Seafood Watch

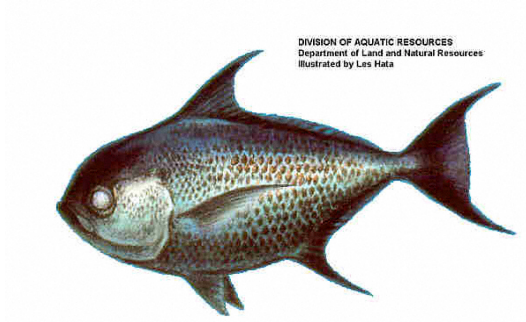
Seafood Report

MONTEREY BAY AQUARIUM®

Pomfrets (monchong)

Family Bramidae

Taractichthys steindachneri & *Eumegistus illustris*



(Image courtesy of Hawaiian Department of Aquatic Sciences)

Hawaii

Final Report
10/02/03

(Updated 10/20/04)

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INTERNATIONAL MARINELIFE ALLIANCE

&
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About Seafood Watch® and the Seafood Reports

Monterey Bay Aquarium's Seafood Watch® program evaluates the ecological sustainability of wild-caught and farmed seafood commonly found in the United States marketplace. Seafood Watch® defines sustainable seafood as that originating from species, wild-caught or farmed, that can exist into the long-term through maintained or increased stock abundance and conservation of the structure, function, biodiversity and productivity of the surrounding ecosystem. Seafood Watch® makes its science-based recommendations available to the public in the form of regional pocket guides that can be downloaded from the Internet (www.montereybayaquarium.org) or obtained from the program by emailing seafoodwatch@mbayaq.org. The program's goals are to raise awareness of important ocean conservation issues and to shift the purchasing habits of consumers, restaurateurs and other seafood purveyors to support sustainable fishing and aquaculture practices.

Each sustainability recommendation on the regional pocket guides is supported by a Seafood Report. Each report synthesizes and analyzes the most current ecological, fisheries and ecosystem science on a species, then evaluates this information against the program's conservation ethic to arrive at a recommendation of "Best Choices", "Good Alternative", or "Avoid". In producing the Seafood Reports, Seafood Watch® seeks out research published in academic, peer-reviewed journals whenever possible. Other sources of information include government technical publications, fishery management plans and supporting documents, and other scientific reviews of ecological sustainability. Seafood Watch® Fishery Analysts also communicate regularly with ecologists, fisheries and aquaculture scientists, and members of industry and conservation organizations when evaluating fisheries and aquaculture practices. Capture fisheries and aquaculture practices are highly dynamic; as the scientific information on each species changes, Seafood Watch's sustainability recommendations and the underlying Seafood Reports will be updated to reflect these changes.

Parties interested in capture fisheries, aquaculture practices and the sustainability of ocean ecosystems are welcome to use Seafood Reports in any way they find useful. For more information about Seafood Watch® and Seafood Reports, please contact the Seafood Watch® program at Monterey Bay Aquarium by calling (831) 647-6873 or emailing seafoodwatch@mbayaq.org.

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Executive Summary

Two species of pomfret are landed commercially in Hawaii by pelagic longline and bottomfish handline fisheries: sickle and lustrous pomfret. For management purposes, both species of pomfret are classified as miscellaneous pelagics and are marketed commercially as “monchong”. Pomfrets are reported to be widely distributed in the epipelagic waters of the world’s oceans, but because they are not targeted in any fishery, very limited biological and ecological information pertaining to these species is available. Therefore, the vulnerability of pomfrets to fishing pressure cannot be determined. The population status in relationship to an overfishing threshold is currently classified as *unknown* by NMFS. In Hawaii, the CPUE of pomfrets remained fairly constant from 1998 through 2001, which may indicate a stable population. As pomfret are pelagic, the fishing methods utilized in their capture, pelagic longline and handline, do little to no damage to marine habitats. Longlining, however, regularly results in the bycatch of threatened and endangered sea turtles and seabirds. The U.S. has taken management steps to decrease the extent of this bycatch, but the nature of this bycatch is still of concern in pelagic longline fisheries. The paucity of biological and stock status information, combined with the nature and extent of bycatch in longline fisheries, results in an overall seafood recommendation of Good Alternative for both species of pomfret caught in Hawaii-based longline and handline fisheries until additional information becomes available.

Table of Ranks

	Conservation Concern			
Sustainability Criteria	Low	Moderate	High	Critical
Inherent Vulnerability		√		
Status of Wild Stocks		√		
Nature & Extent of Bycatch			√	
Habitat Effects	√			
Management Effectiveness		√		

Overall Seafood Recommendation:

Best Choice | **Good Alternative** | Avoid

Introduction

In Hawaii, two species of pomfret (Family Bramidae) are caught incidentally in pelagic longline fisheries. Sickle pomfret, *Taractichthys steindachneri* (Fig. 1), is the species most commonly taken in western Pacific longline fisheries. Lustrous pomfret, *Eumegistus illustris* (Fig. 2), are caught both in the longline fishery and in the deep bottomfish snapper fishery, but account for only 5% of annual pomfret landings (DEBT 2003). For management purposes, both sickle and lustrous pomfret are generally classified under "miscellaneous pelagics" and marketed commercially as "monchong".

Figure 1. Sickle pomfret, *Taractichthys steindachneri*. (Source: DBET 2003)

Both species of pomfret are common incidental catch in western Pacific pelagic fisheries. In 1999, 288,550 pounds (lbs; ~1,300 metric tons [mt]) of monchong were landed in Hawaii (of which 287,564 lbs were sold), with an ex-vessel value of US$389,719 (DLNR 2002).

Lustrous and sickle pomfret inhabit the tropical waters of the Pacific and Indian Oceans (Mead 1972, *in* NMFS 2001). Unlike other members in the family Bramidae, lustrous pomfret are typically found in association with specific bathymetric features, such as island chains and seamounts or submarine ridges (Mead 1972, Prut'ko 1986, Chave and Mundy 1994, *in* NMFS 2001). Pomfret are found in epipelagic waters to approximately 300 m in depth (Nakano et al. 1997, *in* NMFS 2001). Lustrous pomfret have been caught at depths down to about 500 m, and on seamounts when the summit was less than 450 m (~ 250 fathoms; Okamoto 1982, *in* NMFS 2001).

Figure 2. Lustrous pomfret, *Eumegistus illustris*. (Photo courtesy of J. Randall)

Market Availability

Market Names:
In the continental U.S., *T. steindachneri* is known as *bigscale* or *sickle pomfret*. In Hawaii all pomfret are referred to as *monchong.* According to the Hawaii Department of Economic Development and Tourism (DEBT), the French name is *castagnole fauchoir*. In Japanese, pomfret are called *monchong* or *hire jiro*. In Spanish the name is *palometa negra*. In German they are known as *brachsenmakrele.*

Seasonal Availability:
As pomfret are not usually targeted by fishermen, only limited quantities are available year-round. Most are taken incidentally in the tuna longline fishery, especially with vessels that fish deep waters around seamounts. Seasonal trends in availability are variable (DEBT 2003).

Product Forms:
According to the Hawaii Seafood Buyer's Guide, monchong sold in auction are usually sold fresh and may be between 4 and 25 pounds (lbs), with the prime market sized fish over 12 lbs (DEBT 2003). Most of the catch is sold at the Honolulu fish auction to restaurants on both the Hawaiian Islands and the U.S. mainland (DEBT 2003).

Statement on the Availability of Science:
Because fishers in Hawaii do not directly target monchong, these fishes have historically been poorly studied and as a result available information pertaining to the biology and ecology of these resources does not exist. A project is currently underway by the NOAA-Fisheries Laboratory in Honolulu to obtain fundamental data on life history and ecology of monchong and opah (*Lampris guttatus*) in the North Pacific (Hawn et al. 2002). Preliminary results were expected in 2003.

Analysis of Seafood Watch® Criteria

Criterion 1: Inherent Vulnerability to Fishing Pressure

Life History Characteristics

Virtually no information is available on the life history characteristics of pomfrets. Dotsu (1980) reported a total length of 80 cm (TL[1]) for sickle pomfret, but no maximum size has been reported for lustrous pomfret. However, a single 70 cm lustrous pomfret was taken bottomfishing at Johnston Atoll (Ralston et al. 1986), so they are known to grow to at least that length. Trawl-caught lustrous pomfret (n =100) in the Indian Ocean range from 44.0 to 67.0 cm standard length (SL[2]) and 2 to 7 kg in weight (Prut'ko 1986). Pomfret weights in Okamoto's (1982) exploratory study off Hawaii ranged from 2.2–9.6 kg and averaged 5.5 kg. The only attempt to age pomfrets was conducted by Smith (1986), who reported a 60 cm sickle pomfret, weighing 11 kg, to be 8 years old. This age has not yet been validated, however, or supported by further ageing studies.

Age and size at maturity for pomfrets are also largely unknown. One observed female (78 cm TL) taken in the Southeast Pacific had small, mature ovaries weighing about 90 g and containing about 7.0 x 10^5 eggs (Dotsu 1980), indicating high fecundity. The male to female ratio in the Indian Ocean was determined from a collection of lustrous pomfret by Prut'ko (1986) to be 1:1, and judging from the advanced maturation stages observed in the gonads, the school was in spawning condition.

Feeding Habits

Again, there is only anecdotal information regarding feeding habits of pomfrets. The stomach of a single sickle pomfret collected by a National Marine Fisheries Service (NMFS) research cruise contained a pelagic squid, *Moroteuthis* spp. (NMFS, unpublished data). Lustrous pomfret taken on bottom handline rigs off Hawaii (Okamoto 1982) as well as those caught in the Indian Ocean with trawl nets (Prut'ko 1986) fed on midwater fishes such as lanternfishes, crustaceans and squid (NMFS 2001). Predators of juvenile pomfrets (both species) include larger pelagic species of tunas and swordfish (NMFS 2001).

Analysis

1) Growth rate: **Unknown**
2) Age at sexual maturity: **Unknown**
3) Maximum age: **Unknown**
4) Fecundity: **High**
5) Species Range: **Broad**
6) Behaviors that increase ease of capture: **No**
7) Evidence of population variability driven by cyclical oceanographic events: **No**

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[1] Total length is measured from the tip of the snout to the end of the tail (caudal fin).
[2] Standard length is measured from the tip of the snout to the end of the hypural bone in the caudal peduncle area (Miller and Lea 1972).

Synthesis
Pomfrets are widely distributed in the epipelagic waters of the world's oceans. However, because pomfrets are not currently targeted in any fishery, very limited biological and ecological information pertaining to either sickle or lustrous pomfret is available. The vulnerability of these species to fishing pressure, therefore, cannot be determined at this time.

Vulnerability to Fishing Pressure Rank:

Resilient	**Unknown**	Vulnerable

Criterion 2: Status of Wild Stocks

In the U.S. EEZ[3] surrounding Hawaii, pomfrets are included in the species managed under the Pelagics Fishery Management Plan (FMP), implemented in 1987. The population status in relationship to an overfishing threshold is currently classified as *unknown* by NMFS (WPRFMC 1998). In the absence of definitive population data for pomfrets, the Western Pacific Region Fisheries Management Council (WPRFMC) has set a proxy for maximum sustainable yield (MSY) at a minimum stock size threshold of 20-30% of the stock's virgin biomass. This level was assigned as a default to prevent overfishing until more precise information becomes available (WPRFMC 1998).

A general indicator of the status of the portion of the pomfret population available to Hawaii-based pelagic vessels is the general trend of catch-per-unit-effort (CPUE, a measure of catch per 1,000 hooks set per longline). Data from 1998 through 2001 suggest a stable trend in CPUE during this time period (Fig. 3).

[3] The U.S. Exclusive Economic Zone (EEZ) is the sea extending 3–200 miles off any U.S. coastline. State jurisdiction is from the coast out to 3 miles.

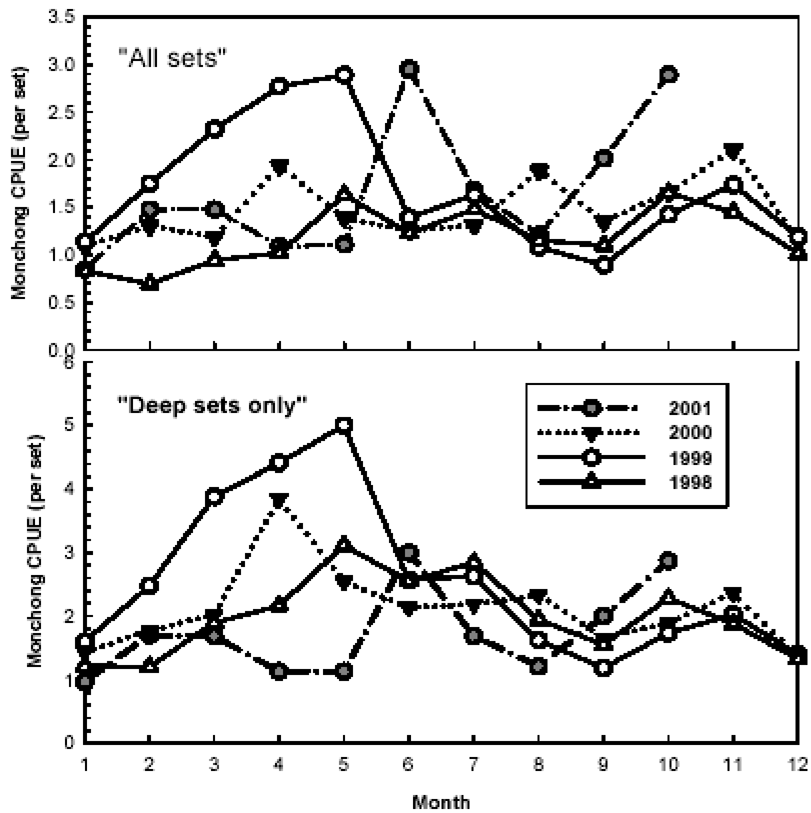

Figure 3. CPUE of monchong (number per set) for all sets (top), and for only deep sets targeting bigeye tuna (bottom), in the Hawaii-based longline fishery. (From: Hawn et al. 2002)

Analysis

1) Species overfishing classification status: **Unknown**
2) Population relative to over-fishing threshold: **Unknown**
3) Long term trends in abundance (CPUE): **Unknown**
4) Short term trends in abundance (CPUE): **Stable**
5) Occurrence of overfishing: **Unknown**
6) Current life history parameter distribution: **Unknown**
7) Overall stock status uncertainty: **High**

Synthesis

In Hawaii, the CPUE of pomfret remained stable from 1998 through 2001, which may indicate that the population is stable. Because population abundance is not defined, however, and other indicators of abundance (landings, size and sex structure) are inconclusive, the status of pomfret stocks is uncertain.

Status of Stocks Rank: Healthy **Unknown** Poor

Criterion 3: Nature and Extent of Bycatch

Seafood Watch® defines sustainable wild-caught seafood as that which is captured using fishing techniques that successfully minimize the catch of unwanted and/or unmarketable species (i.e., bycatch). Bycatch is defined as species that are caught but subsequently discarded (injured or dead) for any reason. Bycatch does not include incidental catch (non-targeted catch) if it is utilized, accounted for and/or managed in some way.

Pomfrets are primarily caught using pelagic longline gear by U.S.[4] and foreign-based vessels that fish in the central Pacific Ocean. In the longline fishery, interactions with a range of species, from endangered and protected sea turtles, seabirds, and marine mammals, to sharks and other fishes, occur regularly (Oravetz 1999; NMFS 2001; NMFS 2002). These non-target animals approach (or are attracted to) baited longline hooks and may become hooked or entangled in the gear, causing them to be injured or drowned (NMFS 2001). Interactions with sea turtles and seabirds occur more frequently with shallow-set techniques that target swordfish (5 - 60 m depth) than with deep-set techniques (15 – 180 m depth) that target tunas (Ito and Machado 2001; NMFS 2001), as the bait (usually squid) sinks more slowly and stays closer to the surface with shallow-set than with deep-set gear. Seabirds and sea turtles are more common in surface waters, consequently they are more vulnerable to interactions with these shallow-set longlines (Cousins 2001; Polovina et al. 2003). Interactions are also linked to the areas fished using the different gear types, as swordfish vessels primarily fish north of Hawaii (~ 22˚ N latitude), while tuna vessels primarily fish in waters south (~ 13˚ N latitude) of Hawaii[5]. Swordfish (shallow) sets are known to have bycatch rates as much as 10 times greater than tuna (deep) sets (Crowder and Myers 2001; NMFS 2001; Cousins et al. 2002), but mortality is thought to be less than deep-set fishing, since the hooks remain within reach of the surface, sometimes enabling a hooked/entangled turtle to breathe[6].

Bycatch Overview for the Hawaii-Based Longline Fishery

Data obtained from logbook reports, combined with observer coverage in the Hawaii-based fishery (starting in 1994), provide an indication of the historical extent of longline gear interactions with protected and other non-target species. Estimates of total take[7] in the Hawaii-based fishery indicate a large number of protected species interactions in the years preceding the closure of the swordfish fishery (1999-2000) (McCracken 2000). In the year 2000 (for seabirds) and 2001 (for sea turtles), takes dropped significantly, largely due to regulations prohibiting

[4] The U.S. Pacific pelagic longline fleet consists of vessels based in Hawaii (~ 100 active vessels in 2002), and American Samoa (~ 60 active vessels).
[5] Eric Gilman. 2003. Personal comm. Seabird Researcher. National Audubon Society, 2718 Napua'a Place, Honlulu, HI 96822.
[6] Yonat Swimmer. 2003. "Sea Turtles and Fisheries Interactions in the Pacific Ocean". Oral Presentation given at Pacific Fisheries Environmental Laboratory (NOAA), 8/19/03. 1352 Lighthouse Ave, Pacific Grove CA 93950-2097.
[7] McCracken (2000) defines take as "an interaction between an animal (e.g., sea turtle, seabird, marine mammal) and the fishing vessel or gear, and usually implies that the animal became entangled in the line or was caught on a hook" (p. 1).

swordfish-style longlining, as well as seasonal closures of fishing grounds south of Hawaii (see discussion under Criterion 5: Effectiveness of the Management Regime). Takes of marine mammals are less common, although rates of serious injury and mortality exceed Potential Biological Removal[8] (PBR) levels for one species, false killer whales (Carretta et al. 2002). Hawaii-based longliners also catch and land non-target pelagic fishes: 3 species of shark; 4 species of non-target scombrids (tunas); 6 species of non-target billfish; and 7 other non-target species are sold at the Honolulu fish auction[9]. Because these species are landed rather than discarded, Seafood Watch® does not consider them as bycatch.

Based on observed interactions, as well as population analyses of protected species, NMFS issued a Biological Opinion (March 2001) stating that U.S. Pelagic Fisheries of the Western Pacific Region were jeopardizing the long-term survival of green, leatherback, and loggerhead sea turtles (NMFS 2001). However, in the year 2000 (for seabirds) and 2001 (for sea turtles), takes dropped significantly, largely due to regulations prohibiting swordfish-style longlining. As requested by the Pacific Islands Area Office (PIAO) in October 2002, NMFS issued another Biological Opinion (released in November 2002) that analyzed the effects of current management measures (prohibition of swordfish sets and seasonal closures south of the islands in April/May) and stated that western Pacific pelagic fisheries were no longer jeopardizing the continued existence of sea turtles (NMFS 2002). A third biological opinion completed in February 2004 concluded that under the proposed new management measures, the shallow-set swordfish fishery is not likely to jeopardize the continued existence of any species listed under the Endangered Species Act (Federal Register 2004). Because seabirds are not listed under the Endangered Species Act (ESA), their population status and fishery effects were not analyzed in the February 2004 biological opinion. However, several environmental organizations filed a petition with the Fish and Wildlife Service in October 2004 to list the Black-footed albatross as threatened or endangered under the ESA. The International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species categorizes the Black-footed albatross as 'Endangered' due to the high mortality rates associated with bycatch in longline fisheries in the north Pacific (IUCN 2004). The Laysan albatross is considered 'Vulnerable' by the IUCN Red List (IUCN 2004).

On April 2, 2004, a Final Rule was issued to re-open the shallow-set Hawaii-based swordfish fishery with a number of conservation and management measures in place (Federal Register 2004). New management measures implemented in the April 2, 2004 Final Rule include: an effort limit on the number of shallow-sets north of the equator (2,120 shallow-sets per year); all shallow-sets made north of the equator must use circle hooks 18/0 or larger with a 10-degree offset, and may only use mackerel-type bait; shallow-sets made north of the equator must occur at night. There is also a limit on the number of allowable interactions with leatherbacks (16) and loggerheads (17) – if either of these limits is reached the shallow-set fishery is closed for the remainder of the year (Federal Register 2004). Additionally, NMFS intends to mandate 100-

[8] The Marine Mammal Protection Act (MMPA, 16 U.S.C. 1362 [20]) defines the PBR level as the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimum sustainable population.

[9] Chris Boggs. 2003. Personal commun. Chief Scientist. Pacific Islands Fisheries Science Center. National Marine Fisheries Service (NOAA). 2570 Dole Street, Honolulu Hawaii, 96822-2396.

percent observer coverage for the shallow-set component of the Hawaii-based longline fishery (Federal Register 2004). However, a suit was filed by several environmental groups on August 30, 2004 to close the swordfish fishery on the basis that re-opening the fishery was a violation of the Migratory Bird Treaty Act (MBTA), the ESA, and the National Environmental Policy Act (NEPA).

An experimental fishery conducted in the Atlantic over the past two years has shown that using the combination of 18/0 circle hooks and mackerel bait reduced loggerhead interactions by 91% and leatherback interactions by 67% (Watson et al. 2004). The experimental fishery took place in the Northeast Distant Waters statistical reporting zone in the western Atlantic Ocean. Within the experimental fishery, five potential mitigation techniques were evaluated (Figure 4) during 539 research sets in 2003. The results of 2003 research confirmed 2002 research results that found 18/0 circle hooks with both mackerel and squid bait significantly reduce both loggerhead and leatherback sea turtle interactions when compared with industry standard J hooks and squid bait. Also, circle hooks significantly reduced the rate of hook ingestion by the loggerheads, reducing the post-hooking mortality associated with interactions. Research conducted in 2003 found that 20/0 circle hooks were also effective in reducing both loggerhead and leatherback interactions but did not increase swordfish catch rates over the use of 18/0 circle hooks. Mackerel bait was found to be more efficient for swordfish than squid bait but the increase in swordfish catch with mackerel bait only occurred in waters cooler than 64° F. Circle hooks with squid bait were more efficient for tuna than J hooks, but mackerel bait was less efficient for tuna than squid bait (Watson et al. 2004).

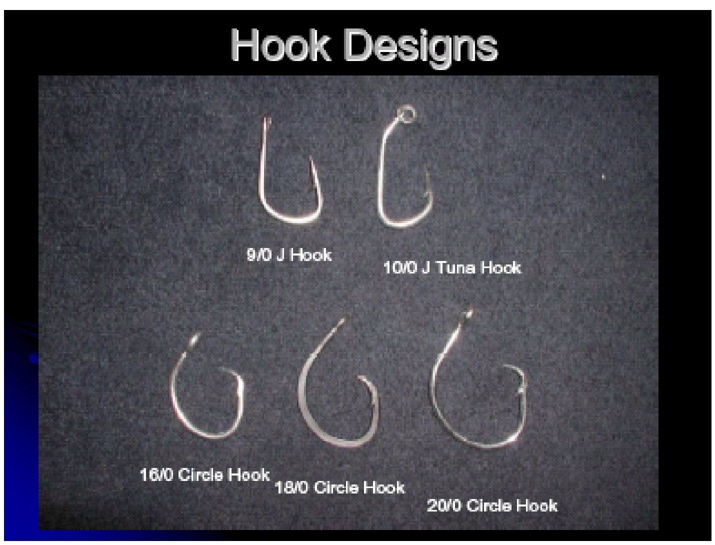

Figure 4. Control and experimental hook designs tested (Image from Watson et al. 2004).

Additional mitigation measures for avoiding seabird bycatch (i.e., side-setting) are still in the experimental stage and will therefore not be implemented fleet-wide. Therefore, seabird bycatch remains a high concern.

Bycatch Overview of the International/High-Seas Longline Fishery

Pelagic longline fleets operating in the central North Pacific originate from many nations[10] and provide little more than basic catch data to the international tuna management body for the central and eastern Pacific, the Inter-American Tropical Tuna Commission (IATTC). Comprehensive observer programs for international pelagic longline vessels in the Pacific are rare; most international observers are stationed on large tuna purse seine vessels and are charged with monitoring interactions between that fleet and dolphins (Bayliff 2001). Although more countries are beginning to collect bycatch data, it is generally not made available and therefore a thorough analysis of bycatch interactions by international vessels is difficult. In a recent paper, Lewison et al. (2004) quantified the incidental take of loggerhead and leatherback sea turtles on a global scale. By integrating catch data from more than 40 nations and bycatch data from 13 international observer programs, they estimated that over 200,000 loggerheads and 50,000 leatherback sea turtles were taken as bycatch in pelagic longline fisheries in the year 2000. Global estimates of seabird takes have also indicated a high conservation concern (Lewison and Crowder 2003). Lewison and Crowder (2003) estimated that total mortality of Black-footed albatrosses (*Phoebastria nigripes*) due to longline interactions in the central North Pacific may be as much as 10,000 individuals per year. In addition, it has been estimated that over 50 species of fish are incidentally caught in the tropical and sub-tropical waters of the western Pacific Ocean (Bailey et al. 1996), including 21 species of shark, 7 species of non-target scombrids (tunas), 6 species of billfish and 21 other fish species. Much of this catch is presumed to be marketable and is landed, although it is not well accounted for or managed collectively. As in the Hawaii-based longline fisheries, the non-marketable catch of endangered species, especially sea turtles and seabirds, is of major concern, and perhaps even more so, due to the sheer magnitude of the international fishery (~ 4,700 vessels) (NMFS 2001) and lack of consistent and enforceable regulations.

The majority of international longline vessels use deep-set rather than shallow-set gear (Skillman 1998; Uosaki and Bayliff 1999), as tunas are the primary target of most longlining, and tunas are caught at depths of 100 – 400 m (Uosaki and Bayliff 1999; Bayliff 2001; IATTC 2002). The Japanese fleet in particular is increasingly using deeper gear as the fishery continues to focus on the valuable bigeye tuna (*Thunnus obesus*)[11], which lives deeper than other tropical tunas (IATTC 2002).

Threatened Species Interactions

Marine Mammals

In the Hawaii-based longline fishery, reported and observed interactions with cetaceans (dolphins and whales) are generally low and usually result in the animal being released alive (NMFS 2003). However, one cetacean species, the false killer whale (*Pseudorca crassidens*), is presently categorized as a ‘strategic’ stock under the 1994 Marine Mammal Protection Act

[10] The largest fleets are from Japan, Taiwan (Republic of China), and Korea. Other major Pacific longlining nations include Philippines, Indonesia, Belize, and the U.S. (Cousins, NMFS FEIS, Bayliff 2001).
[11] Bayliff, W. 2003. Personal Commun. Director, Pelagic Fisheries, Inter-American Tropical Tuna Commission, 8604 La Jolla Shores Drive, La Jolla CA 92037-1508.

(MMPA), because the rate of serious injury and mortality in the Hawaii longline fishery exceeds the Potential Biological Removal (PBR) allowed under the MMPA (Carretta et al. 2002). The PBR level is "the maximum number of animals, not including natural mortalities, that may be removed from a marine mammal stock while allowing that stock to reach or maintain its optimal sustainable population" (Federal Register 2004). All marine mammals, regardless of whether or not they are listed under the ESA, are protected under the MMPA. According to the 2004 List of Fisheries, the Hawaii-based longline fishery is a Category I fishery; that is, "The annual mortality and serious injury of a stock in a given fishery is greater than or equal to 50% of the PBR level" (Federal Register 2004). The annual PBR for the Hawaiian stock of false killer whales is 0.8; since 2000 the estimate of mortality and serious injury of this species in the Hawaii-based longline fishery has exceeded the PBR every year (4.6 – 6.9 animals per year) (Caretta et al. 2004). Uncertainty in population size and stock structure of false killer whales make it difficult to evaluate population-level impacts of the fishery on this species[12]. Efforts are presently underway by NMFS to address these critical research needs (Carretta et al. 2002).

Two species of endangered whales, the humpback whale (*Megaptera novaeangliaei*) and the sperm whale (*Physeter macrocephalus*) have also been observed entangled in Hawaiian longline gear. In most cases, the whales are released alive with trailing gear still attached to the animal, and their fate is unknown. By analyzing the history of interactions between longline fisheries and endangered animals, NMFS concluded that current longline fisheries "are not likely to adversely affect these marine mammals (blue, fin, humpback, right, sei, or sperm whales, Hawaiian monk seal)" (NMFS 2002). Except for the Hawaiian population of false killer whales, interactions with marine mammals appear to be of minor concern. From April to June 2004, the Hawaii-based longline fishery interacted with one whale (unidentified species) which was released alive and uninjured (PIFSC 2004).

Seabirds

Of the many families of migratory birds inhabiting the Pacific Ocean, albatrosses (mainly Black-footed, *Phoebastria nigripes*; and Laysan, *P. immutabilis*) have been observed to frequently interact with western-central Pacific pelagic longline fisheries (NMFS 2001). The Black-footed and Laysan albatrosses are protected under the U.S. Migratory Bird Treaty Act (MBTA, 16 USC. 703 *et. seq*.). No endangered short-tailed albatrosses (*P. albatrus*) have been observed to interact with the Hawaii-based longline fishery (NMFS 2001; Cousins et al. 2002); this species is more often observed interacting with longline fisheries off Alaska. Black-footed and Laysan albatrosses, however, have their primary nesting grounds in the Northwestern Hawaiian Islands (NHI), and consequently do interact with pelagic longline fisheries around this area.

In addition to exhibiting the greatest number of gear interactions of any marine species, seabirds also experience the highest rate of mortality compared to sea turtles and mammals (Ito and Machado 2001). In 2000, for example, 70% of hooked albatrosses were reported dead upon retrieval; 13% were reported released alive but injured, and 16% were reported released alive in good condition (Ito and Machado 2001). In addition to those seabirds hauled on deck, approximately 30% of hooked seabirds fall off the hooks prior to being hauled on board and their fate is unknown[2]. In contrast to seabirds, only 15% of sea turtles (loggerhead, green, olive

[12] Karin Forney. 2003. Personal Commun. Scientist. NOAA/SWFSC. 110 Shaffer Road, Santa Cruz CA 95060.

ridley) were reported dead upon retrieval, while the rest were apparently released alive (Ito and Machado 2001).

Reported interactions with protected albatrosses in the Hawaii-based longline fishery have been relatively high throughout the last decade (Figure 5). Researchers estimate that between 1994 and 1999, an average of 1,330 Laysan albatrosses and 1,743 Black-footed albatrosses were killed in the Hawaii-based longline fishery each year (NMFS 2001). Starting in 2000, however, a sharp decrease in albatross takes was observed. In 2002, a total of 57 seabirds were reportedly caught, resulting in 43 deaths (entirely comprised of albatross spp.), 6 injuries (albatrosses), and 8 uninjured releases (4 albatrosses, 4 unidentified species) (NMFS 2003). These numbers represent approximately one quarter of the activity in the fishery (observer coverage for 2002 was 27.8%) and suggest that *total* takes were probably higher. From April to June 2004, the Hawaii-based longline fishery interacted with one bird (unidentified species) which was released dead (PIFSC 2004). These numbers demonstrate that seabird interactions have dropped precipitously since the mid-1990s. This drop is linked directly to the banning of shallow set techniques, which were used to primarily target swordfish, rather than tuna.

Longline gear modifications, such as dyed bait, bird-scaring devices (plastic streamers), modified hooks, and experimental underwater chutes for line deployment have also greatly reduced seabird bycatch when used (Boggs 2001). At present, these techniques are mostly experimental, but managers hope that fleet-wide implementation of these modifications will continue to reduce the take of all seabirds, and potentially bring the number of interactions to zero[13]. Recent research on the utility of these techniques provides evidence that seabird bycatch can be reduced significantly when this gear is implemented on a fleet-wide basis. Although some regulations are in use by Hawaii[2], full implementation of seabird mitigation measures has not yet occurred, and there appears to be no recognized international fleet effort to reduce seabird interactions.

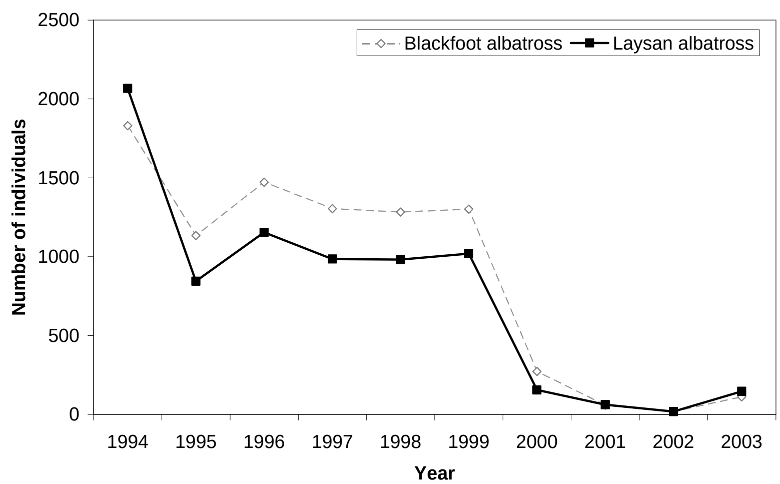

Figure 5. Estimated fleet-wide seabird takes in the Hawaii-based longline fishery, 1994-2003 (WPFMC 2004).

[13] Paul Dalzell. 2003. Personal Commun. Pelagic Director. WPRFMC, 1164 Bishop Street, Room 1400 Honolulu, Hawaii 96813.

Sea Turtles

Green, hawksbill, loggerhead, leatherback, and olive ridley turtles are highly migratory (or have a highly migratory phase in part of their life history), making them susceptible to incidental catch by fisheries operating throughout the Pacific Ocean. Loggerheads, for instance, travel across the Pacific to their nesting beaches in Japan and Australia, as well as utilize foraging habitat in the eastern Pacific (Polovina et al. 2000). The Hawaii-based longline fishery under the Pelagics FMP is historically known to interact with all of these sea turtle species except hawksbill turtles (NMFS 2001).

Populations of all Pacific sea turtle species, especially leatherbacks and loggerheads, have declined precipitously over the last two decades (Crowder and Myers 2001). Leatherbacks have declined worldwide, from 115,000 adult females in 1982 to 34,500 in 1994. In some areas such as Mexico and Costa Rica, nesting female leatherbacks have dropped from hundreds of thousands in the 1980s to only a few hundred in 1999 (Spotila et al. 2000). Similarly, nesting populations of loggerheads in the Pacific have declined 80 – 86% over the last 20 years (Kamezaki et al. 2003; Limpus and Limpus 2003).

All five species of sea turtles found in the Pacific are listed as 'Vulnerable' or 'Endangered' by the IUCN, and their classification status under the ESA is as follows:

Green turtle *(Chelonia mydas)*	Endangered/Threatened
Hawksbill turtle *(Eretmochelys imbricata)*	Endangered
Leatherback turtle *(Dermochelys coriacea)*	Endangered
Loggerhead turtle *(Caretta caretta)*	Threatened
Olive ridley turtle *(Lepidochelys olivacea)*	Endangered/Threatened[14]

The decline in Pacific Ocean sea turtle populations has been linked to both environmental and human-induced activity. In addition to anthropogenic factors such as harvesting of eggs and fishery-induced mortality, natural threats to nesting beaches and adult turtles are thought to affect the survival and recovery of sea turtle populations (NMFS 2002). Progress has been made in protecting eggs at nesting beaches and reducing nearshore fishing mortality of many species, but there continues to be a rapid decline in leatherback and loggerhead turtles at primary nesting sites in the Pacific[15]. Although there is uncertainty about the primary cause of decline for these species, the continued take of turtles each year in longline operations suggest that both domestic and international longline fisheries in the Pacific Ocean are contributing to the long-term decline in sea turtle populations (Crouse 1997; Spotila et al. 2000; Polovina et al. 2003; Lewison et al. 2004).

In Hawaii-based longline fisheries, the number of sea turtle mortalities for loggerhead and olive ridley turtles was historically high but has been reduced substantially since 2000, mainly due to the prohibition of swordfish-style longline fishing (Figure 6) (NMFS 2002). The take of

[14] The breeding populations of Mexico olive ridley turtles are currently listed as endangered, while all other ridley populations are listed as threatened.

[15] Selina Heppell. 2003. Personal Commun. Assistant Professor of Fisheries. Oregon State University. 126 Nash Hall, Corvalis OR 97331-3803.

leatherback and green sea turtles has remained low, with most animals being released alive (WPFMC 2003). Live releases, however, may seriously underestimate the actual observed deaths in sea turtles. Estimates of this additional indirect mortality of turtles hooked and released live ranges from 4 to 30% internationally[16]. Most of these indirect, delayed mortalities are caused by intestinal blockages from ingested monofilament line, rather than by metal hooks.

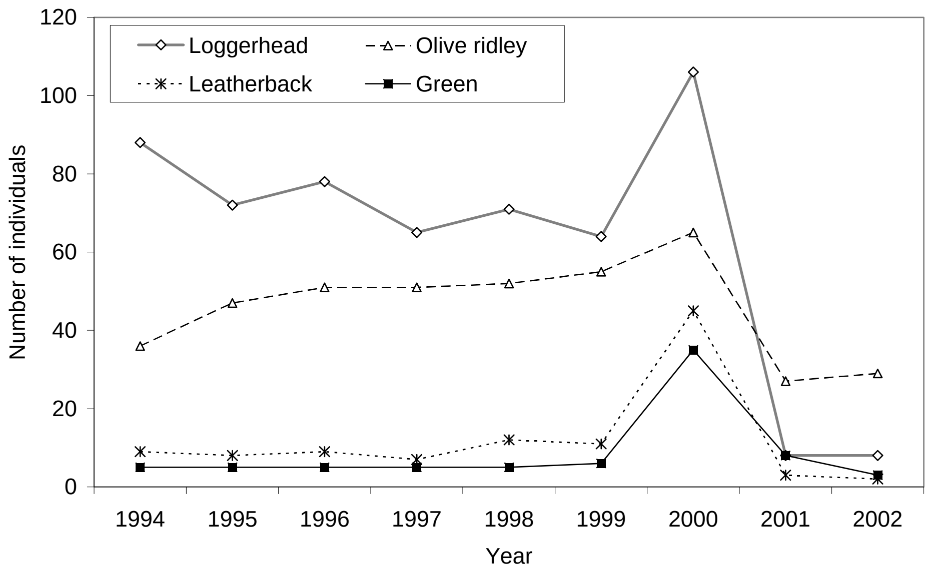

Figure 6. Estimated fleet-wide sea turtle mortality in the Hawaii longline fishery, 1994-2002 (WPFMC 2003).

Increased concern for the survival of sea turtle populations (and subsequent lawsuits stemming from public concern) has motivated U.S. fishery managers to actively reduce gear interactions and bycatch. The Hawaii-based longline fishery operates under management measures (described in the Preferred Alternative of the final Environmental Impact Statement (EIS) dated March 30, 2001), which were implemented to mitigate the adverse impacts of longlining on sea turtles (67 FR 40232, June 12, 2002). Observer data from the last three years indicates these management measures are working, and that bycatch is down substantially. Observed interactions decreased by an order of magnitude from the 1990s to 2001, the same year shallow-set swordfish longlines were completely prohibited. From April to June 2004, the Hawaii-based longline fishery released one dead olive ridley, and did not interact with any other sea turtle species (PIFSC 2004).

Sea turtle bycatch data from international longline fisheries are limited. A few studies, however, give some indication of overall bycatch rates. In the late 1980s, an observer-based study of the Spanish swordfish longline fleet in the Mediterranean found a turtle hook rate of 4.5 turtles per 1,000 hooks (NMFS 1993). Also in the late 1980s, scientists studying the Japanese tuna longline fleet worldwide estimated an incidental capture rate of 0.1 turtles per 1,000 hooks (NMFS 1993). At 350 million hooks per year (Uosaki and Bayliff 1999), an estimated 3,500 turtles may be taken each year in this fishery. Lewison et al. (2004) estimated that in the year 2000, there were

[16] Sloan Freeman. 2003. Personal Commun. Sea Turtle Researcher, Duke University, Beaufort, NC.

20,000 to 40,000 leatherback and 30,000 to 75,000 loggerhead sea turtles caught as bycatch in the Pacific Ocean alone. This research implies that a large number of interactions with protected species continue regularly with the international longline fleet, and jeopardize the continued survival of these endangered sea turtle species.

Sharks

Despite their known vulnerability to overfishing, sharks have been increasingly exploited in recent decades, both as bycatch, from the 1960s onward, and as targets in directed fisheries, which expanded rapidly beginning in the 1980s (Baum et al. 2003). Over twenty species of sharks are caught in the Hawaii-based longline fishery, but blue sharks (*Prionace glauca)* make up approximately 90% (in numbers) of the sharks caught (Haight and Dalzell 2000). Blue sharks were targeted for their fins up until 2000, when the practice of "finning", taking the shark's fins without retaining the carcass, was prohibited in U.S. waters, thus making the retention of this species uneconomical (the meat is inedible unless processed immediately). From 2000 to 2003, an average of less than 1% of the total blue shark catch was kept each year (Figure 7) (PIFSC 2004); in the first six months of 2004, only 434 of the 20,854 blue sharks caught by the Hawaii-based longline fishery were kept (PIFSC 2004). Although blue sharks are not protected under the Endangered Species Act, IUCN Red List of Threatened Species categorizes the blue shark as 'Lower Risk', but 'Near Threatened', as it is close to qualifying for the 'Vulnerable' category (IUCN 2004). The IUCN defines 'Vulnerable' as facing a high risk of extinction in the wild (IUCN 2004). Most other sharks caught in the Pacific are considered incidental catch and are not retained; the exceptions are thresher and mako sharks, whose meat has market value with no special processing required (NMFS 2003). Post-release mortality of discarded sharks is unknown.

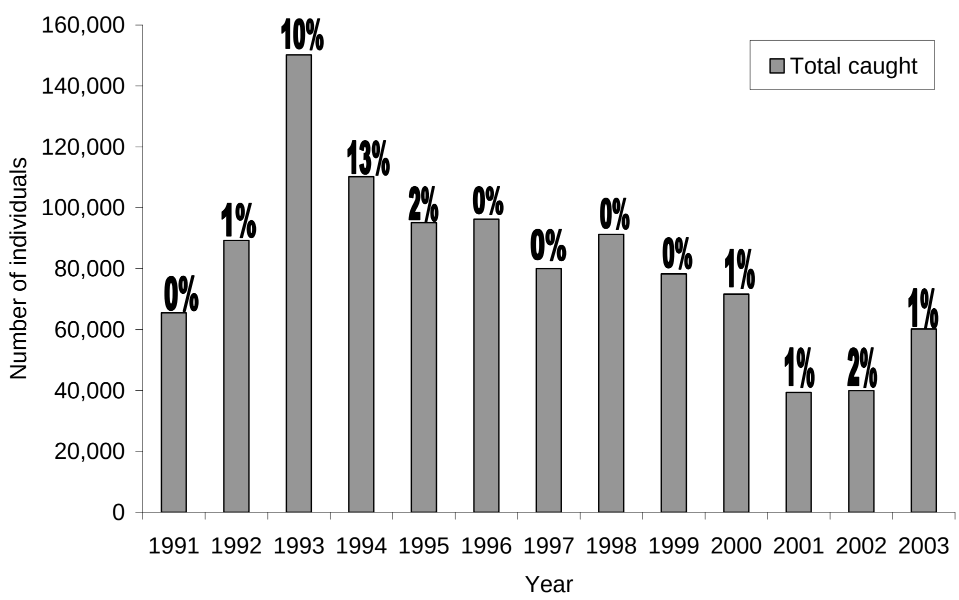

Figure 7. Total number of blue sharks caught, and percentages kept, by longline vessels landing or based in Hawaii from 1991 to 2003. The values over each bar are the percentages of blue sharks kept each year (PIFSC 2004).

Sharks caught incidentally in Pacific Ocean longline fisheries are not adequately managed by any government agency and therefore, very little information exists on their population biology and stock status. Other than the recent work relating the decline of Atlantic shark species by

Baum et al. (2003), very few data are available detailing the international exploitation of sharks, particularly in the Pacific. Earlier studies, such as those conducted by Nakano and Bayliff (1992) and Stevens (1996) suggest that high seas Pacific fisheries take millions of blue sharks each year, with unknown consequences to the population structure of that species. Estimates of CPUE for blue sharks caught in the Hawaii-based longline fishery have decreased from the 1991 – 2000 mean (NMFS 2003), and CPUE for other sharks has not been calculated. Given the observed declines in CPUE of heavily fished sharks in the Atlantic Ocean (Crowder and Myers 2001), and the fact that fishing pressure in the Pacific is greater than the Atlantic (52% of global fishing effort in 2000 was in the Pacific, 37% in the Atlantic, 11% in the Indian Ocean) (Lewison et al. 2004), it is reasonable to assume the incidental catch of many shark species in the Pacific may be having a negative influence on population levels. Estimates of annual fishing mortality ranges from 10 to 20 million blue sharks worldwide (IUCN 2004).

Population Consequences of Bycatch

When assessing the biological significance of fishery-induced mortality of protected or endangered species, it is necessary to have some estimate of total take across the species' known range. Although good records are available for Hawaii-based fisheries (over 20% observer coverage since 2001), few data are available for international fleets operating on the high seas, making these estimates extremely difficult to determine. The reporting of discarded catch in international fisheries is very poor (SPC 1996; Bayliff 2001; IFF2 2002). There are no observer requirements on other longline fleets in the eastern tropical Pacific, the area administered under the IATTC treaty (Bayliff 2001; IATTC 2001). In the western Pacific, observer activity on the longline vessels of certain nations has recently increased (e.g., SPC Fishery Monitoring Program, 2002) but overall coverage remains low and is not considered adequate to provide reliable indications of overall levels of bycatch and discards in the tropical waters of the western Pacific Ocean. There is a growing concern among the scientific and environmental community that the collective effect of bycatch in longline fisheries is seriously jeopardizing the long-term survival of many protected and endangered species[17].

Seabirds

Separating the effect of each fleet (Hawaii-based vs. international) on the long-term survival of highly migratory seabirds is a difficult task. Four important pieces of information are needed: species population size, distribution (and degree of overlap with fisheries), growth rate, and annual global mortality (both natural and anthropogenic). However, these parameters are seldom determined with a high degree of certainty. Nevertheless, seabird biologists estimated that as of 1999, there were 61,866 and 558,415 breeding pairs of Black-footed and Laysan albatrosses in the Pacific, respectively (Cousins et al. 2002). Based on these population estimates and known life history characteristics of the species, biologists from the Pacific Seabird Group made this statement:

[17] This statement is based on several conversations over the past 5 months with various researchers and scientists familiar with the longline bycatch problem, many of whom are already mentioned through "personal communication" citations throughout the text.

> In the absence of anthropogenic and catastrophic influences, the growth rate of the Black-footed Albatross population ranges between zero and 4%; if the total number of birds killed in the longline fishery each year is 1% of the total population, then the population growth rate will be reduced by more than 1%; and a total population of 300,000 birds can withstand, maximally, a loss of 10,000 birds per year to all mortality sources including natural and anthropogenic sources. Without a doubt, all of the modeling exercises indicated that a loss of, for example, 1% of the Black-footed albatross population had a fairly dramatic long-term effect on the population growth rate. (Cousins 2001; p.112)

Given this population estimate and a model for mortality effects, it may be possible to infer the effect of these fisheries on the populations of Black-footed and Laysan albatrosses. In their review of global pelagic longline fisheries, Crowder and Myers (2001) analyzed international catch data to estimate total fishing effort in the central north Pacific (CNP; 15° N – 50° N, 130° E – 110° W). They then estimated overall albatross (Black-footed and Laysan) mortality for a range of three scenarios, based on bycatch comparisons (higher, lower, and similar) with the U.S. fleet, for which bycatch information is readily available. They estimated an average of 7,200 Laysan and 7,340 Black-footed albatrosses are killed annually by the Japanese fleet, while the Taiwanese fishery takes 1,630 Laysan and 1,315 Black-footed albatrosses annually (this fleet sets fewer hooks in the north Pacific). Combined with estimates of take for the U.S. fleet (1,280 Laysan and 1,988 Black-footed albatrosses annually), approximately 5,000 to 18,000 Laysan and 6,000 to 16,000 Black-footed albatrosses are thought to be killed in the CNP annually (Crowder and Myers 2001). These numbers do not include the additional mortalities associated with marine debris and plastics associated with fishing gear or other human activities[18].

This range of overall fishery-induced mortality for the Black-footed albatross exceeds the 1% loss stated above as having a "fairly dramatic long-term effect on the population growth" (Cousins 2001). In fact, the range of take represents a 2 – 5% population loss, if the current population estimate of 300,000 birds is correct. This conclusion is based on data from the Hawaii longline fishery before shallow set techniques were banned and thus likely overestimates Hawaii's relative contribution to albatross mortality, however using this information, it can be concluded that the take of Black-footed albatrosses as of the year 2000 was negatively influencing the species' population growth. Hawaii's contribution to this total effect has clearly declined dramatically since then, and has remained relatively low through 2003. Continued reductions in seabird take, combined with a new population analysis indicating that Hawaii fisheries are no longer a contributing factor to seabird decline, would distinguish its impact from that of international longline vessels.

Sea Turtles

Limited and uncertain data exist on sea turtle bycatch in the international longline fishery and thus make difficult accurate predictions of the overall consequences of turtle take in the international fishery. However, the endangered or threatened status of all five species of turtles found in the Pacific indicates that even low levels of catch may not be sustainable. From 1990 through 2000, the combined fishing effort in the Pacific resulted in an estimated 23 – 33% annual mortality in leatherback populations (Spotila et al. 2000). Leatherbacks are thought to be

[18] Kathy C. Hopper. 2003. Personal Commun. Seabird Biologist. 5490 N. Turret Way, Boise, Idaho 83703.

able to withstand, at most, 1% annual human-caused mortality (Spotila et al. 2000). In the eastern Pacific, for Mexican and Costa Rican nesting females this means losses of no more than 30 individuals per year from the current population of 2,995 individuals. The western Pacific population of approximately 1,800 adult females could sustain a loss of no more than 18 individuals per year (Spotila et al. 2000). The "hard cap" for leatherback interactions in the recently opened Hawaii swordfish fishery is 16 animals; almost the entire estimate of mortality the population is able to withstand, according to Spotila et al. (2000).

Recent data on total sea turtle take suggests that turtle bycatch throughout the Pacific is a contributing factor in the long-term decline and potential extinction of this species. The enormous extent of international deep-set longlining in the Pacific (~ 7 million hooks, > 50% of total longline effort in 2000) (Lewison et al. 2004) means that, even with a lower rate of take in the Hawaii-based fishery, the overall removal of sea turtles from the population through all sources of fishery-induced mortality is still significant and likely unsustainable.

Sharks

As with seabirds and sea turtles, the impacts of longline fisheries on shark populations are not fully understood. The population consequences of bycatch for shark species in the Pacific is not well known, but the findings of Baum et al. (2003) in the Atlantic Ocean indicate caution is warranted for these highly vulnerable species.

Synthesis

The primary factors used by Seafood Watch® to evaluate the nature and extent of bycatch include: the diversity and volume (by weight or number) of discarded species; whether or not interactions occur with threatened or endangered species; the population consequences of those species interactions (takes and mortalities, given that post-release mortality is largely unknown); and the trend in discard rate as a consequence of management decisions. Regular interactions that are decreasing in frequency because of management measures are considered a 'Moderate' conservation concern if they are not thought to be contributing to the long-term decline of protected species, or a 'High' conservation concern if they are considered to be a contributing factor in declines of protected species populations. Regular interactions that are either unchanged or increasing in frequency and that are thought to be contributing to the long-term decline (and possible extinction) of protected species are ranked as 'Critical' and those species fished with methods involving such interactions receive an overall designation of 'Avoid'.

International longline fisheries (Pacific Ocean)

Because of limited data, it is extremely difficult to gauge the absolute magnitude of bycatch of endangered or protected species in international longline fishing operations or the consequences of this catch to species' populations. It is reasonable, however, to conclude that bycatch of protected species and other animals is likely much higher in the international fleet than in the Hawaii-based fleet based on size alone (~ 4,500 international vessels vs. ~ 150 U.S. vessels; WPFMC 2003). In addition, there is currently no collaborative effort by foreign countries to monitor, regulate, or mitigate bycatch. For international longline fisheries, therefore, Seafood

Watch® concludes that interactions regularly occur with protected sea turtles and seabirds. The population consequences of protected species interactions are thought to be a contributing factor in the long-term decline, and potential extinction, of sea turtles and seabirds. In addition, the bycatch of non-threatened species (including fishes and sharks) is thought to be high, with unknown impacts to some populations of these species. Seafood Watch® finds no reason to believe that the trend in overall bycatch rates has improved substantially in the international fishery and suspect it may become worse if overall longlining effort increases. This combination of factors results in a rank of 'Critical' for the Nature of Bycatch Criterion for the international longline fishery, and an overall rank of 'Avoid' for internationally-caught swordfish.

Hawaii-based longline fisheries
In contrast to the international longline fishery, observer data for the Hawaiian longline fishery are available to estimate overall takes and mortalities of protected species with some degree of confidence. This allows a more robust calculation of the absolute magnitude of interactions with protected species. It is clear that interactions before the year 2000 were high for both sea turtles and seabirds and were likely a contributing factor in the decline of these species. However, new management measures include: an effort limit on the number of shallow-sets north of the equator (2,120 shallow-sets per year); all shallow-sets made north of the equator must use circle hooks 18/0 or larger with a 10-degree offset, and may only use mackerel-type bait; and shallow-sets made north of the equator must occur at night. There is also a limit on the number of allowable interactions with leatherbacks (16) and loggerheads (17) – if either of these limits is reached the shallow-set fishery is closed for the remainder of the year (Federal Register 2004). Additionally, NMFS intends to mandate 100-percent observer coverage for the shallow-set component of the Hawaii-based longline fishery (Federal Register 2004). An experimental fishery showed that this combination of hooks and bait reduced loggerhead interactions by 91% and leatherback interactions by 67% (Watson et al. 2004). In summary, the population consequences of these interactions remain unclear and until new information is available, Seafood Watch® conservatively concludes that these interactions continue to contribute to the long-term decline of these highly migratory and highly threatened species. The Nature and Extent of Bycatch Criterion, therefore, ranks as 'High' for swordfish caught in the Hawaii-based longline fishery.

Analysis

1) Composition diversity of bycatch: Regular interactions with threatened, endangered or protected species
2) Bycatch population consequences: **Thought to have negative impact**
3) Bycatch/target species ratio: **Moderate**
4) Bycatch quantity trend: **Down**
5) Ecosystem effects: **Unknown**

Nature and Extent of Bycatch Rank:

Low ▇ Moderate ▇ **High** ▇ Critical ▇

Criterion 4: Effect of Fishing Practices on Habitats and Ecosystems

Fishing methods that come into physical contact with the seafloor or other critical habitat structures (seamounts, reefs, etc.) may inflict damage upon those areas and ultimately reduce the health of the habitat and ecosystem in which the targeted species lives. Due to the pelagic nature of the longline fishery in which monchong are retained, tangible habitat structure is unaffected. Because of this, WPRFMC has determined that there are no direct impacts on fishing habitat from longline fisheries (WPRFMC 1998). Lost gear may be a hazard to other species, but the magnitude originating from Hawaii-based vessels is thought to be negligible.

Besides the impact from lost fishing gear, fishing activities in general can produce various negative effects on the environment including lost oil, sewage, garbage and debris, and potential for habitat damage through anchoring and grounding. Therefore it is possible that, as with any fishery in the region, pelagic activities might increase the risk of environmental impact when added to other anthropogenic impacts. As with any fishery, impacts may occur through grounding, which can damage coral reef structure, release fuel and oil, and perhaps introduce alien species to a sensitive habitat.

Analysis

1) Area extent of fishing gear effects: **Limited**
2) Effect of fishing gear on habitat: **Minimal**
3) Resilience of habitat to disturbance: **High**
4) Evidence that removal of target species disrupts the food-web: **No**
5) Evidence that fish removal causes ecosystem changes: **No**
6) Evidence that the fishing method causes ecosystem changes: **Uncertain**

Synthesis

The type of gear used in the Hawaiian pelagic fishery is thought to have a minimal impact on the environment, and, because monchong is not landed in high numbers (relative to other commercially-important pelagic fishes), the effect of removal of monchong on the central Pacific pelagic ecosystem is probably minor.

Effect of Fishing Practices Rank:	**Benign**	Moderate	Severe

Criterion 5: Effectiveness of the Management Regime

Monchong is classified under "miscellaneous pelagics" managed through the 'Pelagic Fisheries of the Western Pacific Region' fishery management plan (FMP), which was first implemented in 1987 (WPRFMC 2002). This FMP applies to all pelagic fisheries that operate within the U.S. EEZ of the western Pacific (Fig. 7). The plan regulates the size of the U.S. longline fleet, and the potential for interaction between fishers and protected or endangered species, through limited entry permits for all commercial fisheries, gear modifications (to reduce bycatch), and time/area closures, such as the closure of a 50-mile radius around the Northwestern Hawaiian Islands (NWHI) to protect monk seal and nesting albatross populations.

In response to growing concern over protected species interactions, managers implemented an observer program (1994), which now attempts to cover 20% of longline trips. In addition, longline trips for swordfish were phased out beginning in 1999. Because of this measure, the number of seabird and sea turtle interactions in the longline fishery dropped dramatically during 2001 and 2002 (Sam Pooley. 2003. Personal commun. NMFS/SWFSC, 2570 Dole St, Honolulu, HI 96822-2396). In order to further mitigate bycatch interactions, NMFS has implemented provisions for the U.S. pelagic longline fleet. These regulations are explained in detail in the 'Record of Decision', authorized by NMFS (NMFS 2003d).

Although one of the objectives of the FMP is to gather biological information for all commercially important species, stock assessment information is currently lacking for many miscellaneous pelagic species, including monchong. Fishing for all species under the FMP, assessed or not, is allowed with no estimate of maximum sustainable yield (MSY) or a set quota. Without this estimate, management cannot determine the sustainability of the current catch rate.

Pelagic fishes, including monchong, are highly migratory and are caught in international waters by several countries, some with limited or no regulations. Although there are several international regulatory bodies working towards sustainable high seas fishing (Cousins et al. 2002), there is currently no international cooperation to conduct fisheries research and manage these stocks collectively (other than those attempting to manage tunas). The efforts of U.S./Hawaii-based fishers (~164 longline vessels) to reduce bycatch and conserve fish stocks may be undermined by international fishing effort (3,000+ vessels) on the high seas (Cousins et al. 2002).

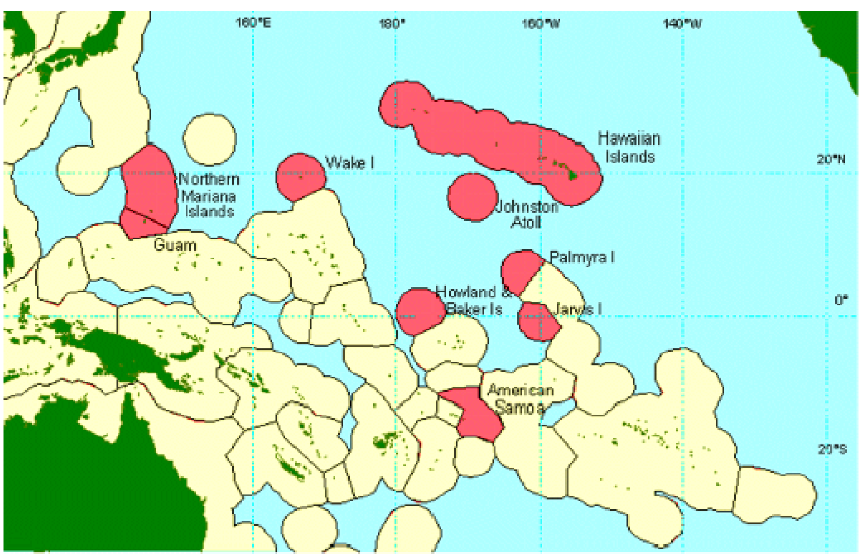

Figure 6. Exclusive Economic Zones (EEZs) of the Pacific Islands. WPRFMC managed areas are shaded. (Note: In some cases the boundaries shown here are provisional since not all of them have been legally delimited.) (Source: WPRFMC 1998, *in* NMFS 2001)

Analysis

1) Management implements stock assessments: **Incomplete**
2) Managements collects data for stock abundance analysis: **Mainly fishery-dependant data**
3) Management research plan seeks scientific knowledge on the short and long term status of the stock, and takes a precautionary approach regarding ecosystem impacts: **Yes**
4) Management acts in a timely fashion to ensure sustainability and minimize bycatch and habitat damage: **Yes**
5) Management implements a bycatch plan: **Yes**
6) Management routinely ignores scientific recommendations: **No**
7) Management enforces fishery regulations: **Yes**
8) Management track record**:** **Moderate**

Synthesis

Managers of the U.S.-led, Hawaii-based longline fleet compile landings and effort data, which provide some indication of trends in abundance. They have also attempted to mitigate interactions with endangered/protected species, resulting in reduced mortality of sea turtles and albatrosses over the last few years. Internationally, management and enforcement of regulations is lacking. Lack of information on stocks, including monchong, continues to prevent management from determining the sustainability of the current catch level.

Effectiveness of the Management Rank:

Highly effective | **Moderately effective** | Ineffective

Overall Evaluation and Seafood Recommendation

Pomfrets, known collectively as monchong throughout Hawaii, are widely distributed in the epipelagic waters of the world's oceans. However, because pomfrets are not currently targeted in any fishery, very limited biological and ecological information pertaining to these species is available. Therefore, the vulnerability of pomfrets to fishing pressure has not yet been determined and cannot be determined until their life history characteristics are understood. Their stock status in relationship to an overfishing threshold is currently classified as *unknown* by NMFS (WPRFMC 1998). In Hawaii, the CPUE of pomfrets remained stable from 1998 through 2001, which may indicate that the population is stable. As pomfrets are pelagic, the fishing methods utilized in their capture, pelagic longline and handline, do little to no damage to marine habitats, although their impact to ecosystems is not yet well understood. Longlining, however, is known to regularly result in the bycatch of threatened and endangered sea turtles and seabirds. The U.S. has taken management steps to decrease the extent of this bycatch, but the nature of the bycatch is still of concern in pelagic longline fisheries. The paucity of biological and stock status information, combined with the nature and extent of bycatch in longline fisheries, results in an overall seafood recommendation of Good Alternative for both sickle and lustrous pomfret caught in Hawaiian longline and handline fisheries.

Table of Ranks

	Conservation Concern			
Sustainability Criteria	Low	Moderate	High	Critical
Inherent Vulnerability		√		
Status of Wild Stocks		√		
Nature & Extent of Bycatch			√	
Habitat Effects	√			
Management Effectiveness		√		

Overall Seafood Recommendation:

Best Choice **Good Alternative** Avoid

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