Commercial marine aquarium surveys in Samoa

In April 2015, in response to an industry operator expressing an interest in establishing himself in Samoa, the Secretariat of the Pacific Community (SPC), in collaboration with an external consultant and the Fisheries Division of the Samoa Ministry of Agriculture and Fisheries, undertook commercial surveys of targeted marine aquarium fish around the island of Upolu.[1]

Following up on preliminary work conducted in 2008 (Yeeting and Samuelu Ah Leong 2008), the overall aim of the surveys was to determine if a sustainable and viable aquarium marine fishery could be set up in Samoa. Specific goals of this survey were fourfold:

1. to determine if flame angelfish (*Centropyge loricula*) (Fig. 1) could be found in commercial quantities;
2. to verify that red hawkfish (*Neocirrhites armatus*) (Fig. 2) were present in commercial quantities and that the habitat in which they were found would allow a sustainable and viable collection;
3. to make note of other fish species of interest, available in sufficient numbers to support sustainable and viable collection; and
4. to record clam and coral colours that would make for potential interesting broodstock were mariculture activities to be developed.

The majority of surveys were conducted over eight days by three or four individuals, SCUBA diving on the outer reef slope at depths between 10 m and 40 m at locations all around the island of Upolu (Fig. 3). A few surveys were also conducted in shallower waters (5 m and less), diving and/or snorkelling.

Over the course of the surveys, we did not record a single flame angelfish. Similarly, while *Pocillopora* heads, the typical habitat for red hawks, were abundant at over 50% of the sites surveyed, we recorded only a total of two red hawks. Interestingly, and of note, is that both fish were the completely red morph and had no black stripe, while red hawks in Fiji and French Polynesia present a distinct black bar on the upper body, just below the dorsal fin and typically extending above the eye.

In general, we found leopard wrasse (*Macropharyngodon meleagris*) to be the single most consistently spotted and abundant fish around Upolu. A few areas had collectible quantities of angelfish species other than flames, such as threespot angelfish (*Apolemichthys trimaculatus*), lemonpeel (*Centropyge flavissimus*), Herald's angelfish (*Centropyge heraldi* with a black dorsal), regal angelfish (*Pygoplites diacanthus*), as well as Scott's wrasse, (*Cirrhilabrus scottorum*) and Walsh's wrasse (*Cirrhilabrus walshi*). However, such areas were generally small in size.

Figure 1. Centropyge loricula, *the flame angelfish, is considered to be one of the most colourful and attractive of the angelfish species commonly found in the marine aquarium trade. (Image: Andreas März)*

Figure 2. A red hawkfish, Neocirrhites armatus, *perched in a* Pocillopora *coral head. This is the typical colour morph, displaying the black band at the top of the body. The two fish spotted in Upolu lacked this distinctive bar. (Image: Brian Gratwicke)*

[1] The surveys were made possible in part by industry

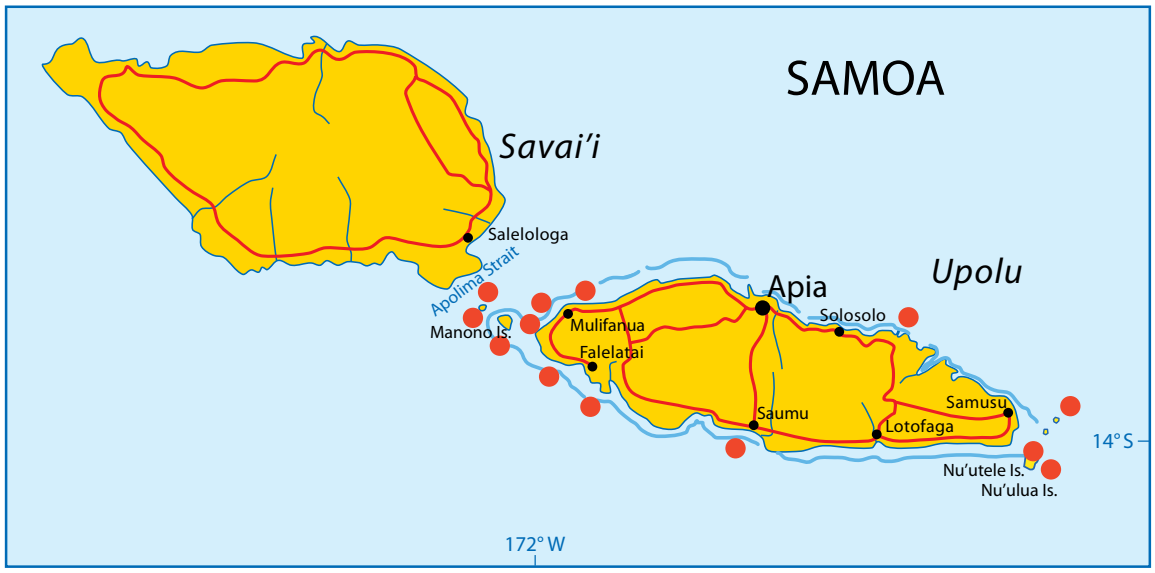

Figure 3. Upolu Island, Samoa. Red circles represent dive locations.

The islands off the extreme east (Fanuatapu, Manua, Nu'ulua) and west (Apolima) of Upolu had good numbers of interesting fish, such as a few species belonging to the *Cirrhilabrus* genus and blackfin *C. heraldi*. However, these islands would not support the regular sustainable and viable collection of fish, given that suitable habitat around these islands is limited, and that weather and ocean conditions limit visiting opportunities. Other species of interest included whitecheek tang (*Acanthurus nigricans*) and mimic tang (*Acanthurus pyroferus*), with only a few individuals recorded in a size suitable for the aquarium trade.

The presence of flame angelfish (and red hawk) in abundances that would allow their sustainable long-term collection was critical to the development of an economically viable industry in Samoa. The findings of the survey do not support the assertion that a sustainable and/or viable industry can be developed on the island.

Clams

We came across only a few attractive clams per dive, primarily in shades of green and blue. The main species on the reef are *Tridacna squamosa*, *T. maxima* and *T. noae*.

Corals

Overall coral diversity around Samoa is low, and of the species present, few were found to be of particular interest to the aquarium industry, in terms of variety and/or colour.

The main observation was that a significant and widespread bleaching event affecting the majority of coral species, but particularly *Acropora,* was under way around Upolu. Compounding the destructive impact of the bleaching, there was also an ongoing extensive crown-of-thorns outbreak. Of particular note is the reef at the island of Nu'ula in the southeast (Fig. 4). It hosts significantly greater diversity than other locations, both in terms of corals and fish; it benefits from cooler temperatures and is subjected to stronger currents; and, at the time of the surveys, only a few individual corals appeared bleached. Unfortunately, the adjacent island of Nu'utele was observed to be suffering from a mass bleaching/mortality (Fig. 5) event and crown-of-thorns outbreak.

In response to these observations, the Department of Environment, the Fisheries Division and Conservation International, with financial support provided by the German Agency for International Cooperation, GIZ, jointly sent out a response team to monitor the extent of the damage and control the crown-of-thorns outbreak through the use of biosalt injections. Crown-of-thorns were also removed physically with the support of community members from 33 selected village reefs and lagoons.[2]

[2] See the article on page 24 of this newsletter.

Reference

Yeeting, B. and Samuelu Ah Leong J. 2008. A first survey of the marine aquarium fish resources of Upolu Island, Samoa: a look at the status and the potential of the resources for marine aquarium trade operations. Draft technical report prepared on behalf of the Samoa Ministry of Agriculture and Fisheries, Government of Samoa. Secretariat of the Pacific Community, Noumea, New Caledonia. 61 p.

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Figure 4. Reef at Nu'ula island, where water temperatures were up to 2 degrees cooler than at other sites around Upolu Island at comparable depths. While Acropora species were still found to be dominant on the reef, diversity was generally much greater than at other locations and fish life more abundant. (Image: Colette Wabnitz)

Figure 5. Mass bleaching event observed at Nu'utele Island. The image on the left shows Acropora colonies in the process of bleaching (in about 7 m of water or less), while the image on the right shows dead colonies (from about 7 m to deeper water), with structures intact covered in algae and essentially devoid of fish life. (Images: Colette Wabnitz)