

Measuring Incremental Improvements in Water Quality Based on Statewide Statistical Surveys – Proposed in FY13 NWPB

Measure Language: Using statewide statistical survey results, the percentage of waters in good condition increases or remains constant in each state; the percentage of waters in poor condition decreases or remains constant in each state; and, there is no statistically significant degradation in mean water quality.

Objective: Use water quality monitoring results from probability-based surveys to track statewide changes in water quality conditions for specific water body types (e.g., rivers, lakes, coastal waters and wetlands). This measure differs from existing measures, in that it captures incremental improvements in water quality across a state by answering the following questions:

- Are waters in good condition being protected? (i.e., no decrease in percent of waters in good condition);
- Are waters not getting worse? (i.e., no increase in percentage of waters in poor condition); and,
- How is overall water quality changing (i.e., the mean value is shifting in a positive, improving direction).

This measure is a complement to existing measures that track:

- waterbodies listed as impaired in 2002 that are fully attaining water quality standards (SP-10)
- waterbodies that are partially restored because specific causes of impairment have been removed (SP-11)
- watersheds with impaired waters demonstrating incremental improvements in water quality using the watershed approach (SP-12).

Background: Following the *Elements of a State Monitoring and Reporting Program*, (EPA 2003) and the *2008 Guidelines for the Award of Monitoring Initiative Funds under Section 106 Grants to States, Interstate Agencies, and Tribes*, states began implementing statewide statistical surveys to address the gap in reporting on the condition of waters state wide. Statewide statistical surveys are water quality assessments designed to yield unbiased estimates of the condition of a resource class (such as *all* lakes greater than 4 hectares) based on monitoring a representative sample of those waters. States use statewide statistical surveys to describe how widespread water quality problems are in the state by providing a statewide characterization of the extent of waters in different condition categories, with documented confidence. The survey results complement site-specific, targeted monitoring activities which provide detailed information about individual waters.

Over time surveys can be used to track changes in water condition across the state scale or sub-state scale depending on design. Reporting on this measure will be supported by data from the statewide statistical surveys that states have adopted as part of their state monitoring programs either independently or in conjunction with the National Aquatic Resource Surveys. It is important to recognize that this is a long term measure with most states rotating through each water body type (e.g., river, stream, lakes, wetlands, etc) on a 5 year rotating cycle. A baseline reported for lakes in 2014 may not have a second round of data for comparison until 2020. Each year a different water body type may be reported, but it will take decades to document significant changes in condition for each of those water body types.

Type of Measure: Indicator

FY13 Measure Definitions

a) Terms and phrases:

Improved: The results of successive statewide statistically valid surveys for a specific waterbody type and core indicator demonstrate that:

- There is no decrease in the percent of waters in good condition;
- There is no increase in the percentage of waters in poor condition; and,
- The mean value for water quality condition is shifting in a positive direction.

State-wide statistically valid survey: A state-scale probabilistic survey that meets the criteria set out in the *2008 Guidelines for the Award of Monitoring Initiative Funds under Section 106 Grants to States, Interstate Agencies, and Tribes* (<http://www.epa.gov/fedrgstr/EPA-WATER/2008/July/Day-17/w16385.pdf>)

Core indicators: Indicators or chemical/ physical parameters selected by the state and reported consistently to track water quality (e.g., biology, habitat, total suspended solids, total nitrogen and phosphorus). Refer to the elements of a state monitoring program and the national aquatic resource surveys for examples of appropriate core indicators.

Condition categories: Categories are defined by the state (e.g., good, fair, poor) and used to describe gradations of water quality in general groupings. Refer to the reference condition approach and the biological condition gradient for examples. For purposes of this measure, “higher” (or the “highest”) condition categories are those with better (or the best) water quality conditions.

Good condition and poor condition: EPA recognizes that states use different terminology and gradients to classify water quality condition. For purposes of this measure, “good condition” means the state-defined condition category (or categories) with the best water quality conditions. In general, waters in good condition meet water quality standards. “Poor condition” means the state-defined condition category (or categories) with the lowest water quality conditions.

Mean value for water quality condition: The mean value of a water quality parameter or indicator for the set population. For example, the mean score for the population of waters surveyed for biological condition using the states’ Index for Biotic Integrity for benthic macroinvertebrates is shifting in an improving direction, usually a higher score is better for IBI. For stressors like nutrients, a lower concentration is better, the improving direction would be a lower mean concentration of nutrients across the population of waters surveyed.

b) Methodology for computation of results:

The data used to report on this measure should be derived from state-scale statistically-valid surveys that meet the criteria contained in the *2008 Guidelines for the Award of Monitoring Initiative Funds under Section 106 Grants to States, Interstate Agencies, and Tribes* (2008 Guidelines). This includes, but is not limited to data collected through participation in the national aquatic resource surveys. State-scale statistical surveys are conducted for specific waterbody types and results are reported as the percentage and amount of waters within each state-defined condition category by core indicator. For example, “Stream Condition Index scores showed that 10% of streams are in excellent condition, 20% are in good condition, 50% are in fair condition and 20% are in poor condition.”

A baseline for this measure begins with the first report of state-scale survey results. Measure results indicating states are protecting or improving water quality across the state cannot be reported until a state has completed at least two statewide statistical surveys for a specific waterbody type, which EPA recognizes may not happen for several years. The surveys being compared across time must include core indicators that are interpreted

consistently across the surveys (i.e., the parameters, collection and analytical methods, and interpretation thresholds).

The measure is intended to track positive shifts or improvements across the water quality spectrum (i.e., low to high quality) while ensuring there is no degradation in water quality.

States will estimate the percentage and amount of waters in each state-defined condition category and compare these results to successive statewide statistical surveys for a specific waterbody type and core indicator. For example, a state has completed a state-scale statistically-valid survey for lakes and the results indicate that for biological condition, 10% of the state's lakes are in excellent condition, while 50% are in good condition, 20% are in fair condition, and 20% are in poor condition. Five years later, the state completes a second statewide statistical survey of lakes and the biological condition scores show 10% of the state's lakes are in excellent condition, while 60% are in good condition, 25% are in fair condition, and 5% are in poor condition. In this case, 15% of lakes showed incremental improvements in water quality (i.e., 10% increase in lakes in good condition plus a 5% increase in lakes in fair condition).

States also estimate the mean value of the population for each core indicator, which can then be compared among successive surveys to track changes over time in average water quality condition. As data sets grow in size and power, states may also estimate trend slope to determine the rate of change over time and whether water quality conditions are improving or declining.

States can take credit for improvement if there is a shift in mean value in the indicator that reflects better water quality or a net shift in the percentage of waters moving from a lower condition category to a high condition category, as long as there is no degradation in the water quality condition for the specific waterbody type being surveyed. No degradation means that, in comparing results from different surveys, there is no statistically significant increase in the proportion of waters rated in lowest condition category compared to the earlier results, and there is no statistically significant decrease in the proportion of waters in the state's highest condition category compared to earlier results.

States may choose which core indicators to report on for this measure, but must include a biological indicator and at least one physical/chemical parameters. The core indicators must be the same (i.e., parameters, collection and analytical methods and confidence intervals are comparable) from cycle to cycle. EPA recommends that the core indicators selected represent applicable designated uses consistent with the *2008 Guidelines* and *Elements of a State Water Monitoring and Assessment Program* guidance (refer to Table 1).

In addition to biological condition (required), states are requested to report on the following:

- Habitat assessment
- Nutrients (Nitrogen and/or Phosphorus) or Chlorophyll a
- Trophic status (lakes/estuaries)
- Human health indicator such as fish tissue contaminants, pathogen indicator or algal toxin indicator

Baseline: The baseline will be established during the FY14 strategic plan measure reporting cycle. States are encouraged to report the results of state-scale statistical surveys as part of their Integrated Report submission beginning in 2012, consistent with the *2008 Guidelines*. The agency would like to work with states reporting in 2012 to evaluate and refine the reporting template so the IR reporting template can be used to support this measure as well. As the state implements state-scale statistically valid surveys for other water body types, the results of these surveys can serve the baselines. States that have completed more than one survey cycle may begin to report change under this measure at any time.

Reporting Requirements: Documentation of the state’s statistical survey design and assessment methods should be contained within the state’s monitoring strategies and associated quality assurance project plans or quality management plans. States using NARS data may refer to the national QAPP for the individual NARS surveys.

In the March 21, 2011 Integrated Reporting Memorandum, EPA requested that States report their state-wide statistical survey findings as part of the 2012 Clean Water Act Sections 303(d), 305(b), and 314 Integrated Reporting (IR) cycle. States should provide results in the 2012 and subsequent IRs . To assist states with reporting statewide statistical survey data as part of the IR, EPA is developing a template for states to complete and submit to EPA. An early version of this template was provided in Appendix 1 of the March 21, 2011 Integrated Reporting Memorandum. EPA intends for states to be able to use this template to submit information for reporting on this measure. EPA will use the information in the template to report results in the Agency Commitment System (ACS).

Regions will report in the Agency Commitment System (ACS) the number of states that were able to document incremental improvements in water quality for at least one core parameter.

Frequency: States report every six years for an each water body type. Each 2-year IR reporting cycle should include an update for one or more water body types as they rotate through water body types over time. The specific timing and frequency with which a state reports on a particular waterbody type will depend on the state’s schedule for completing statistically valid surveys.

Units: Number for states.

Universe: 50 states

Start: 2014 Integrated Report