

One breeder called me and said, 'Don't do that, you're driving the price down.' Whatever the price, Mitchell said he sold out his available stock. 'If I had more, I could have sold more,' he said as he and Luana inspected rows of empty tanks.

Big Island fish-farmer Bob Kern agreed. 'The potential is there. If we had more fish, we would sell them,' Kern said. The Pahoia special-education teacher said he raised tropical fish as a teen-ager. 'Selling tropical fish paid for his college degree,' he said. After he moved to Hawaii from Alaska, he said he got back into the business with help from the University of Hawaii Sea Grant extension service programme. In just two years, he got production up enough to sell about 1,000 fish last year. 'I teach because it's something I like doing. Ornamentals are going to send the kids to college and I need that because there's five of them,' he said.

The ornamental freshwater-fish business is just getting into the water in Hawaii, Sea Grant extension agent Brian Cole said. Gross sales of freshwater ornamental fish from Hawaii totalled US\$ 1.2 million in 1989. They've grown since then, although sales data are not available. Cole was recruited by the Sea Grant Program from Florida, where he had been manager of a tropical fish farm. He has a master's degree in aquaculture from Auburn University. 'Sales of ornamental fish in the United States have been growing 10 to 15 percent a year for the past eight years,' he said. Spending on fish and aquarium supplies is topping US\$ 1 billion a year, which makes the industry the second largest 'hobby' in the United States after photography, he said.

'I think it's a combination of factors,' he said. 'As a country, we're becoming more urbanised and instead of a dog or a cat for a pet, we think of fish. In some places, dogs or cats may not be allowed, but an aquarium is no problem,' he said. Another factor is that a tank full of colourful fish is seen as an element in interior decorating. 'In the last couple of years, it seems that having a fish tank is supposed to be something special,' he said.

Sea Grant extension agent, Richard Bailey said Hawaii has advantages in being part of the United States, having a better climate than Florida and being closer to the

Mainland than the biggest fish-farming countries of South-East Asia. A five-year study showed 75 per cent of fish imported to the United States are coming from Asia—Singapore, Thailand, the Philippines, Hong Kong and Indonesia. But Bailey said Hawaii-raised fish get to Mainland markets faster, don't go through US customs and don't need to be transshipped through a major city. 'Time in shipping and extra handling increases stress mortality and costs,' he said.

The potential of the aquarium market got the attention of Richard Spencer, whose Hawaiian Marine Enterprises is successfully growing **ogo** and **manavea** (edible seaweed) in Kahuku. Spencer has an advantage. He's chairman of the advisory committee for the US Department of Agriculture Center for Tropical and Subtropical Aquaculture, which funded studies on the ornamental fish industry. He said he did test production and marketing of tropical fish based on predictions of the studies. 'The numbers held up,' he said. Since last April, Hawaiian Marine Enterprises has been putting in production facilities to breed ornamental tropical fish on a commercial scale.

For backyard fish farmers, there still is a place in the market. There are 1,539 different species that are sold for home aquariums and plenty of room for growth. 'Production itself hasn't been keeping up,' Bailey said. 'Stocks of fish netted in the wild are dwindling, creating even more potential for growth in captive breeding,' he said. It is also an industry more suited to small individual breeders than to corporate farming. A small farmer can recover more quickly from a disease that kills off all breeding stock. Small producers like the Mitchells and Kern also can take their time developing production and markets, while holding other jobs. Dennis is a cook, Luana a sales clerk, Kern a teacher and tax-preparation specialist.

'Anybody who wants to go into fish farming should go into it because they want to raise fish,' Dennis said. 'Not because they want to make money'. Luana wasn't so sure at first. The only fish she'd raised before she met Dennis 'were the ones you got at the Country Fair and they died a week after you got them home,' she said. 'But now, I like this a lot better than what I was doing'.

Source: *The Honolulu Advertiser*, 31 March 1996.

New rules open way for lucrative aquaculture

by Bruce Dunford, Associated Press writer

Honolulu, Hawaii has an abundant mineral resource that, on a per pound basis, can be made to be worth more than pure silver. New rules approved this week by Governor Ben Cayetano open the way to get that resource to market. It's called live rock and can sell for as much as US\$ 100 a pound in the growing inter-

national market of saltwater aquariums, according to Michael Wilson, chairman of the Department of Land and Natural Resources (DLNR).

In the effort to preserve the delicate ecology of the coral reef, Hawaii has for several years banned the

taking of coral from off-shore waters. But the new rules open the way for licensed aquaculturists to dig up ancient coral pieces on the land and put them into an ocean environment such as a shoreside fishpond to attract a colony of sea life.

After a few months, when colourful anemones and other small sea creatures and plants indigenous to Hawaii's tropical water set up housekeeping on the old coral piece, it becomes a valuable commodity in the international aquarium market, Wilson said. He points to an aquarium tank in his Kalanimoku Building office containing a large creature-covered coral piece he estimates would be worth US\$ 1,000.

Other rule changes approved by the governor allow the year-round, unlimited commercial sale of fish such as the highly-priced **moi** (or threadfin, *Polydactylus sexfilis*) and the more common mullet if they are raised in aquaculture ponds. **Moi**, a silver fish that feeds on ocean-bottom crustaceans, once was reserved exclusively for Hawaii's **alii** (chiefs). In modern times it has been tightly regulated with a bag limit and season on commercial sales because of the dwindling offshore populations.

However, **moi** has proved to thrive in Hawaii's aquaculture ponds and the changes of the rules allow its

sale as long as the retailer can provide documentation it was obtained from a licensed aquaculture facility, said John Corbin, manager of the State's Aquaculture Development Program. Commercially raised **moi** also has great potential as an export to international markets for fine cuisine restaurants because of its superior taste and quality, Corbin said. He noted that in a taste test, **moi** was the star attraction at a recent food show in Chicago.

Not only will the raised **moi** find a good market, the aquaculture farms will be raising the fish for restocking offshore waters, similar to the mullet restocking efforts now underway in the Hilo area, Corbin said. 'These rules will go far to accomplish one of DLNR's goals to sustain Hawaii's unique natural resources by taking fishing pressure off ocean fishing', Cayetano said in signing them. He said it also will help expand Hawaii's aquaculture industry and provide more jobs.

Because **moi** has been banned for sale for many years, one of the tasks for the sellers will be to get local shoppers familiar with the quality and taste of the fish, Corbin said. Guy Tamashiro, seafood manager of Tamashiro Market, agreed that many shoppers are unfamiliar with **moi** because it is seldom available and is 'one of our more pricier fish' when it is available.

'Tomiei-Maruo no. 17', a Japanese-built live-fish carrier

by Ikuhya Ohtagaki

A growing demand for live seafood in Japanese restaurants and the need to transport fry from overseas for farming in Japan have led to the construction of a number of purpose-built live-fish carriers in Japanese yards in recent time. *Tomiei-Maruo no. 17* is 58.2 m long. She is the sixth such vessel to join the fleet of Tomiei-Suisan. Like her five predecessors, she was built by Ishii Shipbuilding which is situated in Chiba Prefecture. The yard has thus gained a considerable amount of expertise in the construction of such vessels. Its basic philosophy in the construction of *Tomiei-Maruo no. 17* was to 'carry live fish in good health and without giving stress'.

In order to achieve this aim the 10 fish holds, totalling 645 m³ in volume, have 'fresh' seawater circulating through them. The method by which this is achieved is perhaps the most notable feature of the vessel. The seawater enters a hold automatically through holes in the bottom of the hull when the ship is under way and flows up through the hold and then out through holes in the vessel's side. The time required to completely fill the holds after removal of a plug was said to be about one minute during trials.

In order to load fish into or out of a cage, *Tomiei-Maruo no. 17* is first brought alongside the cage. In order to

make this as efficient as possible, the designers of the vessel have equipped her with a flap rudder and bow thruster to enhance manoeuvrability. Fish are transferred from a cage to the vessel by positioning the cage next to one of the four gates fitted in the vessel's side. The cage is then tightened, forcing the fish to swim in to the flooded hold.

When the fish are to be transferred into a cage, the water level in the holds is first lowered by pumping out the water. Ten pumps from Daiei are used for this purpose. The top of the hold is then covered with a hatch, darkening the hold. The fish are then naturally inclined to swim toward the light at the gate leading to the cage. Any fish that do not find their own way out are forced out using a drive-net installed in the hold.

Tomiei-Maruo no. 17 hull has been designed to minimise wave-making resistance and incorporates a bulbous bow. A highly skewed propeller is fitted to reduce hull vibration.

Source: *Fishing Boat World*, Vol. 8, no. 4, July 1996

