Monitoring and management of the humphead wrasse, *Cheilinus undulatus*[1]

Robert Gillett[2]

The humphead wrasse, *Cheilinus undulatus*, is a small but important part of the international trade in live reef food fish, being one of the highest species in unit value. The main threats of the live reef food fish trade to the sustainability of the species are overfishing and the effects of destructive fishing on target species, non-target species, and on the reef environment. In 2004, the humphead wrasse was listed on Appendix II of the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). With this listing, international trade is only permitted if the export will not be detrimental to the survival of the species in the wild. For fisheries resources in general, this requirement has been interpreted to mean that in the exporting country there must be a functional management plan and associated monitoring. In this context this report discusses the core elements of a management system for humphead wrasse, making considerations about major fisheries management objectives, management measures, enforcement, monitoring and fisheries assessment.

Live reef fish fisheries

Fisheries for live fish from coral reefs have received much attention in recent years. This increased interest is largely due to concerns over the sustainability of the target species, destructive fishing techniques, expansion of the fishery to new areas, negative interactions with marine tourism, and the prospects of developing new fisheries with large earnings for rural fishers. Except for Australia, this fishery is little managed.

Some features of fishing for the humphead wrasse

Important aspects include:

- Other than activities oriented to the live reef food fish trade, there are few directed fisheries for the humphead wrasse. This is due to its natural rarity and to the inherent difficulty of capturing the fish.
- In most countries where the fish occurs, most of the catch of this species is for domestic use. Fishing for the live fish trade is relatively important only in Southeast Asia.
- A large number of fishing techniques are used for capturing humphead wrasse in Southeast Asia.
- There is much illegal fishing of this fish, especially the use of cyanide, and considerable illegal trade.
- Spearfishing is one of the important techniques for capturing the humphead wrasse in the non-live fisheries.

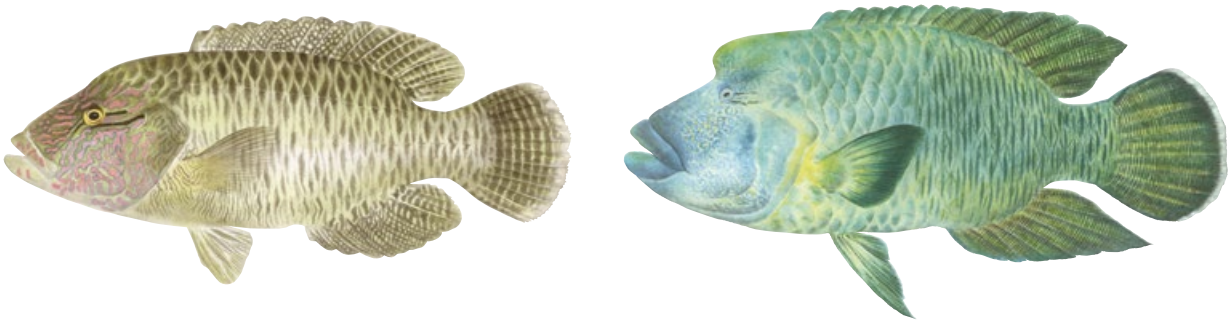

Figure 1. Sub-adult (left) and adult (right) humphead wrasse, *Cheilinus undulatus* (illustrations by Les Hata, ©SPC)

[1] This article is a summary of a 2010 report of the Food and Agriculture Organization of the United Nations: Gillett R. 2010. Monitoring and management of the humphead wrasse, *Cheilinus undulatus*. FAO Fisheries and Aquaculture Circular No. 1048. Rome: Food and Agriculture Organization of the United Nations. 62 p.

[2] Email: gillett@connect.com.fj

Figure 2. Humphead wrasse on display in Shanghai (photo by Mike McCoy).

The trade in live reef food fish

Some 60% of the international trade in live reef food fish flows into Hong Kong and mainland China. Live reef food fish enter the trade either as wild-caught fish that are held briefly before export, about 50–70% of the total trade (15,000–21,000 tonnes); undersized fish that are grown in cages or ponds until they reach market size, 15–40% of the trade (about 5,000–12,000 tonnes); or (for a few of the groupers and snappers) reared from egg to market size in controlled conditions in full-cycle aquaculture, 10–15% (3,000–5,000 tonnes). The humphead wrasse does not undergo full-cycle aquaculture.

The international trade in humphead wrasse

Humphead wrasse is a small, but important, part of the overall trade in live reef food fish. Although the fish is not even close to being the most important species in terms of volume in the markets of China and Hong Kong, it is one of the highest in unit value. In 1997 the leading suppliers of humphead wrasse to markets in China and Hong Kong were Indonesia, Philippines, China, Australia and Malaysia. The total recorded international live trade in this species ranged from about 58 to 138 tonnes for the years 2000–2006. The global domestic trade is likely to be at least 50 tonnes, exclusive of the Philippines, Malaysia and Indonesia. Although the humphead wrasse occurs in the waters of 48 countries, the important suppliers of this fish to the live trade are limited to a few countries in Southeast Asia and Papua New Guinea. In addition to its role in the live reef food fish trade, the humphead wrasse is valued for several reasons, especially for local food and its role in dive tourism. The illegal trade in this species appears to be intense in relation to Indonesia, Malaysia and the Philippines. Illegal exports from Singapore to China and Hong Kong also occur.

Threats to sustainability

The main threats of the live reef food fish trade to the sustainability of fisheries resources are the overfishing of the target species, and the effects of destructive fishing methods on the target species, non-target species and on the reef environment. The main threats to the sustainability of these fisheries are whether a fishing enterprise can be profitable when kept on a scale consistent with the limited productivity of the resource and whether the public management costs needed to keep the fishery within sustainable bounds is prohibitive. The threats posed by the live reef food fish trade to the humphead wrasse are similar, but more severe. This is because the prices obtained from humphead wrasse are very high, the fish is relatively non-resilient to fishing pressure, and it is likely that more destructive fishing is associated with this species than with others in the live fish trade due to the difficulty of capture using conventional techniques.

The question is whether this species can be adequately managed and monitored for sustainability.

CITES and the humphead wrasse

In October 2004, the humphead wrasse was listed on Appendix II of CITES. International trade of species on this list is permitted only if the export will not be detrimental to the survival of the species in the wild. For fish, this has generally been interpreted to mean that in the exporting country there must be a functional management plan and associated monitoring. It is recognized that many states will be challenged to develop such monitoring and/or management measures for humphead wrasse. Considerable efforts have, therefore, been taken to assist countries.

Fisheries management and the humphead wrasse

Some of the important desirable attributes of fisheries management are the precautionary approach, the ecosystem approach, adaptive management, and participatory decision-making. The major difficulty is that few of the major humphead wrasse exporting countries have much in the way of functional management for small-scale commercial fisheries, let alone use more sophisticated management concepts. Some reconciling of ideals and realities is required to develop a workable management strategy.

Major objectives in the management of humphead wrasse

Common objectives in the management of humphead wrasse include efforts to:

- achieve a sustainable level of fishing;
- reduce destructive fishing;
- increase humphead wrasse abundance for viewing on reefs by dive tourists;
- increase abundance for cultural and/or subsistence purposes; and
- generate government revenue.

Management measures

Various measures could be used to obtain the objectives commonly associated with the management of humphead wrasse. Some considerations on these measures include the following:

- All of the identified measures have significant deficiencies, especially in the extremely challenging management environment that exists in most of the humphead wrasse range countries, especially those that are major exporters.
- To attain any of the humphead wrasse management objectives that are commonly put forward, it is likely that more than one management measure will be required.
- This leads to the contention that humphead wrasse management requires considerable effort to be effective. Some countries may, therefore. conclude that attaining certain objectives is not cost effective.
- Many of the measures are applicable to attaining more than one objective. This may suggest that certain measures are especially important in humphead wrasse management. Accordingly, special attention should be given to the various restrictions on exports, the ban on scuba spearfishing, and marine protected areas.

Enforcement considerations

Some of the recent suggestions for improving humphead wrasse management consist of otherwise sensible measures that are predicated on remarkable progress in enforcement. The reality is that national fishery enforcement arrangements are unlikely to undergo major transformation due to the requirements of the relatively small humphead wrasse fishery. However, some generic suggestions for humphead wrasse management can be made:

- giving priority to management measures that are carried out at the point of export;
- focusing enforcement at the collector vessel level rather than on fisher vessels;
- using marine protected areas in appropriate situations;
- engineering enforcement cooperation at the one major overseas destination;
- creating incentives and constituencies for enforcement cooperation;
- using communities in enforcement;
- identifying opportunities for using awareness raising to facilitate enforcement; and
- promoting appropriate legislation.

Monitoring

Some important considerations on the collection of information for humphead wrasse monitoring purposes are:

- Rarely will all of the desirable monitoring measures be possible, hence there is a need for prioritizing a hierarchy of objectives. In many range countries, such a ranking is likely to result in the

conclusion that collecting total catch and catch per unit of effort data is the most important objective.

- Should humphead wrasse data from a national fisheries statistical system be available, this could be valuable for monitoring purposes. This information, however, is often unverified and erroneous and should be used with caution.
- Effective monitoring of the small-scale component of the humphead wrasse fishery in many countries is likely to be costly and/or time consuming and out of proportion with the size and benefits of the fishery. This suggests that, wherever possible, monitoring activities related to humphead wrasse take place at the level of the collector vessel or higher.

Assessments

The assessment of a stock of humphead wrasse can range in sophistication from trends in simple biological indicators to very complex stock assessment models. Trends have the advantage that they are simple, easy for developing country managers to use, and are readily understood by policy-makers, fishers and the general public. The more sophisticated models are able to integrate many different types of information on the resource and can give important information, such as potential yields.

The new stock assessment approach for the humphead wrasse

A new stock assessment approach has been developed for determining the sustainable catch of humphead wrasse. It comprises a method for estimating stock density based on underwater visual surveys and a population model. The approach involves the following steps:

- Specifying an objective, such as maximum sustainable yield, or maintenance of a population size above some threshold level.
- Using the population model to determine the rate of fishing mortality that will, on average, achieve the above objective, and the associated uncertainty.
- Calculating the current size of the population.
- Multiplying the population size by the fishing mortality rate to give a raw catch limit.

The model represents a tremendous advancement in our ability to assess the status of humphead wrasse stocks. Where only analysis of trends in simple indicators was possible in the recent past, there is now a scientific basis for the establishment of catch limits and/or export quotas. Added advantages are that the model is relatively easy to use and does not require large amounts of data. Drawbacks include the uncertainty in calculating suitable reef area.

Rules of thumb

In countries where expertise in fisheries science is not available for humphead wrasse assessment, there could be considerable value in extending the model to developing simple "rules of thumb" yield estimates based on the model. This could consist of crude ranges in annual yields of humphead wrasse per linear or square kilometer of reef, under various conditions.

The single species focus of current approaches

Some simple management measures are needed to produce tangible benefits in an environment that has seen little management success, and these efforts could conceivably be broadened in the future to include other species, fisheries or ecosystem considerations.

Is the humphead wrasse exportable?

Nothing in this report should be taken as supporting the contention that exporting humphead wrasse is sustainable. Given that the fish is naturally rare, cannot sustain much fishing pressure, and is mostly caught in fisheries that are notoriously difficult to regulate, the logical solution in many range countries would be to simply ban the export of humphead wrasse.