



GENERAL GUIDANCE FOR THE OFFICE OF WATER QUALITY EXTERNAL DATA FRAMEWORK

PREPARED BY:
Jody Arthur
Watershed Assessment and Planning Branch

Watershed Assessment and Planning Branch
Indiana Department of Environmental Management (IDEM)
Office of Water Quality
100 North Senate Avenue
MC65-40-2 Shadeland
Indianapolis, Indiana 46204-2251

June 24, 2021

CONTENTS

General Guidance for the Office of Water Quality External Data Framework.....	1
What is the External Data Framework?	1
Is Participation Required?.....	1
The Benefits of Sharing Your Data with OWQ.....	1
What Types of Data Does the EDF Accept?.....	2
How “Good” Does Your Data Need to Be?.....	4
The Role of Hoosier Riverwatch and Clean Lakes program in OWQ’s EDF	7
How will OWQ determine the usability of your data?	7
Data Quality Assessment.....	8
Reconciliation with OWQ Requirements for the Use of Secondary Data.....	9
General Requirements.....	9
Disclaimers Regarding IDEM’s Use of Secondary Data	10
OWQ’s Secondary Data Certification.....	10
Reconciliation of Conflicting Data Results	11
Timelines for Data Submission	11
Where to Get Technical Assistance.....	12

WHAT IS THE EXTERNAL DATA FRAMEWORK?

The External Data Framework (EDF) is a process developed by the Indiana Department of Environmental Management (IDEM) Office of Water Quality (OWQ) to provide a systematic, transparent, and voluntary means for external organizations to share their water quality data with IDEM for consideration and possible use in various OWQ programs. The data provided by such organizations is considered by OWQ to be secondary data, that is, data not collected by OWQ. The EDF describes:

- OWQ policy regarding the use of secondary data by its programs
- Guidelines for submitting data
- How the data will be reviewed and evaluated for different OWQ and other uses
- Technical assistance available to facilitate greater collaboration between the OWQ and external parties

The purpose of this guidance is to provide an overview of the EDF and address in a general way some of the more common questions regarding its structure, policies and participation. In addition to the information provided here, the EDF also provides technical guidance and recommendations that external organizations can use to develop their own monitoring plans, improve the quality of the data they collect and determine whether data sets they obtain from others are suitable for use in their own projects. This information is contained in the *Technical Guidance for the Office of Water Quality External Data Framework*, which is available online at: <http://www.in.gov/idem/nps/2637.htm>.

Many universities, municipalities, watershed and other grassroots organizations and indeed individual citizens throughout the state participate in water monitoring activities at various scales. There are also a number of regulated facilities that conduct monitoring above and beyond what their permits require. The EDF paves the way for greater collaboration between individuals and organizations conducting their own surface water monitoring and OWQ to help meet our shared goals of improving and protecting Indiana's water resources.

IS PARTICIPATION REQUIRED?

Submission of data through the EDF is voluntary unless your organization's monitoring activities are funded with or used as match for an OWQ Nonpoint Source (NPS) Program grant.¹ The EDF does not impose additional requirements on regulated facilities.

THE BENEFITS OF SHARING YOUR DATA WITH OWQ

Collaboration with OWQ through the EDF may benefit your organization in a number of ways. For some organizations, having their data used by a state agency may help to ensure continued support for their monitoring efforts from funding institutions and the public. In addition, providing your water quality monitoring results to OWQ through the EDF can make your data available to countless other organizations and institutions through U.S. EPA's STORET database online at: <http://www.epa.gov/storet/dbtop.html>.

STORET (short for STORage and RETrieval) is U.S. EPA's largest computerized environmental data system and serves as a repository for water quality, biological, and physical data. STORET is used by state

¹Organizations funded with a NPS grant are required under the terms of their contractual agreement with OWQ to submit any monitoring data collected during the grant period.

environmental agencies, U.S. EPA and other federal agencies, universities, private citizens, and many others.

Most secondary data sets submitted through the EDF are stored in OWQ's Assessment Information Management System (AIMS), which allows OWQ to upload the data to STORET². Having your data in this online database makes it available to anyone with an Internet connection, including potential partners and granting institutions.

It is the goal of the EDF to make OWQ's acceptance criteria for secondary data transparent so that organizations interested in sharing their data with OWQ can determine the requirements they need to meet in order for OWQ to use their data. In addition, the EDF also recommends data quality objectives for other uses to support local level decision-making. These recommendations along with OWQ's process for evaluating secondary data for use in its programs can help you determine whether the water quality data you collect or obtain from other sources are reliable for your needs:

- If your organization is in the process of developing a water quality monitoring study, the guidelines here will help you know the types of quality control procedures you might need to include in your study and other factors you may need to consider in order to ensure the data you collect will be reliable for your intended use(s).
- If you are already monitoring, these guidelines will help you identify any changes you might need to make in your monitoring program to improve the quality of your data, making it reliable for broader use by OWQ and other organizations.
- The recommendations in the EDF provide data quality benchmarks for water quality data that OWQ considers suitable for a number of local-level needs and which can help you evaluate whether data you have obtained from other sources are reliable for your own uses.
- Adhering to EDF guidelines will help you produce a data set of known quality, enhancing both its credibility and value.

WHAT TYPES OF DATA DOES THE EDF ACCEPT?

Waterbody-specific water quality data may be submitted through the EDF for surface waters throughout the state of Indiana.

The EDF was developed to accommodate water quality data collected from rivers and streams as well as lakes and reservoirs. The EDF does not currently accept groundwater monitoring data or data collected from wetlands because the AIMS database that houses the data received and facilitates their review is not set up to accommodate these waterbody types and/or the types of monitoring data that might be available for them.

Data collected on rivers and streams, lakes and reservoirs anywhere in Indiana are potentially reliable for the OWQ uses described in EDF regardless of the scope of the study or the geographic scale over which the data are collected.

Monitoring data may be submitted for sites selected using a targeted study design or from randomly selected sites. Statistical studies for which sites are selected randomly may also be useful to OWQ. Water

² Level 1 data submitted through the EDF do not meet the requirements for upload to STORET but remain in OWQ's AIMS database where they are made available to the public by request.

quality data from such studies can be applied in a site-specific manner, and the statistical conclusions may provide supplementary information OWQ decision-making processes.

OWQ can accept monitoring results through the EDF for:

- General chemistry and physical properties (in and of surface water)
- Nutrients (in surface water)
- Metals (in surface water and fish tissue)
- Bacteria (in surface water)
- Algal toxins (in surface water)
- Pesticides (in surface water)
- Polychlorinated biphenyls (PCBs in surface water and fish tissue)
- Polycyclic aromatic hydrocarbons (PAHs in surface water)
- Volatile and semi-volatile organic compounds (VOCs and SVOCs in surface water)
- Radionuclides (in surface water)
- Aquatic biological communities (fish and macroinvertebrates)
- Habitat evaluations (for aquatic biological communities)

HOW “GOOD” DOES YOUR DATA NEED TO BE?

The EDF is based on the premise that all data are potentially useful. The EDF is based on a graded approach that allows for varying levels of data quality depending on the intended use(s) of the data and available resources.

Generally, the greater the stakes associated with a given use the more scientifically rigorous the data supporting it needs to be (Figure 1). For the purposes of the EDF, scientific rigor means that the data collection will have followed documented field, laboratory and data handling procedures and include sufficient quality control procedures to ensure the quality of the resulting data set is commensurate with its intended use.

Using a graded approach to data quality allows OWQ to accept any and all readily existing data from external organizations and creates greater opportunity for collaboration. Table 1 identifies these opportunities – the potential uses in each tier of the EDF based on the relative level of scientific rigor necessary to support them.

Figure 1: Scientific rigor as it relates to the three tiers in the EDF.

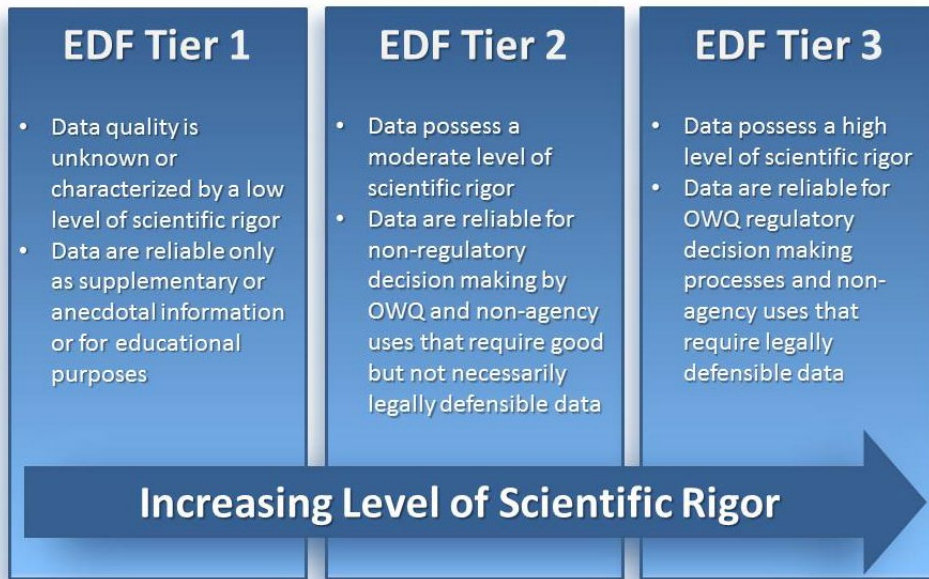


Table 1: Scientific rigor as it relates to the three tiers in the EDF and the different types of uses within each tier.

EDF Tier	Scientific Rigor	Potential Uses for Which OWQ Considers the Data Reliable
3	Data must possess a high level of scientific rigor and are reliable for OWQ regulatory decision making	<ul style="list-style-type: none"> • Clean Water Act Section 305(b) assessments of beneficial use support and Section 303(d) listing decisions • Determining lake trophic level and lake trends for Clean Water Act Section 314 assessments • Total maximum Daily Load (TMDL) modeling • Determining representative background conditions for the purpose of developing National Pollutant Discharge Elimination System (NPDES) permits • Determining or changing the antidegradation classification of a waterbody • One or more Tier 2 uses
2	Data must possess a moderate level of scientific rigor and are reliable for non-regulatory decision making by OWQ and the other uses shown	<ul style="list-style-type: none"> • Supplementary information for use in planning and prioritization of OWQ monitoring efforts for baseline and other projects • Supplementary information for use in planning and prioritizing watersheds for Total Maximum Daily Load (TMDL) monitoring and development • Demonstrating the effectiveness of implementation of measures recommended in a watershed management plan or an approved TMDL (incremental improvements that meet U.S. EPA performance measures) • Establishing need for low interest loans to assist with formation of regional sewer and water districts (RSWDs) • Supplementary information for use in evaluating loan applications for drinking water and wastewater infrastructure improvements through the Indiana State Revolving Loan Fund (SRF) • Supplementary information for use in evaluating Clean Water Act Section 401 permit applications and identifying potential wetland mitigation sites³ • Watershed management planning • Determining water quality trends over time • Increasing public awareness, support and involvement in water quality improvements by demonstrating the effectiveness of measures implemented as recommended in watershed management plans, approved TMDLs, long-term combined sewer overflow (CSO) control plans and municipal separate storm sewer system (MS4) permits • Screening for potential recreational use issues including human health use (lakes and streams) and aesthetics (lakes) • All Tier 1 Uses
1	Data are not reliable for decision making either because data quality is unknown or is based on sound science but characterized by a low level of scientific rigor	<ul style="list-style-type: none"> • Education and raising awareness • Supplementary information for total maximum daily load development • Supplementary information for OWQ's Integrated Report

³ The EDF does not currently accept wetland water quality data. This use pertains specifically to data collected on flowing waters. Secondary data may be used by OWQ to help substantiate any claims made in the process of reviewing a Clean Water Act Section 401 permit regarding the condition of a potentially affected waterbody and/or identify potential mitigation sites where such activities might improve water quality.

THE ROLE OF HOOSIER RIVERWATCH AND CLEAN LAKES PROGRAM IN OWQ'S EDF

Indiana is fortunate to have two state-sponsored volunteer monitoring organizations that help to educate citizens about the importance of Indiana's water resources and the issues facing them. Together these programs have trained thousands of citizen scientists many of whom actively monitor surface waters throughout the state.

The Hoosier Riverwatch Program at IDEM OWQ has been the state's leading volunteer organization for stream monitoring since 1994. The Indiana Clean Lakes Program, which is administered by Indiana University School of Public and Environmental Affairs (IU-SPEA) began in 1988 and with support from OWQ's Nonpoint Source (NPS) Program has built and maintained a strong network of volunteers who regularly monitor many of Indiana's lakes and reservoirs.

Volunteers participating in these programs do not need to participate in the EDF to have their data considered for potential use in OWQ programs. Volunteers that collect and submit water quality samples and or results through either the Clean Lakes program or Hoosier Riverwatch Program can be confident that their data will automatically be considered for Tier 1 and possibly Tier 2 uses through OWQ's partnership with these programs:

- Volunteers in the Clean Lakes Program send their field data to IU-SPEA on post cards, by email or they directly enter their results through the program web site. Some volunteers also collect water samples, which they send to the Clean Lakes Program laboratory for analysis. With the exception of those data entered directly by volunteers, all volunteer monitoring results for Indiana lakes are entered into the Clean Lakes Program database by staff and students at IU-SPEA. These results are routinely provided to OWQ as part of the program's grant agreement.
- Volunteers having completed Hoosier Riverwatch training are encouraged to enter their stream water quality data directly into the Hoosier Riverwatch database online. This database is maintained by OWQ making the data entered by volunteer readily available for potential use by OWQ programs.

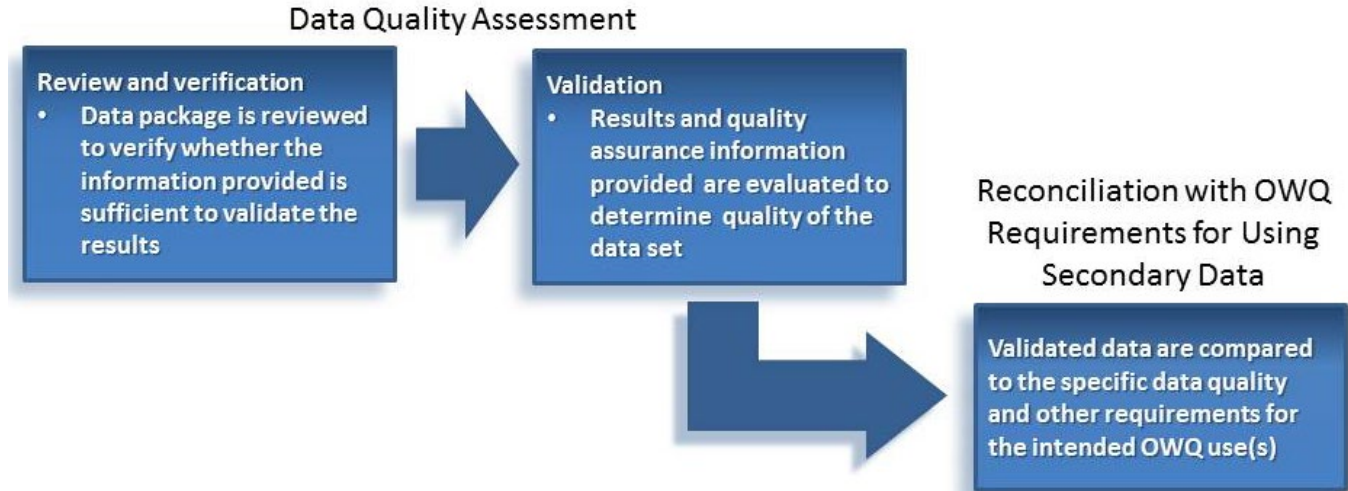
In addition to volunteers, there are a number of organizations that use Hoosier Riverwatch methods alongside other methods to achieve their water monitoring goals. These organizations may submit their data through the Hoosier Riverwatch database for automatic consideration by OWQ provided they have completed Hoosier Riverwatch training, which is required to access the data entry portal for the database. Otherwise, organizations using a combination of Hoosier Riverwatch and other methods may submit their data to the EDF using spreadsheet templates provided by OWQ's NPS program for this purpose.

HOW WILL OWQ DETERMINE THE USABILITY OF YOUR DATA?

OWQ review of secondary data consists of two steps that together help to determine the reliability of your data for OWQ uses (Figure 2):

1. The data quality assessment in which the data and the accompanying documentation are reviewed, verified and validated to determine the quality of the data set
2. Reconciliation with OWQ requirements for the use of secondary data

Figure 2: Simple model of how OWQ determines whether a secondary data set is reliable for uses described in the EDF.



DATA QUALITY ASSESSMENT

OWQ's process for determining the usability of a Secondary data set is described in detail in the technical guidance for the EDF. In order to validate the data, OWQ will look for the following types of data quality documentation:

- A quality assurance project plan (QAPP)
- Any project-specific planning documents that describe the study design, identify the analytical equipment and methods used, and document the quality assurance and quality control procedures, etc.
- Standard Operating Procedures (SOPs) that describe field, laboratory, or other relevant processes
- Published, approved sampling or analytical methods and documents that describe any non-standard analytical methods used
- Results from quality control samples and other procedures designed to ensure data quality

OWQ then uses this information to validate the data set for potential use by OWQ programs. Generally, OWQ is checking for:

- The use of standardized methods for sample collection and analysis for the parameter(s) monitored
- Adherence to the data quality controls articulated for the type of data
- Proper testing and calibration of equipment and instruments used for field measurements and sample collection

RECONCILIATION WITH OWQ REQUIREMENTS FOR THE USE OF SECONDARY DATA

All results validated through OWQ's data quality assessment process are considered potentially reliable for OWQ uses. In order to determine if they may be applied to a specific use, OWQ must compare the quality assurance data and information provided with the validated data set against the requirements established for a given EDF tier for the type of data under consideration. In addition, some OWQ uses have other specific requirements that must be met, such as those that require corresponding results for more than one parameters or data minimums.

OWQ's tier-specific and use-specific requirements are described in the technical guidance for the EDF. For non-OWQ uses, this information is provided as a set of recommendations regarding the data quality OWQ considers appropriate for the use(s) identified in the EDF. General requirements and recommendations are provided in the following section.

OWQ's decision regarding the usability of a secondary data set is considered final where OWQ uses are concerned. All organizations submitting data to OWQ through the EDF will be notified of OWQ's review results and the OWQ processes for which their data may be used. Organizations interested in making their data reliable for higher tier uses are encouraged to contact the EDF Coordinator for recommendations about how this might be achieved.

GENERAL REQUIREMENTS

Tier 1 uses are limited to those needs that do not require data of known quality. Thus, there are few requirements associated with Tier 1 in terms of either the components of the data package or data quality characteristics. In contrast, data quality characteristics of a data set become more important for Tier 2 and Tier 3 uses, most of which involve decision-making processes in which the consequences of making a wrong decision based on the data are much higher.

The uses For Tier 2 and Tier 3 uses. The general requirements and recommendations shown in Table 2 are intended to help you determine the likelihood that your data might be usable for one or more Tier 2 or tier 3 uses based on the characteristics of the data set.

More specific information regarding the requirements for data submittal may be found in the technical guidance for the EDF. One of the most important requirements is providing adequate data quality documentation with your data set. A QAPP is the preferred format for documenting the quality of your data set. A QAPP will contain all the information needed for OWQ and other potential users to determine whether your data will meet their needs and that the quality control steps needed to verify this were built into the project from the beginning.

Monitoring projects funded by IDEM's NPS Program are required to submit a QAPP for approval by the OWQ prior to initiation of monitoring activities. For all other organizations submitting data, other documentation may be acceptable if it provides sufficient information for the OWQ to ascertain the quality of your data set through comparison with the DQOs for OWQ uses.

The OWQ provides a template for the development of a QAPP online at: <http://www.in.gov/idem/nps/3383.htm> and can provide additional technical assistance if needed to help your organization to develop a QAPP or determining if the documentation you already have is sufficient.


Table 2: General requirements for Tier 2 and Tier 3 data.

Characteristics of Tier 2 and Tier 3 Data Sets	General Requirements/Recommendations
Age of data	OWQ considers data that are less than or equal to five years of age to be more reliable than older data for most Tier 2 and Tier 3 uses.
Sampling Design	Sampling design may be either targeted or randomized. For any statistical assessments received, OWQ will apply the results to the waterbody on which they were collected and for which they are representative. OWQ will review the sampling design to determine whether the study provides representative data for one or more OWQ uses.
Comparability	EDF participants are encouraged to use common sampling and analytical methods and equipment whenever possible and to include the minimum quality controls required or recommended for their intended use(s) and any recommended in the method documentation.
Geographic Information	Site location information is required and must be submitted electronically. Site location information must be sufficient to identify the specific waterbody to which the water quality results apply. Site location information may be obtained electronically with a geolocation positioning system (GPS) or using map interpolation methods. Coordinate data may be provided in any map projection (e.g. latitude and longitude).
Formatting Requirements	Electronic submittals are preferred using one of the options available through OWQ's Secondary Data Portal, which includes online data entry, customized Microsoft Excel templates, or electronic data interchange (EDI). Paper submittals will be accepted. However, OWQ resources for reviewing such submittals are limited. Therefore, hardcopy submittals will be considered reliable for Tier 1 uses only until such time as OWQ is able to perform the necessary data quality review.
Data Quality Documentation	Data quality documentation should provide sufficient information to determine the quality of your data set through comparison with the data quality objectives for one or more OWQ uses. A QAPP is preferred and is required for all data submitted by any organization whose monitoring project is funded in whole or part with a NPS Program grant.

DISCLAIMERS REGARDING IDEM'S USE OF SECONDARY DATA

Data submitted by external organizations will not be used by IDEM to initiate or support enforcement actions against permitted facilities. OWQ's Compliance and Enforcement Program and Watershed Assessment and Planning Branch work together and with other relevant state and federal agencies to collect the data necessary to support enforcement activities. IDEM has processes in place to follow up on complaints about potential environmental issues and to conduct further investigation when necessary. In cases where secondary data submitted through the EDF indicates possible permit violations, IDEM will investigate as appropriate in accordance with established policies and procedures.

OWQ'S SECONDARY DATA CERTIFICATION

Prior to using secondary data for its Tier 2 or Tier 3 uses, OWQ must certify the data set. Certification provides an added layer of confidence that OWQ has received or can easily obtain all the information needed to support the DQA level assigned to the data set. All data submittals that participants wish to have OWQ programs consider for Tier 2 and Tier 3 uses must contain a certification form completed by the individual or organization and returned with each submittal.  This form is provided in Appendix 1 of the Technical guidance for the EDF.

RECONCILIATION OF CONFLICTING DATA RESULTS

It is possible that data submitted through the EDF may contradict data submitted for the same water body by other external parties and/or data collected by OWQ. Because OWQ's Tier 1 and Tier 2 uses do not have a regulatory impact, conflicting data is not generally a problem. In these cases, conflicting results will be noted as such in any decision documentation developed by OWQ programs that use the data.

The issue of conflicting data becomes more important with regard to OWQ's Tier 3 uses due to their regulatory nature. Two different scenarios are possible:

- Data submitted by an external organization shows a different result than data collected by OWQ, or
- Data from two or more external sources are the only data available for a given Tier 3 use and they show conflicting results.

In these cases, OWQ will review all the information available to identify the more reliable data set(s). OWQ will consider factors such as the relative data quality, which can vary somewhat within a given tier, the amount of data in each data set, the age of the data, any bias apparent in the study design and other factors as appropriate. In some cases, a clear cut answer is not evident from the information available. In these cases, OWQ staff will rely on best professional judgment in resolving the conflicting results to facilitate decision making.

OWQ will document its rationale regarding the reconciliation of conflicting results and for any subsequent decisions based on the data. OWQ's determinations about how to use conflicting data from external sources in its decision-making are final. Individuals and/or organizations that disagree with OWQ's decisions regarding the use of their data may do so formally through the public comment periods built into the OWQ programs that evaluated the data for potential use.

Any organization using data obtained from other sources must make their own decisions about the conclusions that can be drawn from conflicting results. Resolving questions with regard to conflicting data for non-OWQ uses shown in Table 1 is beyond the scope of this guidance. However, the factors that OWQ considers when resolving conflicts may be useful to others when making such decisions.

TIMELINES FOR DATA SUBMISSION

Data may be submitted to the EDF at any time for consideration by OWQ. In addition, OWQ routinely conducts a number of program-specific solicitations.

OWQ's Integrated Reporting Program solicits data for its 305(b) assessment and 303(d) listing processes every two years. These solicitations follow OWQ's nine-year rotating monitoring, assessment and reporting schedule and focus on the next basin to be assessed. This schedule can be found online at: [insert link]. While the goal of OWQ's solicitation is to obtain as much data as possible to support its assessments in that basin, all data submitted to the EDF regardless of where they were collected are considered for potential use in its assessment and listing processes.

The timeline for submission of data for use in TMDLs varies. Separate solicitations are conducted for each TMDL as part of the OWQ's TMDL development. As such, solicitations are targeted to those watersheds in which TMDL development is planned. However, like the Integrated Reporting Program, OWQ's TMDL program considers all data submitted through the EDF in its processes regardless of where they were collected for the different purposes shown in Table 1. OWQ's TMDL development schedule may be found online at: <http://www.in.gov/idem/nps/2652.htm>

For organizations monitoring with a NPS Program grant, project sponsors should consult their grant agreements and/or their OWQ project managers for their specific deadlines.

For other OWQ uses, data submission is not time-sensitive. Regardless of when they are submitted, all sets will be reviewed. Most of the data sets and associated quality assurance information received through the EDF are housed in OWQ's Assessment Management Information System database. These data may be accessed by other programs within IDEM or the public by request to the Secondary Data Coordinator.

WHERE TO GET TECHNICAL ASSISTANCE

Technical assistance is available for any organization with an interest in submitting their data for potential use in OWQ programs. Many useful resources are available from the EDF home page at: <http://www.in.gov/idem/nps/2908.htm> where you can find:

- Assistance with documenting the quality of your data to make it more broadly usable
- Help with formatting your data submittals
- Recommendations on how to improve the quality of the data you collect
- Information on where to obtain training and other resources for water quality monitoring

The Hoosier Riverwatch Program provides training for stream monitoring through several one-day [workshops](#) held throughout Indiana each year. The Hoosier Riverwatch training schedule and manual are available online at: www.in.gov/idem/riverwatch/2332.htm.

The Clean Lakes Program provides those interested in monitoring lakes with a monitoring manual and works with its volunteers to answer questions and help address issues that arise in their sampling activities. The Clean Lakes Program volunteer manual and other information are available at: <https://clp.indiana.edu/doc/volunteer/volunteer-lake-monitoring-manual.pdf>.

If you or your organization is interested in learning more about the EDF and how to participate, you are encouraged to contact OWQ's Secondary Data Coordinator:

Secondary Data Coordinator
IDEM Office of Water Quality
100 North Senate Avenue
MC 65-44 Shadeland
Indianapolis, IN 46204-2251
317-308-3392; 800-451-6027 (toll free)
Email: WaterQualityEDF@idem.IN.gov

