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COMMENT #

I. Stream Nutrient Assessment Procedure

A. The Stream Nutrient Assessment Procedure (SNAP) is performed to determine whether and to what degree a stream segment has been adversely affected by nutrients. 60

1. SNAP is comprised of two steps: preliminary assessment of nutrient enrichment status and status verification.

a. SNAP is applicable to segments of free flowing streams having aquatic life habitat use designations with associated biological criteria, drainage areas less than 1,000 square miles, and benthic algae predominate over sestonic algae. 1 2

b. The Director may apply SNAP to segments of free flowing streams having aquatic life habitat use designations with associated biological criteria, drainage areas greater than 1,000 square miles, and benthic algae predominate over sestonic algae. 81 61

c. The Director shall define the stream segment(s) that shall be used for each SNAP assessment in a study plan. 82 3

2. Preliminary Assessment. The Director shall complete a preliminary assessment of the stream segment by evaluating the attainment status of biological criteria (IBI, MIWb and ICI), the 24-hour dissolved oxygen (DO) swing, and the concentration of benthic chlorophyll *a*, to determine the segment's nutrient enrichment status. The Director shall use the SNAP matrix in the Appendix to complete a preliminary assessment, which will result in one of the following preliminary findings: 4

a. Attaining aquatic life use and not threatened;

b. Attaining aquatic life use, but aquatic life use may be threatened;

c. Impaired aquatic life use, but from cause(s) other than nutrients;

d. Impaired aquatic life use, nutrient enrichment is a likely cause; or

e. Impaired aquatic life use, nutrient enrichment is a material cause.

3. Status Verification. As described in the Appendix, the pertinent SNAP flowchart in the Appendix shall be applied to the Preliminary Assessment results, which will result in one of four findings for a stream segment:

   a. Attaining aquatic life use; not threatened; 5 6 62

   b. Attaining aquatic life use; but aquatic life use attainment is threatened;

   c. Impaired aquatic life use; nutrients are not a material cause of the impairment; or 63

   d. Impaired aquatic life use; nutrient enrichment is a material cause.

4. SNAP Tables and Flowcharts (See Appendix)

   a. Stream Nutrient Assessment Procedure Table

   b. Flow Chart A – Decision Tree for Determining when Biologically Attaining Condition Status is Threatened by Nutrients

   c. Table 1 – Equations used as guidance to help determine whether biological indices are underperforming relative to existing habitat. 64

   d. Table 2 – Concentration ranges of total phosphorus (TP) and dissolved inorganic nitrogen (DIN) arrayed by narrative levels of ecological risk. 83

   e. Flow Chart B – Decision Tree for Determining Biological Impairment Caused by Stressors Other Than Nutrients

f. Flow Chart C – Decision Tree for Confirming Biological Impairment Caused by Nutrients

B. Data Requirements

1. Data Type. Data required to perform SNAP determinations shall include the following:

   a. Minimum data required to perform a preliminary assessment (Table I-1);

   b. Additional supporting data required for status verification of threatened stream segments and stream segments impaired by cause(s) other than nutrients; and

   c. Additional supporting data needed for status verification of stream segments impaired by nutrients including, as necessary and appropriate, information regarding other potential stressors affecting the stream segment. 84

2. Data Quantity. Minimum data requirements for performing SNAP determinations shall be consistent with the requirements given in Table I-1, unless otherwise approved by the Director. 7

3. Data Quality. Except as approved by the Director, all data used in the SNAP shall comply with rule 3745-4-06 of the Administrative Code, for Level 3 credible data requirements and reporting.

Table I-1. Suggested Minimum Data Requirements for Performing SNAP 8

SNAP Assessment Steps	Data Type	Minimum Suggested Requirement for SNAP	
		Number of Samples per Site*	Temporal Considerations**
Preliminary Assessment	Biological	• At least one fish and/or macroinvertebrate community sample	• Collect during or no later than 3 weeks after benthic chlorophyll sampling 85 • During periods with comparable baseflows to those measured during benthic chlorophyll sampling, provided the communities have not been affected by extreme flow events (flooding, desiccation, etc.) in the interim 9
	Dissolved Oxygen	• 48 hours of continuous data, or • At least five days of discrete maximum and minimum data	• Collect during or within 2 weeks of benthic chlorophyll sampling during comparable baseflow conditions provided the stream has not been affected by extreme flow events in the interim 10
	Benthic Chlorophyll	• 10 – 20 benthic scrapings, reported as a geometric mean	• Collect following at least 3 weeks of stable, baseflow conditions
Flow Charts A & B	Nutrients	• At least 3 samples per location, reported as a geometric mean	• Collect during stable, baseflow conditions
	Biological	• Same as above	• Same as above
	Qualitative Habitat Evaluation Index (QHEI)	1	• Collect during or no later than 3 weeks of biological sampling 11
Flow Chart C	Other Stressors	• Narrative observations and data commensurate with assessing the impact of the relevant stressor(s)	

* Number of sites per segment is based on best professional judgment. 48

** With the exception of multi-year trend data needed to complete Flow Chart A or unless sufficient justification is presented, all data shall be collected during the same calendar year. With the exception of QHEI data and information needed to complete Flow Chart C, all data shall be collected between June 15 and October 15th.

II. SNAP Implementation

A. Develop Target Concentration, Target Load, Wasteload Allocations, and Load Allocations

1. This section applies to stream segments that have been identified through SNAP as either impaired or threatened by nutrients.

    a. A Water Quality Target Concentration ("WQTC") shall be determined for TP only, unless DIN is found to be a limiting nutrient and a WQTC is found to be necessary for DIN. 49

    b. The WQTC shall be calculated as a growing season average.

2. Water Quality Target Concentrations

    a. If the necessary data are available or readily attainable, the Director shall calculate water quality target concentrations (WQTC) using water quality modeling based on achieving an instream segment DO swing ≤6.5 milligrams per liter (mg/L) and benthic chlorophyll *a* ≤320 milligrams per square meter (mg/m^2). 86

    b. In the event that the necessary data are not available or readily attainable, the Director may develop provisional WQTCs based on achieving an instream TP concentration of 0.40 mg/L or a DIN concentration of 3.6 mg/L, whichever is the nutrient principally responsible for the threatened or impaired condition. A provisional WQTC shall not be used as the basis for TMDLs, permit limits, or other regulatory actions if a water quality model is prepared pursuant to paragraph a. 86 12 50 13

    [Rule needs to address that anti-backsliding does not apply to permit limits based on a provisional WQTC.] 51

3. Water Quality Target Load

    a. Using the WQTC developed pursuant to Section II.A.2, the Director shall calculate a water quality target load (WQTL) for the stream segment as the product of the WQTC and the stream flow.

i. The WQTL shall be calculated using the stream flow exceeded 80 percent of the time during the growing season, based upon available stream flow data and use of suitable USGS procedures for estimation of low flow characteristics. 45 46

4. Nutrient Wasteload Allocations and Load Allocations 14 15

a. Waste load allocations (WLAs) shall be calculated for point sources and load allocations (LAs) shall be calculated for nonpoint source discharges to stream segments in which a WQTL has been calculated. Point sources include publicly owned treatment works (POTWs), industrial point sources, and municipal separate storm sewer systems (MS4s).

b. For point source dischargers of nutrients, the wasteload allocation (WLA) shall be calculated using the following equation:

$$WLA = WQTL - LA - BA$$ 100 16

Where: LA = load allocation assigned to nonpoint source discharges
BA = load from background sources

c. For nonpoint sources of nutrients, the load allocation shall be based on the following information: _____

d. The WLA and LA shall be based on the growing season stream flow exceeded 80 percent of the time.

e. The WLA based on the SNAP shall only apply during the growing season 17

5. Allocation – WLA for each point source 52

a. Multiple dischargers may agree to an aggregate WLA, or the Director may propose WLAs that consider cost effectiveness and affordability.

B. Adaptive Management

1. As used in this rule, adaptive management (AM) means an iterative process involving the design and implementation of cost-effective management actions to abate impairments and reduce threats to water quality, as

determined by SNAP, associated with nutrients. Because there is uncertainty regarding causal and restorative links between aquatic biology, nutrients, and other stressors, AM involves the evaluation of biological, chemical, physical, technical, economic and other relevant information to design and evaluate the effectiveness of management alternatives that are expected to reduce the adverse biological impact caused by nutrients. These management alternatives, including but not limited to nutrient reduction, riparian and habitat restoration and improvement, effluent trading, watershed management practices, and other actions, shall be evaluated on their potential to materially improve biological conditions, cost-effectiveness, technical feasibility, affordability, time to implement, and other relevant factors. 87 88

2. AM plans (AMPs) shall include one or more management alternatives, a description of the actions to be taken, how they shall be maintained, an implementation time schedule, the estimated cost, projected benefits, and a post-implementation monitoring program to assess the effectiveness of the plan. 89 18

3. As applied to permitted NPDES point sources, the AMP shall be submitted to the Director for approval. Upon approval, it shall become an enforceable part of the NPDES permit. If post-implementation monitoring determines that nutrient-caused impairment or threat still exists, then the permittee shall prepare and, upon the Director's approval, implement an updated AMP, which shall assess the previous AMP and consider alternative or additional actions. 19 90 20

C. Multi-Party Adaptive Management ("MPAM")

1. MPAM can be part of a point source's AMP. The elements of a MPAM Plan may include:

   a. An agreement between multiple point sources that discharge into the same stream segment to allocate the WQTL of nutrients among them. The point source NPDES permits shall be modified by the Director to reflect such agreement.

   b. A commitment by the point sources to perform AM on property that is owned by other parties. In such event, the point source shall obtain, and provide to the Director, easements or other rights in the land that

assure that the point source can implement and maintain the AM actions for as long as necessary.

c. A legally binding agreement between the point source and one or more nonpoint sources (and may also include a third party coordinator for multiple nonpoint source parties), that stated (in the AMP) that best management practices (BMPs) shall be implemented on the nonpoint source property, and/or that the nonpoint source shall modify the nature or intensity of its activities on part or all of its property to achieve nutrient reduction or other watershed improvement to reduce the impact of nutrient caused impairment. 21 22

d. The MPAM and Water Quality Trading Program (WQTP) under Ohio Admin. Code 3745-5 are separate and independent programs. A discharger may participate in one or both.

D. Point Sources

1. Overview – Point Source (POTW and Industrial) Implementation

a. SNAP assessment will result in one of four findings listed in I.A.3. Each finding carries different regulatory requirements for a point source. 23

i. If SNAP shows nutrients are not impairing or threatening to impair a stream segment's aquatic life use, or if the impairment is caused by stressors other than nutrients, the Director shall not require nutrient-related permit limits except as otherwise required by law. 91 24

ii. If SNAP shows nutrients are threatening a stream segment's designated aquatic life use:

(a) the Director shall place the threatened stream segment on a watch list, 25

(b) permits issued to existing POTWs shall cap existing nutrient loads at existing effluent quality ("EEQ"),

(c) permits issued to existing industrial point sources shall require nutrient loading caps at EEQ, or if requested by the industry, permits may require implementation of appropriate pollution prevention measures in lieu of loading caps at EEQ as approved by the Director.

Recommendation: We recommend developing a new threatened category for stream segments threatened due to nutrients. A TMDL would not be needed due to adaptive management plan(s) or permittee accepting final limits.

iii. If SNAP shows nutrients are a material cause of impairment, the Director shall, as an initial measure, cap existing point source nutrient loads at EEQ in subsequent NPDES permits. As an alternative for industrial point sources, an industry may request a requirement to implement nutrient pollution prevention measures in lieu of a nutrient loading cap. Such load caps or nutrient pollution prevention measures are referred to below as "initial management actions").

The Director shall also evaluate whether point source nutrient load reductions alone are expected to materially improve biological criteria in the SNAP-assessed stream segment. If not, permittees shall maintain their initial management actions. If point sources nutrient load reductions are expected to materially improve stream biology, NPDES permits for the sources shall require the point sources to develop and implement an adaptive management plan ("AMP") or include final TP or DIN limits with a compliance schedule. The permit shall provide a reasonable time period for the point source to evaluate and decide whether to proceed with development and implementation of an AMP or to proceed with activities to achieve final nutrient limits.

b. If a point source discharging to an impaired water body chooses to pursue the AM option, it enters an iterative development, implementation, and monitoring process. After each iteration, the point source will evaluate the effectiveness of its AMP and the need for continued or additional AM measures, and shall either maintain previously implemented AM measures, if necessary, or revise its AMP.

c. The point source shall submit the AMP—which will describe the AM measures to be performed and the rationale therefor, and contain an implementation schedule and a post-implementation monitoring plan – to the Director for approval. Upon approval, the discharger shall implement the AMP. The approved AMP is an enforceable condition of an NPDES permit. An annual progress report on activities/achievements of the AMP may be required. Post-implementation monitoring will disclose whether the stream segment is attaining its designated aquatic life uses, the biology of the stream segment is materially improving, or the biology of the stream segment is not materially improving. 66

d. AMP - Reassessment

i. Attaining. If post-implementation monitoring shows that designated aquatic life use has been attained (or that the post-implementation cause of nonattainment is not materially due to nutrients), then point sources shall evaluate (and include in the post-implementation monitoring report to the Director) whether the existing AM measures need to be maintained. If so, the Director shall incorporate such requirements into future renewal permits for as long as they are necessary. The Director shall also revise the 303(d) list, TMDL, and WLAs and LAs for the water body to reflect its attainment status. 67 56 68

ii. Improving. If post-implementation monitoring shows that the designated aquatic life use is not in attainment but the biological criteria are materially improving, the point source shall evaluate whether continuing the current AMP is expected to yield further biological improvement. If so, subject to the Director's approval, point sources shall continue implementing their existing AMP and conduct post-implementation monitoring. If revisions to the adaptive management plan are needed to further materially improve biological criteria, the point source(s) shall revise their AMPs, submit them to the Director for approval, and implement the approved AMP. The iterative process shall continue, by evaluating the results of post-implementation monitoring and making AMP revisions as appropriate.

iii. Not Improving. If the post-implementation monitoring shows that designated aquatic life use is not in attainment and the biological criteria are not materially improving, the point source shall evaluate whether reductions in nutrient discharges, and/or other or additional AM measures, will materially improve biological criteria. If not, the point source may conduct a use attainability analysis to determine whether the designated use for the water body segment may be changed, or apply to the Director for a water quality variance. If nutrient reductions or additional AM measures will materially improve biological criteria, the point source shall revise its AMP, submit it to the Director, and implement the approved AMP. The iterative process of maintaining, revising, or terminating AM measures based on the monitoring results shall continue. 69

2. Permits without SNAP (Renewal/Modification)

a. For facilities that discharge to stream segments where SNAP has not been performed, renewal NPDES permits (or permit modifications) that have not previously included TP or DIN limits may require monitoring (effluent, upstream, and downstream), but shall not include TP/DIN limits. If the previous permit included TP or DIN limits, the nutrient limits in the renewal NPDES permit shall not be more stringent. Notwithstanding the above, the Director may impose new or more stringent nutrient limits in permits if required by federal law, interstate compact, or nutrient rules developed for waterbodies not encompassed by SNAP. 70 28

b. Existing permits (including renewals and modifications) that have the same TP or DIN limit as the previous permit shall be treated as follows.

i. In those cases where the permittee has not made (or has not entered into a binding legal commitment to make) the capital investment for construction and/or installation to meet the limit (whether interim or final), and neither a site specific assessment based on the existing narrative standard or SNAP has been performed, the permittee may apply for, and the Director shall grant, a modification to the limit, which shall be based on existing effluent quality, pending the completion of 71 72 73

SNAP and determination of whether a more stringent nutrient limit is needed.

ii. In those cases where the permittee has made (or has entered into a binding legal commitment to make) the capital investment for construction and/or installation to meet the limit, the point source shall complete the construction/installation and operate the equipment pending the completion of the SNAP for the affected stream segment(s). If SNAP determines that no, or less stringent, nutrient limits are appropriate, the permittee may apply for, and the Director shall grant, a modification based on SNAP results. 74 29

iii. Alternatively, the permittee may request, and the Director shall grant, a modification to provide that a compliance schedule based on AM be substituted for the existing numeric nutrient permit limit.

3. Permits with SNAP

a. Reasonable Potential. The assessment whether to establish nutrient limits (which may be a WQTL or AM), shall be based on whether reductions in nutrients by point sources alone are expected to result in a material improvement in biological criteria. 75

i. Permit limits shall only be imposed on TP unless there is site-specific evidence that DIN is a limiting nutrient. 57

b. Before imposing numeric nutrient limits or AMPs, and the compliance schedules associated therewith, the director shall consider:

i. The technical feasibility of meeting the limits and implementing the AMP. 76

ii. The projected environmental benefits of meeting the limits/AMPs and compliance schedules. In determining such benefits, the director shall consider:

(a) The need for additional data collection.

(b) The permittee's and Director's ability to generate additional data.

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(c) Other relevant information pertaining to the relationship between nutrient loads and/or concentrations and biological responses.

iii. The costs, cost-effectiveness, and affordability of implementing the measures and the time needed to meet the limit or other less stringent limits, or to implement AM. In determining cost-effectiveness and affordability, the Director shall consider:

(a) the incremental cost per mass unit of nutrient removed and the projected benefit resulting from more stringent limits;

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(b) as regards affordability: :

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(1) for governmental entities:

(i) Current debt burden, debt ratio, and ability to issue additional debt;

(ii) Liquidity (days of cash on hand and days of working capital);

(iii) Revenue data and trends, including net revenues available for debt service;

(iv) Planned and historical utility rate or fee increases;

(v) Rate impact studies;

(vi) Utility account data and trends;

(vii) Number of customers and top ten customers as a percentage of total revenues;

(viii) Current and projected changes in costs of wastewater operations;

(ix) Cost per household of imposing the proposed nutrient limits;

(x) Service area economic conditions and trends, including poverty levels;

(xi) Service area unemployment data and trends;

(xii) Service area population data and trends;

(xiii) Service area Median Household Income;

(xiv) Service area property tax revenue collection rate;

(xv) Service area tax revenues, system charges, and other local taxes as a percent of full market property value;

(xvi) Service area size, including any changes in size or boundaries;

(xvii) Costs associated with meeting all Clean Water Act obligations as well any other regulatory obligations, including Safe Drinking Water Act obligations;

(xviii) Extraordinary considerations, such as bankruptcy, natural disasters, limited funding access;

(xix) Any other factor relevant to changes in financial circumstances or other financial or budgetary issues. 78

(2) for non-public Dischargers:

(i) Liquidity (days of cash on hand and days of working capital);

(ii) Debt burden, debt ratio, and ability to incur additional debt;

(iii) Revenue data and trends (current-year net revenues available for debt service);

(iv) Extraordinary considerations, such as bankruptcy, natural disasters, limited funding access; and

(v) Any other factor relevant to changes in financial circumstances or other financial or budgetary issues. 78

c. Permit Limit Details

i. Permittees shall elect whether to accept final numeric permit limits based on the stream segment WQTL (and individual WLAs) or engage in adaptive management.

(a) If numeric permit limits are chosen, a compliance schedule shall be included in the NPDES permit. The compliance schedule may extend beyond the term of the permit and shall:

(1) Provide the permittee adequate time for collection and evaluation of information relevant to the factors in paragraph II.D.3.b. before final permit limits and the final compliance schedule are established.

(2) Provide the permittee adequate time to perform engineering studies to evaluate alternative treatment process modifications.

(3) Provide the permittee adequate time for detailed engineering design, submittal and review of a permit-to-install application, construction contract bidding, construction, startup, and initial process troubleshooting for treatment facilities. 95

ii. If adaptive management is chosen, an AMP shall be developed by the permittee (or jointly by two or more permittees 59

impacting a particular stream segment) and approved by the Director.

(a) Approved AMPs shall be enforceable conditions of NPDES permits.

(b) The Director may include a compliance schedule for the AMP. The compliance schedule may extend beyond the term of the permit and shall:

(1) Provide the permittee adequate time to perform necessary engineering studies to evaluate treatment process modifications and/or AM actions.

(2) Provide the permittee adequate time for collection and evaluation of information relevant to the factors in paragraph II.D.3.b. before final permit conditions are established.

(3) Provide the permittee adequate time for detailed engineering design, PTI application submittal and review, construction contract bidding, construction, and startup and initial process troubleshooting for treatment facilities and alternative actions.

(4) Given the uncertain relationship between specific nutrient concentrations and attainment of designated aquatic life use, when interim limits are imposed, the compliance schedule shall provide adequate time to assess the impact of reduced nutrient loadings and/or alternative AM actions on the receiving stream before more stringent limits are imposed or become effective. 96

(c) If the water body is attaining its designated aquatic life use but nutrient controls are still necessary to maintain these uses, interim limits established in the previous permit may be continued as final limits in future renewal permits as long as they are necessary to maintain the designated use. 97

(d) If the stream segment is improving but has not attained its designated aquatic life use, the permittee shall evaluate whether continuing to implement the current AMP is expected to yield material further biological improvement. If continuing current AM measures is expected to yield material further improvement in biological criteria, subject to the Director's approval, point sources shall continue implementing their existing AMP in the next renewal permit and perform post-implementation monitoring. If revisions to the existing AMP can further materially improve biological criteria to meet the designated aquatic life use, a revised AMP shall be submitted to the Director for approval and incorporated into a renewal permit with appropriate interim limits and a reasonable compliance schedule for implementing the revised AMP.

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(e) If the water body is not improving, the permittee shall evaluate whether reductions in nutrient discharges, or other or additional AM measures, will materially improve biological criteria. If revisions to the existing AMP will improve biological criteria, a revised AMP shall be submitted to the Director for approval and incorporated into a renewal permit.

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(f) If nutrient controls on the permittee alone will not materially improve biological criteria, new or more stringent nutrient limits shall not be included in the renewal permit nor shall the permittee be required to engage in any additional AM measures.

iii. For permittees that choose numeric nutrient limits and those that choose adaptive management:

(a) Permit limits shall be imposed only for the growing season and shall be expressed as a seasonal average.

(1) Nutrient limits shall be expressed as mass loads.

(b) Interim limits other than those based on EEQ shall not be imposed when:

(1) Construction of treatment facility improvements to achieve interim limits would substantially increase the cost of subsequent facility modifications necessary to achieve more stringent final limits that may reasonably be expected; or

(2) There is no reasonable expectation that interim limits will materially improve biological criteria.

E. Municipal Separate Storm Sewer Systems (MS4s)

1. SNAP assessment will result in one of four findings listed in I.A.3. 32

2. Findings and Required Action.

a. When SNAP shows nutrients are not impairing or threatening to impair a stream segment's designated aquatic life use, the Director shall not require modification of a MS4 Storm Water Management Program (SWMP) to address nutrient pollution controls.

b. When SNAP shows nutrients are impairing or threatening a stream segment's designated aquatic life use, the Director shall place the threatened segment of the water body on a watch list and the MS4 permittee shall update its SWMP to address nutrient pollution. The updates to its SWMP are considered to be "initial management actions". The updated SWMP shall include: 33

i. Evaluation and inclusion of economically feasible pollution prevention measures to reduce nutrient pollution; 34

ii. Public education on nutrient pollution; and 35

iii. A tracking system to report on nutrient related best management practices (BMPs) and other nutrient management efforts.

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c. Following completion of a SNAP, the Director shall evaluate whether MS4 nutrient load reductions alone are expected to

materially improve biological criteria in the SNAP-assessed stream segment(s). If not, the MS4 shall maintain its initial management actions. If a MS4's nutrient load reductions are expected to materially improve stream biology, the NPDES permit for the source(s) shall require the MS4 to:

i. Submit a modified SWMP that identifies and assesses additional BMPs or other measures that may be taken to further reduce nutrient loadings. The assessment will consider nutrient removal efficiencies, maintenance requirements, resource requirements and costs of prospective BMPs, and will develop storm water management strategies to implement appropriate BMPs. The SWMP will describe the BMPs, expected nutrient load reductions, implementation schedule, and funding needs and mechanisms.

ii. Before requiring completion of the additional BMPs or other measures identified in E.2.c.i. and the compliance schedules associated therewith, the director shall consider the factors listed in section II.D.3.b.

3. Post-Implementation Monitoring

a. The MS4's permittee's SWMP shall include a post-implementation monitoring program.

b. Post-Implementation monitoring may include instream monitoring, visual inspections of BMPs, performance monitoring of a new technology or a technology being deployed in a new region, or other appropriate monitoring activities.

4. Reassessment

a. Attaining. If post-implementation monitoring and reassessment by SNAP shows that the designated aquatic life use is being met and the stream segment is not threatened, the Director shall evaluate whether AM measures in the SWMP need to be continued or maintained. The Director shall also revise the 303(d) list, TMDL, and WLAs and LAs for the water body to reflect its attainment status.

b. Improving. If post-implementation monitoring shows that the designated aquatic life use is not in attainment but the biological

criteria are materially improving, the Director shall evaluate whether continuing with the current SWMP is expected to yield further material biological improvement. If yes, the MS4 shall continue/update the existing SWMP. If no, the MS4 shall revise, obtain the Director's approval, and implement the revised SWMP. The iterative process shall continue, by evaluating the results of post-implementation monitoring and making SWMP revisions as appropriate.

c. Not improving. If the post-implementation monitoring shows that the designated aquatic life use is not in attainment and the biological criteria have not materially improved, the Director shall evaluate whether additional nutrient reductions or additional or other AM measures in the SWMP will materially improve attainment of biological criteria. If not, the MS4 shall maintain the AM measures that it has implemented, if appropriate, and the Director will evaluate whether a water quality variance may be warranted or a use attainability analysis may be performed. If additional reductions or AM measures will materially improve biological criteria, the MS4 shall revise its SWMP, submit it to the Director for approval, and implement it. The iterative process of maintaining, revising, or terminating AM measures based on the monitoring results shall continue.

F. Nonpoint Sources

1. SNAP assessment shall result in one of four findings listed in I.A.3.

2. Findings and Required Action.

a. When SNAP shows nutrients are not threatening to impair or impairing aquatic life use, no requirements shall be imposed on nonpoint sources. 47

b. When SNAP shows nutrients are threatening the attainment of aquatic life use, the Director shall place the threatened segment of the water body on a watch list. 37

c. When SNAP shows nutrients are impairing aquatic life use, the Director shall evaluate whether nonpoint source reductions in nutrient loading will be expected to result in a material improvement 38

of the biological criteria. If not, no requirements shall be imposed on nonpoint sources.

i. If nonpoint source reductions are expected to make a material improvement in biological criteria, then adaptive management to achieve nutrient loading reductions shall proceed via a watershed action plan developed to serve as the adaptive management plan (WAP-AMP).

ii. The WAP-AMP shall be developed by a local watershed stakeholder group within three years and submitted to the Director and Ohio DNR for endorsement. The WAP-AMP shall be in accordance with Ohio's *Guide to Developing Local Watershed Action Plans in Ohio* (June 1997), including the Appendix 8 Update (February 7, 2003), and the most recent U.S. EPA section 319 planning guidance (federal fiscal year 2006), and modified to incorporate an AM post-implementation monitoring program and iterative revisions and implementation.

iii. The WAP-AMP shall provide for sustainable funding for a watershed coordinator as well as implementation of the selected nonpoint source management measures and post-implementation monitoring.

3. Post-Implementation Monitoring.

a. The WAP-AMP shall include a post-implementation monitoring program.

b. Post-Implementation Monitoring may include in-stream monitoring, visual inspections of BMPs, performance monitoring of a new technology or a technology being deployed in a new region, or other appropriate monitoring activities.

4. Reassessment.

a. Attaining. If post-implementation monitoring and reassessment of the SNAP shows that aquatic life habitat use designations are being met and are not threatened, the Director shall evaluate whether AM measures in the WAP-AMP need to be continued or maintained.

The Director shall also revise the 303(d) list, TMDLs, and WLAs and LAs for the water body to reflect its current attainment status. 80

b. Improving. If post-implementation monitoring shows that the designated aquatic life use is not in attainment, but that biological criteria are materially improving, the Director shall evaluate whether continuing with the current WAP-AMP is expected to yield further biological improvement. If yes, the watershed group shall continue/update the existing WAP-AMP. If no, the nonpoint source shall revise, obtain the Director's and Ohio DNR endorsement, and implement the revised WAP-AMP. The iterative process shall continue, by evaluating the results of post-implementation monitoring and making AM revisions as appropriate.

c. Not improving. If the post-implementation monitoring shows that the designated aquatic life use is not in attainment and that biological criteria are not materially improving, the Director shall evaluate whether additional nutrient reductions or additional or other AM measures in the WAP-AMP will materially improve attainment of biological criteria. If not, the local watershed group shall maintain the AM measures that it has implemented, if appropriate, and the Director shall evaluate whether a water quality variance may be warranted or a use attainability analysis may be performed. If additional reductions or AM measures will materially improve biological criteria, the watershed group shall revise its WAP-AMP, submit it to the Director and Ohio DNR for endorsement, and implement it. The iterative process of maintaining, revising, or terminating AM measures based on the monitoring results shall continue.

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Stream Nutrient Assessment Procedure (SNAP)

STEP 1	*STEP 2*	*STEP 3*	*STEP 4*	
Biological Criteria	**DO Swing** [2]	**Benthic Chlorophyll** [3]	**Preliminary Assessment: Nutrient Enrichment Status of Evaluated Segment or Waterbody**	
All indices attaining or in non-significant departure[1]	Normal or low swings (≤6.5 mg/l)	Low to moderate (≤320 mg/m^2)	Attaining aquatic life use / Not threatened	
		High (>320 mg/m^2)	Attaining aquatic life use, but may be threatened	*See Flow Chart A*
	Wide swings (>6.5 mg/l)	Low (≤182 mg/m^2)		
		Moderate to high (>182 mg/m^2)		
Non-attaining (one or more indices below non-significant departure)	Normal or low swings (≤6.5 mg/l)	Low to moderate (≤320 mg/m^2)	Impaired, but cause(s) other than nutrients	*See Flow Chart B*
		High (>320 mg/m^2)	Impaired, nutrient enrichment is a likely cause	*See Flow Chart C*
	Wide swings (>6.5 mg/l)	Low (≤182 mg/m^2)		
		Moderate to high (>182 mg/m^2)	Impaired, nutrient enrichment is a material cause	

Stream Nutrient Assessment Procedure (SNAP) -- continued

Notes:

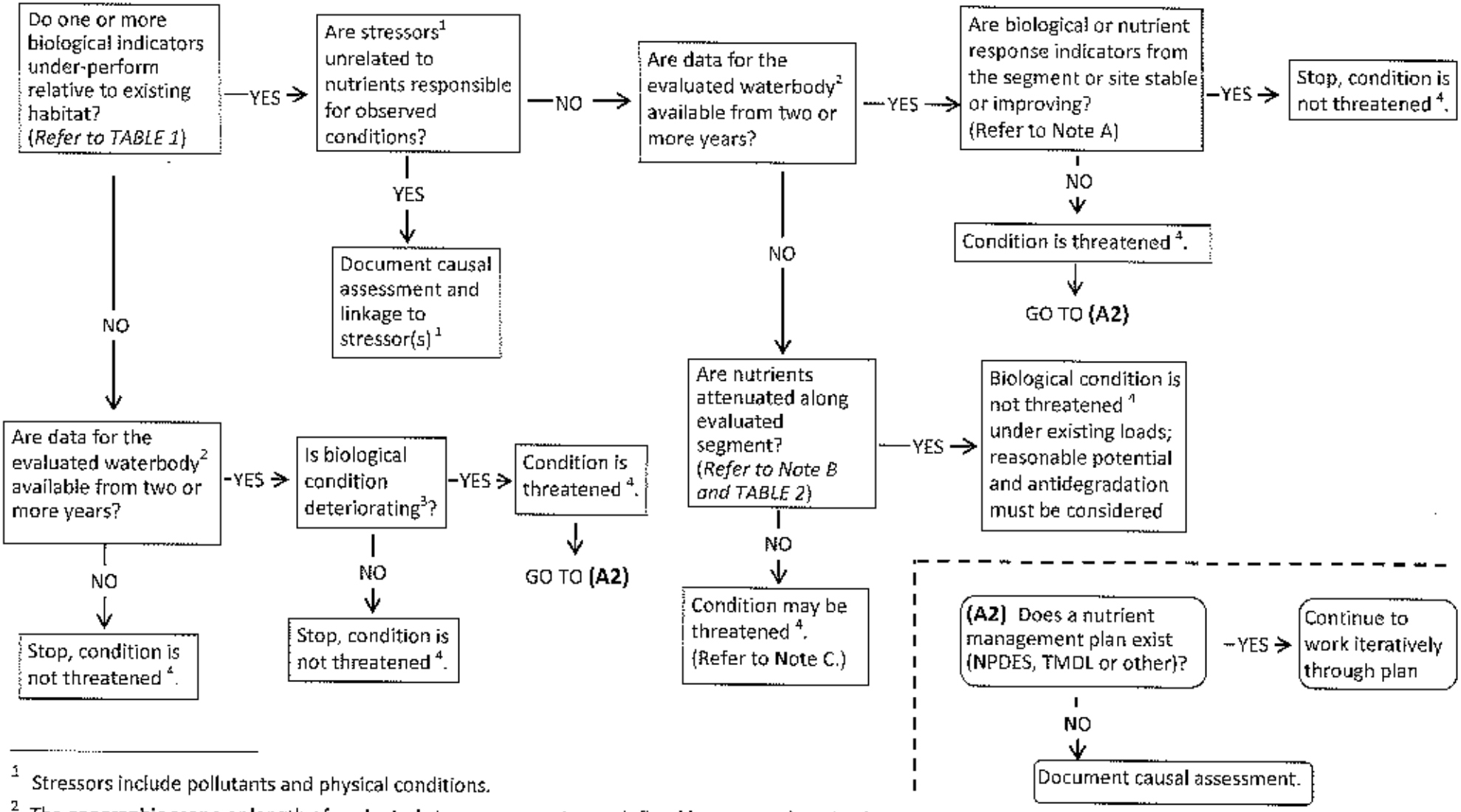
[1] Non-significant departure from biological criteria values accounts for background variability in measurements for biological indices. In accordance with "*Biological Criteria for the Protection of Aquatic Life: Volume II: Users Manual for Biological Field Assessment of Ohio Surface Waters*", Ohio EPA (1987, updated 1988, 1989, 2006), non-significant departure is 4 points for IBI and ICI, and 0.5 point for MIwb.

[2] Threshold value for 24-hour DO swing based upon a change point of 6.5 mg/l between DO swing and minimum DO. "Low to normal" DO swing is ≤6.5 mg/l. "Wide" DO swing is >6.5 mg/l. Data used for analysis from *Technical Support Document for Nutrient Water Quality Standards for Ohio Rivers and Streams*, Ohio EPA (2011).

[3] Threshold values for benthic chlorophyll *a* are based upon change points between benthic chlorophyll *a* and DO swings or Invertebrate Community Index (ICI). "Low" chlorophyll *a* is ≤182 mg/m^2. "Moderate" chlorophyll *a* is >182 and ≤320 mg/m^2. "High" chlorophyll a is >320 mg/m^2. Data used for analysis from *Technical Support Document for Nutrient Water Quality Standards for Ohio Rivers and Streams*, Ohio EPA (2011).

FLOW CHART A. – DECISION TREE FOR DETERMINING WHEN BIOLOGICALLY ATTAINING CONDITION STATUS IS THREATENED BY NUTRIENTS

For application when biological criteria are attaining, but one or both nutrient response indicators (DO swing or benthic chlorophyll) are elevated.



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[1] Stressors include pollutants and physical conditions.

[2] The geographic scope or length of evaluated stream segments are defined in approved study plans.

[3] For a given location, a decrease of 5 or more IBI or ICI points, or 0.6 or more MIWb points between sampling years represents a significant change. Trends for waterbodies are formally evaluated in Biological and Water Quality Technical Support Documents.

[4] As recommended by US EPA in its integrated reporting guidance (*Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act*), "threatened" waters are currently attaining WQSs but are expected to not meet WQSs by the next listing cycle (every two years). For example, a declining trend may indicate threatened status, whereas a stable or improving trend would not.

Flow Chart A (continued) – Additional Notes:

Note A. Two set of circumstances result in a determination of "threatened" by nutrient impacts – (1) when biological indicators are underperforming relative to habitat and biological or nutrient response indicators are not stable or improving; and (2) when (although biological indicators are not underperforming) the biological condition is deteriorating. For such cases, the Flow Chart at "A2" provides a conditional evaluation for a subset of cases where existing nutrient management plans exist, either via NPDES permit, TMDL, or other. In such cases, the Flow Chart indicates that the nutrient management plan shall continue to be implemented iteratively, reviewing and reassessing the results of implementation.

Note B. Attenuation of nutrients in an evaluated segment is demonstrated by nutrient concentrations measured at two or more successive sites downstream from a defined source decreasing through uptake, sequestration or dilution such that concentrations fall to either background levels or levels where risk of eutrophication to downstream waters is minimal (see Table 2). Where there are no historic data on which to base trends, attenuation of nutrients within the segment implies assimilation within what the waterbody can handle under existing conditions, and that stress from the nutrient load is spatially transient (i.e., localized to the immediate segment).

Note C. If attenuation appears ambiguous or cannot be determined because of an insufficient number of downstream sampling points between the source in question and the next downstream receiving water or the next downstream major source contributor, additional sampling is needed to determine condition status.

TABLE 1 – Equations used as guidance to help determine whether biological indicators are underperforming relative to existing habitat.

To assist in determining whether measured biological indicator values at the site being assessed underperform relative to the existing habitat, the measured value(s) are compared with the 25th and 15th percentile values of all data classified as unimpaired in the Ohio EPA assessment database and stratified by the designated classification (EWH, WWH or MWH) within the specific ecoregion for the site. The 25th and 15th percentiles represent levels that most sites equal or exceed. If the respective measured biological indicator value is less than the 15th percentile value then the site is likely underperforming relative to what could be expected given the local habitat quality (QHEI). If the indicator value is between the 15th and 25th percentile values, additional information or observations should be used to determine whether the site is underperforming with respect to its habitat. If the indicator value is above the 25th percentile value, the site is performing within the range expected for the existing habitat.

The following equations calculate the 25th and 15th percentile values as determined by regression analysis for the respective biological indicators for a given QHEI score, or a combination of QHEI score and drainage area. For small streams where insufficient stream flow prevents collection of a quantitative sample, thereby precluding calculation of an ICI score, the number of EPT taxa is used as the macroinvertebrate indicator. Such small streams are typically less than 20 square miles in drainage area, or larger if stream velocity is insufficient to collect a quantitative sample.

Class / Ecoregion		Percentile	IBI (fish)	MIWb (fish)	EPT Taxa (macroinvertebrates)	ICI (macroinvertebrates)
EWH / All Ecoregions		25th	40.67 + 0.118·QHEI	8.21 + 0.006·QHEI + 0.385·Log10(DA)	4.65 + 0.123·QHEI + 1.182·Log10(DA)	= 46
		15th	39.60 + 0.113·QHEI	NA	1.47 + 0.151·QHEI + 1.084·Log10(DA)	NA
WWH & MWH	HELP	25th	23.65 + 0.150·QHEI	5.64 + 0.959·Log10(DA)	4.26 + 2.585·Log10(DA)	All Ecoregions: 25th percentile: 25.60 + 0.160·QHEI; 15th percentile: 19.32 + 0.213·QHEI
		15th	22.00 + 0.121·QHEI	NA	2.54 + 2.659·Log10(DA)	
	EOLP	25th	22.00 + 0.316·QHEI	4.76 + 0.043·QHEI + 0.491·Log10(DA)	NA	
		15th	18.24 + 0.336·QHEI	4.55 + 0.045·QHEI + 0.397·Log10(DA)	= 9 taxa	
	WAP	25th	31.30 + 0.200·QHEI	7.94 – 0.537·Log10(DA)	3.94 + 0.114·QHEI	
		15th	27.78 + 0.225·QHEI	7.58 + 0.543·Log10(DA)	2.14 + 0.113·QHEI	
	ECBP & IP	25th	29.96 + 0.157·QHEI	4.94 + 0.036·QHEI + 0.388·Log10(DA)	-0.95 + 0.147·QHEI + 0.927·Log10(DA)	
		15th	29.47 + 0.133·QHEI	4.96 + 0.034·QHEI + 0.362·Log10(DA)	-2.19 + 0.138·QHEI + 1.010·Log10(DA)	

NA = Not Available. Could not be determined because of limited data or data distribution.
DA = Drainage Area (in square miles)

TABLE 2 – Concentrations of total phosphorus (TP) and dissolved inorganic nitrogen (DIN) arrayed by narrative levels of ecological risk.

Table 2 presents narrative descriptions of various levels of ecological condition and potential risk, arrayed with ranges of nutrient concentrations commonly observed at the respective ecological condition levels. This information may be useful reference for nutrient assessment using Charts A or C. **Chart A**: Attenuation from a defined source may be inferred by nutrient concentrations measured at successive stations within an evaluated segment decreasing from a higher risk level to a lower risk level. **Chart C**: Table 2 may be used as a general reference in assessing impairment risk. Actual risks and the potential benefits of abatement are site-specific determinations.

← *DECREASING RISK*

TP Conc. (mg/l) ↓ *DECREASING RISK*	DIN Concentration (mg/l) <0.44	0.44 < 1.10	1.10 < 3.60	3.60 < 6.70	≥6.70
<0.040	background levels typical of least disturbed conditions	levels typical of developed lands; little or no risk to beneficial uses	levels typical of modestly enriched condition in phosphorus limited systems; low risk to beneficial use if allied responses are within normal ranges	levels typical of enriched condition in phosphorus limited systems; moderate risk to beneficial use if allied responses are elevated	characteristic of tile-drained lands; otherwise atypical condition with moderate risk to beneficial use if allied responses are elevated (1.1% of observations)
0.040-<0.080	levels typical of developed lands; little or no risk to beneficial uses	levels typical of developed lands; little or no risk to beneficial uses	levels typical of working landscapes; low risk to beneficial use if allied responses are within normal ranges	levels typical of enriched condition in phosphorus limited systems; moderate risk to beneficial use if allied responses are elevated	characteristic of tile-drained lands; moderate risk to beneficial use if allied responses are elevated (1.1% of observations)
0.080-<0.131	levels typical of modestly enriched condition in nitrogen limited systems; low risk to beneficial use if allied responses are within normal ranges	levels typical of working landscapes; low risk to beneficial use if allied responses are within normal ranges	levels typical of working landscapes; low risk to beneficial use if allied responses are within normal ranges	characteristic of tile-drained lands; moderate risk to beneficial use if allied responses are elevated; increased risk with poor habitat	characteristic of tile-drained lands; moderate risk to beneficial use if allied responses are elevated (1.0% of observations)
0.131-<0.400	levels typical of modestly enriched condition in nitrogen limited systems; low risk to beneficial use if allied responses are within normal ranges	levels typical of enriched condition; low risk to beneficial use if allied responses are within normal ranges	levels typical of enriched condition; low risk to beneficial use if allied responses are within normal ranges; increased risk with poor habitat	enriched condition; generally high risk to beneficial uses; often co-occurring with multiple stressors; increased risk with poor habitat	enriched condition; generally high risk to beneficial uses; often co-occurring with multiple stressors
≥0.400	atypical condition (1.3% of observations)	atypical condition (1% of observations);	enriched condition; generally high risk to beneficial uses; often co-occurring with multiple stressors; increased risk with poor habitat	enriched condition; generally high risk to beneficial uses; often co-occurring with multiple stressors ; increased risk with poor habitat	enriched condition; generally high risk to beneficial uses; often co-occurring with multiple stressors

"allied responses" = allied response indicators (24-hour DO swing, benthic chlorophyll)

TABLE 2 (continued)

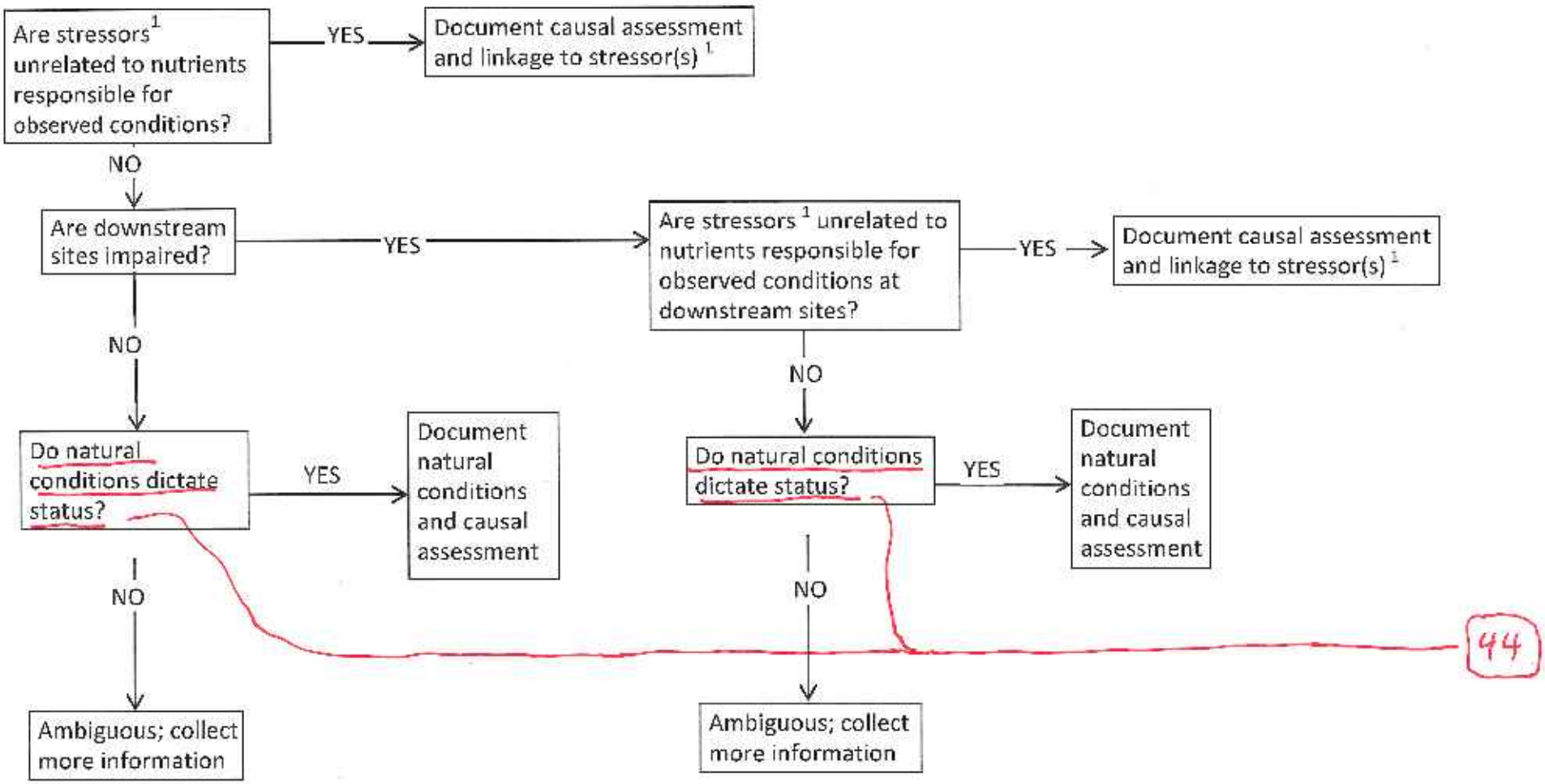
Ohio EPA's monitoring data for the years 1981 through 2011 (n = 16,870), from index period samples (June-October) and all stream sizes, was used to derive the information presented in Table 2. Following is the frequency of occurrence in the database for each nutrient concentration range, expressed as percent of total data values.

Frequency of Occurrence in Database, as Percent of Total (n=16,870)

Total Phosphorus (TP) [mg/l]	Dissolved Inorganic Nitrogen (DIN) [mg/l]				
	<0.44	0.44 < 1.10	1.10 < 3.60	3.60 < 6.70	≥6.70
<0.040	18.14%	5.00%	4.26%	1.13%	0.66%
0.040 < 0.080	6.50%	5.66%	4.87%	1.11%	0.29%
0.080 < 0.131	3.30%	3.77%	5.20%	1.01%	0.31%
0.131 < 0.400	3.62%	4.31%	11.39%	3.01%	1.45%
≥0.400	1.33%	0.99%	4.84%	4.07%	3.78%

FLOW CHART B – DECISION TREE FOR DETERMINING BIOLOGICAL IMPAIRMENT CAUSED BY STRESSORS OTHER THAN NUTRIENTS

For application when one or more biological criteria are non-attaining, but no nutrient response indicators (DO swing or benthic chlorophyll) are elevated.



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[1] Stressors include pollutants and physical conditions.

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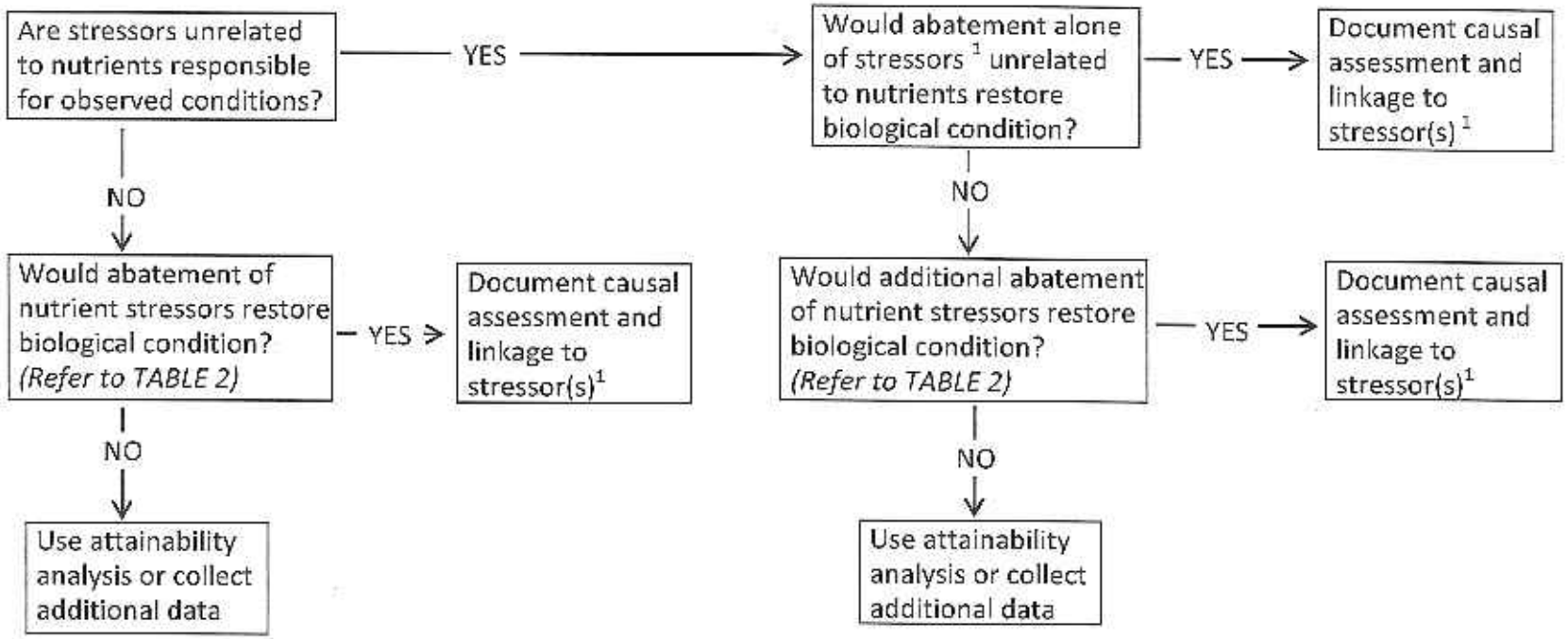
FLOW CHART C – DECISION TREE FOR CONFIRMING BIOLOGICAL IMPAIRMENT CAUSED BY NUTRIENTS

For application when one or more biological criteria are non-attaining, and either nutrient response indicator (DO swing or benthic chlorophyll) is elevated.



[1] Stressors include pollutants and physical conditions.