The Waterbody Inventory Priority Waterbodies List Assessment Methodology

Assessment methodology refers to what monitoring approaches are used and how results are interpreted to determine use support and arrive at an assessment of water quality. The various aspects of assessment methodology include the type of monitoring data and water quality information used in the assessments, the source of the data/information, and the level of confidence in the data/information and the resulting assessment. What follows is an outline of specific criteria relating water quality monitoring data and information to the degree of use support. Such criteria are critical to providing a balanced and consistent assessment of the quality of waters throughout New York State.

WI/PWL Water Uses

- Water Supply
- Shellfishing
- Public Bathing
- Fish Consumption
- Aquatic Life
- Recreation
- Aesthetics

Waterbody Inventory/Priority Waterbodies List

NYS DEC maintains use support/impairment information for the waters of the state through its Waterbody Inventory/Priority Waterbodies List (WI/PWL) database. The assessment of New York State water resources contained in the WI/PWL is based on the ability of waters to support a range of specific designated uses (see box). The particular uses that a specific waterbody are expected to support is dependent upon the classification of that waterbody. For example, only specifically designated waterbodies are considered to have best uses of water supply, shellfishing and public bathing.

The use support/impairment information in the WI/PWL database is generated from a variety of available sources

WI/PWL Severity of Use Impairment

PRECLUDED

Frequent/persistent water quality, or quantity, conditions and/or associated habitat degradation *prevents all aspects* of the waterbody use.

IMPAIRED

Occasional water quality, or quantity, conditions and/or habitat characteristics *periodically prevent* the use of the waterbody, or;

Waterbody uses are not precluded, but some aspects of the use are *limited or restricted*, or;

Waterbody uses are not precluded, but *frequent/persistent* water quality, or quantity, conditions and/or associated habitat degradation *discourage* the use of the waterbody, or;

Support of the waterbody use *requires additional/advanced* measures or treatment.

STRESSED

Waterbody uses are not significantly limited or restricted, but *occasional* water quality, or quantity, conditions and/or associated habitat degradation *periodically discourage* the use of the waterbody.

THREATENED

Water quality currently supports waterbody uses and the ecosystem exhibits no obvious signs of stress, however *existing or changing land use patterns* may result in restricted use or ecosystem disruption, or;

Monitoring *data reveals a decrease in water quality* or the presence of toxics below the level of concern, or;

Waterbody uses are not restricted and no water quality problems exists, but the support of a specific and distinctive use makes the waterbody more susceptible to water quality threats.

including statewide ambient network monitoring data, monitoring of toxic substances in fish and wildlife, special intensive surveys, fisheries resource surveys, water quality complaints, beach closure reports, shellfish area closures, etc. Given the growing involvement of local agency and citizen volunteers in water quality monitoring, the WI/PWL updating process also includes a significant public participation and outreach component. This effort relies on a statewide network of local Water Quality Coordinating Committees and county Soil and Water Conservation Districts working in conjunction with the DEC Division of Water to capture additional available water quality information.

After available water quality information is collected, judgements and evaluations are made regarding:

- whether an impairment to a specific use is actually occurring,
- the severity of the impairment to the use, and
- the level of documentation indicating a use impairment.

The focus of a water quality assessment is based on a specific use being restricted. If this is the case, then the severity of use impairment is evaluated as either *precluded*, *impaired*, *stressed* or *threatened*. Based on the level of documentation, the impairment is also determined to be *known*, *suspected* or *possible*. The national use support categories used by USEPA to assess waters differ somewhat from those tracked in the NYS DEC Waterbody Inventory/Priority Waterbodies List system. The general relationship between the USEPA Designated Use Support categories (fully supporting, partially supporting, not supporting) and the WI/PWL severity and documentation categories is shown in Table 1. More detailed relationships between specific monitoring and assessment results and various uses supported are outlined and discussed on the following pages.

WI/PWL Level of Documentation

Known - Water quality monitoring data and/or *studies have been completed and conclude* that the use of the waterbody is restricted to the degree indicated by the listed severity.

Suspected - Anecdotal evidence, public perception and/or specific citizen complaints *suggest* that the use of the waterbody may be restricted. However, water quality data/studies that establish an impairment *have not been completed* or there is *conflicting information*.

Possible - Land use or other activities in the watershed are such that the use of the waterbody *could be affected*. However, there is *currently very little, if any, documentation* of an *actual* water quality problem.

Documentation of Waters with *No Known Impairment*

Historically, limited resources forced the NYS DEC monitoring effort to focus on waterbodies with known or suspected water quality problems and issues. Correspondingly, there was not much emphasis on the monitoring and documentation of waters with good (*fully supporting*) water quality. However, modifications to the NYS DEC Rotating Intensive Basin Studies (RIBS) Sampling Program to correct this bias were piloted in 1996 and began in earnest in 1998. The new RIBS strategy employs a tiered approach where rapid biological screening methods are applied at a large number of sites during the first year of a two-year study. This enables the program to document water quality in a greater percentage of all waters, not just those with known or potential problems. More intensive chemical monitoring is used in the second year to follow-up problems and issues identified by the biological screening effort. While resources are not currently available for a full-blown *probabilistic* monitoring network in the state, the wide coverage of the biological screening allows the RIBS Program to incorporate some of the main ideas behind the probabilistic approach and document good, as well as poor, water quality. However, until the biological screening is employed in a larger percentage of the state, waterbodies with no known use impairments will continue to be characterized as *nonimpacted/unassessed*.

Table 1 **Relationships Between USEPA Designated Use Assessments and WI/PWL Severity/Documentation Categories**

Severity of Problem	Level of Problem Documentation		
	Known Problem	**Suspected Problem**	**Possible Problem**
Precluded	Not Supporting	N/A	N/A
Impaired	Partially Supporting	Partially Supporting	N/A
Stressed	Supporting, but Threatened	Supporting, but Threatened	Fully Supporting (needs verification)
Threatened	Supporting, but Threatened	Fully Supporting (needs verification)	Fully Supporting (*Special Protection*)
No Known Impairment	Fully Supporting		

Aquatic Life Use

The primary focus of the NYS DEC river and stream monitoring effort involves determining the degree to which waters support aquatic life. There are a number of reasons for this emphasis:

- Aquatic life is the most significant use of the large majority of the states rivers,
- Aquatic life use support can be assessed easily and economically using biological (macroinvertebrate) sampling techniques,
- Aquatic life use support is one of the most sensitive of the national use support categories.

The evaluation of Aquatic Life support represents a recent change to the WI/PWL. Prior to 1999, the WI/PWL tracked waterbody support of *Fish Propagation* and *Fish Survival* rather than *Aquatic Life*. This was a reflection of the designated uses outlined in New York State standards. However, the change to the broader category of *Aquatic Life* better represents the results of the monitoring tools (primarily macroinvertebrate sampling) used to assess water quality. The change from *Fish Propagation/Survival* to *Aquatic Life* also provides greater flexibility in reporting water quality and allows tracking of aquatic impacts that are not sufficiently severe as to be apparent in the fishery. The revised category also corresponds more closely to other New England State's and the USEPA national use support category.

The relationship between biological (macroinvertebrate) sampling data and the impairment to *Aquatic Life* support is shown in Table 2.

Atmospheric Deposition (Acid Rain) Impacts on *Aquatic Life*

In addition to the biological (macroinvertebrate) assessment criteria outlined in Table 2, separate criteria to determine aquatic life support is applied to waterbodies, particularly lakes and ponds, that are subject to atmospheric deposition, or acid rain. Acid rain has long been a significant problem in New York State. Because of the extent and significance of this issue, extensive chemical sampling efforts to monitor the pH of lakes and ponds in the state have long been in place. The separate aquatic life use support/acid rain criteria takes advantage of the considerable amount of available chemical (pH) data. The relationship between chemical (pH) monitoring data and the impairment to aquatic life is shown in Table 3.

Table 2 Aquatic Life Use Assessment Criteria

Biological (Macroinvertebrate) Assessment		WI/PWL Use Impairment		EPA Designated Use Support
		Severity	Documentation	
Non-Impacted (Very Good)		No Known Impairment	Assessment Level: *Monitored*	Fully Supporting
Slightly Impacted* (Good)	No other indications of impairment	No Known Impairment	Assessment Level: *Evaluated*	Fully Supporting
	Other indications of impairment present	Stressed	Suspected or Known	Fully Supporting, but Threatened
Moderately Impacted (Poor)		Impaired	Known	Partially Supporting
Severely Impacted (Very Poor)		Precluded	Known	Not Supporting

* *Slightly Impacted* represents a broad category ranging from generally good water quality to minor impairment of use. Other water quality information and conditions are generally necessary to determine an appropriate level of *Documentation* and corresponding *USEPA Designated Use Support*.

Table 3 Acid Rain/Aquatic Life Assessment Criteria

Lake pH/Fishery Assessment	WI/PWL Use Impairment		EPA Designated Use Support
	Severity	Documentation	
pH less than 5.0	Precluded	Known	Not Supporting
pH between 5.0; and 6.0	Impaired	Known	Partially Supporting
pH greater than 6.0, but fishery surveys indicate no fish, and lake characteristics suggest acid rain as cause	Impaired*	Suspected*	Partially Supporting
other indications of acid rain**	Stressed	Suspected	Fully Supporting, but Threatened
No indications of acid rain effects	No Known Impairment	Assessment: *Evaluated*	Fully Supporting

* Actual use impairment and relationship to acid rain as a cause should be verified with additional monitoring.

** Lake characteristics may indicate possible acid rain effects, but no pH/fish data exists to support an impairment.

Note about *Episodic Acidification*

Episodic Acidification refers to short-term decreases in acid neutralizing capacity (ANC) that may occur during high streamflow events (i.e., spring runoff, snowmelt). Although these events are periodic, bioassays and other fish studies show that the impact on the fishery can be significant and longer lasting. The severity of the impact may result in precluded–rather than merely *impaired*–aquatic life, even though episodic acidification occurs over a short time period. This situation represents an exception to the strict application of the Priority Waterbodies List (PWL) definitions for a precluded use (frequent/persistent water quality condition) and an impaired use (occasional water quality conditions).

Drinking Water Use

Drinking water use support is based on New York State Department of Health or local health department closures or advisories for drinking water supplies, the need for any additional treatment beyond "reasonable" levels, and monitoring data for contaminants that exceed criteria for the protection of human health. Only those waters specifically designated for drinking water use (i.e., Class A, AA, A/AA-Special waters) are evaluated for their support of this use. Furthermore, waterbodies designated for and used as sources of drinking water are considered highly valued resources deemed worthy of *Special Protection*. Even if such waters have no known impairment or imminent threat, these waters are included on the NYS DEC Priority Waterbodies List as *Special Protection* waters. The relationship between public water supply advisories and other monitoring information and the level of drinking water use support is outlined in Table 4.

Table 4 Drinking Water Use Assessment Criteria

Criteria	WI/PWL Use Impairment		EPA Designated Use Support
	Severity	Documentation	
Frequent/Persistent Conditions Prevent Use • One or more NYS DOH Drinking water supply closures resulting in closure of the supply for more than 30 days.	Precluded	Known	Not Supporting
Occasional Conditions Prevent Use • One or more NYS DOH drinking water supply closures resulting in closure of the supply for less than 30 days, or	Impaired	Known	Partially Supporting
Frequent/Persistent Conditions Discourage Use • Problems that do not require closure or advisories but adversely affect treatment costs and/or the quality of the finished water (e.g., taste/odors, color, excessive turbidity/dissolved solids, need for activated charcoal filters, etc.). • Monitoring data exceeds contaminant criteria* more than 25% of time.	Impaired	Known or Suspected	Partially Supporting
Occasional Conditions Discourage Use • Monitoring data exceeds contaminant criteria* more than 10% of time.	Stressed	Suspected	Full Support (Threatened)
Conditions Support Uses, Threats Noted • Contaminants are present, but at levels sufficiently low that routine treatment results in acceptable drinking water.	Threatened	Known or Suspected	Full Support or Full Support, (Threatened)
No Known Impairments or Imminent Threats • No drinking water restrictions, and • No additional treatment required, and • No known contaminants present.	*Special Protection Waters**		Full Support

* Waterbodies designated as drinking water sources (Class A and higher) are considered highly valued resources deemed worthy of *Special Protection*. Regardless of impairment, these waters are included on the NYS DEC Priority Waterbodies List.

Fish Consumption Use

The assessment of fish consumption use is based on NYS DOH advisories regarding the catching and eating of sportfish, and contaminant monitoring in fish tissue, other biological tissue and surficial bottom sediments. The advisories reflect federal government standards for chemicals in food that is sold commercially, including fish. The NYS DEC Division of Fish Wildlife and Marine Resources routinely monitors contaminant levels in fish and game. Based on this monitoring data, NYS DOH issues advisories for specific waterbodies and species when contaminant levels in sportfish exceed the federal standards. These advisories are updated and published annually.

Because the general advisory for eating sportfish is precautionary and is not based on any actual contaminant monitoring data, it does not represent any documented impairment of fish consumption use. Consequently, the general statewide advisory is not reflected in this assessment of fish consumption use.

In addition to the waterbody-specific advisories, a general advisory recommends eating no more than one meal (one-half pound) per week of fish taken from New York State freshwaters and some marine water at the mouth of the Hudson River. This general advisory is to protect against eating large amounts of fish

Table 5 Fish Consumption Use Assessment Criteria

Criteria	WI/PWL Use Impairment		EPA Designated Use Support
	Severity	Documentation	
Frequent/Persistent Conditions Prevent Use • NYS DOH advisory recommends eating no fish (or none of sub-species) from specific waterbody.	Precluded	Known	Not Supporting
Periodic/Occasional Conditions Prevent Use • NYS DOH advisory recommends limiting consumption of fish from a specific waterbody. • Monitoring of fish tissue show contaminant levels that exceed levels of concern, but NYS DOH advisory has not been issued.	Impaired	Known or Suspected	Partially Supporting
Occasional (Other) Conditions Discourage Use • Monitoring of macroinvertebrate tissue or surficial bottom sediment show contaminant levels that exceed levels of concern.	Stressed	Suspected	Fully Supporting (Threatened)
Conditions Support Use, Threats Noted • Monitoring of fish (known), macroinvertebrate tissue/bottom sediment (suspected) show contaminant levels present but not exceeding levels of concern.	Threatened	Known or Suspected	Full Support or Full Support (Threatened)
No Known Impairment or Imminent Threats • No fish consumption advisory beyond the NYS DOH *General Advisory for Eating Gamefish*, and • Monitoring data revealing no contaminants in fish, macroinvertebrate tissue or surficial bottom sediment above background levels.	No Known Impairment	Assessment Level: *Monitored*	Full Support

that have not been tested or that may contain unidentified contaminants. It does not apply to most marine waters. Because the general statewide advisory is precautionary and is not based on any actual contaminant monitoring data, it does not represent any documented impairment of fish consumption use.
Consequently, the general statewide advisory is not reflected in the assessment of fish consumption use.

The relationship between the waterbody-specific fish consumption advisories and the severity and documentation of an impairment to fish consumption use is reflected in Table 5.

Shellfishing Use

Marine Resources staff from the NYS DEC Division of Fish Wildlife and Marine Resources (DFWMR) assess the quality of nearly 1,200,000 acres of marine waters for shellfishing purposes. DFWMR certification of shellfishing areas is based on bacteriological water quality and evaluation of potential pollution sources by shoreline surveys. Only those waters specifically classified for shellfishing use (i.e., Class SA waters) are evaluated for their support of this use.

The relationship between the shellfishing certification and the severity and documentation of an impairment to shellfishing use is reflected in Table 6.

Restrictions on shellfishing are based on either water quality (bacteriological) monitoring results and/or on the proximity to and expected impact of known discharges and potential sources of contamination.

Table 6 Shellfishing Use Assessment Criteria

Criteria	WI/PWL Use Impairment		EPA Designated Use Support
	Severity	Documentation	
Frequent/Persistent Conditions Prevent Use • NYS DEC Division of Fish Wildlife and Marine Resources (DFWMR) has issued a year-round shellfishing closure for the water.	Precluded	Known	Not Supporting
Periodic/Occasional Conditions Prevent Use • DFWMR has issued a seasonal or partial shellfishing closure for the water.	Impaired	Known	Partially Supporting
Occasional (Other) Conditions Discourage Use • ???	Stressed	Known or Suspected	Full Support, Threatened
Conditions Support Use, but Threats Noted • Shellfish Land Certification monitoring reveals contaminant above background, but not sufficient to warrant shellfish bed closure.	Threatened	Known	Full Support (Threatened)
No Known Impairment or Threat to Use • DFWMR has certified (opened) the water for direct market harvesting of shellfish, and • Shellfish Land Certification monitoring (DFWMR) reveals no contaminants above background levels.	No Known Impairment	Assessment Level: *Monitored*	Full Support

Public Bathing and Recreation Uses

Swimming and public recreation are important and popular uses for the waters of the state. The assessment of these wide range of activities involves two separate use categories: *Public Bathing* and *Recreation*.

Table 7 Public Bathing/Recreation Use Assessment Criteria

Criteria	WI/PWL Use Impairment		EPA Designated Use Support
	Severity	Documentation	
Frequent/Persistent Conditions Prevent Uses • State/local/county health department has closed beach/water to swimming for the entire season.	Precluded	Known	Not Supporting
Periodic/Occasional Conditions Prevent Uses • State/local/county health department has issued temporary beach closure for the waterbody. • Sufficient stream flow/water level necessary to support recreational uses are artificially restricted.	Impaired	Known	Partially Supporting
Frequent/Persistent Conditions Discourage Uses • Recreational Uses of water require additional measures (e.g., weed harvesting/control). • Monitoring data exceeds *Impaired* criteria* more than 10% (suspected) or 25% (known) of time. • Observational criteria* for restricted use noted more than 75% of the time.	Impaired	Known or Suspected	
Occasional (Other) Conditions Discourage Uses • Monitoring data exceeds *Stressed* criteria* more than 10% (suspected) or 25% (known) of time. • Observational criteria* for restricted use noted more than 25% of the time.	Stressed	Known or Suspected	Full Support (Threatened)
Conditions Support Uses, but Threats Noted • Data exceeds *Threatened* criteria* more than 10% (suspected) or 25% (known) of time. • Observational criteria* for restricted use noted more than 10% of the time.	Threatened	Known or Suspected	Full Support or Full Support, (Threatened)
No Known Impairments or Threats to Uses • Monitoring data does not exceed use restriction criteria more than 10% of time. • Observational criteria* for restricted use noted less than 10% of the time.	No Known Impairment	Assessment Level: *Monitored*	Full Support

* **Monitoring Data Criteria**	*Impaired*	*Stressed*	*Threatened*
Total Phosphorus	40 µg/l	30 µg/l	20 µg/l
Chlorophyl a	15 µg/l	12 µg/l	8 µg/l
Clarity (Secchi Disc)	1.2 m	1.5 m	2.0 m

*** Observational Data Criteria**

Swimming/recreation are slightly (or more seriously) restricted by specifically identified causes (algae, clarity, odors, etc). (C=3,4 or 5) and (A=3,4,5 & D=1,2 >50%)

Observational Criteria refers to responses to specific questions on *CSLAP Field Observation Forms*.

Evaluation of *Public Bathing* use is limited to only those waters classified by New York State for primary contact recreation (i.e., Class B, SB, or higher waters). This classification applies to waters specifically designated as public beaches and bathing areas, which have a higher level of swimming use and are more regularly monitored by public health agencies.

The broader *Recreation* use category tracks impairments to a more expansive list of recreational uses, such as fishing, boating, water skiing, and other primary/secondary contact activities, including swimming. The *Recreation* category addresses the federal Clean Water Act goal that all waters be "swimmable." * However, while all waters of the state are to be "swimmable," as a practical matter not all waters of the state are regularly monitored to assess swimming use support to the same degree that designated public bathing areas are. As a result of the varying levels of monitoring, *Public Bathing* waters are evaluated separately from other waters for *Recreation* uses.

As a practical matter, not all waters of the state are regularly monitored to assess swimming use support to the degree that designated public bathing areas are. Therefore, general precautions should be taken regarding recreation in these other waters.

The assessment of *Public Bathing* and *Recreation* uses rely on various water quality indicators. For waters used as public bathing areas state and local/county health departments conduct regular bacteriological sampling programs and perform sanitary surveys. Based on the findings of these surveys, bathing use may be restricted either permanently or periodically. Localized closings may also occur due to contamination by spills, waterfowl, or stormwater runoff.

In addition to swimming restrictions due to bacteriological contamination, the swimming/recreation uses of some waters are discouraged by other water quality conditions. Excessive weed growth, silty/muddy lake bottoms, and poor water clarity all represent lesser impairment of waters for public bathing use.

The relationship between water quality monitoring and other indicators and the severity and documentation of an impairment to swimming/bathing use is reflected in Table 7.

Natural Resources Habitat/Hydrologic Use Support

In an effort to better incorporate wetlands and other natural resources concerns into the water quality assessment, the additional water use category of *Natural Resources Habitat/Hydrology* was recently added to the list of uses to be assessed. This broad category captures waterbodies where water quality may be satisfactory, but various activities result in degradation of natural resources (e.g., fish and wildlife populations, habitats) and/or impacts to wetland uses such as flood protection, erosion control, nutrient recycling and surface and groundwater recharge. This category may also be used to capture impacts to various water quantity and flooding/flood plain issues including excessively low flows, increased peak flows, alterations to the frequency, duration and timing of floods and loss of flood storage.

For many impacts to habitat/hydrologic use support, situation are more clearly defined by the cause or source of the problem, than by the use affected. Such causes/sources include dredging, draining, excavation/filling of wetlands, stream channels, lakes/ponds; stream widening; stream downcutting; sediment embeddedness; other losses of wetlands; habitat fragmentation; loss of riparian vegetation or upland buffer zones.

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* In order to meet the federal Clean Water Act goal that all waters be "swimmable," water quality of New York State waters Class C, SC (and above) "shall be suitable for primary and secondary contact recreation." However, other factors (such as flow/depth, access, conflicting use) may limit this use. (See NYS Classifications for Surface Waters, Part 701.1 thru 701.14.)

Specific criteria for *Natural Resources Habitat/Hydrology* use support have not yet been developed.

Aesthetic Use

An assessment of waterbody support of *aesthetics* is much more subjective than those for the other assessed uses. Consequently, there is no table of specific assessment criteria to determine support of aesthetics. Instead, the assessment of aesthetics use support will rely on the PWL definitions for the severity of impairment, level of documentation, and the relationship between severity/documentation and USEPA use support categories as outlined in Table 1.