

7 California grunion, *Leuresthes tenuis*



Male grunion, *Leuresthes tenuis*, swimming around a female buried in the sand. Photo credit: D Martin.

History of the Fishery

The California grunion, *Leuresthes tenuis*, is of minor commercial importance. Grunion are taken incidentally with encircling nets, for human consumption, and as bait. Grunion are usually caught with other small fish and are typically not reported separately, thus commercial catch records provide an incomplete account of commercial grunion landings.

Grunion provide an important, although limited, recreational fishery in southern California. Grunion are famous for their remarkable spawning habits; they are the only terrestrially spawning fish in California, actually leaving the water to spawn in wet beach sand. As the fish leave the water to spawn, they may be picked up while they are briefly stranded, providing a unique recreational fishery. Existing recreational fisheries surveys such as the California Recreational Fisheries Survey do not typically collect grunion catch data, because these surveys operate only during daylight hours, whereas grunion are vulnerable to recreational anglers during the nocturnal spawning runs.

Grunion spawning runs declined during the 1920s, and a regulation was passed in 1926 establishing a closed season for the recreational fishery during the months of April, May, and June. The spawning runs improved, and in 1948, the closure was shortened to April through May, where it remains. Grunion may be taken by recreational anglers using their hands only. No appliances of any kind may be used to catch grunion, and no holes may be dug in the sand to entrap them. Anglers sixteen years of age and older must possess a valid sportfishing license. There is no bag limit for grunion.

Status of Biological Knowledge

The California grunion is classified in the family of New World silversides, Atherinopsidae, along with the jacksmelt and topsmelt in California. Silversides differ from true smelts (family Osmeridae) by having two dorsal fins, while true smelts have one dorsal fin and one adipose fin. Grunion are small, slender fish with bluish-green backs, and silvery sides and bellies. Grunion are most common from Point Conception, California, to Point Abrejos, Baja California, Mexico, with a maximum range from Tomales Bay, California to Bahía Magdalena, Baja California, Mexico. The establishment of populations at the northern extent of the species range may coincide with El Niño Southern Oscillation (warm-water events). Adult grunion inhabit nearshore waters from the surf zone to a depth of 60 feet (18 meters). Grunion are non-migratory, although they do not necessarily return to spawn on the same beach where they hatched.

Grunion grow rapidly to approximately 5 inches (12.7 centimeters) in length by the time they are one year old, at which time they reach sexual maturity. Adult grunion normally range from 5-6 inches (12.7-15.2 centimeters) in length, with a maximum recorded size of 7.5 inches (19.0 centimeters). The normal life span is two or three years, with rare individuals living to four years. Growth ceases during each spawning season, causing noticeable annuli to form on the scales. These annuli can be used for ageing purposes.

Grunion runs typically occur for four nights following the highest tide associated with each new and full moon. Spawning begins shortly after high tide and continues for one to three hours. As a wave breaks on the beach, the grunion swim as far up the beach as possible. The female excavates the sand with her tail, twisting her body and digging tail-first until she is buried up to the pectoral fins. After the female is in the nest, one to several males attempt to mate with her by curving around the female and releasing their milt as she deposits her eggs a few inches below the surface (Figure 7-1). Multiple paternity is common in grunion nests. After spawning, the males immediately retreat toward the ocean. The female twists free and then returns to the sea. The spawning act can happen in twenty seconds, but some fish remain on the beach for several minutes.



Figure 7-1. Female grunion in the nest with male approaching. Photo credit: D Martin.

The major spawning season is from March through August, with spawning occasionally starting in late February or extending into early September. Peak spawning occurs during the months of April, May, and June. Individuals may spawn during successive spawning periods at approximately two-week intervals. Most females spawn about four

to eight times during the season. Females produce approximately 1000 to 3600 eggs every two weeks, with larger females producing more eggs.

The eggs incubate in the damp sand above the level of subsequent waves, and do not hatch until the next high tide series reaches them. Grunion eggs can delay hatching if tides do not reach them, for up to several weeks. The mechanical action of the waves uncovers the eggs and triggers hatching. The larvae hatch within minutes of being stimulated by wave action, and enter the oceanic phase of their lives.

Grunion have no teeth, and feed primarily on mysid crustaceans. Predators upon adult grunion include humans, birds, marine mammals, and larger fish. Incubating eggs are subject to predation by sand-dwelling invertebrates. Disruptions of spawning habitat include beach erosion, beach grooming, coastal construction, and pollution.

Status of the Population

Despite brief local concentrations during spawning runs, the grunion is not an abundant species. Although no formal stock analyses have been undertaken, the population north of Los Angeles County is considered to be extremely limited. The majority of the population occurs along the coast of Los Angeles, Orange, and San Diego counties. Grunion runs in 2011 were weak in comparison to previous years.

The Grunion Greeters program coordinated by Pepperdine University researchers has collected the most comprehensive, long-term data set of grunion spawning activity. Data collected by volunteer observers include run locations, duration, and the relative strength of observed spawning runs. These data have been used to assess the effects of oil spills on grunion spawning habitat.

Management Considerations

Grunion are vulnerable to human and environmental impacts due to their restricted range, narrow critical spawning habitat, and because they are fished during the spawning season. While no take is allowed during the peak spawning months of April and May, and no gear is allowed during the open season, there is no limit to the number of grunion an individual may possess. Given the apparent popularity of the fishery, the growing human population in coastal California, and the paucity of grunion catch and effort data, the institution of a bag limit may warrant further consideration.

Protection of nest sites is an important management measure, as incubating embryos are subject to human perturbations including coastal construction, sand replenishment, beach grooming, and foot traffic, as well as terrestrial predators. Outreach to beach managers has led to changes in beach grooming practices in parts of southern California, so that beach grooming now remains above the highest tide line during the grunion spawning season, avoiding the intertidal zone where grunion nests may be located. The impacts of coastal construction and sand replenishment include crushing and burial of eggs by bulldozers grading or moving sand in the intertidal, as well as artificial lighting and turbidity affecting adult spawning behavior. Sand replenishment

may result in the building of beach berms that are too steep for successful grunion spawning. Steep slopes may not allow the eggs to hatch if the next high tide cannot reach the area where eggs are incubating.

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Further Reading

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