobile based decision support tool for short-term application timing
Real-time forecasting makes *NWS uniquely suited* to fill the void and meet the desire for national modeling support.

**Timing of nutrient applications matters**
- A few large events can carry most nutrients off fields
- These significant events could negate year-long adherence to BMPs

**Runoff Risk supplements** “Right Time” guidance of 4R’s
- Warn of risk of runoff → delay application → potentially reduce losses
- Provides farmers with second opinion (back-up perspective)

**Runoff Risk incorporates factors farmers already use**
- Soil moisture, precip, snow water content, warming temps, etc.

*Right Source*  *Right Rate*  *Right Time*  *Right Place*
Why should NWS help?

- NOAA/NWS strategic plans and WRN address this issue
  - Leverage current capabilities into new IDSS
  - Address water quality issues and economic impacts
  - New partnerships and national/regional/local collaboration
  - Support NOAA and NOS to reduce hypoxic zones and HABs

- Supports the creation of Runoff Risk IDSS as a NOAA/NWS Ecological Forecast Service tool addressing nutrient pollution
Runoff Risk in Wisconsin

- Started in 2009, Live in 2011
- DATCP built, owns, and maintains the website (Public Face)
- First generation tool uses operational lumped model
- Spatial scale has always been a concern
- RRAF conditioned by analysis with observed field runoff
- Important to communicate limitations
Wisconsin’s RRAF

- Runoff Risk Advisory Forecast Updated 3 Times Per Day

Map of Wisconsin showing runoff risk levels and precipitation forecast for the next 3 days. Basin name: LAKE WINNEBAGO OSHKOSH (OSHW3)

3-day spreading risk forecast on Apr 07: Moderate
Earliest runoff expected (after Apr 07): Apr 07

Precipitation Forecast (inches)

Single-Day Runoff Risk

Forecast updated: Apr 7 4:00 PM
Wisconsin incorporated RRAF into state nutrient reduction plan

Mentioned in 2014 Government Accountability Office (GAO) report on freshwater

Other federal agencies are supportive and interested:
- Briefed senior NRCS scientists and federal HTF members

GLRI Priority Watershed Group
- New states engaged (OH and MI)
- Funding development and expansion of 2nd generation tool
Transition from lumped model to distributed (4km x 4km grid)

- Spatial scale was a concern: 300 mi² → 6 mi²
- Requires new model setup, all new analysis
- Collecting more edge-of-field runoff data
Second Generation Mock-up
Proposed Expansion via GLRI

[Map of the United States highlighting states in red, indicating the proposed expansion areas.]
Collaboration Growing & Essential

Established

Starting

Building a Weather-Ready Nation
Key Points

- First-of-its-kind real-time DSS focused on timing of any surface applied manure and fertilizer to reduce ag-field nutrient losses

- Meets numerous initiatives and goals in NOAA/NWS strategic plans

- Multi-agency collaboration with state led working groups and state investment, ownership, and delivery
  - State ownership and delivery required due to state specific rules for applications

- Increasing demand for this type of tool by increasingly sophisticated users and state agencies

- Requires little effort to incorporate into daily farming routine/management could produce positive impact:
  - More efficient fertilizer usage = save money
  - Decrease nutrient loads = improve environment
Wisconsin RRAF

- Google “Wisconsin RRAF”
  - [www.manureadvisorysystem.wi.gov/app/runoffrisk](http://www.manureadvisorysystem.wi.gov/app/runoffrisk)

- Background Information
  - NOAA Tech Report NWS 55
  - [http://docs.lib.noaa.gov/noaa_documents/NWS/TR_NWS/](http://docs.lib.noaa.gov/noaa_documents/NWS/TR_NWS/)

Further Questions & Comments

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