

**California Water Quality Monitoring
Collaboration Network Webinar**

Water Quality Goals

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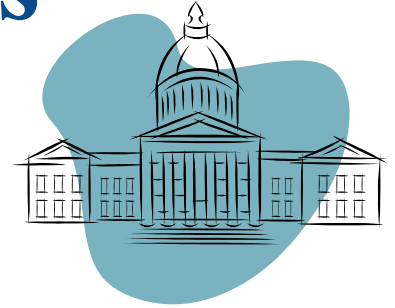
Main Concepts

- **How do we select numerical limits to protect water resources?**
 - ◆ **Porter-Cologne Water Quality Control Act**
 - ◆ **Water quality standards**
 - ◆ **State & Regional Water Board plans & policies**

What Will We Cover Today?

- **Statutes, regulations plans & policies relating to water quality standards**
- **Implementing narrative water quality objectives**
 - ◆ **Using numeric thresholds from other organizations and the peer reviewed literature**
- **Water quality goals**
 - ◆ **Report**
 - ◆ **Database and on-line resources**
- **Algorithms to select water quality assessment thresholds**

Water Quality Standards



Federal Clean Water Act—

- Provisions of state or federal law
- **Designated use** or uses for waters of the United States and
- **Water quality criteria** for such waters based upon such uses

[40 CFR 130.2(c) and 131.3(i)]

Water Quality Standards In California



- Found in the
Water Quality
Control Plans
(Basin Plans)
- Adopted by the
State and Regional
Water Boards



Water Quality Standards In California



Water Quality Standards include

- **Beneficial Use designations**
for each water body or portion thereof
- **Water Quality Objectives**
(criteria) to protect uses
- **Implementation Programs**
to achieve the objectives

Beneficial Uses of Waters of the State

California Water Code § 13050(f)

“Beneficial uses” of the waters of the state that may be protected against water quality degradation include, but are not necessarily limited to,

- ◆ **domestic, municipal, agricultural and industrial supply;**
- ◆ **power generation;**
- ◆ **recreation;**
- ◆ **esthetic enjoyment;**
- ◆ **navigation; and**
- ◆ **preservation and enhancement of fish, wildlife, and other aquatic resources or preserves.**

Water Quality Objectives

Water Code §13050(h)

“Water quality objectives” means

- **Limits or levels of water quality constituents or characteristics established for the**
 - ◆ **Reasonable protection of beneficial uses of water or the**
 - ◆ **Prevention of nuisance within a specific area**

Water Quality Objectives

Come in two forms

- **Numeric**

- ◆ **Specifies a concentration limit**

- **Narrative**

- ◆ **Describes a requirement or prohibits a condition harmful to beneficial uses**

Narrative Water Quality Objectives

language from the Central Valley Region Basin Plans

- **Chemical Constituents - General**
 - ◆ **Waters shall **not** contain chemical constituents in concentrations that **adversely affect beneficial uses****

Narrative Water Quality Objectives

language from the Central Valley Region Basin Plans

- **Chemical Constituents - MCLs**
 - ◆ **At a minimum, waters designated for use as domestic or municipal supply shall not contain concentrations of chemical constituents in excess of California drinking water Maximum Contaminant Levels (MCLs)**
 - ◆ **To protect all beneficial uses the Regional Water Board may apply limits more stringent than MCLs**

Narrative Water Quality Objectives

language from the Central Valley Region Basin Plans

■ Toxicity

- ◆ All waters shall be maintained free of toxic substances in concentrations that produce detrimental physiological responses in human, plant, animal, or aquatic life
- ◆ This objective applies regardless of whether the toxicity is caused by a single substance or the interactive effect of multiple substances



Narrative Water Quality Objectives

language from the Central Valley Region Basin Plans

■ Tastes & Odors

- ◆ **Water shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors**
 - to domestic or municipal water supplies or
 - to fish flesh or other edible products of aquatic origin or
 - that cause nuisance or
 - otherwise adversely affect beneficial uses



Toxicity vs. Taste & Odor



**California
Primary
MCL**

**Taste & Odor
Threshold**

Ethylbenzene

300 ug/L

29 ug/L

Toluene

150 ug/L

42 ug/L

Xylenes

1750 ug/L

17 ug/L

MTBE

13 ug/L

5 ug/L

California Toxics Rule (CTR)

- **Federal Clean Water Act**
 - ◆ All States required to have enforceable numerical water quality criteria for **priority toxic pollutants** in surface waters

- **National Toxics Rule (NTR) USEPA**
 - ◆ Promulgated in 1992 (amended in 1995 & 1999)
 - ◆ Numerical NTR criteria for many states' waters

- **California Toxics Rule USEPA**
 - ◆ Promulgated 18 May 2000 (amended Feb 2001)
 - ◆ NTR criteria still in effect
 - ◆ Numerical CTR criteria for California waters

Enforceable Water Quality Standards



- **Two scenarios in California**

- Water Quality Objectives**
 - + Basin Plan Beneficial Use Designations**

- CTR and NTR Criteria**
 - + Basin Plan Beneficial Use Designations**

Policy for Application of Water Quality Objectives

from the Implementation Chapter of the **Central Valley** Region Basin Plans

■ Narrative Objectives

- ◆ Implement with numeric limits in orders
- ◆ Evaluate compliance by considering
 - Direct evidence of beneficial use impacts
 - All material and relevant information submitted by the discharger and other interested parties
 - Relevant numeric criteria and guidelines from other agencies and organizations
 - see *“A Compilation of Water Quality Goals”*

Application of Water Quality Objectives

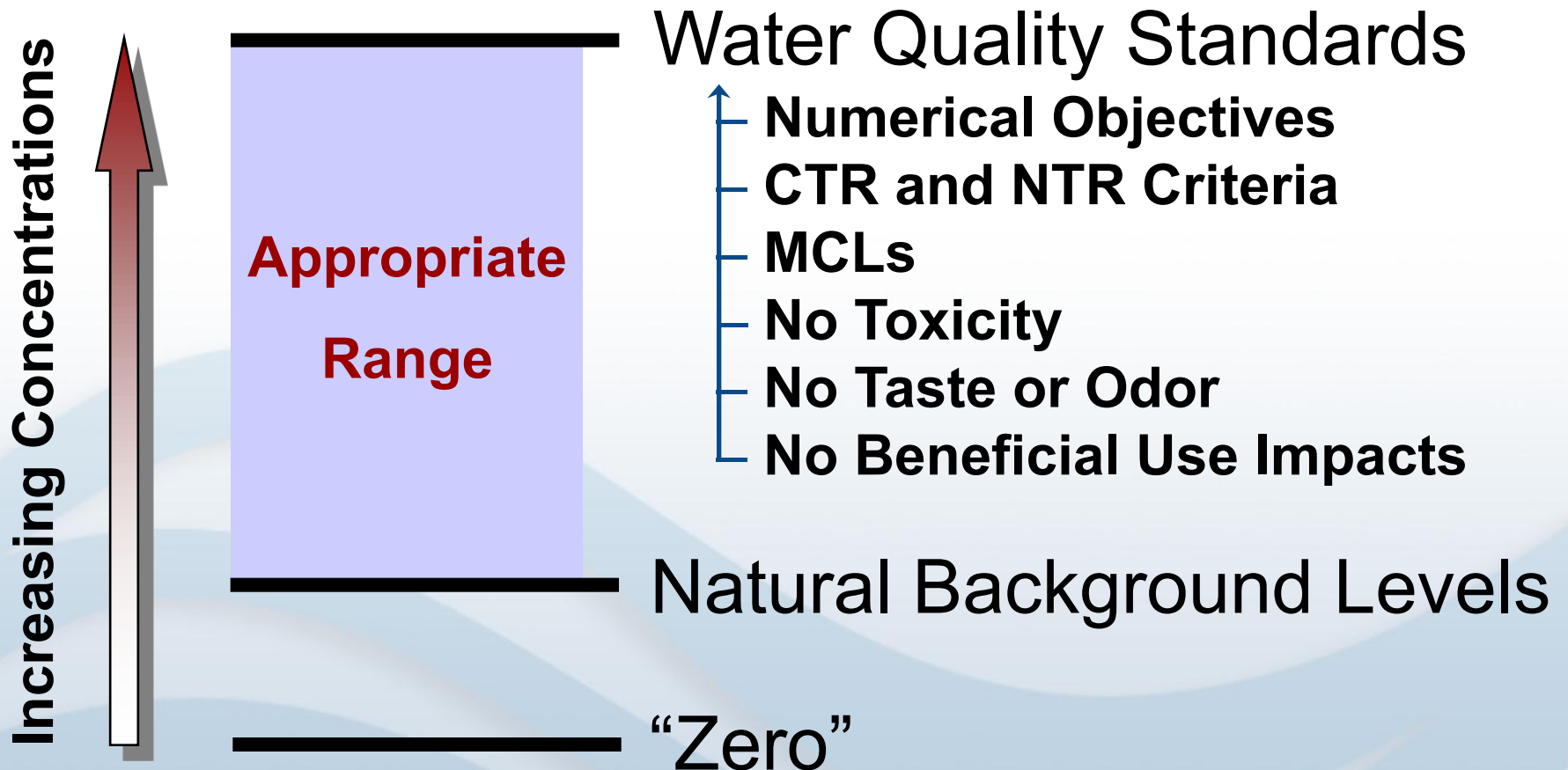
from the Implementation Chapter of the SF Bay Region Basin Plan

- **To evaluate compliance with water quality objectives, Board will consider**
 - ◆ **All relevant and scientifically valid evidence**
 - ◆ **Including numerical criteria and guidelines developed and/or published by other agencies and organizations**
 - Summarized in
“A Compilation of Water Quality Goals”

Minimum & Maximum Levels

- **Water Quality Objectives + CTR & NTR Criteria**
define the least stringent limits imposed on ambient water quality
- **Natural Background**
defines the most stringent limits imposed on ambient water quality
 - ◆ Antidegradation Policy (68-16)
 - ◆ Site Assessment and Cleanup Policy (92-49)

Appropriate Range of Water Quality to Protect Beneficial Uses



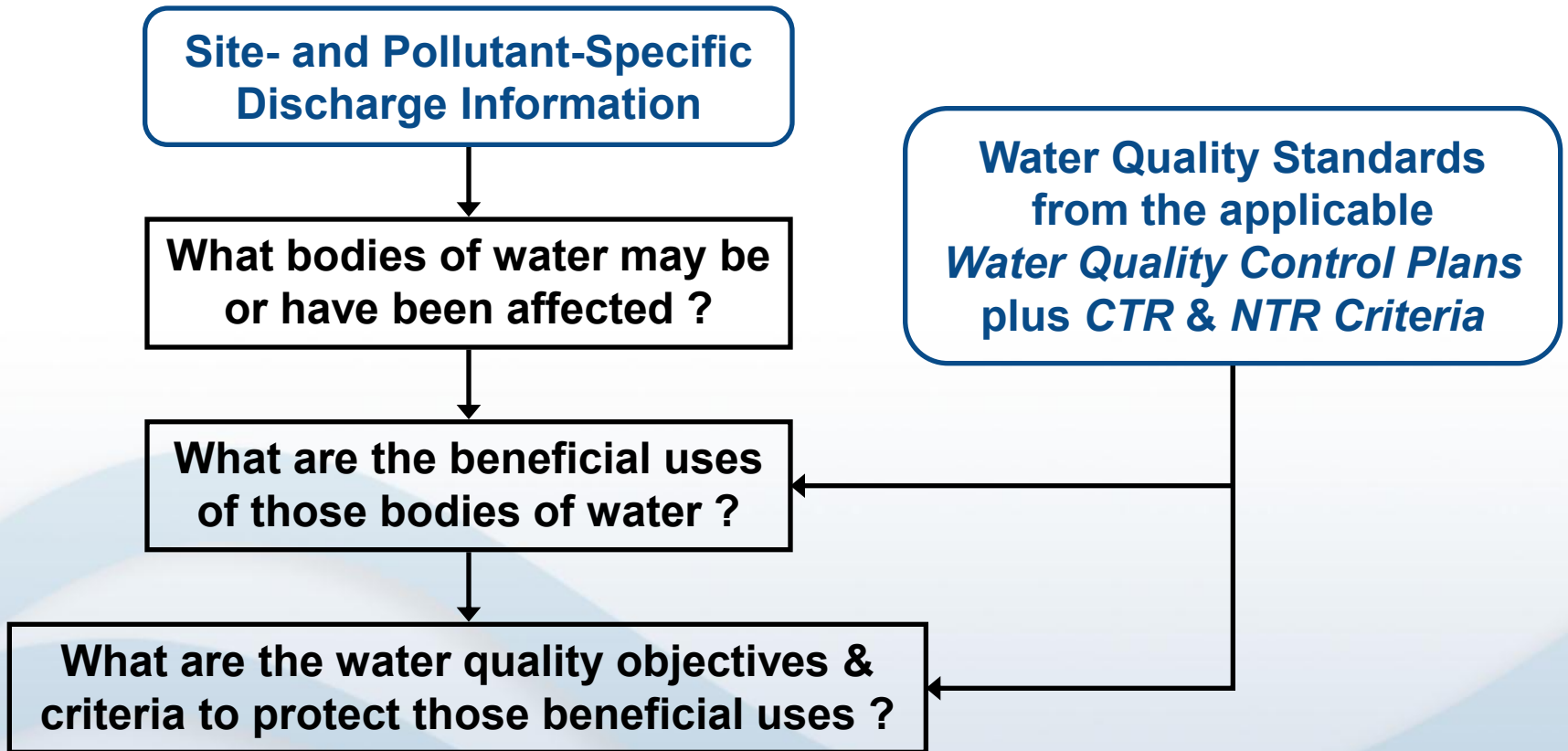
Selecting Assessment Thresholds

**Site- and Pollutant-Specific
Discharge Information**

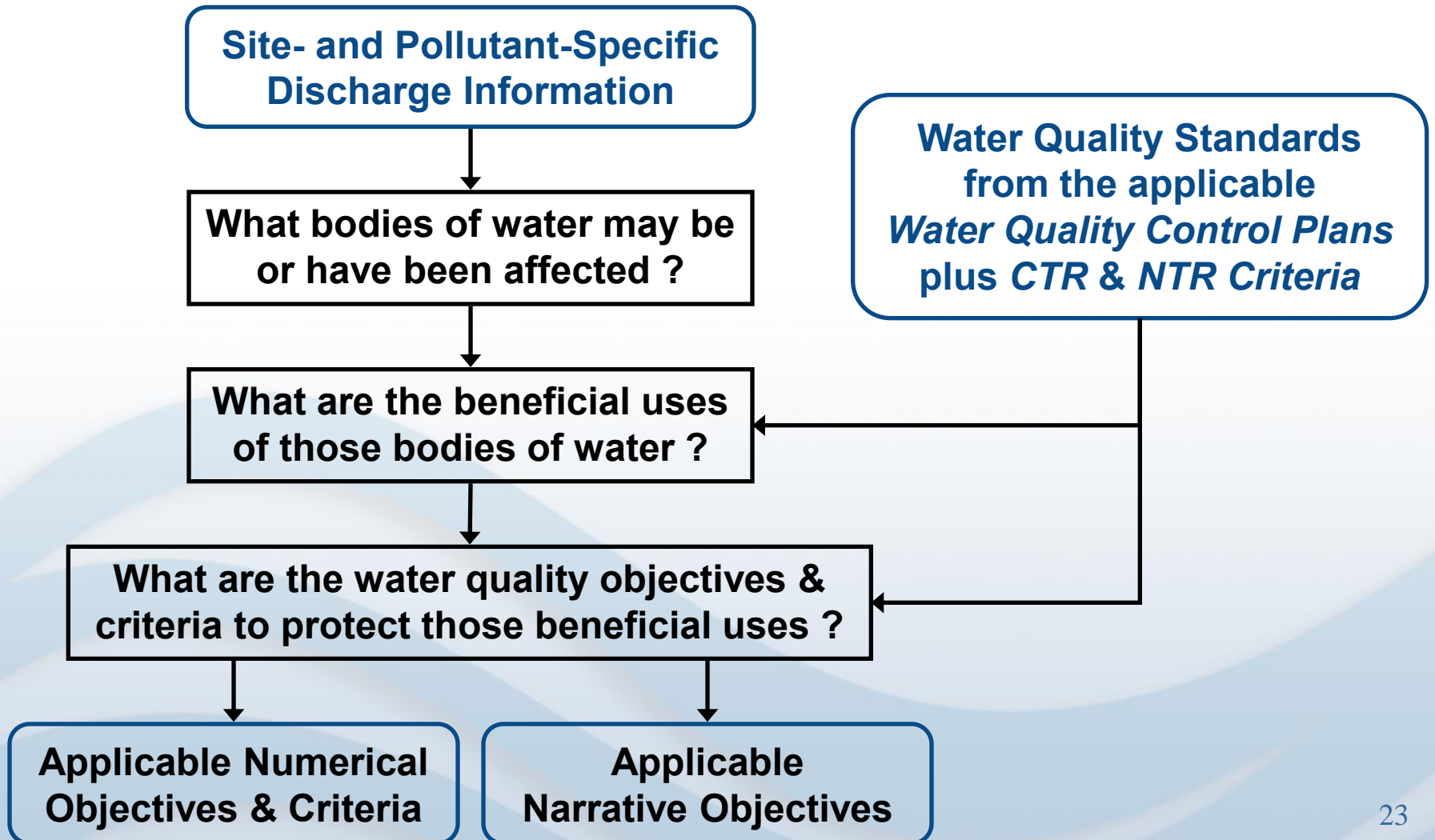


**What bodies of water may be
or have been affected ?**

Selecting Assessment Thresholds



Selecting Assessment Thresholds



Selecting Assessment Thresholds

**Applicable Numerical
Objectives & Criteria**

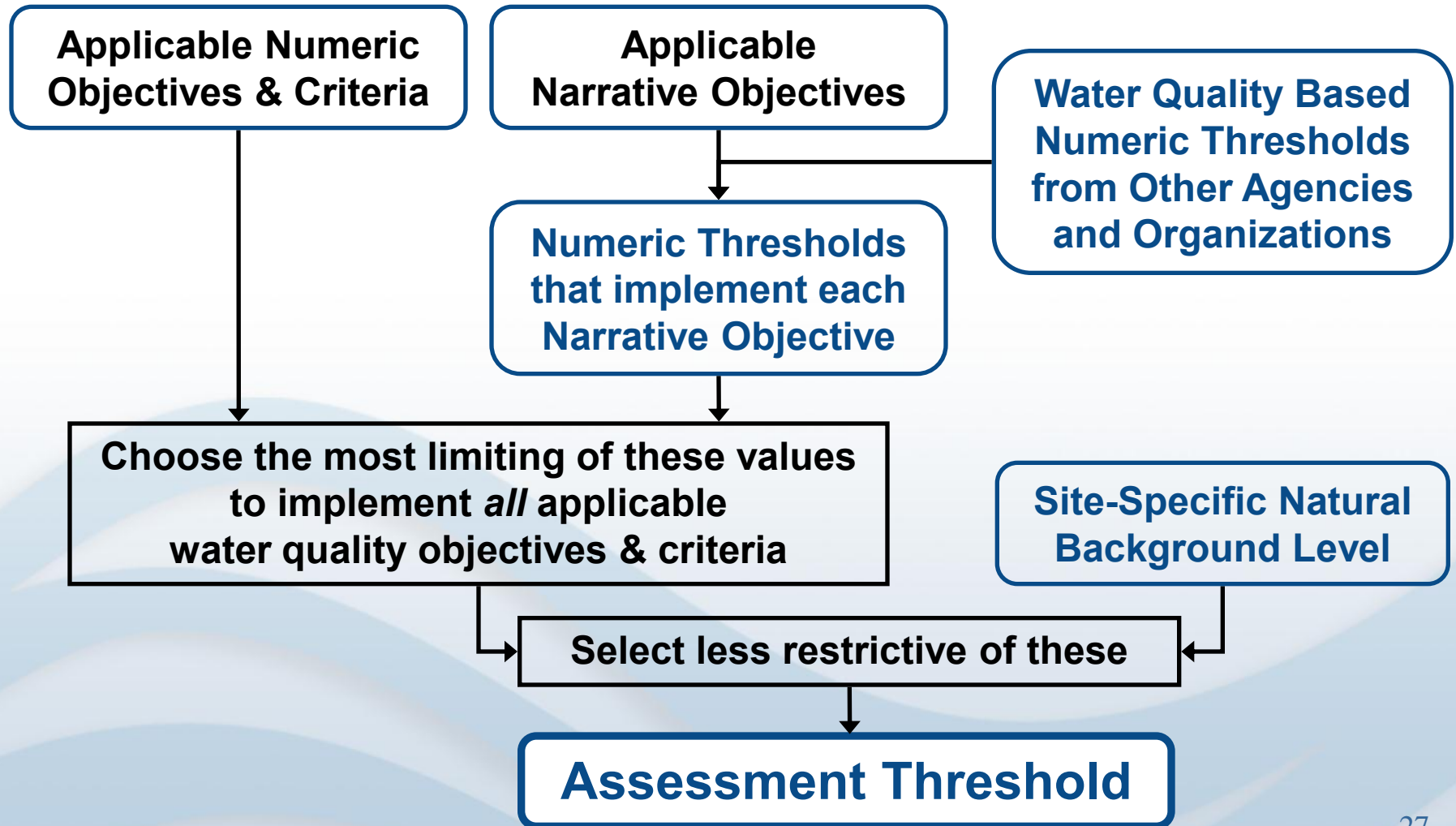
**Applicable
Narrative Objectives**

Selecting Assessment Thresholds

**Applicable Numerical
Objectives & Criteria**

**Applicable
Narrative Objectives**

Selecting Assessment Thresholds



Sources of Numeric Thresholds

Used to Implement Narrative Objectives

Chemical Constituents objective

- **California Drinking Water MCLs** **DHS**
 - ◆ Primary MCLs based on human health
 - ◆ Secondary MCLs based on human welfare
 - ◆ Technology & Economics of water use at the tap
- **Federal Drinking Water MCLs** **USEPA**
 - ◆ Only if lower than California MCLs
- ***Water Quality for Agriculture*** **FAO-UN**
- ***Water Quality Criteria*** (McKee & Wolf) **SWRCB**
 - ◆ e.g., industrial use criteria

Sources of Numeric Thresholds

Used to Implement Narrative Objectives

Toxicity objective

no “detrimental physiological responses...”



- California Public Health Goals **OEHHA**
- Federal MCL Goals **USEPA**
 - ◆ non-“zero” limits only
- California Notification (Action) Levels **DHS**
- Integrated Risk Information System **USEPA**
 - ◆ Reference Doses for non-cancer effects
 - ◆ Cancer Risk Estimates
- Cancer Risk Estimates **OEHHA, NAS**

Sources of Numeric Thresholds

Used to Implement Narrative Objectives



Toxicity objective

■ Drinking Water Health Advisories

USEPA & NAS

■ Proposition 65 Regulatory Levels

OEHHA

- ◆ Carcinogens at 1-in-100,000 (10^{-5}) risk level
- ◆ Reproductive Toxins at 1/1000 of NOAEL
- ◆ Intent of statute
 - Public Notice prior to exposure
 - Prohibit Discharge to drinking water sources
 - Not establishment of levels considered “safe”

Sources of Numeric Thresholds

Used to Implement Narrative Objectives

Toxicity objective



■ National Recommended (Ambient) Water Quality Criteria

USEPA

- ◆ Human Health protection
 - Assume ingestion of aquatic organisms
 - Apply to surface waters only
- ◆ Aquatic Life protection

■ Pesticide Hazard Assessments

CDFG

- ◆ Aquatic Life Protective Limits

for CDPR

Sources of Numeric Thresholds

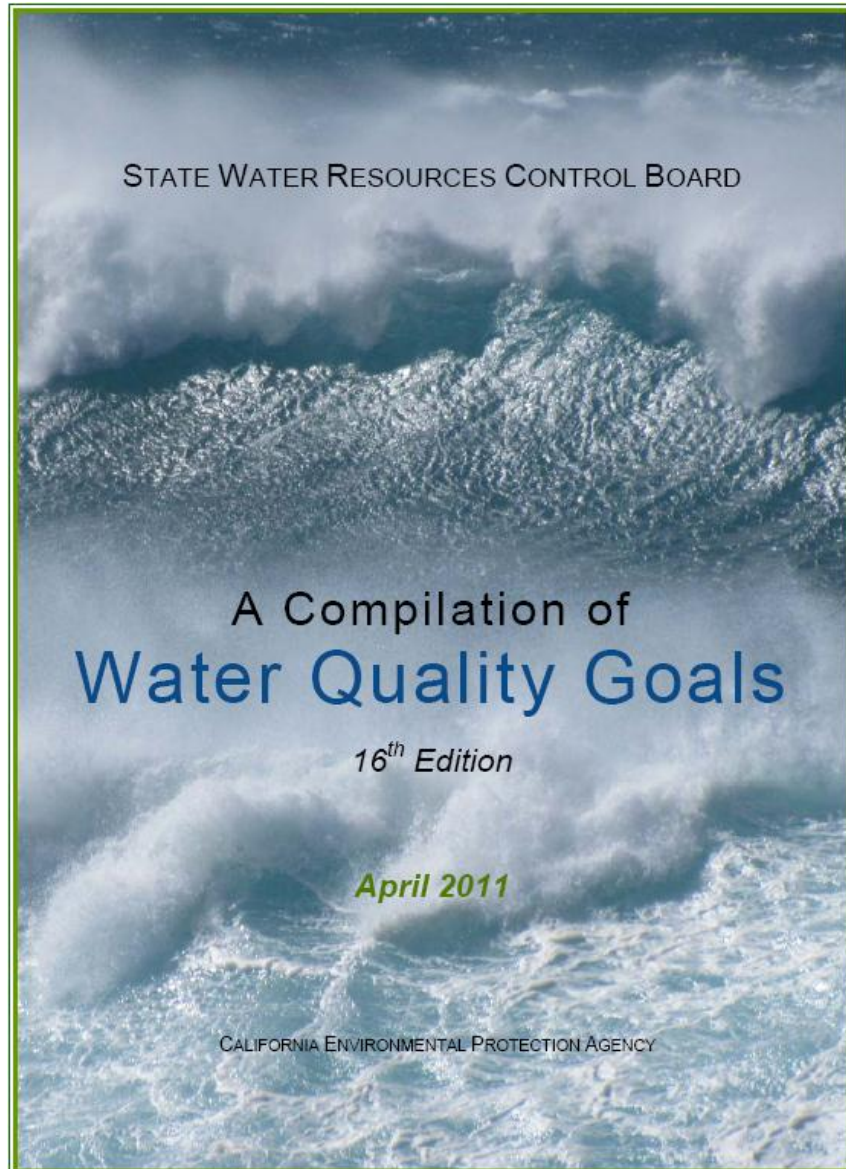
Used to Implement Narrative Objectives



Tastes & Odors objective

- Secondary MCLs CDPH & USEPA
- National Recommended (Ambient) Water Quality Criteria USEPA
- Drinking Water Health Advisories USEPA & NAS
- Taste and Odor Thresholds USEPA & others

A Source of Numeric Thresholds



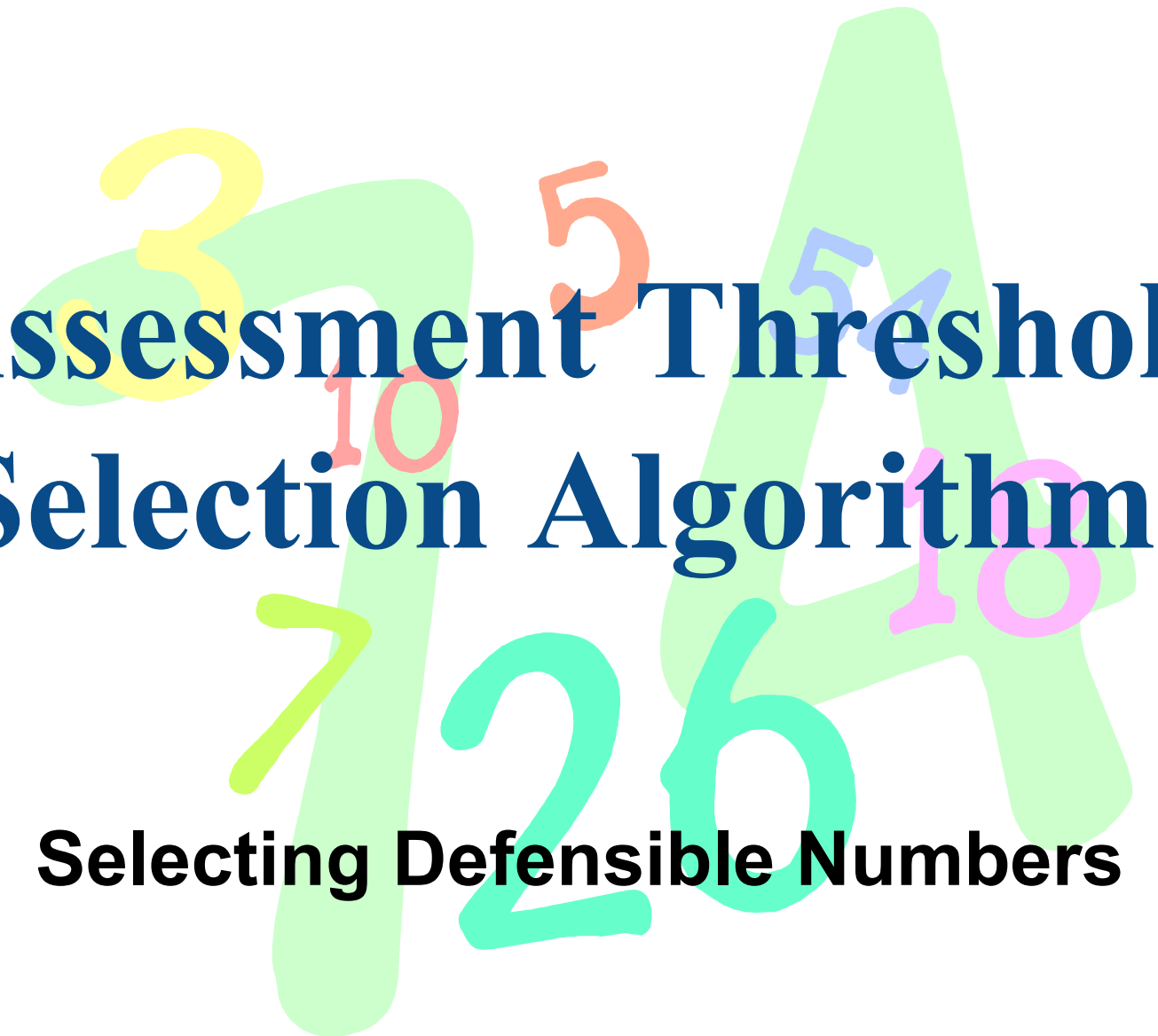
Available on
the Internet at

[www.waterboards.ca.gov/
water_issues/programs/
water_quality_goals/](http://www.waterboards.ca.gov/water_issues/programs/water_quality_goals/)

Water Quality Goals Online

Database Demonstration

[www.waterboards.ca.gov/water_issues/
programs/water_quality_goals/](http://www.waterboards.ca.gov/water_issues/programs/water_quality_goals/)

The background features a large, light green number '10' in the center. Overlaid on this are several other numbers in various colors: a yellow '3' at the top left, an orange '5' at the top center, a blue '54' at the top right, a pink '10' at the middle right, a green '7' at the middle left, and a cyan '26' at the bottom center.

Assessment Threshold Selection Algorithms

Selecting Defensible Numbers

Water Quality Limit Selection

- **To be defensible, water quality limits should be chosen to apply each applicable water quality objective and promulgated water quality criterion**
- **Assessment threshold = most stringent of above limits**

Algorithms – Main Steps

- Step 1.** Select a single **numeric threshold** to satisfy each applicable water quality objective and promulgated criterion or relevant portion thereof
- Step 2.** To satisfy all applicable objectives select the lowest threshold from Step 1 as the **assessment threshold**
- Step 3.** Adjust for natural background levels
 - ◆ Uncontrollable factors

Algorithms – Guiding Principles for Step 1

- **Use purely risk-based numeric thresholds instead of risk management-based thresholds to implement narrative water quality objectives**
 - ◆ Toxicity-based limits instead of MCLs
 - ◆ Risk management-based limits may contain irrelevant information and constraints
 - e.g., Proposition 65 limits
- **Use California numeric thresholds when available**
 - ◆ Instead of federal numeric thresholds or thresholds from other sources
 - ◆ Consistency with other California agencies



Algorithms – Guiding Principles for Step 1

- **Use numeric thresholds that reflect peer-reviewed science**
 - ◆ **Avoid using draft or provisional thresholds unless nothing else is available**
- **Use thresholds that reflect current science**
 - ◆ **Check dates**
- **Use relevant limits**
 - ◆ **Check intent**
 - **Compare with language of narrative objective**
 - ◆ **Check exposure routes**

Assessment Threshold Algorithms

Water Body Types

- **Water Quality Goals, 13th Edition (2003)**
 - ◆ Groundwater
 - ◆ Inland Surface Waters
- **Water Quality Goals, 16th Edition (2011)**
 - Added
 - ◆ Enclosed Bays & Estuaries
 - ◆ Ocean Waters



CALIFORNIA

Water Boards

STATE WATER RESOURCES CONTROL BOARD
REGIONAL WATER QUALITY CONTROL BOARDS