

Vulnerability of Delta Functions

There is no comprehensive plan to protect the Bay-Delta System by managing the risk of catastrophic levee failure and inundation of Delta islands. Inundation would result in loss of agricultural production, wildlife habitat and infrastructure, and could result in increased salinity intrusion into the Delta, adversely affecting habitat and water supply operations. Periodic levee failures indicate that the risk of inundation is unacceptably high. The major problems contributing to the unacceptably high level of risk include:

- A. **Ongoing subsidence** (lowering of the land surface) of Delta islands contributes to levee instability by increasing the elevation difference between the island and the surrounding water surface. There are basically two types of subsidence problems:
 - 1. **Accelerated subsidence** resulting from microbial decomposition of exposed peat soils in agricultural areas.
 - 2. **Gradual subsidence** resulting from natural processes such as erosion and consolidation, exacerbated by gradual increase in sea levels.

- B. The **physical condition** of many of the levees is inadequate to withstand service conditions such as **high water levels (flood flows) and wave action**. Several problems contribute to the levees' poor physical condition.
 - 1. Many of the levees are constructed of **unsuitable materials** including:
 - a) **Uncompacted, poorly graded materials.**
 - b) **Materials with high organic content.**
 - 2. Many of the levees were constructed without **engineering design** including proper geometry, line and grade control, and/or drains and filters.
 - 3. Many of the levees are **poorly maintained**.
 - a) Many maintenance programs are **underfunded**. Many entities with Delta levee maintenance responsibilities are supported by agricultural interests with a limited ability to fund adequate maintenance programs. No mechanism is in place for developing funding contributions from other sources.
 - b) **Regulatory constraints** on the use of dredge material and protected habitat designations make maintenance activities problematic and discourage establishment of additional habitat on levees.
 - c) The existence of **multiple agencies** with concurrent, overlapping, redundant, conflicting, or vague jurisdictional limits and authorities impact efforts to maintain and/or rehabilitate levees.

- C. The **physical condition** of many of the Delta levees is believed to be inadequate to withstand the **maximum credible seismic event**. Several problems contribute to this belief:
 - 1. The **physical response** of the highly organic (peat) materials underlying many of the Delta levees is **not understood** well enough to permit reasonable technical evaluation of their structural stability under seismic loading.

- D. The current level of **flood protection is too low** in some places in the Delta. Failures at these locations can adversely impact other places in the Delta, reducing their existing level of protection.
1. The ability of some **channels** to carry flood flows is too low.
 2. The ability of some **levees** to withstand flood flows without overtopping is too low.
- E. Delta channels and levees are not generally configured to accommodate the consequences of **flood control operations upstream**.
1. Some **levees are too low** to protect Delta islands from inundation by a flood event of the expected magnitude.
 2. Some **channels are too small** to carry a flood event of the expected magnitude.
- F. **Upstream flood control management** is focused on protecting areas outside the Delta.
1. The Delta's ability to withstand the flood flows of **upstream flood control operations** is uncertain.
 2. **Upstream flood control facilities**, such as flood control reservoirs, are not sized or configured to provide sufficient flood control benefits to the Delta.