

Starry Flounder Biology

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Key References

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- California Sea Grant 2021, <http://casg-legacy.ucsd.edu/seafood-profiles/starry-flounder>
- NOAA Fisheries Office of Science and Technology Starry Flounder *Platichthys stellatus* Overall Vulnerability Ranking. https://www.st.nmfs.noaa.gov/data-and-tools/Bering_Sea_CVA/pdf/sis-starry-flounder.pdf 2022?

Introduction

- Starry flounder (*Platichthys stellatus*)
- Other common names include the grindstone, emery wheel, long-nosed flounder, rough jacket, diamond flounder, English sole, sole, and swamp flounder (Orcutt 1950).



The Family Pleuronectidae

- Members of this flatfish family are distinctive in possessing:
 - monomorphic optic chiasmae (“ki-as-ma”) (optic nerve crossing below the brain),
 - ribs,
 - one or two post-cleithra on each side (membrane bone along scapula),
 - pre-operculae with free margins, and
 - eyes normally on right side of the head (Orcutt 1950).
- Starry Flounder is primarily “left-eyed”.



Status/Threats

- Habitat abundant and widely distributed, considered a generalist (NMFS 2022).
- Known predators include birds, marine mammals, and sharks.
- Nearshore and estuary habitat use exposes it to human activities, including development and potential exposure to toxic chemicals (ODFW 2016).
- Impacts from parasites and disease are rare (Orcutt 1950)
- Known to hybridize with *Kareius bicoloratus* (Japanese waters) and *Parophrys vetula* (eastern Pacific) (Orcutt 1950).



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Fisheries Resource Use

- Important food for Native American Tribes. (ODFW 2016)
- included in the federal Pacific Coast Groundfish Fishery Management Plan administered by the Pacific Fishery Management Council (PFMC).
- States coordinates with PFMC and manage fisheries within state waters. The PFMC conducts stock assessments to ensure sustainable fisheries.



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Fisheries Resource Use

- Regarded as a food fish and is an important recreational species in some areas (Ralston 2005)
- Caught commercially by trawl and recreationally by hook/line.
- The young and smaller individuals are more sought after than the larger and heavier fish.
- Minor commercial value. Usually filleted and often sold under the name of "sole." (Ca Sea Grant 2021)
- Generally not considered very flavorful or texturally decent.



UCSD

Habitat

- Shallow water species most commonly found in estuaries (Orcutt 1950)
- Wide distribution along north rim of Pacific from California to Korea.
- Found on gravel, clean shifting sand, hard stable sand, and mud substrates, but are most commonly found on soft sand substrate.
- Euryhaline, found 120 km up the Columbia river (Orcutt 1950).
- In Sacramento and San Joaquin Rivers they have been observed in salinities of 0.02-0.06 ppt, (nearly freshwater) (Orcutt 1950).



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Habitat

- Spends summers in shallow waters and moves to deeper waters in winter.
- Preference to lower salinity habitat because it lacks the ability to keep its cells from becoming hypersalinated.
- Can tolerate temperatures as low as -1.7°C (ODFW 2016)



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Adult Morphology

- Diamond shaped flat body
- White to orange and black bars on the dorsal and anal fins.
- Both its eyes are on the upward facing side of the body (dark brown)
- Skin covered with scales modified into tiny star-shaped plates or tubercles with a rough feel.
- Underside is white



Adult Morphology

- Can grow up to 1 m, weigh a maximum of 9.1 kg.
- Males documented living up to 24 years and females 17 years (Ca Sea Grant 2021).
- Females are generally larger than males, but sexual dimorphism is not apparent.
- Scales/otolith rings used for aging (Orcutt 1950)



Pinetrest

Life Cycle

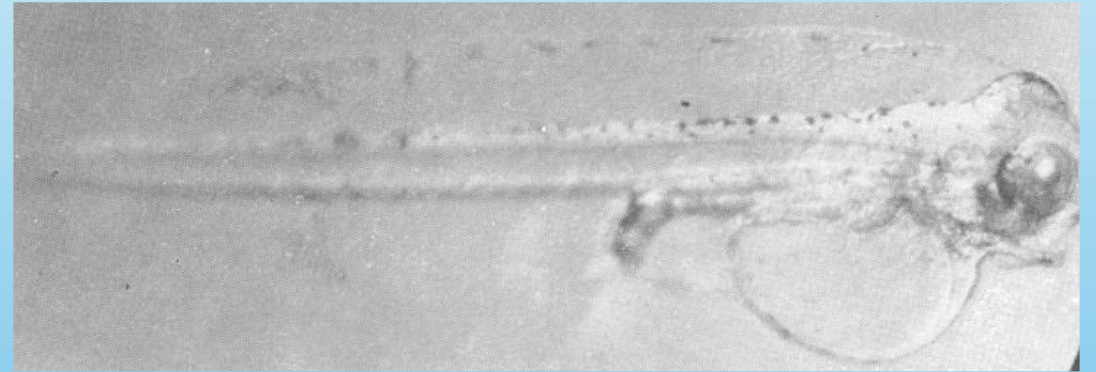
- A female 0.5m in length can produce as many as 11million eggs (Orcutt 1950)
- Spawning primarily occurs in December-January in California, in February-April in Washington and Oregon, and some time in the spring in Alaska based upon large catches in the spring (NMFS 2022).
- Usually occurs in shallower water (46m) (Ca Sea Grant 2021)
- Seasonal migration of adults from ocean to estuary to spawn (ODFW 2016)



ODFW

Life Cycle

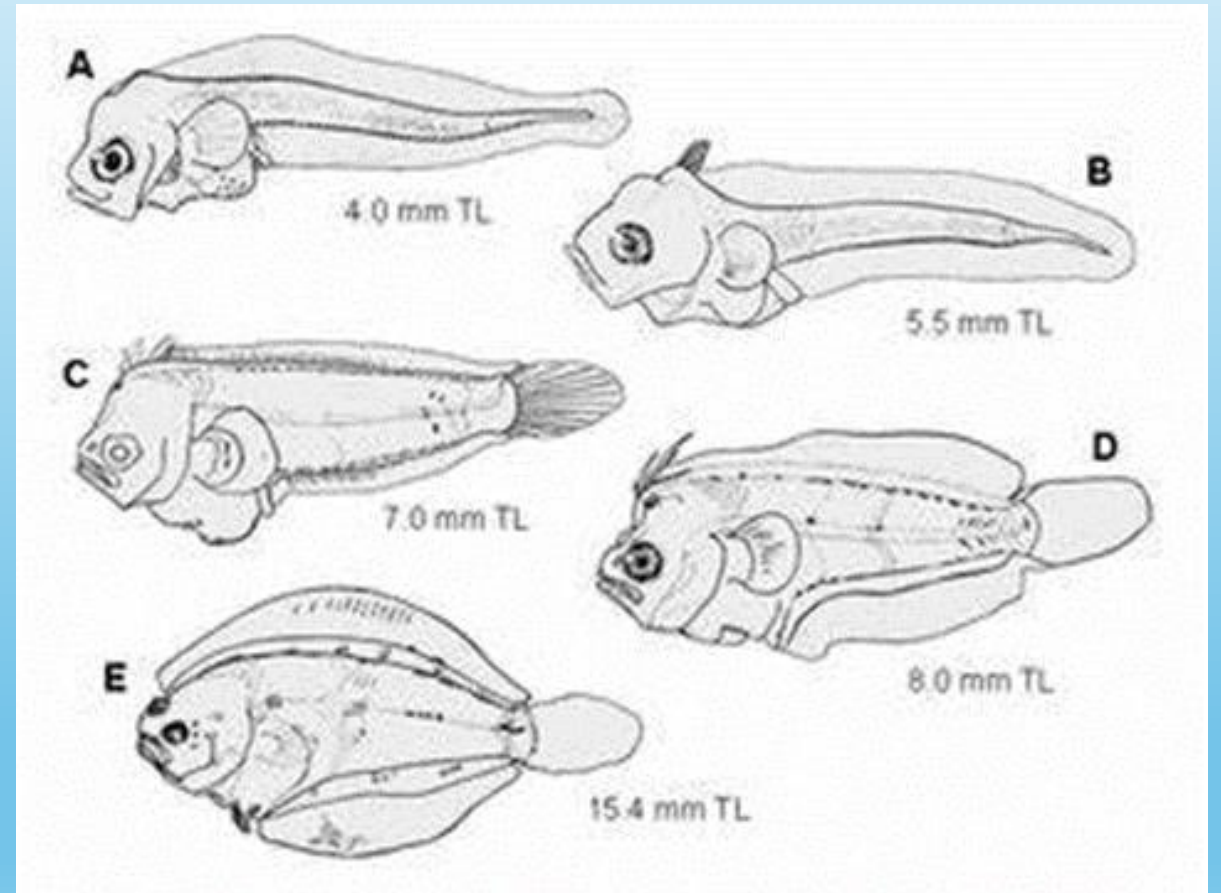
- Fertilized eggs are planktonic and hatching occurs in just under 3 days at 12.8C and almost 5 days at 10.6C (ODFW 2016).
- They remain larvae for 2-3 months (January through March in California) (NMFS 2022).



Orcutt 1950

Life Cycle

- Larvae hatch with typical rounded, vertical, streamlined appearance
- One eye migrates to other side of head within 24 days of hatching.
- Other larvae body changes are
 - Development of pterygiophores (cartilaginous element) to support median fin rays
 - Pigmentation changes
 - Dark above, light below
 - Black stripes on dorsal and anal fins
 - Fin rays replaced with lepidotrichia (fin rays)
- Smallest morphed fish was 10.5 mm.
- At 15 mm, eyes completed migration
- Larval period is 2-3 months, January-March. But metamorphosis can occur as quickly as 1 month, even faster in warmer water temperatures.



Orcutt 1950

Life Cycle

- Larval survival thought to be more dependent upon availability of prey than predation pressure (NMFS 2022)
- By 1 year of age they are about 11cm long and still mostly found in estuaries
- By 2 years old many have moved into ocean habitats not far from the estuary (ODFW 2016).
- Males reach maturity at about 2 years (approximately 28cm) and females at about 3 years (approximately 35cm) (Orcutt 1950).



Biodiversity of the Central Coast

Locomotion/Movement

- Glide over bottom by rippling their dorsal and anal fins.
- Can move forward and backward with this motion.
- Quick movement is facilitated by the additional use of the pectoral fin



Juneau Empire

Locomotion/Movement

- When frightened, it swims very rapidly and buries itself deeper than its eyes.
- Gradually the eyes will appear at the surface and eventually the head will emerge to free the posterior margin of the operculum of the eyed side.
- Burying itself seems to provide a sense of security. (Orcutt 1950).
- There is little information on regional variation in stock structure. Tagging studies have shown that fish are relatively sedentary and move little during their adult lives (Ralston 2005).



Central Coast Biodiversity

Behavior/Traits

- At a normal resting position, the dorsal and anal fins are angled to prevent the body from resting upon the substrate
- The fin support creates a cushion of water between the fish and the substrate.
- This allows water to escape through an opening on the blind side gill slit and lessens the amount of effort needed to move (Orcutt 1950).



Behavior/Traits

- It changes body coloration to match substrate or environment by changing pigment granule concentration in chromatophores (Orcutt 1950).



Prey

- Larvae prey upon planktonic algae and crustaceans (ODFW 2016).
- Adults consume crabs, shrimps, worms, clams and clam siphons, other small mollusks, small fishes, nemertean worms, and brittle stars (Hart 1973).
- An individual's stomach had both sternapsid worms (mud habitat) and *Siliqua patula* clams (sand habitat), suggesting the fish move freely from one habitat type to another while feeding (NMFS 2022).



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Prey

- By 30 cm length, their prey includes crabs, bivalve mollusks, echinoderms, and smaller fish (Orcutt 1950).
- Feeding occurs by waiting for the prey to settle to the floor or around eye level and then making a quick lunge at the food, drawing a mouthful of water also to help pull the prey in (ODFW 2016)



Change in fish communities over time (1987-2016/17) in South Slough and the starry flounder population abundance

Shon Schooler

Research Coordinator

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Accounting for the differences in Starry Flounder Collections in the lower Columbia River in 2022 and 2023

Amy Hansen

Fish Biologist

Western Fisheries Research Center

US Geological Survey

Changes in eelgrass habitats (potential nursery habitat for starry flounder) in South Slough

Alicia Helms

Estuarine Monitoring Coordinator

South Slough National Estuarine Research Reserve

Oregon Department of State Lands

A Cross-Decadal Change in the Fish and Crustacean Community of Lower Yaquina Bay

Scott Heppell

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Burrowing Shrimp, A primary flounder prey item

Tony D'Andrea

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