Section F

Frequently Asked Questions

The last section of this toolkit is a series of simple information guides about water quality that address misunderstood topics, frequently asked questions by watershed residents, coordinators, SWCD commissioners, etc. They can be used for reproduction and distribution within your community. We have presented the information in a format that emphasizes key points and with a layout that is simple and easily understood.

The need for these guides emerged out of our work with SWCD commissioners and other local stakeholders across the state over the last several years. These guides offer general definitions and descriptions and are not meant to replace legal definitions provided by the Iowa Department of Natural Resources and the United States Environmental Protection Agency.

Impaired Water Bodies in Iowa

Disclaimer: *These are general definitions and descriptions meant to inform and educate watershed citizens about frequently misunderstood topics. Legal definitions are provided by the Iowa Department of Natural Resources (IDNR) in cooperation with the United States Environmental Protection Agency (federal Clean Water Act).*

What does it mean for a water body to become impaired?

An impaired water body is one that fails to meet water quality standards set for its designated use. In simple terms, each water body has a set of uses that it should have sufficient water quality to support. These uses may include being capable of supporting aquatic life, being safe for primary contact recreation like wading, tubing, and swimming, being able to safely eat your catch of fish and being

suitable for use as drinking water. Section 303(d) of the Clean Water Act requires the IDNR to report a list of Iowa's waters to the USEPA that do not meet minimum water quality standards for such uses. This list of impaired water bodies is submitted every two years.

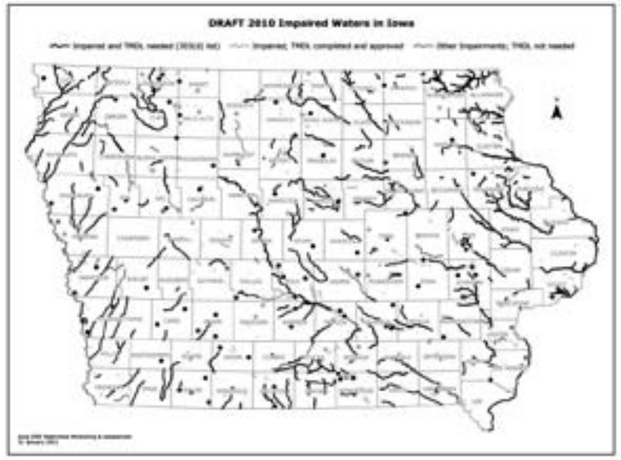
How is a water body's designated use determined?

The federal Clean Water Act requires that the state determine designated uses for each water body. These designations recognize existing and potential uses, and determine the water quality standards for each water body. Use Assessment and Use Attainability (UA/UAA) is a step-by-step process used to determine designated uses of water bodies. In the UA/UAA process, a variety of parameters are assessed: physical features of the stream or water body, aquatic life, and recreational uses of the water body. Different segments of rivers and streams can have different designated uses. "Downgrading" or weakening a designated use is prohibited if it would remove any protection for existing use.

As the DNR carries out recreational assessments of our state's water bodies, they are asking for Iowans' input about the streams they visit and how they are being used. The survey is available online (http://www.iowadnr.gov/InsideDNR/RegulatoryWater/WaterQualityStandards.aspx) and survey results will be used in determining recreation-related designated uses for water bodies throughout the state.

Where are the impairments in Iowa?

The 2010 list of impaired waters in Iowa includes 572 water bodies. Most streams and rivers are impaired for indicator bacteria (*E. coli*), biological impairments and fish kills, while lakes commonly suffer from impairments due to algae, bacteria, and turbidity. Sediment has been found to be by far the leading cause of impairment in Iowa's streams, rivers, and lakes. Bacterial contamination and nutrient loading are other primary causes.



Who is collecting water quality data?

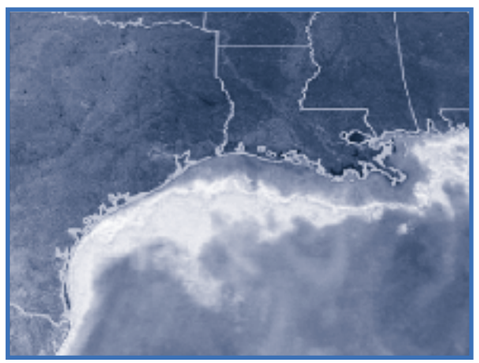
Water quality experts at agencies like the IDNR, in collaboration with university researchers and county conservation boards, routinely monitor Iowa's surface waters and groundwater as discussed in the "Water Quality Monitoring in Iowa" informational guide.

How can an impairment status be lifted?

An impairment can be lifted by the USEPA if more recent data shows the impairment no longer exists, there was an error in the data or rationale that got it on the list, or by preparation and approval of a Total Maximum Daily Load (TMDL) water quality improvement plan. Completion and approval of a TMDL improvement plan removes the water body from the 303(d) list, but the water body remains impaired until routine monitoring indicates water quality standards are met. Both technical and financial assistance are available to aid in Iowans' watershed improvement efforts.

Our impairments go beyond our borders…

At the mouth of the Mississippi River, a large area in the Gulf of Mexico has become incapable of supporting aquatic life due to a severe lack of oxygen (hypoxia). Heavy nutrient loads from both urban and agricultural landscapes in Iowa and the Midwest lead to rapid growth of algae and aquatic plants. When these die, they are decomposed by bacteria, using up dissolved oxygen in the water. This phenomenon creates hypoxic or dead zones which do not have sufficient oxygen levels to support fish and other aquatic life.



For further information or technical assistance, contact your local Soil and Water Conservation District or the Iowa Department of Natural Resources office.

Water Quality Monitoring in Iowa

Who is collecting water quality samples around the state?

In Iowa, there are a number of groups conducting water quality monitoring of our streams, rivers and lakes. These groups consist of water quality experts and professionals at state agencies, like the Iowa Department of Natural Resources (IDNR), university researchers, and county conservation boards (CCBs). Trained citizens of the public can volunteer through programs like IOWATER—a public monitoring program administered by the IDNR. However, only routine professional monitoring can determine a water body's status of being impaired (see the "Impaired Water Bodies in Iowa" Informational Guide for further details).

What parameters are being measured and how frequently?

In order to assess the quality of water bodies and the health of our aquatic ecosystems, IDNR and its collaborators routinely test Iowa's surface and groundwater resources. Depending upon the specific type of water body and its designated use, a number of different water quality parameters may be routinely measured:

- Bacteria (E. coli)
- Temperature
- pH
- Conductivity
- Dissolved Oxygen
- Turbidity
- Suspended Solids
- Total Nitrogen
- Nitrate
- Ammonia
- Total Phosphorus
- Dissolved Reactive Phosphorus
- Biological Indicators (See "Biological Indicators and Water Quality" Informational Guide)

Beach Monitoring

IDNR, in collaboration with many CCBs, routinely monitors water quality at 37 state-owned recreational beaches to ensure the water is safe for human contact. Weekly samples are taken from April to October and analyzed for E. coli, a bacterium indicating the presence of fecal contamination that poses a health risk to humans. Water samples are collected at three locations on the beach, and at three different water depths (ankle-, knee-, and waist-deep).

Stream Monitoring

IDNR has a surface water monitoring network consisting of 84 stations located on major rivers and streams which are sampled monthly and 70 stations on smaller streams and rivers which are sampled yearly for fish and other aquatic organisms. Upstream-downstream city monitoring is conducted at 24 stations on major rivers and streams.

Lake Monitoring

IDNR sponsored a statewide lake monitoring program in which monitoring was completed on 131 of Iowa's recreational lakes by Iowa State University and the State Hygienic Laboratory. Researchers located the deepest point of each lake and collected water samples three times per year to measure numerous physical, chemical, and biological characteristics.

Wetland Monitoring

Known as the kidneys of the landscape, wetlands provide many water quality and wildlife benefits to our state. DNR and Iowa State University researchers are monitoring wetlands and shallow lakes for a number of parameters, including nutrients, sediment, pesticides, and metals, in addition to assessing trends related to the biological community (microorganisms as well as birds, insects, and other wildlife).

Groundwater Monitoring

Since 1982, IDNR, the United States Geologic Survey, and University of Iowa Hygienic Laboratory have collaborated on testing of both quality and quality of water in Iowa's aquifers. Seventy-five percent of Iowans rely of groundwater as their source of drinking water, either through private wells or municipal water supply. Researchers continue to gather information and monitor a variety of parameters related to groundwater through a network of 150 monitoring wells across the state.

Research-based monitoring is often performed continuously with the help of auto-sampling devices, with additional sampling during and after individual rainfall events.

How are the data being used?

Water data collected and analyzed by professionals are used to study the health of the water body. In lakes, these data can be used to determine trophic status, a measure of the potential for growth of algae and aquatic plants. Water data also determine whether a water body is of sufficient quality to support life, serve as healthy habitat, or suitable for recreational purposes or for use as drinking water. If a water body fails to meet basic water quality standards, it may be listed as impaired (discussed further in the "Impaired Water Bodies in Iowa" informational guide).

Additional water quality monitoring takes place at various research sites around the state. University, agency and private entities are collecting water data from experiments that investigate the impacts of nutrient application rates, differing crop varieties and rotations, and varying management scenarios regarding tillage and subsurface drainage systems. Data are also being collected from targeted nutrient reduction sites like wetlands and bioreactors. These data assist in the development of plans for reduction of sediment and nutrient transport.

Water quality data collected by IOWATER volunteers across the state are input into a public online water quality database, offering an in-depth snapshot of numerous water quality parameters statewide. Consistent monitoring by volunteers has brought to light a number of water quality problems that are then further investigated by professionals at the IDNR, municipal public works, and/or county health departments.

Are the data reliable?

Water quality data are collected following a set of approved Standard Operating Procedures (SOPs). These SOPs ensure that accurate samples/measurements are taken, appropriate handling of samples is occurring, consistent procedures are followed in the field and lab, and samples can be trusted to produce representative results in lab analyses.

For further information or technical assistance, contact your local Soil and Water Conservation District or the Iowa Department of Natural Resources office.

To learn more about the IOWATER volunteer water monitoring program or to become a volunteer, visit http://www.iowater.net.

Biological Indicators and Water Quality

What is a biological indicator?

A biological indicator is a living organism whose presence or absence can help to indicate quality of the surrounding environment. Scientists can make determinations about the health of the environment if biological indicator species are healthy, stressed or diseased, as well as the balance of different species living in a particular habitat or environment. In Iowa, biological indicators are one assessment that is used to determine the health of our state's streams, rivers and lakes.

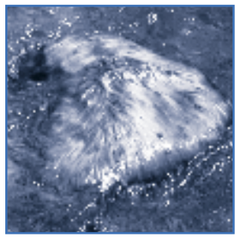
Can biological indicator organisms really provide indication as to the overall health of an ecosystem or environment?

Like the proverbial canary in a coal mine, biological indicator organisms are an early warning detection system that can alert us to potential or impending water quality problems. These organisms are exposed constantly to many stresses and fluctuations in the aquatic habitat; changes in these species can indicate changes in the health of the overall aquatic ecosystem. Biological indicators can show the cumulative effects of various pollutants or stressors as well as changes over time.

What particular species or groups are considered biological indicators?

Fish are excellent indicators of the health of aquatic ecosystems, based on the kinds of fish living there, quantities/proportions of each, and the health of different species. Fish have very different levels of sensitivity to environmental stressors. While carp are known as bottom feeders that can survive in very polluted waters, trout are a highly sensitive species that require cold, clean and highly oxygenated water to survive.

Benthic macro invertebrates are a diverse group of bottom-dwelling aquatic organisms. Similar to fish, their varying levels of sensitivity to changing environmental conditions make them beneficial biological indicator organisms. Caddis flies, stone flies and mayflies are considered clean water indicator organisms. On the other hand, leeches are a resilient species whose abundance indicates very poor water quality. While other species suffer from habitat changes and environmental stressors, the leech population can grow unchecked.



Periphyton are algae that attach to submerged rocks and other surfaces, serving as biological indicators in lotic (flowing) systems such as streams and rivers. Periphyton are important indicators due to their ubiquity (e.g. diatoms are found in all lotic systems), ability to absorb contaminants, fast response to change, and role as a food source for invertebrates, tadpoles, and some fish.

Macrophytes are aquatic plants whose abundance is an important indicator of water quality. Few (or no) macrophytes may indicate water quality problems such as high turbidity or presence of herbicides. Excessive macrophyte growth can be the result of high nutrient loading.

Amphibians are very sensitive to changes in water temperature, pH, and chemical pollutants in the aquatic environment; this high level of sensitivity makes them outstanding biological indicators, helping scientists assess changing conditions and concentrations before any human effects can be noticed.

How is the biological health of a water body measured?

A number of characteristics are measured and evaluated in aquatic habitats, including species diversity, relative amounts of sensitive and tolerant organisms, and the proportion of individuals belonging to specific feeding groups within the community. The Iowa Department of Natural Resources (IDNR) collects and identifies both fish and macro invertebrates to assess the biological integrity of Iowa's water bodies, in addition to fish tissue monitoring in water bodies designated for fish consumption.

How are biological indicator data used?

Biological monitoring is an integral part of routine water quality monitoring and reporting under the federal Clean Water Act. The data are also used as part of the development of Total Maximum Daily Load (TMDL) water quality improvement plans for impaired water bodies, problem investigation, evaluation of stream health and recovery following fish kills, and development of water quality standards for Iowa's water bodies.

Are there opportunities to participate in biological monitoring?

The IOWATER volunteer water quality monitoring program offers citizens the opportunity for hands-on participation in biological monitoring efforts across the state. Upon completion of the IOWATER introductory training workshop, participants have the option of attending an additional specialized biological monitoring workshop, where they are trained on sampling techniques, identification, and analysis of biological data.

For further information or technical assistance, contact your local Natural Resources Conservation Service (NRCS) or Iowa Department of Natural Resources office.

To learn more about the IOWATER volunteer water monitoring program or to become a volunteer, visit http://www.iowater.net.

Urban Conservation Practices

Did you know that 55 percent of rainwater becomes surface runoff in urban settings? This can negatively impact water quality as sediment and unseen pollutants, such as lawn fertilizers and chemicals, may be free to move with urban runoff. More extensive surface runoff during, and after, high intensity rainfall events increases the likelihood of local and downstream flooding. Urban conservation measures help to capture and infiltrate stormwater, reducing a property's contribution to water quality degradation, flashy stream flows and flooding.

What can be done to help lessen urban runoff on individual yards?

Rainwater harvesting is the practice of collecting rainwater for future use which lessens the amount of surface runoff to storm sewers. One option is to install a rain barrel which collects some of the rain falling on the roof of your home or building. The captured water can be used later to water plants, trees and lawns, or even wash cars.

Bioretention cells or rain gardens utilize strategic landscaping to capture runoff, giving it the opportunity to infiltrate into the soil rather than move directly to city stormwater systems. The rain gardens use plants that have deep root systems and can take up a significant amount of water, while creating more pathways for surface water to move to lower levels in the soil. The gardens can be engineered with layers of sand and rock to encourage infiltration and storage.

In Okoboji, rain gardens have greatly reduced urban runoff and improved water quality. Curb cut-outs direct water to 15 different rain gardens that capture and treat stormwater before it is able to run off into the lake. Okoboji was the first city in Iowa to implement an ordinance requiring all new/expanding construction to install systems that address stormwater.

Soil quality restoration boosts infiltration potential and increases the amount of water that soil can hold, reducing surface runoff and creating a healthier lawn environment.

When topsoil is compacted (or sometimes completely removed) and covered with sod, pore spaces and pathways for water to infiltrate can be reduced or destroyed. The mats of grass cover a nearly impenetrable layer of soil, leading to shallow rooting and forcing excess rainwater to run off onto sidewalks and streets and into stormwater systems.

Improving soil quality often begins with aeration. Different methods exist from do-it-yourself tools, equipment rentals and professional aeration services that will do the work for you. Once the lawn is aerated, compost is applied to incorporate nutrient-rich organic matter. This promotes increased water infiltration and storage, increased microbial activity, deeper rooting of grasses and plants, and overall improved soil quality and structure. Through such improvements, the need for watering is lessened and water bills are reduced.

What can be done in the community?

Porous pavements can be used on streets, parking lots, driveways, patios and recreational areas, reducing surface runoff that would otherwise move directly to storm sewers. Porous paving systems include modular concrete pavers, articulating concrete blocks/mats, porous asphalt and porous concrete.

In each case, the hard surface material is installed over an infiltration and storage bed of varying sizes and layers of rock, making a stable substrate while maintaining a 40 percent void space for water to flow through and/or be stored.

Porous paving systems offer a multitude of benefits: reducing annual runoff volume by over 80 percent, removing 65-85 percent of undissolved nutrients and removing up to 95 percent of sediment in runoff. These systems can also reduce the potential for hydroplaning, increase skid resistance, encourage melting and prevent ice formation, reduce roadway noise, and absorb/store less heat.

Although porous paving systems carry a higher up-front cost per square foot, overall installation costs can often be lower than conventional options because porous systems can eliminate expansion of stormwater system costs. Also additional land needed for retention ponds is eliminated. The longer life expectancy (20-40 years) of permeable systems also helps to offset the increased costs.

Across Iowa, permeable paving systems have been installed in many places. In 2010, Charles City embarked on one of the first and largest projects of its kind in the state, and possibly the nation, by replacing 16 city blocks of residential streets with modular pavers. By the end of 2012, they will have completed installation of over 30 city blocks of modular pavers.

Bioswales and stormwater wetlands help retain water during rain events and keep it from overwhelming stormwater systems. Utilizing low points in the landscape, bioswales can be installed in parking lots, street medians or placed strategically to capture rainfall running off impervious surfaces. Native plant landscaping combines beauty and functionality by increasing the potential for water to infiltrate into the soil.

Stormwater wetlands serve to capture and temporarily store water on a larger scale than bioswales. Stormwater wetlands are designed to capture and treat urban runoff before it can be deposited to streams and lakes. Natural biological processes filter and remove pollutants from the water as it moves through these wetlands. Like their smaller counterpart, these wetlands also bring an element of native Iowa back onto the landscape, providing natural beauty and increased bird and wildlife habitat.

Green roofs feature living plants grown in a porous media that is installed over a drainage system. The living roof system, although sometimes hard to see, conserves energy by adding an extra layer of insulation and by transforming solar heat into evaporative cooling through photosynthesis. Green roofs can help to reduce the urban heat island effect—the difference in temperature between urban and rural areas. The plants reduce runoff volume and protect roof systems from damaging UV radiation. The plants are able to buffer acid rain and filter nitrates, carbon dioxide and pollutants from the air. A diverse array of plants may be used: grasses, succulents and sedums, chives and mountain garlic, and even several varieties of vegetables.

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For further information or technical assistance, contact your local Iowa Department of Natural Resources office or the Iowa Department of Agriculture and Land Stewardship's Urban Conservation Program.