Humphead Wrasse (*Cheilinus undulatus*)

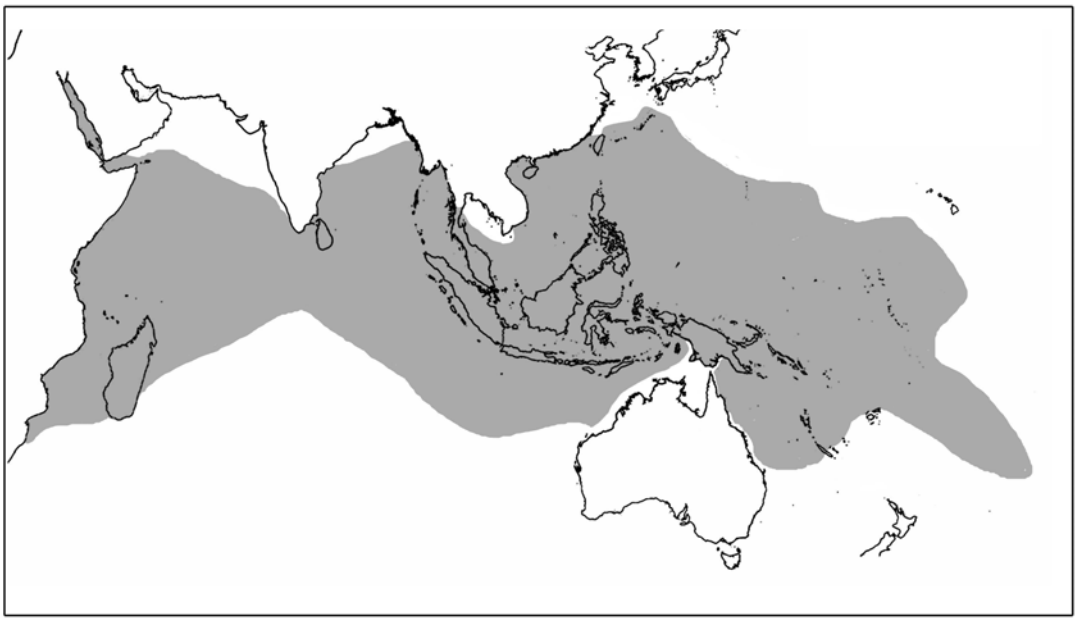

Figure 1. Distribution of Humphead Wrasse

Overall data summary

There are many studies of Humphead Wrasse population trends and fish densities from throughout the species' range. These sources of information include underwater visual censuses, fishermen's reports, dive operator reports, fishery-based and anecdotal information. Collectively, these reports show declining populations in nearly all studied locations with suitable habitat subject to commercial fisheries wherever the species is not effectively protected (such as in a marine protected area, or managed) and especially where there is an export trade. Even in Australia, where the species is totally protected (Western Australia) or subject to no-take restrictions (Queensland), recent catches have been much lower than historic levels (Johnson in Pogonoski *et al*. 2002). Much of the export trade involves late stage juvenile fish.

In non-consumptive use, the Humphead Wrasse is valuable to SCUBA diving operators. Individual fish maintain consistent home ranges on particular reefs, and become familiar to operators in the area. Because of concerns for the species, there are campaigns in progress to collect information on it from recreational divers and promote its conservation for such uses, citing higher value in the non-consumptive vs. consumptive markets. (O'Connell in litt., 1 May 22, 2002; Donaldson in litt., 20 May 2002; Sadovy in litt., 31 March 2002; Napwatch- http://www.divesociety.ch/napwatch.htm).

Humphead Wrasse have significant cultural value in many small island developing states. In several countries it has long been an important ceremonial fish, sometimes reserved for kings or special community festivities (Sadovy in litt., 31 March 2002). In addition, many of these nations utilize Humphead Wrasse and other reef fishes in artisinal fisheries or small-scale spearfisheries to supply local demand. Free diving with spearfishing equipment is the typical method of capture in these domestic fisheries, but even this minimal technology has resulted in overfishing, for example in Guam, especially when replaced by spearfishing on SCUBA (Donaldson in litt., 20 May 2002).

Fishery-independent Data

Survey (underwater visual census = UVC) results throughout the species' range in preferred habitats have shown adult densities of *C. undulatus* in unfished or lightly fished areas rarely exceed 10 fish per 10,000 square meters of reef (Sadovy *et al*. 2003). Data were derived from underwater visual censuses in 24 independent studies (i.e., many different scientists) in the western Pacific in habitat suitable for the species at different levels for fishing intensity (0 is none to 5 is highest). The data show (a) that Humphead Wrasse density is naturally low and variable, even in preferred habitats and (b) that densities are lower by 10 fold, or more, in areas that are fished; even light fishing pressure causes marked declines. In areas targeted by the live fish trade, fishing intensity is typically high and 10-fold declines are therefore likely based on these data, as strongly supported by anecdotal and fishery-dependent data.

'Reef Check' underwater visual surveys were carried out with trained divers in the Indo-Pacific, in 34 countries or jurisdictions from 1997 to 2002. In surveys during1997 and 1998, zero fish per 100 square meters were recorded at over 80% of the sites surveyed with virtually no counts of over 0.5 fish per 100 square meters (Gregor Hodgson undated ms.). Throughout the sampling period 1997-2002, mean densities per 100 square meters ranged from zero to 11 per 10,000 square meters (Data courtesy of the Reef Check global coral reef monitoring program; www.reefcheck.org). While the scale of such surveys is small for large reef species like the Humphead Wrasse, the apparently low numbers of these fish in suitable habitat is of note.

Fishery-independent data by country:

American Samoa

During recent surveys, the Humphead Wrasse was noted at an average of 2 fish per 10,000 m^2 at the lesser-fished Manu'a Islands and was absent at the more heavily fished Tutuila (Green 2003).

Fiji

Numbers of humphead wrasse were considered to be too few to record during recent UVC surveys of key commercially important fishes or had become smaller and scarcer where more heavily fished (e.g., in Bua Province: Yeeting 1999, Yeeting *et al*. 2001). The species has virtually disappeared from some places (Thaman 1998) and is suspected to be extirpated on one island due to fishing (Dulvy *et al*. 2003). Four underwater surveys provide valuable comparative information from different areas in Fiji. In 1994, six fishing grounds, with varying levels of fishing pressure in the southern and eastern regions of the Fijian archipelago, were surveyed with five sites per fishing ground and 36 replicates per site for a total area of 162,000 m^2 and about 100 diver hours (Jennings and Polunin 1996, 1997). Out of 10,000 fishes surveyed of >15 cm TL, only five humphead wrasses (0.05% of all fish) were seen, despite the surveys being conducted in habitat suitable for the species. More recent (1995/6)

surveys in the same areas on the NW coast of Kadavu Is., (covering 126,000 m^2 and over about 150 diver hours) showed that this species had become even scarcer; not one was seen. Local villagers suggested that numbers had become scarcer because of the arrival of outside spearfishers, and the wrasses were noted to be very wary of divers (Simon Jennings, pers. comm.). In 1999-2000, in Lau, where fishing pressure is relatively low, 13 islands were surveyed by UVC, yielding an average of 2.6 fish per 10,000 m^2 (range 0.7-4.78) (Nick K. Dulvy, pers. comm.). In all, 7 separate locations were surveyed in Fiji spanning the range of fishing pressure from low (=1) to highest (=5) with a range of densities of fish per 10,000 m^2 of 8.4–0 respectively, the difference of 10 fold or so almost certainly the result of fishing pressure

Malaysia

An extensive series of underwater visual census surveys at more than 30 survey sites around Sabah (the major supplier and source of this species in Malaysia) found that, after extensive and uncontrolled fishing had occurred, only 2 sites had more than 1 Humphead Wrasse per km squared with only two reproductive sites identified. Population declines determined from these surveys to have occurred since 1974 were 99.91% in Humphead Wrasse numbers, when compared with similar unfished reefs. Sabah is the principle source of Humphead Wrasse in Malaysia, and a location central to the geographic range of the species with habitat suitable for the species (TRACC 2004). It is also thought that spawning aggregations may have ceased in the area as a result of overfishing (T. Daw, pers. comm., based on WWF Malaysia Project Report 2002).

This species is found in marine protected areas (MPA) of peninsular Malaysia (e.g., Pulau Payar, west coast) and, in a survey of Sabah, was noted from Mabul Is., Bodgaya Is. (Semporna district) and Sipadan Is. (A. Cabanban, pers. comm.; G. Allen, unpublished data; World Wildlife Fund, unpublished data). The Humphead Wrasse is nowadays rarely seen by divers in much of eastern Malaysia, where most of the country's coral reefs are located. Exceptions are at Pulau Layang Layang where an estimated 350 fish measuring 60-120 cm TL were noted, and west of Sabah and Pulau Sipadan where an estimated 70 fish were recorded in the late 1990s) (TRACC 2004). These locations are protected by the Royal Malaysia Navy and by dive resorts, respectively. The TRACC study around coasts of Sabah yielded only 2 sites with more than 1 fish noted per km with most fish in the immature size range (TRACC 2004).

Philippines

In a UVC survey of the Calamianes Islands, Palawan Province, the Humphead Wrasse was rare; all fish noted were juveniles of < 15 cm except for one 50 cm fish (Werner and Allen, 2000). Palawan is the only area from the Philippines from which the species has been extracted in any numbers; indeed it appears to be the stronghold for this species in the Philippines.

Indonesia

On a one-month dive trip in Indonesia (Sulawesi, Maluku, Komodo and Bali) of 4–5 dives most days at remote islets and reefs only one small *Cheilinus undulatus* was seen, where fish had been seen on previous visits (J.E. Randall in litt. 11.19.00). In many areas around Indonesia frequented by divers, *C. undulatus* is uncommon where once individuals were readily seen, although juveniles may be seen again once live reef fishery operations cease (M. Erdmann, pers. comm.). In a survey of the Sangihe-Talaud archipelago by The Nature Conservancy in 2001, only 5 individuals of *C. undulatus* were sighted in approximately 80 hours of focussed dive time spread over 67 sites. Only one of these fishes was greater than 1 m in length (Halford and Russell 2002).

Society Islands (French Polynesia)

The Humphead Wrasse was reported to be uncommon in the early 1970s with large fish becoming rare following the advent of spearfishing, in particular the practice of spearing large fish in their night

resting holes (Bagnis *et al*. 1972, Galzin 1985). In Moorea, fish were seen on inner fringing reefs and on top of the barrier reef and 3 fish were sighted on the outer reef over 15 months of surveys between 1982 and 1983; censuses also recorded this species in the lagoon of Mataiva atoll in 1981, 1983 and 1985, but not in 1987 and numbers were generally low in all surveys (Galzin *et al*. 1990).

New Caledonia, Chesterfield Islands, Uvea Atoll, and the Tuamotu Archipelago

Detailed UVC studies show a rapid decline in biomass per unit area once this species is fished (Sadovy *et al*. 2003).

South China Sea

This species has evidently become rare in the South China Sea. The Humphead Wrasse used to be taken occasionally in Hong Kong, is noted from Hainan Is. and was once reportedly abundant on offshore reefs (e.g., Pratas Reef, Paracel and Dangan Is.) but is no longer taken in significant numbers from any of these areas (Sadovy and Cornish 2000; P. Chan, J. Wong, pers. comms.; Huang 2001). Small numbers of humphead wrasses are occasionally brought in from the Spratley Is. by Hong Kong vessels (C. Chu, unpublished data). In Taiwan, this wrasse has become uncommon in the Pescador Is. (Sadovy and Cornish 2000) and, although occasionally taken around the islands off southern Taiwan (Orchid and Green Is.), young fish are rarely seen underwater and there is only a "limited amount of population left" (K-T Shao, pers. comm.).

Wake Atoll (USA)

This area is fully protected by the U.S. Department of Defence. The species is abundant and especially so between 5 and 30 m. A survey of the area produced an estimate of at least 13–27 large fish per 10,000 m^2 in a high visibility area and juveniles (< 30 cm TL) were everywhere abundant (P.S. Lobel, pers. comm.; Lobel and Lobel 2000).

Maldives

This species is not heavily fished in the Maldives, and export is banned (see Regulations). Body size estimates ranged from 30-165 cm TL with most fish estimated at between 60 and 110 cm TL (Sluka 2000). Quantitative surveys were carried out in three habitats (outer atoll rim, inner atoll rim and faros) at 12 sites. At each, 6 x 15-minute surveys were conducted between 9 and 18 m depth. Water visibility was good and all Humphead Wrasse seen were counted. Data were analysed using a one-way nested ANOVA and confirmed the density estimates of the qualitative surveys at about 4–20 fish per 10,000 m^2 (Sluka 2000).

Fishery-Dependent data

Data from all countries from where the Humphead Wrasse is caught, with the possible exception of Australia where the species is totally protected (Western Australia) or no-take restrictions applied (Queensland), and especially countries at the centre of distribution of this species (i.e., Indonesia, E. Malaysia and SW Philippines) have shown declines in almost all cases for which records are available. Declines have been particularly marked within the last decade or so and largely in relation to the live reef export trade. Available data also strongly suggest that, in the major supplying countries for this trade, Indonesia, Philippines and Malaysia, many of the fish traded now are in their juvenile size range or were removed from the wild, prior to grow-out as juveniles. Indeed, juvenile size is preferred in much of the retail sector for being 'plate-sized'. This trend is fully supported by the sizes monitored in the retail sector of the trade in Hong Kong, almost all of which are juvenile fish (Sadovy *et al*. 2003).

Fishery-dependent data by country:

Australia

In Australia, there is conflicting information on Humphead Wrasse abundance. Queensland fisheries data show a sharp rise in catch rates for *C. undulatus*, from approximately 6 kg/day/boat in 1989 to almost 25 kg/day/boat in 1992, coinciding with rising interest in the live reef fish trade with Hong Kong. Catch rates then stabilized at approximately 20 kg/day/boat from 1993-1998, suggesting no decline in local Humphead Wrasse stocks in Queensland (Samoilys *in litt*., 1 June 2002). However, catch per boat per year declined between 1991 and 1998 from approx. 0.23 kg to approx 0.12 kg (M. Samoilys, pers. comm.). According to the CITES Management Authority, evidence of decline is apparent in Queensland waters (O'Connell in litt., 1 May 2002). Reports from several dive operators in northern Queensland indicate there has been a decline in *C. undulatus* at the sites they frequently visit. In addition, these operators report that the average size of Humphead Wrasse at these locations is much smaller than 10 years ago. Queensland volunteer diver surveys indicate local spawning aggregations have never exceeded 10 individuals since 1999. However, in the past spawning aggregations of several hundred fish have been noted but have since completely disappeared for unknown reasons (Johannes and Squire 1988). Dive operators have observed decline or disappearance of the species at six different reefs. The species may be more common on the Queensland outer reefs but the catches on outer reefs are much lower than historic levels (O'Connell in litt., 1 May 2002). The Australian Institute of Marine Science (AIMS) has been monitoring the Great Barrier Reef biota since 1992, and reports that the species is not common and may no longer be found at sites where it once occurred. Queensland Museum scientists have studied the Swain and Pompey outer reefs annually for the last three years, and have observed only four individuals. Historical information shows that the species was very common on these reefs in the 1950s and 1960s, and that declines have coincided with increased fishing activity (O'Connell in litt., 1 May 2002). As of December 2003, this species cannot be exported for commercial use from Australia (see http://www.dpi.qld.gov.au/fishweb/13510.html - then see Coral Reef Fin Fish Fishery). In Queensland waters *C. undulatus* is now a no-take species (Queensland Department of Primary Industries and Fisheries 2004), and in Western Australia the species is totally protected (Pogonoski 2002). As of December 2003, this species cannot be exported for commercial use from Australia.

Indonesia

In Indonesia, catch rates have evidently been declining based on information obtained from traders and fishermen, with catch rates maintained only by moving to new fishing areas or by spending longer fishing, strongly suggesting serial depletions. Many fishermen note that this species is scarcer now compared to five years ago when 45 kg fish could be readily caught; now individual fish of over 25 kg are rare and fishermen have to travel further from home ports to maintain catches of this species (Sadovy *et al*. 2003). Many anecdotal or popular accounts from experienced ichthyologists, divers and fishers indicate severely reduced numbers of Humphead Wrasse in many fished areas of Indonesia according to their previous personal experiences. The sum of these accounts strongly points to depletions in much of the Indonesian archipelago and these have happened over the time period that the live reef fish export trade has been growing. Recent fisher interviews (N=40) conducted by the Society for the Conservation of Reef Fish Aggregations in 2004 in SW Sulawesi, and the Kei Islands (Maluku), which included a question on the Humphead Wrasse, consistently showed that, wherever the species had been heavily targeted it had become rare within the last 10–15 years but where not fished it was still seen and occasionally caught. Moreover, much of the catch currently appears to be of juveniles that are either sold directly or placed in cages for growout.

Malaysia

In eastern Malaysia, a large trader in Kudat, one of the three major supply areas of Humphead Wrasse in the country for the live food trade, experienced more than a 10 fold decline in fish purchases between 1995 and 2003 for the preferred size class of 0.3–3kg – all other sizes also

declined markedly (trader logbook data, Helen Hendry, pers. comm. 2003). This trader purchases fish from many fishermen who travel extensively to source fish for the business and had to close his business due to the declines: many of the fish he purchased were juveniles and had to be kept in captivity and grown-out to reach market size. Catch rates by individual boats supplying this business declined from approximately 10 kg/boat/month in 1995 when the business started in a relatively unexploited fishery for Humphead Wrasse to negligible catch rates per boat by 2002, when the business closed due to insufficient catch rates (Helen Hendry, Conservation Biology Group, Dept. Zoology, Cambridge University, UK, unpublished data). To maintain catch volumes, fishing boats travel ever further from home bases and rapidly move on from area to area in serial depletions of this species (TRACC 2004; T. Daw, pers. comm., based on WWF Malaysia Project Report 2002).

Japan

Annual landings are a few mt a year in Okinawa (Sadovy *et al*. 2003).

Palau

In Palau, interviews with 30 older and experienced (at least 10 years fishing) fishers from throughout the country revealed that nine fished for Humphead Wrasse. The species was perceived to be uncommon now where once it was common and the number and body size have declined most probably due to SCUBA night spearfishing according to fishers (SCRFA 2003). Palau government fishery department figures show that market landings (local sales) increased up to about 3,000-3,500 kg per year in the 1980s and then had declined more than 10-fold by the early 1990s to a few hundred kg annually resulting in protective legislation (no export or small fish to be caught). In the mid 1990s, a 2-year summary report of all fish going through the 3 main markets showed that, of 9,000 fish sampled from night-time spearing (the principle capture method for this species), only 6 were Humphead Wrasse (Graham, Thomas, pers. comm. 1998).

Fiji

Government landings data (Fiji Fishery Department Annual Reports) show a sharp decline of over 80% of sales over 10 years from 22.5 mt in 1994 to 3.5 mt in 2003. This pattern was evident in two independent markets (municipal and non-municipal). Of 52 fisher interviews in Fiji, 24 fishers used to or still catch the species (SCRFA, 2003). Overall, from regular catch rates of 2–5 large fish per month in the 1970s and 1980s declines to 1 per month or just several large fish per year were noted by these fishers, with the species often stated as being hard to find now, and few large fish now caught or seen, suggesting declines of 10–20 fold over the 20–30 year period involved; according to interviews, pressure has only increased beyond low on this species in the last 20–30 years. Protective legislation is being considered.

SUMMARY TABLE

Country	Before	After	Change
Palau (annual catch)	3–3.5 mt (mid 1980s)	< 0.3 mt (mid 1990s)	> 10 fold decline
Fiji (annual catch)	22.5 (1994)	3.5 (2003)	> 80% decline
Australia	Catch per boat per year (1991) 0.23 mt	Catch per boat per year (1998) 0.12 mt	Catch rates per boat per day stable, catch rates per boat per year decline 50%
E. Malaysia (trader) UVC data	3.3 mt (1995)	0.2 mt (2003) Between 1974 and 2000s	> 10 fold decline > 90% decline
UVC data 24 study sites in western Pacific	No or light fishing *ca*. 5–20 fish per 10,000 square metres	Medium to heavy fishing 0–*ca*. 3 fish per 10,000 square metres	Marked declines occur once this species is fished, in many areas it is heavily fished

Note: References mentioned above are cited in full under the detailed results page for the species on the *IUCN Red List of Threatened Species*.