

**CALFED Bay-Delta Program Fish Assessment Process**  
**Species and Assessment Variable Selection**  
**Supplemental Information**  
**September 13, 1996**

**Other Potential Species**

As requested by the participants in the August 22 and 27 meetings, CALFED has provided a complete species list for the aquatic ecosystem potentially affected by the CALFED alternatives and has documented a process for selecting species to include in the programmatic assessment (i.e., information dated and mailed by CALFED on September 6, 1997). The list of species selected for inclusion in the fish impact assessment (Table I in the September 6 information) excluded several previously proposed additions to the original species list (additions to the species list from August 22 and 27, 1996 meetings). The species excluded were:

- bluegill,
- green sturgeon,
- rainbow trout,
- sculpin,
- threadfin shad,
- hitch,
- tule perch, and
- starry flounder.

For the purpose of assessing potential impacts and benefits of implementing each alternative, the general response of green sturgeon, bluegill, and rainbow trout (i.e., riverine populations) to potential effects of the alternatives were determined to be represented (i.e., relative to adequacy for the programmatic assessment) by the response of white sturgeon, largemouth bass, and steelhead trout, respectively (Table II).

For the other species excluded, species importance was insufficient to justify inclusion in the impact assessment. In addition, responses to the effects of the CALFED alternatives were generally unknown for many of the species excluded (Table II).

The importance criteria applied for the species selection process included sport and commercial fisheries value, listing under the federal Endangered Species Act or the California Endangered Species Act, and whether the species plays a significant ecological role. Other importance criteria could be considered and might result in selection of additional species. Additional importance criteria include the species' contribution to native species diversity, the species' population abundance as a potential indicator of environmental conditions (e.g., habitat conditions, species diversity), and species targeted by historical management actions (e.g., habitat restoration programs, fishing regulations).

## **Definition of Fish Communities**

The information mailed on September 6, 1996 (CALFED Bay-Delta Program Fish Assessment Process, Species and Assessment Variable Selection) did not include a definition for the fish communities in the aquatic ecosystem potentially affected by CALFED actions. The fish communities are described below.

The aquatic ecosystem is divided into five fish communities: reservoir-, squawfish-sucker-hardhead-, deep-bodied-, estuarine-, and marine-fishes communities.

- The reservoir fishes community occurs in Central Valley reservoirs that are lower than 1,500 feet in elevation (e.g., Shasta and Folsom Lakes, Lake Oroville).
- The squawfish-sucker-hardhead fishes community occurs in the stream and river reaches that include chinook salmon spawning habitat (i.e., habitat that provides adequate water temperature for spawning and incubation and physical habitat needs as defined by velocity, depth, and substrate size).
- The deep-bodied fishes community occurs in the river reaches downstream of the squawfish-sucker-hardhead community and extends to the upstream edge of the Sacramento-San Joaquin Delta (Delta).
- The estuarine fishes community extends from the downstream edge of the deep-bodied fishes community to the upstream edge of the marine fishes community, and occurs in tidally influenced habitat ranging in salinity from 0 to 10 parts per thousand (ppt).
- The marine fishes community extends from the downstream edge of the estuarine fishes community to the Golden Gate Bridge, and occurs in tidally influenced habitat with salinity exceeding 10 ppt.

With the exception of reservoir fish communities, the geographic boundaries between the fish communities are not clearly defined. Hydrological and meteorological conditions shift the boundaries up and downstream. During wet years, the downstream boundaries of all the communities shift toward San Francisco Bay. During drier years, the downstream boundaries shift upstream toward the dams or headwaters.

## **Ranking of Assessment Variables**

Ranking of the assessment variables by participants in the assessment process followed the numbering convention discussed during the meetings on August 22 and 27, 1996. The numbering convention was modified for the Species and Assessment Variable Selection mailed on September 6, 1996. The convention was modified to facilitate species selection for inclusion in the assessment process. The definitions for ranking were similar to the definitions previously identified and are as follows:

- 2 The species' response to a variable is critical to survival or critical to the maintenance or increase of a species' population abundance (i.e., the variable is definitely important in the assessment process).
- 1 The variable may be important but needs further discussion.
- 0 The variable has minimal effects on a species (i.e., the variable is not very important in the assessment process) and should be dropped from further consideration.
- "blank" Information on a species-variable interaction is not available and the species response to the variable is unknown.

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**Description of Assessment Variables**  
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The following are brief descriptions of the assessment variables being used in the fish assessment process.

**Flow:**

Flow is measured in cubic feet per second. In the estuarine and marine fish communities, flow refers to net river or channel flow and does not include tidal flow.

**Reservoir drawdown:**

Reservoir drawdown refers to the change in reservoir water surface elevation over time and can indicate either falling or rising elevation.

**Temperature:**

Water temperature is measured in degrees Fahrenheit.

**Estuarine salinity:**

Estuarine salinity is measured in parts per thousand (ppt) and is a measure of the concentration of ocean salinity. Activity and

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**Food availability:**

Food availability refers to the density of prey items identified.

**Sedimentation:**

Sedimentation refers to the movement of sediment, either depositional or erosional processes (including dredging and filling operations).

**Diversion:**

Diversion includes both the actual water pumped or siphoned from a natural water body and the associated effects of predation, abrasion, turbulence, and fish screens on fish survival.

**Barrier:**

Barriers include dams, temporary physical barriers of rock and other materials, and gated structures. Barriers are any structures that impede movement of fish or reduce the survival of fish that must pass over, around, or through the barrier. Barriers can indirectly affect fish survival through changes in flow patterns in areas remote from the actual barrier.

**Spawning habitat:**

Spawning habitat refers only to the physical habitat (e.g., substrate), not relationships to flow, temperature, or other assessment variables that affect habitat quality relative to species needs.

**Rearing habitat:**

Similar to spawning habitat, rearing habitat refers only to physical habitat and not relationships to other assessment variables that affect habitat quality relative to species needs.

**Pollutants:**

Refers to pesticides, fertilizers, warm water, salts, metals, and other substances that affect the survival of species in the receiving water body. Pollutants may enter natural water bodies in discharge, runoff, and through direct application (e.g., herbicides).

**Fishing:**

Includes commercial fishing, sport fishing, and illegal fishing activities that cause or contribute to the death of individuals in a species' population.

**Hatchery production:**

Includes the human-aided production of a species in facilities isolated to some degree from the natural ecosystem (e.g., fish hatcheries, rearing pens). The production is released to natural water bodies to supplement wild populations or to provide fishing opportunities.

**Disease:**

Disease refers to fungi, bacteria, viruses, and other pathogens that may limit a species' population abundance. The pathogens may be natural or introduced, and the effects may vary depending on interactions with other assessment variables.

**Species interactions:**

Species interactions include competition and predation that may limit a species' population abundance. Effects of species interactions may also vary depending on relationships to other assessment variables.