DFG EXHIBIT 59

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Exhibit 59, entered by the California Department of Fish and Game for the State Water Resources Control Board 1987 Water Quality/ Water Rights Proceeding on the San Francisco Bay/Sacramento-San Joaquin Delta.

Summary of Delta Outflow Effects on San Francisco Bay Fish and Invertebrates

Larval Fish Catches - For all years, over 90% of the larval fish catch consisted of Pacific herring, northen anchovy, unidentified smelts, yellowfin goby and longfin smelt. Striped bass was also among those making up 90% of the catch in 1980 and 1983. Pacific herring were the most common in all years except 1980 and 1984. When considered as a group, gobies were in the top three most abundant species especially in 1980 and 1984.

FISH AND INVERTEBRATE USES OF THE BAY

There are many uses of the Bay associated with fish and wildlife resources and a prerequisite to protecting these resources is the maintenance of healthy Bay habitat. The following discussion briefly describes some of these important uses.

Use as a Nursery Area

One important function of the Bay is that it acts as a nursery area for marine and estuarine species. We documented the use of the Bay as a nursery area during our six year study. We found various life stages of many species that occurred in the Bay at some time of the year. Other researchers have documented the importance of San Francisco Bay as a nursery area, particularly for the Dungeness crab. Tasto (1983) found that crabs spawned offshore and reared in the Bay contribute to the fishery 3 years after hatching, while ocean spawned and reared crabs enter the fishery 4-5 years aftr hatching. Bay reared crabs grow almost twice as fast as ocean reared crabs. Reasons that organisms use estuarine systems as nursery areas include the following:

1. Reduced Predation and Parasitism - Increased turbidity (Minello, Zimmerman and Maitinez 1987), abundant submerged vegetation (Wilson, Heck and Able 1987) and lowered salinity (McCabe,et al. 1987) all have been shown to reduce predation or parasitism in estuaries and thereby enhance survival of juvenile forms using the estuary.

2. Increased Nutrients and Subsequent Food Production - Estuaries receive inflow from vast watersheds and are therefore usually rich in nutrients and other food sources. Such food is advantageous to young fish using the estuary as a nursery area (Odum 1971; Krygir and Pearcy 1986).

3. Estuaries Provide Variable Habitat Types - Habitat types are more variable in bays and estuaries than oceans. Such variability increases the chance that suitable conditions will be present for a greater number of