

Table 3. Potential Tools and Indicators of Success for Assessing Effectiveness of CALFED Water Quality Actions

Tool	Applicable Parameters of Concern	Strengths	Weaknesses	Current Uses
Water Quality Concentrations/ Objectives	All metals and toxic elements; All organics and pesticides; temperature, DO, salinity, turbidity, disinfection byproducts, pathogens, pH, boron, nitrate, ammonia.	Includes most parameters of concern. Convenient, toxicity-based, nationally accepted values.	Indirect measure. Does not address site-specific issues or ecological exposure and impairment directly.	NPDES permits/ waste discharge requirements. Nonpoint source assessments. TMDLs/waste load allocations. Remedial investigations and risk assessments.
Water Toxicity Test	For potentially toxic chemicals of concern assessed as "toxicity" (causes could be all metals and toxic elements, all organics/pesticides, ammonia, pH, chlorine).	May detect toxicity from unknown causes when chemical tests did not reveal problems. Tests using resident species are sometimes possible (e.g., rainbow trout for mountain stream bioassays).	Not for human health. Standard tests may not be representative of species affected or field conditions. Typical tests are limited to fathead minnows, zooplankton, and algal assays.	NPDES permits/ waste discharge requirements. Nonpoint source assessments. TMDLs/waste load allocations. Remedial investigations and risk assessments.
Toxicity Identification Evaluation (TIE)	For potentially toxic chemicals of concern assessed as "toxicity" (causes could be all metals and toxic elements, all organics/pesticides, ammonia, pH, chlorine)	May detect toxicity when chemical tests did not reveal problems. TIE narrows causes of toxicity by using laboratory treatments to test separate fractions of the water for toxicity. Tests using resident species are sometimes possible (e.g., rainbow trout for mountain stream bioassays).	Not for human health. Standard tests may not be representative of species affected or field conditions.	NPDES permits/ waste discharge requirements. Nonpoint source assessments. Regional Board assessments of sources of toxicity.

Tool	Applicable Parameters of Concern	Strengths	Weaknesses	Current Uses
Sediment Concentrations/ Objectives	Sediment absorptive, binding, and flocculating chemicals. CALFED water quality parameters of concern for sediment limited to: all metals and toxic elements, all organics/pesticides.	Acts as a long-term integrator for chemical loading to the immediate area and from upstream influences. Preserves historical indications of contamination. May detect otherwise undetectable contaminants.	Few criteria or accepted guidelines for evaluating concentrations. Important to analyze sediment characteristics in addition to parameters of concern (e.g., TOC). Highly variable spatial distributions. Difficult to estimate exposure to benthic and aquatic organisms. Deposition and resuspension difficult to quantify.	Dredging disposal assessments. Special studies/baseline characterization. Remedial investigations. Ecological risk assessments.
Sediment Toxicity Test	Sediment absorptive, binding, and flocculating chemicals. CALFED water quality parameters of concern for sediment limited to: all metals and toxic elements, all organics/pesticides.	May detect otherwise undetectable toxicity. Standard sediment toxicity tests are available (e.g., amphipod, midge, or mayfly tests).	Standard tests may not be representative of species affected or field conditions. Highly variable spatial distributions. Important to analyze sediment characteristics in addition to parameters of concern (e.g., TO). Deposition and resuspension difficult to quantify.	Dredging disposal assessments. Special studies. Remedial investigations. Ecological risk assessments.

Tool	Applicable Parameters of Concern	Strengths	Weaknesses	Current Uses
Tissue Concentration (Bioaccumulation)	Bioaccumulating chemicals (CALFED water quality parameters of concern limited to: all metals and toxic elements and organics/pesticides.	Excellent long-term integration of sub-lethal exposure to resident species. May detect exposure to otherwise undetectable chemicals.	Limited chemicals of concern. May not reveal strongest toxins. No short-term responsiveness to changing exposure. Difficult to specify the source of exposure.	Remedial investigations. Ecological risk assessments. Special studies/baseline characterizations. Human health warnings regarding fish consumption.
Biological Assessment	Physical, chemical, and biological effects are potentially detected. For potentially toxic parameters of concern (causes could be all metals and toxic elements, all organics/pesticides, ammonia, pH, chlorine).	Direct detection of impairment and/or enhancement. Reveals ecological response to complex stressors to the fish or macroinvertebrate community.	Criteria are now being developed and are only applicable to limited types of environments. No baseline data is available for comparison or to aid in interpreting results. Difficult to identify sources and types of stressors. Must be correlated to other information to be meaningful.	Special studies in support of point source investigations. Ecological risk assessments and baseline characterizations.