Hobbyists' preferences for marine ornamental fish: A discrete choice analysis of ecolabeling and selected product attributes[1]

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Introduction

The Marine Aquarium Council (MAC) certification program is a means to promote the sustainability of marine ornamental fish populations and coral reef ecosystems through market mechanisms. MAC has created a third-party certification program to assure compliance with standards designed to support sustainability. Certified parties, which include collectors, exporters, importers and retailers, can display a label proclaiming their environmentally sound practices for marine ornamental fish. This program brings together all elements of the production and distribution channels to accomplish the common goal of resource sustainability. This effort became operational in late 2001, and by 2002 some certifications were already conferred. The initial scope of the program extends only to the collection of fish from the wild, but it is expected to include aquaculture practices in the future. Possible perceived benefits of certification of cultured specimens could be assurance of humane treatment during production, handling and transit, as well as reduced harvesting pressures on wild populations.

The ultimate purpose of the MAC ecolabel is to inform consumers (i.e. hobbyists) about reduced environmental effects caused by certified activities, and empower them to promote sustainability through their purchase decisions. According to information published by MAC, the most important objectives of the program are to:

- develop core standards to assess marine ornamental practices;
- create a system to verify the implementation of standards and certify qualified products and practices;
- provide a framework that allows the industry to conduct responsible collection, handling and transporting practices as well as to generate accurate data for the management of marine ornamental activities; and
- support responsible management through education and training for industry participants.

Three sets of criteria for certification, or "core standards", have been developed by MAC and are used in assessments by accredited independent certifiers. The criteria deal with coral reef conservation, as well as with the health and sustainability of wild fish stocks. The core standards applied in this program are:

- *Ecosystem and fisheries management*:
  addresses "in-situ" habitat, stock and species management and conservation in the collection area by verifying that management is conducted according to principles ensuring marine ecosystem conservation and stock sustainability.
- *Collection, fishing and holding:*
  focuses on harvesting fish, coral, live rock and other coral reef organisms and related activities (e.g. handling, holding, packaging and transport prior to export) by verifying that the collection, fishing, and pre-exporter handling, packaging and transport of marine aquarium organisms do not harm the health of the collection area, the sustainable use of the marine aquarium stocks or the optimal health of the harvested organisms.
- *Handling, husbandry and transport*:
  addresses the handling, husbandry, packing and transport at points along the commercialization chain in an attempt to ensure the optimal health of organisms during the commercialization process, as well as the differentiation of labeled products and practices from uncertified ones. (One important point is that a certified product must pass from one MAC certified industry operator to another.)

Additional details of the MAC certification program can be found on its Internet website (www.aquariumcouncil.org).

Costs and benefits of MAC certification to United States marine aquarium retail operations were examined in a case study of four firms in 2002, and the study concluded that the program had "definite financial advantages for retailers". The advan-

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tages were derived from lower mortality rates and through increased levels of efficiency with respect to store operations (MAC 2002). The stores cooperating in the case study did not charge price premiums for MAC certified specimens.

Although the MAC program has been initiated and is continuing, little is known about consumer preferences for ecolabeled marine ornamental organisms and consumers' willingness to pay price premiums for such products. To fill this void, researchers at the University of Florida conducted a survey of marine aquaria hobbyists to gain information about influences of the ecolabeling program in the marketplace. The information from this survey can be used to help assess the potential effectiveness and success of the program (Alencastro 2004). The study also sought to obtain information about the influence on consumers of specific fish attributes, including whether it was brought to market in a sustainable manner (i.e. whether the fish was "ecolabeled", meaning in this context that it satisfied the requirements of the MAC certification program), and the impact of individual respondents' characteristics on preferences for marine ornamental fish at the retail level. This article briefly summarizes the information obtained from that survey, which was conducted on the Internet in early 2004.

Methodology

The survey sample comprised marine aquaria hobbyists that were members of online discussion boards relating to marine ornamental fish. They were recruited using a convenience sampling approach. Thus, this group was likely to be more involved in the hobby and more knowledgeable about the marine aquaria industry in general than the broader population of hobbyists. Considering that this sample is unlikely to represent the entire population of aquaria hobbyists, the validity of the reported results is limited to this specific market segment. Survey responses are analyzed using discrete choice modeling, which is a survey-based technique that is being increasingly used to determine preferences for new environmental products and services (Adamowicz et al. 1998; Haaijer 1999).

Two discrete choice experiments were conducted to analyze the importance of product attributes on a consumer's decision on which product to buy. The first experiment involved a high-value specimen, the blue-faced angelfish, *Pomacanthus xanthometopon*, and the second involved a more affordable specimen, the maroon clownfish, *Premnas biaculeatus* (Fig. 1). These species were selected for the experiment because they are popular with hobbyists and because both originate in areas that have experienced varying degrees of ecological damage. Accordingly, respondents were told the angelfish and clownfish were from the Philippines and Indonesia, respectively, countries where some collectors are known to utilize collection practices that harm marine ecosystems (Bunting and Meyers 2002). Both experiments were used to examine the individual and interactive effects of the price of the fish and whether it was ecolabeled. In addition, the effects of a longer post-purchase survival guarantee and whether the fish was collected from the wild or tank-bred (cultured) were examined in the angelfish and clownfish experiments, respectively. Thus, the results from each experiment are specific to the species examined.

Statistical models were first used to determine the factors that had a significant effect on the probability that a particular fish would be purchased. Then the estimated models were used in simulations to obtain the probabilities that a fish with given characteristics would be purchased in the marketplace by a particular type of consumer (Alencastro 2004).

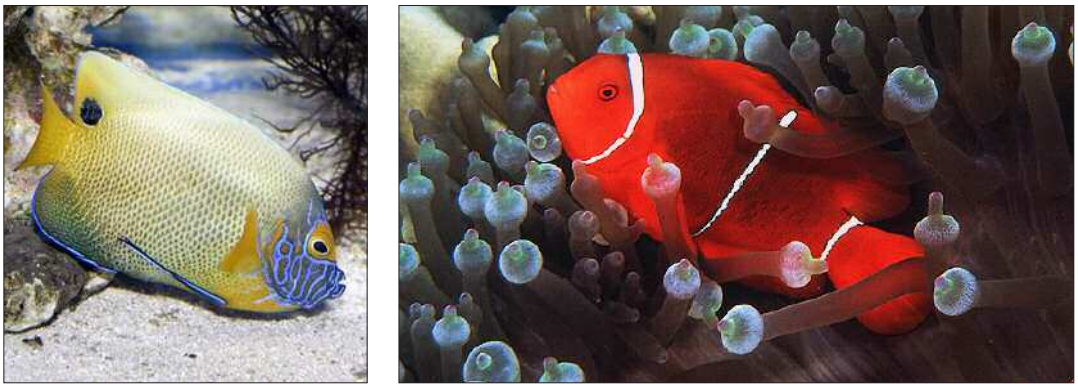

Figure 1.

Blue-faced angelfish, *Pomacanthus xanthometopon* (printed with permission of Jeff's Exotic Fish) and maroon clownfish, *Premnas biaculeatus* (printed with permission of John E. Randall).

Results

Descriptive analysis showed that this segment of the market is very homogeneous in general. Most respondents were males aged between 24 and 44 years, with above-average levels of education and annual income. Respondents gave considerable importance to conservation of coral reefs and wild stocks, and showed a particularly high level of involvement in, and knowledge about, their hobby. About 80% reported keeping marine ornamental fish as their primary hobby, 59% were members of an aquarium society, 88% had researched the specimens they keep, and more than 60% had paid more than 50 US dollars (USD) for a single fish. Contrary to expectations, about 50% were not familiar with the MAC ecolabeling program.

Results from both choice experiments showed interesting and unexpected findings. Price was found to be a relatively unimportant factor affecting purchasing behaviour, as expected. However, price was positively related to increases in the likelihood of purchase, meaning that respondents indicated they would be more likely to buy the higher priced fish. This type of market behaviour indicates that higher-priced marine ornamental fish may be viewed as being of higher quality. Other product attributes were also found to be important to the purchase decision. For example, an extended life warranty and identification as tank-bred specimens were found to be close substitutes for MAC certification. Contrary to expectations, MAC certification had weak or even negative effects on the likelihood that a particular fish would be bought, especially among respondents professing some degree of familiarity with the program. An important observation is that respondents' comments revealed a strong lack of credibility for the MAC program and a higher confidence in alternatives such as tank culture as a means to avoid harmful consequences related to collection from the wild.

For the maroon clownfish experiment, an extreme preference for tank-bred fish was observed. When compared with a wild-caught fish with the same selling price, tank-bred fish as the source of supply dramatically increased the probability of purchase for this species. This preference for the tank-bred source was observed regardless of whether the fish was ecolabeled, although the preference was higher for an uncertified fish. Since the certification (ecolabel) did not increase the probability that a tank-bred maroon clownfish would be purchased, the hobbyists that responded to the survey may perceive tank-bred fish as equally sustainable to, and thus equally substitutable with, ecolabeled fish of this species in the marketplace. Simulations also showed that respondents were increasingly willing to buy tank-bred maroon clownfish at higher prices, although at a diminishing rate.

The effect of MAC certification at a constant price was negative; that is, the probability that an ecolabeled maroon clownfish would be purchased was lower than that of a non-ecolabeled fish of the same price. In addition, this finding was robust to the source (i.e. independent of whether the fish was wild-caught or tank-bred). The probability of purchase was lowest for a tank-bred, ecolabeled maroon clownfish. Simulations with price increases showed that respondents' willingness to pay for certification increased at an increasing rate if the maroon clownfish was wild-caught. Such observations suggest that avid hobbyists would be increasingly likely to pay price premiums associated with MAC certification if a fish is supplied from the wild. Respondents seemed to be concerned with ecosystem conservation and a higher price may indicate a healthier ecosystem as a result of the program. However, they would not pay price premiums for certification if the maroon clownfish were tank-bred. Thus, it may be that respondents viewed tank culture as a means of conserving marine ecosystems and that they judged certification to be an unnecessary expense. This result suggests a low market potential for an extension of the MAC program to tank-bred specimens, at least among this segment of hobbyists. Furthermore, since several clownfish species are available from culture, this observation could be applicable to other clownfish species.

Results of the blue-faced angelfish experiment revealed that an extended survival guarantee (from 5 to 14 days) and an ecolabel were perceived as close substitutes to the consumer in terms of ensuring better quality fish collected from the wild. However, the positive influence of extended life warranties on purchase decisions was higher than the effect of the MAC ecolabel for this species. In addition, it was again observed that this specific segment of hobbyists did not weigh price considerations as heavily as other attributes, especially those related to environmental issues.

The effects of respondents' characteristics on preferences for MAC certification were also analyzed in both experiments. Increasing the level of familiarity with the MAC program and the association of effective prevention of coral reef and wild stock damage with the MAC ecolabel showed highly significant positive influences on preferences for certification by avid hobbyists. This confirms the initial hypothesis that marine ecosystem protection has a high influence on preferences for marine ornamental fish for this group of hobbyists.

Demographic variables such as age, income level, education and geographic distribution also showed significant influences on preferences for certification, but only in some of the blue-faced angelfish scenarios. Results showed that respondents older than 44 years who had at least a college education or an annual income between USD 25,000 and USD 75,000 were more likely to choose a certified fish at the specified price premium, which ranged from USD 2 to USD 7.

On the other hand, and contrary to initial expectations, there were no significant regional differences in the US with respect to preferences for certified (ecolabeled) fish. However, in comparison with international hobbyists, respondents from the US were less likely to purchase a certified fish. Such a result suggests a stronger perception of survival guarantees as a substitute for certification (ecolabeling) when considering fish quality. Further research to confirm this finding is needed.

Conclusions

Considering the observed negative perception of the MAC ecolabel, the market potential of the program for this group of hobbyists looks limited. However, since only 50% of respondents had some level of familiarity with MAC, efforts to improve the level of knowledge and perceived credibility of the program are recommended. In order to broaden the program's appeal to hobbyists, MAC must address not only coral reef conservation but also sustainability of fish stocks and efficient post-harvest activities (i.e. handling, holding and transportation of marine ornamentals). Such information could be very useful and successful in improving preferences for a MAC ecolabel.

It is important to note that results from this research may not apply to the entire population of marine aquaria owners or all ornamental fish species. An understanding of the preferences of this sample of hobbyists could, however, be very useful for creating increased demand for certified specimens. Due to their high level of involvement in the hobby and high exposure to information, these avid hobbyists should be easier, faster and cheaper to reach with educational and promotional efforts. In addition, due to the secondary role that price plays in influencing purchase behaviour and the capacity to afford price premiums, this group would be very likely to react positively to price increases and to contribute to support of the program if their perceptions of the MAC ecolabel can be improved. Lastly, a survey of the general population covering additional species would be useful in obtaining a better estimate of overall demand for ecolabeled ornamental marine specimens. Further study of expected costs of certification could also help estimate premiums associated with the ecolabel.

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