

Environmental Indicator Profile Sheet

	<p>Indicator Profile No. 4</p> <p>Exceedance Frequencies of Water Quality Standards</p> <p>Category: Water Quality</p>	<p>Tools Used to Measure Indicator:</p> <ul style="list-style-type: none"> • Chemical Monitoring • Trend Analysis
--	---	--

Description:
 Water quality standards have been established by federal, state, and local governments for various pollutants and receiving water classifications. The frequency with which a particular standard is exceeded or the percentage of water bodies, river-miles, or lake-acres failing to meet designated uses may be indicative of the relative success or failure of stormwater management efforts.

While physical characteristics (e.g., downcutting, flooding) and biological parameters (e.g., assemblage or diversity) could be evaluated by this method, few jurisdictions have standards for such parameters. Consequently, current use of this indicator is based primarily on chemical standards.

The frequency analysis can incorporate data already collected by local and State agencies as part of the 305(b) reporting process. Section 305(b) of the Federal Water Pollution Control Act requires States to prepare a biennial report including analyses of the extent to which pollution reduction; maintenance of specified levels of water quality; and protection of aquatic habitat, wildlife, and recreational usage has been achieved.

- Utility of Indicator to Assess Stormwater Impacts:**
- Can be used to evaluate the performance of stormwater BMPs with respect to various storm frequencies.
 - Can be used to identify long-term and seasonal trends in regional water quality.
 - Can be used to characterize water quality impacts due to urban runoff with respect to various storm categories (frequent storms, flood events).
 - Can be used to document periods of poor water quality (e.g., following large storm events, during low-flow summer months).

Indicator Useful for Assessing:

- * Aquatic Integrity of:
 - Lakes ●
 - Streams ●
 - Estuaries ●
- * Land Use Impacts ●
- * Stormwater Mgmt Programs ●
- * Whole Watershed Quality ●
- * Industrial Sites ●
- * Municipal Programs ●

Key:

Very Useful ●

Mod. Useful ●

Not Useful ○

Indicator Advantages

- * Geographic Range ●
- * Baseline Control ●
- * Reliable ●
- * Accuracy ●
- * Low cost ○
- * Repeatable ●
- * All Watershed Scale ●
- * Familiar to Practitioners ●
- * Easy to use & Low training ●

Key

Very Advantageous ●

Mod. Advantageous ●

Not Advantageous ○

Cost

See Table 3.3A

Advantages of Method:

- Many jurisdictions already have long-term databases which may be examined to determine if standard exceedances are increasing in frequency (trend analysis).
- Required sampling and parameter determination for this indicator are already incorporated into regular monitoring programs and the 305(b) reporting process in many jurisdictions.
- Results are easy to interpret, making the method a good tool for initiating policy actions, securing funding sources, etc.
- Provides a reliable and legally defensible benchmark for enforcement actions.

Disadvantages of Method:

Exceedance frequencies are developed on a constituent by constituent basis. Comprehensive assessment of a particular water body or stormwater management effort requires identification and evaluation of several parameters and standards.

- Several sample locations are required within a relatively small area to determine the actual cause or source of the standard exceedance.
- Exceedance frequencies alone may not identify the causes and sources of observed degradation. Additional long-term and/or longitudinal monitoring may be required, especially if in-stream samples are used.
- Most criteria and standards are based on a few chemical water quality parameters that present indirect measure of the presence or absence of aquatic life.
- There are almost none that are based on physical or biological parameters that reflect the actual versus inferred presence or absence of aquatic species.
- Exceedance frequency may be an artifact of monitoring effort as much as water quality degradation. The more frequently monitoring is conducted, the more likely exceedances will be detected.
- Exceedance of a water quality standard or criteria may only occur briefly during storm events. Exceedance of the standard may not be reflected in the sample collected, and actual long-term impacts on the aquatic community are difficult to predict.

Case Study: Cooke, T.; Drury, D.; Katznelson, R.; Lee, C.; Mangarella, P.; Whitman, K. 1995
Storm Water NPDES Monitoring in Santa Clara Valley

Stormwater NPDES-Related Monitoring Needs. Conference Proceedings. 1995.

The authors compared metals monitoring data from four years of sampling with water quality objectives contained in the April 1991 California Inland Surface Waters Plan. Dissolved concentrations seldom exceeded objectives, whereas total metal concentrations exceeded the objectives with greater frequency. Most exceedances occurred at stations whose watersheds were smaller and more highly urbanized. Exceedances of objectives by dissolved metal concentrations were considered better indicators of potential toxicity problems than exceedances by total metals concentrations because dissolved metals are more bioavailable.

The duration of exceedance was also measured at one station. The duration of exceedance of acute water quality objectives for total copper, lead and zinc was always less than the duration of the storm runoff event. The frequency of exceedance varied depending on the metal, and was greatest for copper, followed by zinc and lead. For those cases where an exceedance was measured, the average duration of exceedances, expressed as a percent of the storm duration, was approximately 60% for copper, 40% for zinc, and about 20% for lead.

Method References:

- Frequency Exceedances: Yamane, C.M.; M.G. Lum, 1985. *Quality of Storm-Water Runoff, Mililani, Oahu, Hawaii, 1980-1984*. USGS Water-Resources Investigations Report 85-4265.