

**CALFED BAY-DELTA PROGRAM  
 RESOURCE CATEGORIES AND ASSESSMENT VARIABLES  
 FOR THE PROGRAMMATIC EIR/EIS  
 OCTOBER 1996  
 DRAFT**

**I. PHYSICAL ENVIRONMENT**

**A. Surface-Water Hydrology**

Important Changes to be Evaluated

Volume of flow

Timing of flow

Related Information to be Measured

Rainfall  
 Snowmelt  
 Groundwater discharge  
 Direct runoff  
 Evapotranspiration from program features (soil moisture, vegetation [e.g., terrestrial, agricultural crops, riparian, wetlands], open-water area)

Seasonal weather pattern variation

**B. Groundwater Hydrology**

Important Changes to be Evaluated

Groundwater supply

Conjunctive use supply

Related Information to be Measured

Basin storage capacity  
 Groundwater recharge  
 Groundwater withdrawals

**C. Riverine Hydraulics**

Important Changes to be Evaluated

Depth, width, and velocity

Related Information to be Measured

Slope of water surface and channel bed  
 Channel or floodplain roughness (resistance)  
 Water viscosity  
 Hydrographs  
 Channel geometry  
 Instream and bank erosion: channel loss; riparian loss (e.g., from channel migration, recreation, wind, current); gravel loss; conveyance loss  
 Sediment movement

## D. Water Management Facilities and Operations

### Important Changes to be Evaluated

Reservoir storage volumes, releases, and spills

Instream flow targets, deficits, and surpluses

Diversions/exports targets, deficits, and surpluses

Agricultural drainage volumes

Remaining opportunities for water management

### Related Information to be Measured

Capacity  
Elevation  
Runoff  
Flood control  
Diversion targets  
Instream targets

Instream targets  
Runoff  
Storage  
Diversion targets  
Transport

Runoff  
Diversion targets  
Diversion limits  
Reservoir storage  
Groundwater pumping

Rainfall  
Irrigation  
Soils  
Drainage facilities

Spills/surplus outflow  
Unused conveyance  
Carryover storage  
Urban stormwater drainage volumes

## E. Bay-Delta Hydrodynamics

### Important Changes to be Evaluated

Delta outflow

X2 location

Channel flows at key Delta locations

### Related Information to be Measured

Delta inflows  
Channel depletions  
Exports

Outflow  
Tidal mixing

Delta inflows  
Channel depletions  
Exports  
River diversions  
Transport

Water entrainment in diversions/exports

Delta inflows  
Channel depletions  
Exports  
River diversions

## F. Water Quality

### Important Changes to be Evaluated

### Related Information to be Measured

Ecosystem Water Quality

Metals:

Cadmium  
Copper  
Mercury  
Selenium  
Zinc

Organics/Pesticides

Carbofuran  
Chlordane  
Chlorpyrifos  
DDT  
Diazinon  
Polychlorinated bipheyls (PCBs)  
Toxaphene

Ammonia

Dissolved oxygen

Salinity (total dissolved solids [TDS],  
electroconductivity [EC])

Temperature

Turbidity/Transparency

Urban Water Quality

Bromide

Nutrients

Pathogens

Salinity

Total organic carbon (TOC)

Turbidity

Viruses

Agricultural Water Quality

Boron

Chloride

Nutrients

pH

Salinity

Sodium adsorption ratio (SAR)

Turbidity

Temperature

**G. Geomorphology, Soils, and Seismicity**

Important Changes to be Evaluated

Surface soil erosion

Soil salinity

Subsidence caused by peat oxidation

Subsidence caused by groundwater withdrawals

Seismicity (risk of levee failure during seismic event)

Related Information to be Measured

Agricultural soil loss  
Wind  
Stormwater

Soil geology  
Applied EC  
Agricultural drainage

Peat content  
Soil moisture  
Ground disturbance and tilling practices

Groundwater levels  
Aquifer clay content

Levee structural integrity

**H. Air Quality**

Important Changes to be Evaluated

Ozone

Carbon monoxide

Particulate matter

Related Information to be Measured

Construction activities  
Agricultural operations  
Pump operations

Construction activities  
Agricultural operations  
Pump operations

Construction activities  
Agricultural operations  
Pump operations  
Wind and soil conditions

**I. Noise**

Important Changes to be Evaluated

Short-term construction noise

Noise from aquatic recreation (i.e., boating)

Noise from terrestrial recreation (i.e., hunting)

Noise from facilities operation

**J. Traffic and Navigation**

Important Changes to be Evaluated

Navigation

Railways

Ferries

Airports

Roadways

**II. BIOLOGICAL ENVIRONMENT**

**A. Fisheries and Aquatic Resources**

Important Changes to be Evaluated

Related Information to be Measured

Instream flow

Flow  
Transport

Delta flow

Net flow  
Tidal flow  
Transport

Reservoir elevation

Temperature

Estuarine salinity

Sediment movement

Diversion impacts

Fish impingement  
Entrainment  
Predation

Barriers

Habitat

Physical habitat  
Effect of flow on habitat  
Effect of temperature on habitat  
Effect of estuarine salinity on habitat  
Effect of reservoir elevation on habitat

Water quality

Agricultural salinity  
Thermal pollution  
Dissolved oxygen  
Nutrients  
Toxicants  
Transparency

Fishing

Commercial fishing  
Sport fishing

Artificial production

Species interactions

Predation  
Competition  
Food availability  
Disease  
Non-native plants

### 3. Vegetation and Wildlife Including Special-Status Species

#### Important Changes to be Evaluated

Area and condition of habitat

Area of agricultural land use providing habitat value

Agricultural operations and land use practices on  
habitat values

Connection and orientation of habitats

Number of known populations of special-status species

Area and condition of habitat occupied by  
special-status species

Changes in non indigenous/introduced species  
populations

Changes in ecological processes that sustain habitats

#### Related Information to be Measured

Open water and tidal wetlands  
Saline, brackish and freshwater wetlands  
Riparian and riverine habitats  
Upland habitats

SPECIAL STATUS SPECIES IS TO BE SEPARATED OUT  
FROM VEGETATION & WILDLIFE.

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III. ECONOMICS AND SOCIAL ENVIRONMENT

A. Land Use

Important Changes to be Evaluated

- Acres in agricultural use
- Acres in open space and habitat use
- Acres in developed use
- Indian trust assets

B. Flood Control System

Important Changes to be Evaluated

- Hazards to the levee system
- Potential flood damage and resources at risk
- Relative risk of levee failure
- Cost of flood-damage protection

Related Information to be Measured

- Overtopping failure (flood stage elevation)
- Mass failure (potential for erosion, stability, seepage, and seismic failure)
- Existing and planned property values
- Existing and planned utility and infrastructure values
- Distribution of values lost from levee failure
- Natural resource values (including protected species)
- Cost of repair and rehabilitation of facilities after levee failure
- Maintenance of Delta water quality
- Hazards (potential failures)
- Values of resources at risk
- Levee improvements (project and nonproject levees)
- Levee design standards and guidelines

C. Agricultural Economics

Important Changes to be Evaluated

- Value of agricultural production
- Cost of production

Related Information to be Measured

- Acres in production
- Crop prices
- Crop choices
- Crop yield
- Cost of surface water used
- Groundwater costs
- Irrigation efficiency and costs
- Production costs
- Acres in agricultural production

Agricultural net income

Crop revenue  
Production costs  
Water transfers

Cost of water supply variability

Certainty in water supply and cost  
Indirect/third-party impacts

**D. Municipal and Industrial Water Supply Economics**

Important Changes to be Evaluated

Related Information to be Measured

Cost of water supply

Surface-water supply and distribution  
Groundwater pumping costs  
Alternative water supplies and cost  
Water transfer costs  
Infrastructure costs for water conveyance and distribution

Cost of water shortage

Water supplies  
Consumer willingness to pay and demand elasticity

Cost of treatment

Quality of water supply  
Constraints to treatment

**E. Fish, Wildlife, and Recreation Economics**

Important Changes to be Evaluated

Related Information to be Measured

Recreation-related spending

Recreation use and opportunity  
Distance traveled to recreation area

Recreation benefits

Value of recreation resource  
Recreation use and opportunity

Commercial fishing harvest values

Income  
Catch

Recreation employment and net income

**F. Regional Economics**

Important Changes to be Evaluated

Related Information to be Measured

Income

Agricultural income  
Recreational expenditure  
Commercial fishing income  
Municipal and industrial water expenditure  
Indirect income (i.e., third-party effects)

Employment

Agricultural  
Recreation-related  
Commercial fishing  
Municipal and industrial water expenditure  
Indirect employment (i.e., third-party effects)

Fiscal conditions

Property tax revenues  
Sales tax revenues  
Public costs/costs of actions  
Indirect (i.e., third-party) fiscal effects

**G. Power Production and Energy**

Important Changes to be Evaluated

Quantity and value of energy produced

Quantity and cost of energy consumed

Related Information to be Measured

Reservoir elevation  
Reservoir releases  
Seasonal power value

Groundwater pumping  
Surface-water pumping  
Seasonal power costs

**H. Recreation Resources**

Important Changes to be Evaluated

Recreation opportunities

Recreation use

Related Information to be Measured

Resource conditions and availability

Regional population and demographics  
Demand for recreation resources

**I. Visual Resources**

Important Changes to be Evaluated

Visual quality

Viewer sensitivity

**J. Cultural Resources**

Important Changes to be Evaluated

Risk to prehistoric sites

Risk to historic sites

Related Information to be Measured

Acreage of ground disturbance from  
construction  
Distribution of culturally sensitive landforms  
Locations of known sites

Association of historic sites with land  
conditions  
Locations of known sites

**K. Public Health and Environmental Hazards**

Important Changes to be Evaluated

- Area of mosquito breeding habitat
- Area of habitat that supports other disease vector populations
- Risk of contact between humans and vector populations
- Risk of hazardous material and waste upset (construction and operation)

Related Information to be Measured

Known hazardous material sites

**L. Utilities and Public Services**

Important Changes to be Evaluated

- Electrical supply and use
- Water conveyance
- Transportation facilities (e.g., roads, railroads, and ferry)
- Deepwater ship channels and shipping ports
- Natural gas fields and storage reservoirs
- Underground pipelines
- Communications facilities
- Police, fire, and emergency services

**M. Social Well-Being**

Important Changes to be Evaluated

- Community stability
- Environmental justice

Related Information to be Measured

- Demographics
- Regional economics
- Demographics
- Regional economics