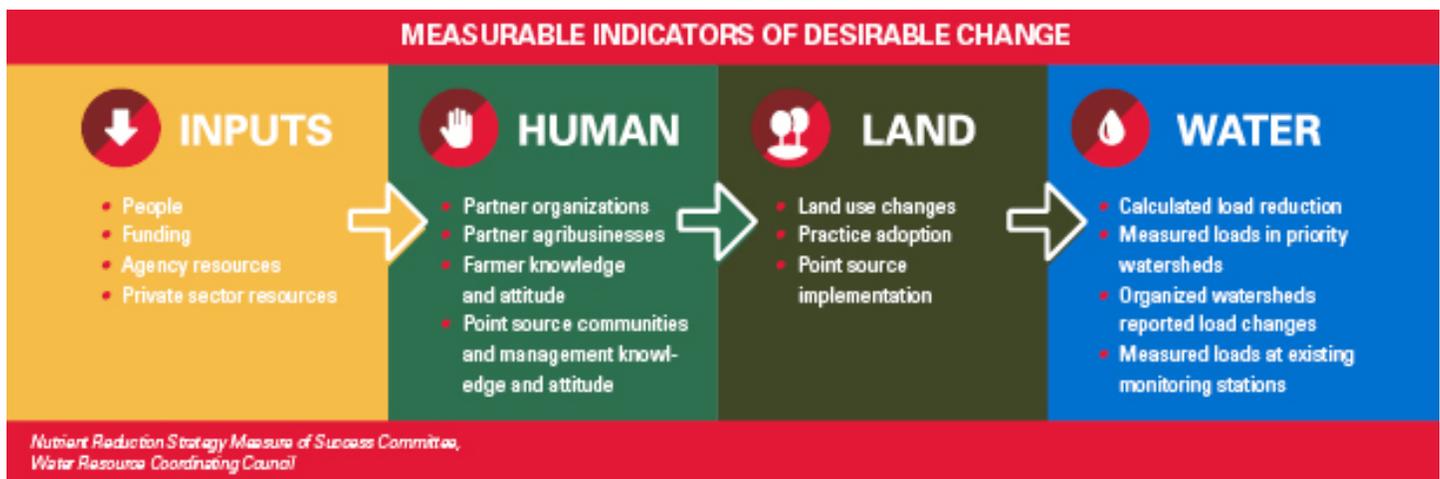


Iowa Nutrient Reduction Strategy Stream Water Quality Monitoring in Iowa

Measuring Progress

The Iowa Nutrient Reduction Strategy (NRS) is a research- and technology-based approach to assess and reduce nutrients—nitrogen and phosphorus—delivered to Iowa waterways and the Gulf of Mexico by 45 percent. To measure progress, researchers track many different factors, from inputs (e.g. funding) and the human domain (e.g. farmer perspectives) to land management (e.g. on-farm practices) and water quality. Monitoring Iowa streams provides valuable insight into measuring water quality progress and the reduction of surface water nutrient loss. The Iowa Nutrient Reduction Strategy (NRS) aims to reduce the load, or total amount (e.g. tons), of nutrients lost annually. Researchers calculate the load from water monitoring results, which measure concentration combined with stream flow.



This handout serves as a summary of the collaborative report, titled “Stream Water Quality Monitoring Conducted in Support of the Iowa Nutrient Reduction Strategy”; which can be accessed at <http://nutrientstrategy.iastate.edu/documents>.

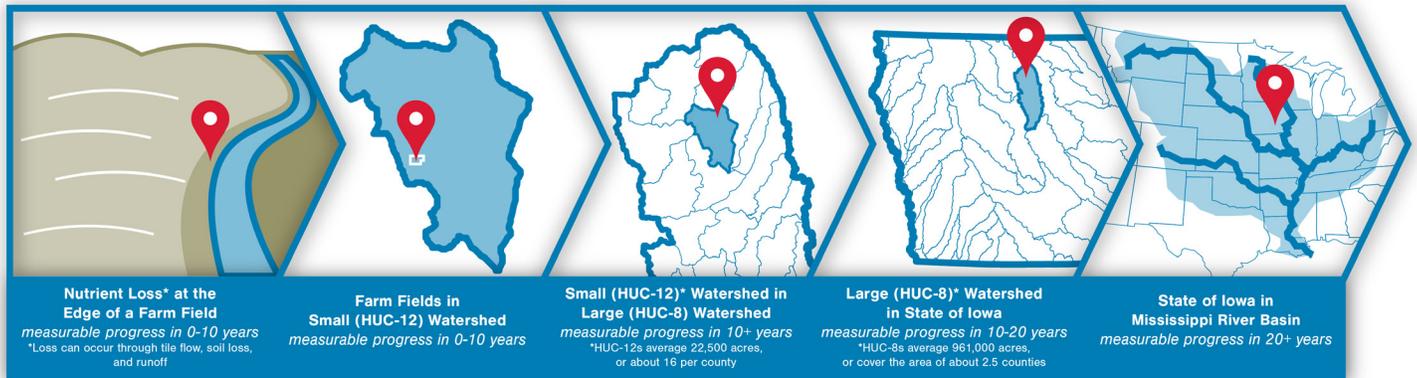
What are the Challenges in Tracking Progress Using Stream Water-Quality Monitoring Data?

While a wide array of monitoring projects are conducted in Iowa, there are a variety of key challenges that make it difficult to track progress in water quality over time. These challenges are continually evaluated and explored through research and continued monitoring.

- **Legacy Nutrients:** While nutrients are lost from land use and management, nitrogen and phosphorus that are already present in soil and groundwater can exit the system through surface water.
- **Lag Time:** After conservation practices are used in a watershed, it can take a significant amount of time, typically years, before the benefit is measured in the water depending on watershed size.
- **Limitations of Conservation Practice Data:** The use of conservation practices in a watershed must be well documented in order to attribute water quality changes to those practices.
- **Extreme Weather Events:** Heavy rains and severe droughts add complexity to measured changes in water quality, or make it difficult to effectively monitor. Climate change will increase the frequency of these events.
- **Locations of Monitoring Sites:** Selecting the appropriate location within a watershed area of a monitoring site is crucial to detecting changes that occur upstream.
- **Importance of Long-Term Data Collection:** Long-term records are often necessary to attribute water quality changes to conservation efforts (see framework on reverse side of handout).
- **Variable Precipitation and Stream Flow:** Precipitation is a factor that is highly variable, impossible to control, and significantly impacts nutrient loss; accounting for this variability in monitoring design and data analysis is a major challenge.

What kinds of surface water monitoring projects are happening in Iowa?

Many water monitoring projects are conducted across Iowa to gather data on the status of streams and rivers. Iowa may experience improved water quality at the outlets of small watersheds much sooner than at the outlets of large watersheds. To measure this change, current monitoring efforts target a variety of scales. Examples include, but are not limited to:



Large Watersheds

Hydrologic Unit Code (HUC) 8 or larger (about 961,000 acres, or about 2.5 counties in area)

- Iowa Department of Natural Resources' fixed-station network includes 60 monitoring sites throughout the state as of 2015. The data collection by these sites support a variety of projects, including the annual report of Iowa's water quality submitted to the U.S. Environmental Protection Agency and to the public.
- University of Iowa's IIHR—Hydroscience and Engineering manages 45 real-time monitoring stations that measure nitrate every 15 seconds.

Small Watersheds

HUC 12 size (about 22,500 acres, or about 16 per county)

- The Iowa Water Quality Initiative supports 23 demonstration projects, helping prioritize areas and identify practices that reduce nutrient loss. Eighteen projects focus on targeted small-scale watershed areas for implementing agricultural conservation practices. These small watersheds aim to implement conservation practices and monitor their effectiveness.

Paired Watersheds

- Two ongoing projects in Iowa examine paired small watersheds. In each project, one watershed receives targeted conservation practice implementation, while the other receives no targeted practices and remains relatively the same. Water monitoring at the outlet of each watershed is conducted with the goal of eventually detecting the collective impact of conservation practices.

Edge-of-Field Monitoring

- Multiple organizations, including the Iowa Soybean Association and Iowa State University, are conducting monitoring at the edge of farm fields through farmer collaboration and on research sites. Efforts are underway to inventory and report on these efforts in detail by August 2017.

This summary and its accompanying report were developed collaboratively by:

Iowa Department of Natural Resources
Iowa Department of Agriculture and Land Stewardship
IIHR—Hydroscience and Engineering
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