
# Alabama's Water Quality Assessment and Listing Methodology

**January 1, 2026**

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# List of Acronyms

| | |
|---|---|
| A&I | Agricultural and Industrial Water Supply |
| ADEM | Alabama Department of Environmental Management |
| ADPH | Alabama Department of Public Health |
| AEMC | Alabama Environmental Management Commission |
| AWIC | Alabama Water Improvement Commission |
| CBOD5 | Five-Day Carbonaceous Biochemical Oxygen Demand |
| $Cl^{-1}$ | Chlorides |
| CWA | Clean Water Act |
| DO | Dissolved Oxygen |
| DRP | Dissolved Reactive Phosphorus |
| EPA | United States Environmental Protection Agency |
| EPT | Ephemeroptera/Plecoptera/Trichoptera |
| F&W | Fish and Wildlife |
| GIS | Geographical Information System |
| GPS | Global Positioning System |
| IBI | Index of Biotic Integrity |
| IWQMAR | Integrated Water Quality & Monitoring |
| LWF | Limited Warmwater Fishery |
| MDL | Method Detection Limit |
| NH3-N | Ammonia Nitrogen |
| NHD | National Hydrography Dataset |
| NO3+ NO2-N | Nitrate + Nitrite Nitrogen |
| NPDES | National Pollutant Discharge Elimination System |
| OAW | Outstanding Alabama Water |
| ONRW | Outstanding National Resource Water |
| PWS | Public Water Supply |
| S | Swimming and Other Whole Body Water-Contact Sports |
| SH | Shellfish Harvesting |
| SOP | Standard Operating Procedures |
| SWQAPP | Surface Water Quality Assurance Project Plan |
| TAL | Treasured Alabama Lake |
| TDS | Total Dissolved Solids |
| TKN | Total Kjeldahl Nitrogen |
| TMDL | Total Maximum Daily Load |
| Total-P | Total Phosphorus |
| TSS | Total Suspended Solids |
| USGS | United States Geological Survey |
| WMB-EPT | Wadeable Multi-habitat Bioassessment - EPT Families |
| WMB-I | Intensive Wadeable Multi-habitat Bioassessment |

## 1.0 Introduction

Alabama has long been recognized for its abundant water resources. With over 129,700 miles of perennial and intermittent streams and rivers, 425,748 acres of publicly-owned lakes and reservoirs, 610 square miles of estuaries, and 337 miles of coastal shoreline (includes bays and inlets), the state is faced with a tremendous challenge to monitor and accurately report on the condition of its surface waters (USGS National Hydrography Dataset High Resolution, 2015).

Sections 305(b) and 303(d) of the federal Clean Water Act (CWA) direct states to monitor and report the condition of their water resources. Guidance published by the Environmental Protection Agency (EPA) provides a basic framework that states may use to fulfill this reporting requirement. *Guidance for 2006 Assessment, Listing and Reporting Requirements Pursuant to Sections 303(d), 305(b) and 314 of the Clean Water Act* provides recommendations on the delineation of assessment units, reporting the status and progress towards comprehensive assessment of state waters, attainment of state water quality standards and the basis for making attainment decisions, schedules for additional monitoring, listing waters which do not fully support their designated uses (i.e. impaired waters), and schedules to address impaired waters (EPA, 2005). This methodology is consistent with this guidance and supplemental guidance issued in 2008, 2010, 2012, 2014, 2016, 2018, and 2020.

Alabama's assessment and listing methodology establishes a process, consistent with EPA's guidance, to assess the status of surface waters in Alabama relative to the designated uses assigned to each waterbody. The methodology will also describe the procedure to assign the size or extent of assessed waterbodies. This methodology is not intended to limit the data or information that the State considers as it prepares an Alabama's Integrated Water Quality Monitoring and Assessment Report (IWQMAR). Rather, it is intended to establish a rational and consistent process for reporting the status of Alabama's surface waters relative to their designated uses.

## 2.0 Alabama's Water Quality Standards

State water quality standards are the yardstick by which the condition of the nation's waters is measured. They are intended to protect, restore, and maintain the condition of the nation's waters. In Alabama, the Alabama Water Improvement Commission (AWIC) first adopted water quality standards in 1967. In 1982, the Alabama Department of Environmental Management (ADEM) was formed by merging AWIC with elements of the Alabama Department of Public Health (ADPH). Since first being adopted in 1967, Alabama's water quality standards have been amended on numerous occasions (ADEM, 2017). The Alabama Environmental Management Commission (AEMC), which is the entity that oversees ADEM, has the authority to adopt revisions to the ADEM Administrative Code. The Use Classifications for Surface Waters (ADEM Administrative Code r. 335-6-11) and the Water Quality Criteria (ADEM Administrative Code r. 335-6-10) are reviewed once every three years pursuant to EPA regulations at 40 CFR Part 131.20. Known as the triennial review, this process affords the public the opportunity to make comments and suggestions regarding Alabama's water quality standards. Any changes that ADEM may propose as a result of the review process are subject to further public comment before consideration by the AEMC.

Water quality standards consist of three components: designated uses, numeric and narrative criteria, and an antidegradation policy. These three components have been compared to the three

legs of a stool which work together to provide water quality protection for the nation's surface waters.

Designated uses describe the best uses reasonably expected of waters. These uses should include such activities as recreation in and on the water, public water supply, agricultural and industrial water supply, and habitat for fish and wildlife. While not all waters may support all of these uses, the goal of the Clean Water Act is to provide protection of water quality consistent with "fishable/swimmable" uses, where attainable. In Alabama, waters can be assigned one or more of seven designated uses pursuant to ADEM Administrative Code r. 335-6-11. These uses include:

1. Outstanding Alabama Water (OAW)
2. Public Water Supply (PWS)
3. Shellfish Harvesting (SH)
4. Swimming and Other Whole Body Water-Contact Sports (S)
5. Fish and Wildlife (F&W)
6. Limited Warmwater Fishery (LWF)
7. Agricultural and Industrial Water Supply (A&I)

Designated uses 1 through 5 in the list above are considered by EPA to be consistent with the "fishable/swimmable" goal and, therefore, provide for protection of aquatic life and human health.

The State also has two special designations – Outstanding National Resource Water (ONRW) and Treasured Alabama Lake (TAL). These high quality waters are protected or require a thorough evaluation of discharges from new or expanded point sources of pollutants and may be assigned to any one of the first five designated uses in the list above.

Numeric and narrative criteria provide the means to measure the degree to which the quality of waters is consistent with their designated use or uses. The criteria are intended to provide protection of the water quality commensurate with the water's use, to include protection of human health. Narrative criteria generally describe minimum conditions necessary for all uses and may include certain restrictions for specific uses. Numeric criteria include pollutant concentrations or physical characteristics necessary to protect a specific designated use. Alabama's narrative and numeric criteria are defined in ADEM Administrative Code r. 335-6-10.

The state's antidegradation policy provides for the protection of high quality waters that constitute an outstanding national resource (Tier 3), waters whose quality exceeds the levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water (Tier 2), and existing instream water uses and the level of water quality necessary to protect the existing uses (Tier 1). In Tier 3 waters, ADEM Administrative Code r. 335-6-10-.10 prohibits new or expanded point source discharges. In Tier 2 waters, ADEM Administrative Code r. 335-6-10-.04 provides for new or expanded discharge of pollutants only after intergovernmental coordination, public participation, and a demonstration that the new or expanded discharge is necessary for important economic or social development. Alabama's water quality standards regulations (ADEM Administrative Code r. 335-6-10 and 335-6-11) may be found at the Department's web page at: http://www.adem.alabama.gov/alEnviroRegLaws/files/Division6Vol1.pdf

## 3.0 Waterbody Categorization

The water quality assessment process begins with the collection, compilation, and evaluation of water quality data and information for the purpose of determining if a waterbody is supporting all of its designated uses. It is imperative that the data and information used in the process be of adequate quality and provide an accurate indication of the water quality conditions in the waterbody since decisions arising from the assessment process may have long-term consequences. Issues of data sufficiency and data quality must be addressed to ensure that use support decisions are based on accurate data and information. However, the minimum data requirements discussed in this methodology are not intended to exclude data and information from the assessment process, but are a guide for use in designing monitoring activities to assess the State's surface waters and to ensure that decisions are made using the best available data. The goal is to accurately describe the status of surface waters where possible and to identify waters where more information is needed to make use support decisions.

The use support assessment process considers all existing and readily available data and information with a goal of placing waterbodies in one of five separate categories. This process is specific to the highest designated use assigned to the waterbody and is described by the flow chart depicted in **Figure 1**.

### 3.1 Waterbody Categories

Waterbody data and information are evaluated using the use support assessment methodology and the waterbody is assigned to one of the following categories.

Category 1

Waters that are attaining all applicable water quality standards. This category includes waterbodies with exceedances of water quality criteria determined to be the result of Non-anthropogenic Impacts (Natural Conditions). For a description of Non-anthropogenic Impacts (Natural Conditions) see Section 4.8.11.

Category 2

Waters for which existing and readily available data, which meet the State's requirements as described in Section 4.9, supports a determination that some water quality standards are met and there is insufficient data to determine if remaining water quality standards are met. Attainment status of the remaining standards is unknown because data are insufficient. Waters for which the minimum data requirements have not been met will be placed in Category 2.

1. Category 2a
   For these waters, available data does not satisfy minimum data requirements but there is a high potential for use impairment based on the limited data. These waters will be given a higher priority for additional data collection.

2. Category 2b
   For these waters available data does not satisfy minimum data requirements but there is a low potential for use impairment based on the limited data. These waters will be included in future monitoring plans as resources allow.

Category 3

Waters for which there are no data or information to determine if any applicable water quality standard is attained or impaired. These waters will be considered unassessed.

Category 4

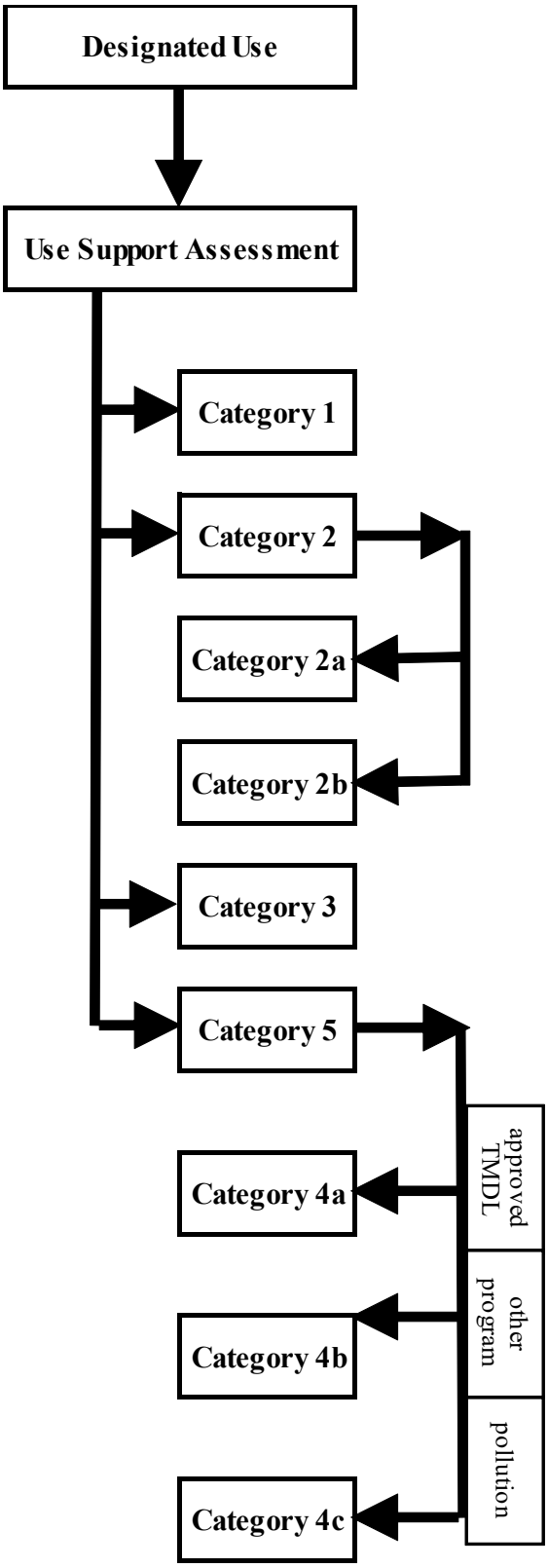
Waters in which one or more applicable water quality standards are not met but establishment of a Total Maximum Daily Load (TMDL) is not required.

1. Category 4a
   Waters for which all TMDLs needed to result in attainment of all applicable WQSs have been approved or established by EPA.
2. Category 4b
   Waters for which other required control measures are expected to attain applicable water quality standards in a reasonable time. Adequate documentation is required to indicate that the proposed control mechanisms will address all major pollutant sources and should result in the issuance of more stringent effluent limitations required by either federal, state, or local authority or the implementation of "other pollution control requirements (e.g., best management practices) required by local, state, or federal authority" that are stringent enough to implement applicable water quality standards. Waters will be evaluated on a case-by-case basis to determine if the proposed control measures or activities under another program can be expected to address the cause of use impairment within a reasonable time. A reasonable time may vary depending on the degree of technical difficulty or extent of the modifications to existing measures needed to achieve water quality standards. EPA's 2006 assessment and listing guidance offers additional clarification of what might be expected of waters placed in Category 4b.
3. Category 4c
   Waters in which the impairment is not caused by a pollutant. This would include waters which are impaired due to specific pollution. A pollutant is defined in Section 502(6) of the CWA as "spoil, solid waste, incinerator residue, sewage, garbage, sewage sludge, munitions, chemical wastes, biological materials, radioactive materials, heat, wrecked or discarded equipment, rock, sand, cellar dirt, and industrial, municipal, and agricultural waste discharged into water." Pollution is defined as "the man-made or man-induced alteration of the chemical, physical, or radiological integrity of a waterbody." Invasive plants and animal species are considered pollution.

Category 5

Waters in which a pollutant has caused or is suspected of causing impairment. If an identified pollutant causes the impairment, the water should be placed in Category 5. All "existing and readily available data and information" will be used to determine when a water should be placed in Category 5. Waters in this category comprise the State's list of impaired waters or Section 303(d) list.

## Figure 1: Alabama's Waterbody Assessment Process



3.2 Evaluated or Monitored Assessments

When the information used to assess the waterbody consists primarily of observed conditions, (limited water quality data, water quality data older than six years, or estimated impacts from observed or suspected activities), the assessment is generally referred to as an evaluated assessment (Category 2). Evaluated assessments usually require the use of some degree of professional judgment by the person making the assessment and these assessments are not considered sufficient to place waters in or to remove waters from the impaired category (Category 5) or the fully supporting category (Category 1).

Monitored assessments (Categories 1 and 5) are based on existing and readily available chemical, physical, and/or biological data collected during the previous six years, using commonly accepted and well-documented methods. Existing and readily available data are data that have been collected or assembled by the Department or other groups or agencies and are available to the public. Data older than six years old may be used on a case-by-case basis when assessing waters that are not currently included in Category 1 or Category 5. (For example, older data could be used if conditions, such as land use, have not changed.) Much of the remainder of this document will pertain to the use of monitoring data to make use support determinations.

## 4.0 The Water Quality Assessment Process

The water quality assessment process is different for each of Alabama's seven designated uses, because each use is protected by specific numeric and narrative water quality criteria. As such, the methodology for assigning a given waterbody to one of the five categories may have different data requirements and thresholds for determining the waterbody's use support status. In addition, interpretation of narrative criteria may differ by classified use and waterbody type. Data and information that may be considered when assessing state waters could include water chemistry data such as chemical specific concentration data, land use or land cover data; physical data such as water temperature, and conductivity, and habitat evaluations, biological data such as macroinvertebrate and fish community assessments; and bacteriological data such as *E. coli* or enterococci counts. Waters classified as "Fish and Wildlife" or higher must provide protection of the aquatic life use. All classifications must provide protection of the human health use.

In order to ensure consistent and accurate assessment of a waterbody's support status and proper categorization of the waterbody, minimum data requirements must be defined that address data quality and data quantity. Data requirements will not only be dictated by the classified use of the waterbody, but also by the waterbody type to account for the different monitoring strategies that may be used for different waterbody types. The minimum data requirements are expected to guide future water quality monitoring activities and provide the basis for making use support decisions. However, in those cases where a data set may not include all of the elements specified by the minimum data requirements, a decision to include the water in Category 5 can still be made, provided the available data indicate a clear impairment and the cause of the impairment is evident. These decisions will be made on a case-by-case basis and the decision will be documented.

In the assessment methodology, the terms "Level IV WMB-I", "Fish IBI", "habitat assessment", "conventional parameter samples", "pesticide/herbicide samples", "inorganic samples", "chlorophyll *a* samples", and "fish tissue analysis" are used. For the purposes of this assessment methodology, these terms will have the following meanings.

**Level IV WMB-I:**

- An intensive wadeable multi-habitat bioassessment (WMB-I) of the macroinvertebrate community in a wadeable stream involving the collection of macroinvertebrates for identification and enumeration in a laboratory

**Fish IBI:**

- A multihabitat index of biotic integrity (IBI) fish community assessment method developed by the Geological Survey of Alabama (O'Neil et al. 2006) and described in ADEM SOP # 6100 and 6101.

**Habitat assessment:**

- An assessment of available aquatic habitat in a stream which evaluates habitat characteristics important to supporting a diverse and healthy aquatic community

**Conventional parameter samples** will include analyses for the following constituents:

- Air Temperature, °C
- Alkalinity, mg/l
- Ammonia Nitrogen (NH3-N), mg/l
- Caffeine (wadeable flowing streams, Montgomery FO)
- Chlorides ($Cl^{-1}$)
- Collector Name
- Color (coastal plain streams, ecoregion 65)
- Conductivity, µmhos/cm @ 25°C
- Date (Month, Day, Year)
- Dissolved organic carbon (coastal plain streams, ecoregion 65)
- Dissolved Oxygen (DO), mg/l
- Dissolved Reactive Phosphorus (DRP), mg/l (field filtered, separate bottle)
- Five-day Carbonaceous Biochemical Oxygen Demand (CBOD5), mg/l
- Hardness, mg/l
- Nitrate + Nitrite Nitrogen (NO3+ NO2-N), mg/l
- pH, s.u.
- Salinity, ppt (coastal waters only)
- Sample Collection Depth, ft. or m
- Stream Flow (where appropriate) cfs
- Sulfate, mg/l
- Time (24 hr)
- Total Dissolved Solids (TDS), mg/l
- Total Kjeldahl Nitrogen (TKN), mg/l
- Total Phosphorus (Total-P), mg/l
- Total Stream Depth at Sampling Point, ft. or m
- Total Suspended Solids (TSS), mg/l
- Turbidity, NTU
- Water Temperature, °C
- Weather Conditions

**Pesticide/Herbicide samples** will include analyses for the following constituents:

- Atrazine by Immunoassay

- Chlorinated Herbicides by method SW8151
- Glyphosate (EPA547)
- Organochlorine Pesticides by method SW8081A
- Organophosphorus Pesticides by method SW8141

**Inorganic (metals) samples** will include analyses for the following constituents:

- "Total" Aluminum (Al), µg/l
- "Dissolved" Aluminum (Al), µg/l
- "Total" Antimony (Sb), µg/l
- "Dissolved" Antimony (Sb), µg/l
- "Total" Arsenic$^{+3}$ ($As^{+3}$), µg/l
- "Dissolved" Arsenic$^{+3}$ ($As^{+3}$), µg/l
- "Total" Cadmium (Cd), µg/l
- "Dissolved" Cadmium (Cd), µg/l
- "Total" Chromium$^{+3}$ ($Cr^{+3}$), µg/l
- "Dissolved" Chromium$^{+3}$ ($Cr^{+3}$), µg/l
- "Total" Copper (Cu), µg/l
- "Dissolved" Copper (Cu), µg/l
- "Total" Iron (Fe), µg/l
- "Dissolved" Iron (Fe), µg/l
- "Total" Lead (Pb), µg/l
- "Dissolved" Lead (Pb), µg/l
- "Total" Manganese (Mn), µg/l
- "Dissolved" Manganese (Mn), µg/l
- "Dissolved" Mercury (Hg), µg/l
- "Total" Nickel (Ni), µg/l
- "Dissolved" Nickel (Ni), µg/l
- "Total" Selenium (Se), µg/l
- "Dissolved" Selenium (Se), µg/l
- "Total" Silver (Ag), µg/l
- "Dissolved" Silver (Ag), µg/l
- "Total" Thallium (Tl), µg/l
- "Dissolved" Thallium (Tl), µg/l
- "Total" Zinc (Zn), µg/l
- "Dissolved" Zinc (Zn), µg/l

**Bacteriological Samples**

- E. coli, colonies/100 ml in non-coastal waters
- Enterococci, colonies/100 ml in coastal waters
- Fecal coliform, colonies/100 ml in Shellfish Harvesting waters

**Chlorophyll *a* samples** will include the collection of photic zone composite water samples to be processed in accordance with ADEM Standard Operating Procedures (SOP) # 2063 Chlorophyll *a* Collection and Processing.

**Fish tissue analysis** will include collection and analyses of fish for the following constituents:

- 2,4-DDD
- 2,4-DDE
- 2,4-DDT
- 4,4-DDD
- 4,4-DDE
- 4,4-DDT
- Arochlor 1016
- Arochlor 1221
- Arochlor 1232
- Arochlor 1242
- Arochlor 1248
- Arochlor 1254
- Arochlor 1260
- Arsenic
- Cadmium
- Chlordane
- Chlorpyrifos
- Dieldrin
- Endosulfan I
- Endosulfan II
- Endrin
- Heptachlor
- Heptachlor Epoxide
- Hexachlorobenzene
- Lindane
- Mercury
- Mirex
- Percent lipids
- Selenium
- Total PCBs
- Toxaphene

Fish sampling and tissue preparation procedures are described in SOP #2300 Fish Tissue Monitoring Sample Collection and ADEM SOP #2301 Fish Tissue Monitoring Sample, Processing and Data Reporting Procedures. Chronic aquatic life criteria will be used to assess a waterbody's use support where the designated use specifies such criteria. In those cases where both human health criteria and chronic aquatic life criteria are included, the more stringent of the criteria will determine the waterbody's use support status. The assessment process, including minimum data requirements and the number of chronic criteria exceedances, is described for each designated use in the remainder of the document. The corresponding ADEM SOPs describing each of the methods required are listed in **Table 1**.

## Table 1: ADEM Standard Operating Procedures

| SOP# | Title |
|---|---|
| 2040 | Stream Flow Abbreviated Measurement Method |
| 2041 | Temperature Field Measurements |
| 2042 | pH Field Measurements |
| 2043 | Conductivity Field Measurements |
| 2044 | Turbidity Field Measurements |
| 2045 | SW Dissolved Oxygen Field Measurements |
| 2046 | Photic Zone Measurements and Visibility Determinations |
| 2047 | SW DataSonde Field Measurements |
| 2048 | Continuous Monitoring using Datasondes |
| 2049 | Time of Travel |
| 2050 | ADCP Flow Measurement |
| 2051 | SW Rio Grande ADCP Flow Measurement |
| 2061 | General Surface Water Sample Collection |
| 2062 | Dissolved Reactive Phosphorus (DRP) Collection & Processing |
| 2063 | Water Column Chlorophyll *a* Sample Collection |
| 2064 | Bacteriological Sample Collection |
| 2065 | Sediment Sample Collection |
| 2066 | Dissolved Metals Sample Collection and Processing |
| 2067 | Organic Sample Collection |
| 2069 | Cyanide Sample Collection and Processing |
| 2300 | Fish Tissue Monitoring Sample Collection |
| 2301 | Fish Tissue Monitoring Sample, Processing and Data Report |
| 2302 | FTMP Non-Lethal Biopsy Plug Sample Collection and Processing |
| 5700 | Algal Growth Potential Testing (AGPT) |
| 6000 | Macroinvertebrate Sample Collection |
| 6001 | Macroinvertebrate Sample Processing |
| 6002 | Macroinvertebrate Organism Identification |
| 6004 | Macroinvertebrate Sample Data Analysis |
| 6100 | Wadeable Rivers and Streams Fish Community Sample Collection |
| 6101 | Fish IBI Metrics/Data Analysis |
| 6300 | Physical Characterization |
| 6301 | Wadeable Stream Habitat Survey |
| 9020 | Sample Submittal to Labs |
| 9021 | Field Quality Control Measurements and Samples |
| 9025 | Field Equipment Cleaning and Storage |
| 9040 | Station, Sample ID & Chain of Custody Procedures |

## 4.1 Outstanding Alabama Waters (OAW)

The best usage of waters assigned this classification are those activities consistent with the natural characteristics of the waters. Waterbodies assigned the OAW use are high quality waters that constitute an outstanding Alabama resource, such as waters of state parks and wildlife refuges and waters of exceptional recreational or ecological significance. Beneficial uses encompassed within this classification include aquatic life support and wildlife propagation, fish and shellfish harvesting and consumption, water contact recreation, agricultural irrigation, livestock watering, and industrial cooling and process water supply.

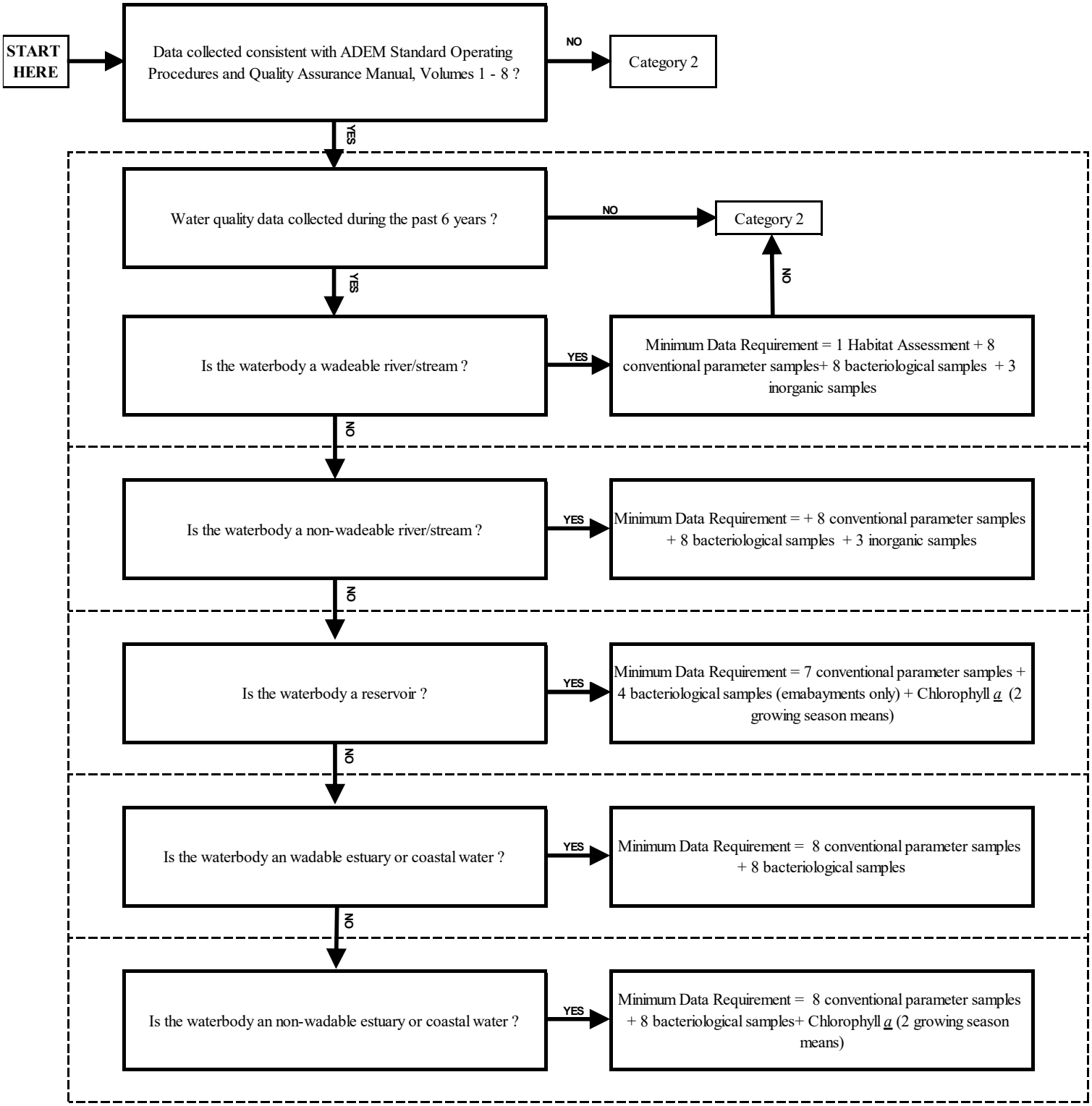
### 4.1.1 Minimum Data Requirements for OAW Waters

For waters with the OAW classification, the available data must have been collected consistent with the following standard operating procedures (SOP) manuals listed in **Table 1**.

In addition, the data must have been collected within the last six years. Failure to satisfy this condition places the waterbody in Category 2. If this condition is met, the determination of the minimum data requirements is dependent upon the waterbody type. Waterbody types include wadeable rivers and streams, non-wadeable rivers and streams, reservoirs and reservoir embayments, and estuary and coastal waters. In addition, the minimum data requirements may change if pollutant sources upstream of the monitoring location are likely. Failure to meet the minimum data requirements for any waterbody type will place the waterbody in Category 2. The following list and **Figure 2** describe the minimum data requirements for assessing waters classified as OAW.

- Wadeable River or Stream
  - 1 habitat assessment
  - 8 conventional parameter samples
  - 8 bacteriological samples
  - 3 inorganic samples
- Non-wadeable River or Stream
  - 8 conventional parameter samples
  - 8 bacteriological samples
  - 3 inorganic samples
- Reservoirs and Embayments
  - 7 conventional parameter samples
  - 4 bacteriological samples (embayments only)
  - Chlorophyll *a* – 2 growing season means
- Wadeable Estuary or Coastal Waters
  - 8 conventional parameter samples
  - 8 bacteriological samples
- Non-Wadeable Estuary or Coastal Waters
  - 8 conventional parameter samples
  - 8 bacteriological samples
  - Chlorophyll *a* – 2 growing season means

## Figure 2: Minimum Data Requirements for the OAW Designated Use



4.1.2 Use Support Assessment for OAW Waters

Once the minimum data requirements have been met, an assessment of the data can be completed resulting in the categorization of the waterbody as either fully supporting the OAW use (Category 1) or not fully supporting the OAW use (Category 5). The assessment process considers the available data and may include any fish consumption advisories, shellfish harvesting closure notices, chemical specific data, bacteriological data, biological community assessments, habitat assessments, periphyton assessments, and toxicity evaluations. **Table 2** shows OAW Category 1 Requirements and **Table 3** shows OAW Category 5 Requirements. **Figure 3** illustrates the assessment process for OAW waters.

## Table 2: OAW Category 1 Requirements

| **The OAW waterbody can be placed in Category 1 if all the following are true:** | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | No fish/shellfish consumption advisory issued by the Alabama Department of Public Health. |
| **Macroinvertebrate and Fish Assessments** | Level IV WMB-I or fish IBI community assessment "good" or "excellent".[1] |
| **Chlorophyll *a* Data** | Growing season mean chlorophyll *a* criterion has not been exceeded where such a criterion has been established.[2] |
| **Toxic Pollutants** | No more than two exceedances of a particular toxic pollutant criterion in previous six years or more than one in a 3-year period. |
| **Conventional Parameters[3]** | No more than a 10% exceedance rate for any given parameter.[4] |
| **Bacteriological Data** | **Non-Coastal Waters:**<br>**A.** The geometric mean *E. coli* density must be less than or equal to 126 colonies/100 ml, and;<br>**B.** 10% or less of single samples must be less than or equal to 235 colonies/100 ml.[4] |
| | **Coastal Waters:**<br>**A.** The geometric mean enterococci density must be less than or equal to 35 colonies/100 ml, and;<br>**B.** 10% or less of single samples must be less than or equal to 104 colonies/100 ml.[4] |

[1] Applicable to wadeable streams only.

[2] Chlorophyll *a* values in excess of the criterion, due to extreme hydrological events (i.e. drought, floods), will not be considered as an exceedance of the criterion. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75th percentile streamflow based on period of record caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

[3] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.

[4] As determined by the binomial distribution function and Table 17.

## Table 3: OAW Category 5 Requirements

| The OAW waterbody can be placed in Category 5 if any of the following are true: | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | A fish consumption advisory has been issued by the Alabama Department of Public Health. |
| **Macroinvertebrate and Fish Assessments** | Level IV WMB-I or fish IBI community assessment less than "good".[5] |
| **Chlorophyll *a* Data** | Growing season mean chlorophyll *a* criterion has been exceeded where such a criterion has been established.[6] |
| **Toxic Pollutants** | More than two exceedances of a particular toxic pollutant criterion in previous six years or more than one in a 3-year period. |
| **Conventional Parameters**[7] | More than a 10% exceedance rate for any given parameter.[8] |
| **Bacteriological Data** | **Non-Coastal Waters:**<br>**A.** The geometric mean *E. coli* density is greater than 126 colonies/100 ml, or;<br>**B.** More than 10% of single samples are greater than 235 colonies/100 ml.[8] |
| | **Coastal Waters:**<br>**A.** The geometric mean enterococci density is greater than 35 colonies/100 ml, or;<br>**B.** More than 10% of single samples are greater than 104 colonies/100 ml.[8] |

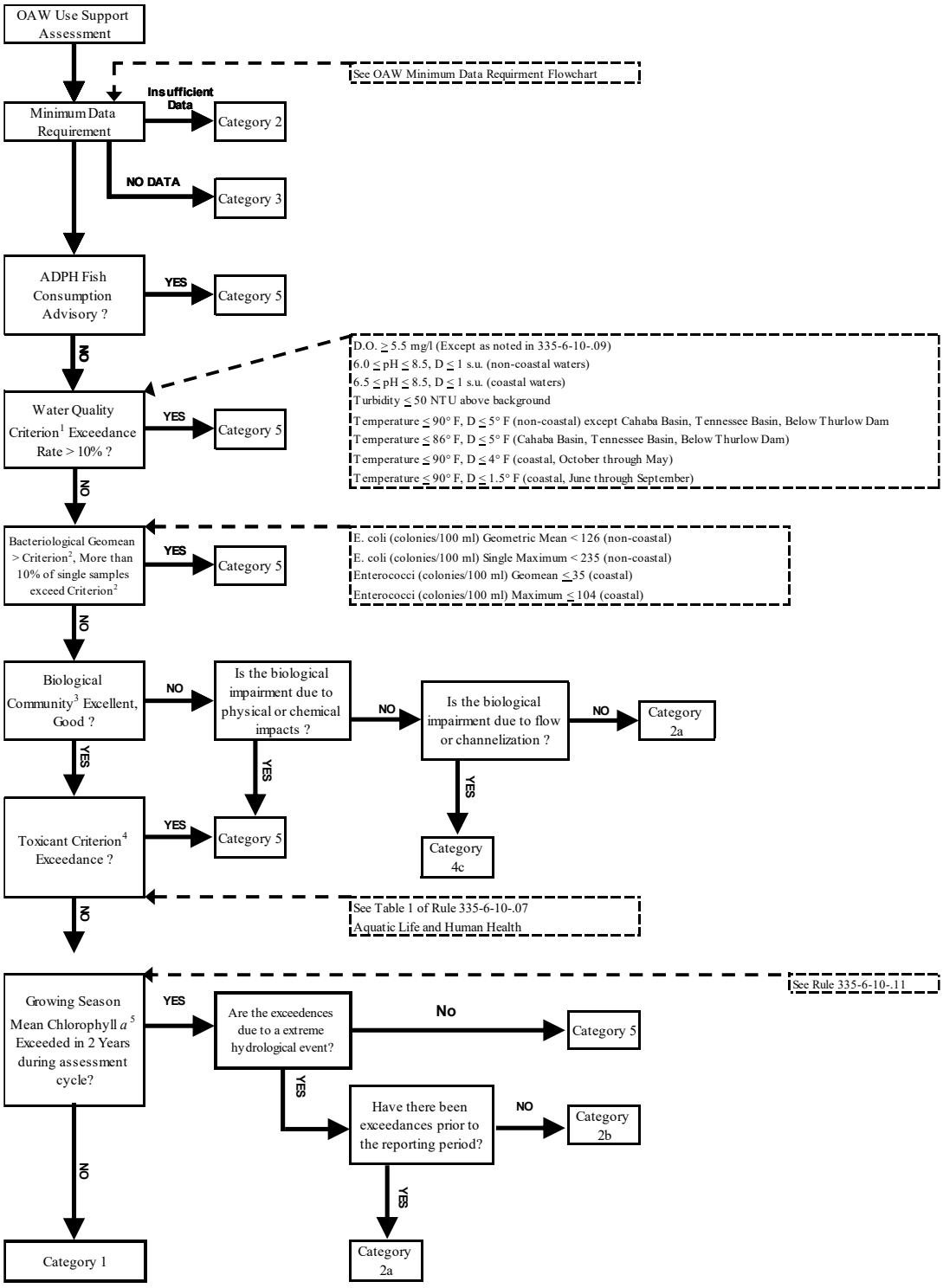
[5] Applicable to wadeable streams only. A potential anthropogenic cause for the degraded condition must be identified using observations made during the sampling events or from information contained in the Department's geographic information system.

[6] Chlorophyll *a* values in excess of the criterion, due to extreme hydrological events (i.e. drought, floods), will not be considered as an exceedance of the criterion. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75$^{th}$ percentile streamflow based on period of record caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

[7] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.

[8] As determined by the binomial distribution function and Table 17.

# Figure 3: Outstanding Alabama Water (OAW) Categorization Methodology




1 Water Quality Criterion refers to pH, Dissolved Oxygen, turbidity, and temperature resulting from heat sources

2 Bacteriological Criterion refers to both the single sample maximum and geometric mean, see discussion in Section 4.1.2

3 Biological community refers to macroinvertebrates and/or fish in wadeable rivers/streams only (See Minimum Data Requirments)

4 Toxicant Criterion refers to toxics listed in 335-6-10-.07

5 Applies only to reservoirs with established Chlorophyll a criteria and not during extreme hydrologic events. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75th percentile caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

**Special Note** - Natural waters may, on occasion, have characteristics outside of the limits established by these criteria. These criteria relate to condition of waters as affected by the discharge of sewage, industrial wastes, or other wastes, not to conditions resulting from natural forces. See 335-6-10-.05(4)

## 4.2 Public Water Supply (PWS)

The best usage of waters assigned this classification is as a source of water supply for drinking or food-processing purposes after approved treatment. Waterbodies assigned the PWS use are considered safe for drinking or food-processing purposes if subjected to treatment approved by the Department equal to coagulation, sedimentation, filtration and disinfection, with additional treatment if necessary to remove naturally present impurities. Beneficial uses encompassed within this classification include aquatic life support and wildlife propagation, fish and shellfish harvesting and consumption, drinking and food-processing water supply, water contact recreation, agricultural irrigation, livestock watering, and industrial cooling and process water supply.

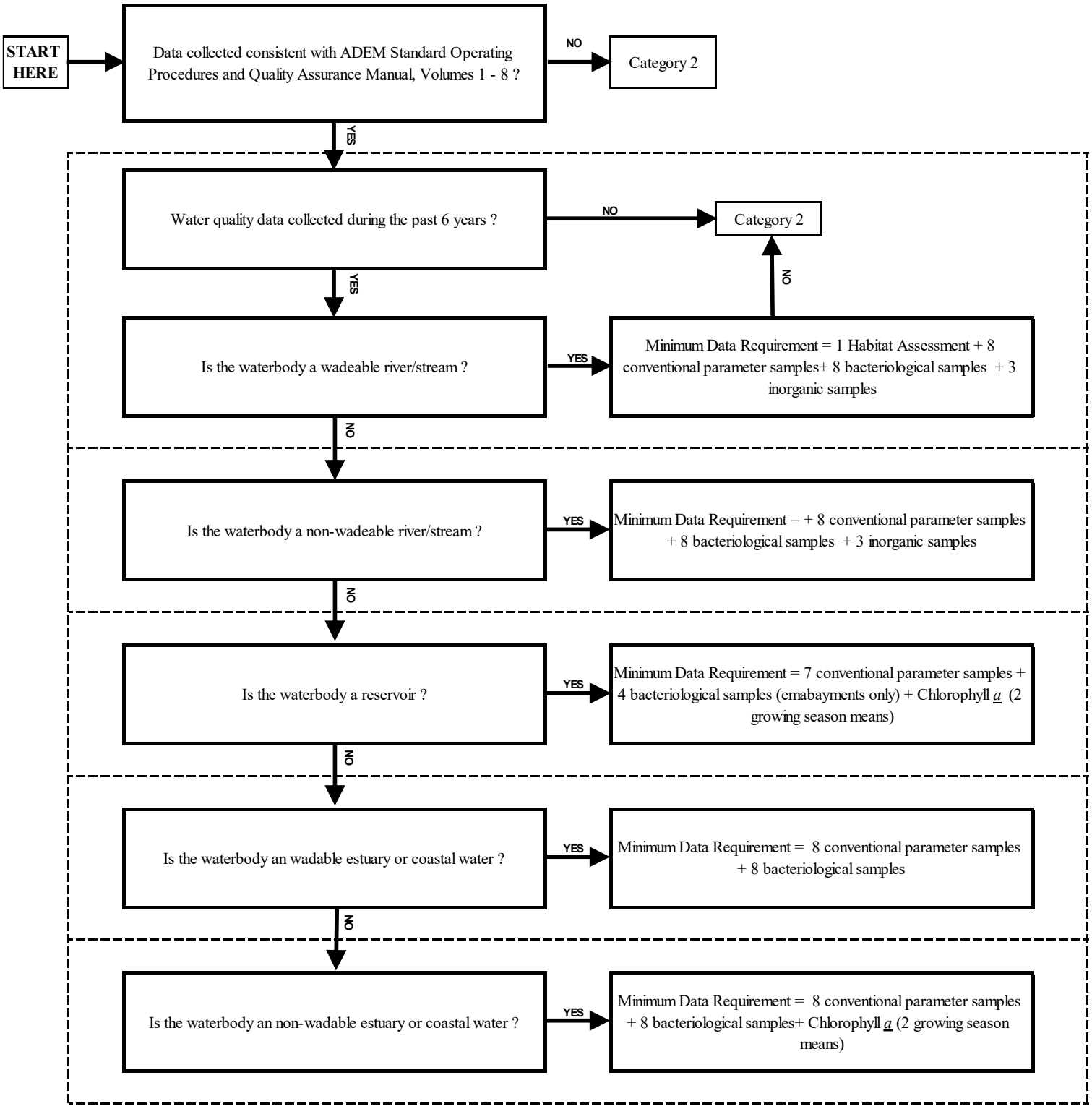
### 4.2.1 Minimum Data Requirements for PWS Waters

For waters with the PWS classification, the available data must have been collected consistent with the following standard operating procedures manuals listed in **Table 1**.

In addition, the data must have been collected within the last six years. Failure to satisfy this condition places the waterbody in Category 2. If this condition is met, the determination of the minimum data requirements is dependent upon the waterbody type. Waterbody types include wadeable rivers and streams, non-wadeable rivers and streams, reservoirs and reservoir embayments, and estuary and coastal waters. Failure to meet the minimum data requirements will place the waterbody in Category 2. The following list and **Figure 4** describe the minimum data requirements for assessing waters classified as PWS.

- Wadeable River or Stream
  - 1 habitat assessment
  - 8 conventional parameter samples
  - 8 bacteriological samples
  - 3 inorganic samples
- Non-wadeable River or Stream
  - 8 conventional parameter samples
  - 8 bacteriological samples
  - 3 inorganic samples
- Reservoirs and Embayments
  - 7 conventional parameter samples
  - 4 bacteriological samples (embayments only)
  - Chlorophyll *a* – 2 growing season means
- Wadeable Estuary or Coastal Waters
  - 8 conventional parameter samples
  - 8 bacteriological samples
- Non-Wadeable Estuary or Coastal Waters
  - 8 conventional parameter samples
  - 8 bacteriological samples
  - Chlorophyll *a* – 2 growing season means

## Figure 4: Minimum Data Requirements for the PWS Designated Use



4.2.2 Use Support Assessment for PWS Waters

Once the minimum data requirements have been met, an assessment of the data can be completed resulting in the categorization of the waterbody as either fully supporting the PWS use (Category 1) or not fully supporting the PWS use (Category 5). The assessment process considers the available data and may include any fish consumption advisories, shellfish harvesting closure notices, chemical specific data, bacteriological data, biological community assessments, habitat assessments, periphyton assessments, drinking water system compliance records, and toxicity evaluations. **Table 4** shows PWS Category 1 Requirements and **Table 5** shows PWS Category 5 Requirements. **Figure 5** illustrates the assessment process for PWS waters.

## Table 4: PWS Category 1 Requirements

| **The PWS waterbody can be placed in Category 1 if all the following are true:** | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | No fish/shellfish consumption advisory issued by the Alabama Department of Public Health. |
| **Macroinvertebrate and Fish Assessments** | Level IV WMB-I or fish IBI community assessment "fair", "good" or "excellent".[9] |
| **Chlorophyll *a* Data** | Growing season mean chlorophyll *a* criterion has not been exceeded in two years during the assessment cycle where such a criterion has been established.[10] |
| **Toxic Pollutants** | No more than two exceedances of a particular toxic pollutant criterion in previous six years or more than one in a 3-year period. |
| **Conventional[11] Parameters** | No more than a 10% exceedance rate for any given parameter.[12] |
| **Bacteriological Data** | **Non-Coastal Waters:**<br>**A.** The geometric mean *E. coli* density must be less than or equal to 126 colonies/100 ml (May – October) or less than or equal to 548 colonies/100 ml (November – April), and;<br>**B.** 10% or less of single samples must be less than or equal to 298 colonies/100 ml (May – October) or less than or equal to 2,507 colonies/100 ml (November – April).[12] |
| | **Coastal Waters:**<br>**A.** The geometric mean enterococci density must be less than or equal to 35 colonies/100 ml, and;<br>**B.** 10% or less of single samples must be less than or equal to 158 colonies/100 ml (May – October) or less than or equal to 275 colonies/100 ml (November – April). [12] |

[9] Applicable to wadeable streams only.

[10] Chlorophyll *a* values in excess of the criterion, due to extreme hydrological events (i.e. drought, floods), will not be considered as an exceedance of the criterion. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75$^{th}$ percentile streamflow based on period of record caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

[11] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.

[12] As determined by the binomial distribution function and Table 17.

## Table 5: PWS Category 5 Requirements

| **The PWS waterbody can be placed in Category 5 if any of the following are true:** | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | A fish consumption advisory has been issued by the Alabama Department of Public Health. |
| **Macroinvertebrate and Fish Assessments** | Level IV WMB-I or fish IBI community assessment less than "fair".[13] |
| **Chlorophyll *a* Data** | Growing season mean chlorophyll *a* criterion has been exceeded in two years during the assessment cycle.[14] |
| **Toxic Pollutants** | More than two exceedances of a particular toxic pollutant criterion in previous six years or more than one in a 3-year period. |
| **Conventional Parameters[15]** | There is more than a 10% exceedance rate for any given parameter.[16] |
| **Bacteriological Data** | **Non-Coastal Waters:**<br>***A.*** The geometric mean *E. coli* density is greater than 126 colonies/100 ml (May – October) or is greater than 298 colonies/100 ml (November – April), or;<br>***B.*** More than 10% of single samples are greater than 487 colonies/100 ml (May – October) or greater than 2,507 colonies/100 ml (November – April). [16] |
| | **Coastal Waters:**<br>***A.*** The geometric mean enterococci density is greater than 35 colonies/100 ml, or;<br>***B.*** More than 10% of single samples are greater than 158 colonies/100 ml (May – October) or greater than 275 colonies/100 ml (November – April). [16] |

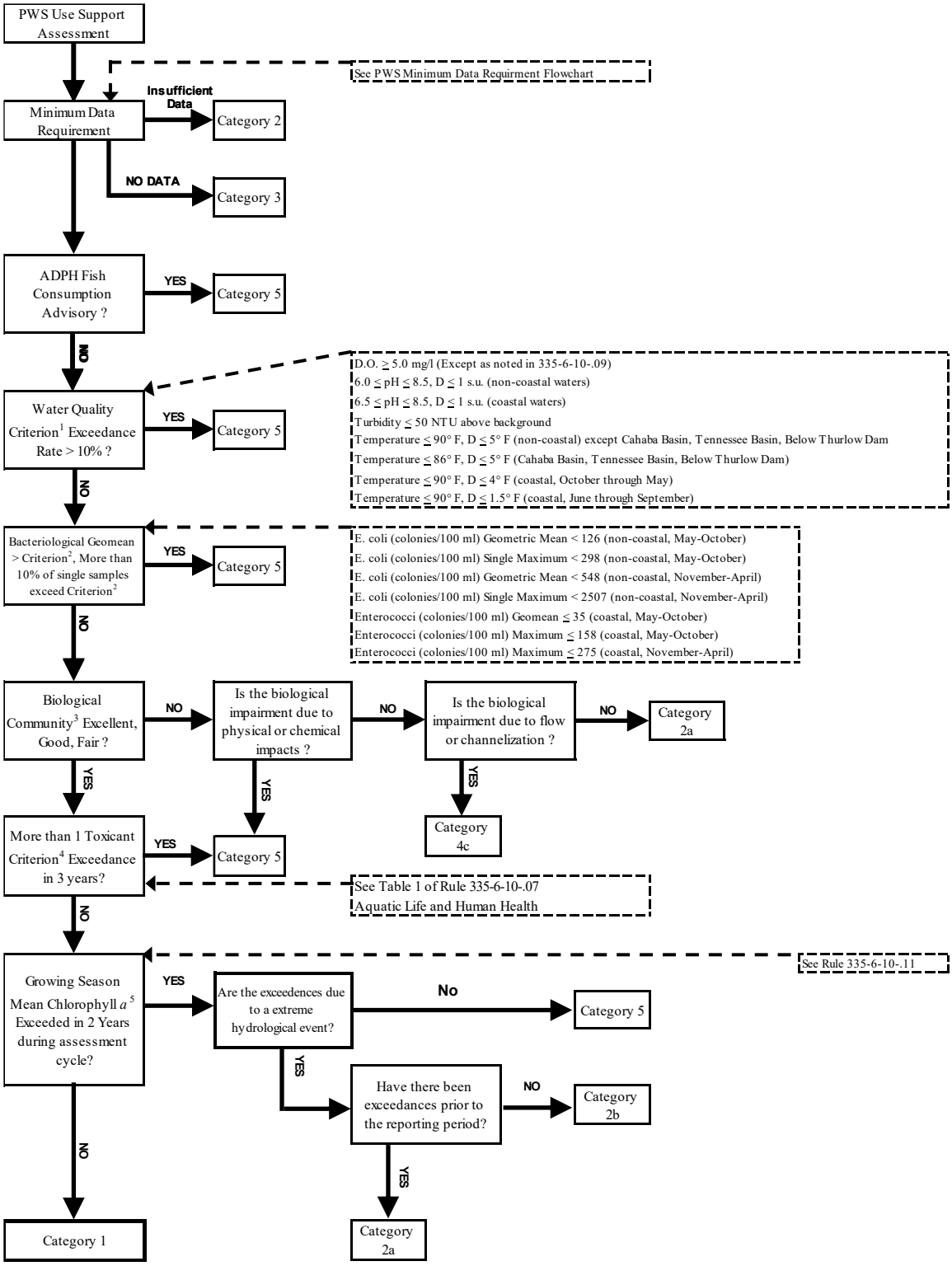
[13] Applicable to wadeable streams only. A potential anthropogenic cause for the degraded condition must be identified using observations made during the sampling events or from information contained in the Department's geographic information system.

[14] Chlorophyll *a* values in excess of the criterion, due to extreme hydrological events (i.e. drought, floods), will not be considered as an exceedance of the criterion. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75$^{th}$ percentile streamflow based on period of record caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

[15] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.

[16] As determined by the binomial distribution function and Table 17.

# Figure 5: Public Water Supply (PWS) Categorization Methodology




1 Water Quality Criterion refers to pH, Dissolved Oxygen, turbidity, and temperature resulting from heat sources

2 Bacteriological Criterion refers to both the single sample maximum and geometric mean, see discussion in Section 4.2.2

3 Biological community refers to macroinvertebrates and/or fish in wadeable rivers/streams only (See Minimum Data Requirments)

4 Toxicant Criterion refers to toxics listed in 335-6-10-.07

5 Applies only to reservoirs with established Chlorophyll a criteria and not during extreme hydrologic events. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75th percentile caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

**Special Note** - Natural waters may, on occasion, have characteristics outside of the limits established by these criteria. These criteria relate to condition of waters as affected by the discharge of sewage, industrial wastes, or other wastes, not to conditions resulting from natural forces. See 335-6-10-.05(4)

4.3 Swimming and Other Whole Body Water-Contact Sports (S)

The best usage of waters assigned this classification is for swimming and other whole body water-contact sports. Waterbodies assigned the S use, under proper sanitary supervision by the controlling health authorities, will meet accepted standards of water quality for outdoor swimming places and will be considered satisfactory for swimming and other whole body water-contact sports. Beneficial uses encompassed within this classification include aquatic life support and wildlife propagation, fish and shellfish harvesting and consumption, water contact recreation, agricultural irrigation, livestock watering, and industrial cooling and process water supply.

4.3.1 Minimum Data Requirements for S Waters

For waters with the S classification, the available data must have been collected consistent with the following standard operating procedures manuals listed in **Table 1**.

In addition, the data must have been collected within the last six years. Failure to satisfy this condition places the waterbody in Category 2. If this condition is met, the determination of the minimum data requirements is dependent upon the waterbody type. Waterbody types include wadeable rivers and streams, non-wadeable rivers and streams, reservoirs and reservoir embayments, and estuary and coastal waters. Failure to meet the minimum data requirements will place the waterbody in Category 2. The following list and **Figure 6** describe the minimum data requirements for assessing waters classified as S.

- Wadeable River or Stream
  - 1 habitat assessment
  - 8 conventional parameter samples
  - 8 bacteriological samples
  - 3 inorganic samples

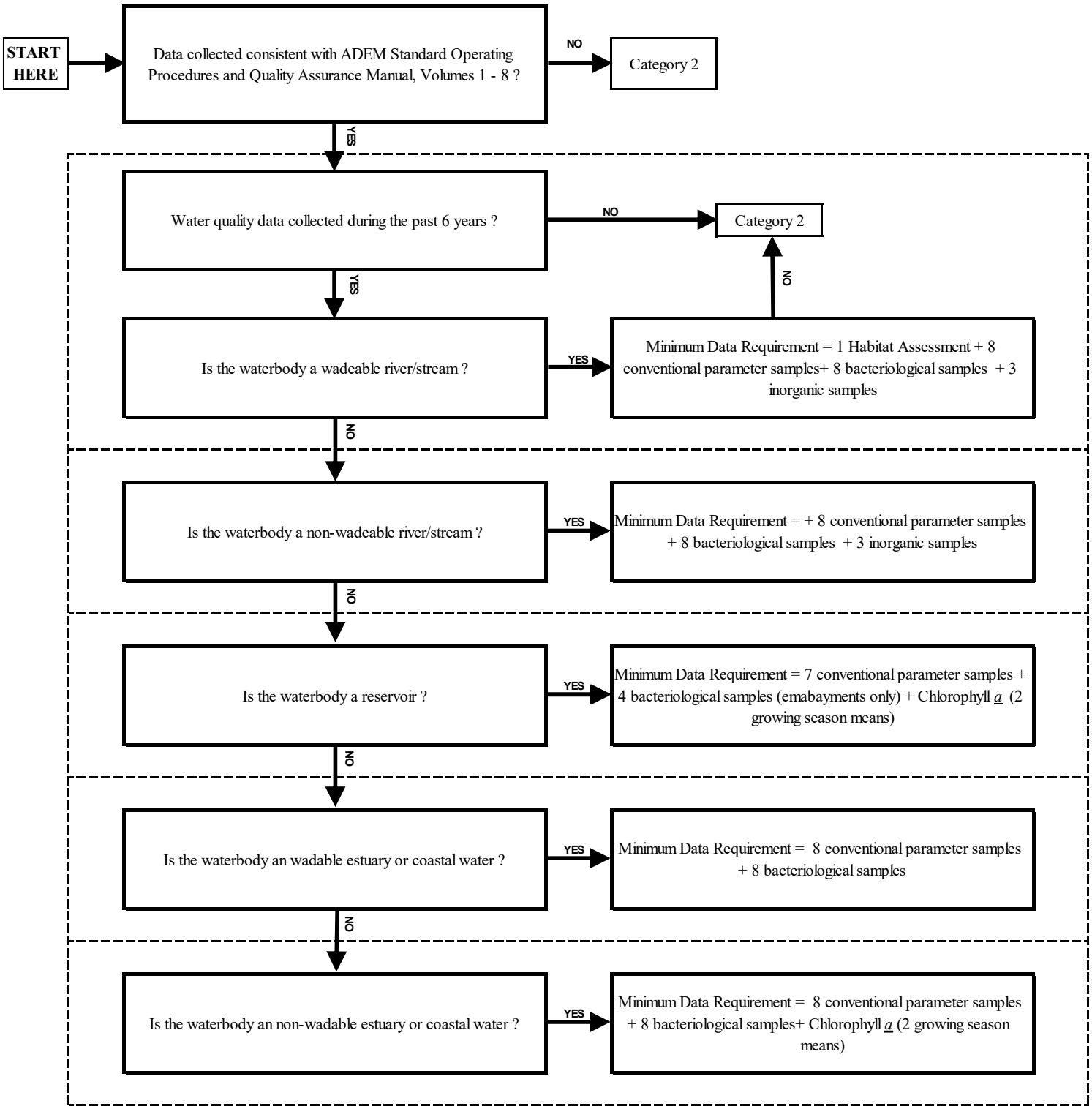
- Non-wadeable River or Stream
  - 8 conventional parameter samples
  - 8 bacteriological samples
  - 3 inorganic samples

- Reservoirs and Embayments
  - 7 conventional parameter samples
  - 4 bacteriological samples (embayments only)
  - Chlorophyll *a* – 2 growing season means

- Wadeable Estuary or Coastal Waters
  - 8 conventional parameter samples
  - 8 bacteriological samples

- Non-Wadeable Estuary or Coastal Waters
  - 8 conventional parameter samples
  - 8 bacteriological samples
  - Chlorophyll *a* – 2 growing season means

## Figure 6: Minimum Data Requirements for the S Designated Use



4.3.2 Use Support Assessment for S Waters

Once the minimum data requirements have been met, an assessment of the data can be completed resulting in the categorization of the waterbody as either fully supporting the S use (Category 1) or not fully supporting the S use (Category 5). The assessment process considers the available data and may include any fish consumption advisories, shellfish harvesting closure notices, chemical specific data, bacteriological data, biological community assessments, habitat assessments, periphyton assessments, beach closure notices and toxicity evaluations. **Table 6** shows S Category 1 Requirements, and **Table 7** shows S Category 5 Requirements. **Figure 7** illustrates the assessment process for S waters.

## Table 6: S Category 1 Requirements

| **The S waterbody can be placed in Category 1 if all the following are true:** | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | No fish/shellfish consumption advisory issued by the Alabama Department of Public Health. |
| **Macroinvertebrate and Fish Assessments** | Level IV WMB-I or fish IBI community assessment "fair", "good" or "excellent".[17] |
| **Chlorophyll *a* Data** | Growing season mean chlorophyll *a* criterion has not been exceeded in two years during the assessment cycle where such a criterion has been established.[18] |
| **Toxic Pollutants** | No more than two exceedances of a particular toxic pollutant criterion in previous six years or more than one in a 3-year period. |
| **Conventional Parameters[19]** | No more than a 10% exceedance rate for any given parameter.[20] |
| **Bacteriological Data** | **Non-Coastal Waters:**<br>**A.** The geometric mean *E. coli* density must be less than or equal to 126 colonies/100 ml, and;<br>**B.** 10% or less of single samples must be less than or equal to 235 colonies/100 ml.[20] |
| | **Coastal Waters:**<br>**A.** The geometric mean enterococci density must be less than 35 colonies/100 ml, and;<br>**B.** 10% or less of single samples must be less than or equal to 104 colonies/100 **ml**.[20] |

[17] Applicable to wadeable streams only.

[18] Chlorophyll *a* values in excess of the criterion, due to extreme hydrological events (i.e. drought, floods), will not be considered as an exceedance of the criterion. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75th percentile streamflow based on period of record caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

[19] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.

[20] As determined by the binomial distribution function and Table 17.

## Table 7: S Category 5 Requirements

| The S waterbody can be placed in Category 5 if any of the following are true: | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | A fish consumption advisory has been issued by the Alabama Department of Public Health. |
| **Macroinvertebrate and Fish Assessments** | Level IV WMB-I or fish IBI community assessment less than "fair".[21] |
| **Chlorophyll *a* Data** | Growing season mean chlorophyll *a* criterion has been exceeded in two years during the assessment cycle.[22] |
| **Toxic Pollutants** | More than two exceedances of a particular toxic pollutant criterion in previous six years or more than one in a 3-year period. |
| **Conventional Parameters[23]** | There is more than a 10% exceedance rate for any given parameter.[24] |
| **Bacteriological Data** | **Non-Coastal Waters:**<br>***A.*** The geometric mean *E. coli* density is greater than 126 colonies/100 ml, or;<br>***B.*** More than 10% of single samples are greater than 235 colonies/100 ml.[24] |
| | **Coastal Waters:**<br>***A.*** The geometric mean enterococci density is greater than 35 colonies/100 ml, or;<br>***B.*** More than 10% of single samples are greater than 104 colonies/100 ml.[24] |

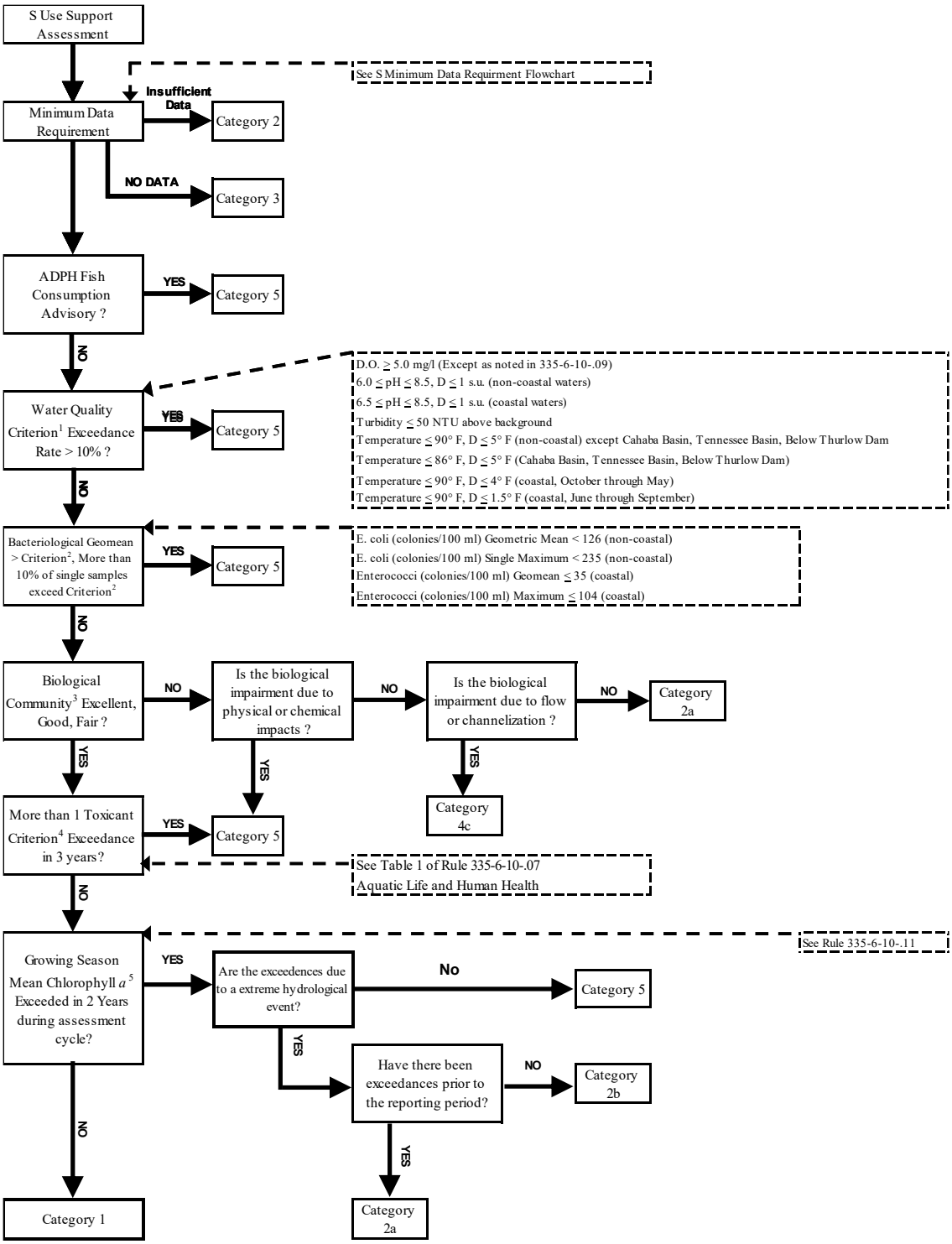
[21] Applicable to wadeable streams only. A potential anthropogenic cause for the degraded condition must be identified using observations made during the sampling events or from information contained in the Department's geographic information system.

[22] Chlorophyll *a* values in excess of the criterion, due to extreme hydrological events (i.e. drought, floods), will not be considered as an exceedance of the criterion. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75$^{th}$ percentile streamflow based on period of record caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

[23] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.

[24] As determined by the binomial distribution function and Table 17.

## Figure 7: Swimming and Other Whole Body Water-Contact Sports (S) Categorization Methodology




1 Water Quality Criterion refers to pH, Dissolved Oxygen, turbidity, and temperature resulting from heat sources

2 Bacteriological Criterion refers to both the single sample maximum and geometric mean, see discussion in Section 4.3.2

3 Biological community refers to macroinvertebrates and/or fish in wadeable rivers/streams only (See Minimum Data Requirments)

4 Toxicant Criterion refers to toxics listed in 335-6-10-.07

5 Applies only to reservoirs with established Chlorophyll a criteria and not during extreme hydrologic events. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75th percentile caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

**Special Note** - Natural waters may, on occasion, have characteristics outside of the limits established by these criteria. These criteria relate to condition of waters as affected by the discharge of sewage, industrial wastes, or other wastes, not to conditions resulting from natural forces. See 335-6-10-.05(4)

## 4.4 Shellfish Harvesting (SH)

The best usage of waters assigned this classification is the propagation and harvesting of shellfish (oysters) for sale or for use as a food product. Waterbodies assigned the SH use will meet the sanitary and bacteriological standards included in the *National Shellfish Sanitation Program Model Ordinance, (latest edition, Chapter IV)*, published by the Food and Drug Administration, U.S. Department of Health and Human Services and the requirements of the Alabama Department of Public Health. The waters will also be of a quality suitable for the propagation of fish and other aquatic life including shrimp and crabs. Beneficial uses encompassed within this classification include aquatic life support and wildlife propagation, fish and shellfish harvesting and consumption, water contact recreation, agricultural irrigation, livestock watering, and industrial cooling and process water supply.

### 4.4.1 Minimum Data Requirements for SH Waters

For waters with the SH classification, the available data must have been collected consistent with the following standard operating procedures manuals listed in **Table 1**.

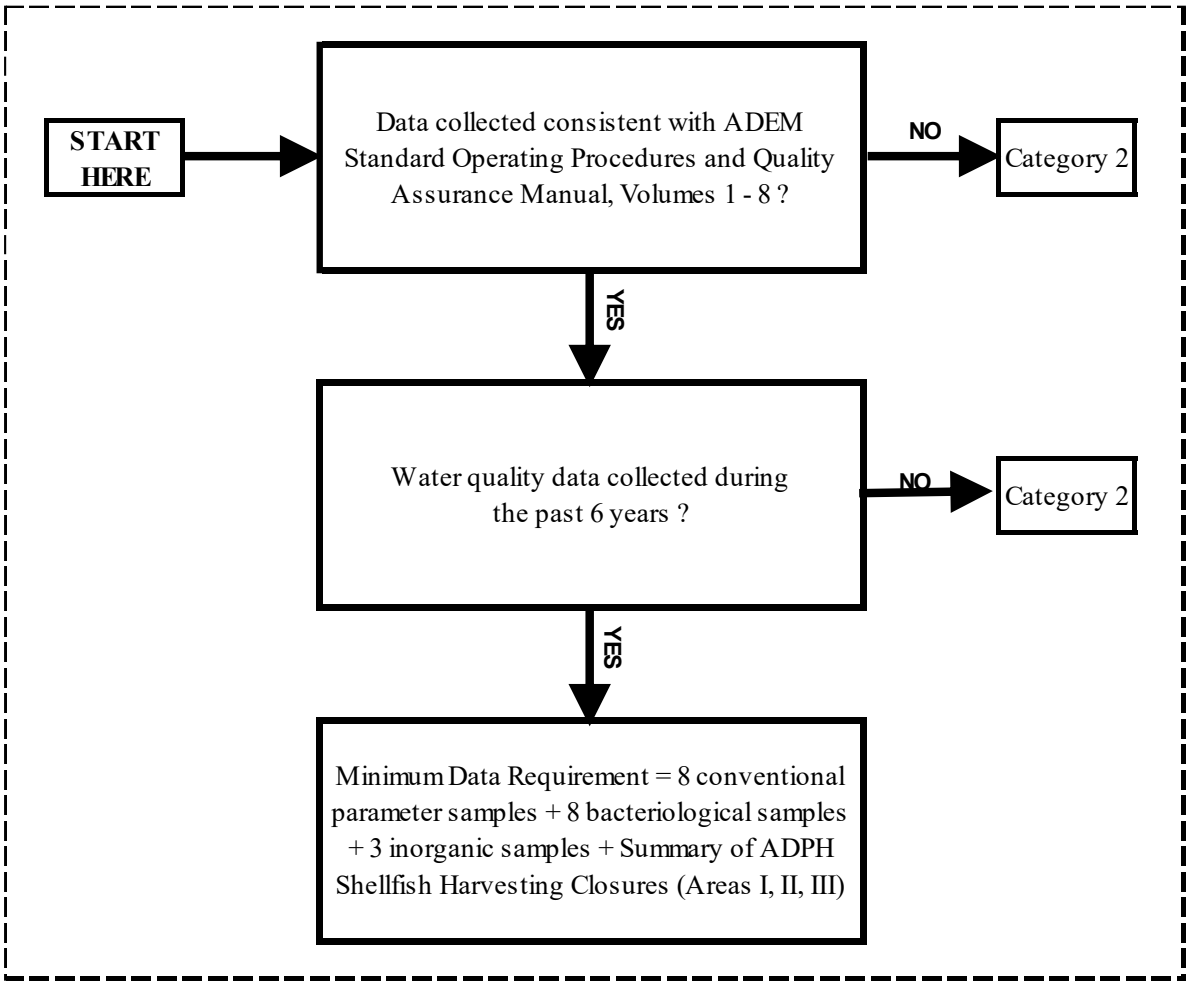
In addition, the data must have been collected within the last six years. Failure to satisfy this condition places the waterbody in Category 2. The following list and **Figure 8** describe the minimum data requirements for assessing waters classified as SH.

- 8 conventional parameter samples
- 8 bacteriological samples or 1 geometric mean sample
- 3 inorganic samples
- Summary of ADPH shellfish harvesting closure notices for Areas I, II, and III

### 4.4.2 Use Support Assessment for SH Waters

Once the minimum data requirements have been met, an assessment of the data can be completed resulting in the categorization of the waterbody as either fully supporting the SH use (Category 1) or not fully supporting the SH use (Category 5). The assessment process considers the available data and may include any fish consumption advisories, shellfish harvesting closure notices, chemical specific data, bacteriological data, and toxicity evaluations. **Table 8** shows SH Category 1 Requirements, and **Table 9** shows SH Category 5 Requirements. **Figure 9** illustrates the assessment process for SH waters.

## Figure 8 Minimum Data Requirements for the SH Designated Use



## Table 8: SH Category 1 Requirements

| The SH waterbody can be placed in Category 1 if all the following are true: | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | No fish/shellfish consumption advisory issued by the Alabama Department of Public Health. |
| **Macroinvertebrate and Fish Assessments** | NA |
| **Chlorophyll *a* Data** | NA |
| **Toxic Pollutants** | No more than two exceedances of a particular toxic pollutant criterion in previous six years or more than one in a 3-year period. |
| **Conventional Parameters**[25] | No more than a 10% exceedance rate for any given parameter.[26] |
| **Bacteriological Data** | **Coastal Waters:**<br>**A.** The geometric mean enterococci density must be less than 35 colonies/100 ml, and;<br>**B.** 10% or less of single samples must be less than or equal to 104 colonies/100 ml enterococci (May – October) or less than or equal to 275 colonies/100 ml enterococci (November - April).[26] |

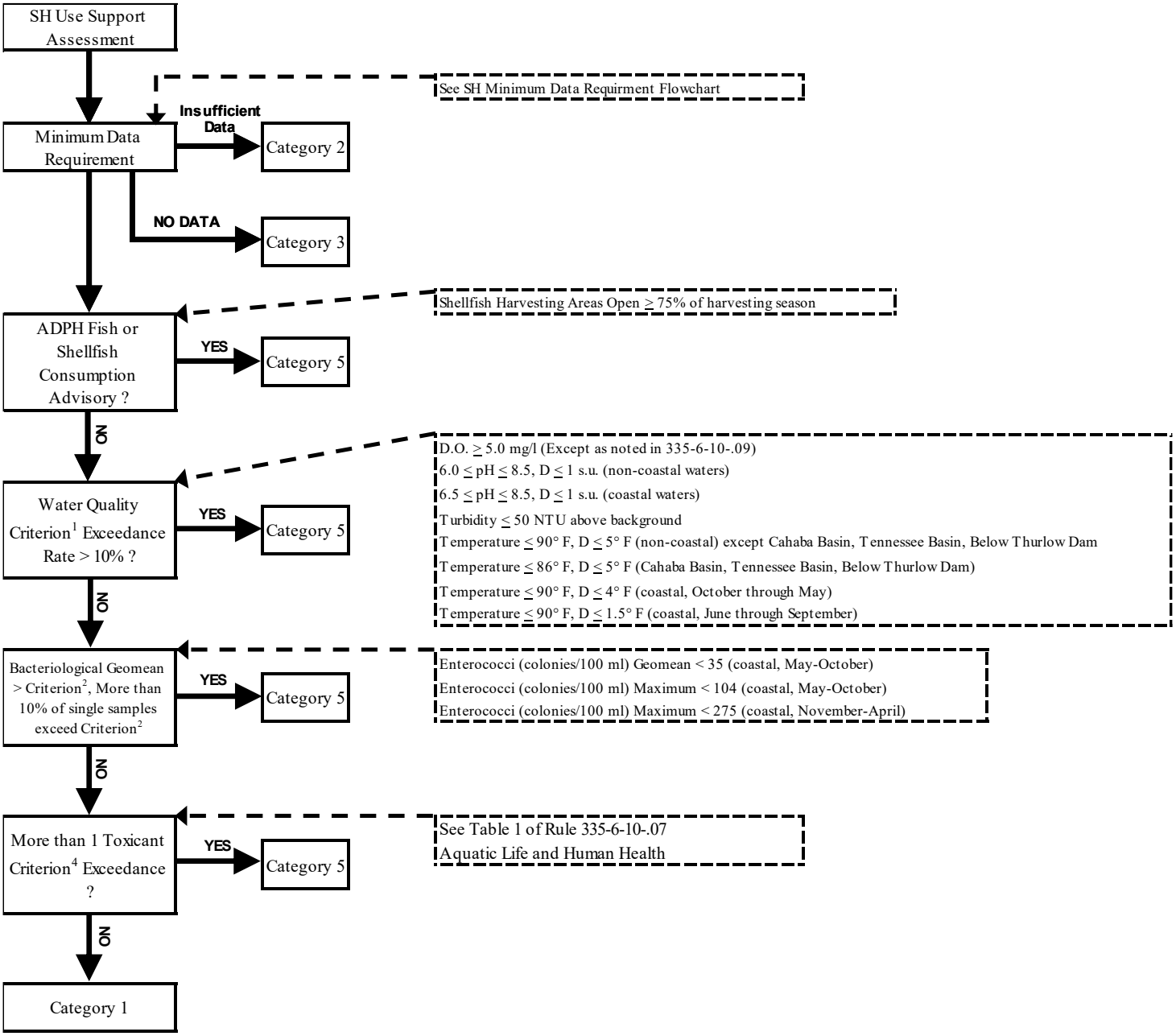
[25] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.
[26] As determined by the binomial distribution function and Table 17.

## Table 9: SH Category 5 Requirements

| The SH waterbody can be placed in Category 5 if any of the following are true: | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | A fish consumption advisory has been issued by the Alabama Department of Public Health, or the shellfish growing areas are "conditionally approved" or "conditionally restricted". |
| **Macroinvertebrate and Fish Assessments** | NA |
| **Chlorophyll *a* Data** | NA |
| **Toxic Pollutants** | More than two exceedances of a particular toxic pollutant criterion in previous six years or more than one in a 3-year period. |
| **Conventional Parameters**[27] | There is more than a 10% exceedance rate for any given parameter.[28] |
| **Bacteriological Data** | **Coastal Waters:**<br>**A.** The geometric mean enterococci density is greater than 35 colonies/100 ml, or;<br>**B.** More than 10% of single samples exceed 104 colonies/100 ml enterococci (May – October) or less than or equal to 275 colonies/100 ml enterococci (November – April).[28] |

[27] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.
[28] As determined by the binomial distribution function and Table 17.

# Figure 8: Shellfish Harvesting (SH) Categorization Methodology




1 Water Quality Criterion refers to pH, Dissolved Oxygen, turbidity, and temperature resulting from heat sources

2 Bacteriological Criterion refers to both the single sample maximum and geometric mean

3 Not to exceed the limits specified in the latest edition of the National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish: 2007 Revision, published by the Food and Drug Administration, U.S. Department of Health and Human Services.

4 Toxicant Criterion refers to toxics listed in 335-6-10-.07

**Special Note** - Natural waters may, on occasion, have characteristics outside of the limits established by these criteria. These criteria relate to condition of waters as affected by the discharge of sewage, industrial wastes, or other wastes, not to conditions resulting from natural forces. See 335-6-10-.05(4)

4.5 Fish and Wildlife (F&W)

The best usage of waters assigned this classification includes fishing, the propagation of fish, aquatic life, and wildlife. Waterbodies assigned the F&W classification are suitable for fish, aquatic life, and wildlife propagation. The quality of salt and estuarine waters to which this classification is assigned will also be suitable for the propagation of shrimp and crabs. In addition, it is recognized that these waters may be used for incidental water contact and recreation during May through October, except in the vicinity of wastewater discharges or other conditions beyond the control of the ADPH. Under proper sanitary supervision by the controlling health authorities, these waters will meet accepted standards of water quality for outdoor swimming places and will be considered satisfactory for swimming and other whole body water-contact sports during the months of May through October.

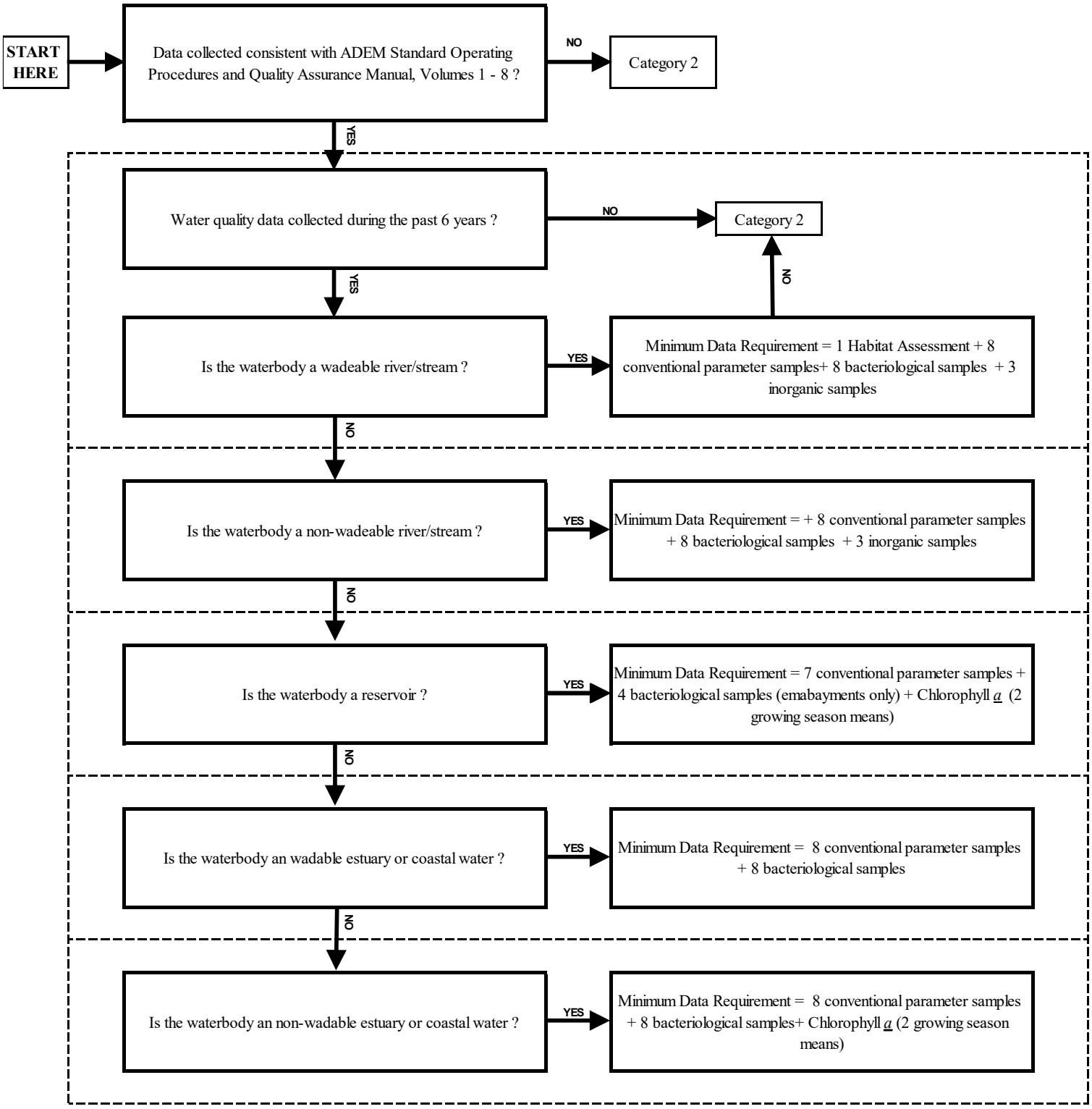
4.5.1 Minimum Data Requirements for F&W Waters

For waters with the F&W classification the available data must have been collected consistent with the following standard operating procedures manuals listed in **Table 1**.

In addition, the data must have been collected within the last six years. Failure to satisfy this condition places the waterbody in Category 2. If this condition is met, the determination of the minimum data requirements is dependent upon the waterbody type. Waterbody types include wadeable rivers and streams, non-wadeable rivers and streams, reservoirs and reservoir embayments, and estuary and coastal waters. Failure to meet the minimum data requirements will place the waterbody in Category 2. The following list and **Figure 10** describe the minimum data requirements for assessing waters classified as F&W.

- Wadeable River or Stream
  - 1 habitat assessment
  - 8 conventional parameter samples
  - 8 bacteriological samples
  - 3 inorganic samples
- Non-wadeable River or Stream
  - 8 conventional parameter samples
  - 8 bacteriological samples
  - 3 inorganic samples
- Reservoirs and Embayments
  - 7 conventional parameter samples
  - 4 bacteriological samples (embayments only)
  - Chlorophyll *a* – 2 growing season means
- Wadeable Estuary or Coastal Waters
  - 8 conventional parameter samples
  - 8 bacteriological samples
- Non-Wadeable Estuary or Coastal Waters
  - 8 conventional parameter samples
  - 8 bacteriological samples
  - Chlorophyll *a* – 2 growing season means

## Figure 9: Minimum Data Requirements for the F&W Designated Use



4.5.2 Use Support Assessment for F&W Waters

Once the minimum data requirements have been met, an assessment of the data can be completed resulting in the categorization of the waterbody as either fully supporting the F&W use (Category 1) or not fully supporting the F&W use (Category 5). The assessment process considers the available data and may include any fish consumption advisories, chemical specific data, biological community assessments, bacteriological data, beach closure notices and toxicity evaluations. **Figure 11** illustrates the assessment process for F&W waters.

## Table 10: F&W Category 1 Requirements

| **The F&W waterbody can be placed in Category 1 if all the following are true:** | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | No fish consumption advisory issued by the Alabama Department of Public Health. |
| **Macroinvertebrate and Fish Assessments** | Level IV WMB-I or fish IBI community assessment "fair", "good" or "excellent".[29] |
| **Chlorophyll *a* Data** | Growing season mean chlorophyll *a* criterion has not been exceeded in two years during the assessment cycle where such a criterion has been established.[30] |
| **Toxic Pollutants** | No more than two exceedances of a particular toxic pollutant criterion in previous six years or more than one in a 3-year period. |
| **Conventional Parameters[31]** | No more than a 10% exceedance rate for any given parameter.[32] |
| **Bacteriological Data** | **Non-Coastal Waters:**<br>**A.** The geometric mean *E. coli* density must be less than or equal to 126 colonies/100 ml (May – October) or less than or equal to 548 colonies/100 ml (November – April), and;<br>**B.** 10% or less of single samples must be less than or equal to 298 colonies/100 ml May – October) or less than or equal to 2,507 colonies/100 ml (November – April).[32] |
| | **Coastal Waters:**<br>**A.** The geometric mean enterococci density must be less than or equal to 35 colonies/100 ml, and;<br>**B.** 10% or less of single samples must be less than or equal to 158 colonies/100 ml (May – October) or less than or equal to 275 colonies/100 ml (November – April).[32] |

[29] Applicable to wadeable streams only.

[30] Chlorophyll *a* values in excess of the criterion, due to extreme hydrological events (i.e. drought, floods), will not be considered as an exceedance of the criterion. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75th percentile streamflow based on period of record caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

[31] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.

[32] As determined by the binomial distribution function in Table 17.

## Table 11: F&W Category 5 Requirements

| The F&W waterbody can be placed in Category 5 if any of the following are true: | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | A fish consumption advisory has been issued by the Alabama Department of Public Health. |
| **Macroinvertebrate and Fish Assessments** | Level IV WMB-I or fish IBI community assessment less than "fair".[33] |
| **Chlorophyll *a* Data** | Growing season mean chlorophyll *a* criterion has been exceeded in two years during the assessment cycle.[34] |
| **Toxic Pollutants** | More than two exceedances of a particular toxic pollutant criterion in previous six years or more than one in a 3-year period. |
| **Conventional Parameters[35]** | More than a 10% exceedance rate for any given parameter.[36] |
| **Bacteriological Data** | **Non-Coastal Waters:**<br>***A.*** The geometric mean *E. coli* density is greater than 126 colonies/100 ml (May – October) or greater than 548 colonies/100 ml (November – April), or;<br>***B.*** More than 10% of single samples are greater than 298 colonies/100 ml (May – October) or greater than 2,507 colonies/100 ml (November – April).[36] |
| | **Coastal Waters:**<br>***A.*** The geometric mean enterococci density is greater than 35 colonies/100 ml, or;<br>***B.*** More than 10% of single samples are greater than 158 colonies/100 ml (May – October) or greater than 275 colonies/100 ml (November – April).[36] |

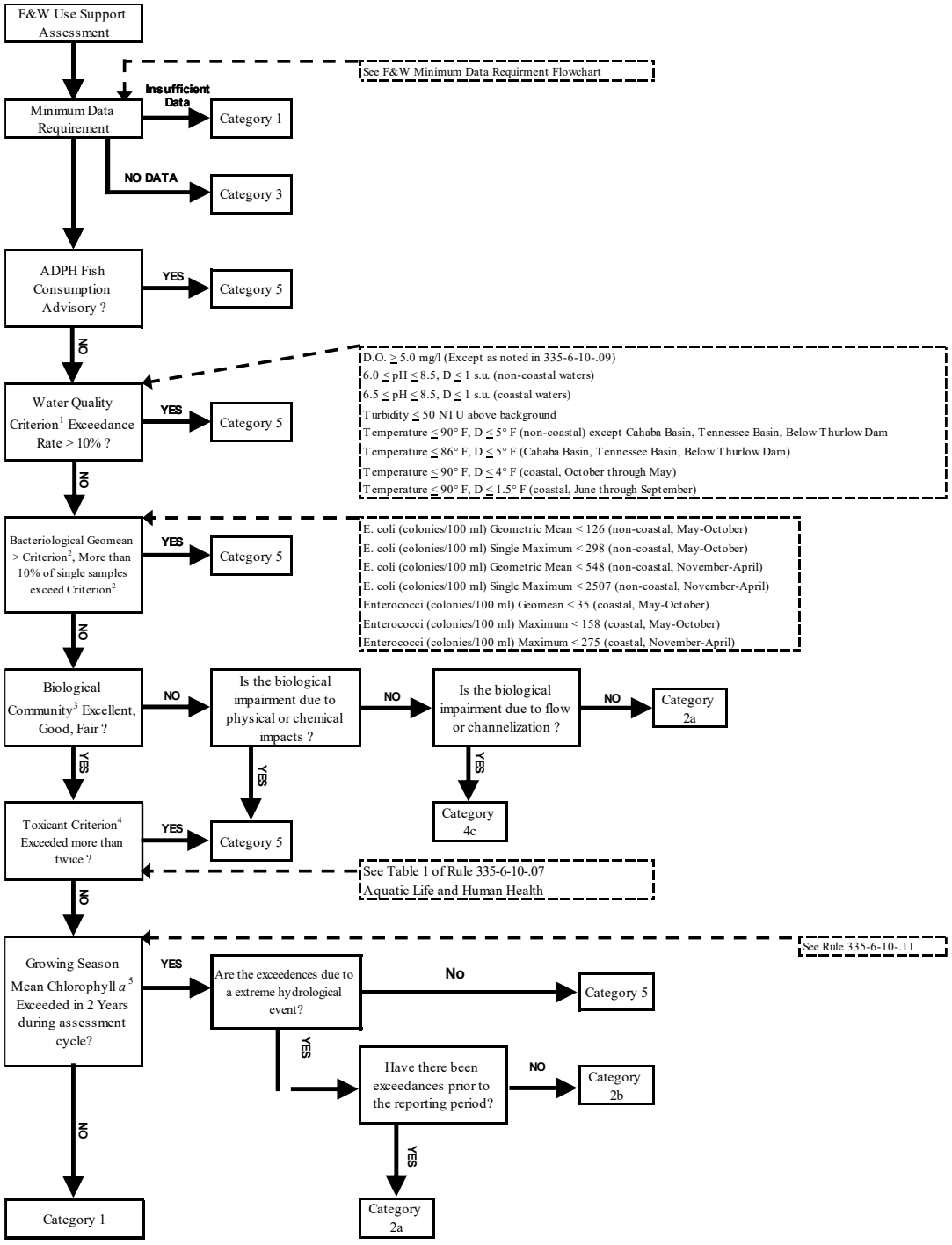
[33] Applicable to wadeable streams only. A potential anthropogenic cause for the degraded condition must be identified using observations made during the sampling events or from information contained in the Department's geographic information system.

[34] Chlorophyll *a* values in excess of the criterion, due to extreme hydrological events (i.e. drought, floods), will not be considered as an exceedance of the criterion. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75$^{th}$ percentile streamflow based on period of record caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

[35] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.

[36] As determined by the binomial distribution function in Table 17.

# Figure 10: Fish and Wildlife (F&W) Categorization Methodology




1 Water Quality Criterion refers to pH, Dissolved Oxygen, turbidity, and temperature resulting from heat sources

2 Bacteriological Criterion refers to both the single sample maximum and geometric mean, see discussion in Section 4.5.2

3 Biological community refers to macroinvertebrates and/or fish in wadeable rivers/streams only (See Minimum Data Requirments)

4 Toxicant Criterion refers to toxics listed in 335-6-10-.07

5 Applies only to reservoirs with established Chlorophyll a criteria and not during extreme hydrologic events. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75th percentile caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

**Special Note** - Natural waters may, on occasion, have characteristics outside of the limits established by these criteria. These criteria relate to condition of waters as affected by the discharge of sewage, industrial wastes, or other wastes, not to conditions resulting from natural forces. See 335-6-10-.05(4)

4.6 Limited Warmwater Fishery (LWF)

For the months of December through April, the best usage of waters assigned this classification includes fishing, the propagation of fish, aquatic life, and wildlife, and any other usage except swimming and water-contact sports or as a source of water supply for drinking or food-processing purposes. May through November the quality of waters to which this classification is assigned will be suitable for agricultural irrigation, livestock watering, industrial cooling and process water supplies, and any other usage, except fishing, bathing, recreational activities, including water-contact sports, or as a source of water supply for drinking or food-processing purposes.

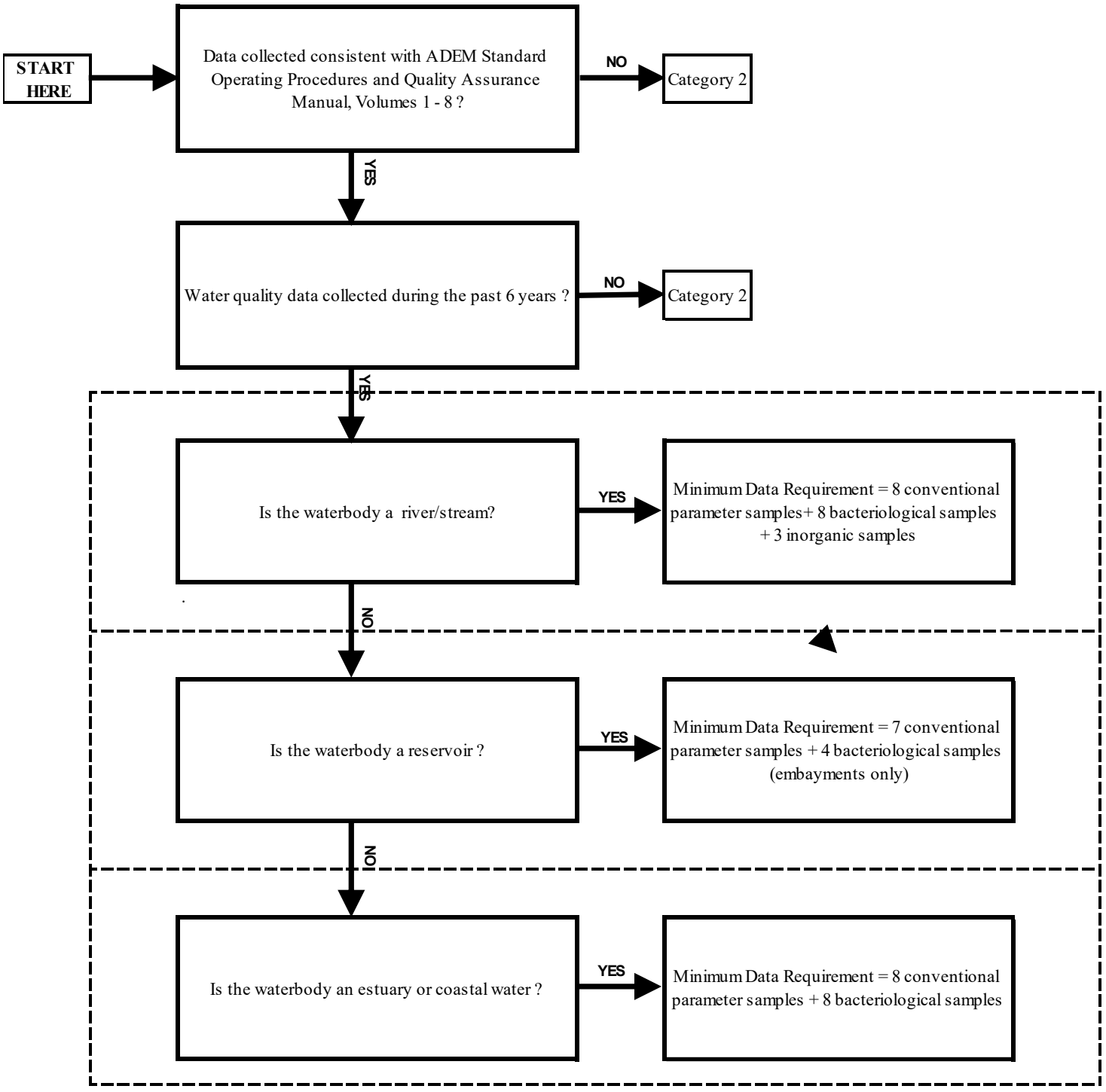
4.6.1 Minimum Data Requirements for LWF Waters

For waters with the LWF classification, the available data must have been collected consistent with the standard operating procedures manuals listed in **Table 1**.

In addition, the data must have been collected within the last six years. Failure to satisfy this condition places the waterbody in Category 2. If this condition is met, the determination of the minimum data requirements is dependent upon the waterbody type. Waterbody types include rivers and streams, reservoirs and reservoir embayments, and estuary and coastal waters. Failure to meet the minimum data requirements will place the waterbody in Category 2. The following list and **Figure 12** describe the minimum data requirements for assessing waters classified as LWF.

- River or Stream (Wadeable and Non-wadeable)
  - 8 conventional parameter samples
  - 8 bacteriological samples
  - 3 inorganic samples
- Reservoirs and Embayments
  - 7 conventional parameter samples
  - 4 bacteriological samples (embayments only)
- Estuary or Coastal Waters (Wadeable and Non-wadeable)
  - 8 conventional parameter samples
  - 8 bacteriological samples

## Figure 11: Minimum Data Requirements for the LWF Designated Use



4.6.2 Use Support Assessment for LWF Waters

Once the minimum data requirements have been met, an assessment of the data can be completed, resulting in the categorization of the waterbody as either fully supporting the LWF use (Category 1) or not fully supporting the LWF use (Category 5). The assessment process considers the available data and may include any fish consumption advisories, chemical specific data, bacteriological data, and toxicity evaluations. However, currently there is no available protocol for use of biological assessment results to assess use support in LWF-classified waters. The Department's current SOP for conducting biological assessments employs the use of reference sites located in least impacted watersheds and is intended to assess the "fishable" use. **Table 12** shows LWF Category 1 Requirements, and **Table 13** shows LWF Category 5 Requirements. **Figure 13** illustrates the assessment process for LWF waters.

## Table 12: LWF Category 1 Requirements

| **The LWF waterbody can be placed in Category 1 if all the following are true:** | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | No fish consumption advisory issued by the Alabama Department of Public Health. |
| **Macroinvertebrate and Fish Assessments** | NA |
| **Chlorophyll *a* Data** | NA |
| **Toxic Pollutants** | No more than one exceedance of a particular toxic pollutant acute criterion (May – November) in previous six years. No more than one exceedance of a particular toxic pollutant chronic criterion (December – April). |
| **Conventional Parameters**[37] | No more than a 10% exceedance rate for any given parameter.[38] |
| **Bacteriological Data** | **Non-Coastal Waters:**<br>**A.** The geometric mean *E. coli* density must be less than or equal to 548 colonies/100 ml, and;<br>**B.** 10% or less of single samples must be less than or equal to 2,507 colonies/100 ml.[38] |
| | **Coastal Waters:**<br>**A.** 10% or less of single samples must be less than 275 colonies/100 ml enterococci.[38] |

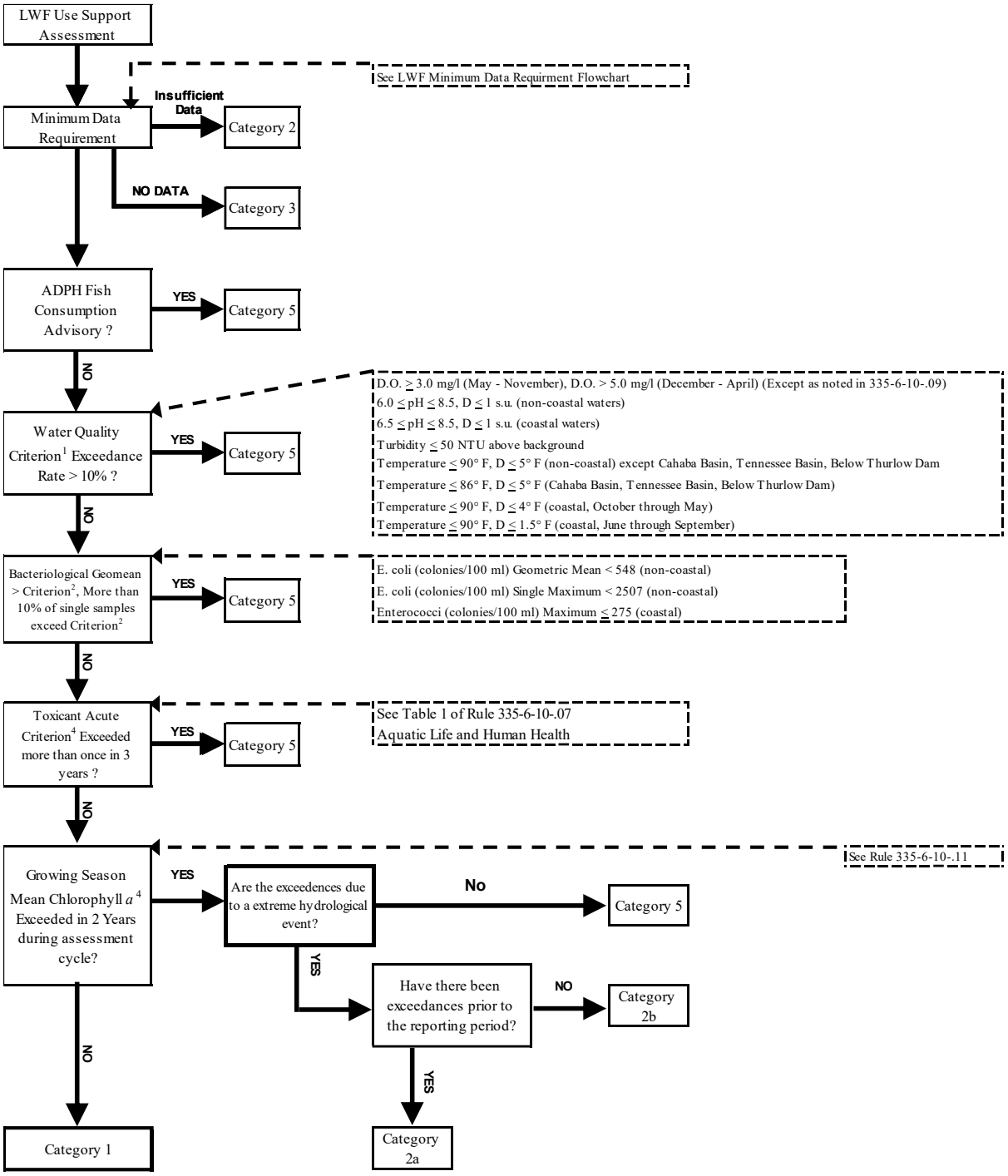
[37] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.
[38] As determined by the binomial distribution function in Table 17.

## Table 13: LWF Category 5 Requirements

| The LWF waterbody can be placed in Category 5 if any of the following are true: | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | A fish consumption advisory has been issued by the Alabama Department of Public Health. |
| **Macroinvertebrate and Fish Assessments** | NA |
| **Chlorophyll *a* Data** | NA |
| **Toxic Pollutants** | Two or more exceedances of a particular toxic pollutant acute criterion (May – November) during the previous six years or more than one in a 3 year period. Two or more exceedances of a particular toxic pollutant chronic criterion (December – April) during previous six years or more than one in a 3 year period. |
| **Conventional Parameters**[39] | More than a 10% exceedance rate for any given parameter.[40] |
| **Bacteriological Data** | **Non-Coastal Waters:**<br>***A.*** The geometric mean *E. coli* density is greater than 548 colonies/100 ml, or;<br>***B.*** More than 10% of single samples are greater than 2,507 colonies/100 ml.[40] |
| | **Coastal Waters:**<br>***A.*** More than 10% of single samples are greater than 275 colonies/100 ml enterococci.[40] |

[39] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.
[40] As determined by the binomial distribution function in Table 17.

# Figure 12: Limited Warmwater Fishery (LWF) Categorization Methodology




1 Water Quality Criterion refers to pH, Dissolved Oxygen, turbidity, and temperature resulting from heat sources

2 Bacteriological Criterion refers to both the single sample maximum and geometric mean, see discussion in Section 4.6.2

3 Toxicant Criterion refers to toxics listed in 335-6-10-.07

4 Applies only to reservoirs with established Chlorophyll a criteria and not during extreme hydrologic events. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75th percentile caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

**Special Note** - Natural waters may, on occasion, have characteristics outside of the limits established by these criteria. These criteria relate to condition of waters as affected by the discharge of sewage, industrial wastes, or other wastes, not to conditions resulting from natural forces. See 335-6-10-.05(4)

## 4.7 Agricultural and Industrial Water Supply (A&I)

Best usage of waters assigned this classification include agricultural irrigation, livestock watering, industrial cooling and process water supplies, and any other usage, except fishing, bathing, recreational activities, including water-contact sports, or as a source of water supply for drinking or food-processing purposes. The waters, except for the natural impurities that may be present, will be suitable for agricultural irrigation, livestock watering, industrial cooling waters, and fish survival. The waters will be usable after special treatment, as may be needed under each particular circumstance, for industrial process water supplies. This classification includes watercourses in which natural flow is intermittent and non-existent during droughts and which may, of necessity, receive treated waste from existing municipalities and industries, both now and in the future.

### 4.7.1 Minimum Data Requirements for A&I Waters

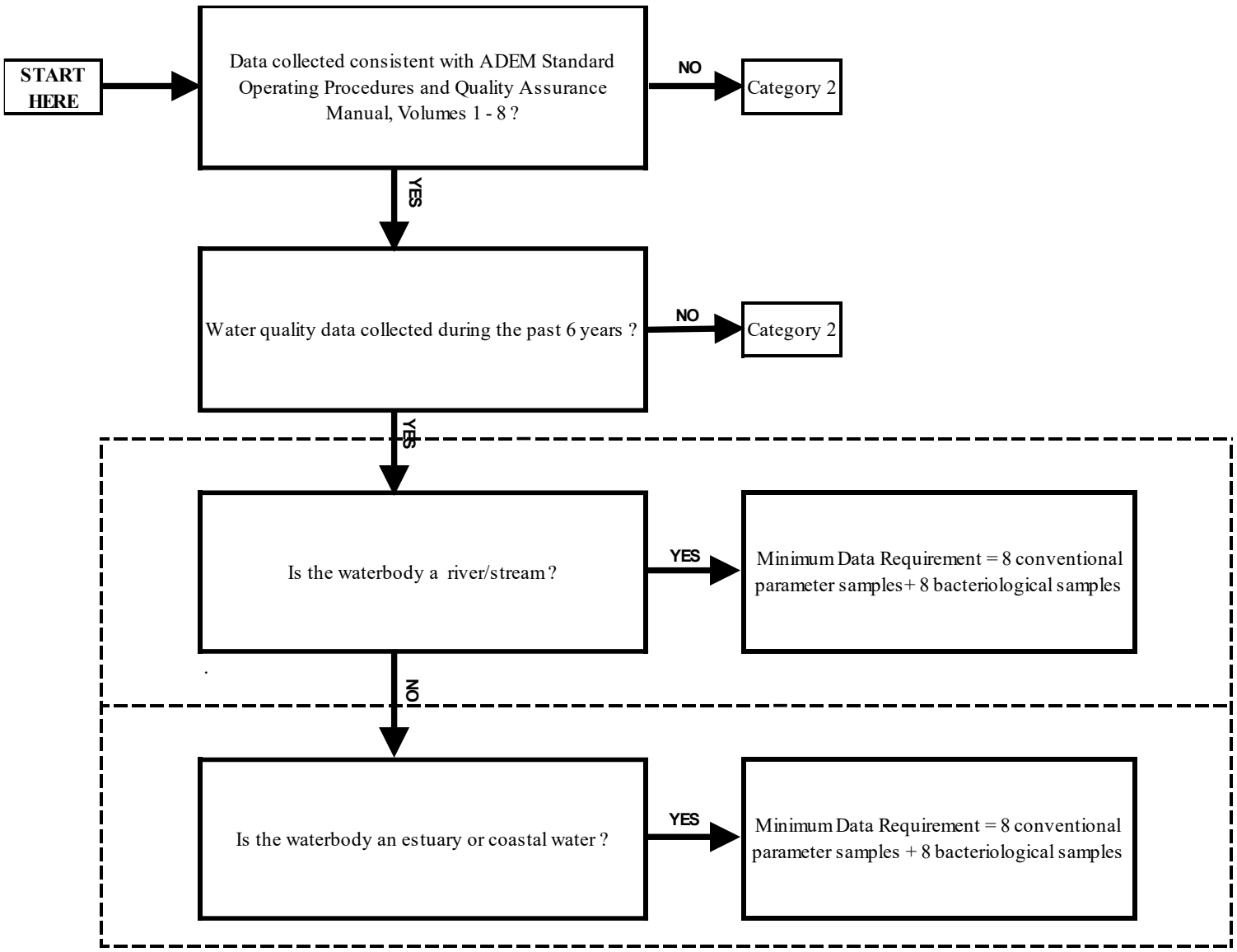
For waters with the A&I classification, the available data must have been collected consistent with the standard operating procedures manual listed in **Table 1**.

In addition, the data must have been collected within the last six years. Failure to satisfy this condition places the waterbody in Category 2. If this condition is met, the determination of the minimum data requirements is dependent upon the waterbody type. Waterbody types include wadeable rivers and streams, non-wadeable rivers and streams, reservoirs and reservoir embayments, and estuary and coastal waters. Failure to meet the minimum data requirement will place the waterbody in Category 2. The following list and **Figure 14** describe the minimum data requirements for assessing waters classified as A&I.

- River or Stream
    - 8 conventional parameter samples
    - 8 bacteriological samples

- Estuary or Coastal Waters
    - 8 conventional parameter samples
    - 8 bacteriological samples

## Figure 13: Minimum Data Requirements for the A&I Designated Use



4.7.2 Use Support Assessment for A&I Waters

Once the minimum data requirements have been met, an assessment of the data can be completed resulting in the categorization of the waterbody as either fully supporting the A&I use (Category 1) or not fully supporting the A&I use (Category 5). The assessment process considers the available data and may include any fish consumption advisories, chemical specific data, biological community assessments, bacteriological data, beach closure notices, and toxicity evaluations. **Table 14** shows A&I Category 1 Requirements, and **Table 15** shows A&I Category 5 Requirements. **Figure 15** illustrates the assessment process for A&I waters.

## Table 14: A&I Category 1 Requirements

| **The A&I waterbody can be placed in Category 1 if all the following are true:** | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | No fish consumption advisory issued by the Alabama Department of Public Health. |
| **Macroinvertebrate and Fish Assessments** | NA |
| **Chlorophyll *a* Data** | NA |
| **Toxic Pollutants** | No more than two exceedances of a particular toxic pollutant acute criterion in previous six years or more than one in a 3-year period. |
| **Conventional Parameters**[41] | No more than a 10% exceedance rate for any given parameter.[42] |
| **Bacteriological Data** | **Non-Coastal Waters:**<br>**A.** The geometric mean *E. coli* density must be less than or equal to 700 colonies/100 ml, and;<br>**B.** 10% or less of single samples must be less than or equal to 3,200 colonies/100 ml.[42] |
| | **Coastal Waters:**<br>**A.** 10% or less of single samples must be less than or equal to 500 colonies/100 ml.[42] |

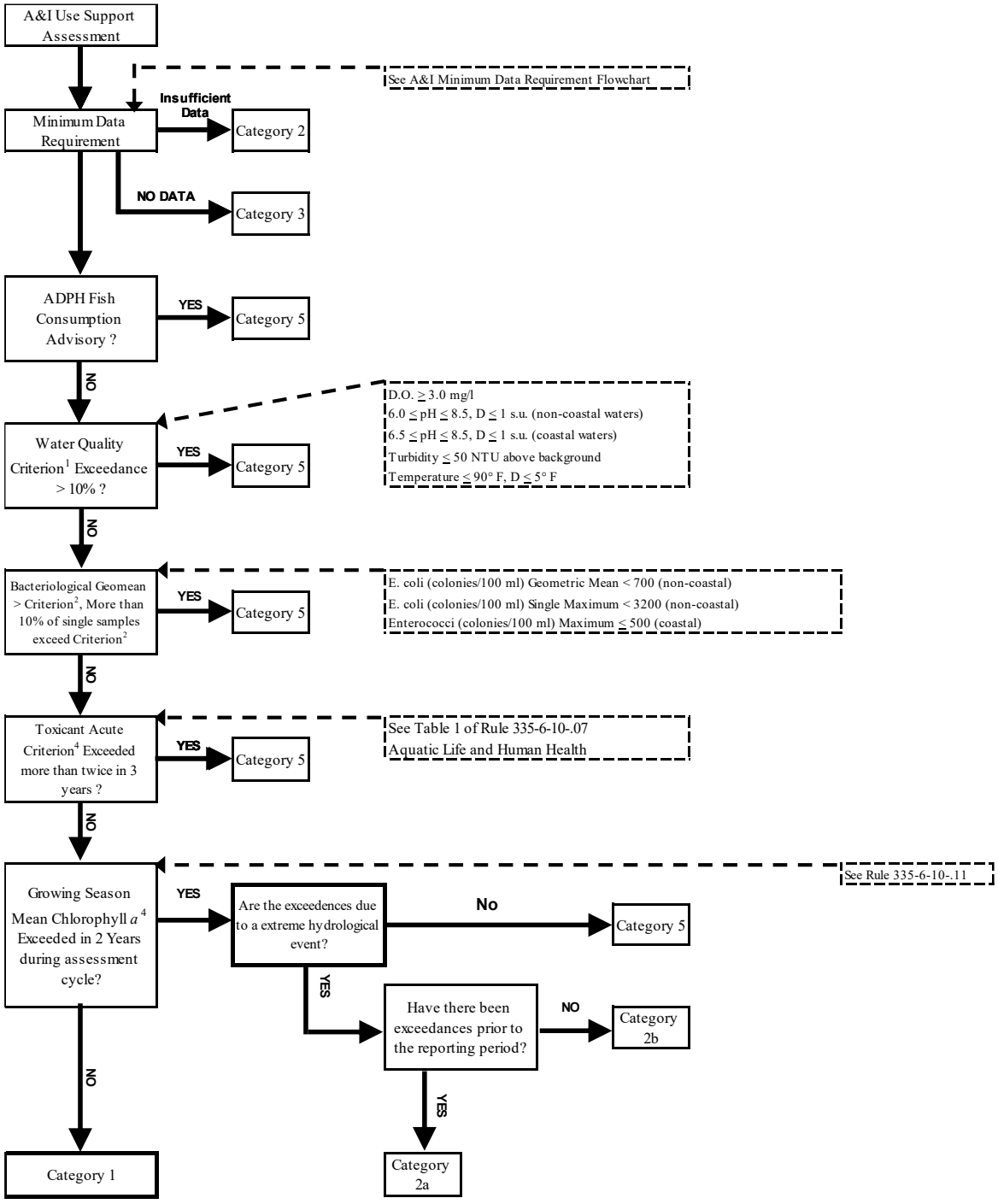
[41] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.
[42] As determined by the binomial distribution function in Table 17.

## Table 15: A&I Category 5 Requirements

| **The A&I waterbody can be placed in Category 5 if any of the following are true:** | |
|---|---|
| **Issue** | **Condition** |
| **Consumption Advisories** | A fish consumption advisory has been issued by the Alabama Department of Public Health. |
| **Macroinvertebrate and Fish Assessments** | NA |
| **Chlorophyll *a* Data** | NA |
| **Toxic Pollutants** | More than two exceedances of a particular toxic pollutant acute criterion in previous six years or more than one in a 3-year period. |
| **Conventional Parameters**[43] | More than a 10% exceedance rate for any given parameter.[44] |
| **Bacteriological Data** | **Non-Coastal Waters:**<br>***A.*** The geometric mean *E. coli* density is greater than 700 colonies/100 ml, or;<br>***B.*** More than 10% of single samples are greater than 3,200 colonies/100 ml.[44] |
| | **Coastal Waters:**<br>***A.*** More than 10% of single samples are greater than 500 colonies/100 ml.[44] |

[43] Conventional parameters include DO, pH, temperature (where influenced by heated discharge), and turbidity.
[44] As determined by the binomial distribution function and Table 17.

## Figure 14: Agricultural and Industrial Water Supply (A&I) Categorization Methodology




1 Water Quality Criterion refers to pH, Dissolved Oxygen, turbidity, and temperature resulting from heat sources

2 Bacteriological Criterion refers to both the single sample maximum and geometric mean, see discussion in Section 4.7.2

3 Toxicant Criterion refers to toxics listed in 335-6-10-.07

4 Applies only to reservoirs with established Chlorophyll a criteria and not during extreme hydrologic events. Extreme drought conditions are droughts with a drought intensity category of D2 or greater as listed in the U.S. Drought Monitor (http://droughtmonitor.unl.edu/) that persists for 50% or more of the growing season. Extreme flood conditions are streamflows greater than the 75th percentile caused by events such as tropical storms, hurricanes, and unusually intense storm activity.

**Special Note** - Natural waters may, on occasion, have characteristics outside of the limits established by these criteria. These criteria relate to condition of waters as affected by the discharge of sewage, industrial wastes, or other wastes, not to conditions resulting from natural forces. See 335-6-10-.05(4)

## 4.8 Other Data Considerations and Requirements

### 4.8.1 Use of the 10% Rule

Seasonal variation in water quality conditions, non-anthropogenic impacts (natural conditions), sampling frequency and number of samples collected, and the temporal and spatial sampling coverage of the waterbody must be considered when evaluating water quality data to determine whether a waterbody is fully supporting its designated uses. Most states, including Alabama, determine a waterbody's use support status based on the percent of measured values exceeding a given water quality criterion. Based on EPA guidance, 10% is commonly used as the maximum percent of measurements that may exceed the criterion for waters fully supporting their designated uses. For any given set of samples, the percent exceedance indicated by the number of samples exceeding a given criterion is only an estimate of the true percent exceedance for the waterbody segment. As a result, it is important that a level of confidence be assigned to the estimate of percent exceedance for a given set of samples.

Hypothesis testing can be used to make this estimate. When making a decision about whether a water should be included in Category 5 on the basis of data for conventional pollutants, the null hypothesis is that the water is not impaired and sufficient data must be collected to minimize the probability that this assumption is incorrect (Type I error). For the purpose of this methodology, a 90% confidence level will be used so that it can be said for a given sample size with a given number of criterion exceedances, there exists a 90% confidence that the true exceedance percentage is greater than 0.1 (10%). Using the binomial distribution, it is possible to determine the number of exceedances out of a given number of samples that will result in a greater than 10% exceedance rate at approximately the 90% confidence level. This is the number of exceedances needed to reject the null hypothesis.

When making a decision about whether a water in Category 5 should be removed to Category 1 for a particular conventional pollutant, the null hypothesis is that the water is impaired and sufficient data must be collected to minimize the probability that this assumption is incorrect. Again, a 90% confidence level will be used in the binomial distribution function to estimate the number of samples required to be 90% confident that the water is truly not impaired.

### 4.8.2 Use of Data Older than Six Years

Data that are more recent shall take precedence over older data if:

- The newer data indicates a change in water quality and the change is related to changes in pollutant loading to the watershed or improved pollution control mechanisms in the watershed contributing to the assessed area, or;

- The Department determines that the older data do not meet the data quality requirements of this methodology or are no longer representative of the water quality of the segment.

Data older than six years will generally not be considered valid, for the purpose of initially placing a waterbody in Category 1 or Category 5, except that data and information older than six years will be considered in the assessment process when such data/information is determined to be reliable. Data older than six years may be used to demonstrate that a waterbody was placed in the wrong category (Category 1 or Category 5) when the original water quality assessment was completed. In addition, data older than six years may be used if the data was not considered during a previous reporting cycle and there is evidence that conditions affecting water quality have not changed since the original data was collected. Waterbodies will not be removed from Category 5 based on the age of data. However, if there is evidence that water quality conditions are likely to have changed since the water was originally placed in Category 1, waterbodies may be removed from Category 1 to Category 2, based on the age of the data.

4.8.3 Use of Accurate Location Data

Accurate location data is required to ensure the appropriate use classification is applied, as well as to confirm that sampling stations are located outside of regulatory mixing zones where water quality criteria do not apply. The monitoring data is acceptable if the locations are correct to within 50 feet. Digital spatial data Geographical Information Systems (GIS) or Global Positioning System (GPS), or latitude/longitude information obtained from United States Geological Survey (USGS) 7.5-minute quadrangle maps are acceptable methods of providing location information.

4.8.4 Use of Temporally Independent Samples

When relying solely on chemical data to determine designated use support, at least eight temporally independent samples of chemical and physical conditions obtained during a time period are optimal. That includes conditions considered critical for the particular pollutant of interest. Independent samples, for the purpose of parameters other than bacteria and in-situ water quality measurements, will have been collected at least four days apart. Samples collected at the same location less than four days apart shall be considered as one sample for the purpose of determining compliance with toxic pollutant criteria, with the mean value used to represent the sampling period.

4.8.5 Data from Continuous Monitoring

For conventional parameters measured using continuous monitoring instruments, such as multi-probe datasondes, compliance with the applicable criteria will be determined at the regulatory depth established for dissolved oxygen measurements. This depth is five feet in water that is ten feet or more in total depth or is at mid-depth in water that is less than ten feet in total depth. Hourly measurements of dissolved oxygen, temperature, and pH data collected using continuous monitoring equipment will be assessed using the same binomial distribution function used for discrete sampling of these parameters. When measurements are made more frequently than hourly, the hourly values will be calculated as the mean of the measured values within each hour.

4.8.6 Use of Fish / Shellfish Consumption Advisories and Shellfish Growing Area Classifications

In October 2000, EPA issued guidance to states regarding the use of fish and shellfish consumption advisories (EPA, 2000). The guidance recommended that states consider certain information when determining if designated uses were impaired, including consumption advisories for fish and shellfish and certain shellfish growing area classifications. The following is an excerpt from the EPA guidance.

> "*Certain shellfish growing area classifications should be used as part of determinations of attainment of water quality standards and listing of impaired waterbodies. Shellfish growing area classifications are developed by the National Shellfish Sanitation Program (NSSP) using water column and tissue data (where available), and information from sanitary surveys of the contributing watershed, to protect public health. The States review these NSSP classifications every three years. There are certain NSSP classifications that are not appropriate to consider, and certain data and information that should not be considered independently of the classification (unless the data and information were not used in the development or review of the classification). These instances are: "Prohibited" classifications set as a precautionary measure due to the proximity of wastewater treatment discharges, or absence of a required sanitary survey; shellfish tissue pathogen data (which can fluctuate based on short-term conditions not representative of general water quality); or short-term actions to place growing areas in the closed status."*

The ADPH Seafood Program regulates shellfish harvesting in coastal waters of Alabama. The ADPH has designated seven areas in Mobile Bay and adjacent coastal waters and classifies shellfish harvesting waters within these areas as "conditionally approved", "conditionally restricted", "restricted", "unclassified", and "prohibited". Area I waters comprise most of Mobile Bay south of East Fowl River and west of Bon Secour Bay and including Mississippi Sound. Area II waters include Portersville Bay with exceptions near wastewater discharges. Area III waters are located in Bon Secour Bay and east of a line drawn from Fort Morgan to Mullet Point. Area IV waters are located in approximately the northern half of Mobile Bay east of the west boundary of the Mobile Ship Channel to Marker 51 and west from Marker 51 to Daphne. Area V waters are located in the northwestern section of Mobile Bay within a line drawn from Theodore Industrial Canal to Mobile Ship Channel Marker 53/1A and from Mobile Ship Channel Mark 53/1A to a point on the beach at the southeast corner of the Brookley Air Field air strip. Area VI waters are located in the western portion of the northern half of Mobile Bay. Area VII waters are located in Grand Bay with exceptions near wastewater discharges.

Most of the waters designated as Shellfish Harvesting are classified as "conditionally approved". These harvesting areas are closed when the river stage on the Mobile River at Barry Steam Plant in Bucks, Alabama reaches a river stage of 8.0 feet above mean sea level and a public notice announcing the closure is published. These procedures are described in detail in the Conditional Area Management Plan developed by ADPH (ADPH, 2001) and the 2007 Comprehensive Sanitary Survey of Alabama's Growing Waters in Mobile and Baldwin Counties Area I, Area II and Area III (ADPH, 2008) which can be found at http://www.alabamapublichealth.gov/foodsafety/seafood-and-shellfish.html.

For purposes of making use support decisions relative to the SH designated use, the Department will consider "conditionally approved" and "conditionally restricted" waters as impaired and will include these water in Category 5. In "prohibited" and "unclassified" waters, the Department will use water column bacteria sampling results to determine use support. When the applicable bacteria criterion is exceeded in more than 10% of the samples as determined using the binomial distribution function and Table 17, these waters will be included in Category 5.

The October 2000 EPA guidance concerning the use of fish and shellfish consumption advisories for protection of human health also recommended that states include waters in Category 5 when there was a consumption advisory which suggested either limited consumption or no consumption of fish due to the presence of toxics in fish tissue. The following is an excerpt from the guidance:

> *"When deciding whether to identify a water as impaired, States, Territories, and authorized Tribes need to determine whether there are impairments of designated uses and narrative criteria, as well as the numeric criteria. Although the CWA does not explicitly direct the use of fish and shellfish consumption advisories or NSSP classifications to determine attainment of water quality standards, States, Territories, and authorized Tribes are required to consider all existing and readily available data and information to identify impaired waterbodies on their section 303(d) lists. For purposes of determining whether a waterbody is impaired and should be included on a section 303(d) list, EPA considers a fish or shellfish consumption advisory, a NSSP classification, and the supporting data, to be existing and readily available data and information that demonstrates non-attainment of a section 101(a) "fishable" use when:*
>
> > *1. the advisory is based on fish and shellfish tissue data,*
> > *2. a lower than "Approved" NSSP classification is based on water column and shellfish tissue data (and this is not a precautionary "Prohibited" classification or the state water quality standard does not identify lower than "Approved" as attainment of the standard)*
> > *3. the data are collected from the specific waterbody in question and*
> > *4. the risk assessment parameters (e.g., toxicity, risk level, exposure duration and consumption rate) of the advisory or classification are cumulatively equal to or less protective than those in the State, Territory, or authorized Tribal water quality standards."*

This listing and assessment methodology will consider fish consumption advisories issued by the ADPH as an indication of impaired use in all State waters. However, there may be circumstances under which these waters could be placed in a category other than Category 5. For example, it may be appropriate to place certain waters in Category 4b when activities are ongoing under another restoration program with the goal of restoring the water to fully supporting its uses. These decisions will be made on a case-by-case basis and the decision will be documented.

4.8.7 Use of Biological Assessments

The objective of the Clean Water Act and water quality management programs is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters, where biological integrity is defined as the "capability of supporting and maintaining a balanced, integrated, and adaptive community of organisms having a composition and diversity comparable to that of natural habitat within a region". Biological assessments are an evaluation of the condition of a waterbody using surveys of the structure and function of a community of resident biota in comparison to conditions expected within a specific waterbody type and region. They directly measure the condition of aquatic communities, and are used to assess the waterbody's degree of aquatic life use support.

There are many other advantages to conducting biological assessments, such as:

1) They characterize biological condition of a waterbody relative to its water quality standards;
2) They can be used to identify high-quality waters, and waters of important ecological significance;
3) They show biological responses to habitat degradation, eutrophication and other non-toxic impacts, as well as the cumulative effects of different stressors from multiple sources;
4) They can detect long-term impacts to aquatic communities caused by short-term, episodic events;
5) They can detect aquatic life impairment from pollutants not routinely monitored and from pollutants without established numeric criteria; and,
6) They provide data on biotic responses to stressors to develop stressor-response models.

As recommended by the US EPA, biological monitoring is integrated into ADEM's standards, assessment, listing, NPDES, TMDL, and restoration programs. Biological assessments are used together with chemical-specific analyses, habitat surveys, and other parameters as needed to assess attainment of aquatic life use support, and to assist with stressor identification and causal analysis.

Several steps are taken to ensure that all management decisions are made with data of the highest quality:

1) Well-established multi-metric indices, calibrated to specific ecoregions, sampling periods, drainage area, and gradient are used to assess wadeable streams and rivers statewide.
2) All biological data are collected, processed, and analyzed using scientifically accepted methods with well-documented standard operating procedures.
3) QA/QC procedures are used to ensure that all methods and protocols are adhered to during the collection, processing, identification, and analysis of all data.
4) Study-specific reference reaches are identified and sampled for all waterbody and indicator types where reference conditions are not yet well-established.

Both macroinvertebrate and fish community bioassessments are used to assess aquatic life use support. In order to maximize the number of stations where biological assessments can be conducted, generally only one biological assessment is conducted at a location. The two communities are sensitive to different stressors, due to differences in life cycles and motility. The potential for different kinds of stress, presence of threatened and endangered species, watershed area, stream width and depth, as well as types of assessment previously conducted are all factors used to determine which assemblage is used to assess each site. Because the two communities are sensitive to different types of stress, it may be appropriate to place the waterbody in Category 5 when both communities are surveyed, but only one assessment indicates impairment. These decisions will be made and documented on a case-by-case basis in consultation with the biologist(s) responsible for conducting the assessment.

4.8.8 Use of Data Collected by Others

Data collected by other agencies, industry or industry groups, neighboring states, and watershed groups will be considered and evaluated, provided the data meet the minimum data requirements specified for each designated use and comply with the quality control and quality assurance requirements discussed in Section 4.9. Data collected by others assist the Department in making use support determinations, as well as, help to focus our water quality monitoring priorities from year to year. Examples of other agencies and groups collecting water quality data in Alabama include, but are not limited to, the following agencies and groups:

- USGS
- EPA
- Tennessee Valley Authority
- National Oceanic and Atmospheric Administration
- United States Fish and Wildlife Service
- Mobile Bay National Estuary Program
- Dauphin Island Sea Lab
- Geological Survey of Alabama
- Natural Resources Conservation Service
- Soil and Water Conservation Districts
- Alabama Department of Conservation and Natural Resources
- Alabama Department of Public Health
- Alabama Department of Transportation
- Citizen and Watershed Groups
- Industries and municipalities conducting river monitoring pursuant to National Pollutant Discharge Elimination System (NPDES) or CWA Section 401 requirements

Data submitted by third parties for consideration should include methods used to collect the data, including study plans, SOPs, and documentation that the data were (or were not) collected consistent with the requirements presented in this methodology.

4.8.9 Use of Bacteria Data

Waterbody segments are sampled for bacteria either as part of a special study, routine ambient monitoring, or as part of the Department's Beach Monitoring Program. Bacteria of the *E. coli* group are currently used as indicators of the possible presence of pathogens in non-coastal waters. In coastal waters, bacteria of the enterococci group are used as indicators of the possible presence of pathogens. **Table 16** summarizes Alabama's bacteria criteria for each designated use.

**Table 16: Alabama's Bacteria Criteria**

| | Non-Coastal Waters | Coastal Water |
|---|---|---|
| **Outstanding Alabama Water (OAW)** | *E. coli (colonies/100 ml)*<br>• Geometric Mean ≤ 126<br>• Single Sample Max ≤ 235 | *Enterococci (colonies/100 ml)*<br>• Geometric Mean ≤ 35<br>• Single Sample Max ≤ 104 |
| **Public Water Supply (PWS)** | *E. coli (colonies/100 ml)*<br>May through October<br>• Geometric Mean ≤ 126<br>• Single Sample Max ≤ 298<br>November through April<br>• Geometric Mean ≤ 548<br>• Single Sample Max ≤ 2507 | *Enterococci (colonies/100 ml)*<br>May through October<br>• Geometric Mean ≤ 35<br>• Single Sample Max ≤ 158<br>November through April<br>• Single Sample Max ≤ 275 |
| **Swimming and Other Whole Body Water-Contact Sports (S)** | *E. coli (colonies/100 ml)*<br>• Geometric Mean ≤ 126<br>• Single Sample Max ≤ 235 | *Enterococci (colonies/100 ml)*<br>• Geometric Mean ≤ 35<br>• Single Sample Max ≤ 104 |
| **Shellfish Harvesting (SH)** | Does not apply to non-coastal waters. | *Enterococci (colonies/100 ml)*[45]<br>May through October<br>• Geometric Mean ≤ 35<br>• Single Sample Max ≤ 104<br>November through April<br>Single Sample Max ≤ 275 |
| **Fish and Wildlife (F&W)** | *E. coli (colonies/100 ml)*<br>May through October<br>• Geometric Mean ≤ 126<br>• Single Sample Max ≤ 298<br>November through April<br>• Geometric Mean ≤ 548<br>• Single Sample Max ≤ 2507 | *Enterococci (colonies/100 ml)*<br>May through October<br>• Geometric Mean ≤ 35<br>• Single Sample Max ≤ 158<br>November through April<br>• Single Sample Max ≤ 275 |
| **Limited Warmwater Fishery (LWF)** | *E. coli (colonies/100 ml)*<br>• Geometric Mean ≤ 548<br>• Single Sample Max ≤ 2507 | *Enterococci (colonies/100 ml)*<br>• Single Sample Max ≤ 275 |
| **Agricultural and Industrial Water Supply (A&I)** | *E. coli (colonies/100 ml)*<br>• Geometric Mean ≤ 700<br>• Single Sample Max ≤ 3200 | *Enterococci (colonies/100 ml)*<br>• Single Sample Max ≤ 500 |

[45] Not to exceed the limits specified in the latest edition of the *National Shellfish Sanitation Program Guide for the Control of Molluscan Shellfish: (latest edition, Chapter IV)*, published by the Food and Drug Administration, U.S. Department of Health and Human Services.

When assessing the geometric means of bacteria sample results, one excursion will generally be sufficient to determine impairment. If the number of individual samples is less than eight and there is enough data to calculate a geomean, both the geometric mean and single sample maximum criteria must be exceeded to determine impairment. If there are eight or more individual samples and a geomean is unable to be calculated with the data, **Table 17** will be used to determine impairment based on exceedances of the single sample criterion. Bacteria data from the Beach Monitoring Program will be assessed by calculating the geometric mean on a monthly basis. More than one geomean exceedance, in this case, will be sufficient to determine impairment. Impairment can also be determined if the single sample maximum criteria is exceeded, independent of geomean exceedances.

4.8.10 Consideration of Stream Flow and Method Detection Limits

During toxicant sampling in rivers or streams, the measured flow must be at or above the 7Q10 value for that location. In cases where the applicable water quality criterion is less than the method detection limit (MDL) for a particular pollutant and the concentration for the pollutant is reported as less than detection (<MDL), the Department will evaluate the data consistent with EPA guidance (Guidance for Data Quality Assessment), and will use the approach that is appropriate for the data set.

These requirements are intended to ensure that existing water quality conditions are accurately portrayed, do not characterize transitional conditions, and do not include data that are obsolete or inaccurate. In addition, the minimum data requirements may change on a case-by-case basis if pollutant sources upstream of the monitoring locations are likely. This determination will be made using information obtained from the Department's geographic information system or other databases. Failure to meet the minimum data requirements for any waterbody type will place the waterbody in Category 2.

4.8.11 Non-anthropogenic Impacts (Natural Conditions)

In determining appropriate or acceptable parameter levels to support Alabama's water designated uses, ADEM elected to use a "reference condition" approach to determine appropriate chemical, physical, and biological conditions consistent with protection of designated uses and being scientifically defensible in assessing and evaluating water quality influences or impacts. It is also used as the basis of natural condition determinations by documenting when expected reference conditions deviate from water quality criteria.

ADEM's reference condition is based on ambient water quality data from verified reference streams located in characteristically similar types of watersheds known as ecoregions. When comparing measured ambient water quality data to the ecoregional reference streams for the purpose of establishing natural conditions as the sole reason for criterion exceedances, the ambient water quality results will generally be compared to the 90th percentile of the data measured at one or more ecoregion stations, except in the case of bacteria data. An intensive investigation of waterbody status is conducted to verify and document that natural conditions are entirely responsible for the deviation from water quality criteria. Methods used to determine water quality issues caused by natural conditions may include, but are not limited to, reviewing watershed surveys; researching landuse coverage; inventorying point and nonpoint sources; conducting field reconnaissance; and collecting chemical, physical and biological data.

4.8.12 Application of Hardness Based Metals Criteria

For purposes of assessing compliance with the freshwater aquatic life criteria for metals calculated using the equations in ADEM Administrative Code r. 335-6-10-.07(1)(a), ambient in situ hardness measurements will be used to compute the aquatic life criteria. When hardness values are less than 25 mg/l and the measured hardness-dependent metal concentration exceeds the applicable aquatic life criterion, the ambient in situ hardness and metal concentrations will be compared to the ecoregion/unimpacted reference site hardness and metal concentration. If the mean ambient hardness concentration is statistically similar ($p < 0.05$) to the mean ecoregion/unimpacted reference site and the metal concentration is statistically similar ($p < 0.05$) to the mean ecoregion/unimpacted reference site, the exceedance of the aquatic life criterion for the hardness-dependent metal will be considered natural in the absence of potential anthropogenic sources.

4.9 Quality Control / Quality Assurance Requirements

Collection and analyses of all data (including chemical, physical, and biological) should be collected and analyzed consistent with the SOPs presented earlier. Study plans should reference the SOP appropriate for the type of data being collected and should discuss how data quality will be documented. This should include a discussion of the quality control procedures followed during sample collection and analysis. These procedures should describe the number and type of field and laboratory quality control samples for the project, if appropriate for the type of sampling being conducted, field blanks, equipment blanks, split samples, duplicate samples, the name of the laboratory performing the analyses, name of the laboratory contact person, and the number and type of laboratory quality control samples.

While the Department will consider any existing and readily available data and information, the Department reserves the right to reject data or information in making use support decisions that do not comply with the minimum data requirements presented in this document. The decision not to use certain data will be documented. The Department applies best professional judgment when considering datasets smaller than the specified minimum data requirements. In such instances, use support decisions are made on a case-by-case basis in consideration of ancillary data and information such as watershed characteristics, known pollutant sources, water quality trends, or other environmental indicators.

4.10 Minimum Sample Size and Allowable Number of Water Quality Criterion Exceedances

**Table 17** shows the allowable number of exceedances for various samples sizes up to 199 samples. The Department's annual sampling plans and available resources generally allow for at least eight samples per sampling location except in reservoirs where fewer samples (i.e. 3 samples) may be collected due to sample holding time and resource constraints. The number of exceedances in each range of sample sizes was calculated using the binomial distribution function. This number is the number of exceedances of a particular water quality criterion needed to say with 90% confidence that the criterion is exceeded in more than 10% of the population represented by the available samples. This table will be used to determine the number of exceedances of Alabama numeric water quality criteria listed in ADEM Administrative Code r. 335-6-10 (for dissolved oxygen, temperature, turbidity, pH, and bacteria), consistent with the assessment methodology for each use discussed earlier, necessary to establish that a waterbody segment is not fully supporting its designated uses. This approach is consistent with ADEM Administrative Code r. 335-6-10, which recognizes that natural conditions may cause sporadic excursions of numeric water quality criteria,

and with EPA's 1997 305(b) guidance. For conventional water quality parameters, there must be at least eight temporally independent samples collected during the previous six-year period to be considered adequate for making use support determinations, except where fewer samples are determined to be adequate as discussed earlier. As used in this context, temporally independent means that the samples were collected at an interval appropriate to capture the expected variation in the parameter. For example, dissolved oxygen, temperature, and pH measurements should capture the normal diurnal variation that occurs in the parameters and temporal independence may occur in several hours (i.e. morning versus afternoon). Measurements for turbidity and bacteria should typically be at least 24 hours apart.

It is the intent of the methodology to ensure that an adequate number of samples are available for use in the assessment process and for developing future monitoring plans. Smaller sample sizes may be appropriate in certain circumstances where there is a clear indication that exceedances of the criteria are not due to natural conditions. For example, a data set comprised of fewer than the required minimum number of samples collected monthly may be sufficient to determine that a waterbody is not supporting its use when a significant number (more than two) exceed a particular criterion. Conversely, a data set with fewer than the required minimum number of samples collected monthly may be sufficient to determine that a waterbody is fully supporting its use if none of the samples exceed any of the criteria and there is sufficient supporting information to support this conclusion (i.e. biological assessment indicates full use support). The decision to use smaller data sets for making use support decisions will be made on a case-by-case basis using best professional judgment. These decisions will be made on a case-by-case basis and the decision will be documented.

**Table 17: Minimum Number of Samples Exceeding the Numeric Criterion Necessary for Listing ***

| Sample Size | Number of Exceedances | Sample Size | Number of Exceedances |
|---|---|---|---|
| 8 thru 11 | 2 | 97 thru 104 | 14 |
| 12 thru 18 | 3 | 105 thru 113 | 15 |
| 19 thru 25 | 4 | 114 thru 121 | 16 |
| 26 thru 32 | 5 | 122 thru 130 | 17 |
| 33 thru 40 | 6 | 131 thru 138 | 18 |
| 41 thru 47 | 7 | 139 thru 147 | 19 |
| 48 thru 55 | 8 | 148 thru 156 | 20 |
| 56 thru 63 | 9 | 157 thru 164 | 21 |
| 64 thru 71 | 10 | 165 thru 173 | 22 |
| 72 thru 79 | 11 | 174 thru 182 | 23 |
| 80 thru 88 | 12 | 183 thru 191 | 24 |
| 89 thru 96 | 13 | 192 thru 199 | 25 |

*For conventional parameters, including bacteria, at the 90% confidence level.

## 4.11 Ecoregions, Ecoregional Reference Streams, and Ecoregional Reference Guidelines

### 4.11.1 Ecoregions

An ecoregion is described as a relatively homogeneous area defined by similar climate, landform, soil, potential natural vegetation, hydrology, and other ecologically relevant variables (EPA, 2000b). The EPA has recommended the development of ecoregional reference conditions as a scientifically defensible method of defining expected habitat, biotic, and chemical conditions within streams, rivers, reservoirs, and wetlands.

There are six Level III ecoregions in Alabama: Piedmont, Southeastern Plains, Ridge and Valley, Southwestern Appalachians, Interior Plateau, and the Southern Coastal Plain **(Figure 15)**. Within these Level III ecoregions, 29 Level IV ecoregions exist. A general description of each of the six Level III ecoregions is provided below. Griffith et al. (2001) describes each Level III and IV ecoregion in more detail.

The Piedmont region, otherwise known as Ecoregion 45, comprises a transitional area between the mostly mountainous ecoregions of the Appalachians to the northwest and relatively flat coastal plain to the southeast. The Southeastern Plains, otherwise known as Ecoregion 65, are irregular plains consisting of broad inter-stream areas that provide a variety of cropland, pasture, woodland, and forest. The Ridge and Valley region, otherwise known as Ecoregion 67, is relatively low-lying with numerous springs and caves. Land cover is mixed and present-day forests cover approximately 50% of the region. The Southwestern Appalachians, known as Ecoregion 68, consists of forest and woodland with some cropland and pasture and is mostly restricted to deeper ravines and escarpment slopes. Ecoregion 71, otherwise known as the Interior Plateau, is an important agricultural region in Alabama and the springs, lime sinks, and caves contribute to this region's distinctive faunal distribution. The tidally influenced Southern Coastal Plain, known as Ecoregion 75, consists of mostly flat plains but is a heterogeneous region that contains barrier islands, coastal lagoons, marshes, and swampy lowlands. This makes it one of the hardest ecoregions to sample and establish reference stations. (Griffith 2001)

### 4.11.2 Ecoregional Reference Streams

"Reference streams" are defined as minimally-impacted (least-impacted) waterbodies monitored to represent the natural chemical, physical, and biological conditions of a particular stream type. These "reference streams" can be monitored over time to establish a baseline to which other waters can be compared. Reference streams are not necessarily pristine or undisturbed by humans, however they do represent waters within Alabama that are healthy and fully support their designated uses, to include protection of aquatic life.

ADEM has maintained an Ecoregional Reference Reach Monitoring Program since 1991 (ADEM 2001b) to develop baseline reference reach conditions for Alabama's 29 Level IV subecoregions. Data from these sites are used to classify waters with unique chemical, physical, and biological characteristics and to define expected or background conditions. They have been used as the basis to define regions characterized by similar communities of fish (ichthyoregions) and macroinvertebrates (bioregions). They are also used as the basis of natural condition determinations when expected reference conditions deviate from water quality criteria. To date,

ADEM's ecoregional reference reach program has focused on establishing ecoregional reference reaches in wadeable, flowing stream systems throughout the state. High quality watersheds are also identified for use as study-specific reference reaches where ecoregional reference guidelines have not yet been established.

A specific multi-step process is used to establish ecoregional reference reaches in watersheds of the highest quality, and to use the highest quality reference reach data to define background conditions as accurately as possible. Since 2005, the ADEM has delineated 5,030 watersheds statewide to provide information for watershed conditions including ecoregion, drainage area, gradient, percent wetland area, and other factors. Land cover information from the National Land Cover Datasets is used to estimate percent land use.

Several measures of watershed condition are used to identify the highest quality watersheds within each ecoregion. ADEM's Watershed Disturbance Gradient (WDG) category (based on land use, population density, and road density) and a Preliminary Healthy Watersheds Initiative (PHWI) Assessment are calculated for each of ADEM's existing stations and are used as a measure of watershed disturbance and watershed health, respectively. Results of a PHWI completed at the HUC 12 scale in 2016 and a Healthy Watersheds Initiative (HWI) Assessment completed at the catchment scale in 2012 are also used to identify areas most likely to contain high quality watersheds.

An Ecoregional Reference Reach Evaluation Form to document the extent, severity, and proximity of watershed disturbances is completed in three phases:

1. *Desktop Screening*: Aerial photography and satellite imagery are used to screen for obvious impacts within the watersheds. Departmental databases are used to determine the number, type, and location of point source discharges within each watershed.
2. *Reach Reconnaissance*: In addition to the ecoregional reference reach evaluation form, a reconnaissance physical characterization form is completed. In situ field parameters and visual macroinvertebrate surveys are conducted to screen for obvious impacts to chemical and biological conditions. Substrate composition, gradient, canopy cover, sinuosity, and habitat quality/availability are also estimated to quickly evaluate stream condition and to ensure that the reach was typical of other streams in the subecoregion.
3. *Watershed Reconnaissance*: Ground-truth land use estimates further ensure that staff are aware of major disturbances within the sub-ecoregion.

The compiled natural features of ADEM's established ecoregional reference reaches provide the user with some guidance as to what types of waterbodies the guidelines can be accurately applied, and when a study-specific reference reach should be located to ensure accurate assessment results. With the compiled land use information, the ADEM has defined "least-disturbed" conditions within each level IV sub-ecoregion to use as a rule-of-thumb when selecting reference reaches. Watersheds that do not meet these standards may be considered for reference reach status if all available data from ADEM and other state, local, and federal agencies indicate the watershed to be in good or excellent condition, and fully supporting their designated uses. Sites of the highest quality within each ecoregion are selected for sampling as candidate reference reaches. At each candidate reference reach, monthly water quality sampling is conducted, March-October. A habitat/physical characterization form, a habitat survey, and at least one biological survey are

completed. Individual results from each candidate reference reach are reviewed to verify that all results are valid. Any result determined to be invalid is excluded from the reference dataset. The reason for excluding any data is documented.

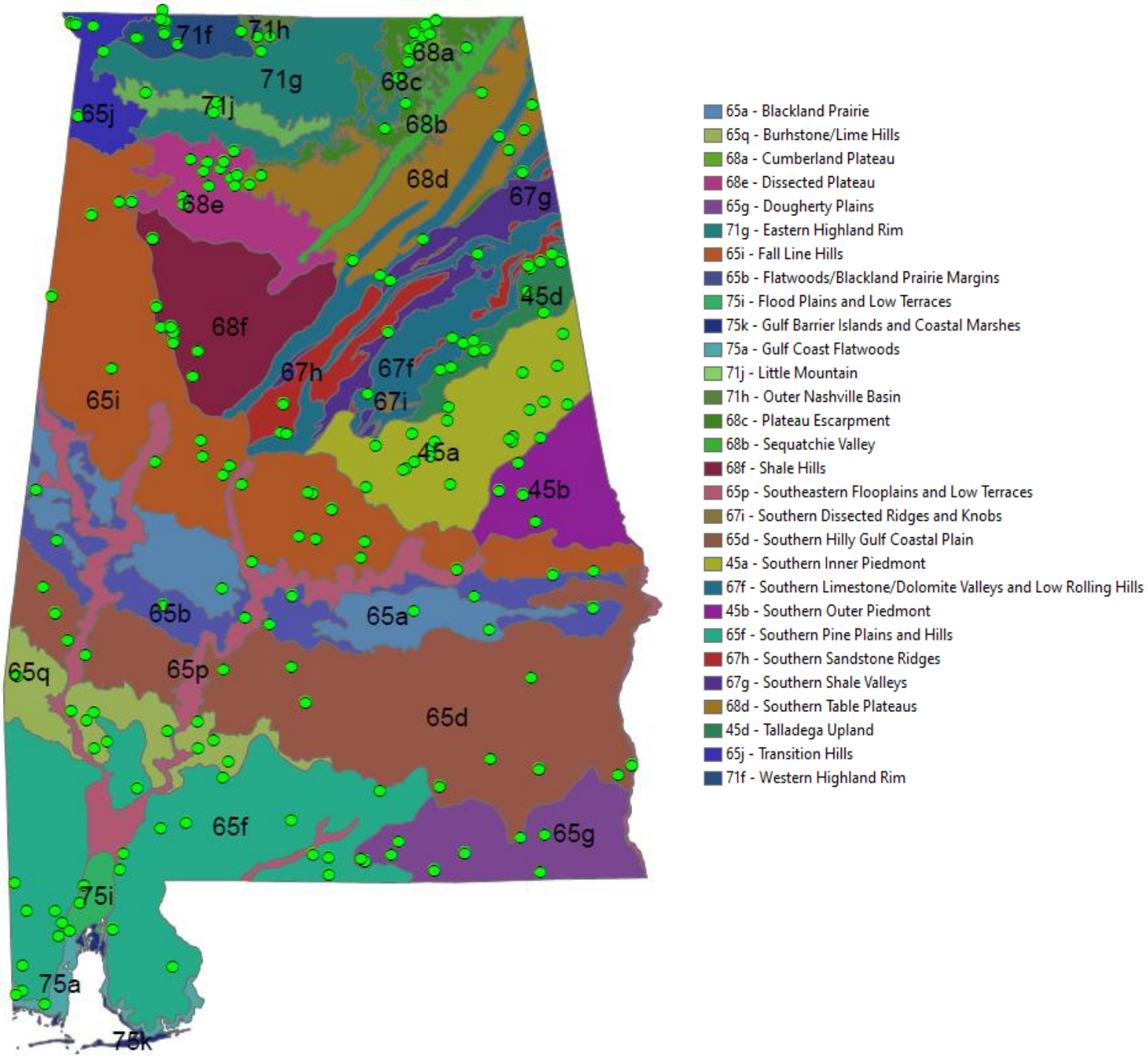
### 4.11.3 Ecoregional Reference Guidelines

In determining appropriate or acceptable parameter levels to support designated uses of Alabama's waters, ADEM elected to use a "reference condition" approach to determine appropriate chemical, physical, and biological conditions that are consistent with protection of designated uses and are scientifically defensible in assessing and evaluating water quality influences or impacts. ADEM's reference condition is based on ambient water quality data from verified reference streams located in characteristically similar types of watersheds known as ecoregions. **Table 18** summarizes the 2020 Ecoregional Guidelines which define ADEM's "reference conditions", and provides a baseline for assessing and evaluating water quality conditions.

The reference streams selected for a particular analysis depends primarily on the available number of reference streams and associated data within a particular ecoregion. Therefore, the total number of reference sites selected and the aerial scale (i.e. Ecoregion Level III, Level IV) used to represent a reference condition will often vary on a case-by-case basis. The 90th percentile of the data distributions from the selected reference site(s) is used to establish guidelines on an ecoregional basis. The 90th percentile of the data distribution is considered an appropriate target since it falls within an acceptable range of "least-impacted" conditions (i.e. upper quartile).

The 2020 Ecoregional Reference Guidelines should be used by ADEM staff for purposes of implementing the various Clean Water Act programs such as 303(d) & 305(b) assessment, listing and reporting, total maximum daily loads (TMDLs), and waste load allocations (WLAs). Reference reach data will be reviewed and updated periodically, and as necessary for ecoregions and parameters where guidelines could not be calculated due to lack of sufficient data.

**Figure 15: 2020 ADEM Ecoregional Reference Stations Location Map**



# Table 18: Alabama's 2020 Ecoregional Reference Guidelines

| Alabama's 2020 Ecoregional Reference Guidelines | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Level 4 | Level 4 | Level 4 | Level 3 | Level 4 | Level 4 | Level 4 | Level 4 | Level 4 | Level 4 | Level 4 | Level 4 | Level 4 | Level 3 | Level 4 | Level 4 | Level 4 | Level 3 | Level 4 | Level 4 | Level 4 | Level 4 | Level 3 | Level 4 | Level 4 | Level 4 | Level 4 | Level 3 | Level 4 |
| Parameters | Basis of comparison | 45a | 45b | 45d | 45 | 65a | 65b | 65a/b | 65d | 65f | 65g | 65i | 65j | 65q | 65 | 67f | 67g | 67h | 67 | 68c | 68d | 68e | 68f | 68 | 71f | 71g | 71h | 71j | 71 | 75a |
| **Physical** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Temperature (°C) | 90th Percentile | 26.00 | 25.28 | 25.26 | 26.00 | 28.80 | 27.78 | 28.50 | 26.00 | 25.00 | 25.18 | 25.40 | 22.37 | 27.00 | 26.20 | 25.00 | 24.28 | 26.00 | 25.00 | 24.18 | 24.00 | 24.60 | 26.26 | 24.91 | 23.40 | 26.00 | 23.08 | 26.24 | 24.91 | 24.80 |
| Turbidity (NTU) | 90th Percentile | 13.58 | 24.98 | 14.75 | 16.70 | 46.70 | 40.18 | 44.14 | 35.75 | 13.24 | 12.52 | 25.92 | 9.30 | 23.78 | 27.20 | 12.36 | 25.90 | 9.24 | 14.30 | 8.00 | 9.50 | 8.68 | 18.32 | 10.40 | 4.40 | 23.00 | 6.40 | 22.72 | 11.00 | 8.66 |
| Total Dissolved Solids (mg/L) | 90th Percentile | 67.00 | 61.00 | 75.90 | 67.00 | 192.40 | 145.60 | 174.00 | 102.70 | 54.10 | 91.10 | 66.00 | 49.10 | 120.00 | 115.00 | 172.00 | 119.60 | 311.00 | 169.60 | 212.00 | 73.60 | 75.00 | 339.40 | 188.00 | 79.00 | 190.10 | 123.50 | 213.00 | 179.00 | 72.00 |
| Total Suspended Solids (mg/L) | 90th Percentile | 13.00 | 12.30 | 12.00 | 13.00 | 44.00 | 44.50 | 44.00 | 33.60 | 16.00 | 10.60 | 30.00 | 16.00 | 23.60 | 27.00 | 13.00 | 14.00 | 9.10 | 13.00 | 6.00 | 19.40 | 9.00 | 12.60 | 10.00 | 6.00 | 21.60 | 7.00 | 16.00 | 10.00 | 7.00 |
| Specific Conductance (µmhos/cm@25c) | Median | 38.75 | 52.55 | 38.60 | 39.50 | 167.20 | 122.70 | 130.60 | 55.30 | 29.00 | 53.40 | 27.75 | 23.00 | 109.00 | 41.70 | 206.80 | 106.35 | 36.00 | 158.90 | 298.50 | 45.50 | 47.00 | 79.50 | 64.00 | 87.00 | 265.50 | 108.60 | 284.20 | 119.50 | 60.00 |
| Hardness (mg/L) | Median | 10.80 | 16.35 | 11.90 | 11.40 | 60.40 | 48.55 | 52.90 | 22.75 | 7.10 | 14.65 | 8.00 | 6.95 | 47.30 | 14.30 | 93.70 | 48.00 | 8.20 | 68.65 | 156.00 | 13.20 | 14.50 | 16.65 | 20.00 | 41.20 | 146.00 | 46.00 | 133.00 | 64.70 | 12.00 |
| Total Alkalinity (mg/L) | 90th Percentile | 22.82 | 27.80 | 22.18 | 24.22 | 134.47 | 93.93 | 118.10 | 36.78 | 9.82 | 60.46 | 14.10 | 10.70 | 76.20 | 64.60 | 137.18 | 104.23 | 87.24 | 125.40 | 166.80 | 24.14 | 39.20 | 58.60 | 143.00 | 60.05 | 144.80 | 88.74 | 155.95 | 129.40 | 15.04 |
| **Chemical** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved Oxygen (mg/L) | 10th Percentile | 7.30 | 7.40 | 7.50 | 7.40 | 5.20 | 5.46 | 5.30 | 6.80 | 6.80 | 5.10 | 7.00 | 7.70 | 6.80 | 6.50 | 7.10 | 5.92 | 7.00 | 6.85 | 5.80 | 6.31 | 7.30 | 6.85 | 6.60 | 8.00 | 6.30 | 8.31 | 4.94 | 6.70 | 6.20 |
| pH (SU) | 10th Percentile | 6.40 | 6.70 | 6.60 | 6.50 | 6.80 | 6.73 | 6.80 | 6.40 | 4.70 | 4.51 | 5.80 | 5.90 | 6.60 | 5.20 | 7.00 | 7.00 | 6.70 | 6.86 | 7.50 | 6.30 | 6.50 | 6.34 | 6.50 | 7.10 | 7.30 | 7.30 | 7.13 | 7.20 | 5.60 |
| pH (SU) | 90th Percentile | 7.60 | 7.70 | 7.61 | 7.60 | 7.90 | 8.00 | 7.90 | 7.40 | 6.60 | 7.49 | 7.40 | 7.17 | 7.70 | 7.60 | 8.20 | 8.10 | 8.00 | 8.10 | 8.00 | 7.90 | 7.80 | 7.80 | 7.90 | 8.00 | 7.90 | 8.40 | 7.90 | 8.10 | 7.40 |
| Ammonia Nitrogen (mg/L) | 90th Percentile | 0.0110 | 0.0404 | 0.0105 | 0.0150 | 0.0474 | 0.0586 | 0.0558 | 0.0352 | 0.0400 | 0.0230 | 0.0512 | 0.0276 | 0.0450 | 0.0424 | 0.0270 | 0.0480 | 0.0221 | 0.0356 | 0.0420 | 0.0502 | 0.0758 | 0.0400 | 0.0526 | 0.0219 | 0.0303 | 0.0391 | 0.0595 | 0.0300 | 0.0270 |
| Nitrate + Nitrite Nitrogen (mg/L) | 90th Percentile | 0.1610 | 0.3540 | 0.1252 | 0.1830 | 0.1449 | 0.2360 | 0.1920 | 0.6055 | 0.5254 | 0.4470 | 0.3206 | 0.2198 | 0.1858 | 0.4076 | 0.3528 | 0.2840 | 0.0675 | 0.3136 | 0.3244 | 0.7973 | 0.2650 | 0.1410 | 0.3630 | 0.5800 | 1.1670 | 1.4822 | 0.7347 | 1.3560 | 0.6502 |
| Total Kjeldahl Nitrogen (mg/L) | 90th Percentile | 0.3870 | 0.4720 | 0.3240 | 0.3774 | 1.1283 | 0.7512 | 0.9540 | 0.6021 | 0.5800 | 0.6354 | 0.6109 | 0.3814 | 0.6736 | 0.6722 | 0.4150 | 0.6344 | 0.5180 | 0.4880 | 0.4395 | 0.6798 | 0.4548 | 0.4010 | 0.4868 | 0.4349 | 0.5717 | 0.3882 | 1.3100 | 0.5555 | 0.6560 |
| Total Nitrogen (mg/L) | 90th Percentile | 0.4758 | 0.6960 | 0.4130 | 0.4902 | 1.1597 | 0.8685 | 1.0522 | 0.9100 | 0.9206 | 0.9562 | 0.7330 | 0.4685 | 0.6990 | 0.8811 | 0.6770 | 0.7720 | 0.5401 | 0.6950 | 0.6755 | 1.4952 | 0.5612 | 0.4794 | 0.7570 | 0.8490 | 1.4010 | 1.7017 | 1.8413 | 1.5562 | 1.2500 |
| Dissolved Reactive Phosphorous (mg/L) | 90th Percentile | 0.0170 | 0.0302 | 0.0230 | 0.0207 | 0.0598 | 0.0304 | 0.0456 | 0.0151 | 0.0110 | 0.0138 | 0.0190 | 0.0406 | 0.0170 | 0.0220 | 0.0172 | 0.0270 | 0.0138 | 0.0196 | 0.0150 | 0.0200 | 0.0100 | 0.0130 | 0.0130 | 0.0495 | 0.0130 | 0.0454 | 0.1512 | 0.0580 | 0.0104 |
| Total Phosphorous (mg/L) | 90th Percentile | 0.0598 | 0.0470 | 0.0540 | 0.0575 | 0.1376 | 0.1155 | 0.1300 | 0.0573 | 0.0360 | 0.0452 | 0.0560 | 0.0180 | 0.0640 | 0.0690 | 0.0520 | 0.0623 | 0.0418 | 0.0534 | 0.0320 | 0.0500 | 0.0340 | 0.0500 | 0.0460 | 0.0500 | 0.0766 | 0.0544 | 0.1830 | 0.0788 | 0.0218 |
| CBOD-5 (mg/L) | 90th Percentile | 2.00 | 2.43 | 2.10 | 2.10 | 2.39 | 2.19 | 2.30 | 1.48 | 1.20 | 1.00 | 2.00 | 1.00 | 2.13 | 1.90 | 1.80 | 2.80 | 2.20 | 1.96 | 1.00 | 1.90 | 1.00 | 1.02 | 1.10 | 1.00 | 1.00 | 1.19 | 2.05 | 1.00 | 1.00 |
| Total Chlorides (mg/L) | 90th Percentile | 4.50 | 5.10 | 4.00 | 4.50 | 11.08 | 6.35 | 9.42 | 5.50 | 5.77 | 4.00 | 4.80 | 4.10 | 5.61 | 5.85 | 4.83 | 5.10 | 13.76 | 5.22 | 4.30 | 4.10 | 1.90 | 14.73 | 4.70 | 2.30 | 2.40 | 4.20 | 21.92 | 4.20 | 8.82 |
| **Total Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total Alumnium (mg/L) | 90th Percentile | 0.3691 | 0.5334 | 0.2104 | 0.3456 | 2.9620 | 1.8550 | 2.5380 | 1.1500 | 0.5816 | 0.5060 | 0.7232 | 0.2300 | 0.7456 | 1.0370 | 0.3033 | 1.0156 | 0.4985 | 0.5206 | 0.3349 | 0.3534 | 0.3360 | 0.9458 | 0.3994 | 0.1679 | 0.2612 | 0.1520 | 0.7120 | 0.2262 | 0.3713 |
| Total Iron (mg/L) | 90th Percentile | 1.1820 | 2.8250 | 0.8234 | 1.3140 | 3.4940 | 3.4930 | 3.5440 | 2.9300 | 1.6460 | 2.1630 | 3.8960 | 1.0690 | 2.2940 | 3.0580 | 0.7496 | 1.3280 | 0.7822 | 0.9608 | 0.2676 | 0.7864 | 1.0990 | 1.190 | 1.0380 | 0.1809 | 0.2520 | 0.4560 | 1.1462 | 0.3288 | 1.0980 |
| Total Manganese (mg/L) | 90th Percentile | 0.0745 | 0.5171 | 0.0766 | 0.0872 | 0.2382 | 0.0570 | 0.1851 | 0.1493 | 0.0489 | 0.2024 | 0.3908 | 0.0870 | 0.3068 | 0.1923 | 0.0570 | 0.1414 | 0.1143 | 0.0810 | 0.0488 | 0.1590 | 0.0926 | 0.2494 | 0.1226 | 0.0308 | 0.0873 | 0.0472 | 0.0767 | 0.0500 | 0.0478 |
| **Dissolved Metals** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Dissolved Alumnium - Al (mg/L) | 90th Percentile | 0.1060 | 0.0435 | 0.0545 | 0.0580 | 0.2176 | 0.2156 | 0.2166 | 0.1320 | 0.2446 | 0.2858 | 0.10 | 0.0702 | 0.1610 | 0.1959 | 0.10 | 0.10 | 0.10 | 0.10 | 0.0406 | 0.1521 | 0.10 | 0.10 | 0.10 | 0.0416 | 0.0380 | 0.10 | 0.2365 | 0.0672 | 0.2137 |
| Dissolved Antimony - Sb (µg/L) | 90th Percentile | 1.00 | 1.00 | 1.00 | 1.00 | 5.00 | 1.00 | 2.82 | 1.3095 | 3.75 | 1.00 | 5.00 | 5.00 | 3.75 | 3.75 | 5.00 | 1.00 | 5.00 | 5.00 | 1.46 | 5.00 | 5.00 | 1.9825 | 5.00 | 5.00 | 1.46 | 5.00 | 5.00 | 5.00 | 1.3660 |
| Dissolved Arsenic - As (µg/L) | 90th Percentile | 0.4370 | 0.4370 | 0.5371 | 0.4370 | 2.7095 | 2.7170 | 2.7150 | 0.7395 | 0.4678 | 0.4340 | 1.3370 | 0.3445 | 1.6000 | 1.6405 | 16.00 | 1.0540 | - | 13.40 | 0.5882 | 0.50 | 0.50 | 2.20 | 0.50 | 0.4020 | 0.9556 | 10.40 | 14.40 | 1.88 | 0.95 |
| Dissolved Cadmium - Cd (µg/L) | 90th Percentile | 0.4275 | 0.4211 | 0.1925 | 0.4275 | 0.3630 | 0.1925 | 0.3630 | 0.3630 | 0.3684 | 0.3630 | 0.1555 | 0.3630 | 0.1250 | 0.3630 | 0.3695 | 1.50 | - | 1.50 | 0.4139 | 0.3759 | 0.3630 | 0.1010 | 0.3630 | 0.4195 | 0.4275 | 1.50 | - | 1.50 | 0.4107 |
| Dissolved Chromium - Cr (µg/L) | 90th Percentile | 6.50 | 2.00 | 39.50 | 39.50 | 25.00 | 6.50 | 22.30 | 16.00 | 6.50 | 4.8690 | 25.00 | 25.00 | 7.50 | 25.00 | 25.00 | 8.8500 | 34.10 | 25.00 | 3.50 | 39.50 | 25.00 | 19.75 | 25.00 | 25.00 | 4.0240 | 25.00 | 39.50 | 25.00 | 3.00 |
| Dissolved Copper - Cu (µg/L) | 90th Percentile | 2.50 | 2.50 | 6.50 | 6.50 | 15.50 | 10.00 | 10.00 | 10.00 | 6.50 | 2.0605 | 25.00 | 25.00 | 10.00 | 10.00 | 25.00 | 12.00 | 21.50 | 21.90 | 5.987 | 25.00 | 25.00 | 10.00 | 25.00 | 25.00 | 4.5480 | 25.00 | 25.00 | 25.00 | 2.50 |
| Dissolved Iron - Fe (mg/L) | 90th Percentile | 0.6180 | 0.8756 | 0.4178 | 0.5820 | 0.7744 | 1.1760 | 0.8684 | 0.9594 | 0.6136 | 0.7333 | 0.6405 | 0.19 | 0.8292 | 0.7640 | 0.2047 | 0.4734 | 0.1881 | 0.3482 | 0.0811 | 0.4794 | 0.5720 | 0.7074 | 0.5379 | 0.0703 | 0.0880 | 0.1762 | 0.3160 | 0.1518 | 0.5737 |
| Dissolved Lead - Pb (µg/L) | 90th Percentile | 1.00 | 1.00 | 1.00 | 1.00 | 2.50 | 1.00 | 1.00 | 1.00 | 2.50 | 1.00 | 5.00 | 5.00 | 2.50 | 2.50 | 5.00 | 1.00 | 1.00 | 2.00 | 0.75 | 5.00 | 1.0390 | 2.5480 | 1.72 | 5.00 | 1.72 | 5.00 | 5.00 | 5.00 | 1.3428 |
| Dissolved Manganese - Mn (mg/L) | 90th Percentile | 0.0499 | 0.4452 | 0.0235 | 0.0558 | 0.0790 | 0.0342 | 0.0626 | 0.1045 | 0.04 | 0.2095 | 0.4382 | 0.0800 | 0.1656 | 0.1316 | 0.04 | 0.0537 | 0.1001 | 0.05 | 0.038 | 0.0758 | 0.0838 | 0.1172 | 0.0874 | 0.0250 | 0.0840 | 0.0250 | 0.0606 | 0.0341 | 0.0505 |
| Dissolved Mercury - Hg (µg/L) | 90th Percentile | - | - | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.04 | 0.0706 | - | 0.30 | 0.04 | 0.0525 | 0.0525 | 0.04 | - | - | 0.04 | - | 0.013 | 0.0653 | 0.04 | 0.0458 | 0.04 | - | 0.04 | - | 0.04 | - |
| Dissolved Nickel - Ni (µg/L) | 90th Percentile | 21.00 | 3.00 | 114.00 | 114.00 | 25.00 | 21.00 | 24.60 | 21.40 | 7.80 | 3.00 | 25.00 | 25.00 | 21.30 | 25.00 | 25.00 | 15.00 | 87.30 | 25.00 | 4.00 | 114.00 | 25.00 | 23.80 | 25.00 | 25.00 | 3.56 | 25.00 | 114.00 | 25.00 | 3.50 |
| Dissolved Selenium - Se (µg/L) | 90th Percentile | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 3.75 | 5.00 | 25.00 | 3.29 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 5.00 | 1.0125 | 5.00 | 1.0750 | 5.00 | 5.00 | 1.3180 | 1.0750 | 25.00 | 25.00 | 17.00 | 0.7050 |
| Dissolved Silver - Ag (µg/L) | 90th Percentile | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.50 | 1.00 | 0.9955 | 1.50 | 1.00 | 1.50 | 1.50 | 1.50 | 1.50 | 2.50 | 1.50 | 1.06 | 1.50 | 1.4485 | 1.00 | 1.50 | 0.8920 | 1.06 | 7.50 | - | 1.06 | 0.3468 |
| Dissolved Thallium - Tl (µg/L) | 90th Percentile | 0.50 | 0.50 | 0.50 | 0.50 | 0.55 | 0.50 | 0.54 | 0.5298 | 0.60 | 0.50 | 0.68 | 0.3205 | 0.60 | 0.5425 | 0.68 | 0.50 | 0.50 | 0.6260 | 0.54 | 0.50 | 0.3560 | 0.55 | 0.50 | 0.54 | 0.5420 | 0.50 | 9.0550 | 0.54 | 0.60 |
| Dissolved Zinc - Zn (µg/L) | 90th Percentile | 15.00 | 3.00 | 34.50 | 34.50 | 25.00 | 15.00 | 25.00 | 15.00 | 17.3812 | 13.2175 | 34.50 | 30.00 | 15.00 | 25.00 | 25.00 | 15.00 | 25.95 | 25.00 | 30.00 | 34.50 | 25.00 | 19.00 | 25.00 | 30.00 | 8.50 | 25.00 | 34.50 | 30.00 | 16.00 |
| **Biological** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Chlorophyll a (mg/m^3) | 90th Percentile | 2.670 | 1.636 | 2.140 | 2.562 | 6.765 | 3.350 | 5.340 | 3.950 | 1.834 | 4.509 | 4.036 | 1.548 | 2.589 | 3.468 | 3.20 | 2.27 | 1.60 | 2.670 | 1.496 | 3.302 | 1.690 | 2.670 | 2.140 | 2.140 | 1.070 | 2.988 | 2.140 | 2.140 | 0.50 |
| E Coli (mpn/dl) | 10th Percentile | 29.30 | 46.33 | 17.54 | 28.32 | 28.66 | 57.69 | 36.80 | 79.04 | 13.41 | 18.60 | 90.90 | 15.68 | 2.60 | 23.90 | 43.80 | 101.22 | - | 38.30 | 49.40 | 29.20 | 27.20 | 36.34 | 29.29 | 53.54 | 75.85 | - | - | 59.48 | 32.40 |

## 5.0 Removing a Waterbody from Category 4a or 5

Waterbodies may be removed from **category 4a** or a 303(d) list (Category 5) for various reasons, including:

- Assessment of more recent water quality data demonstrates that the waterbody is meeting all applicable water quality standards. (Move to Category 1)
- A review of the original listing decision demonstrates that the waterbody should not have been included in Category 5. (Move to Category 1 or Category 2)
- TMDL has been completed. (Move to Category 4a)
- Other pollution control requirements are reasonably expected to result in the attainment of the water quality standards in the near future. These requirements must be specifically applicable to the particular water quality problem. (Move to Category 4b)
- Impairment is not caused by a pollutant. (Move to Category 4c)
- Natural causes, when it can be demonstrated the exceedance of a numeric water quality criterion is due to natural conditions and not to human disturbance activities. (Move to Category 1)

**Table 19** shows the allowable number of exceedances of criteria for conventional pollutants for various sample sizes and a 90% confidence level. This table will be used to determine the number of allowable exceedances of Alabama numeric water quality criteria for pollutants listed in ADEM Administrative Code r. 335-6-10, with the exception of chlorophyll *a* criteria and the toxics criteria listed in the appendix to ADEM Administrative Code r. 335-6-10, for the waterbody to be removed from **category 4a** or a 303(d) list (Category 5) for a specific pollutant (move to Category 1). In addition, the original basis for listing the waterbody will be considered as a part of the delisting process. Included in this evaluation will be a review of pollutant sources to determine which ones may have been removed or remediated, changes in land practices or uses, installation of new treatment facilities or best management practices, and changes in stream hydrology or morphology.

**Table 19: Maximum Number of Samples Exceeding the Numeric Criterion Necessary for Delisting ***

| Sample Size | Number of Exceedances | Sample Size | Number of Exceedances |
|---|---|---|---|
| 8 thru 21 | 0 | 104 thru 115 | 7 |
| 22 thru 37 | 1 | 116 thru 127 | 8 |
| 38 thru 51 | 2 | 128 thru 139 | 9 |
| 52 thru 64 | 3 | 140 thru 151 | 10 |
| 65 thru 77 | 4 | 152 thru 163 | 11 |
| 78 thru 90 | 5 | 164 thru 174 | 12 |
| 91 thru 103 | 6 | 175 thru 186 | 13 |

*For conventional parameters, including bacteria, at the 90% confidence level.

When a waterbody has been included in Category 5 due to a fish consumption advisory, the waterbody will be moved to Category 1 when subsequent fish tissue results indicate that pollutant concentrations have declined and a fish consumption advisory is no longer

needed. The Alabama Department of Public Health makes the determination that a fish consumption advisory is no longer needed.

For waters originally placed in Category 5 due to a specific toxic pollutant or specific toxic pollutants, there should be no violations of the appropriate criteria in a preferred minimum of eight samples collected over a three-year period before the cause of impairment is removed or the water is placed in Category 1. As stated in section 4.10 Minimum Sample Size and Allowable Number of Water Quality Criterion Exceedances, the decision to use smaller data sets for making use support decisions will be made on a case-by-case basis using best professional judgment and the decision will be documented.

## 6.0 Estimating the Size of the Assessed Waterbody

Waterbodies are assessed based on assessment units. Assessment units vary in size, depending on the waterbody type, watershed characteristics, designated use, and the location of monitoring stations. Individual assessments will lie completely within a designated use or a segment with multiple designated uses. For example, an assessment unit will not be partially within one designated use and partially within a different designated use. However, assessment units may be assigned more than one designated use as listed in ADEM Administrative Code r. 335-6-11. For example, an assessment unit may have classified uses of both Fish and Wildlife and Public Water Supply provided both uses are assigned to the entire assessment unit. An assessment unit may be defined as a stream, the mainstem of a river, embayment, portion of a lake or reservoir, or a part of an estuary or coastal water.

A monitoring unit is defined as the watershed draining to a sampling location and is generally made up of many assessment units (individual reaches). A monitoring unit will generally have a drainage area of more than 5 square miles. When it is necessary to better characterize assessment units within the larger monitoring units, new monitoring units can be delineated based on the location of the additional sampling location or locations. Water quality data and information gathered at a sampling location, which defines a monitoring unit, will be the primary means for assigning a use support status to assessment units within the monitoring unit.

The spatial extent of each monitoring unit will be determined using information contained in the Department's GIS. Specifically, stream coverage contained within the National Hydrography Dataset (NHD) will be the basis for determining the size of assessed waters. This database of natural and constructed surface waters is a comprehensive set of digital spatial data that contains information about surface water features, such as lakes, ponds, streams, rivers, springs, and wells. Within the NHD, surface water features are combined to form "reaches", which provide the framework for linking water-related data to the NHD surface drainage network. These linkages enable the analysis and display of these water-related data in upstream and downstream order. Characteristics such as stream length or reservoir area can be aggregated within a monitoring unit to estimate the size of assessed waters.

## 7.0 Ranking and Prioritizing Impaired Waters

Section 303(d)(1) of the CWA requires each state to establish a priority ranking for waters it identifies on the 303(d) list (i.e., Category 5 waters) taking into account the severity of pollution and the designated uses of such waters.

The State of Alabama is to establish TMDLs in accordance with its priority ranking strategy; however, states are given considerable flexibility in establishing their ranking method based on their particular circumstances and available resources. In accordance with EPA's *Long-Term Vision for Assessment, Restoration, and Protection under the Clean Water Act Section 303(d) Program*, Alabama has determined priority waters from the 303(d) list for which TMDLs will be developed during FY2016 through FY2022. Factors that were considered in the development of the list of priority waters include:

- Pollutants of concern
- Degree of public interest and support for particular waterbodies
- General watershed management activities (e.g., CWA Section 319 grant activities and watershed management planning)
- Existence of endangered and sensitive aquatic species
- Data availability
- Sources of the pollutants
- Designated uses of waterbodies

All waters placed on the 303(d) list will be given a priority ranking for TMDL development. Those waters identified as priority waters under the *Vision* will be given higher rankings, while those that are not currently identified as priority waters will be given lower rankings. Alabama's IWQMAR will include proposed schedules (both long term and annually) for the development of TMDLs. The Department will communicate with bordering states concerning the status of shared waters, and when requested, the state will provide data concerning shared waters to the adjacent state.

## 8.0 Public Participation

Alabama's IWQMAR will combine the Water Quality Inventory Report (Section 305(b)) with the Impaired Waterbodies (Section 303(d)) listing. Category 5 in the IWQMAR is considered the Impaired Waterbodies list. The remaining categories are considered the Water Quality Inventory. This methodology lays out the framework for assessing data and determining which of the five categories the waterbody will be assigned. The entire Integrated List will follow the same public process as the Section 303(d) listing but Categories 1 through 4 and the monitoring schedule will be provided for informational purposes only since these schedules are subject to change as resources allow.

The Department will solicit the submittal of data and information for use in developing the IWQMAR. The public notice requesting data will be published in four major daily newspapers in the state and on the Department's website. The time period for submitting data will be specified in the public notice. Data submitted after the specified period will be considered in the development of subsequent IWQMAR Reports. The Department reviews all existing and readily available data and is committed to using only data with acceptable quality assurance to develop

the IWQMAR. Only electronic data or data available in published reports are considered "readily available".

The Department will publish notice of the availability of the Integrated Water Quality Monitoring and Assessment Methodology and Draft Integrated Report in four major daily newspapers of general circulation throughout the State and on the Department Website. Adjacent states, federal agencies, and interstate agencies shall also be noticed as necessary. The Department will coordinate with neighboring states during the development of the IWQMAR, as needed. The comment period on a proposed Category 5 (Section 303(d)) list will be a minimum of 30 days.

The IWQMAR, which will include the integrated list, expected monitoring schedules, TMDL schedules, as well as any other information usually included in the Section 305(b) Report, will be submitted to the EPA as required by Section 305(b) of the CWA. The Department will post the availability of the IWQMAR on its web page at that time.

## 9.0 References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