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KEY INFORMATION

Areas of Concern

Found throughout 46 countries in the Indo-Pacific including the Red Sea and East Africa to the Line Islands and Samoa; north to Taiwan and Yaeyama Islands (Japan), south to Australia and New Caledonia; Palau, Caroline, and Marshall Islands in Micronesia. In the U.S. it occurs in Guam, American Samoa, Commonwealth of the Northern Mariana Islands, and Wake and Palmyra Atoll, and Howland and Jarvis Islands, but not Hawaii or Johnston Atoll.

Year Identified as “Species of Concern”
2004

Factors for Decline

- Fishing
- Night spearfishing
- Habitat degradation

Conservation Designations

IUCN: Vulnerable

Brief Species Description:

The bumphead parrotfish is the largest of all parrotfishes, growing to 4 feet (1.3 m) in length and 100 lbs (46 kg) in weight. Adults are a dull green, with the front of the head pale yellowish to pink; juveniles are greenish to brown with five vertical rows of small whitish spots (Randall 2005). This species does not display sex-associated patterns of color change. Adults develop a bulbous forehead and their teeth plates are exposed (only partly covered by fleshy lips). The species is slow growing and long-lived (up to 40 years), with delayed reproduction and low replenishment rates (Choat and Robertson 2002; Hamilton 2003).

Bumphead parrotfish appear to recruit at low levels throughout the year but are not very selective about which habitats they settle into. They live in coral reef habitats from 3 to 100 feet (1-30 m) depth in the central and western Pacific and Indo-Pacific (Figure 1). They occur in barrier and fringing reefs during the day, but rest in caves or shallow sandy lagoon flats at night (Donaldson and Dulvy 2004). Juveniles (Figure 2) are found in seagrass beds inside lagoons while adults are more commonly found in outer lagoons and seaward reefs. This species is gregarious and usually occurs in small aggregations, but group size can be quite large (> 75 individuals) on seaward and clear, outer lagoon reefs. They sleep in large groups, thus rendering them highly vulnerable to exploitation by spearfishers and netters at night (Myers 1999).

The bumphead parrotfish is primarily a corallivore, but also eats benthic algae. They use their large head to ram corals and break them into pieces that are more easily ingested (each fish ingests over 5 tons of structural reef carbonates per year), contributing significantly to the bioerosion of reefs (Bellwood et al. 2003). Aggregations of this species are important coral sand producers on reefs and may be important in maintaining ecosystem resilience (Bellwood et al. 2003).

They spawn **pelagically** during a lunar cycle near the outer reef slope or near promontories, gutters, or channel mouths (Donaldson and Dulvy 2004), and utilize spawning aggregations sites (Johannes 1981, Gladstone 1986). Courtship and spawning have been reported to occur in early morning (Gladstone 1986), although it may occur at other times (Johannes 1981).



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Rationale for “Species of Concern” Listing:

Demographic and Genetic Diversity Concerns:

The species is thought to have been abundant throughout its range historically (Dulvy and Polunin 2004). In more recent years, despite a very wide range with an interconnected population structure, population sizes have declined in populated or fished areas due to overexploitation (Bellwood et al. 2003, Dulvy and Polunin 2004, Hamilton 2004). Abundance of bumphead parrotfish varies widely and differences in abundance between locations may be related, at least in part, to habitat and biogeographic preferences (Kobayashi et al. 2011). For example, densities of the species are over an order of magnitude higher on Australia’s Great Barrier Reef compared with two isolated island locations in the Coral Sea approximately 1000 km from the Great Barrier Reef with little fishing pressure. Likely limiting factors for bumphead parrotfish abundance are sheltered lagoons for recruitment, high-energy forereef foraging habitat for adults, and nighttime shelter (caves) for sleeping (Kobayashi et al. 2011).

Estimates of abundance throughout the entire geographic range of the species are unavailable, though estimates are available for certain locations (Jennings and Polunin 1995, 1996, Dulvy and Polunin 2004). Among the non-United States (U.S.) sites examined, the Great Barrier Reef had the highest observed densities with an estimate of 3.05 fish per km², followed by the Solomon Islands (1.40 fish per km²), and Fiji (0.03 fish per km²). Currently, the species is still abundant in parts of Australia, Papua New Guinea, Micronesia, Palau, Borneo, Malaysia, and New Caledonia. Low numbers exist in East Africa, the Seychelles, Tonga, Fiji, Samoa, the Solomon Islands, Niue, and Nauru (Kobayashi et al. 2011). Many other areas of intermediate levels of abundance exist, as do areas with no abundance estimates (Kobayashi et al. 2011).

In the U.S. Pacific Islands, abundance of bumphead parrotfish has been assessed since 2000 as part of intensive diver surveys on research cruises by the National Marine Fisheries Service (NMFS) Pacific Islands Fisheries Science Center. Bumphead parrotfish were most abundant at Wake Atoll (~300 fish per km²), followed by Palmyra Atoll (5.22 fish per km²), Pagan Island in the Commonwealth of the Northern Mariana Islands (1.62 fish per km²), Jarvis Island (1.26 fish per km²), Tau Island in American Samoa (1.08 fish per km²), and Tutuila Island in American Samoa (0.41 fish per km²) (Kobayashi et al. 2011).

In summary, bumphead parrotfish have a vulnerable life history with slow growth and delayed reproduction that makes them susceptible to stressors (Donaldson and Dulvy 2004). Additionally, there is evidence of a large overall decline and continuing trend of decline despite lack of strong spatial coherence (Kobayashi et al. 2011).



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Bumphead Parrotfish SOC Range

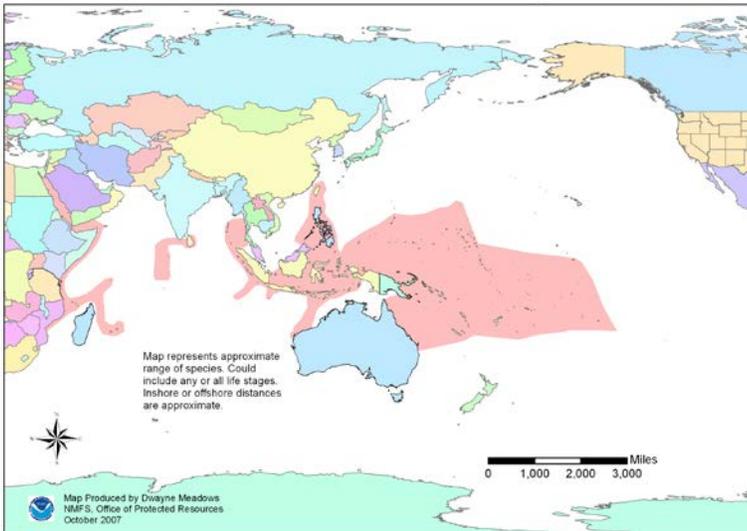


Figure 1. Geographical range of the bumphead parrotfish *Bolbometopon muricatum*.



Figure 2. Juvenile, New Caledonia. Photo Credit: © John E. Randall, B.P. Bishop Museum.

Factors for Decline:

The main threats to this species are 1) overexploitation (especially the taking of sleeping adults at night with spears or nets); 2) destructive fishing techniques including sodium cyanide and dynamite; and 3) degradation and loss of coral reef habitats.

The bumphead parrotfish is one of the most vulnerable species to fishing pressure (Donaldson and Dulvy 2004). Quantitative and anecdotal data show that catches have declined dramatically over the past few decades (Dulvy and Polunin 2004). The catch declines are attributed primarily to declines in stock size as a result of commercial and subsistence fishing, including spearfishing and the use of cyanide and dynamite, which have severely reduced populations of this once moderately abundant species. Its life history traits render it particularly susceptible to overexploitation. In addition to slow



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growth and late maturity, this species sleeps on the reef at night making it vulnerable to spearfishing by divers. Spearfishing, the use of nets, and the use of “bangsticks” (a device used to both fend off sharks and stun large individual fish) for taking bumphead parrotfish are recognized as major problems. This species is also highly prized by certain subsistence and artisanal communities and was often captured for ceremonial events, suggesting this species has a high cultural significance (Dulvy and Polunin 2004).

Status Reviews/Research Underway:

In August 2006, the National Marine Fisheries Service (NMFS) Pacific Islands Regional Office (PIRO) Protected Resources Division held its first Species of Concern workshop in Honolulu, Hawaii, for species in the Pacific Islands Region. The purpose of the workshop was to have experts share their knowledge and research in order to compile updated information on the species, their habitat, threats, research, and conservation ideas. After the open discussion on the species, threats were prioritized, recovery actions/conservation efforts addressing each threat were identified, and data and research needs for each species were identified. These efforts contributed to the development of a NMFS PIRO conservation action plan for the species. This conservation action plan is a living document that will aid NMFS PIRO to identify, prioritize, and fund conservation and research projects in the U.S. for each Pacific Islands Region Species of Concern over the coming years.

From 2008-2010, the Commonwealth of the Northern Mariana Islands (CNMI) Coastal Resources Management Office (CRMO) undertook an assessment of status and habitat specificity for the species in the southern islands of the CNMI (CRMO 2011).

In 2010 we were petitioned by WildEarth Guardians to list the species under the Endangered Species Act (ESA). A comprehensive [status review](#) (Kobayashi et al. 2011) of the species was completed. We determined that the bumphead parrotfish did not meet the definition of a threatened or endangered species, and thus did not warrant ESA listing ([77 Federal Register 66799](#); November 7, 2012).

Data Deficiencies:

Needs include: 1) continue monitoring in all U.S. areas of occurrence; 2) determine the extent of the species' home range (how far individuals normally travel); 3) identify individual populations using DNA sampling; 4) characterize and determine locations of spawning aggregations and their usage patterns; 5) understand the importance of the bioerosion of this species to reef ecology, since the loss of a keystone species may have adverse effects on overall reef health; 6) collect creel, artisanal, and commercial fisheries data throughout its U.S. range; 7) determine if this species makes sound; and 8) if it makes sound, understand when and why the sound is made and use acoustic monitoring to assess population parameters such as presence/absence, spatial distribution, and temporal patterns of occurrence.

Existing Protections and Conservation Actions:

To supplement the bumphead parrotfish status review report in assessing whether the species warranted listing under the ESA, a [management report](#) was drafted that compiled the management activities affecting the bumphead parrotfish across its range, including existing regulatory mechanisms



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and non-regulatory conservation efforts. More detail on the existing protections and conservation actions for the bumphead parrotfish can be found in this management report (NMFS 2012). In summary, a wide variety of governance structures, laws, statutes, and regulations exist throughout the 46 countries within the bumphead parrotfish range. Conservation efforts summarized in the report include actions, activities, and programs undertaken by both governmental and non-governmental organizations that may eliminate or reduce threats or otherwise improve the status of the bumphead parrotfish. These are summarized worldwide as well as for just the U.S. (NMFS 2012).

To briefly summarize the existing protections and conservation actions in the U.S., the bumphead parrotfish is listed as a Management Unit Species (MUS) in the Coral Reef Ecosystems Fishery Management Plan for the Western Pacific. In fisheries management, MUS typically include those species that are caught in quantities sufficient to warrant management (i.e., gear or harvest restrictions) or specific monitoring by NMFS and the Western Pacific Regional Fishery Management Council in U.S. Pacific areas.

Spearfishing with SCUBA gear was banned in American Samoa in 2001, and in 2012 the territorial waters of American Samoa were declared a no-take zone for bumpheads as well as other species (NMFS 2012). In the CNMI, while no species-specific regulations exist, there are four no-take marine reserves and SCUBA spearfishing is prohibited. In Guam, take of the species is regulated, it is unlawful to use explosive devices, and there are six no-take marine reserves. And though proposed in years' past, a ban on SCUBA spearfishing has not yet occurred in Guam (NMFS 2012). In the Pacific Remote Island Areas (PRIA), which include Wake and Palmyra Atoll and Howland and Jarvis Island, no fishing of any fish including the bumphead parrotfish within 12 nautical miles (nm) of the PRIA is allowed; beyond 12 nm, only allowable fishing gear/methods are permitted.



A school of bumphead parrotfish at Astrolaba Reef in New Caledonia.
Photo Credit: © Enric Sala



Bumphead parrotfish in Solomon Islands.
Photo Credit: © J.E. Maragos, USFWS



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Videos:

Adult at Sipadan, Malaysia (2:04) <http://www.youtube.com/watch?v=NdTuBexVtgo>

Feeding (1:24) <http://www.arkive.org/humphead-parrotfish/bolbometopon-muricatum/video-00.html>

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Point(s) of contact for questions or further information:

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