

Executive Summary

The Delta is a critical component of California's economy. It simultaneously provides a unique and delicately balanced aquatic environment for a wide variety of fish, animal, and plant species, drinking water for 22 million Californians, and more than ?? million gallons of irrigation water annually. The long-term management of Delta resources is critical to California's future.

The purpose of this report is to examine water quality issues associated with the use of Delta water for drinking water purposes and to assess potential CALFED core activities that are likely to reduce or eliminate drinking water problems. It also identifies areas that need additional research.

From a drinking water treatment perspective, the following constituents commonly found in Delta waters are considered a potential problem: pathogens, organic material, nutrients, suspended solids, and bromide. All are naturally occurring, although man-made discharges such as treated and untreated sewage, urban stormwater runoff, and agricultural drainage also contribute to the loading of these constituents in the Delta. Bromide, which is naturally present in seawater, is present in the Delta primarily as a result of seawater intrusion, although agricultural drainage also contributes to bromide concentrations in the Delta.

Pathogens are a direct threat to public health, and a primary purpose of drinking water treatment is to remove or kill pathogens. Organic material, nutrients, and suspended solids are typically not a direct threat to public health, but they do tend to complicate and interfere with drinking water treatment by shielding pathogens from removal and disinfection, or by helping produce unpleasant tastes and odors. Organic materials can also react with disinfectants, especially chlorine, to generate undesirable disinfection byproducts. Bromide is not a direct threat to public health, but it, too, complicates treatment by reacting with disinfectants, especially ozone, to generate harmful disinfection byproducts.

Bromide currently raises the greatest concern in terms of drinking water treatment. Ozone reacts with bromide to create a potent carcinogen - bromate - while chlorine and bromide generate less potentially harmful brominated organic compounds. However, future drinking water regulations may favor the use of ozone over chlorine because of its increased effectiveness against microbial pathogens, such as *Cryptosporidium*, and its tendency to produce fewer disinfection byproducts than chlorine in the presence of organic matter. A move toward more frequent use of ozone and more stringent regulatory limits on disinfection byproducts is likely to create a significant problem, making bromide one of the most important water quality issues for Delta water users. The problem cannot be fully quantified because many of the key variables, such as regulatory limits and treatment effectiveness, have yet to be fully determined. No means of significantly reducing bromide concentrations in Delta water were identified in the core elements of the CALFED program.

Further complicating the Delta water quality issue is the fact that drinking water is withdrawn from the Delta at several different locations, each with its own distinct water quality issues. Improving the water quality at one location by relocating a pollution source, such as an agricultural drain, may have an adverse impact on water quality at another location.

To address the concerns as currently understood, the Drinking Water Quality subgroup of the CALFED Water Quality Technical Group developed the following list of potential action items. This is a general list and not all items will apply to each withdrawal point or delivery system.

- Agricultural Drains: Treat drainage, relocate outfall, implement best management practices, fallow or retire land
- Animal Enclosures: Implement best management practices
- Treated Sewage Effluents: Improve treatment, relocate outfall, implement watershed-based approach to permitting that evaluates cumulative impacts using methods such as total maximum daily loading (TMDL)
- Urban Storm Drainage: Treat drainage, relocate outfall, implement watershed-based approach to permitting that evaluates cumulative impacts using methods such as total maximum daily loading (TMDL)
- Algae Control: Treat water to kill or remove algae, reduce nutrient sources
- Boating Control: Develop and implement education and enforcement programs
- Local Watershed Mgmt: Control recreation, control grazing, reroute agricultural drains

In addition, the Drinking Water Quality group identified several issues that require further study. The conversion of agricultural lands to wetlands has been identified as a CALFED core activity. Although such conversion may improve the quality of Delta waters from an ecological perspective, it may have an adverse affect on water quality from a drinking water treatment perspective. This potential impact should be studied before large-scale conversions are implemented. Additional study of the impact on key drinking water constituents of treated sewage discharges and urban drainage is also necessary, as these impacts have not been fully studied and quantified. This is especially true of cumulative impacts of such discharges.