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Key Nutrient Management Decisions and Questions

Several key management decisions and questions provide the context for the San Francisco Bay nutrient management strategy. The primary anticipated management decisions include:

1. Establishing Bay nutrient objectives
2. Evaluating the need for revised objectives for dissolved oxygen (in sub-habitats) and ammonium/ammonia
3. Developing and implementing a nutrient monitoring program
4. 303(d) listing decisions for the adverse effects of nutrients or ammonium - whether impairment exists currently or is forecast in the future
5. Specifying nutrient limits in NPDES permits (e.g. POTW and MRP) as well as determining additional data collection needs
6. Determining whether management actions are necessary to prevent or address nutrient enrichment impacts and if so, the schedule, and nature for POTW treatment plant upgrades and stormwater treatment

Nutrient management issues may be influenced by, or can influence to some degree, decisions on other issues, such as the regulation of freshwater flow from the Delta, a regional sediment management strategy, recycling of wastewater, management of nutrient loading to the Delta, and nutrient watershed TMDLs, e.g., Sonoma Creek and Napa River.

These upcoming decisions are the foundation for five key management questions that, in turn, drive the elements of the nutrient strategy, and correspond to the recommendations laid out in a recent literature review and data gap analysis that was conducted as an early step in the NNE process (Table 1; McKee et al., 2011).

Table 1. Summary of management questions developed with input from the Nutrient Workgroup, and corresponding recommendations from the San Francisco Bay NNE literature review (McKee et al. 2011).

Type	Management Question	Recommendation From McKee et al. 2011 Review
Status and trends	Is there a problem or are there signs of a problem? Are trends spatially the same or different in San Francisco Bay? a. Is eutrophication currently, or trending towards, adversely affecting beneficial uses of the Bay? b. Are beneficial uses in segments of San Francisco Bay impaired by any form of nutrients (e.g. ammonium)? c. Are trends spatially the same or different in San Francisco Bay?	Implement a monitoring program to support regular assessments of nutrient support for the Bay beneficial uses. Coordinate with Delta nutrient monitoring and management.
Objectives	What are appropriate guidelines for identifying a nutrient-related problem?	Establish a NNE framework for the Bay
Sources and Pathways	Which nutrient sources, pathways, and cycling processes are most important to understand and quantify? (Get the loads right!) 1. What is the relative contribution of each loading pathway (POTW, Delta inputs, NPS, etc.)? 2. What are contributions of internal sources (e.g. benthic fluxes) from sediments and sinks (e.g. denitrification) to the Bay nutrient budgets?	Quantify external sources of nutrients to the Bay and develop a spatially-explicit budget of the Bay.
Fore-casting	What nutrient loads can the Bay assimilate without impairment of beneficial uses?	Develop load-response models
	What is the likelihood that the Bay will be impaired by nutrient overenrichment/eutrophication in the future?	



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