THE PRICE OF GOOD TASTE
BY YVONNE SADOVY

“Earth provides enough to satisfy every man’s needs, but not every man’s greed.”
— Mahatma Gandhi

HARD-BOILED EGGS FOR HUMPHEAD

Hard-boiled eggs are not a popular lunchbox item for divers in Egypt’s Sinai Peninsula. But that was good news for the area’s favorite giant reef fish, the humphead wrasse. What the tourists did not want, the massive and handsome humphead male relished. It was a perfect relationship. Once, while on a dive, I tentatively offered my unwanted egg to a humphead male, which I estimated weighed in at about 150 kilograms (330 pounds), the size of a young elephant. As I looked directly into his chameleon-like eye, I had the feeling that he was just as curious of me as I was of him. That encounter left quite an impression on me; I could never have imagined then, what a big impact this species was to have on my life. An entire decade would pass before I would meet the humphead wrasse again.

In a meeting room of the Zoological Society in London’s Regent’s Park, a group of biologists, including myself, had gathered. We were there to assess for the very first time the conservation status of commercially important marine fishes. Such an exercise would not seem remarkable today, given what we have come to learn about fisheries collapses. Yet, at the time, there was considerable doubt about whether marine species, abundant enough to be commercially important, could ever be threatened with extinction. The thought of any of them being threatened directly contradicted what we knew, or at least what we thought we knew, about most of these fish species; the widely held belief at the time was that such fishes, with their wide geographic distributions, their abundance and their ability to produce millions of eggs could not possibly be threatened with extinction. Surely, the massive seas are endlessly full of fish; surely, a little bit of fishery management would put them right…right? That London meeting revealed that we were sadly mistaken.

Using the IUCN’s Red List of Threatened Species classification system, the biologists at that meeting produced a list of more than 100 species deemed to be threatened and in need of immediate attention. The London meeting marked the beginning of years of controversy that ultimately led to the acknowledgement, often grudgingly, that certain economically valuable marine fish species may not simply be overfished, but actually threatened with extinction if nothing was done to reverse current fishing trends. One of those species was the humphead wrasse. Unfortunately, help was not to come for another 8 years and in the meantime we had a lot to learn.

AN ENIGMATIC GIANT

The humphead wrasse, also known as the Napoleon fish or Maori wrasse, is an impressive animal. It can reach two meters (ca. 6.6 feet) from its big pouting lips to the end of its sturdy tail. I sometimes think of it as an elephant of the underwater world; big solid animals that can live over 30 years. Instead of a trunk and thick grey skin, the massive fish are distinguished by a prominent hump at the front of the head and are covered in large, tough blue-green scales. As it swims, it appears to fly leisurely over the reef, using its pectoral fins as wings and its tail coming into play only when it accelerates. Like elephants, this fish
also is greatly valued, although in Napoleon’s case it is the excellent quality and taste of their flesh which underpins its international trade as a luxury sought by so many. And, similar to elephants, it doesn’t take the removal of many humphead wrasse before its populations start to suffer.

Scientists have barely begun to understand this mysterious animal. Although broadly distributed across the reefs of the Indian and Pacific Oceans, adults are nowhere common and typically not easy to find, especially in areas where they are fished. The largest humphead wrasse can live in water depths well below the normal range of SCUBA divers. Yet, divers can occasionally spot them in shallow waters, where they must regularly come to mate. The smaller females prefer shallower reefs, but move out to the drop-off, where the deep open ocean waters begin, in order to meet males. Mating usually involves aggregations of tens to hundreds of fish. The large males patrol and parade, keeping smaller males at bay and attracting females to release their precious eggs into the ocean where they can fertilize them.

Over the years, our research has shown that as females grow older and larger, some change their sex to become males. Hence, the largest fish we see have led interesting lives, to say the least, mating as both male and female. This fascinating ability to change sexes is known as hermaphroditism (after the god Hermes and goddess Aphrodite) and is also common among relatives of the humphead wrasse. Evolution has given these species a reproductive edge, ensuring there are always males to fertilize the eggs. The big fish are those most likely to be successful males, because they can best attract females and defend their turf. Therefore, the best strategy for the humphead to produce the most young in a lifetime is to be female while small and change to male while bigger and has the best chance to win many partners.

I always found it exciting to come across a big adult, to be checked out by a large, bold male. Most of the time, while doing our field surveys of the species, we only saw the occasional small fish, 40 cm or less. Every now and again, appearing suddenly out of the deep blue below, a large male would effortlessly approach, circling slowly, casually scrutinizing me with his swiveling eye. If he came really close, I could see the beautifully elaborate markings on his face. The elegant and intricate facial patterns have earned him the name, the Maori wrasse. It’s no wonder divers yearn to see this fish. At Blue Corner, a world famous dive site in Palau in the western Pacific, one famous resident individual was known fondly as Abu. I was lucky enough to have seen him on several visits. He was so loved by divers that when he disappeared he was given his own obituary in a local newspaper. Wounds from earlier failed attempts to spear him were clearly visible, and almost certainly, he had been caught by a fisherman for whom his tasty flesh would fetch a high price at market.

HERU AND THE HUMPHEAD

The year was 2003 when I first met Heru, a seafood businessman. I had come to Indonesia, the major source of humphead wrasse for the Chinese seafood market, to interview live fish exporters. It had been a long and tiring trip and my interview with Heru was to be the last of many. I desperately was looking forward to packing up and heading home. Heru, a major exporter of wrasse, was introduced to me by some Indonesian government colleagues. I needed to interview traders like Heru to understand the nature and volume of international trade of humphead wrasse (from the moment it is caught to how it is transported to Hong Kong, and beyond). I wanted to understand the complexities of the trade and the perspectives of the traders to combine with fishery information and identify practical solutions for its unsustainable trade.
Given how that first meeting progressed, how wary I felt about him and how different our lives and interests were, I would have never imagined that years later Heru would renounce export of the species and work to conserve it. We would count humpheads together in the wild and appear in a documentary about saving this lovely animal. Heru listened and understood. He began to see that, just because he saw many humpheads in his collector cages around the country, this did not necessarily mean that the species was common in the wild. He knew that all those fish gathered together resulted from the work of many fishermen over many months traveling many kilometers, and came to see that this reflected how uncommon the species is. He could see that consolidating catches in this way, from so many fishers, masked low numbers of fish actually in the wild. Heru could see and he decided to act. Meeting somebody like Heru, a trader and a Buddhist, who was prepared to listen and empathize was one of those wonderful surprises that life occasionally brings. He has the long-term interests of the fishing communities at heart, because it is on these communities that he depends on for his own business. He could also see that loss of food species from overfishing is in nobody’s interests. People like Heru renew my hope for positive change in the future.

A FIRST FOR CITES

The Convention on International Trade in Endangered Species (CITES) came into being in 1975. At that time, conservationists focused almost entirely on large land animals such as big cats. It was not until much later, and after considerable controversy and with one exception, commercial marine fishes started to attract the attention and concern of the conservation community. As of 2002, they were included on CITES Appendices. The community’s faith in our ability to manage marine fisheries sustainably was eroding quickly, as species after species was listed as threatened on the IUCN Red List. It seemed that a listing on this powerful Convention was a last resort to stop further declines of marine species. Several countries had already protected the humphead wrasse within their borders, an unusual measure for a reef fish and a clear sign of its vulnerability to fishing. Yet, the massive international trade in live reef fish, expected to get even bigger as China’s economy burgeons, poses the most serious threat of emptying the reefs of this particular species.

In 2004, the humphead wrasse became the first reef fish valued as food to be included in CITES Appendix II. The unsustainable international trade of luxury seafood for Chinese restaurants and markets was what landed the humphead wrasse in troubled waters. Its high value was an enticing incentive for fishermen and traders to hunt down any humphead, sometimes even the very last one in an area. In many places, we found no adults during our field surveys; trade was dominated by juvenile fish, mostly caught at sub-market sizes and grown out to market size in captivity. The species cannot be hatchery produced, and so the trade is largely one of baby humpheads. In most managed fisheries, this would be bad news and likely prompt minimum capture size regulations, allowing young fish to mature, reproduce and replenish the population. However, for humphead wrasse, diners actually prefer the smaller fish; the challenge for long-term trade is to ensure that the number of fish exported is within limits that the wild population could sustain. The million dollar question is how do you determine how many fish can be exported sustainably each year as required under CITES Appendix II listings?
As part of my work, I had to figure this out. I remember sitting down one day, a little bit of funding in my pocket for field work, staring at a map of massive Indonesia. How could I possibly even begin to answer the question? Instead of brilliant answers, only questions flooded my brain. Where do I do the work? How do I survey this already uncommon reef fish in the field? What kind of fishery management models could be applied for a sex-changing fish, caught largely for grow-out, and about which very little of its life cycle is known? With Indonesia’s estimated 50,000 km² of reef area to cover, the task seemed impossible.

Luckily, I have wonderful and creative friends and colleagues. Between us, we surveyed over one hundred kilometers of reef, mainly with just mask, snorkel and fins. Needless to say, we got quite fit in the process. We developed new survey techniques for the species that other workers have since adopted. We explored humphead habitats where fishing pressure ranged from high to none, and from this, could observe the incredible differences in fish numbers and sizes. It became very apparent how rapidly heavy fishing had destroyed fish populations and the food and income opportunities these brought to local fishing communities. We got help from the United Nations Food and Agriculture Organization to develop a unique fishery model, specially designed for the species. The model uses an interactive program, which can be adapted depending on the country and circumstance, to calculate the numbers of fish that can be exported sustainably each year. Using this model, Indonesia reduced its export quota ten-fold and eastern Malaysia stopped exporting humpheads altogether because of very low population levels. With the numbers calculated and the countries acknowledging them, most of the pieces were in place for sustainable trade. All that is needed now is better law enforcement to ensure people keep to the export quotas. But this seems to be asking too much; enforcement is the biggest challenge we face today and is a huge hurdle to overcome.

ALL TRADE ROUTES LEAD TO CHINA

China contains about one fifth of the world’s human population. It has a rapidly growing economy and a massive appetite for seafood. Hong Kong alone has the second highest consumption rate for seafood among all developed countries. The luxury seafood restaurants and markets are massive business. Popular with customers and high on the price list is the humphead wrasse, all of which are imported. This delicacy can retail for as much as $600 USD/kilogram during important festivities such as Chinese New Year. Top chefs take pride in featuring the species on their menus. Yet, many of these sales are illegal, unregulated and unmonitored (IUU), all in violation of a CITES Appendix II listing.

Hong Kong and mainland China are the major trade centers for the live, edible fish trade. Their overwhelming demand requires sourcing a wide range of fish species from the reefs of the Indian and Pacific Oceans. As importers, they are required under CITES to monitor and document trade in listed species. While Hong Kong makes some efforts to do this, mainland China has yet to put in place the institutional framework needed to make this possible, or at least practical. Monitoring marine species, such as humpheads, that are transported alive and by sea is a major challenge, since most ships are freely allowed to come and go into ports and across borders with little attention paid to their cargo or movements. But the issue
must be addressed to bring rampant trade in this species under control.

The challenge of eradicating IUU transport of endangered humphead wrasse is considerable. Yet, without the checks and balances on trade, especially that by sea, the enormous demand for seafood by China will continue to take a severe toll on marine ecosystems. And in the future we may not have the luxury of options. The overwhelming need for enforcement affects not only the humphead wrasse, but also the growing number of marine species gaining protection under CITES, most of which is due to the growing demand from China. Although the task at hand is daunting, there is hope.

Recently, I travelled to Bangkok, Thailand where I attended the 17th Conference of the Parties, one of the periodic meetings held under the Convention. I was very encouraged to see the continuation of a Working Group of major trading countries of this species who will focus on its IUU. The group has a good relationship with the IUCN Groupers & Wrasses Specialist Group, which I Co-chair, and plenty of room for discussion—always an important first step. We all know what the problems are; what we need are practical solutions and above all, the political will to make the CITES listings work. For all the humpheads and other marine species, my fingers are crossed!
Dr. Yvonne Sadovy knew that she wanted to work with marine animals since the age of 8 years old when she had her first glimpse of life underwater. She earned her Ph.D. studying the sexual pattern and social organization of the bicolor damselfish in 1986 from the University of Manchester in the United Kingdom, with thesis field work conducted out of the University of Puerto Rico’s Marine Sciences Department. She then worked as Director of the Puerto Rican government’s marine research laboratory where her interest in the link between fish biology and fishery exploitation developed and when she first began to realize that commercially important marine species could become threatened with extinction.

Despite a move to the University of Hong Kong in 1993, where she is now a Professor teaching fish biology, fisheries and mariculture, marine biology and conservation, she maintains strong links to the Caribbean region, in particular, working on groupers and spawning aggregations. Over the last 20 years, Yvonne has been doing research on coral reef fishes in Southeast Asia and the western Pacific, working both in the field and with fishing communities and governments. She has come to appreciate how heavily the future of many coastal communities depends on having ready access to healthy coral reef ecosystems.

Yvonne is a co-founder and the Director of a global initiative to protect fish spawning aggregations (SCRFA), which are highly susceptible to commercial fishing. For the last two decades, she has worked extensively on grouper aggregations, and since the mid-1990s has also focused on the sustainable use and conservation of the Napoleon fish (aka the humphead wrasse), an iconic giant reef fish, which is threatened by unmanaged and illegal international trade for the luxury Chinese restaurant fish market.

She has published and co-published 5 books and over one hundred and fifty articles in marine science journals and other outlets, appeared in films including, “End of the Line” and “Deep Trouble” from the BBC Blue Planet series, and has been featured on radio and TV and in print. She is active in the IUCN in marine conservation and is founder and Co-Chair of the IUCN Groupers and Wrasses Specialist Group.
**Humphead Wrasse**

*Kingdom: Animalia*
*Phylum: Chordata*
*Class: Actinopterygii*
*Order: Perciformes*
*Family: Labridae*
*Genus: Cheilinus*
*Species: C. undulatus*

**Name**

The species’ name reflects its physical shape and its place in history. The name “Napoleon fish” may have originated from the knowledge that Napoleon was a New Caledonian fisherman, famed for catching the species. The attractive and intricate markings on the face and the large hump above the eyes of larger fish, account for two other commonly used English names, Maori wrasse and humphead wrasse.

In parts of the western Pacific, notably Palau, Fiji, Cook Islands, Yap and Pohnpei, the humphead wrasse has had strong cultural significance. It was formerly only available to higher ranking members of society. The esteem with which it is held culturally in some places may partially account for the many different names by which this species is known in different languages, often several names in one location, distinguishing its various growth phases in Palau.

**Status**

The humphead wrasse was listed as Vulnerable (VU) on the IUCN Red List in 1996. Since its reassessment in 2004, it is now listed as Endangered (EN).

The species was added to CITES (Convention on International Trade in Endangered Species of Wild Fauna and Flora) Appendix II in 2004, because of the threat of international trade in live animals for the Chinese restaurant and food markets, centered in Southeast Asia. It was the first coral reef food fish to be listed on any CITES Appendix due to severe reduction in many parts of its range.

Its population is decreasing.

**Range and Habitat**

The species is widely distributed across coral reef habitat of the Indo-Pacific region from inshore down to at least 100 meters (300 feet). It is found from the Red Sea and African coast, across the Indian Ocean and much of the Pacific, north to southern Japan and the coast of southern China, and south to New Caledonia. The humphead wrasse changes noticeably in both body form and coloration throughout its life, with younger fish found in coral-rich areas of lagoon reefs, particularly among live thickets of staghorn, *Acropora* sp., corals, in seagrass beds, mangroves, murky outer river areas with patch reefs and in shallow sandy areas adjacent to coral reef lagoons. Adults are more common offshore than inshore, their preferred habitat being steep outer reef slopes, reef drop-offs, passes and tops, channel slopes and lagoon reefs.

**Biology**

This species is never common, rarely exceeding more than 10 fish per hectare (ca. 2.5 acres), even in preferred, unexploited habitats. Such densities are very low for a commercially targeted species and more akin to densities of large terrestrial animals. Once fishing is present, densities rapidly drop; in many countries the species is now rare due to overfishing. However, where it is protected,
Humphead wrasse with slender suckerfish in Fakarava, Tahiti
COURTESY OF PAUL McKENZIE
Humphead wrasse feed on other fish, molluscs, crustaceans and starfish. It is one of the few species that can predate toxic animals such as the crown of thorns starfish, boxfishes and sea hares.

Maximum recorded sizes exceed 2 meters (ca. 6.6 feet) and 190 kilograms (ca. 419 pounds). The species can live for 3 decades. Age and growth studies suggest longevity of at least 32 years for females and 25 for males, if the growth checks in otoliths (ear stones), used to age the fish, are deposited annually. Fish mature at about 5 years and 40 cm and spawning is in pairs formed within larger social groups that form temporary spawning aggregations. Although spawning aggregations can number several hundred fish in unexploited areas, more typically, mating groups are much smaller. Planktonic eggs are released into the water column and drift away from the spawning site. This wrasse is particularly interesting because some individuals change their sex; adult females do not grow larger than about 80 cm while the sex-changed males, along with their head humps, grow much larger.

**Threats**

This highly desired fish is sought after by fishermen and subsequently seafood consumers. It is caught in many places and through various methods, depending on its size, whether it is needed alive or dead, and depending on local traditions. Smaller individuals may be attracted by bait on a hook and line or fish traps, although they are difficult to catch in this way and in many places the most commonly used fishing “gear” is cyanide, a poison that can damage reefs. When the species is not wanted alive, it is easy to spear, often in its resting places and at night, such as in Palau, Tahiti and Fiji. Its high retail price enables it to be transported long distances, which is expensive and risky for traders, but lucrative and with high profit levels when successful.

All humphead wrasse trade are wild-caught, since commercial-level hatchery propagation of this species is not yet possible. The major importing countries are China, including Hong Kong, Taiwan and Singapore. Animals nowadays are exported most often from Indonesia, Malaysia, and the Philippines. In smaller numbers, they also come, or once came from western Pacific Islands including Palau, Solomon Islands, Fiji, and Tonga, among others. Most fish in trade are caught as juveniles and grown-out in captivity, which puts
a heavy strain on the reproductive potential of the species.

**Conservation**

The humphead wrasse is protected in many countries, ranging from Palau, Fiji and Australia in the Pacific, to the Maldives and the Seychelles in the Indian Ocean, a reflection of its cultural and tourist value in some places, as well as its vulnerability to fishing. The species attracted international attention following its listing on the IUCN Red List and its addition to CITES Appendix II.

A major challenge following the CITES listing was population assessment, which was necessary in major exporting countries to establish sustainable exports under the Convention. This led to new assessment methods for determining abundance in the wild, modeling the fishery and calculating export quotas. Exports of humphead wrasse have declined significantly since the CITES listing, especially from Indonesia and Malaysia. However, much illegal, unregulated and unmonitored (IUU) trade continues in Southeast Asia, which needs to be addressed in order to bring trade under control. Numbers of fish are often good in marine protected areas where diving tourism is popular.

To learn more and donate, please go to:

www.iucn.org
www.fao.org
www.SCRFA.org - Science and Conservation of Fish Aggregations