

Water Quality Monitoring and the Water Quality Initiative



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The Water Quality Initiative

The [Iowa Water Quality Initiative \(WQI\)](#) is a series of funding measures initiated during the 2013 legislative session to help implement the Iowa Nutrient Reduction Strategy (NRS). The Nutrient Reduction Strategy claims to provide a framework to achieve a 45 percent reduction in nitrogen and phosphorus losses to Iowa waters through collaborative efforts between point and nonpoint sources and public and private partners. Iowa State University (ISU), the Iowa Department of Natural Resources (DNR), and Iowa Department of Agriculture and Land Stewardship (IDALS) authored the NRS.

In 2018, the Iowa Legislature, with support from Governor Kim Reynolds, passed Senate File 512, which allocated more than \$270 million to help fund the state's water quality efforts through 2029. During the 2021 legislative session, legislators passed a 10-year extension, making an additional \$320 million of funding available through 2039 to help implement water quality practices including wetlands, saturated buffers, bioreactors, and urban conservation projects.

WQI funding addresses [point source and nonpoint source](#) nutrient pollution. The point source program addresses wastewater and drinking water discharges and is managed by DNR. The nonpoint source program addresses both agricultural and urban nonpoint sources of pollution and is managed by IDALS. Most of the nonpoint WQI funds provide cost-share to subsidize farmers and landowners who install nutrient-reducing conservation practices around the state.

WQI Appropriations WQI Expenditures

	WQI Appropriations	WQI Expenditures
2013	\$10,000,000	
2014	\$3,900,000	\$2,674,118
2015	\$5,725,000	\$2,397,661
2016	\$12,155,000	\$6,441,987
2017	\$10,925,000	\$8,697,554
2018	\$7,645,000	\$10,961,544
2019	\$12,575,000	\$10,277,587
2020	\$10,575,000	\$15,209,915
2021	\$10,575,000	\$13,833,195
2022	\$10,575,000	
<i>Total</i>	\$94,650,000	\$70,493,561

Information on nonpoint source projects can be found online at www.cleanwateriowa.org. Each project has a detailed list of the partners involved, the geographic scope, and expense.

Unfortunately, there is no information about water quality data or monitoring associated with the projects.

Table 1: Water Quality Initiative annual appropriations and expenditures. Sources: Appropriations: [Budget Unit Brief – FY 2021](#) and [Legislative Services Agency Notes on Bills and Amendments, General Assembly 89, Sessions 1 & 2](#); Expenditures: [Water Quality Initiative \(WQI\) Projects – FY 2022](#)

Water Quality Monitoring

The NRS authors (ISU, DNR, and IDALS) recognized the importance of monitoring to assess progress toward the state's goals. The NRS included recommendations about the type of additional monitoring the state must undertake, including:¹

- “Regarding nonpoint sources, develop new and expanded frameworks to track progress, beyond the traditional ambient water quality monitoring networks.”
- “Enhance the state’s water monitoring to support watershed implementation strategies and to be useful in verifying performance.”

In August 2016, the NRS authors and the IIHR Hydroscience and Engineering Center released a report summarizing the changes to DNR's existing stream monitoring necessary to support the NRS. The report emphasizes the importance of these changes for the success of the Iowa NRS:²

- *"Monitoring of nitrogen and phosphorus in streams and rivers throughout Iowa is an essential element of the Iowa Nutrient Reduction Strategy (INRS)." (pg. 1)*
- *"One of the key elements of the INRS is to develop new and maintain existing programs to measure water quality and the changes that occur over time as nutrient reduction practices are implemented by both point sources and non-point sources." (pg. 2)*

Despite those recommendations, the state has not adopted a standard approach or strategy for water monitoring for WQI projects to establish baselines and track effectiveness of the projects or progress toward NRS goals. As a result, data are not publicly available for many projects and state agencies lack data to assess water quality effects of the individual practices they fund.

DNR primarily monitors water quality using an [Ambient Stream Monitoring Network](#). This network of stations was established in 1999 and is monitored monthly for a number of chemical and physical parameters. The data are used for various purposes including assessment for the [impaired waters list](#) and development of water quality standards. The network is not associated directly with the goals or outcomes of the NRS, WQI-funded projects, or target watersheds.

The most complete nutrient data are collected by the [Iowa Water Quality Information System \(IWQIS\)](#). The system integrates data gathered by real-time water quality sensors deployed across the state by the IIHR Hydroscience and Engineering Center at the University of Iowa and the U.S. Geological Survey. Data are collected every fifteen minutes and transmitted back to the system. The data have been included in the estimates of the nitrogen export reported in the NRS annual report, and have resulted in numerous publications regarding Iowa's nitrate load.

Despite having a Division of Soil Conservation and Water Quality, IDALS staff do not consider themselves water quality monitoring experts. IDALS focuses its efforts on landowner relationships and relies on the DNR for water monitoring and analysis. For any analysis of project impact or nutrient loss reduction, IDALS refers back to the scientific assessment included in the original NRS. The science included in the Iowa NRS resulted from a thorough review of practice assessments in scientific literature by a team of scientists and professionals from ISU, IDALS, DNR, USDA, and EPA. At the same time, the NRS recognizes there is scientific uncertainty about the impact of a practice at a specific location.³ Assuming all projects have the common, predictable impact also does not take into account other practices or land use changes that may diminish the effectiveness of a particular practice and overall stream nutrient loading. It also does not account for variability of precipitation timing or intensity (or lack thereof). The NRS acknowledges that multiple practices in the same place affect the impact of each individual practice.⁴

Assessing the impacts of practices is important for achieving the state's goals. The DNR admits that "The difficulty in obtaining real-time, reliable information regarding land management practices and changes in land use leads to generalizations about non-point source nutrient contributions that may actually undermine efforts to identify practices that improve water quality."⁵ Failing to assess the actual results of the practices while spending tens of millions of dollars installing more will only magnify any inaccurate assumptions or generalizations.

Nutrient Reduction Strategy Progress Reporting

Iowa State University (ISU) issues the public NRS progress tracking data and reports in partnership with DNR and IDALS. ISU published an annual progress report beginning in 2014, the year after NRS completion. The reports primarily focus on counting the number of conservation practices implemented. Since 2021, the data has started to be posted as an [online dashboard](#). However, the water data has not been updated on the dashboard as of summer 2022. ISU intends to update the dashboard quarterly once all components are complete.

ISU has reported changes in water quality using two methods: estimating annual nitrogen export from measured water quality data and modeling nutrient reductions based on conservation practice implementation. A technical work group is developing the method to estimate annual phosphorus export.

The 2018-19 annual progress report provided the first nitrogen export estimates since reporting on the NRS began. The estimates were based on a linear interpolation model of the ambient water monitoring data. If the state implemented continuous in-stream nitrate sensors, it would not have to estimate load using a model.⁶ Using in-stream sensors and stream flow measurements, nutrient loads could be measured directly instead of estimated.

Detecting Water Quality Changes

One of the primary questions posed in the Stream Water-Quality Monitoring report is “What reductions in nitrogen and phosphorus occur following implementation of nutrient reduction practices by non-point sources?”⁷ The Nutrient Water-Quality Monitoring Framework developed for the report concluded that nutrient reductions from edge-of-field practices and in small watersheds can be measured in less than 10 years.⁸ However, measuring such a change would require baseline data that was collected at the start of the strategy’s implementation in 2013. The report found that “Monitoring sites that are sampled consistently over long time periods is critical for evaluating long-term trends in water quality. Long records are necessary to be able to distinguish water-quality changes caused by short-term weather patterns from those resulting from implementation of nutrient reduction practices.”⁹

The state is not broadly monitoring on a scale small enough that the current level of practice implementation could be detected. One [research project](#) monitoring sub-watersheds in the larger Black Hawk Lake watershed is a model for what and how to monitor at a scale that will give definitive results of conservation practice implementation. This project is funded by the DNR 319 Water Quality Improvement program through the Iowa Nutrient Research Center and could be a template for future monitoring projects.

Another example of monitoring at a smaller scale is work conducted by the Iowa Soybean Association (ISA). ISA monitors water quality on the edge-of-field practice projects it is involved with. The data is collected through grab samples, summarized, and presented at watershed management meetings. The purpose of the data and presentations are to demonstrate the benefits of the projects to the participating farmers and landowners and expand participation.

However, ISA data are not used for reporting on NRS progress or other water quality tracking. DNR says that the data does not meet its qualifications for “credible data”¹⁰ and therefore cannot be used for reporting or progress tracking. ISA does not report the data to ISU for inclusion in the NRS tracking and

data dashboards, even though those dashboards are not subject to the state's "credible data" law.¹¹ ISA provides data on Beaver Creek, the Boone River, and the Raccoon River online through [Agriculture's Clean Water Alliance](#).

Recommendations

With the NRS approaching its 10-year anniversary in 2023, Iowans deserve to see water quality results from the nearly \$100 million of public money invested since 2013. Water monitoring is a crucial component to the success of the Nutrient Reduction Strategy and must be designed to assess progress. A strategy without a way to evaluate progress or outcomes is not a real strategy.

Agencies responsible for WQI spending and NRS reporting should implement the following:

1. A collaborative water monitoring framework to evaluate effects of water quality improvement projects funded through the Water Quality Initiative. WQI was established to provide support for the Nutrient Reduction Strategy. Any progress needs to be tracked and evaluated to assure the state's strategy is working and the public's investment is worthwhile.
2. Collect data at various scales. The size of the stream or watershed being measured affects how long it will take to see the impact of nutrient reduction efforts. Collect baseline data now to identify changes over time.
3. Make results of WQI water quality monitoring available and accessible to the public, and report to the state legislature annually. Transparency and accountability are crucial for any taxpayer-funded project.
4. Use water quality monitoring data to evaluate progress on the Nutrient Reduction Strategy. A key component of any strategy is progress assessment. If data show lack of progress, the strategy must be reevaluated and updated to make it effective.

Without monitoring, Iowa will continue to throw money at the state's water quality problem without knowing whether its effect toward achieving the state's goals. It is irresponsible and unjust to continue spending taxpayer dollars without assessing the outcomes.

Appendix A: List of Water Quality Initiative Annual and Legislative Reports

The WQI legislative and annual reports do not contain any water quality data. They provide information on funding, partnerships, and number of practices installed.

- 2021 WQI Annual Report: <https://www.legis.iowa.gov/docs/publications/SD/1286030.pdf>
- 2020 WQI Annual Report: <https://iowaagriculture.gov/sites/default/files/2021/WQI%20Annual%20Report%202020.pdf>
- 2020 WQI legislative report: <https://www.legis.iowa.gov/docs/publications/SD/1129881.pdf>
- 2019 WQI legislative report: <https://www.legis.iowa.gov/docs/publications/SD/1038406.pdf>
- 2018 WQI Legislative report: <https://www.legis.iowa.gov/docs/publications/SD/917634.pdf>
- 2017 WQI legislative report: <https://www.legis.iowa.gov/docs/publications/SD/851876.pdf>
- 2016 WQI legislative report: <https://static1.squarespace.com/static/586bfd13be65947270902ac5/t/58c6c739e58c62bef0ac55f6/1489422144304/WQI+FY2016LegisReport-Final+8.5x11.pdf>
- 2015 WQI legislative report: <https://static1.squarespace.com/static/586bfd13be65947270902ac5/t/58c6c6bdd482e95e8e7cc62e/1489422018476/FY2014LegisReportLayoutFinal8.5x11.pdf>
- 2014 WQI legislative report: <https://www.legis.iowa.gov/docs/publications/SD/631831.pdf>

Endnotes

1. "Iowa Nutrient Reduction Strategy – A science and technology-based framework to assess and reduce nutrients to Iowa waters and the Gulf of Mexico." Updated December 2017. Section 1.4.6, pg. 26.
2. Iowa Department of Natural Resources. "Stream Water-Quality Monitoring Conducted in Support of the Iowa Nutrient Reduction Strategy." August 2016.
3. NRS § 2.2, pg. 27 (Table 14) ("Research indicates large variation in reductions not reflected in this table.").
4. NRS § 2.2, pg. 27 (Table 14) ("Some practices interact such that the reductions are not additive.").
5. Iowa Department of Natural Resources. "Stream Water-Quality Monitoring Conducted in Support of the Iowa Nutrient Reduction Strategy." August 2016. Pg. 7.
6. *Id.*, pg. 18.
7. *Id.*, pg. 5.
8. *Id.*, pg. 4.
9. *Id.*, pg. 9.
10. Iowa Code § 455B.193.
11. Iowa Code §§ 455B.194, 455B.195.