

## Psychrolutidae — The Fathead Sculpins

By Susan McDougall

*“Call me a fish with a face that only a mother could love. Call me lazy if you wish. But please spare me the dubious honor of being called the “ugliest animal on the planet.” Why would I want a stuffed toy modeled after a form perfectly tailored for my environment? Do you do the same for tadpoles? And all that attention — well, we all know what that means. Notoriety. Maybe occasional devotion. Definitely collection.*

*Besides, is it fair to photograph a fish that is comfortable a mile deep but whose shape is completely altered when dragged to the surface? Where I live my nose is not an oversized blob nor is my body collapsed into a mushy mass. And what changes would those two-legged land creatures undergo if slid down a slope into the deep? Even the most zealous photographer might hesitate to share a photo of its new pressurized countenance.*

*Meanwhile, my mate finds my looks just fine, and so I keep busy guarding and cleaning our fertilized eggs. I chase the occasional predator, undulating with my version of a burst of speed, returning quickly to the clutch. It is a busy life then. And when I resume my tenure on the muddy bottom, slithering in a bit to hide my head, I am in a place where I am not defined by a lazy personality, but rather an opportunistic one. A big head means a large mouth, one finely shaped and common to a variety of sea bottom creatures. Even the occasional fish.”*

..... From “Interview with a Fathead”

Also called the “Blobfish” and other visually descriptive, uncomplimentary names (such as “Toadfish” and “Tadpole),” with their large, rounded heads, tapering, slender bodies, and stout, well-developed tails, Bighead sculpins are best known for their odd shape. The scientific family name, Psychrolutidae, means “to have a cold bath,” and as a reference to the frigid waters where these fish dwell is an acknowledgement of the blobfish lifestyle rather than body shape. There are approximately 10 genera and 42 species in the family, native to the Pacific, Atlantic, and Indian oceans. And, contrasting with the narrow body that does resemble a tadpole, as the common name implies these sculpins have large heads, a strange asymmetry to the human way of thinking, but for fish a very old and successful adaptation.

Once placed in the same family as the closely related, more well-known Sculpins (the Cottidae), as with those species the fatheads belong to the Scorpaeniformes order, which, with approximately 1,400 species, ranks as one of the largest fish orders on Earth. Also known as “mail-cheek” fishes, a name that refers to a bone that runs across the side of the face, sculpins, including the fatheads, are also members of a large “Superfamily,” the Cottoidea. Comprised of 7 families, this group includes both marine and freshwater fishes. Most species are small and often adorned with defensive features such as spines. Oversized heads may also contribute to a self-preservation strategy by limiting predator size to large fish and mammals, while at the same time enabling the fathead to hunt and consume prey than might otherwise be inaccessible.

Fathead Sculpins are exclusively marine, although the larvae of some species can tolerate estuarine waters. The family is most common in the north Pacific, with members ranging across the ocean from the cold waters of the Okhotsk Sea to the west coast of North America, including the Salish Sea. Most are small, with at least one especially tiny fish, an inhabitant of the shallow waters of the Strait of Juan de Fuca and known as the Tadpole Sculpin (*Psychrolutes paradoxus*), measuring only 2.6 inches (7

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**Spiny Fathead (*Dasycottus setiger*)**

cm). “Paradoxus” is Greek for “strange,” perhaps in reference to the head. For whereas the Tadpole Sculpin may be small, as with its relatives, the head is disproportionately large. Other common fathead features include lack of scales, loose skin, a gelatinous layer, spines, prickles for some species, and the absence of a swim bladder. The eyes are widely spaced.

All fatheads are oviparous; that is, they are egg-laying fish that provide little development of the eggs before

deposition. Many adult fathead sculpins guard their eggs.

These are often deep-water fish, with a maximum known depth of over 9,000 feet (2,740 m). Some live in shallow waters, including the continental slope. Five species representing three genera are present in the Salish Sea; one of these, the Blackfin Sculpin (*Malacocottus kincaidi*) is considered endemic. Of these five, three species have been collected in the Strait of Juan de Fuca. All range across the north Pacific from Asia to the west coast of North America.

### Fatheads in the Strait

With a scientific name that suggests a flower rather than a large-headed fish, the Spiny Fathead (*Dasycottus setiger*) is probably named for its hairy or shaggy appearance (“dasy”) while “cottus” alludes to the fine cirri (little tassel-like appendages) on the head and body: big spinies have a rather furry appearance. This species ranks as one of largest fathead sculpins, with a total maximum length of 17.7 inches (45 cm) and a weight of 3.5 pounds. The Spiny Fathead ranges to depths of 2,789 feet (850 m), although they also inhabit shallow waters 49 feet (15 m) deep. They can live to an old age of 11 years.

The Spiny Fathead has a blunt snout, a large mouth with a slightly protruding lower jaw, and big eyes high on the head; four spines protrude above the eyes. The skin is smooth, loose, and flabby, and the dorsal fin is spinous. Pinkish to gray in body color, this fathead sculpin is mottled with dark brown spots, speckles, and barring on the fins. It is a demersal species, living on soft sediments where it preys on a variety of invertebrates. Shrimp are a particular favorite. The Spiny Fathead tends to swim in the nektobenthic zone (just above the sea floor), and thus does not typically ingest sediment.

There are two *Psychrolutes* species in the Strait — the Tadpole Sculpin and the Soft Sculpin (*Psychrolutes sigalutes*); “Sigalutes” is Greek; “sig” means “silent,” and “lutes,” a bather. Both fish are tiny, with the Soft Sculpin reaching a maximum length of 3.3 inches (8.3 cm), less than an inch larger

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than the Tadpole Sculpin. The Soft Sculpin ranges from the Commander Islands in Russia, located in the Bering Sea, to the Salish Sea: the Tadpole Sculpin has been collected as far west as the Okhotsk Sea and the Sea of Japan, and recorded south of the Strait in Hood Canal.

### **Delayed Adulthood**

The larvae of the Tadpole and Soft sculpins are indistinguishable in their early weeks of life. Initially they feed at the surface, but their residency in this habitat varies, with the Soft Sculpin larvae remaining until it is nearly 1.6 inches (40 mm) in length. These little fish tend to sink to the bottom during the day, but at dusk they move upwards amongst the plankton where they actively feed. This up-and-down sculpin behavior is considered unusual. Meanwhile, the Tadpole Sculpin larvae descend to the bottom of the sea at half the size of the Soft Sculpin, a move that seems a better choice for a tiny fish that is in constant danger near the surface.

The relatively large size of the surface-dwelling Soft Sculpin larvae has attracted the attention of researchers who determined some interesting developmental properties of these jumbo youngsters. Studying the maturation of the larval skeleton it was determined that the Soft Sculpin's skeleton is incompletely formed until the larva is twice the size of the Tadpole Sculpin. Meanwhile, it quickly increases in size, becoming larger than nearly any other plankton. Now a resident to contend with, the larvae can move more efficiently at their increased size, and though it is hardly swift or elegant, it uses what swimming abilities it possesses to consume smaller prey present in the plankton mass. The tradeoff is a less developed skeleton, but competition is much reduced, and as they mature, finding and settling into suitable rocky habitat on the bottom is much easier for an adult-sized fish.

### **Gelatin Beneath the Skin**

Unlike their close cousins, the Cottidae sculpins, several of the fathead sculpin genera have a gelatinous layer beneath the skin, an adaptation observed in other deep-water fish such as snailfish (Liparidae). The gelatin, with a typical 95% water content, is an "extracellular" fluid, meaning it is of less osmolality (referring to the concentration of solvents) than seawater. Thus, gelatinous fish tend to be more buoyant, an aid in the dark abyssal seas. The gelatinous tissue also contributes to a more streamlined form, reducing drag, and promoting better swimming, and in the case of a fathead sculpin, combined with the head, provides a more efficient configuration for the undulatory mode employed by these fish.

The presence of gelatinous tissue also enables the fish to grow larger, an aid to predator avoidance, although countered by the necessity of consuming more food. Nevertheless, size does mean fewer predators; a two-inch fish is much more at risk than its 20-inch relative. Thus, gelatinous tissues provide a low-density, low-cost method for increasing buoyancy and mass, and is an excellent addition to the fishy tissues.

### **Voted the "Ugliest," a Dubious Honor**

Bring a deep-sea fathead sculpin to the surface, and the decrease of water pressure invokes body changes that, from a human point of view, renders the fish disgustingly weird, and an obvious candidate for an "ugly animal" award. The poor fish is not the solitary entry in such a contest, of which there are several; other than fish one competition includes land birds such as a vulture, as well as pale rats,

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warthogs. Others add monkeys, frogs, and bugs. At least one group, the “Ugly Animal Preservation Society” adopted a fathead species as its mascot in 2013. This is *Psychrolutes microporos*, a native of the southwestern Pacific where it was first caught in 1983 and described in 1995. Named the “Blobfish” for its sea level appearance, when dragged from the depths, this fish collapses into a gelatinous form, complete with a bulbous nose. Fame came its way in 2003 when a photograph taken of a specimen collected in New Zealand waters graphically revealed the strange new features. Such changes had certainly been observed in abyssal species before; these fish tended to fall apart or take on an altered appearance when brought up from the depths. But it was the blobfish photo that attracted attention, and today it is amongst the most common of fish portraits accessible on social media.

If a photo isn't sufficient, there are drawings, stuffed toys, a song or two, and a plethora of articles that in the end reveal how little is known about the blobfish. Insulting? Perhaps. But to the fish and the scientists who try to tease out the specifics of its story, life proceeds, with breathing, feeding, and reproducing its greatest concerns. And cartoons aside, it was the filming of a closely related species to the media blobfish, the so-called “Blob Sculpin” (*Psychrolutes phrictus*) that revealed a behavior rarely observed. With a more fishlike appearance at depth than its media cousin could possibly retain at the surface, this slow creature with the big head and stout fins was guarding a large patch of pink eggs. Here was an animal in the habitat for which it was born, tuned by evolution, and as notable for its stout versatile fins, as for its head.

### To Eat a Fathead Sculpin

Search for sculpin recipes, and it soon becomes apparent that it is the related Cottidae sculpins, not the Fatheads, which are considered edible. Videos, stills of fried or baked fish served up with side dishes, discussion of the taste (which is apparently quite fine), and the occasional warning about avoiding the spines — all this and more are available to the angler who might catch a Cottidae species, either inadvertently or intentionally.

Fishing regulations in Washington state place these sculpins with bottom fish, such as Pacific Cod and Walleye Pollock, and they are commercially regulated in Oregon. Most often they are bycatch, and are also taken in surveys, including those conducted in the Strait.

But what about the occasional Fathead Sculpin? The family is not referenced in state regulations, perhaps because of the rarity of the handful of species present both off the coast and in the Salish Sea. And in North America fatheads are declared “inedible,” although acknowledged to be consumed in Japan. A search of the Internet does verify the lack of desire for a fathead dinner; recipes and even acknowledgement of any use for the fish are quite absent.

Yet, someone must have tried a fathead sculpin or two, if for no other reason than to advertise an online presence for a fish-tasting website. This proves to be the case, as at least one venturesome Japanese man has produced a video of the processing of a fathead sculpin, complete with a taste test of various parts of the fish. There was the stomach, cut into pieces and deep fried, the skin, the fleshy fillets, and the “belly button.” The viewer could watch the experimenter chew and swallow, at least sometimes, and listen to the most positive comments that could probably ever be made concerning fathead taste.

The conclusion? The fatheads are probably safe from human interest, at least as part of fish cuisine. From the tiniest to the largest, predation is more likely from water-breathing species. However, as with

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all creatures, both of land and sea, fathead sculpins are not immune to anthropogenic impacts, and with knowledge of their lives quite limited, changes brought on by human activities are not easy to assess.

*“I am called ‘ugly,’ by those who dwell above, and, if they could talk, ‘tasty’ by other fish that ply the open waters and meander along the bottom of the sea. The occasional bird makes a dive to my home, and my young are quite ‘regular’ in form. Yet in the fish world, my body shape is not so unusual. While most humans visualize sleek salmon and trout, or mighty rays and toothy sharks as typical fish, we irregularly shaped beings are as superbly adapted as our swelt relatives. Our forms reveal much about life in the waters, whether salty or fresh, deep or shallow. We live in pressures that would snuff out others, we nestle in the muddy bottoms, where we can hunt with a stunning burst of speed. We are not confined.*

*I could argue that our variety in form and lifestyle is much more interesting than the primates who dwell above. And, unlike those newcomers, we are very ancient. Even my little family plied the seas long before humans evolved their big brains. We are spiky, bumpy, round, big-eyed, stout, flexible, loose skinned, buoyant, speckled, plain — the list goes on. A very appealing, admirable fish indeed.”*