Performance Measures

The 32 Starting Points are exactly that—starting points to be developed and refined into alternatives which "perform better" overall, with respect to Bay-Delta Program objectives. That "performance" needs to be defined in a systematic way to help identify ways to improve alternatives, to synthesize promising new alternatives, and to finally determine an acceptable short list of alternatives. That "performance" is defined using "Performance Measures"—measurable indices for how well an alternative satisfies a Bay-Delta Program objective. The following pages describe the current set of nine performance measurers (PMs). These PMs have been developed in an orderly process, starting from the set of Bay-Delta problem statements and associated program objectives, which were then developed into a set of measurable indices.

At any given stage in the project, the PMs must "match" the alternatives. That is, the actions that comprise an alternative must be specific enough to be evaluated by the PMs, or to put it another way, the PMs must be general enough to be able to evaluate each action.

As the program progresses, the PMs and actions will "co-evolve." That is, as the alternatives are refined and the actions become better specified, the PMs can be made more specific. In turn, the more specific PMs provide more specific guidance on how to refine the alternatives. At this stage, the actions comprising the alternatives are quite general, so the PMs must be applicable to a very general level. In fact, those PMs assess each action in terms of its potential to contribute to achieving a Bay-Delta objective, or more specifically, its potential to contribute to achieving some maximum achievable benefit identified as a part of a PM.

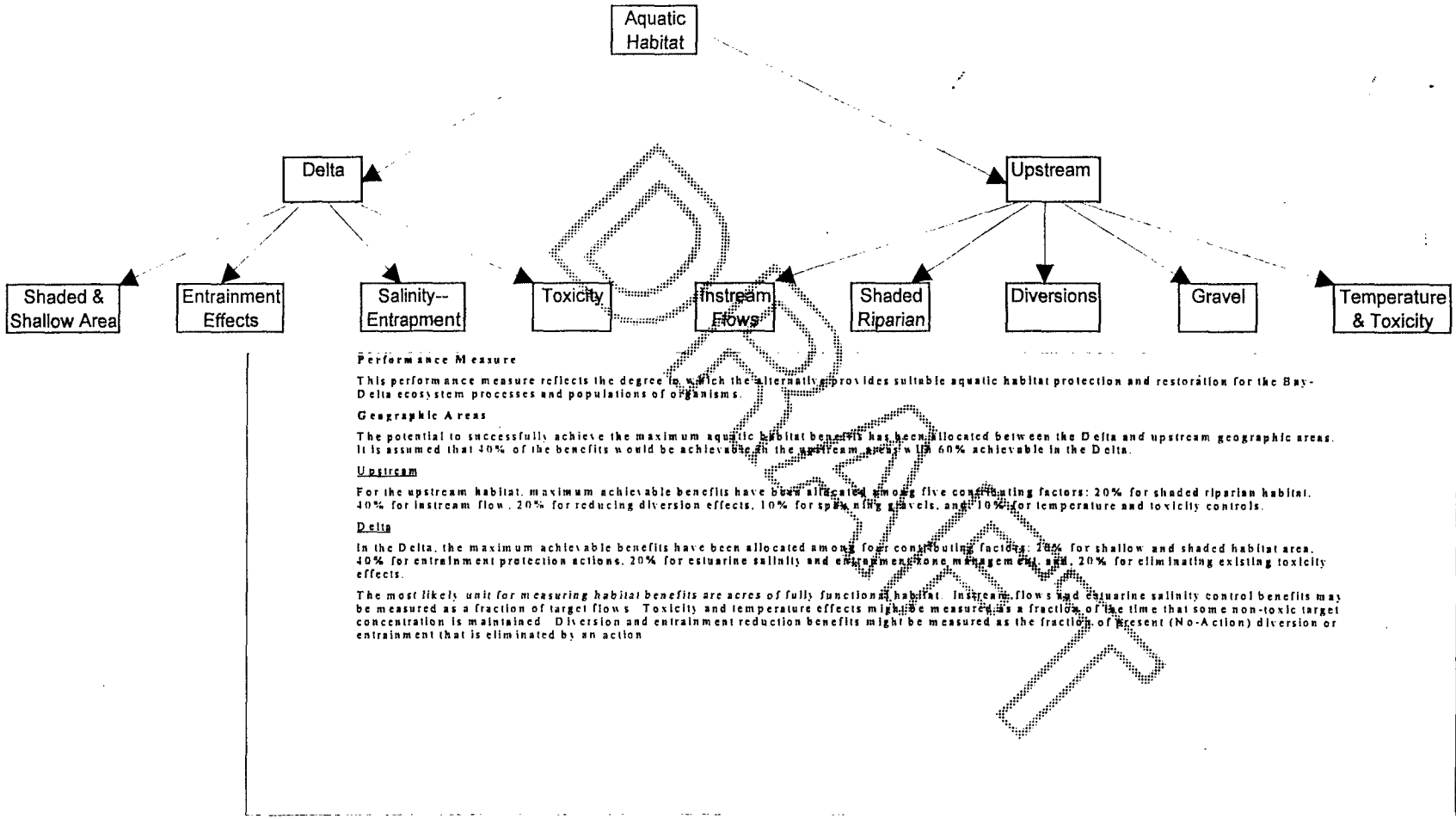
In the current process, each PM is associated with several specific benefits. The following nine figures present the current of nine PMs. Each figure presents the benefit categories and explanationary narrative for a PM.

While in the long term, PMs will measure performance of alternatives, at this stage they will measure performance of the actions, specifically, the benefits associated with a PM forms the basis for "scoring" an action's performance on that PM. First, 100 percentage points are allocated among the associated benefits, then each action is "scored" in terms of its potential to achieve the maximum achievable level of each associated benefit in percentage terms. For example, if an action has the potential to achieve one half of the maximum achievable level of the Shaded and Shallow Area benefit associated with Aquatic Habitat, and that benefit has been allocated 12 percent of the Aquatic Habitat PM, then that action receives a score of 0.6 (50 percent of 12 percent) for its performance with respect to Shaded and Shallow Area. Suppose it also gets scores from other benefits associated with Aquatic Habitat, say .04 and .02. That action's score for Aquatic Habitat is .12 (.06 + .04 + .02).

An alternative is scored with nine numbers, one for each PM. Its score on each PM is simply the sum of the scores its actions receive on that PM. Alternatives can than be compared by comparing their nine numerical PM scores. Graphical devices, such as nine-bar bar graphs, can aid in that comparison. The PM set is still under development, so these could be more than nine PMs at the time of the actual scoring.

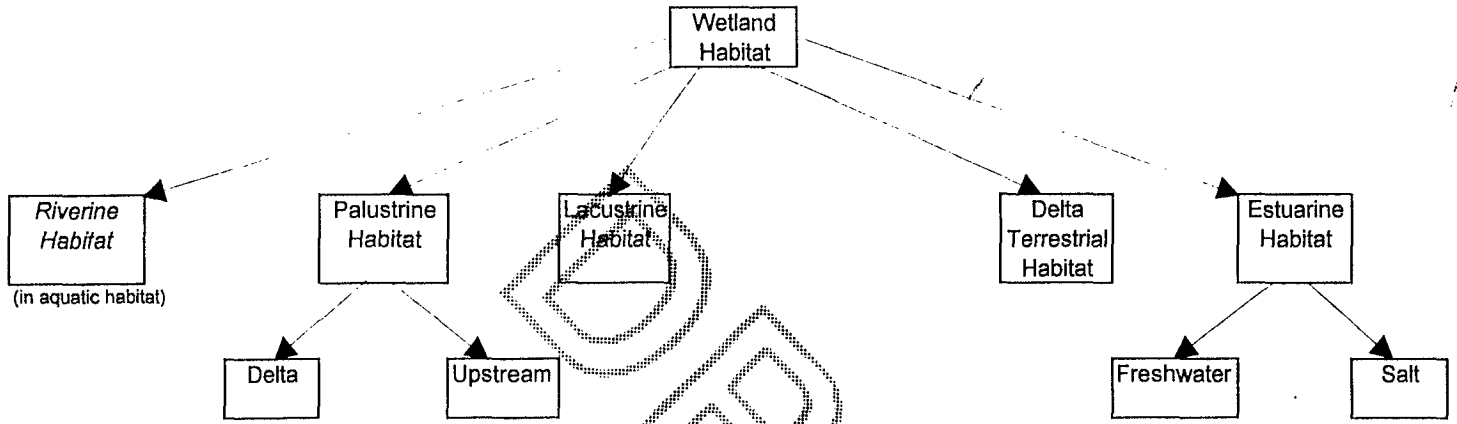
Objective: Improve and Increase Aquatic Habitats so that they can support the sustainable production and survival of native and other desirable estuarine and anadromous fish in the estuary.

Performance Measure: Aquatic Habitat



Objective: Improve and Increase Important Wetland Habitats so that they can support the sustainable production and survival of wildlife species.

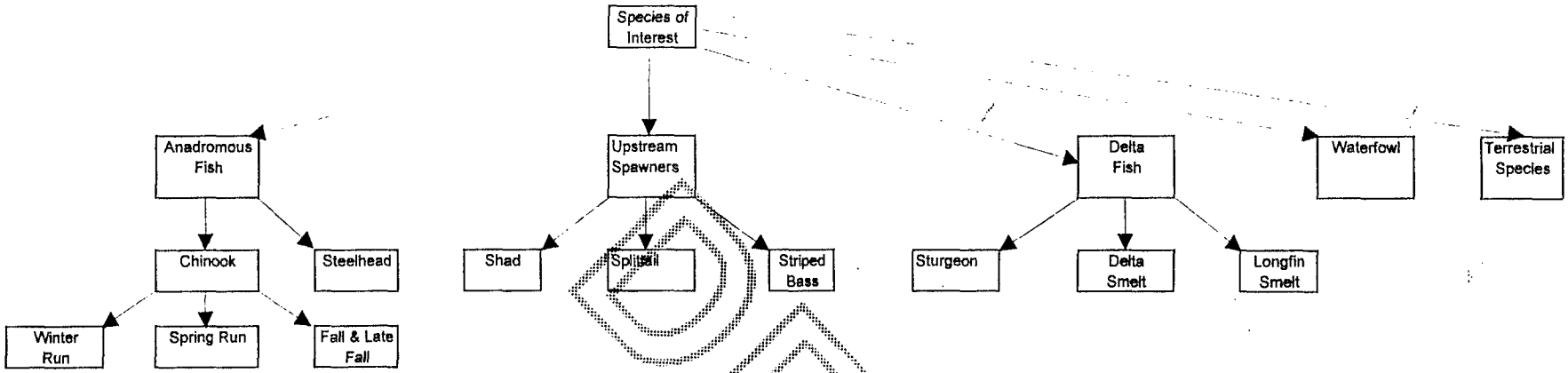
Performance Measure: Wetland/Highland Habitat



The above break-down of objectives is based on the *Classification of Wetlands and Deepwater Habitats of the United States* (Cowardin, Carter, and LaRoe 1979), and is the basis for habitat classification for the U.S. Fish and Wildlife Service. The purpose of this framework is to identify Delta resources and allow for weighting of these resources to facilitate the evaluation of CALFED alternatives. This framework will identify alternatives that most closely meet the ecosystem quality objectives for wetland habitats of the CALFED agencies, as previously described in the workshop process. The framework will also be used to measure incidental impacts of actions not specifically intended to provide habitat maintenance or improvement.

Objective: *Increase population health and population size of Delta species to levels that assure sustained survival.*

Performance Measure: Species of Interest



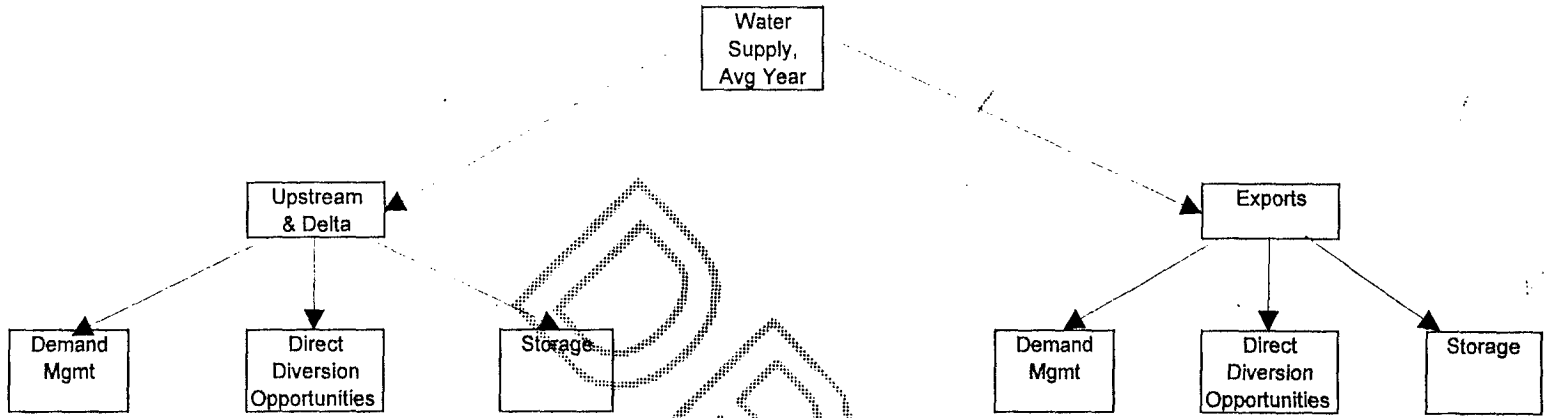
This performance measure reflects the degree to which the alternative provided species-specific stock management and habitat protection or restoration actions that are likely to increase the population of the species of interest. Because the likely benefit of an action will vary with the species, separate benefit factors for 12 species or groups are identified for rating.

The allocation of benefits between these species of interest is difficult and will likely change. Because the actions and alternatives will be separately rated for each important species, the assumed allocation of benefits can easily be adjusted once the initial rating for each species is completed. Additional species can be added as necessary. The most likely units for measuring species population benefits will be percentage change in the existing target or target average abundance.

Habitat protection or restoration actions that provide general aquatic or wetland habitat benefits will be rated in the aquatic habitat performance measure. However, if the primary purpose of the habitat management action is to benefit one of the important species, then additional credit will be given in the important species performance rating. However, CALFED generally endorses integrated habitat management practices that will benefit a wide range of aquatic and terrestrial species.

Objective: Reduce the conflict between beneficial water users and improve the ability to transport water through the Bay-Delta system.

Performance Measure: Average Year Water Supply



Water Supply - Non-Ecosystem Demand

Geographic areas.

Upstream/Delta

Geographic areas with watersheds tributary to the Bay-Delta Estuary including the area within the legal Delta. Actions intended to benefit conditions in the Upstream/Delta area will be evaluated here. Actions determined to have incidental effects on the Upstream/Delta area, either positive or negative, will be evaluated here.

Delta

Geographic areas that receive benefit from water exported from the Delta

Performance Measure Category

Demand Management

Water supply gained through the improved management of existing demands will be measured here considering practices such as crop shifting, improved on-farm efficiency, land fallowing, and others. Incidental water supply loss resulting from an action judged to impair demand management would receive an negative rating

Direct Diversion Opportunities

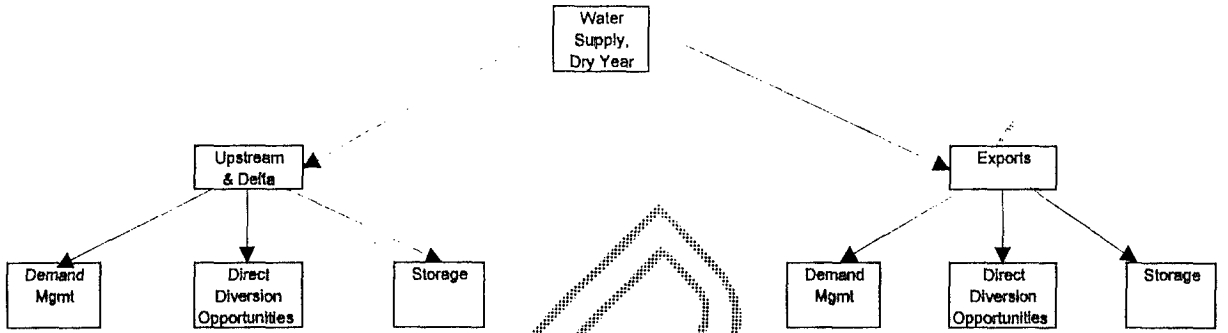
Direct diversion opportunities are actions that could result in added non-ecosystem water supplies without the need for storage. Positive direct diversion opportunities could include improved physical and hydraulic conditions to allow more efficient pumping and/or could include water transfer. Actions that are judged to adversely affect existing direct diversion opportunities would receive a negative rating

Storage

Water supply gained through added storage. Groundwater storage, either through banking or conjunctive use would be rated here

Objective: Reduce the uncertaintyof Bay-Delta system water supplies to help meet short and long term needs.

Performance Measure: Dry Year Water Supply



Water Supply - Non-Ecosystem Demand

Geographic areas.

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Storage

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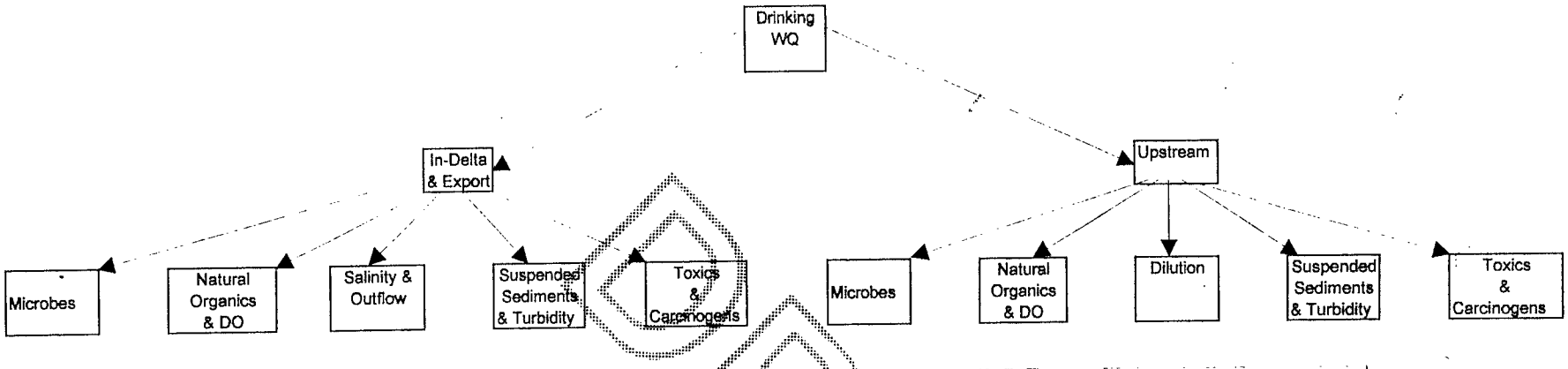
Objective: Provide good water quality in Delta and in water exported for Drinking Water needs.

Performance Measure: Delta Drinking Water Quality

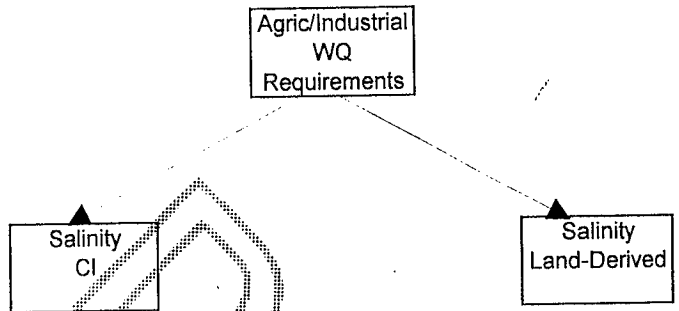


DELTA DRINKING WATER QUALITY

The purpose of this performance measure is to evaluate the objective of providing adequate Delta drinking water quality for human health and aesthetic preferences (e g , taste, odor, and appearance) Upstream land uses and water withdrawals can influence Delta water quality, therefore the measure is geographically divided between the Delta and upstream Five beneficial categories influence the outcome of the performance score for the Delta: Natural Organics/Microbes (e g , viruses and coliform bacteria), Eutrophication & Dissolved Oxygen (e.g., planktonic blue-green algae), Salinity/Outflow, Suspended Sediment and Turbidity, and Toxics (including trace metals and most pesticides). The same categories are used for Upstream except Dilution is substituted for Salinity/Outflow The categories incorporate water quality issues raised in the Water Quality Control Plan for the San Francisco/Sacramento-San Joaquin Delta Estuary (SWRCB/95-IWR/ May 1995).

Objective: Provide good Delta water quality for agricultural/industrial uses.

Performance Measure: Agricultural/Industrial WQ Requirements



In-Delta and Export Agricultural and Industrial Water Quality

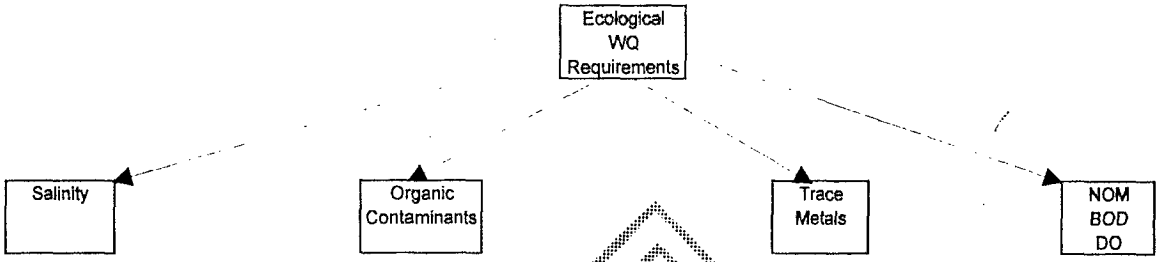
Capability of Actions to provide adequate water quality of Delta water used locally and exported to meet agricultural and industrial water quality needs. The key component of the performance measure is the ability to:

- Reduce total dissolved solids and the incidence of excessive salinity levels (ocean and land-derived) that can impair agricultural and industrial beneficial uses

Degradation of Delta water quality by salts occurs from sources 1) at the upstream end of the estuary (ocean-derived salts), 2) within the Delta (primarily agricultural drainage from Delta islands), and 3) upstream of the Delta (primarily agricultural drainage from the San Joaquin Valley).

Objective: Provide improved Delta water quality for environmental needs.

Performance Measure: Ecological Water Quality Requirements



Bay-Delta Ecological Water Quality Requirements

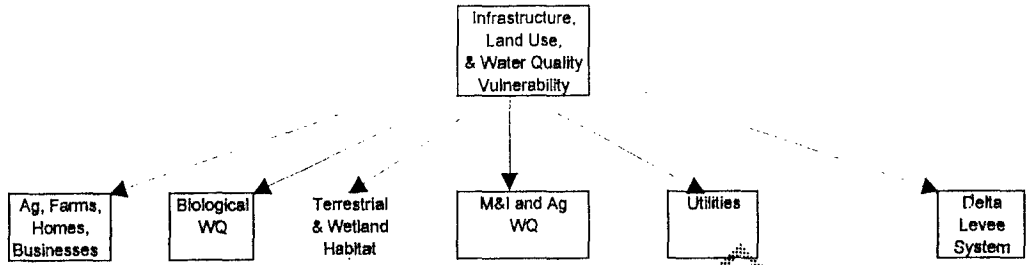
Capability of Actions to provide water of adequate quality to meet the ecological requirements of the plant, animal, fish and bird species dependent on the Bay-Delta system and correct any existing water quality problems impairing biological productivity. Key components of the performance measure include ability to:

- Reduce the incidence of excessive salinity levels (from ocean and land-derived salts) that can lower biological productivity, harm, or otherwise impair uses of Delta habitats by plant, animal, fish and bird species
- Reduce the incidence and mass loadings of excessive or persistent concentrations of organic contaminants (such as pesticides, herbicides, and industrial chemicals) that are believed to cause acute or chronic toxicity problems, or bioaccumulate to adverse levels in the tissues of plant, animal, fish and bird species.
- Reduce the incidence and mass loadings of excessive concentrations of heavy metals or other trace minerals (such as copper, lead and selenium) that are believed to cause acute or chronic toxicity problems, or bioaccumulate to adverse levels in the tissues of plant, animal, fish and bird species.
- Reduce mass loadings of organic materials in areas subject to excessive concentrations of substances exerting high levels of biochemical oxygen demand (BOD) to the point of reducing dissolved oxygen levels in the water column below 5 mg/L.

Degradation of Delta water quality occurs from sources 1) within the Delta, and 2) upstream of the Delta.

Objective: *Reduce the risk to land use and associated economic activities.*

Performance Measure: Infrastructure, Land Use, and Water Quality Vulnerability



Land Use, Infrastructure, Habitat and Water Quality Vulnerability
Capability of Actions to provide adequate protection against potential direct damage and flooding of Delta islands and resources caused by catastrophic floods, high tides, high waves, rising sea level, earthquake, tsunami or further land subsidence. A secondary, but equally catastrophic, potential consequence of a general levee failure (or to a lesser degree, even localized failure) during a low outflow period, is a major intrusion of ocean-derived salinity which could contaminate the raw water supply for an extended period. Key components of the performance measure include ability to protect:

- The Delta levee system network as in-place infrastructure to prevent flooding and pre-emption of land uses, contain channel flows, and provide the foundation for certain key roads, buildings, navigational aids, hydraulic control structures, powerlines, etc. Loss of the levee system would necessitate expenditures of major investments of time, money and materials to restore its functionality. Delta-wide catastrophic damage and flooding are the major consequences that could result from widespread levee failures (these could be simultaneous failures or a series of sequential failures radiating from one point, as a result of increased wind fetch, consequent wave size, and resultant damaging erosion)
- Agricultural lands, farms, homes and businesses, primarily on Delta lowlands that would be subject to inundation and pre-emption of use due to flooding.
- Terrestrial and wetland habitats within the Delta that would be either completely or partially inundated
- Utilities, including railroads, roads, power transmission lines, and aqueducts located on Delta lowlands or elevated foundations. These could be subject to direct damage, pre-emption of use by inundation, or foundational weakening, corrosion and decay during extended periods of inundation.
- Water quality for municipal, industrial and agricultural beneficial uses, both within the Delta and in the export service areas. Major salinity intrusion caused by a sudden influx of the ocean and San Francisco Bay could contaminate the water supply for an extended period and require extraordinary releases of freshwater from storage, accompanied by extensive repairs of infrastructure to restore adequate quality to the water supply.
- *Water quality* for in-Delta habitats and biological species. The same ocean-derived salts could cause major damage to freshwater and brackish marshes, riparian habitats and other wetlands, and agricultural lands. Prolonged flooding with saltwater could necessitate additional flushing and leaching of soils to remove accumulated salts and restore the capacity of the soil to support the desired beneficial uses.