

# California's Living Marine Resources: A Status Report

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## The Status of Habitats and Water Quality in California's Coastal and Marine Environment

aries) are more resistant to changes from thermal effects than those that do not normally experience such changes. Power plant discharges can result in decreased diversity and density of species at the community and ecosystem levels. In addition to heat, power plant discharges can contain high levels of suspended solids, which decrease light penetration of the water column and affect adjacent kelp bed production.

Power plants also cause problems related to water flow. Electricity generating power plants take in billions of gallons of water on a daily basis. Diablo Canyon Nuclear Power Plant circulates 2.5 billion gallons of water per day, which pulls in creatures in the seawater en route to passing the water through the plant in its once-through cooling cycle. This water circulation causes temperature increases in the area of discharge (thermal pollution), impingement (marine animals caught on water intake screens), and entrainment (destruction of marine animals pulled inside the plant). Entrainment is generally limited to those organisms not capable of swimming against the intake current (e.g., larval forms). Most energy company-sponsored studies of power plant entrainment limit analysis to effects on larval fish, arguing that plankton losses are too difficult to enumerate and analyze for ecosystem effects. It has been estimated, however, that plankton losses can significantly increase the estimates of overall wildlife losses due to entrainment. Larval entrainment losses are often estimated at 100 percent due to a multiplicity of factors, including physical changes in pressure, discharge velocity, turbulence, and temperature increase effects. If the power plant has a mechanism to return impinged organisms to the water (most do not), those losses are lower, but do contribute to the cumulative effects of power plants on the ecosystem.

### Hydromodification

Dams in California range from large, permanent structures to small, temporary structures. Millions of gallons of water, often diverted from rivers that empty into the ocean or estuaries, are stored for agricultural use, drinking water supplies, flood control, or groundwater recharge. Dams change the landscape both at the construction site and the downstream conveyance to the ocean or estuary. Loss of upstream habitat due to water diversion has the effect of reducing the production capability of anadromous species that depend on continuous summer flows for rearing and transport of juveniles that travel downstream to the ocean for growth prior to returning to natal streams. Diversion of freshwater inflow to estuarine systems also reduces the productivity of the estuaries by reducing the nutrient input which diatom and other bottom trophic level organisms require. Dams also change stream morphology by altering sediment flow, by

smothering gravels with silt during high flow by emptying summer rearing pools. Dams also contribute to poor water quality by releasing warm surface water that has been mostly depleted of oxygen; or water, through spillways, that may contain oxygen too high for fish survival (supersaturation). They are formed by large dams cover miles of form riffles, and many dams have been built without facilities, blocking the upstream migration of fish trying to find suitable spawning habitat.

Water conveyance structures (i.e., water canals) remove essential water from rivers and streams that have produced the bulk of California's salmon runs. These structures not only remove water, they also alter habitat. For example, canals that leak repeatedly riparian habitat entirely dependent on that leakage. When these canals are repaired, the ecosystem that has developed over the years is lost. Water canals also have the potential to transport fish between watersheds, introducing species into unfamiliar habitats. Many new reservoirs behind dams contain non-native fish that have the potential to escape from the lake into the stream, such as the case of the northern pike introduced into Lake Davis.

## Recreational and Commercial Activities

### Boating

Cruise ships, yachts, and other large recreational vessels discharge sewage, gray water, toxic chemicals, and air pollutants into sensitive coastal waters. Smaller vehicles also can do significant harm.

### Jet Skis (Motorized Personal Watercraft)

For example, jet skis, more generically referred to as "motorized personal watercraft" (MPWC) can cause significant nearshore harm. For example, their noise is rated at 85-105 decibels, can disrupt wildlife activities through alteration of behavior and nest abandonment. MPWCs also pollute more than other boats. From 33 percent of the oil and gasoline used by MPWCs is discharged unburned, impacting local water quality. A two-hour ride on an MPWC can discharge up to 10 gallons of unburned gasoline and oil, or the same amount of pollution as driving 139,000 miles in a 1998 passenger car. The impact of accumulated oil pollution in the environment is particularly significant in sensitive nearshore environments such as estuaries and bays. This pollution can have cumulative effects throughout the food web as the hydrocarbons bioaccumulate, posing a threat to larger marine life.