Delisting Methodology for Biological Assessments in Maryland's Integrated Report

Maryland Department of the Environment

Water and Science Administration

Contents

Introduction:

The delisting methodology is intended to be part of the Biological Assessment Methodology for Non-Tidal Wadeable Streams. The purpose of this delisting methodology is to refine the spatial scale of biological impairment listings in order to demonstrate progress and identify areas that are attaining biocriteria. This delisting methodology utilizes a targeted standardized approach that is complementary to the large scale probabilistic design of the current biological assessment methodology.

Background:

Maryland's nontidal biological assessments use two multi-metric indices of biological integrity (IBI); one based on fish communities (F-IBI) and the other on benthic (bottom) macroinvertebrate communities (B-IBI) to measure the functional diversity of fish and benthic invertebrate assemblages.

MDE's biocriteria methods are based on Maryland Department of Natural Resources' (MDDNR) Maryland Biological Stream Survey (MBSS) program. The MBSS program uses a statewide probability-based survey design in 1st-4th order nontidal streams to assess aquatic life community health by calculating IBI scores for each sampling location. The IBI scores are the average of individual metric scores that are based on a comparison with reference sites in the same ecological region. Metrics are scored 1 (if < 10th percentile of reference value), 3 (10th to 50th percentile), or 5 (> 50th percentile). The final IBI scores for each site are calculated as the arithmetic mean of all the metric scores and therefore range from 1 to 5.

For the purposes of the Integrated Report (IR), MDE follows the Biological Assessment Methodology for Non-Tidal Wadeable Streams which uses the percentage of degraded biological samples in an assessment unit to approximate the percentage of stream miles with degraded aquatic life communities (i.e. not meeting the aquatic life use). The number of biological samples and the proportion of failing sites determines the status of the watershed and corresponding IR category. The IR categories are, Category 2 - waters attaining some standards; Category 3 - waters with insufficient information to determine if water quality standards are attained; Category 4 – impaired or threatened waters that do not need or have already completed a TMDL; Category 5 [the historical 303(d) List] - impaired waters for which a TMDL is required.

If a watershed is determined to be impaired (Category 5), corrective actions are planned. Actions may begin with additional monitoring and evaluation to determine the cause of the impairment (i.e., Biological Stressor Identification Process (BSID)). The BSID analysis uses the MDDNR MBSS dataset to evaluate habitat, sediment, water chemistry and source parameters in order to determine the potential stressors and associated anthropogenic sources impacting biological communities in impaired watersheds. Once the stressor has been identified, it may be appropriate to develop a TMDL for the stressor.

For more information, please see MDE's Biological Assessment Methodology for Non-tidal Wadeable Streams, DNR's website for the Maryland Biological Stream Survey, MDE's webpage on the Integrated Report, and MDE's webpage on BSID analysis.

Delisting Introduction:

The MBSS protocols and MDE Biological Assessment Methodology produce a single, large scale, watershed assessment result which supports the assessment of all of the State's waters, but makes it difficult to identify specific streams or subwatersheds with better ecological conditions that may not be impaired when considered as a separate assessment unit. In the past, any stations, stream segments, or subwatersheds that were meeting standards were lumped into the overall listing for the entire 8-digit Maryland watershed (not the same as a Federal Hydrologic Unit Code or HUC), which could be impaired depending on the proportion of degraded sites. Now, as counties and other non-governmental organizations (NGOs) conduct more biological monitoring of their local waters, the additional data may provide more detailed information on the biological quality at the subwatershed or stream segment scale and allow for smaller scale assessments. If these data demonstrate that there are stream segments or sections that are consistently attaining biocriteria, then these waters could be delisted (moved from category 5 to category 2) and be separated from the larger 8-digit watershed impairment listing. Delisting areas that are meeting standards helps to ensure that restoration efforts will be focused on areas that are truly impaired. MDE still plans to assess attainment of the aquatic life designated use at the MD 8-digit scale as the first step in assessment and utilize the delisting methodology as a secondary step in the assessment process.

To delist a portion of the waters from an impaired watershed, those particular waters need to attain the biocriteria. The delisting methodology described below details the process of identifying and delisting these surface waters. The methodology is intended to allow for flexibility in covering a range of potential delisting opportunities at various scales. MDE's decision to delist or not will be based on a number of factors including but not limited to historical data, the listing basis, the spatial and temporal scale of the samples, F-IBI and B-IBI scores, the quality of the data, habitat information, time since the last sampling, etc. Each biological delisting will include a unique set of circumstances and will require its own evaluation by MDE. Since the Biological Assessment Methodology uses the 8-digit watershed scale for all assessments, the delisting methodology deliberately refrains from a predetermined geographic scale to allow this secondary assessment to be more flexible and address local conditions at various scales. This supports the main purpose of the delisting methodology which is to identify areas of progress and good ecological quality that were otherwise obscured by the original whole watershed listing. Please see the section below on possible scenarios for more detail.

EPA has issued limited guidance on the delisting process. In general, similar data, standards, and guidelines are required to delist a watershed, or portion of the watershed, as were initially used to list the waterbody on the 303(d) list. The current biological assessment methodology uses a probabilistic sampling approach to develop an assessment for an entire 8-digit watershed by estimating the proportion of sites that are not meeting standards. The delisting methodology described below uses a targeted sampling/assessment approach that assesses streams on a smaller scale to identify surface waters that are meeting standards. The delisting methodology still utilizes similar data, standards, and guidelines as defined in The Biological Assessment Methodology for Non-Tidal Wadeable Streams.

Delisting Methodology:

Assessment:

In order to assess if the proposed waters are meeting standards MDE will use the IBI threshold (for B-IBI and F-IBI) of 3.00 from the Biological Assessment Methodology as the threshold for delisting. Based on the methodology, using the scoring criteria at reference sites, an IBI $\geq$ 3 indicates the presence of a biological community with attributes (metric values) comparable to those of reference sites, while an IBI < 3 means that, on average, metric values fall short of reference expectations. Because a metric score of 3 represents the 10th percentile threshold of reference conditions, IBI values less than 3 represent sites that are more likely to be degraded. In contrast, values greater than or equal to 3 (i.e., fair or good) indicate that most attributes of the community are within the range of those at reference sites. Using 3.00 as the delisting threshold rather than the minimum allowable limit (MAL) that is used in the Biological Assessment Methodology is a conservative approach that further demonstrates that stations proposed for delisting have good ecological conditions.

The following paragraphs describe the Department's rules for delisting under this biological assessment methodology. The rules differ depending on whether the stream(s) being evaluated has been designated as Tier II high quality (in COMAR 26.08.02.04-1).[1]

In general, to consider a water body for delisting, **that water body must have at least two sampling events[2] with IBI scores of 3.0 or greater for both fish and benthos**. If there are more than two sampling events in a given water body being evaluated, assessors will use the most recent two events. If the water body being evaluated is NOT designated as Tier II high quality, then these two sampling events must have occurred within the most recent 10 year period. In addition, these two sampling events must have occurred in succession without any failing scores occurring between or after them in time. Worth noting, these sampling events do not need to have occurred in back-to-back years so long as they represent the latest biological sampling events in that water body. For example, a monitoring location with IBI scores greater than or equal to 3.0 from two consecutive sampling events collected in 2013 and 2015 would be acceptable. However, if there was also data collected in 2014 that had an IBI score below 3.0, then more data would need to be collected for that station in 2016 or later to show that two consecutive sampling events (2015 and 2016) are meeting the IBI threshold. All available biological data for the area including MDE, MBSS or any applicable county data will be considered.

For waters that are designated as Tier II high quality, two sampling events with IBIs greater than 3.0 are still required, but only one of these sampling events must be in the most recent 10 year period. Historical data, older than 10 years, must be used for the other sample in Tier II waters, as long as the IBI scores are still greater than or equal to 3.0 and there are no IBI scores less than 3.0 in the intervening years. State assessors make this exception for Tier II waters because there is increased confidence in the ecological quality of these waters by the very nature of their Tier II designation which requires an average set of IBI scores (both fish and benthic, assessed independently) greater than or equal to 4.0. Please note that the assimilative capacity status, defined as the measure for determining when Tier II stream water quality is diminished or degraded beyond natural changes in condition, does not directly impact the delisting in a Tier II watershed. It is possible that Tier II waters without remaining assimilative capacity may still be eligible

[1] Though it seems counterintuitive that a stream could be designated as Tier II high quality and yet not be delisted, it is possible a specific stream segment is Tier II high quality and that the surrounding watershed is not high quality, or that the stream has been degraded since the original Tier II designation. In Maryland, streams keep the Tier II designation even if degradation occurs.

[2] For the purpose of describing biological delistings, a "sampling event", as it's used here, refers to a year in which both a benthic and fish sample were taken at a single location using MBSS protocols.

for delisting due to the different thresholds used for these assessments. For more information on Tier II high quality waters and assimilative capacity calculation, please see MDE's Tier II Webpage.

F-IBI and B-IBI scores are both necessary when evaluating a water body for delisting, but the scores of each will be evaluated independently. If a single station has an IBI score (F-IBI or B-IBI) below a 3.0 for either of the two successive sampling events, then the water body represented by that station will not be delisted. There are multiple options for water bodies that do not meet the IBI score of 3.0 or higher including resampling, delisting a smaller portion of the watershed that is meeting, or placing the entire delisting on hold until all stations are in compliance. The options depend on the specific details of the given waterbody. Details on historical data, the scale of the delisting, current site status, the location of the sites, etc., should all be submitted to MDE as part of the Initial Request for Delisting Document outlined in Appendix A. MDE will review the information and work with any interested parties to determine an appropriate action. Examples of various scenarios and their outcomes are provided on page 6.

Table 1: Summary of Rules for Delisting.

	Waters NOT Designated as Tier II	Waters Designated as Tier II
Data Required	At least 2 sampling events with all IBIs (BIBI and FIBI) ≥3.0	Same
Temporal Data Coverage	The 2 most recent sampling events must have occurred in the most recent 10-year period	The most recent sampling event must be from the most recent 10-year period. The second sampling event can be from the most recent 10-year period or earlier.
Data Succession	Back to back years of sampling is not required but 2 most recent sampling events must have occurred without an intervening IBI score of <3.0	Same

Data Quality:

All biological data used for delisting purposes must follow MBSS field, laboratory, IBI calculation, and mapping protocols and staff sampling for this purpose must have up-to-date MBSS sampling certifications during the time of sampling.

Geographic Scale and Site Selection:

The delisting methodology deliberately refrains from requiring a specific geographic scale, to allow for flexibility and assessment decisions at various scales, as opposed to the predetermined 8-digit scale of the original biological assessment decisions. This is in support of the main purpose of the delisting methodology which is to identify areas of progress and good ecological quality that were otherwise obscured by the original whole watershed listing. The geographic scale of the delisting can be as small as a stream segment or as large as a sub watershed. The biological sampling sites must be spatially representative of the stream segment or larger stream network that is proposed for delisting. All available biological data for the area will be considered along with other supplementary data including but not limited

to historical data, the listing basis, the spatial and temporal scale of the samples, F-IBI and B-IBI scores, the quality of the data, habitat information, time since the last sampling, etc. The biological data must be collected according to MBSS protocols but can include both random and targeted sampling designs. MDE may also request additional sites if the sites are not spatially or temporally representative of the area proposed for delisting or change the scale of the proposed delisting based on review of the sampling plan. For examples of these types of scenarios, please refer to the possible scenarios section starting on page 6.

Requests for Delisting from outside the Department:

Each potential delisting will have a unique set of factors and as such, MDE will evaluate potential delistings on a case by case basis. Delistings may be initiated by the Department upon receipt of new data or they may be initiated by any interested party that wishes to have MDE evaluate a potential delisting. To assist the Department in processing external delisting requests, interested parties should submit an "Initial Request for Delisting" document. The "Initial Request for Delisting" document should include a brief narrative describing the location, the monitoring plan with coordinates and maps, the data that suggests a delisting is possible, quality assurance documentation, and any applicable older monitoring data. For more information and an outline of what should be included in this document, please see Appendix A.

MDE will review the "Initial Request for Delisting", advise on the monitoring and sampling plan design, and determine the next steps required to achieve a delisting. Next steps could include, but are not limited to, requesting more stations if they do not appear to be spatially and temporally representative, requesting an additional sampling event if there are not 2 sampling events with all IBIs (BIBI and FIBI) ≥3.0 in the most recent 10 year period, or stating that the sampling plan appears to be sufficient as-is and to move forward with the delisting. Once MDE has approved the sampling plan, and the plan conforms to all rules for delisting, sampling will commence (in accordance with all standard MBSS protocols). After the interested party has completed sampling and data processing, a final "Final Justification for Delisting" Document will be requested. When the final "Final Justification for Delisting" document has been submitted and the delisting approved, then a new assessment unit will be assigned to the applicable water body, separating it from the larger 8 digit watershed, and it will move from Category 5 (impaired waters for which a TMDL is required) to Category 2 (Category 2 - waters attaining some standards) on the next Integrated Report of Surface Water Quality. Please see Appendix A for more information on the final "Final Justification for Delisting" Document. Please see page 6 for possible scenarios and their decision outcomes.

The Department recommends that interested parties contact MDE early in the process as additional monitoring or documentation might be necessary to justify the scale of delisting sought by the interested party. Please contact Becky Monahan at Becky.Monahan@maryland.gov to discuss any delisting requests.

Possible Scenarios:

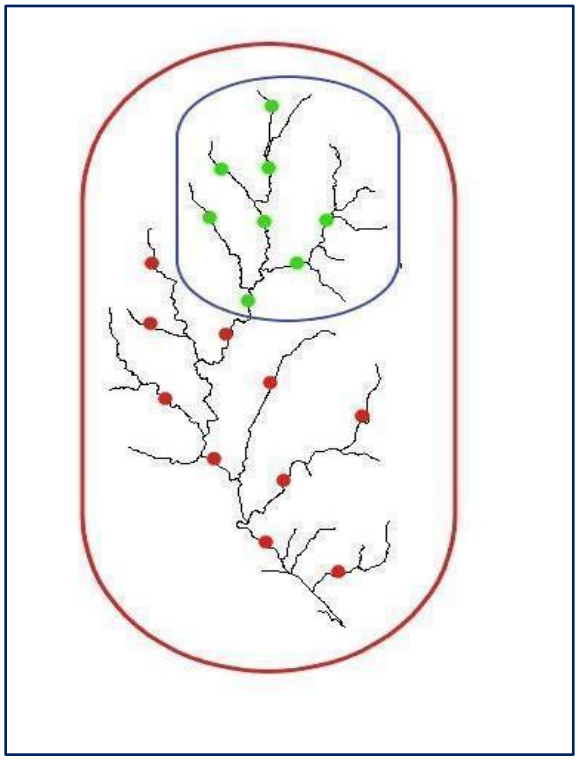
The following are examples of possible scenarios that could warrant a delisting. These scenarios are not exhaustive and are for illustrative purposes only.

MDE's review and the delisting decision will be based on historical data, the listing basis, the spatial and temporal scale of the samples, the type of IBI scores (F-IBI, B-IBI, or both), the quality of the data, time since the last sampling, etc. As previously mentioned, each delisting is unique and will require its own plan and review by MDE.

Watershed A- Contains waters that have current and previous IBI Scores all ≥3.0

Listing Basis

- The surface waters proposed for delisting (blue outline) have eight stations (green dots) that are spatially representative of the area. The data at these locations have IBI scores ≥3.0 since 2002. The waters assessed by these stations were only shown as impaired because they were included as part of the larger 8-digit watershed impairment listing (red outline) based on a number of other impaired stations (red dots).



Historical Data

- Eight stations (green dots) in the area proposed for delisting. These stations have been sampled every other year since 2002.
- Both F-IBI and B-IBI scores are all ≥3.0 for all sampling events associated with each station

MDE Review

- MDE determines that the eight stations (green dots) are spatially and temporally representative of the area in question and no additional stations are necessary.
- There are data since 2002 showing that all stations have F-IBI and B-IBI scores ≥3.0.
- The two most recent sampling events were in 2016 and 2018 and both F-IBI and B-IBI scores were ≥3.0.
- Since the stations are representative of the geographic area and the two most recent sampling events for all stations are within the most recent ten year period and are meeting the threshold of ≥3.0, no additional data collection is necessary.

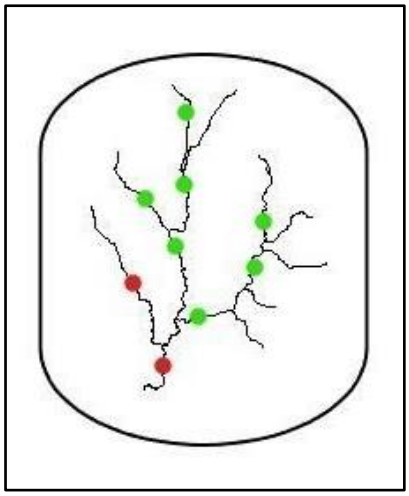
Justification for Delisting

- This section (outlined in blue) will be delisted based on the recent and historical data meeting the threshold.
- Subwatershed A (blue outline) will be split or separated from the larger 8-digit watershed (red outline) and become its own assessment unit. It is moved to category 2 (waters attaining some standards) on the Integrated Report. The remaining portion of the larger 8-digit watershed (red outline) will still be listed in category 5 as impaired.

Watershed B- Contains a subwatershed that has a mix of impaired and not impaired stations

Listing Basis

- The surface waters proposed for delisting (black outline) have nine stations (dots) that include both impaired and not impaired stations. However, the entire sub watershed area was included as part of the larger 8-digit watershed impairment listing (not shown).

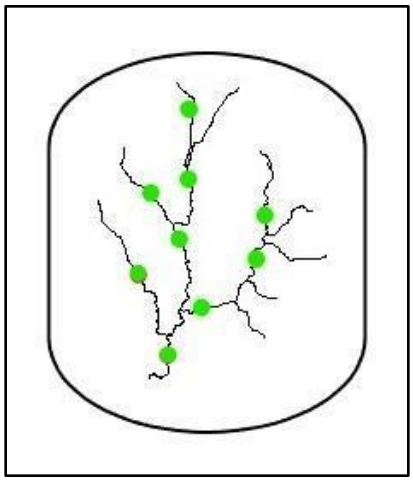


Historical Data

- Seven stations (green dots) have had a score ≥3.0 for B-IBI and F-IBI from 2005-2015.
- Two stations (red dots) had data from 2005-2015 which had scores below 3.0 for B-IBI and F-IBI.

Current Data

- The most recent sampling of the waters within the black outline occurred in 2017 and shows that all nine stations (green dots) have B-IBI and F-IBI scores ≥3.0.
- The seven original stations that were meeting now have two recent sampling events showing both F-IBI and B-IBI scores were ≥3.0.
- The two original stations that were impaired now have only one recent sampling even showing both F-IBI and B-IBI scores were ≥3.0.
- An interested party proposes delisting of the entire area (black outline) since they plan to sample again in 2019 and believe they will have enough data to delist the entire subwatershed. They contact MDE early to see if any changes are necessary in their 2019 sampling plan.



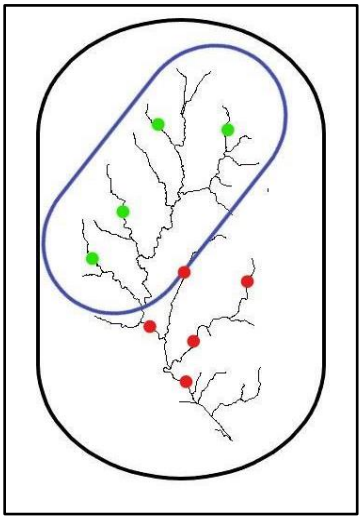
MDE Review

- MDE determines that the nine stations (green dots) are spatially representative of the area in question and no additional stations are necessary.
- The interested party commences with the sampling in 2019 and the data show the same results as the 2017 sampling. All nine stations (green dots) have B-IBI and F-IBI scores ≥3.0.
- With the 2019 data included, all nine stations have two recent sampling events within the past 10 years with both F-IBI and B-IBI scores ≥3.0.
- Since the stations are representative of the geographic area and the two most recent sampling events for all stations are within the most recent ten year period and are meeting the threshold of ≥3.0, no additional data collection is necessary.

Justification for Delisting

- This section (outlined in black) will be delisted based on the recent data meeting the threshold.
- Subwatershed B (black outline) will be split or separated from the larger 8-digit watershed (not shown) and become its own assessment unit. It is moved to category 2 (waters attaining some standards) on the Integrated Report. The remaining portion of the larger 8-digit watershed (not shown) will still be listed in category 5 as impaired.

Watershed C- Contains a subwatershed where additional stations are requested

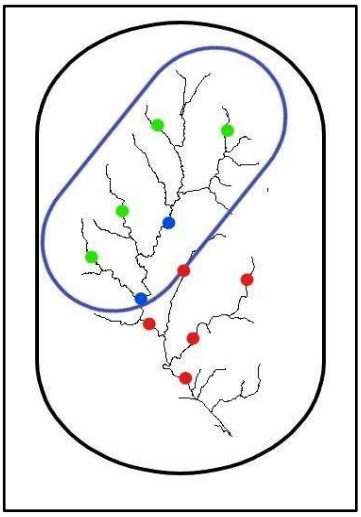


Listing Basis

- The surface waters proposed for delisting (blue outline) have four stations (green dots) with IBI scores ≥3.0 since 2005. The waters assessed by these stations were only shown as impaired because they were included as part of the larger 8-digit watershed impairment listing (black outline) based on a number of other impaired stations (red dots).

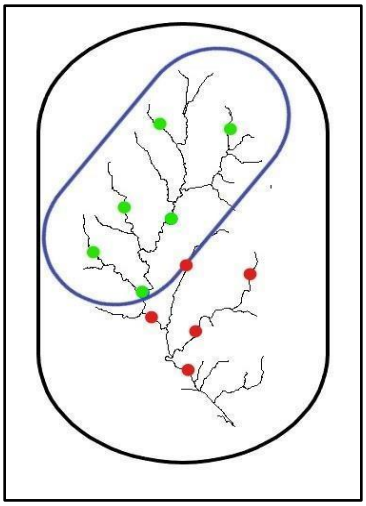
Historical Data

- Four stations (green dots) in the area proposed for delisting. These stations have been sampled four times since 2005 with the two most recent sampling events in 2015 and 2017.
- Both F-IBI and B-IBI scores are all ≥3.0 for all sampling events associated with each station within the area proposed for delisting.



MDE Review

- An interested party proposes delisting of the subwatershed (blue outline). During the review process, MDE determines that the four stations (green dots) are not spatially representative of the entire area proposed for delisting, and suggests an additional two stations (blue dots).
- The interested party agrees and commences with the sampling for the two new stations (blue dots) in 2019 and 2020, and the resulting data shows that the two new stations have both F-IBI and B-IBI scores ≥3.0.
- The original four stations' (green dots) two most recent sampling events were in 2015 and 2017 and both F-IBI and B-IBI scores were ≥3.0.
- Since the six total stations within the subwatershed are now representative of the geographic area and the two most recent sampling events for each station are within the most recent ten year period and are meeting the threshold of ≥3.0, no additional data collection is necessary.



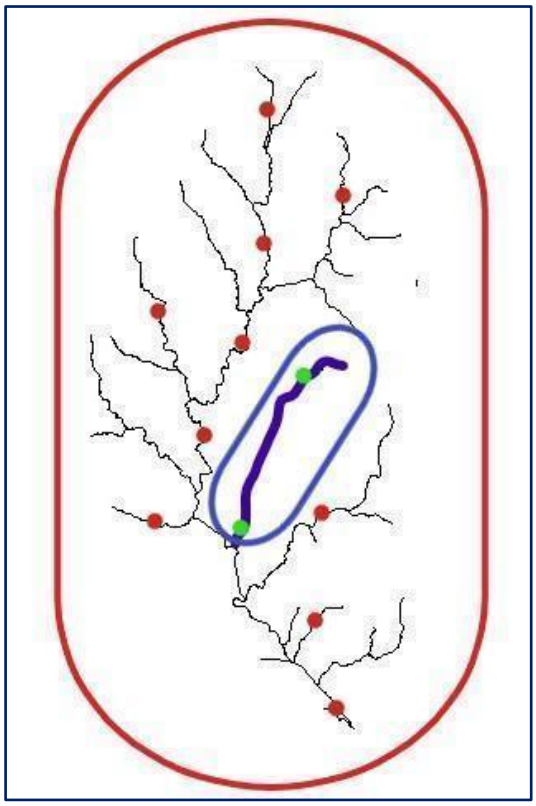
Justification for Delisting

- The subwatershed section (outlined in blue) will be delisted based on the recent data of all six stations (green dots) meeting the threshold.
- Subwatershed C (blue outline) will be split or separated from the larger 8-digit watershed (black outline) and become its own assessment unit. It is moved to category 2 (waters attaining some standards) on the Integrated Report. The remaining portion of the larger 8-digit watershed (black outline) will still be listed in category 5 as impaired.

Segment D- Contains waters designated as Tier II High Quality Water

Listing Basis

- The surface waters proposed for delisting (blue outline) are a smaller stream segment that has had two stations (green dots) with all IBI scores ≥3.0. The stream segment, which was originally sampled in 2002, (blue stream segment line) was classified as a Tier II high quality water since the average BIBI and FIBI scores of these stations were ≥4.0. The stream segment assessed by these stations was only shown as impaired because it was included as part of the larger 8-digit watershed impairment listing (red outline) based on a number of other impaired stations (red dots).



Historical Data

- All of the stations in the watershed were sampled intermittently between 1999-2019. Only two stations (green dots) ever had IBI scores that met standards. In fact, these two stations, initially sampled in 2002, had both IBI scores ≥4.0 and, as a result, the stream segment was designated as a Tier II high quality water (blue stream segment line).

New Data

- The two stations (green dots) on the Tier II segment were sampled again in 2019 and had IBI scores ≥3.0.

MDE Review

- MDE determined that the two stations (green dots) on the Tier II segment are representative of the segment proposed for delisting (blue outline).
- Since this is a designated Tier II segment, the one sampling event in 2019 along with the historical 2002 Tier II samples meet the minimum data requirements and are enough for MDE to approve a delisting. MDE only requires Tier II waters to have a single sampling event in the most recent ten year period due to the increased confidence in the water quality of Tier II waters.

Justification for Delisting

- This Tier II segment has two samples, one within the most recent ten year period, and one historical sample in 2002 (allowed with Tier II waters) that both show IBI scores ≥3.0
- This Tier II segment becomes its own assessment unit and is moved to category 2 (waters attaining some standards) on the Integrated Report.

References:

Maryland Department of Natural Resources (DNR). Maryland Biological Stream Survey Webpage. Annapolis. Online at: https://dnr.maryland.gov/streams/pages/mbss.aspx

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US Environmental Protection Agency. 2003. Guidance for 2004 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d) and 305(b) of the Clean Water Act. Philadelphia, PA. Online at: https://www.epa.gov/sites/production/files/2015-10/documents/2003_07_23_tmdl_tmdl0103_2004rpt_guidance.pdf

Appendix A

Requesting a Delisting

Any party interested in having the Department consider streams or watersheds for delisting (moving them from Category 5 to Category 2 on the Integrated Report) should contact Becky.Monahan@maryland.gov and submit an "Initial Request for Delisting" Document.

The following steps are a brief overview of the review process for a delisting.

The Delisting Review Process

1. An interested party submits an "Initial Request for Delisting" Document to MDE.
2. MDE reviews the request and contacts the interested party.
3. Based on the review, MDE may not have substantive comments on the sampling plan or may recommend additional sampling necessary to justify a delisting.
4. Once the sampling plan is finalized, sampling will occur according to the plan and consistent with MBSS protocols.
5. After sampling has been completed, the interested party submits the "Final Justification for Delisting" document to MDE.
6. Based on all readily available and quality assured data (including that which may have been sampled in these waters for other reasons), MDE will make an assessment determination as to whether waters should be delisted, and if so, at what geographic extent. Waters that are meeting biological standards will be delisted and moved from Category 4 or 5 (impaired) to Category 2 (not impaired) on the next Integrated Report of Surface Water Quality.

Initial Request

Any party interested in a delisting should submit a document with the following information to Becky.Monahan@maryland.gov as an initial request for delisting.

Initial Request for Delisting Document

I. Background and Purpose
II. Description of the original impairment listing
III. Summary of Existing Biological Sampling data
    A. Documentation on sampling and analysis procedures
    B. Coordinates of stations - Map if possible
    C. Sampling data, IBI scores and metadata
    D. Summary of the data that suggest a delisting is possible
IV. Description of Sampling plan for delisting

MDE will review the "Initial Request for Delisting" to determine if a delisting is possible based on the submitted information. MDE will then contact the interested party to let them know that the sampling plan appears to be sufficient as-is and to move forward, or will recommend the collection of additional data, monitoring locations or other changes that are necessary to justify a delisting. If additional data are

necessary, the "Initial Request for Delisting" document should be updated to describe those changes, additional data, or narratives necessary.

Final Justification for Delisting

Once all sampling specified in the "Initial Request for Delisting" has been completed, a "Final Justification for Delisting" document can be submitted. Once it's submitted and the Department determines that the available data demonstrates that the waters meet the biological standards, then these waters will be delisted on the next Integrated Report. Much of the information in the "Final Justification for Delisting" document will come from the "Initial Request for Delisting" Document. However, the "Final Justification for Delisting" document will include all data necessary for the delisting and it will be incorporated into the Integrated Report. The final step, VI. Description of a maintenance monitoring plan, will be discussed between MDE and the interested party during the delisting process. A future maintenance monitoring plan will be required with the Final Justification for Delisting to ensure the delisted area remains in good ecological condition.

Final Justification for Delisting Document- Required Sections

I. Background and Purpose
II. Description of the original impairment listing
III. Final description of the proposal for delisting
IV. Summary of the sampling design, data and IBI scores that led to the delisting
V. Narrative justifying delisting and at what spatial scale
VI. Description of a maintenance monitoring plan