

State of California
STATE WATER RESOURCES CONTROL BOARD

WATER QUALITY CONTROL POLICY

FOR DEVELOPING
CALIFORNIA'S CLEAN WATER ACT SECTION 303(d) LIST

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WATER QUALITY CONTROL POLICY FOR DEVELOPING CALIFORNIA'S CLEAN WATER ACT SECTION 303(d) LIST

1 Introduction

Pursuant to California Water Code section 13191.3(a), this State policy for water quality control (Policy) describes the process by which the State Water Resources Control Board (State Water Board) and Regional Water Quality Control Boards (Regional Water Boards) will comply with the listing requirements of section 303(d) of the federal Clean Water Act (CWA). The objective of this Policy is to establish a standardized approach for developing California's section 303(d) list in order to achieve the overall goal of achieving water quality standards and maintaining beneficial uses in all of California's surface waters.

CWA section 303(d) requires states to identify waters that do not meet, or are not expected to meet by the next listing cycle, applicable water quality standards after the application of certain technology-based controls and schedule such waters for development of Total Maximum Daily Loads (TMDLs) [40 Code of Federal Regulations (CFR) 130.7(c) and (d)]. The states are required to assemble and evaluate all existing and readily available water quality-related data and information to develop the list [40 CFR 130.7(b)(5)] and to provide documentation for listing or not listing a state's waters [40 CFR 130.7(b)(6)]. The methodology to be used to develop the section 303(d) list [40 CFR 130.7(b)(6)(i)] is established by this Policy and includes:

- California Listing Factors and Delisting Factors;
- The process for gathering and evaluating of readily available data and information; and
- Total Maximum Daily Load (TMDL) scheduling.

This Policy applies only to the listing process methodology used to comply with CWA section 303(d). In order to make decisions regarding standards attainment, this Policy provides guidance for interpreting data and information as they are compared to beneficial uses, existing numeric and narrative water quality objectives, and antidegradation considerations. The Policy shall not be used to:

- determine compliance with any permit or waste discharge requirement provision;
- establish, revise, or refine any water quality objective or beneficial use; or
- translate narrative water quality objectives for the purposes of regulating point sources.

Data and information from water bodies shall be analyzed under the provisions of this Policy using a weight-of-evidence approach. The weight-of-evidence approach shall be used to evaluate whether the evidence is in favor of or against placing waters on or removing waters from the section 303(d) list (section 2). The following steps describe the weight-of-evidence approach:

1. Data and Information Preprocessing: All data and information for existing listings shall be solicited and assembled, as appropriate (sections 6.1.1 and 6.1.2.1). Water body fact sheets (section 6.1.2.2) describing the assessments shall be prepared. Evaluation guidelines (section 6.1.3), if needed, shall be selected and the quality of the data (section 6.1.4) and quantity of data (section 6.1.5) shall be assessed.
2. Data and Information Processing: All data and information shall be evaluated using the decision rules listed in sections 3 or 4, as appropriate, and using applicable implementation factors (including, but not limited to, sections 6.1.2.2 and 6.1.5.1 through 6.1.5.9). The Regional Water Boards shall also develop a schedule for completion of TMDLs (section 5). All other information not addressed under sections 3, 4, 5, or 6, shall be evaluated and presented in fact sheets.
3. Data Assessment: An assessment in favor of or against a list action for a water body-pollutant combination shall be presented in fact sheets. The assessment shall identify and discuss relationships between all available lines of evidence for water bodies and pollutants. This assessment shall be made on a pollutant-by-pollutant (including toxicity) basis. The Regional Water Boards shall approve all decisions to list or delist a water segment (section 6.2).

2 Structure of the CWA Section 303(d) List

This section describes the categories of waters that shall be included in the section 303(d) list. Sections 3 and 4 contain the factors that shall be used to add and remove waters from the list. At a minimum, the California section 303(d) list shall identify waters where standards are not met, pollutants or toxicity contributing to standards exceedance, and the TMDL completion schedule. The section 303(d) list shall contain the following categories:

2.1 Water Quality Limited Segments

Waters shall be placed in this category of the section 303(d) list if it is determined, in accordance with the California Listing Factors that the water quality standard is not attained; the standards nonattainment is due to toxicity, a pollutant, or pollutants; and remediation of the standards attainment problem requires one or more TMDLs.

The water segment shall remain in this category of the section 303(d) list until TMDLs for all pollutants have been completed, U.S. Environmental Protection Agency (U.S. EPA) has approved the TMDLs, and implementation plans have been adopted.

2.2 Water Quality Limited Segments Being Addressed

Water segments shall be placed in this category if the conditions for placement in the water quality limited segments category (section 3) are met and either of the following conditions is met:

1. A TMDL has been developed and approved by U.S. EPA and the approved implementation plan is expected to result in full attainment of the standard within a specified time frame; or
2. The Regional Water Board has determined in fact sheets that an existing regulatory program is reasonably expected to result in the attainment of the water quality standard within a reasonable, specified time frame.

Waters shall only be removed from this category if it is demonstrated in accordance with section 4 that water quality standards are attained.

3 California Listing Factors

The Regional Water Boards and the State Water Board shall use the following factors to develop the California section 303(d) list. Waters meeting the conditions in section 3 exceed water quality standards.

In developing the list, the state shall evaluate all existing readily available water quality-related data and information. Data and information collected during a known spill or violation of an effluent limit in a permit or waste discharge requirement (WDR) may be used in conjunction with other data to demonstrate that there is an exceedance of a water quality standard in the water body. Visual assessments or other semi-quantitative assessments shall also be considered as ancillary lines of evidence to support a section 303(d) listing.

Water segments shall be placed on the section 303(d) list if any of the following conditions are met.

3.1 Numeric Water Quality Objectives and Criteria for Toxicants in Water

Numeric water quality objectives for toxic pollutants, including maximum contaminant levels where applicable, or California/National Toxics Rule water quality criteria are exceeded as follows:

- Using the binomial distribution, waters shall be placed on the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 3.1.

3.2 Numeric Water Quality Objectives for Conventional or Other Pollutants in Water

Numeric water quality objectives for conventional pollutants are exceeded as follows:

- Using the binomial distribution, waters shall be placed on the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 3.2.

For depressed dissolved oxygen, if measurements of dissolved oxygen taken over the day (diel) show low concentrations in the morning and sufficient concentrations in the afternoon, then it shall be assumed that nutrients are responsible for the observed dissolved oxygen concentrations if riparian cover, substrate composition or other pertinent factors can be ruled out as controlling dissolved oxygen fluctuations. When continuous monitoring data are available, the seven-day average of daily minimum measurements shall be assessed. In the absence of diel measurements, concurrently collected measurements of nutrient concentration shall be assessed using applicable water quality objectives or acceptable evaluation guidelines (section 6.1.3) and using the binomial distribution as described in section 3.1.

3.3 Numerical Water Quality Objectives or Standards for Bacteria Where Recreational Uses Apply

In the absence of a site-specific exceedance frequency, a water segment shall be placed on the section 303(d) list if bacteria water quality standards in California Code of Regulations, Basin Plans, or statewide plans are exceeded using the binomial distribution as described in section 3.2.

If a site-specific exceedance frequency is available, it may be used instead of the ten percent exceedance frequency as described in Table 3.2 or four percent as described in the following paragraph. The site-specific exceedance frequency shall be the number of water quality standard exceedances in a relatively unimpacted watershed (i.e., a reference water segment). To the extent possible and allowed by water quality objectives, the Regional Water Boards shall identify one or more reference beaches or water segments to compare the measurements.

For bacterial measurements from coastal beaches, if water quality monitoring was conducted April 1 through October 31 only, a four percent exceedance percentage shall be used. For bacterial measurements from inland waters, if water quality monitoring data were collected April 1 through October 31 only, a four percent exceedance percentage shall be used if (1) bacterial measurements are indicative of human fecal matter, and (2) there is substantial human contact in the water body. If the exceedance is due to a closure related to a sewage spill, the water segment shall not be placed on the section 303(d) list. Postings that are not backed by water quality data shall not be used to support placement of a water segment on the section 303(d) list. A binomial table specific to listing coastal beaches can be found on the State Water Board's website at:

www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303d_binomial_tables.xls

3.4 Health Advisories

A water segment shall be placed on the section 303(d) list if a health advisory against the consumption of edible resident organisms, or a shellfish harvesting ban has been issued by the Office of Environmental Health Hazard Assessment (OEHHA), or Department of Health Services and there is a designated or existing fish consumption beneficial use for the segment. In addition, water segment-specific data must be available indicating the evaluation guideline for tissue is exceeded.

3.5 Bioaccumulation of Pollutants in Aquatic Life Tissue

A water segment shall be placed on the section 303(d) list if the tissue pollutant levels in organisms exceed a pollutant-specific evaluation guideline (satisfying the requirements of section 6.1.3) using the binomial distribution as described in section 3.1.

Acceptable tissue concentrations may be based on composite samples measured either as muscle tissue or whole body residues. Residues in liver tissue alone are not considered a suitable measure. Samples can be collected either from transplanted animals or from resident populations.

3.6 Water/Sediment Toxicity

A water segment shall be placed on the section 303(d) list if the water segment exhibits statistically significant water or sediment toxicity using the binomial distribution as described in section 3.1. The segment shall be listed if the observed toxicity is associated with a pollutant or pollutants. Waters may also be placed on the section 303(d) list for toxicity alone. If the pollutant causing or contributing to the toxicity is identified, the pollutant shall be included on the section 303(d) list as soon as possible (i.e., during the next listing cycle). For water segments where adopted narrative sediment quality objectives apply, development of the section 303(d) list shall also be in accordance with section 6.1.3.

Reference conditions may include laboratory controls (using a t-test or other applicable statistical test), the lower confidence interval of the reference envelope, or, for sediments, response less than 90 percent of the minimum significant difference for each specific test organism.

Appropriate reference and control measures must be included in the toxicity testing. Acceptable methods include, but are not limited to, those listed in water quality control plans, the methods used by Surface Water Ambient Monitoring Program (SWAMP), the Southern California Bight Projects of the Southern California Coastal Water Research Project, American Society for Testing and Materials (ASTM), U.S. EPA, the Regional Monitoring Program of the San Francisco Estuary Institute, and the Bay Protection and Toxic Cleanup Program (BPTCP).

Association of pollutant concentrations with toxic or other biological effects should be determined by any one of the following, unless other guidelines apply:

- A. Sediment quality guidelines (satisfying the requirements of section 6.1.3) are exceeded using the binomial distribution as described in section 3.1. In addition, using rank correlation, the observed effects are correlated with measurements of chemical concentration in sediments. If these conditions are met, the pollutant shall be identified as "sediment pollutant(s)."
- B. For sediments, an evaluation of equilibrium partitioning or other type of toxicological response that identifies the pollutant that may cause the observed impact. Comparison to reference conditions within a watershed or ecoregion may be used to establish sediment impacts.
- C. Development of an evaluation (such as a toxicity identification evaluation) that identifies the pollutant that contributes to or caused the observed impact.

3.7 Nuisance

A water segment shall be placed on the section 303(d) list if qualitative assessments of the water segment for nuisance water odor, taste, excessive algae growth, foam, turbidity, oil, trash, and color are associated with numerical water quality data that meets any one of the following:

3.7.1 Nutrient-related

An acceptable nutrient-related evaluation guideline is exceeded using the binomial distribution as described in section 3.1 for excessive algae growth, unnatural foam, odor, and taste. Waters may also be placed on the section 303(d) list when a significant nuisance condition exists as compared to reference conditions, or when nutrient concentrations cause or contribute to excessive algae growth. If listing for nitrogen or phosphorus specifically, the Regional Water Board should consider whether the ratio of these two nutrients indicates which is the limiting agent.

3.7.2 Other Types

An acceptable evaluation guideline is exceeded using the binomial distribution as described in section 3.2 for taste, color, oil sheen, turbidity, litter, trash, and odor not related to nutrients. Water segments may also be placed on the section 303(d) list when there is significant nuisance condition compared to reference conditions.

3.8 Adverse Biological Response

A water segment shall be placed on the section 303(d) list if the water segment exhibits adverse biological response measured in resident individuals as compared to reference conditions and these impacts are associated with water or sediment concentrations of pollutants as described in section 3.6. Endpoints for this factor include reduction in growth, reduction in reproductive capacity, abnormal development, histopathological abnormalities, and other adverse conditions.

Qualitative visual assessments or other semi-qualitative assessments may be used as secondary lines of evidence to support placement on the section 303(d) list. These types of assessments include fish kills or bird kills related to water quality conditions.

For adverse biological response related to sedimentation, the water segment shall be placed on the section 303(d) list if adverse biological response is identified and effects are associated with clean sediment loads in water or with loads stored in the channel. Waters shall be placed on the section 303(d) list if evaluation guidelines (satisfying the conditions of section 6.1.3) are exceeded using the binomial distribution as described in section 3.1.

3.9 Degradation of Biological Populations and Communities

A water segment shall be placed on the section 303(d) list if the water segment exhibits significant degradation in biological populations and/or communities as compared to reference site(s) and is associated with water or sediment concentrations of pollutants including but not limited to chemical concentrations, temperature, dissolved oxygen, and trash. This condition requires diminished numbers of species or individuals of a single species or other metrics when compared to reference site(s). The analysis should rely on measurements from at least two stations. Comparisons to reference site conditions shall be made during similar season and/or hydrologic conditions.

Association of chemical concentrations, temperature, dissolved oxygen, trash, and other pollutants shall be determined using sections 3.1, 3.2, 3.6, 3.7, 6.1.5.9, or other applicable sections.

For population or community degradation related to sedimentation, the water segment shall be placed on the section 303(d) list if degraded populations or communities are identified and effects are associated with clean sediment loads in water or with loads stored in the channel when compared to evaluation guidelines (satisfying the conditions of section 6.1.3) using the binomial distribution as described in section 3.1 or as compared to reference sites.

Bioassessment data used for listing decisions shall be consistent with section 6.1.5.8. For bioassessment, measurements at one stream reach may be sufficient to warrant listing provided that the impairment is associated with a pollutant(s) as described in this section.

3.10 Trends in Water Quality

A water segment shall be placed on the section 303(d) list if the water segment exhibits concentrations of pollutants or water body conditions for any listing factor that shows a trend of declining water quality standards attainment. This section is focused on addressing the antidegradation component of water quality standards and threatened waters as defined in 40 CFR 130.2(j) by identifying trends of declining water quality. Numeric, pollutant-specific water quality objectives need not be exceeded to satisfy this listing factor. In assessing trends in water quality the Regional Water Board shall:

1. Use data collected for at least three years;
2. Establish specific baseline conditions;
3. Specify statistical approaches used to evaluate the declining trend in water quality measurements;
4. Specify the influence of seasonal effects, interannual effects, changes in monitoring methods, changes in analysis of samples, and other factors deemed appropriate;
5. Determine the occurrence of adverse biological response (section 3.8), degradation of biological populations and communities (section 3.9), or toxicity (section 3.6); and

6. Assess whether the declining trend in water quality is expected to not meet water quality standards by the next listing cycle.

Waters shall be placed on the section 303(d) list if the declining trend in water quality is substantiated (steps 1 through 4 above) and impacts are observed (step 5).

3.11 Situation-Specific Weight of Evidence Listing Factor

When all other Listing Factors do not result in the listing of a water segment but information indicates non-attainment of standards, a water segment shall be evaluated to determine whether the weight of evidence demonstrates that a water quality standard is not attained. If the weight of evidence indicates non-attainment, the water segment shall be placed on the section 303(d) list.

When making a listing decision based on the situation-specific weight of evidence, the Regional Water Board must justify its recommendation by:

- Providing any data or information including current conditions supporting the decision;
- Describing in fact sheets how the data or information affords a substantial basis in fact from which the decision can be reasonably inferred;
- Demonstrating that the weight of evidence of the data and information indicate that the water quality standard is not attained; and
- Demonstrating that the approach used is scientifically defensible and reproducible.

TABLE 3.1: MINIMUM NUMBER OF MEASURED EXCEEDANCES NEEDED TO PLACE A WATER SEGMENT ON THE SECTION 303(D) LIST FOR TOXICANTS.

Null Hypothesis: Actual exceedance proportion < 3 percent.
Alternate Hypothesis: Actual exceedance proportion > 18 percent.
The minimum effect size is 15 percent.

Sample Size	List if the number of exceedances equal or is greater than
2 – 24	2*
25 – 36	3
37 – 47	4
48 – 59	5
60 – 71	6
72 – 82	7
83 – 94	8
95 – 106	9
107 – 117	10
118 – 129	11

*Application of the binomial test requires a minimum sample size of 16. The number of exceedances required using the binomial test at a sample size of 16 is extended to smaller sample sizes.

For sample sizes greater than 129, the minimum number of measured exceedances is established where α and $\beta < 0.2$ and where $|\alpha - \beta|$ is minimized.

α = Excel® Function BINOMDIST(n-k, n, 1 – 0.03, TRUE)

β = Excel® Function BINOMDIST(k-1, n, 0.18, TRUE)

where n = the number of samples,

k = minimum number of measured exceedances to place a water on the section 303(d) list,

0.03 = acceptable exceedance proportion, and

0.18 = unacceptable exceedance proportion.

Expanded tables up to 20,000 samples can be found on the State Water Board website located at:

www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303d_binomial_tables.xls

TABLE 3.2: MINIMUM NUMBER OF MEASURED EXCEEDANCES NEEDED TO PLACE A WATER SEGMENT ON THE SECTION 303(D) LIST FOR CONVENTIONAL OR OTHER POLLUTANTS.	
<i>Null Hypothesis: Actual exceedance proportion < 10 percent.</i>	
<i>Alternate Hypothesis: Actual proportion > 25 percent.</i>	
<i>The minimum effect size is 15 percent.</i>	
Sample Size	List if the number of exceedances equal or is greater than
5 – 30	5*
31 – 36	6
37 – 42	7
43 – 48	8
49 – 54	9
55 – 60	10
61 – 66	11
67 – 72	12
73 – 78	13
79 – 84	14
85 – 91	15
92 – 97	16
98 – 103	17
104 – 109	18
110 – 115	19
116 – 121	20

*Application of the binomial test requires a minimum sample size of 26. The number of exceedances required using the binomial test at a sample size of 26 is extended to smaller sample sizes.

For sample sizes greater than 121, the minimum number of measured exceedances is established where α and $\beta < 0.2$ and where $|\alpha - \beta|$ is minimized.

α = Excel® Function BINOMDIST(n-k, n, 1 – 0.10, TRUE)

β = Excel® Function BINOMDIST(k-1, n, 0.25, TRUE)

where n = the number of samples,

k = minimum number of measured exceedances to place a water segment on section 303(d) list,

0.10 = acceptable exceedance proportion, and

0.25 = unacceptable exceedance proportion.

Expanded tables up to 20,000 samples can be found on the State Water Board website located at:

www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303d_binomial_tables.xls

4 California Delisting Factors

This section provides the methodology for removing waters from the section 303(d) list (including the Water Quality Limited Segments category and Water Quality Limited Segments Being Addressed category).

All listings of water segments shall be removed from the section 303(d) list if the listing was based on faulty data, and it is demonstrated that the listing would not have occurred in the absence of such faulty data. Faulty data include, but are not limited to, typographical errors, improper quality assurance/quality control procedures, or limitations related to the analytical methods that would lead to improper conclusions regarding the water quality status of the segment.

If objectives or standards have been revised and the site or water meets water quality standards, the water segment shall be removed from the section 303(d) list. The listing of a segment shall be reevaluated if the water quality standard has been changed.

Any interested party may request an existing listing be reassessed under the delisting factors of this Policy. In requesting the reevaluation, the interested party must, using the delisting factors: state the reason(s) the listing is inappropriate and the Policy would lead to a different outcome; and provide the data and information necessary to enable the Regional Water Board and the State Water Board to conduct the review.

Water segments or pollutants shall be removed from the section 303(d) list if any of the following conditions are met.

4.1 Numeric Water Quality Objectives, Criteria, or Standards for Toxicants in Water

Numeric water quality objectives for toxic pollutants, including maximum contaminant levels where applicable, or California/National Toxics Rule water quality criteria are not exceeded as follows:

- Using the binomial distribution, waters shall be removed from the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 4.1.
- The binomial distribution cannot be used to support a delisting with sample sizes less than 28.

4.2 Numeric Water Quality Objectives for Conventional or Other Pollutants in Water

Numeric water quality objectives for conventional pollutants are not exceeded as follows:

- Using the binomial distribution, waters shall be removed from the section 303(d) list if the number of measured exceedances supports rejection of the null hypothesis as presented in Table 4.2.
- The binomial distribution cannot be used to support a delisting with sample sizes less than 26.

4.3 Numeric Water Quality Objectives for Bacteria in Water

Numeric water quality objectives or standards for bacteria are not exceeded using the binomial distribution as described in section 4.2. If a site-specific exceedance frequency was used to place the water on the section 303(d) list, then the same exceedance frequency shall be used in the assessment to remove waters from the section 303(d) list. To the extent possible and allowed by water quality objectives, the Regional Water Boards shall identify one or more reference beaches or water segments in a relatively unimpacted watershed to compare the measurements. A binomial table specific to delisting coastal beaches can be found on the State Water Board's website at:

www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303d_binomial_tables.xls

4.4 Health Advisories

The health advisory used to list the water segment has been removed or the chemical or biological contaminant-specific evaluation guideline for tissue is no longer exceeded.

4.5 Bioaccumulation of Pollutants in Aquatic Life Tissue

Numeric pollutant-specific evaluation guidelines are not exceeded using the binomial distribution as described in section 4.1.

4.6 Water/Sediment Toxicity

Water/Sediment Toxicity or associated water or sediment quality guidelines are not exceeded using the binomial distribution as described in section 4.1.

4.7 Nuisance

The water segment no longer satisfies the conditions for a nuisance listing or associated numerical water or sediment data meets any one of the following:

4.7.1 Nutrient-related

For excessive algae growth, unnatural foam, odor, taste, applicable numerical nutrient-related evaluation guidelines are not exceeded using the binomial distribution as described in section 4.1.

4.7.2 Other Types

Acceptable numerical evaluation guidelines are not exceeded using the binomial distribution as described in section 4.2 for color, oil sheen, turbidity, trash, taste, or odor not related to nutrients. These types of nuisance shall also be removed from the list when there is no significant nuisance condition when compared to reference conditions.

4.8 Adverse Biological Response

Adverse biological response is no longer evident or associated water or sediment numeric pollutant-specific evaluation guidelines are not exceeded using the binomial distribution as described in section 4.1.

4.9 Degradation of Biological Populations and Communities

Biological populations and communities degradation in the water segment is no longer evident as compared to reference site(s) or associated water or sediment numeric pollutant-specific evaluation guidelines are not exceeded using the binomial distribution as described in section 4.1.

4.10 Trends in Water Quality

The factors for assessing trends in water quality (section 3.10) are not substantiated (steps 1 through 4) or impacts are no longer observed (step 5).

4.11 Situation-Specific Weight of Evidence Delisting Factor

When all other Delisting Factors do not result in the delisting of a water segment but information indicates attainment of standards, a water segment shall be evaluated to determine whether the weight of evidence demonstrates that a water quality standard is attained. If the weight of evidence indicates attainment, the water segment shall be removed from the section 303(d) list. If warranted, a listing may be maintained if the weight of evidence indicates a water quality standard is not attained.

When making a delisting decision based on the situation-specific weight of evidence, the Regional Water Board must justify its recommendation by:

- Providing any data or information including current conditions supporting the decision;
- Describing in fact sheets how the data or information affords a substantial basis in fact from which the decision can be reasonably inferred;
- Demonstrating that the weight of evidence of the data and information indicates that the water quality standard is attained; and
- Demonstrating that the approach used is scientifically defensible and reproducible.

TABLE 4.1: MAXIMUM NUMBER OF MEASURED EXCEEDANCES ALLOWED TO REMOVE A WATER SEGMENT FROM THE SECTION 303(D) LIST FOR TOXICANTS.	
<p><i>Null Hypothesis: Actual exceedance proportion > 18 percent.</i> <i>Alternate Hypothesis: Actual proportion < 3 percent of the samples</i> <i>The minimum effect size is 15 percent.</i></p>	
Sample Size	Delist if the number of exceedances equal or is less than
28 – 36	2
37 – 47	3
48 – 59	4
60 – 71	5
72 – 82	6
83 – 94	7
95 – 106	8
107 – 117	9
118 – 129	10

For sample sizes greater than 129, the maximum number of measured exceedances allowed is established where α and $\beta < 0.10$ and where $|\alpha - \beta|$ is minimized.

α = Excel® Function BINOMDIST(k, n, 0.18, TRUE)
 β = Excel® Function BINOMDIST(n-k-1, n, 1 – 0.03, TRUE)
 where n = the number of samples,
 k = maximum number of measured exceedances allowed,
 0.03 = acceptable exceedance proportion, and
 0.18 = unacceptable exceedance proportion.

Expanded tables up to 20,000 samples can be found on the State Water Board website located at:

www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303d_binomial_tables.xls

TABLE 4.2: MAXIMUM NUMBER OF MEASURED EXCEEDANCES ALLOWED TO REMOVE A WATER SEGMENT FROM THE SECTION 303(D) LIST FOR CONVENTIONAL OR OTHER POLLUTANTS.

*Null Hypothesis: Actual exceedance proportion > 25 percent.
 Alternate Hypothesis: Actual exceedance proportion < 10 percent.
 The minimum effect size is 15 percent.*

Sample Size	Delist if the number of exceedances equal or is less than
26 – 30	4
31 – 36	5
37 – 42	6
43 – 48	7
49 – 54	8
55 – 60	9
61 – 66	10
67 – 72	11
73 – 78	12
79 – 84	13
85 – 91	14
92 – 97	15
98 – 103	16
104 – 109	17
110 – 115	18
116 – 121	19

For sample sizes greater than 121, the maximum number of exceedances allowed is established at α and $\beta < 0.2$ and where $|\alpha - \beta|$ is minimized.

α = Excel® Function BINOMDIST(k, n, 0.25, TRUE)

β = Excel® Function BINOMDIST(n-k-1, n, 1 – 0.1, TRUE)

where n = the number of samples,

k = maximum number of measured exceedances allowed,

0.10 = acceptable exceedance proportion, and

0.25 = unacceptable exceedance proportion.

Expanded tables up to 20,000 samples can be found on the State Water Board website located at:

www.waterboards.ca.gov/water_issues/programs/tmdl/docs/303d_binomial_tables.xls

5 TMDL Scheduling

A schedule shall be established by the Regional Water Boards and the State Water Board for waters on the section 303(d) list that identifies the TMDLs that will be established within the current listing cycle and the number of TMDLs scheduled to be developed thereafter.

For water quality limited segments needing a TMDL, RWQCBs shall develop a completion schedule in compliance with federal law and regulation based on, but not limited to, the following criteria:

- Water body significance (such as importance and extent of beneficial uses, threatened and endangered species concerns, and size of water body);
- Degree that water quality objectives are not met or beneficial uses are not attained or threatened (such as the severity of the pollution or number of pollutants/stressors of concern) [40 CFR 130.7(b)(4)];
- Degree of impairment;
- Potential threat to human health and the environment;
- Water quality benefits of activities ongoing in the watershed;
- Potential for beneficial use protection and recovery;
- Degree of public concern;
- Availability of funding; and
- Availability of data and information to address the water quality problem.

All water body-pollutant combinations on the section 303(d) list shall be assigned a TMDL schedule date.

6 Policy Implementation

This section provides the State Water Board guidance on implementation of this Policy. The most recently completed section 303(d) list shall form the basis for any subsequent lists.

6.1 Process for Evaluation of Readily Available Data and Information

All readily available data and information shall be evaluated. To develop the section 303(d) list the Regional Water Boards and the State Water Board shall use the following process.

6.1.1 Definition of Readily Available Data and Information

The Regional Water Boards and the State Water Board shall actively solicit all readily available data and information. The Regional Water Boards shall review all readily available data and information that has been submitted in response to the solicitation, including but not limited to data that is submitted by the Regional Water Boards, the State Water Board, and other sources. "Readily available data and information" is data and information that can be submitted to the California Environmental Data Exchange Network (CEDEN) or its successor database, as directed in the notice of solicitation. If CEDEN is unable to accept a particular subset of data and information, the State Water Board or the Regional Water Board will accept that data and information if it meets the formatting and quality assurance requirements detailed in section 6.1.4 of the Policy and the notice of solicitation for the current listing cycle.

6.1.2 Administration of the Listing Process

6.1.2.1 Solicitation of All Readily Available Data and Information

In its notice of solicitation, the State Water Board shall identify the database in which data and information shall be submitted and which Regional Water Boards shall administer the listing process for that listing cycle and whether the State Water Board will administer a particular Regional Water Board's listing process, pursuant to section 6.2, for that region. If a Regional Water Board is "off cycle" pursuant to the State Water Board's notice of solicitation, that Regional Water Board or State Water Board may administer the process for one or more water segments that would result in a direct listing change from the previous listing cycle pursuant to section 6.2. In accordance with the listing cycle, the State Water Board and the Regional Water Boards shall seek all readily available data and information on the quality of surface waters of the State. Readily available data and information shall be solicited from any interested party, including but not limited to, private citizens, public agencies, state and federal governmental agencies, non-profit organizations, and businesses possessing data and information regarding the quality of the Region's waters.

Though the State Water Board and the Regional Water Boards must specifically solicit all readily available data and assessment information, the State Water Board and the Regional Water Board may place emphasis in the solicitation on the data and information generated since the last listing cycle. For the purposes of this solicitation, information means any documentation describing the water quality condition of a surface water body. Data are considered a subset of information that consists of reports detailing measurements of specific environmental characteristics. The data and information may pertain to physical, chemical, and/or biological conditions of the State's waters or watersheds.

Information solicited should contain the following:

- The name of the person or organization providing the information;
- The name of the person certifying the completeness and accuracy of the data and information and a statement describing the standards exceedance;
- Mailing address, telephone numbers, and email address of a contact person for the information provided;
- A copy of all information provided. The submittal must specify the software used to format the information and provide definitions for any codes or abbreviations used;
- Bibliographic citations for all information provided; and
- If computer model outputs are included in the information, provide bibliographic citations and specify any calibration and quality assurance information available for the model(s) used.

Data solicited should contain the following:

- Data in electronic form, spreadsheet, database, or ASCII formats. The submittal should use the SWAMP data format and should define any codes or abbreviations used in the database.
- Metadata for the field data, i.e., when measurements were taken, locations, number of samples, detection limits, and other relevant factors.
- Metadata for any Geographical Information System data must be included. The metadata must detail all the parameters of the projection, including datum.
- A copy of the quality assurance procedures.
- A copy of the data.
- Data from citizen volunteer water quality monitoring efforts require the name of the group and indication of any training in water quality assessment completed by members of the group. Data submitted by citizen monitoring groups should meet the data quality assurance procedures as detailed in section 6.1.4.
- For photographic documentation, adhere to the guidelines detailed in section 6.1.4.

Data and information previously submitted to the Regional Water Boards, such as Discharge Monitoring Reports, need not be solicited if the data and information remain available to the Regional Water Boards.

6.1.2.2 Regional Water Board Fact Sheet Preparation

When data and information are available, the Regional Water Board shall prepare a standardized fact sheet for each water and pollutant combination that is proposed for inclusion in or deletion from the section 303(d) list. Fact sheets shall present a description of the line(s) of evidence used to support each component of the weight of evidence approach. Fact sheets shall be prepared for all data and information solicited. If the data and information reviewed indicate standards are attained, a single fact sheet may address multiple water and pollutant combinations.

The fact sheets shall contain the following:

- A. Region
- B. Type of water body (Bay and Harbors, Coastal Shoreline, Estuary, Lake/Reservoir, Ocean, Rivers/Stream, Saline Lake, Tidal Wetlands, Freshwater Wetland)
- C. Name of water body segment (including Calwater watershed)
- D. Pollutant or type of pollution that appears to be responsible for standards exceedance
- E. Medium (water, sediment, tissue, habitat, etc.)

- F. Water quality standards (copy applicable water quality standard, objective, or criterion from appropriate plan or regulation) including:
 - 1. Beneficial use affected
 - 2. Numeric water quality objective/water quality criteria plus metric (single value threshold, mean, median, etc.) or narrative water quality objective plus guideline(s) used to interpret attainment or non-attainment
 - 3. Antidegradation considerations (if applicable to situation)
 - 4. Any other provision of the standard used
- G. Brief Watershed Description (e.g., land use, precipitation patterns, or other factors considered in the assessment)
- H. Summary of data and/or information
 - 1. Spatial representation, area that beneficial use is affected or determined to be supported, including a map, any site specific information, and reference condition
 - 2. Temporal representation
 - 3. Age of data and/or information
 - 4. Effect of seasonality and events/conditions that might influence data and/or information evaluation (e.g., storms, flow conditions, laboratory data qualifiers, etc.)
 - 5. Number of samples or observations
 - 6. Number of samples or observations exceeding guideline or standard
 - 7. Source of or reference for data and/or information
- I. For numeric data include:
 - 1. Quality assurance assessment
- J. For non-numeric data include:
 - 1. Types of observations
 - 2. Perspective on magnitude of problem
 - 3. Numeric indices derived from qualitative data
- K. Potential source of pollutant (the source category should be identified as specifically as possible)
- L. Program(s) addressing the problem, if known
- M. Data evaluation as required by sections 3 or 4 of this Policy
- N. Recommendation
- O. TMDL schedule (developed only for the section 303(d) list as required by section 5 of this Policy).

6.1.3 Evaluation Guideline Selection Process

Narrative water quality objectives shall be evaluated using evaluation guidelines. When evaluating narrative water quality objectives or beneficial use protection, the Regional Water Boards and the State Water Board shall identify evaluation guidelines that represent standards attainment or beneficial use protection. The guidelines are not water quality objectives and shall only be used for the purpose of developing the section 303(d) list.

To select an evaluation guideline, the Regional Water Board or the State Water Board shall:

- Identify the water body, pollutants, and beneficial uses;
- Identify the narrative water quality objectives or applicable water quality criteria;
- Identify the appropriate interpretive evaluation guideline that potentially represents water quality objective attainment or protection of beneficial uses. If this Policy requires evaluation values to be used as one line of evidence, the evaluation value selected shall be used in concert with the other required line(s) of evidence to support the listing or delisting decision.

Depending on the beneficial use and narrative standard, the following considerations shall be used in the selection of evaluation guidelines:

1. Sediment Quality Guidelines for Marine, Estuarine, and Freshwater Sediments:
 - A. If sediment quality objectives apply, the Regional Water Boards shall use the methods and procedures that were adopted to interpret the objective and any provisions adopted to develop the section 303(d) list.
 - B. If no applicable sediment quality objectives apply, or insufficient data exists to interpret sediment quality objectives, the Regional Water Boards may select sediment quality guidelines that have been published in the peer-reviewed literature or by state or federal agencies. Acceptable guidelines include selected values (e.g., effects range-median, probable effects level, probable effects concentration), and other sediment quality guidelines. Only those sediment guidelines that are predictive of sediment toxicity shall be used (i.e., those guidelines that have been shown in published studies to be predictive of sediment toxicity in 50 percent or more of the samples analyzed).
2. Evaluation Guidelines for Protection from the Consumption of Fish and Shellfish:

The Regional Water Boards may select evaluation guidelines published by U.S. EPA or OEHHA. Maximum Tissue Residue Levels (MTRLs) and Elevated Data Levels (EDLs) shall not be used to evaluate fish or shellfish tissue data.
3. Evaluation Guidelines for Protection of Aquatic Life from Bioaccumulation of Toxic Substances: The Regional Water Boards may select the evaluation values for the protection of aquatic life published by the National Academy of Science.

For other parameters, evaluation guidelines may be used if it can be demonstrated that the evaluation guideline is:

- Applicable to the beneficial use
- Protective of the beneficial use
- Linked to the pollutant under consideration
- Scientifically-based and peer reviewed
- Well described
- Identifies a range above which impacts occur and below which no or few impacts are predicted. For non-threshold chemicals, risk levels shall be consistent with comparable water quality objectives or water quality criteria.

The Regional Water Boards shall assess the appropriateness of the guideline in the hydrographic unit. Justification for the alternate evaluation guidelines shall be referenced in the water body fact sheet.

6.1.4 Data Quality Assessment Process

Even though all data and information must be considered, the quality of the data used in the development of the section 303(d) list shall be of sufficient high quality to make determinations of water quality standards attainment. Data supported by a Quality Assurance Project Plan (QAPP) pursuant to the requirements of 40 CFR 31.45 are acceptable for use in developing the section 303(d) list.

The data from major monitoring programs in California and published U.S. Geological Survey (USGS) reports are considered of adequate quality. The major programs include SWAMP, the Southern California Bight Projects of the Southern California Coastal Water Research Project, U.S. EPA's Environmental Monitoring and Assessment Program, the Regional Monitoring Program of the San Francisco Estuary Institute, and the BPTCP.

Numeric data are considered credible and relevant for listing purposes if the data set submitted meets the minimum quality assurance/quality control requirements outlined below. A QAPP or equivalent documentation must be available containing, at a minimum, the following elements:

- Objectives of the study, project, or monitoring program;
- Methods used for sample collection and handling;
- Field and laboratory measurement and analysis;
- Data management, validation, and recordkeeping (including proper chain of custody) procedures;
- Quality assurance and quality control requirements;
- A statement certifying the adequacy of the QAPP (plus name of person certifying the document); and
- A description of personnel training.

A site-specific or project-specific sampling and analysis plan for numeric data should also be available containing:

- Data quality objectives or requirements of the project;
- A statement that data quality objectives or requirements were achieved;
- Rationale for the selection of sampling sites, water quality parameters, sampling frequency and methods that assure the samples are spatially and temporally representative of the surface water and representative of conditions within the targeted sampling timeframe; and
- Documentation to support the conclusion that results are reproducible.

The Regional Water Boards shall make a finding in the fact sheets on the availability of the QAPP (or equivalent), adequacy of data collection, analysis practices, and adequacy of the data verification process (including the chain of custody, detection limits, holding times, statistical treatment of data, precision and bias, etc). If any data quality objectives or requirements in the QAPP are not met, the reason for not meeting them and the potential impact on the overall assessment shall be documented.

Data without rigorous quality control can be used in combination with high quality data and information. If the data collection and analysis is not supported by a QAPP (or equivalent) or if it is not possible to tell if the data collection and analysis were supported by a QAPP (or equivalent), then the data and information should not be used by itself to support listing or delisting of a water segment. All data of whatever quality can be used as part of a weight of evidence determination (sections 3.11 or 4.11).

For narrative and qualitative submittals, the submission must:

- describe events or conditions that indicate impacts on water quality;

- provide linkage between the measurement endpoint (e.g., a study that may have been performed for some other purpose) and the water quality standard of interest;
- be scientifically defensible;
- provide analyst's credentials and training; and
- be verifiable by the State Water Board or the Regional Water Board.

For photographic documentation, the submission must:

- identify the date;
- identify location on a general area map;
- either mark location on a USGS 7.5 minute quad map along with quad sheet name or provide location latitude/longitude;
- provide a thorough description of photograph(s);
- describe the spatial and temporal representation of the photographs;
- provide linkage between photograph-represented condition and condition that indicates impacts on water quality;
- provide photographer's rationale for area photographed and camera settings used; and
- be verifiable by the State Water Board and the Regional Water Board.

6.1.5 Data Quantity Assessment Process

Before determining if water quality standards are exceeded, the Regional Water Boards have wide discretion establishing how data and information are to be evaluated, including the flexibility to establish water segmentation, as well as the scale of spatial and temporal data and information that are to be reviewed. The following considerations shall be documented in each water body fact sheet.

6.1.5.1 Water Body Specific Information

Data used to assess water quality standards attainment should be actual data that can be quantified and qualified. Information that is descriptive, estimated, modeled, or projected may be used as ancillary lines of evidence for listing or delisting decisions. In order to be used in developing the lists:

- Data must be measured at one or more sites in the water segment;
- If applicable and available, environmental conditions in a water body or at a site must be taken into consideration (e.g., effects of seasonality, events such as storms, the occurrence of wildfires, land use practices, etc.); and
- The fact sheet shall contain a description of readily available pertinent factors such as the depth of water quality measurements, flow, hardness, pH, the extent of tidal influence, and other relevant sample- and water body-specific factors.

6.1.5.2 Spatial Representation

Samples should be representative of the water body segment. To the extent possible, samples should represent statistically or in a consistent targeted manner the segment of the water body.

Samples collected within 200 meters of each other should be considered samples from the same station or location. However, samples less than 200 meters apart may be considered to be spatially independent samples if justified in the water body fact sheet.

6.1.5.3 Temporal Representation

Samples should be representative of the critical timing that the pollutant is expected to impact the water body. Samples used in the assessment must be temporally independent. If the majority of samples were collected on a single day or during a single short-term natural event (e.g., a storm, flood, or wildfire), the data shall not be used as the primary data set supporting the listing decision.

Documentation should include the time of day in which the sample was taken, and, to the extent possible, the critical season for the pollutant and applicable water quality standard. In general, samples should be available from two or more seasons or from two or more events when effects or water quality objective exceedances would be expected to be clearly manifested.

Sampling ephemeral waters, during a specific season, or during human-caused events (except spills) should be used to assess significant pollutant-related exceedances of water quality standards. Timing of the sampling should include the critical season for the pollutant and applicable water quality standard. If the implementation of a management practice(s) has resulted in a change in the water body segment, only recently collected data [since the implementation of the management measure(s)] should be considered. The water quality fact sheet should describe the significance of the sample timing.

6.1.5.4 Aggregation of Data by Reach/Area

At a minimum, data shall be aggregated by the water body segments as defined in the Basin Plans. In the absence of a Basin Plan segmentation system, the Regional Water Boards should define distinct reaches based on hydrology and relatively homogeneous land use.

If available data suggest that a pollutant may cause an excursion above a water quality objective, the Regional Water Board should, to the extent information is readily available, identify land uses, subwatersheds, tributaries, or dischargers that could be contributing the pollutant to the water body. The Regional Water Boards should identify stream reaches or lake/estuary areas that may have different pollutant levels based on significant differences in land use, tributary inflow, or discharge input. Based on these evaluations of the water body setting, the Regional Water Boards should aggregate the data by appropriate reach or area.

Data must be measured at one or more sites in the water segment in order to place a water segment on the section 303(d) list.

6.1.5.5 Quantitation of Chemical Concentrations

When available data are less than or equal to the quantitation limit and the quantitation limit is less than or equal to the water quality standard, the value will be considered as meeting the water quality standard, objective, criterion, or evaluation guideline.

When the sample value is less than the quantitation limit and the quantitation limit is greater than the water quality standard, objective, criterion, or evaluation guideline, the result shall not be used in the analysis.

The quantitation limit includes the minimum level, practical quantitation level, or reporting limit.

6.1.5.6 Evaluation of Data Consistent with the Expression of Numeric Water Quality Objectives, Water Quality Criteria, or Evaluation Guidelines

If the water quality objectives, criteria, or guidelines state a specific averaging period and/or mathematical transformation, the data should be evaluated in a consistent manner prior to

conducting any statistical analysis for placement of the water on the section 303(d) list. If sufficient data are not available for the stated averaging period, the available data shall be used to represent the averaging period.

To be considered temporally independent, samples collected during the averaging period shall be combined and considered one sampling event. For data that is not temporally independent (e.g., when multiple samples are collected at a single location on the same day), the measurements shall be combined and represented by a single resultant value. For dissolved oxygen measurements, the minimum value shall be used to determine compliance with the water quality objective. For pH measurements, the minimum or maximum values of the data set shall be used to determine compliance with the water quality objective.

If the averaging period is not stated for the standard, objective, criterion, or evaluation guideline, then the samples collected less than 7 days apart shall be averaged.

6.1.5.7 Binomial Model Statistical Evaluation

Once data have been summarized, the Regional Water Boards shall determine if standards are exceeded. The Regional Water Boards shall determine for each averaging period which data points exceed water quality standards. The number of measurements that exceed standards shall be reported in the water body fact sheet.

When numerical data are evaluated, all of the following steps shall be completed:

- A. For each data point representing the averaging period, the Regional Water Board shall answer the question: Are water quality standards met?
- B. If the measurement is greater than the water quality standard, objective, criterion, or evaluation guideline, then the standard is exceeded.
- C. Sum the number of samples exceeding the standard, objective, criterion, or evaluation guideline.
- D. Sum the total number of measurements (sample population).
- E. Compare the result to the appropriate table (i.e., Tables 3.1, 3.2, 4.1, or 4.2).
- F. Report the result of this comparison in the water body fact sheet.

6.1.5.8 Evaluation of Bioassessment Data

When evaluating biological data and information, the Regional Water Boards shall evaluate all readily available data and information and shall:

- Identify appropriate reference sites within water segments, watersheds, or ecoregions. Document methods for selection of reference sites.
- Evaluate bioassessment data at reference sites using water segment-appropriate method(s) and index period(s). Document sampling methods, index periods, and Quality Assurance/Quality Control procedures for the habitat being sampled and question(s) being asked.

- Evaluate bioassessment data from other sites, and compare to reference conditions. Evaluate physical habitat data and other water quality data, when available, to support conclusions about the status of the water segment.
- Calculate biological metrics for reference sites and develop Index of Biological Integrity if possible.

6.1.5.9 Evaluation of Temperature Data

Temperature water quality objectives shall be evaluated as described in sections 6.1.5.1 through 6.1.5.7. When “historic” or “natural” temperature data are not available, alternative approaches shall be employed to assess temperature impacts.

In the absence of necessary data to interpret numeric water quality objectives, recent temperature monitoring data shall be compared to the temperature requirements of aquatic life in the water segment. In many cases, fisheries, particularly salmonids, represent the beneficial uses most sensitive to temperature. Information on current and historic conditions and distribution of sensitive beneficial uses (e.g., fishery resources) in the water segment is necessary, as well as recent temperature data reflective of conditions experienced by the most sensitive life stage of the aquatic life species. If temperature data from past (historic) periods corresponding to times when the beneficial use was fully supported are not available, information about presence/absence or abundance of sensitive aquatic life species shall be used to infer past (historic) temperature conditions if loss of habitat, diversions, toxic spills, and other factors are also considered.

Determination of life stage temperature requirements of sensitive aquatic life species shall be based on peer-reviewed literature. Similarly, evaluation of temperature data shall be based on temperature metrics reflective of the temperature requirements for the sensitive aquatic life species, including but not limited to, the maximum weekly average temperature and upper lethal limit.

6.2 Approval of the Regional Water Board’s List

At a public hearing, the Regional Water Board shall consider and approve each proposed list change as documented in water body fact sheets. Advance notice and opportunity for public comment shall be provided. The Regional Water Board shall develop written responses to all comments. After consideration of all testimony, the Regional Water Boards shall approve a resolution in support of their recommendations for the section 303(d) list. The Regional Water Boards shall submit to the State Water Board the water body fact sheets, responses to comments, documentation of the hearing process, and identify all data and information considered. Requests for review of specific listing recommendations made by a Regional Water Board must be submitted to the State Water Board no later than 30 days after the date of the Regional Water Board’s approval.

At its election, the State Water Board may administer the listing process for each listing cycle. If the State Water Board administers and considers a region’s proposed list on behalf of a Regional Water Board, the State Water Board shall adopt the list at a public hearing. Such consideration and adoption shall occur after the State Water Board provides advance notice in the affected region and opportunity for public comment and responds to all comments. The State Water Board’s recommendations on behalf of a Regional Water Board shall be

consolidated into the statewide list submitted to U.S. EPA with the supporting fact sheets without further consideration.

6.3 Approval of Statewide List

The Regional Water Boards propose region-specific recommendations for the section 303(d) list. The State Water Board may receive public comments concerning those listing recommendations that are timely requested for review pursuant to section 6.2 and may make changes to the recommendations prior to submitting the section 303(d) list to U.S. EPA. Because U.S. EPA may change the State Water Board's recommended section 303(d) list, the section 303(d) list is only effective upon U.S. EPA's final approval.

The State Water Board shall evaluate the Regional Water Board's developed water body fact sheets for completeness, consistency with this Policy, and consistency with applicable law. The State Water Board shall assemble the fact sheets and consolidate the approved Regions' lists, into a statewide section 303(d) list.

The State Water Board Executive Director or the State Water Board shall approve the section 303(d) list. Before the Executive Director or the State Water Board approves the section 303(d) list, the State Water Board shall provide advance notice and opportunity for public comment. Public comment shall be limited to listing recommendations that are timely requested for review pursuant to section 6.2 unless the Executive Director or the State Water Board elects to consider recommendations on other waters. Upon approval by the Executive Director or State Water Board, the statewide section 303(d) list and supporting fact sheets shall be submitted to U.S. EPA for approval as required by the Clean Water Act.

7 Definitions

α (Alpha) is the statistical error of rejecting a null hypothesis that is true. This type of error is also called Type I error.

ALTERNATE HYPOTHESIS is a statement or claim that a statistical test is set up to establish.

β (Beta) is the statistical error of failing to reject a null hypothesis that is not true. This type of error is also called Type II error.

BINOMDIST is an Excel® function that is used to calculate the cumulative binomial distribution.

BINOMIAL DISTRIBUTION is a mathematical distribution that describes the probabilities associated with the possible number of times particular outcomes will occur in series of observations (i.e., samples). Each observation may have only one of two possible results (e.g., standard exceeded or standard not exceeded).

BIOACCUMULATION is the process by which a chemical is taken up by an organism from its surrounding medium through gill membranes, epithelial tissue, or from food and subsequently concentrated and retained in the body of the organism.

BIOASSESSMENT is an assessment of biological community information along with measures of the physical/habitat quality to determine, in the case of water quality, the integrity of a water body of interest.

CONVENTIONAL POLLUTANTS include dissolved oxygen, pH, and temperature.

DIEL measurements pertain to measurements taken over a 24-hour period of time.

EFFECT SIZE is maximum magnitude of exceedance frequency that is tolerated.

LISTING CYCLE refers to the two-year cycle that the State Water Board submits its section 303(d) list to U.S. EPA for approval.

NULL HYPOTHESIS is a statement used in statistical testing that has been put forward either because it is believed to be true or because it is to be used as a basis for argument, but has not been proved.

RANK CORRELATION is the association between paired values of two variables that have been replaced by their ranks within their respective samples (e.g., chemical measurements and response in a toxicity test).

REFERENCE CONDITION refers to the characteristics of water body segments least impaired by human activities. As such, reference conditions can be used to describe attainable biological or habitat conditions for water body segments with common watershed/catchment characteristics within defined geographical regions.

STATISTICAL SIGNIFICANCE occurs when it can be demonstrated that the probability of obtaining a difference by chance only is relatively low.

TOXICANTS include priority pollutants, metals, chlorine, and nutrients.

TOXICITY IDENTIFICATION EVALUATION (TIE) is a technique to identify the unexplained cause(s) of toxic events. TIE involves selectively removing classes of chemicals through a series of sample manipulations, effectively reducing complex mixtures of chemicals in natural waters to simple components for analysis. Following each manipulation the toxicity of the sample is assessed to see whether the toxicant class removed was responsible for the toxicity.

WATER QUALITY LIMITED SEGMENT is any segment of a water body where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards, even after application of technology-based effluent limitations required by CWA sections 301(d) or 306.