California Department of Fish and Wildlife Pacific Herring Fishery Overview

Pacific herring (*Clupea pallasii*)

Pacific herring: CDFW

Biology: Pacific herring are a schooling species found throughout the coastal zone from California around the Pacific Rim to Korea. They are olive green-dark blue to silvery, with an average size of 6 inches (160mm) in San Francisco Bay. In California they can live up to 8 years and they feed primarily on euphausiids, copepods, amphipods, fish larvae, and mollusks. In California herring are found nearshore during spring and summer and migrate to bays and estuaries to spawn from November through April.

Forage: Herring are an important forage species for ocean and bay food webs. Forage fish are defined as species that contribute significantly to the diets of larger organisms during some part of their life history. Herring eggs, larvae, young-of-the-year, and adults provide a food source for a variety of birds, mammals, fishes, and invertebrates. The California Fish and Game Commission adopted the Forage Species Policy (Policy) in 2012, which recognizes the importance of forage species to the California Current Large Marine Ecosystem. This Policy intends to provide adequate protection for forage species through precautionary and informed management, and by identifying and progressively incorporating Essential Fishery Information needed for ecosystem-based management.

Pacific herring spawn: CDFW

The Fishery: The San Francisco Bay population supports a valuable fishery for herring roe (*kazunoko)*, and a smaller herring-eggs-on-kelp (*komochi or kazunoko kombu*) fishery suspends giant kelp from rafts on which herring spawn. San Francisco Bay also supports a limited commercial fresh fish and recreational fishery.

Research and Management: The Department of Fish and Wildlife (Department) has conducted herring research in San Francisco Bay since 1972 as part of its ongoing monitoring and management of the commercial fishery. The Department uses annual dive surveys and spawn deposition surveys to calculate a spawning biomass estimate each year. In addition to these estimates, the Department collects commercial and research fishery data. These data along with various environmental indicators serve as the basis for establishing fishing quotas for the next season.

Threats: Pacific herring embryos and juvenile herring are vulnerable to predation, temperature and salinity variability as well as suspended sediments associated with

dredge operations in San Francisco Bay. Climate change and variability will also cause herring population level impacts due to sea level rise, increased sea surface temperature, nutrient depletion, decreased pH and extreme storm events.

Fishery Management Plan: The Department is currently working with the commercial fishing industry and the conservation community to develop a Fishery Management Plan (FMP) for Pacific herring. Elements of an FMP will include a fishery model and harvest control rule for the commercial fishery. A FMP will also help the Department to progressively incorporate ecosystem management principles into fishery management to ensure sustainability of this important forage species.