

EO Chesapeake Bay Strategy Goals and Outcomes
Pennsylvania State Agency Comment
February 15, 2013

Stream Restoration Outcome: *Improve the health of streams so that 70 percent of sampled streams throughout the Chesapeake watershed rate three, four or five (corresponding to fair, good, or excellent) as measured by the Index of Biotic Integrity, by 2025.*

Current Condition:

45 percent of sampled streams are rated fair, good, or excellent.

Background:

Why is it important? Restoring water quality in streams is a necessary step in meeting water quality standards in the Bay. Similarly, actions to reduce nutrients, sediment and other pollutants flowing into streams to achieve Bay standards also improves the quality of local streams. Restoring streams also benefits the fish, wildlife and people using them. This outcome also helps address comments from the public and states stressing a need to improve local streams as a way of better engaging watershed organizations and involving the 17 million watershed residents in the restoration effort.

What is the measure? This measure of stream quality is an existing CBP indicator, based on an index of biotic integrity which scores benthic macroinvertebrate communities on a scale of poor to excellent. The CBP has worked with the states to gather information from 10,452 sites across the watershed where samples have been collected during 2000-2008 and scored the average of this data based on ecoregion thresholds. For this measure, an acceptable benthic community is defined as having a score of fair, good or excellent. In the future, the CBP will take a subset of these sites to look at change in stream quality over time. The subset of sites will be designed to adequately represent the distribution of stream conditions throughout the watershed.

What is the current condition? In the most recent assessment, conditions at 4,656 sampling sites are rated fair, good or excellent (45 percent), 5,459 sites are rated very poor or poor (52 percent) and 337 (3 percent) are not rated at this time.

What is the basis for the target? The basis for the target is that as practices are implemented in the watershed to reduce nutrients, sediment and other pollutants, we will see improvements in the quality of streams. The current target (a benthic index of biotic integrity rating of fair, good or excellent) is closely tied to the Bay estuary target of meeting water-quality standards for oxygen, clarity and chlorophyll-a in 60 percent of the Bay segments by 2025. We should have a greater percentage of improvements in streams in the watershed by 2025 since they will respond to management actions prior to seeing improvements in the estuary. Therefore a target of 70 percent was chosen.

More Information:

http://www.chesapeakebay.net/status_watershedhealth.aspx?menuitem=26057

PA DEP COMMENT:

Rodney Kime | Division Chief, Water Quality Standards
Department of Environmental Protection

Summary Comment: We have continually expressed our concerns to the group that developed the "CBP indicator that measures stream quality using an index of biotic integrity which scores benthic macroinvertebrate communities". Simply put, the measure is out of necessity simplistic because it must be applicable to several states encompassing different physiographic regions using different collection methods and the macroinvertebrates are only identified to Family. The indicator is acceptable for use in some limited contexts but we have reservations using it as such an important environmental measure. The measure is not robust and is not sensitive enough.

DEP has spent years in the development and use of macroinvertebrates as indicators of water quality. As a result, DEP biologist are aware of the many confounding factors that must be considered in each stream assessment and that only robust assessment protocols can be trusted. In addition, different protocols are needed in different situations; small freestone streams, limestone streams, limestone influenced streams, pool/glide streams, warm water streams, large warm water streams, and rivers among others. Impairing or de-listing a stream in the context of a 303(d) listing is a serious matter. DEP would never consider using the CBP indicator in such cases. Meeting the Chesapeake Bay restoration targets is an equally serious matter. Just as in the case of 303(d) listings, it would be imprudent to use a generic scaled back Family level IBI to measure progress. DEP reluctantly agreed to the use of the CBP as a broad brush assessment tool but objects to its use as a programmatic tool with broad implications.

One of the major concerns is a reduction in nutrients. The CBP indicator and other macroinvertebrate IBIs are not good indicators of nutrient concentrations. Why would one choose a single indicator especially when that indicator is not responsive to a major pollutant of concern? An EPA Scientific Advisory Board among other things found that:

1. "The Committee emphasizes the importance of choosing the biological endpoints. We note the response of benthic indices can be related to many types of stress. We question why periphyton would not be a better indicator."
2. "Measurements of actual biological responses would be appropriate, emphasizing variables that respond most directly to changes in nutrient concentrations. These are typically measures of primary productivity or primary producers, or water chemistry changes such as DO and pH."
3. Moreover, response variables can be at multiple levels - primary response variables (e.g., plants), secondary response variables (e.g., dissolved oxygen [DO], pH), and tertiary response variables (e.g., fish, macroinvertebrates). A change in a response variable is unlikely to be satisfactorily described by changes in a single "causal" variable (e.g., total nitrogen [TN] or total phosphorus [TP])

DEP does not object to using macroinvertebrate IBIs in the context of measuring progress. However, the CBP indicator is not the answer. Neither is relying on a single indicator. Progress should be measured based on multiple important indicators.

PA DEP COMMENT:

Kenn Pattison, P.G. | Hydrogeologist
DEP Water Planning Office

The assumption that 60% of Bay segments in attainment correlates to about 70% of non-tidal streams meeting the IBI category of fair, good or excellent is questionable. The assumption is based on the premise that improvement in IBI scores as result of nutrient and sediment reductions within the non-tidal watersheds is directly proportional to projections of improvement in Bay water quality as a result of the same nutrient and sediment reductions. The efficacy of this assumption is questionable.

First, the large majority of watershed impairments in Pa are the result of acidic mine drainage and sedimentation. The nutrient reductions needed to reach the Chesapeake Bay TMDLs will not result in improvement within those watersheds impacted by acidic mine drainage. As a result, reaching the 70% improved in non-tidal streams would not be reasonable, assuming only nutrient and sediment reductions.

Second, free-flowing freshwater streams are mostly phosphorous limited in Pa. The Bay is a saltwater/brackish water estuarine environment. Once you get beyond the influence of the non-tidal inflows, principally within the middle and lower Bay, the Bay is mostly nitrogen limited. It is unlikely that nutrient and sediment reductions would generate directly proportional water quality improvements within the two completely different ecosystems.

Third, the nutrient and sediment “pollution diet” for the Bay is based on habitat restoration specific to the Bay. Freshwater benthic invertebrates respond to impairments and stressors specific to the freshwater environment. It is unlikely that identical impairments of dissolve oxygen, chlorophyll-a and water clarity standards within the Bay exist in free flowing freshwater streams and that the identical solution of nutrient and sediment reductions would serve to improve the impaired portions of the fresh water streams.