

# **Benthic Invertebrates and Sediment Quality Objectives**

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# BACKGROUND

- **Benthic invertebrates are used extensively for integrated water quality assessments**
  - Live on the bottom where contaminants accumulate
  - Lack mobility to escape
  - Integrate over typical 2-3 year life spans
- **California has recently adopted Sediment Quality Objectives**
  - Triad approach combining benthos, toxicity, and chemistry measures
- **Developed a statewide database for these measures**
  - Used those data to create 305(b) report

# WHY A TRIAD APPROACH: POTENTIAL FLAWS WITH INDIVIDUAL LINES OF EVIDENCE

- **Chemistry**

- Bioavailability poorly understood (e.g., paint chip, tar ball)
- There may be unmeasured contaminants

- **Toxicity**

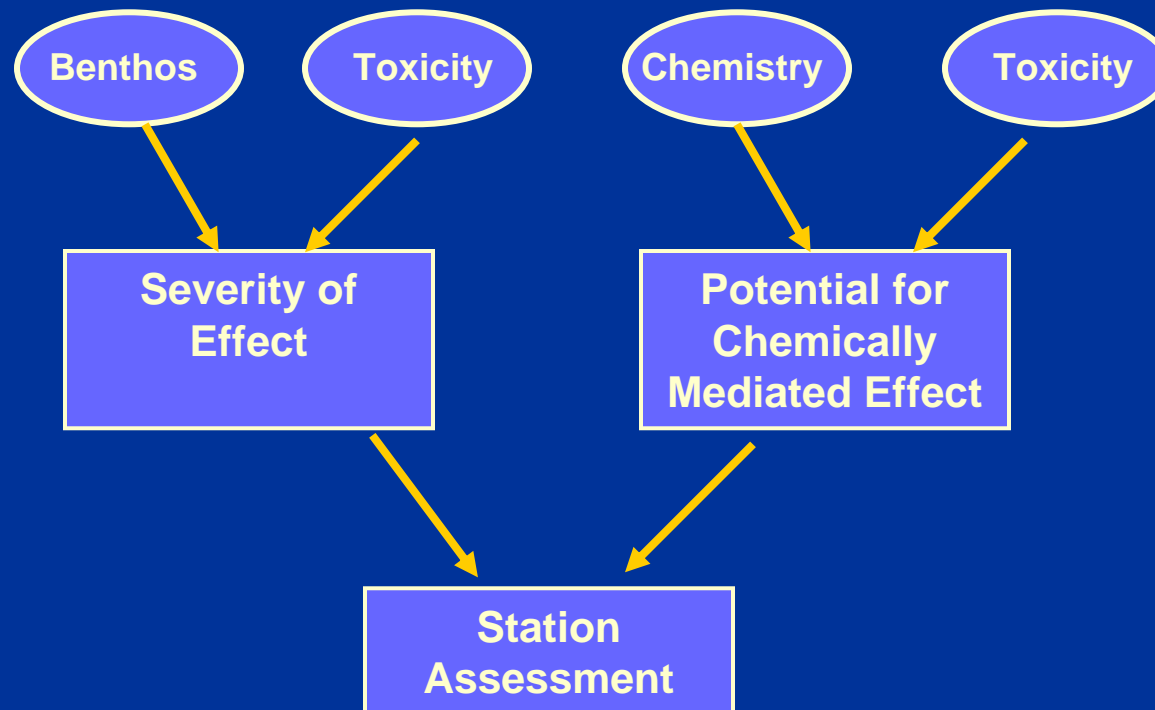
- Confounding factors (e.g., ammonia)
- Agitation enhanced bioavailability
- Differing sensitivity among test species

- **Benthic infaunal assemblages**

- Physical disturbance (anchor, dredging)
- Oxygen stress

# MLOE CONCEPTUAL FRAMEWORK DIRECT EFFECTS

Three lines of evidence (LOE) needed to assess direct effects of sediment contamination

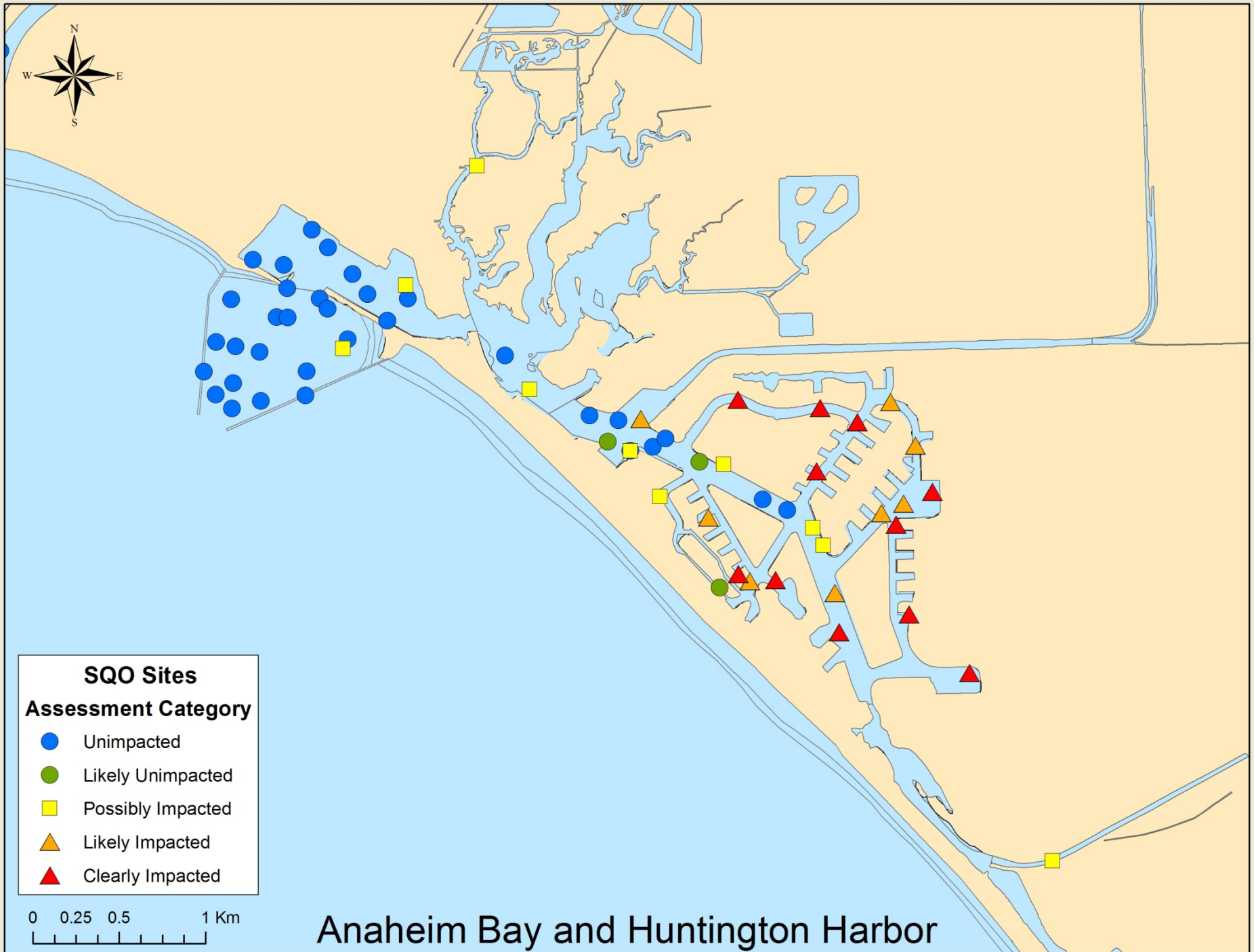


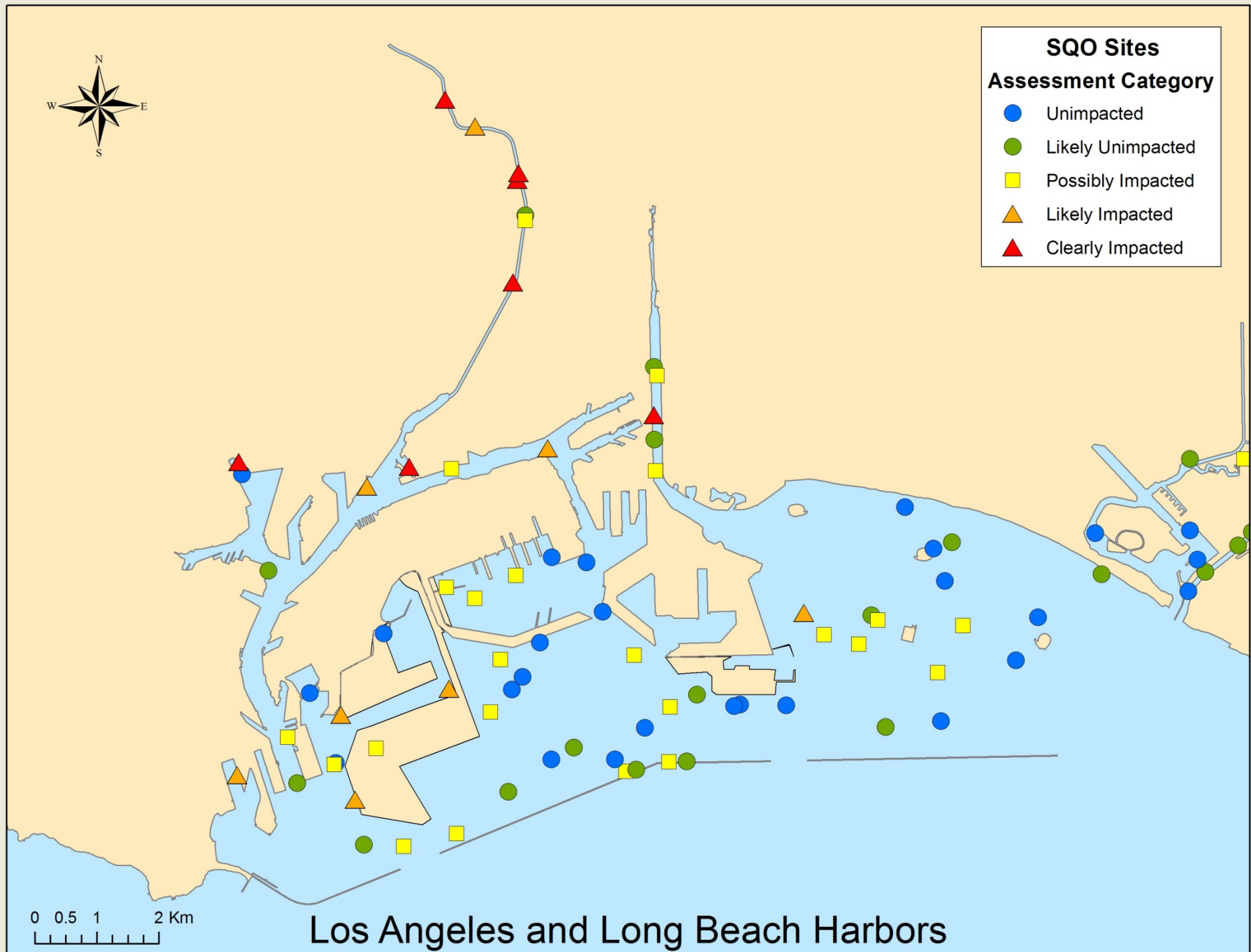
# SIX STATION ASSESSMENT CATEGORIES

- **Unimpacted**
- **Likely Unimpacted**
- **Possibly Unimpacted**
- **Likely Impacted**
- **Clearly Impacted**
- **Inconclusive**

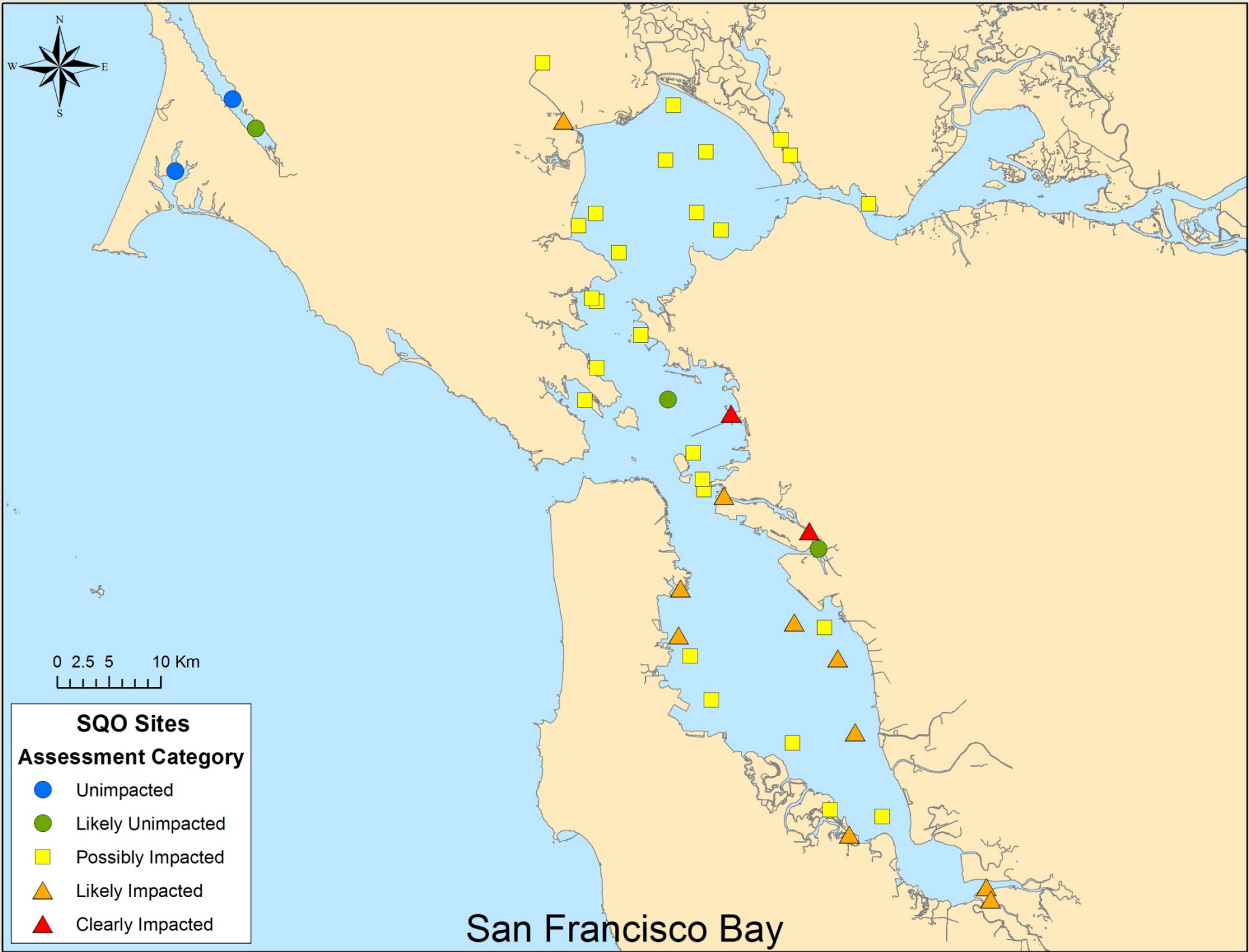
# CALIFORNIA DATABASE

- **Data from about 5000 sample sites**
  - 1,463 Benthos
  - 1,846 Toxicity
  - 4,575 Chemistry
  - 797 All three
- **Database already available on the web**
- **Probability-based samples with all three indicators from 314 sites**
  - Basis for 305(b) report

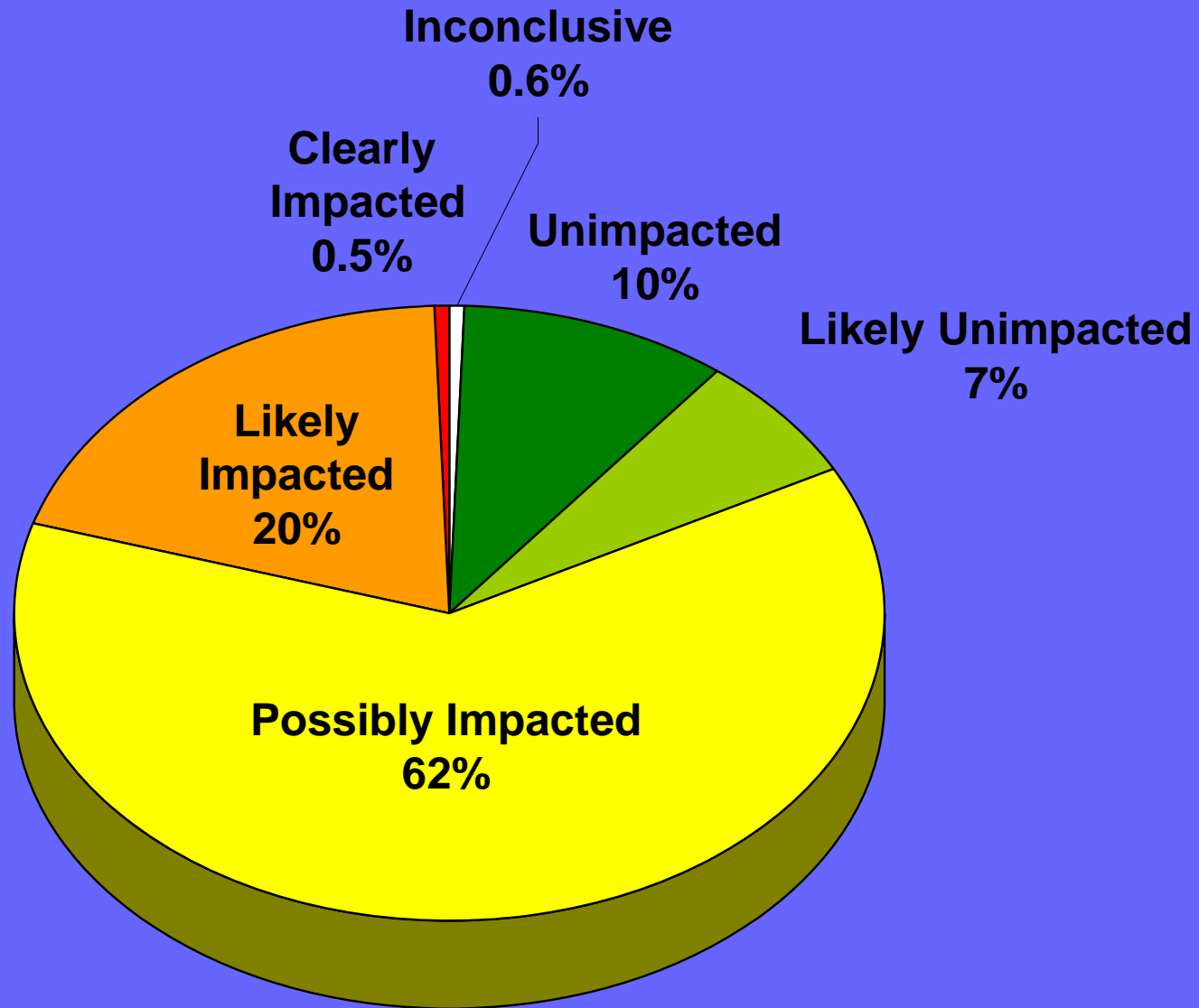




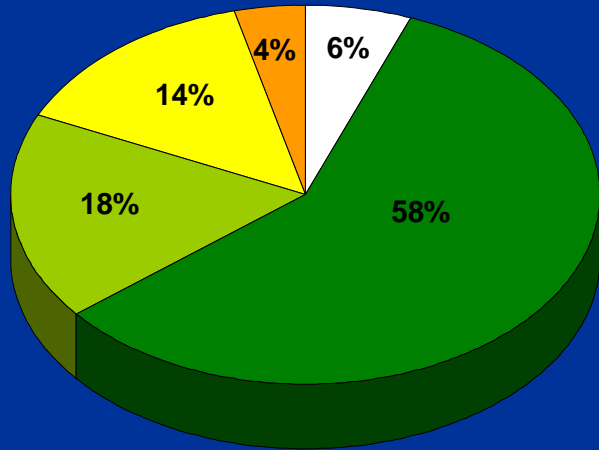




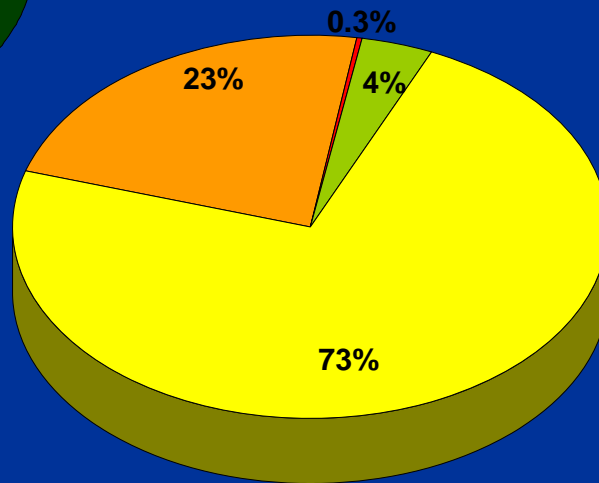
# STATEWIDE CONDITION



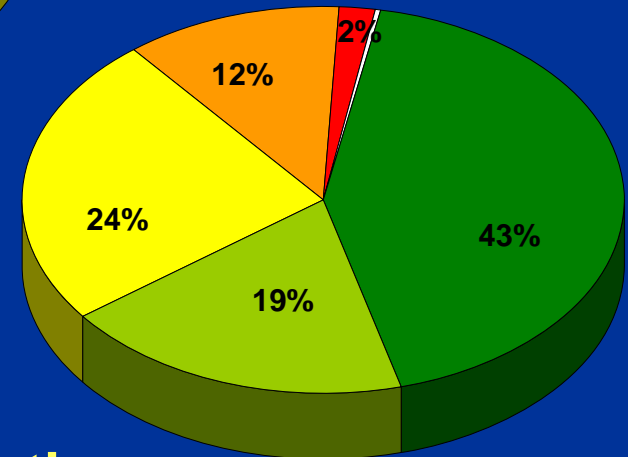
# REGIONAL CONDITION



North

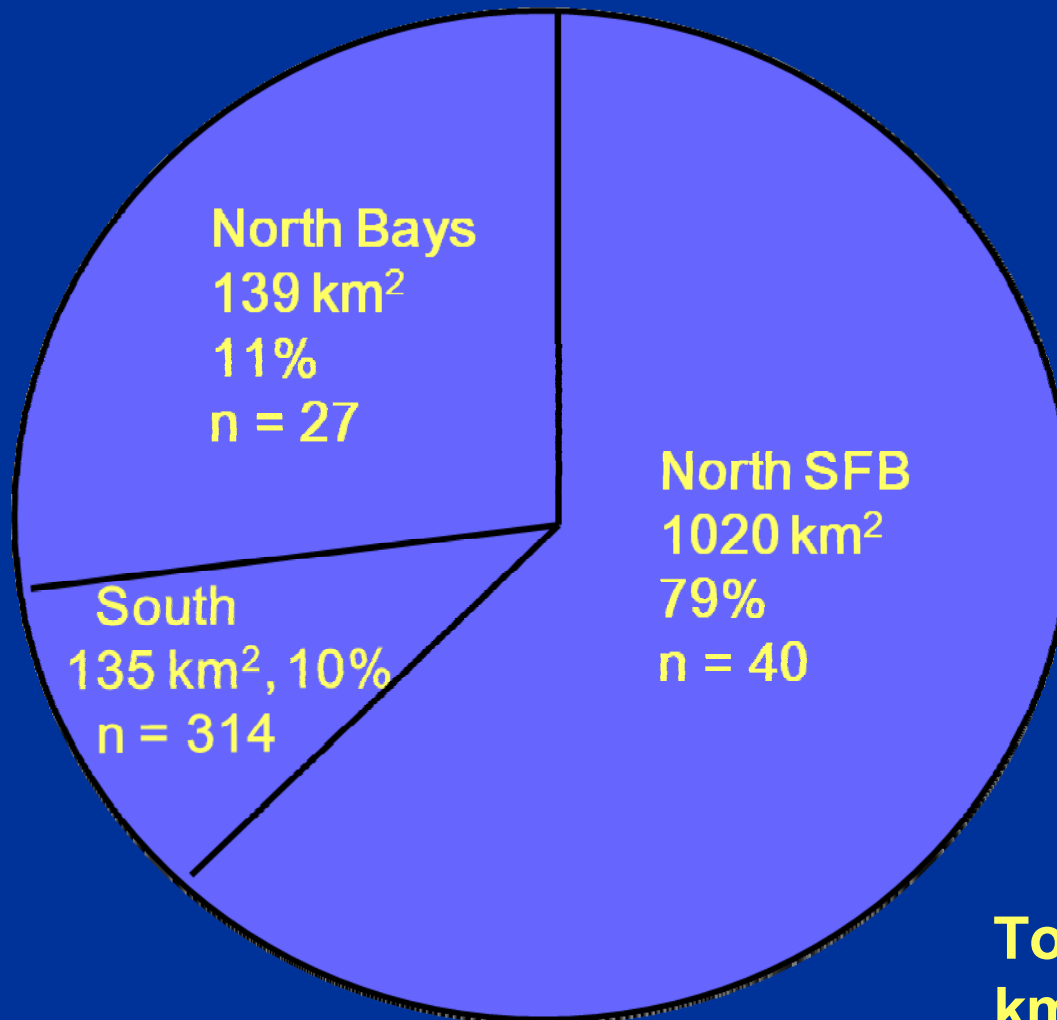


San Francisco Bay



South

# CALIFORNIA REGIONS



**Total = 1295  
km<sup>2</sup>**

# LIMITATIONS

- **Not all data collected with the same gear and sieve size**
  - SQOs define appropriate gear for future sampling
  - Recent gear comparison study also available
- **Database and SQOs mostly limited to bay, harbor and estuarine data**
  - Even larger datasets for the marine environment not yet included
- **No mechanism for capturing new data**
  - Many new data will become available with adoption of SQOs