Deepwater Shrimps
A New Pacific Fishery

by JAMES F. SCHLAIS

ALTHOUGH DESCRIBED scientifically from a specimen dredged during the 1873–1876 voyage of H.M.S. *Challenger,* the deepwater caridean shrimp *Heterocarpus laevigatus* remained virtually unstudied for a century. This shrimp's potential as a fishery item was discovered less than a decade ago. Now it appears that at the right depth, about 300 to 400 fathoms, in the tropical Pacific, this species may live in great numbers, potentially supporting a fishery worth many millions of dollars a year.

Tasting like a combination of shrimp and lobster, this new seafood has begun appearing on the menus and fish counters of restaurants and supermarkets in Hawaii during the past year. Promoted as Hawaiian deep-sea shrimp, *H. laevigatus,* along with its close cousin *H. ensifer* (which is taken in fewer numbers), represents an entirely different group from the penaeid shrimp that are taken in the Gulf of Mexico and that make up more than half of the shrimp landed by American fishermen. The Hawaiian species range in size from the length of a finger to "jumbos" about 7½ inches long, and live in a variety of habitats from rocks to mud and rubble. After initial exploratory studies, biologists Paul Strusaker and Donald Aasted concluded, in 1974, that the *Heterocarpus* populations are a probable "unexploited resource of considerable magnitude."

7½ inches=19 centimeters

Caught in a Trap

Nearly all the Hawaiian deep-sea shrimps now marketed come from a single source, the catcher-processor vessel *Easy Rider Too.* The 126-foot, steel-hulled ship, skippered by Gary "Skip" Naftel, is not the average Hawaiian fishing sampan limited to a ten-day fishing trip. The $2.5 million vessel acts as a mother ship capable of servicing up to five other fish boats and returning to port with a packaged product ready for the consumer. For decades Japanese, Russian, Norwegian, and other major fishing nations have worked catcher-processor vessels, but only now are such designs being used in the United States. *Easy Rider Too*'s twin 960-horsepower diesel engines, a fuel capacity of 50,000 gallons, and a 225-ton-capacity fish hold allow her to go on two-month-

126 feet=38.4 meters
50,000 gallons=189,265 liters

All photographs by the author

FLAGSHIP OF A NEW FISHERY, Easy Rider Too *is the source of most Hawaiian deep-sea shrimps. Vast quantities of these shrimps, which taste like a combination of shrimp and lobster, are believed to live in waters 300 to 400 fathoms deep.*

long fishing voyages to Hawaii's bountiful Leeward Islands fishing grounds, 500 miles from port.

Another feature of this ship, unusual for either Hawaiian or worldwide commercial fishing operations, is that nine of her 18-member crew are women. First mate Laura Raabe, who has a degree in electromechanics, began working for Naftel five years ago aboard his original fishing and research vessel, *Easy Rider.* This boat is well known to the Hawaiian oceanographic community, having participated in research on coral reefs, fish distributions, humpback whales, and sharks.

For decades, shrimpers in the Gulf of Mexico have scooped up penaeid shrimp by dragging huge, baglike nets over a smooth ocean floor. The rugged bottom of most of the tropical Pacific makes trawling difficult or impossible, however, so *Easy Rider Too* catches *Heterocarpus* with baited rectangular traps. Made of steel-bar frames covered with galvanized-wire screen and wrapped in burlap, the traps have funnel-shaped entrances similar to lobster traps. Unlike spiny lobsters, which can be caught with several kinds of bait, deepwater shrimps are more finicky, preferring oily fish such as mackerel. A trap

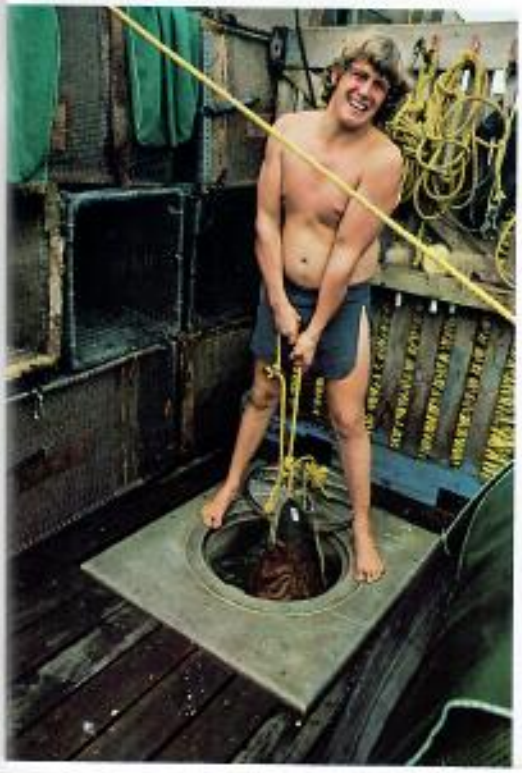
500 miles = 805 kilometers

baited with 3 pounds of fish may bring in 30 pounds of shrimp.

Out at sea, as many as 150 traps, strung 30 fathoms apart along a heavy-duty polypropylene line, are dropped one by one over the stern, with the ends of the line tied to buoys. Down time on the ocean floor depends on the weather, processing backlog, and other factors, but usually lasts one or two days. If the traps are left down longer, cannibalism may occur, although it is less likely than with spiny lobsters. A hydraulic cherry-picker crane on board hauls up the traps, which may contain a total catch of 3,500 pounds of shrimp. The technique is new, and the crew tries different trap configurations, types of bait, and lengths of bottom time. The technique does not work well on extremely rough bottoms strewn with boulders and pinnacles. There, fewer but larger traps may be the answer.

3 pounds=1.36 kilograms; 30 pounds=13.6 kilograms

TRAPS FOR DEEPWATER SHRIMPS *are constructed by the crew (left) prior to a two-month stay at sea. Below, a nylon bag full of shrimp is lifted out of the hold, where it was stored in brine chilled to 32°F until the catch could be processed.*



An Oceanic Crop

Dr. Murray Dailey, a marine biologist who took leave from California State University at Long Beach to study the shrimp, has emphasized the experimental nature of the fishery. With most developing fisheries, the federal government has already explored potential populations, catch, and size limits. With *H. laevigatus*, however, there is little background information. At present, the only established commercial fishery for *Heterocarpus* is for *H. reedi* off Chile and Peru, where trawling produces about 10,000 tons annually. Dailey's goal is to learn how to safely manage the new fishery, much as a crop is managed on land. What size can be taken? When do the shrimp reach breeding age? How many breeding individuals are necessary to maintain a stable population? These are some of the questions that need to be answered. Migratory patterns, common to many crustaceans, also have to be investigated.

Heterocarpus abounds in Hawaiian waters, but more studies are needed

3,500 pounds=1,590 kilograms

ABOARD THE MOTHER SHIP, Easy Rider Too, *shrimps are sorted and tailed by crew members, then boxed and frozen—a product ready for sale. Since parts of the shrimps cannot be utilized, processing at sea saves space otherwise wasted in bringing the whole animals back to market.*

to outline its complete Pacific range. Dailey believes that the shrimp are plentiful throughout the entire tropical Pacific, as long as the depth is right — about 300 to 400 fathoms. They could be taken by fishermen in small boats and become a much needed new source of income in Micronesia and the trust territories. Preliminary estimates peg the potential fishery area of the tropical Pacific at 250,000 square kilometers, with possible annual yields of 1 to 10 tons per square kilometer.

Packaged at Sea

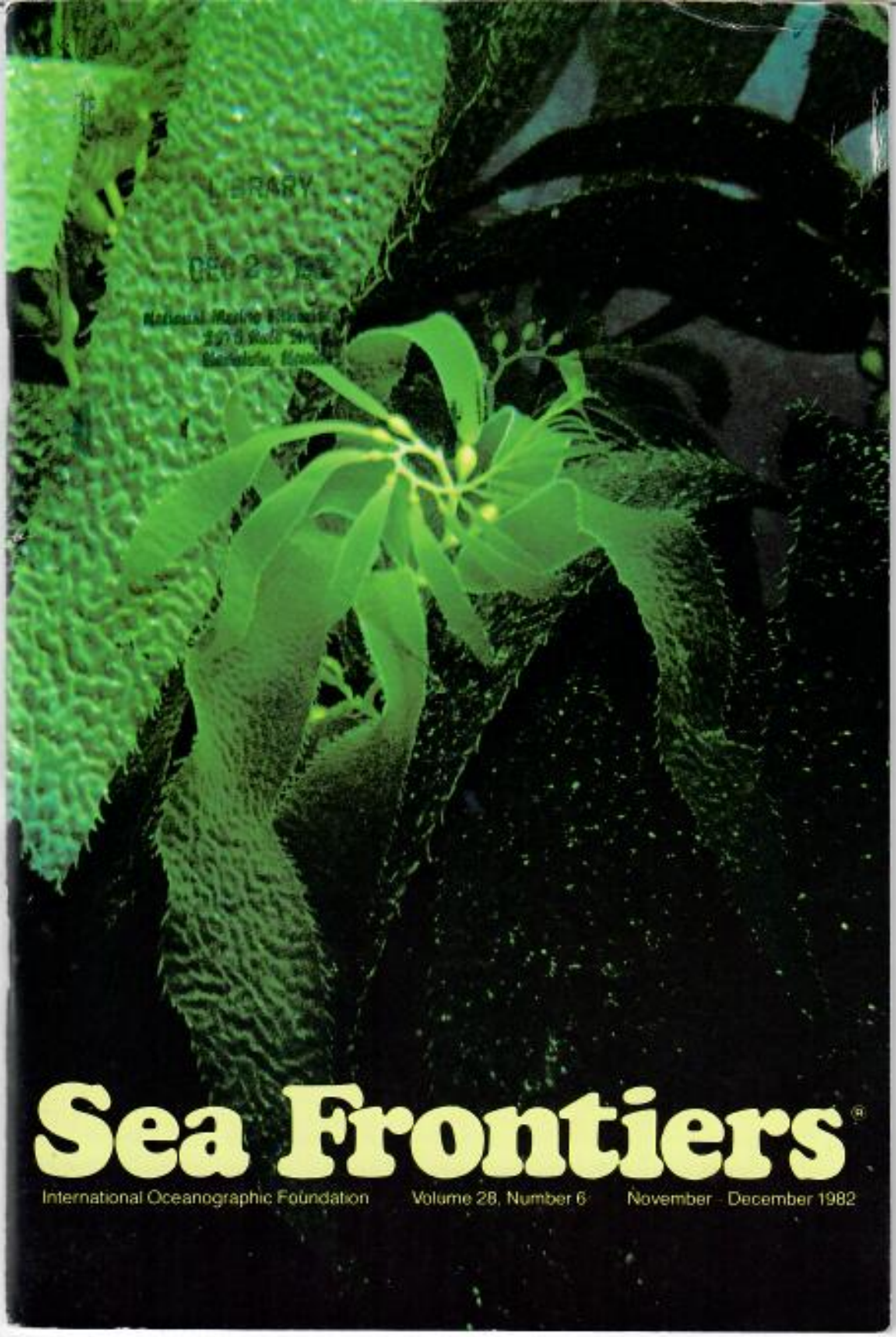
Fishing for the deepwater shrimps on *Easy Rider Too* is big business. On long trips out, she services two other boats, *Mokihana* and *Easy Rider.* The overhead for a two-month fishing trip for the three boats, including fuel, payroll, bank payments, supplies, gear repairs, and new equipment, runs $287,000 per month.

The catch is processed on board right through to the finished product, which must meet Food and Drug Administration and Hawaii Health Department standards. As the traps are pulled one by one from the ocean, the contents are dumped on a large deck table, where crew members quickly sort out the crabs, eels, and other creatures caught incidentally, and send the shrimps down a chute to be bagged in nylon mesh and put in a hold filled with brine chilled to 32°F. This helps revive them (the water they live in is about 36°F) and arrests bacterial growth. In the processing room, the shrimps are tailed and sorted by hand into five sizes, given a 60-second dip in a 5-percent chlorine solution to kill bacteria, drained, and packaged in 5-pound boxes. To improve shelf life, each box is dipped in a corn syrup/seawater glaze, then stored in a cascade-system blast freezer that can freeze 300 pounds of shrimp tails to -30°F in four hours. On two-month trips, the fleet hopes to take 240,000 pounds of shrimp, which will be reduced on board to 80,000 pounds of tails. On two-day trips, shrimps to be sold fresh the next day are stored in the cold brine. At the Honolulu marketplace, shrimp currently brings about $6.50 per pound.

Cooking shrimp is much like cooking most crustaceans. Unlike lobster or prawn, however, the dark anal vein, or gastrointestinal tract, of *Heterocarpus* is reduced and does not have to be removed. The shrimp can be steamed, broiled, sautéed, or even eaten raw, Japanese style, as sashimi. The worst thing one can do is overcook it. "Just lightly sauté in garlic and butter, with a touch of white wine," say those who have tried it, "and ummm!" □

250,000 square kilometers=96,525 square miles

32°F=0°C; 36°F=2.22°C; 5 pounds=2.3 kilograms
300 pounds=136 kilograms; -30°F=-34.44°C
240,000 pounds=108,860 kilograms
80,000 pounds=36,290 kilograms



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