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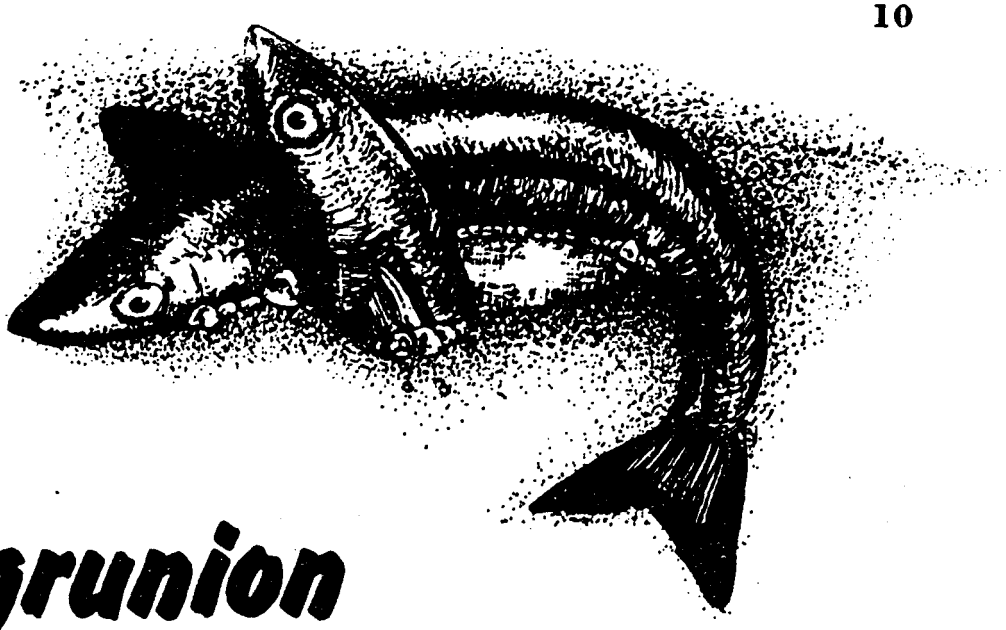
The Amazing Grunion by Jerome D. Spratt on the following pages is reprinted from Outdoor California, a bimonthly publication of the Calofornia Department of Fish and Game. This is for those who have requested native saltwater articles, and I believe this one is written in an excellent style.

By Jerome D. Spratt



the amazing grunion

ALONG SOUTHERN CALIFORNIA'S SANDY BEACHES from March through September, one of the most remarkable life cycles in the sea is completed; the California grunion comes ashore to spawn.

The grunion has been known to many southern Californians for almost 60 years, but there are still those who are skeptical of its existence. To be invited out in the m e of the night to go fishing with only a gunny sack and a light for equipment does sound a little ridiculous, but in reality this is the most popular method.

California grunion are small silvery fish found only along the coast of southern California and northern Baja California. Most sportsmen would be unaware of the existence of these fish were it not for their unique spawning behavior. Unlike other fish, grunion come out of the water completely to lay their eggs in the wet sand of the beach.

As if this behavior were not strange enough, grunion make these excursions only on particular nights and with such regularity that their arrival can be predicted a year in advance. Shortly after high tide, on certain nights, sections of many beaches sometimes are covered with thousands of grunion depositing their eggs.

Since they leave the water to deposit their eggs, the fish may be picked up while briefly stranded. Racing for grunion spotted far down the beach and trying to catch them by hand provides an exhilarating experience for young and old. The common sight of thousands of people lining the more popular beaches in anticipation of a grunion run attests to the growing interest in the sport.

Often there are more people than fish, but at other times everyone catches a fish. All that is needed to catch grunion is a valid California sportfishing license and a willingness to get one's feet wet.

Description. Grunion are small (between 5 and 6 inches) slender fish with bluish-green backs and silvery sides and bellies. Early Spanish settlers called this fish *grunon,* which means "grunter." Grunion are known to make a faint squeaking noise while spawning.

Its scientific name is *Leuresthes tenuis,* and it belongs to the family Atherinidae, commonly known as silversides. Other more abundant atherinids found in California are the topsmelt, *Atherinops affinis,* and jacksmelt, *Atherinopsis californiensis.* Silversides differ from true smelts, family Osmeridae, in that they lack the troutlike adipose fin.

Distribution. The principal range of the grunion is between Point Conception in southern California and Punta Abreojos in Baja California. However, there are small populations both north and south of these points. Occasionally, grunion may appear in fair numbers as far north as Morro Bay, and strays have been reported as far north as Monterey Bay.

A close relative of the California grunion is the gulf grunion, *Leuresthes sardina,* found in the Gulf of California. This species spawns both day and night, while the California grunion spawns only at night.

Spawning. The spawning season extends from late February or early March to August or early September, varying slightly in length from year to year. Grunion spawn only on three or four nights after the highest tide associated with each full or new moon and then only from one to three hours each night following high tide.

Spawning runs typically begin with single fish (usually males) swimming in with a wave and occasionally stranding themselves on the beach. Gradually, more and more fish come in until the beach is covered by a blanket of grunion. Spawning normally starts about 20 minutes after

The rules for grunion hunting are simple: No fishing gear or equipment can be used; it's a hands-only proposition. There's no limit, but you mustn't take more than you can use, and everyone 16 or older needs a fishing license. Photo by Bill Beebe of the Santa Monica Evening Outlook.

the first fish appear on the beach. Typically, a run lasts from one to three hours, but the number of fish on the beach at any given moment can vary from none to thousands. Peak activity is reached about an hour after the start of the run and lasts from 30 to 60 minutes.

Finally, when the tide has dropped a foot or more, the run slackens and then stops as suddenly as it started. No more fish will be seen that night, and they will not appear again until the next night or the next series of runs.

Observing grunion can be much more interesting than catching them. Females ride a far-reaching wave onto the beach, accompanied by as many as eight males. If no males are present, a female will return to the ocean with the outflowing wave.

In the presence of males, she swims as far up on the beach as possible and literally drills herself into the sand as the wave recedes. This is accompanied by arching her body, head up, while vigorously wriggling her tail. As her tail sinks into the semifluid sand, she twists and drills until she is buried up to the pectoral fins. Occasionally, she may bury herself completely.

The male (or males) curves around her as he lies on top of the sand, with his vent close to or touching her body. The female continues to twist, emitting her eggs two or three inches beneath the surface. Males discharge their milt onto the sand near the female and then immediately start to wriggle towards the water.

The milt flows down the body of the female and fertilizes the eggs. She then frees herself from the sand with a violent jerking motion and returns to the sea with the next wave to reach her. This entire process takes about 30 seconds, but individual fish may remain on the beach for several minutes.

Larger females are capable of producing up to 3,000 eggs every two weeks. As the mature eggs are deposited, another group of eggs is developing that will be spawned during the next series of runs. This cycle continues throughout the season. During the early part of the season, only older fish spawn, but fish hatched the previous year come into spawning condition as the season progresses and join the runs. Fish of all ages will spawn by April and May.

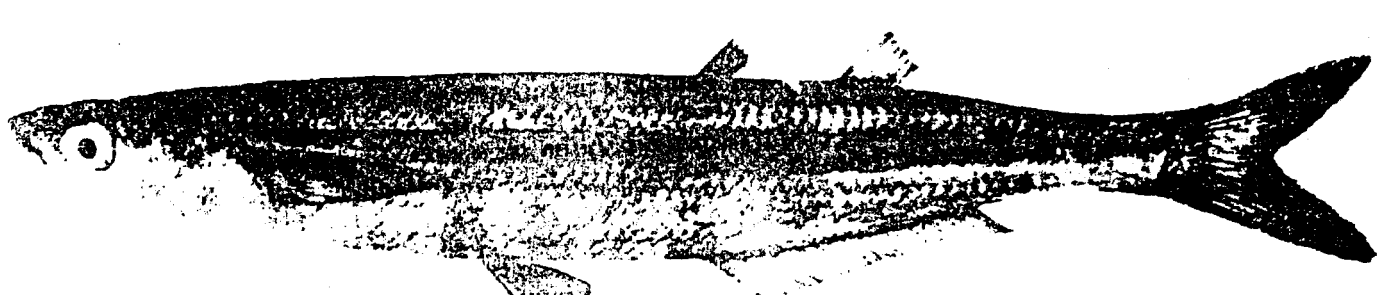
Fate of the eggs. Eggs are initially deposited two to three inches below the surface of the sand. The outgoing tide deposits sand onto the beach, covering the eggs to a depth of 8 to 16 inches. Here the eggs remain in the moist sand.

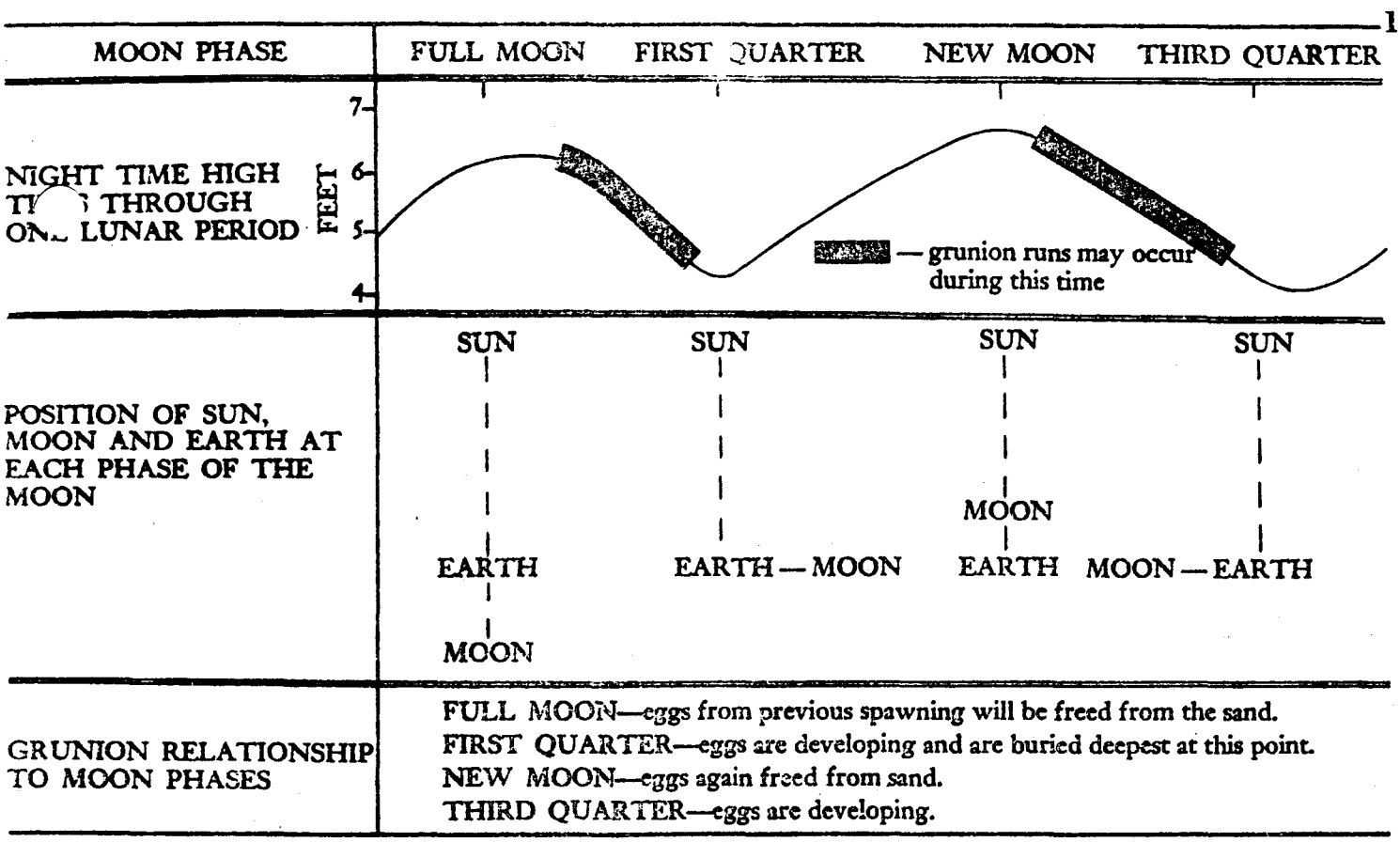
They will be ready to hatch in about 10 days but remain viable until they are freed from the sand by the next series of high tides to reach them. The baby grunion hatch two or three minutes after the eggs are freed from the sand and are washed out to sea.

Age and growth. Young grunion grow rapidly and are about five inches long when a year old and ready to spawn. The normal life span is two or three years, but individuals four years old have been found. The maximum size attained is between six and seven inches. The growth rate slows after the first spawning and stops completely during the season. Consequently, the fish grow only during the fall or winter.

The cessation of growth during spawning causes a mark to form on each scale, and the age of the fish can be determined by counting these marks, much as the age of a tree can be determined by counting its growth rings.

The California Grunion, **Leuresthes tenuis.**





The sun, moon, earth, tides and grunion behavior.

The life history of grunion while at sea is not well known, but these fish apparently spend most of their life close to shore in water 15 to 40 feet deep.

e of the tides. Tides are caused by forces exerted on the earth by celestial bodies in direct proportion to their mass. Theoretically all celestial bodies affect the tides, but realistically only the sun and moon need be considered.

Since the sun has 26 million times the mass of the moon, one might expect the sun to be the dominant tide-producing force. However, the force exerted by a celestial body decreases rapidly as its distance from earth increases. Consequently, the sun, being almost 400 times farther from earth than the moon, exerts less than half as much force as the moon.

Tidal highs and lows vary according to the relative positions of the sun, earth and moon. Highest and lowest tides occur when the sun, earth and moon are most in line, such as during full moon (sun and moon on opposite sides of the earth) and new moon (sun and moon on the same side of the earth). These are known as "spring" tides. The tides occurring during the first and last quarters of the moon, when the sun and moon are least in line, are known as "neap" tides and are intermediate in range.

Grunion behavior. Grunion have adapted to tidal cycles in a precise manner. Along the Pacific coast, two daily high tides vary in height, and the higher occurs at night during spring and summer. Grunion spawn only on these higher tides and after the tide has started to recede.

Since waves tend to erode sand from the beach as the tide rises and deposit sand as the tide falls, it is obvious that if grunion spawn on a rising tide the succeeding waves would wash the eggs out. This danger is eliminated since spawning usually is confined to the falling tide.

In addition, grunion nearly always spawn on a descending series of tides when succeeding tides are lower than tides of the previous night. The eggs would be washed out prematurely by succeeding tides if spawned during the ascending tidal series.

The eggs mature and are ready to hatch in about 10 days, or about the time of the next series of high tides. Thus, spawning must take place soon after the highest tide in a series if the eggs are to have adequate time to develop before the next series of high tides.

Looking at the tidal cycle, it becomes apparent that there are only three to four nights following the highest tide that spawning conditions are right, and it is on these nights that grunion spawn.

Internal clock. How does the grunion know when the time is right to spawn? Evidently some biological mechanism or "internal clock" that can detect some change in the environment sounds an alarm at exactly the right moment. The exact stimulus is not known, but it is suspected that they may be able to detect minute changes in water pressure caused by the rising tides. Without this ability to spawn at precisely the right moment, the grunion would not survive.

Regulations. A valid California fishing license is all that is required for taking grunion. Although the season is closed during April and May, this is an excellent time for observing runs. Grunion must be taken by hand only; no appliances of any kind may be used, and no holes may be dug in the beach. There is no limit to the number that may be taken, but grunion should not be wasted.

When to go. The spawning season extends from March through September, and the California Department of Fish and Game issues schedules of expected grunion runs in advance of each season. Predictions are made only through July, since runs in August and September are erratic.

These schedules of expected runs are published in newspapers and copies are given to many sporting goods stores throughout southern California. If these are not available, all that is needed by the grunion hunter wishing to make his own predictions is a tide table.

Grunion runs may occur anytime from the night of highest tide throughout the descending series of high tides. But runs are most likely to occur on the second, third, fourth and fifth nights following the night of the new or full moon. Generally the third and fourth nights are best.

The time of the run will be 30 to 60 minutes past high tide and will last from one to three hours. The heaviest part of the run usually occurs at least one hour after the run starts.

Best locations. Grunion runs will occur on most southern California beaches, but they may not occur every night on the same beaches and may be limited to small areas of any one beach. The ends of beaches are often the best spots.

Some of the beaches that are known to have the best runs are the beach between Morro Bay and Cayucos, Pismo Beach, Santa Barbara, Malibu, Santa Monica, Venice, Hermosa Beach, Cabrillo Beach, Long Beach, Belmont Shore, Seal Beach, Huntington Beach, Newport Beach, Corona del Mar, Doheny Beach, Del Mar, La Jolla, Mission Beach and the Coronado Strand. The beaches near Ensenada in Baja California also have good runs.

Hints for success. It is best to go to the end of an uncrowded beach. This is not always possible, but the fewer people the better. Fires and lanterns should be used sparingly. Light may scare the fish and they will not come out of the water. After a wave has receded, flashlights may be used to help locate fish. A small gunny sack makes a good grunion creel. Finally, plan to stay late; many grunioners quit an hour after high tide and miss a good run.

Cooking your catch. Grunion should be cleaned and scaled. For best results, they should be rolled in a mixture of flour and yellow corn meal, to which a little salt has been added, and deep fried until golden brown. Although bony, they have a delicate flavor and provide excellent table fare when prepared fresh.#

expected grunion runs for 1976

Open Season

March	2	11:09 PM – 1:09 AM*
	3	11:33 PM – 1:33 AM*
	4	12:02 AM*– 2:02 AM*
	5	12:33 AM*– 2:33 AM*
	17	11:08 PM – 1:08 AM*
	18	11:50 PM – 1:50 AM*
	19	12:39 AM*– 2:39 AM*
	20	1:36 AM*– 3:36 AM*
June	1	11:45 PM – 1:45 AM*
	2	12:37 PM – 2:37 AM*
	13	10:42 PM –12:42 AM*
	14	11:27 PM – 1:27 AM*
	15	12:15 AM*– 2:15 AM*
	16	1:05 AM*– 3:05 AM*
	29	10:54 PM –12:54 AM*
	30	11:38 PM – 1:38 AM*
July	1	12:28 AM*– 2:28 AM*
	2	1:31 AM*– 3:31 AM*
	13	11:08 PM – 1:08 AM*
	14	11:46 PM – 1:46 AM*
	15	12:30 AM*– 2:30 AM*
	16	1:21 AM*– 3:21 AM*
	28	10:46 PM –12:46 AM*
	29	11:32 PM – 1:32 AM*
	30	12:21 AM*– 2:21 AM*
	31	1:26 AM*– 3:26 AM*

Closed Season

April	1	10:49 PM –12:49 AM*
	2	11:17 PM – 1:17 AM*
	3	11:46 PM – 1:46 AM*
	4	12:23 AM*– 2:23 AM*
	16	11:21 PM – 1:21 AM*
	17	12:09 AM*– 2:09 AM*
	18	1:08 AM*– 3:08 AM*
	19	2:19 AM*– 4:19 AM*
May	1	10:47 PM –12:47 AM*
	2	11:19 PM – 1:19 AM*
	3	11:57 PM – 1:57 AM*
	4	12:49 AM*– 2:49 AM*
	15	10:58 PM –12:58 AM*
	16	11:46 PM – 1:46 AM*
	17	12:41 AM*– 2:41 AM*
	18	1:43 AM*– 3:43 AM*
	30	10:26 PM –12:26 AM*
	31	11:00 PM – 1:00 AM*

* Where the time of the expected run is after midnight, the date of the night before is shown. (Pacific Daylight Saving Time)

Note: The times given for each date include the predicted time of the high tide (U.S. National Ocean Survey, for Los Angeles Harbor) and the probable two hour interval in which a spawning run may begin. The second hour is usually the better. The best runs normally occur on the second and third nights of the four night period.

Author Jerome D. Spratt is an assistant marine biologist with the DFG's Operations Research Branch. He works out of Monterey. The expected runs of grunion for 1976 were compiled by Vickie L. Wine, a DFG assistant marine biologist in Long Beach.