

WORLDWIDE BYCATCH OF CETACEANS

An evaluation of the most significant threats to cetaceans, the affected species and the geographic areas of high risk, and the recommended actions from various independent institutions.

N.M. Young and S. Iudicello



U.S. Department of Commerce
National Oceanic and Atmospheric Administration
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A Report to the NOAA Fisheries Office of International Affairs

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July 2007**



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National Oceanic and Atmospheric Administration
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Worldwide Bycatch of Cetaceans

ANALYSIS AND ACTION PLAN



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of International Affairs

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With S. Iudicello and MRAG Americas

30 June 2007

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Hector's dolphin (*Cephalorhynchus hectori*) calf killed in gillnet, New Zealand.© WWF / Stephen Dawson

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EXECUTIVE SUMMARY

Humans have exploited cetaceans (whales, dolphins, and porpoises) since primitive whaling activities began in Japan and Scandinavia many centuries ago. The U.S. Ocean Commission in 2005 judged incidental catch in fisheries the “biggest threat to marine mammals worldwide . . . [killing] hundreds of thousands of them each year.” Fishing gear, especially gillnets, indiscriminately catches an undetermined number of marine species, including dolphins and porpoises. Still, progress on quantifying the scale of this mortality, identifying the magnitude of this threat, and mitigating or reducing the mortality has been slow, sporadic, and limited to a few specific fisheries or circumstances.

Cetaceans are “migratory.” They spend several months each year traveling from one area to another, often covering vast distances in search of food, a particular climate, or a safe breeding ground. From a conservation and management perspective migratory species are exposed to an array of threats because they do not confine themselves to one location. Moreover, because they periodically cross through a number of jurisdictions, the level of protection afforded to cetaceans fluctuates according to their geographical location. Inevitably, migrating animals will pass through jurisdictions where cetacean conservation is less of a priority than in other areas. The protection of small cetaceans has largely been left to the domestic regimes of coastal states, and a number of nations have enacted legislation to protect dolphins and porpoises—particularly Australia, New Zealand, the United Kingdom, and the U.S.

With bycatch a serious and widespread threat to cetaceans, there is an urgent need to better document the extent of this threat, assess cetacean populations, develop alternative fishing gear and practices and, at the same time, institute effective regional agreements that call for mitigation measures ranging from temporal and spatial closures to deterrents. There is also the need to foster greater engagement by inter-governmental bodies (e.g. Food and Agriculture Organization of the United Nations (FAO), the United Nations, and the International Union for the Conservation of Nature (IUCN)) as well as international regional fishery management bodies. Because it requires a country to outline specific measures to address bycatch, the FAO’s International Plan of Action model and resolutions adopted through regional fishery management organizations may provide useful mechanisms to address interactions between cetaceans and fisheries. Finally technology transfer is necessary to develop the scientific infrastructure necessary to monitor cetacean populations, fisheries, and any accompanying bycatch.

There are other recognized threats to cetaceans including toxic pollution, acoustic pollution, ship strikes, environmental change, global warming, and habitat degradation. The occurrence and effects of these threats are even more poorly documented than bycatch. With provisions in U.S. law and international attention turning toward cetacean bycatch, it is appropriate that the focus of this report is the assessment and mitigation of global cetacean bycatch. Any efforts to better document and mitigate bycatch will have collateral benefit to address other threats to cetaceans. Therefore, this report will evaluate the magnitude of the bycatch problem, the affected species and the geographic areas of high risk, and the recommended actions from various independent institutions. The report will describe the tools afforded through the MMPA and international agreements relevant to marine mammal conservation and bycatch; identify gaps in conservation and management efforts related to cetacean bycatch and identify opportunities for international action, cooperative research, and information exchange. The final element will prioritize and recommend strategic actions that NMFS’ Office of International Affairs can undertake to address the international cetacean bycatch threat.

Methodology

The report was completed under contract with the Office of International Affairs of the National Marine Fisheries Service (NMFS) of NOAA for a study that details steps it could take to engage foreign nations and multilateral organizations in reducing marine mammal bycatch. The project scope of work called for an evaluation of the most significant threats to cetaceans, the affected species and the geographic areas of high risk, and the recommended actions from various independent institutions. The report identifies gaps in conservation and management efforts related to threats to cetacean populations and opportunities for international action, cooperative research, and information exchange.

As a structure for examining bycatch of cetacean species, the report is organized geographically, using area designations similar to the Statistical Areas of the FAO. This alignment enables the analysis to overlay the activity of the principal fisheries of the world and the existence of multi- or bi-lateral agreements on areas of occurrence or migration of cetaceans. Following the first general geographic cut, the next level of focus is on populations that are affected by bycatch that represents more than 2 percent of the population. The next screen is for high-risk populations in areas where bycatch occurs in the absence of conservation measures, lack of enforcement of authorized measures, or lack of a policy framework for taking action. Where a policy framework is available, the analysis examines feasibility of implementing conservation measures and the likelihood of their success.

The investigation was undertaken primarily by a review of the scientific literature, but also included some follow-up personal contacts with key authors, managers and policy experts. The summary of legal instruments was conducted through examination of U.S. law and relevant international materials, particularly treaties summarized in 1997 by the U.S. Marine Mammal Commission in a *Compendium of Selected Treaties, International Agreements and Other Relevant Documents*. The analysis of potential tools examines the domestic and international framework available to the U.S., either unilaterally or multilaterally, to implement protection measures, initiate discussions or foster programs in high-risk areas. Exemplary agreements are discussed and similar regional schemes are listed in text boxes.

A comparison of the highest risk populations to agreements in place, parties to those agreements, and whether actions are being taken to reduce bycatch produced a gap analysis that highlights both gaps in information and mitigation measures. Recommendations were drawn from the literature, in response to the gap analysis, and from discussion with key authors, managers and policy experts. A ranking of the recommendations was completed by sorting possible actions according to the level of risk and potential benefit to cetacean species and examining the feasibility and likelihood of success of possible actions. This template for priority setting based on considerations of risk and feasibility results in recommendations for high, second-tier and low priority action options.

The Magnitude of Cetacean Bycatch

Through a review of the literature, several overarching themes or issues emerged. The first is the consistent need that permeates all species in all regions for cetacean abundance and bycatch estimates. Even though most species of cetaceans have been recorded at some time caught in some type of fishing gear, very few studies, with the exception of a few in the U.S., have successfully assessed and quantified the actual impact of a fishery or fisheries bycatch on cetacean populations. Part of the problem is that only a very small proportion of cetacean catches are ever actually recorded using some type of quantifiable process or an independent observer program. Consequently, the evidence for or estimates of bycatch tends to be anecdotal or non-quantitative, consisting of stranding reports, interviews, port monitoring, self-reporting by countries, and opportunistic observations by scientists and fishery observers. Such information can result in underestimates of bycatch. Also, estimates of total bycatch or bycatch rate are difficult to obtain, especially in developing countries where extensive coastal or artisanal fisheries account for most of the bycatch. Further compounding the problem is that in many regions of the world data generally are lacking statistics on fisheries catch, fishing capacity and fishing effort. Additionally, for most cetacean species, it is very difficult and costly to assess population size and trends or to assess the consequences of an uncertain and unpredictable bycatch rate. Adding to the intractability of this problem is the fact that where fisheries are coastal, local, or artisanal, international or even bi- or multi-lateral agreements do not provide mechanisms for action because these activities are solely within the purview of the coastal states. This problem is exacerbated in developing coastal states where fisheries management does not rank high as a national priority, and thus funds are frequently unavailable to undertake such assessments. Furthermore, reporting significant cetacean bycatch may be a low priority, or politically unacceptable, in countries where fishery development is considered vital for food security or maintaining the balance of trade.

There are large areas of the world where it seems likely there may well be interactions between cetaceans and fisheries, but for which there are, as yet, no data, and no idea of any impact that such fisheries may cause. This lack of information on the impacts of a fishery does not imply, however, that there is no problem, especially since reporting of just a few individuals in a specific fishery may be indicative of a larger interaction. Only when scientists can accomplish a detailed study of the cetacean stock abundance, the fishing effort, and the bycatch rate in each fishery can a thorough and accurate assessment be made.

Such assessments are integral to the development of long-term solutions to mitigate bycatch. Solutions to the problem of cetacean entanglement have been sought in several parts of the world with a variety of techniques. No universal solution to the problem has been found, but in one or two cases some reduction in the numbers of cetaceans caught in gillnets has been accomplished through gear modifications (e.g., rigging driftnets to fish a few meters below the surface or increasing twine size) or technological aids (e.g., pingers). Because banning the use of gillnets worldwide is not an option and site-specific gear prohibitions are not always effective, approaches will have to be found on a fishery-by-fishery basis, and such solutions should consider socio-economic alternatives (e.g., eco-tourism opportunities).

For several cetacean species—including the harbor porpoise, vaquita, Hector's and Maui's dolphin, finless porpoise, humpback and bottlenose dolphins, Irrawaddy dolphins, dusky dolphin, and Burmeister's porpoise—operational interactions with fisheries may threaten survival or recovery. In the report, the authors review by FAO statistical area the known fisheries interactions for species for which this interaction is either unsustainable (> than two percent of the population estimate) or may be approaching an unsustainable level (one to two percent of the population estimate). The material in boxes highlights those species that are considered a

priority for the Atlantic and Pacific, based on the level of incidental mortality. Chapter 2 of the report describes and highlights research needs that have been identified in the literature and by scientists and managers; offers preliminary recommendations for action in each area based on scientific data and available mitigation strategies (e.g., national laws, closed areas, or technological fixes); and provides a thorough analysis and review of the literature for all cetaceans incidentally killed in fisheries in each FAO statistical area. Appendix A provides a detailed listing of these findings.

Most notably, in almost all the statistical areas where studies have been conducted, large numbers of small cetaceans, especially coastally distributed species, are affected by coastal gillnet, purse seine, trawl, and trap fisheries. Major (in the top 20 for global, wild-capture landings) fisheries in the Atlantic include Atlantic herring, skipjack tuna, chub mackerel, Atlantic cod, Argentine shortfin squid, European pilchard, Gulf menhaden, European sprat, Atlantic mackerel, and European anchovy. Major fishing nations in the Atlantic are the U.S., Norway, Iceland, Denmark, Spain, and Canada. In the Atlantic Ocean, the major bycaught species and gear types in which this bycatch occurs are north Atlantic right whales off eastern North America, trap lines and gillnets; harbor porpoises in the North Sea, Celtic Sea, and Baltic Sea, gillnets; tucuxis in Caribbean coastal waters, gillnets; humpback dolphins in West Africa, coastal gillnets; sperm whales, striped dolphins, and short-beaked common dolphins in the Mediterranean, pelagic driftnets and gillnets; harbor porpoises in Black Sea, coastal gillnets; tucuxis in eastern South American coastal waters, gillnets; dusky and Commerson's dolphins in Argentina, coastal gillnets and midwater trawls and franciscanas in coastal gillnets.

Atlantic Species at Risk from Fishery Bycatch

- *Northwest Atlantic—Northern right whale*
- *Northeast Atlantic—harbor porpoise, common and striped dolphins*
- *Western Central Atlantic—tucuxi*
- *Eastern Central Atlantic—humpback dolphin*
- *Mediterranean and Black Sea—sperm whale, striped and common dolphins, harbor porpoise*
- *Southwest Atlantic—tucuxi, dusky and Commerson's dolphins, Franciscana*

Nine FAO statistical areas make up the Pacific region, including the Indian Ocean. Many areas in the Pacific are characterized by a lack of information about cetacean population size and incidental bycatch, making difficult an assessment of highest risk. Based on what is known about comparable fisheries and gear types elsewhere, it is likely that critical issues arise for a dozen species of marine and fresh water dolphins, three species of porpoise, and the false killer whale in the waters of 17 countries covering the entire Pacific Rim.

Developed nations such as the United States and Japan, as well as developing countries such as Natal and Sri Lanka, all have fisheries that interact with cetaceans. Challenges include gathering the most basic information on abundance and fishing effort to providing more complex technological solutions and implementation of action plans.

Major (in the top 20 for global, wild-capture landings) fisheries in the Pacific include Peruvian anchovy, Alaska pollock, skipjack tuna, chub mackerel, Japanese anchovy, Chilean jack mackerel, largehead hairtail, blue whiting, yellowfin tuna, capelin, Araucanian herring, and Akiami paste shrimp. Major fishing nations in the Pacific are China, Peru, Japan, Chile, U.S., Indonesia, Russian Federation, India, Thailand, Republic of Korea, Philippines, Malaysia, Mexico, Vietnam, and Taiwan. In the Pacific Ocean, the major bycaught species and gear types in which this bycatch occurs are Risso's dolphins in Sri Lanka, drift and set gillnets in combination with direct harpooning; bottlenose dolphins off the coast of Natal, South Africa, anti-shark gillnets, south coast of Zanzibar (Tanzania), drift and bottom-set gillnets; Indo-Pacific humpback dolphins in Natal (South Africa), anti-shark nets south coast of Zanzibar (Tanzania), drift and bottom-set gillnets, Madagascar and East Africa, coastal gillnets; Ganges river dolphins in India and Bangladesh, gillnets; Irrawaddy dolphins in Chilka Lake (India), gillnets, Bay of Bengal, heavy-mesh drift gillnets for elasmobranchs; Dall's porpoise in direct harvests and salmon driftnets off Japan and Russia; Finless porpoises in Korea and Japan, coastal nets and traps, in Inland Sea (Japan), gillnets, Yangtze River, gillnets and electrofishing; marine waters of China and Southeast Asia, coastal nets and traps; Baijis in China, electrofishing and rolling hooks; Spinner dolphins and Fraser's dolphins in the Philippines, driftnets for large pelagics and flying fish, purse seines for small pelagics; Irrawaddy dolphin (marine), Philippines, (matang quarto) crab nets; (freshwater) Mekong River, Mahakam River, Songkhla Lake, and Ayeyarwady River, gillnets; False killer whales, Hawaii, longlines; Vaquitas, Gulf of California (Mexico), gillnets; Hector's dolphins, North Island (New Zealand), coastal gillnets; Dusky dolphin, Peru, drift gillnets; Burmeister's porpoises, Peru, coastal gillnets.

Pacific Species at Risk from Fishery Bycatch

- *Northwest Pacific (including the Sea of Japan, East and South China Seas, Yangtze River)—finless porpoise, baijis, Dall's porpoise, finless porpoise*
- *Western Central Pacific (including Mekong River, Mahakam River, Songkhla Lake, and Ayeyarwady River) —spinner dolphin, Fraser's dolphin, Irrawaddy dolphin,*
- *Eastern Central Pacific—Vaquita and false killer whales ,*
- *Southwest Pacific--Hector's dolphin and Maui's dolphin*
- *Southeast Pacific—Dusky dolphin, Burmeister's porpoise*
- *Western Indian Ocean—Spinner, Risso's, bottlenosed and humpback dolphins*
- *Eastern Indian Ocean—Ganges and Irrawaddy river dolphins*

Tools for Action to Reduce Bycatch

U.S. law and policy provide mechanisms for action to reduce bycatch of cetaceans and other marine mammals in fishing operations. The Marine Mammal Protection Act, the Endangered Species Act and the Magnuson-Stevens Fishery Conservation and Management Act provide policy statements, action mandates and research direction for U.S. actions. The MMPA, and more recently the M-SFCMA also direct U.S. managers to work in the international arena to protect marine mammals.

The Marine Mammal Protection Act of 1972 (MMPA) contains international sections that provide tools to address international threats to cetaceans. The MMPA requires the Secretary of Commerce or the Secretary of the Interior, working through the Secretary of State, to negotiate agreements with other nations to protect and conserve marine mammals. The act's international provisions are particularly strong in the area of bycatch and provide the U.S. with the tools to take a leadership role in initiating negotiations with all foreign governments engaged in commercial fishing found to be unduly harmful to any species or population stock of marine mammal and in developing bilateral and multilateral treaties with such countries to protect marine mammals. However, the U.S. has rarely applied these measures nor has it taken actions to reduce cetacean bycatch or to protect ecosystems abroad.

In 2006, the Congress reauthorized provisions of the Magnuson-Stevens Fishery Conservation and Management Act (M-SFCMA), the law governing how the U.S. manages fisheries within its EEZ. The reauthorization also directed substantial attention on fishing issues outside U.S. waters, particularly illegal, unregulated and unreported fishing (IUU) and bycatch. Although aimed primarily at strengthening U.S. leadership in international conservation and management of fisheries for purposes of leveling the playing field between the U.S. fleet and those of other nations, the new provisions have strong bycatch language calling for measures comparable to U.S. policy.

The international title of the reauthorization creates a new section in the M-SFCMA authorizing the Secretary to promote improved monitoring and compliance for high seas fisheries or fisheries governed by international or regional fishery management agreements. The provisions call for improved communication and cooperation among law enforcement organizations, an international monitoring network, an international vessel registry, remote sensing technology, technical assistance, and a listing and certification process to decide whether sanctions should be applied to nations that participate in IUU fishing or do not reduce bycatch of protected living marine resources.

The U.S. is party to numerous international agreements related to cetacean protection as well as to fishery agreements that have bycatch-reduction provisions. Another source of authority for action or diplomatic initiatives arises from the numerous regional agreements to which the U.S. is party. Finally, the increasing role of regional fishery management organizations in reaching out to both coastal states and fishing nations, whether they are contracting parties or not, may provide an additional venue for discussion of cetacean bycatch in fisheries.

The global framework for conservation of living marine resources includes agreements that apply to all the seas, some that cover specific seas or regions, and some that govern ocean areas that are used by numerous coastal and flag nations. Fishery conservation agreements, particularly those that create new regional fishery management organizations (RFMOs) have potential to prevent bycatch of non-target species and protected species in the course of fishing. The report examines the emergence of an increased role for regional fishery management organizations in bycatch reduction. This report summarizes relevant and applicable examples in

key regions, concentrating on a few international tools and the agreements that relate to the “hot spots,” or areas where the most significant incidental bycatch require urgent action.

International agreements examined include the International Convention for the Regulation of Whaling, the Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or Bonn Convention) and the Convention on International Trade in Endangered Species among others. Under the auspices of the Bonn Convention, parties have negotiated additional regional agreements such as the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas, the Agreement on the Conservation of Cetaceans of the Black Sea, and the Mediterranean Sea and Contiguous Atlantic Area. The report describes and posits options for action under regional measures such as the UN Regional Seas Programme and specific area protocols that are relevant to cetacean conservation. In addition to wildlife, environmental and specific marine mammal conventions, treaties that govern fisheries can be brought to bear on cetacean bycatch problems.

Attempts at widespread international agreement on fishery management were unsuccessful until the 1982 United Nations Conference on the Law of the Sea (UNCLOS III). With it came recognition of the extension of coastal state jurisdiction to 200 miles, and for the first time, the freedom of fishing on the high seas was circumscribed. Article 56 of the Convention gives coastal states sovereign rights over resources out to 200 miles. (UNCLOS III) This includes the authority to conserve and manage living resources. The UN Law of the Sea, and measures that flow from it, such as the voluntary Code of Conduct for Responsible Fisheries and the Straddling Stocks agreement provide numerous alternatives for tackling cetacean bycatch, such as General Assembly resolutions or creation of new regional management authorities, including ones that may be specific to cetacean conservation.

Exemplary regional authorities discussed include the Northwest Atlantic Fisheries Organization, the International Convention for the Conservation of Atlantic Tunas, Convention on the Conservation and Management of Fishery resources in the Southeast Atlantic Ocean, the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean, and the Convention for the Conservation of Antarctic Marine Living Resources. In addition to treaties and other legal instruments, tools such as information exchange, training and technical assistance, gear workshops, professional exchanges and other capacity building activities can contribute to reducing cetacean bycatch.

Analysis

The analysis examines problems by region. It sets out species at risk, gaps in abundance and bycatch information, gaps in management frameworks and gaps in implementation or enforcement of existing measures. The table below illustrates the gaps in elements critical to conservation.

AREA/ SPECIES	ABUND.EST.	Recent Update	BYCATCH ESTIMATE/ % POP. AFFECTED	Bycat > 2%	STATUS ¹			AGRMNT. IN PLACE? Int'l/ Regl/Bilat	PARTIES ² Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEMENT Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
ATLANTIC OCEAN, MEDITERRANEAN & BLACK SEAS										
AREA 21-NORTHWEST ATLANTIC										
<i>PHOCOENA PHOCOENA</i> - HARBOR PORPOISE										
Gulf of Maine/Bay of Fundy	89,700		55/year (2000- 2004)		NE (VU- over all)		II	BILAT	US- Canada	Pingers
<i>EUBALAENA GLACIALIS</i> NORTHERN RIGHT WHALE										
	300		1.2/year		E	I & II	I & II	BILAT	US- Canada	
AREA 27-NORTHEAST ATLANTIC										
<i>PHOCOENA PHOCOENA</i> - HARBOR PORPOISE										
Northern and Central North Sea	61,335		2,700/4.1%		VU		II	Reg	CS/FS/PS	
Kattegat and Oeresund	36,046 (20,276- 64,083)		83/0.2%		VU		II	Reg	CS/FS/PS	
Skagerrak	4,738		114/2.4%		VU		II	Reg	CS/FS/PS	Pingers
Kattegat	4,009		50/1.2%		VU		II	Reg	CS/FS/PS	
Kiel & Mecklenburg Bight	588 (240- 1,430)				VU		II	Reg	CS/FS/PS	

¹ For IUCN Red List, Categories are: LC, Least Concern; LR, Lower Risk, NT Near Threatened; NE, Not Evaluated; DD, Data Deficient; VU, Vulnerable; EN, Endangered; CR, Critically Endangered. LR/cd, Conservation Dependent (cd). Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years. If listed on CITES, the Appendix is indicated as I, II or both. For the Convention on Migratory Species, Appendix II listings are shown.

² The parties to the international, regional and bi-lateral agreements discussed in Chapters 4 and 5 and summarized in this table are listed in Appendix B.

AREA/ SPECIES	ABUND.EST.	Recent Update	BYCATCH ESTIMATE/ % POP. AFFECTED	Bycat > 2%	STATUS ¹			AGRMNT. IN PLACE? Int'l/ Regl/Bilat	PARTIES ² Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEMENT Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
Southwestern Baltic proper	599 (200- 3,300)		13/2.1%		VU		II	Reg	CS/FS/PS	
Northern North Sea	98,564 (66,679- 145,697)		5,000/5%		VU		II	Reg	CS/FS/PS	Pingers (DMK) gillnet fishery Aug - Oct
Southern & Central North Sea	169,888 (124,121- 232,530)		7,493/4.3%		VU		II	Reg	CS/FS/PS	
Celtic Sea	36,280 (12, 828- 102,604)		2,200/6.2%		VU		II	Reg	CS/FS/PS	
North Sea	268,800		3,410/1.3%		VU		II	Reg	CS/FS/PS	
DELPHINUS DELPHIS-COMMON DOLPHINS										
Celtic Sea	75,449 (22,900 - 284,900)				LC	nl	II	Reg	CS/FS/PS	
Bay of Biscay	61,888 (35,461 - 108,010)		410-419 /0.67%		LC	nl	II	Reg	CS/FS/PS	Driftnet fishery banned
Celtic Sea & Western Waters	101,205 (55,125 - 185,802)		356-8353 614-2005/ 0.6-1.1%		LC	nl	II	Reg	CS/FS/PS	
STENELLA COERULEOALBA-STRIPED DOLPHINS										
Bay of Biscay	73,843		1193-1526 /1.6-1.56%		LR/cd	nl	II	Reg	CS/FS/PS	
Celtic Sea & Western Waters	66,825		136-5287 448/ 0.27- 0.79%		LR/cd	nl	II	Reg	CS/FS/PS	
AREA 31-WESTERN CENTRAL ATLANTIC										

AREA/ SPECIES	ABUND.EST.	Recent Update	BYCATCH ESTIMATE/ % POP. AFFECTED	Bycat > 2%	STATUS ¹			AGRMNT. IN PLACE? Int'l/ Regl/Bilat	PARTIES ² Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEMENT Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
SOTALIA FLUVIATILIS TUCUXI										
Cananea estuary	156-380 No estimate for rest of range				DD	I&II	II	Reg	CS (US)	Marine Mammal Action Plan under SPAW Protocol
AREA 34-EASTERN CENTRAL ATLANTIC										
SOUSA TEUSZII-ATLANTIC HUMPBACK DOLPHIN										
Dakhla Bay	Considered small				DD	I&II	II	Int'l/Reg	CS	
Parc National du Banc d' Arguin in Mauritania.	Considered small				DD	I&II	II	Int'l/Reg	CS	
Saloum delta, Senegal	100				DD	I&II	II	Int'l/Reg	CS	
Canal do Geba-Bijagos	< 1,000 animals				DD	I&II	II	Int'l/Reg	CS	
South Guinea					DD	I&II	II	Int'l/Reg	CS	
Cameroon					DD	I&II	II	Int'l/Reg	CS	
Gaboon Estuaries					DD	I&II	II	Int'l/Reg	CS	
Angola	Considered small				DD	I&II	II	Int'l/Reg	CS	
AREA 37-MEDITERRANEAN AND BLACK SEA										
STENELLA COERULEOALBA – STRIPED DOLPHINS										
Alboran Sea	14,736 (6,923 – 31,366)		145- 201/1.2%		LR/cd	nl	II	Int'l/Reg	CS/FS/PS	Swordfish driftnet fishery banned
Corsican/Ligur ian Sea	25,614 (15,377 – 42,685)		51-326 (+/- 146) 0.19 – 1.3%		LR/cd	nl	II	Int'l/Reg	CS/PS	Swordfish driftnet fishery banned
Western Mediterranean	117, 880 (68,379- 214,800)		14- 15/0.006%		LR/cd	nl	II	Int'l/Reg	CS/FS/PS	

AREA/ SPECIES	ABUND.EST.	Recent Update	BYCATCH ESTIMATE/ % POP. AFFECTED	Bycat > 2%	STATUS ¹			AGRMNT. IN PLACE? Int'l/ Regl/Bilat	PARTIES ² Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEMENT Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
DELPHINUS DELPHIS -COMMON DOLPHINS										
Alboran Sea	14,736 (6,923 – 31,366)		145- 201/1.2%		LC	nl	II	Reg	CS/FS/PS	Swordfish driftnet fishery banned
PHYETER MACROCEPHALUS—SPERM WHALE										
Mediterranean			7-14/year		VU	I	II	Reg	CS/FS/PS	Swordfish driftnet fishery banned
PHOCOENA PHOCOENA – HARBOR PORPOISE										
Azov Sea in total	2,922 (1,333–6,40 31)				DD		II	Reg	CS/FS/PS	
Kerch Strait	54 (12–245)				DD		II	Reg	CS/FS/PS	
NW, N and NE Black Sea within Ukrainian and Russian territorial waters	1,215 (492–3,002)				VU		II	Reg& Nat (EC Direct.)	CS/FS/PS	
SE Black Sea < Georgian terr waters	3,565 (2,071–6,13 7)				VU		II	Reg	CS/FS/PS	
Central Black Sea> waters Ukraine/Turke y	8,240 (1,714–39,6 05)				VU		II	Reg	CS/FS/PS	
AREA 41-SOUTHWEST ATLANTIC										
SOTALIA FLUVIATILIS-TUCUXI										
Cananéia estuaryBrazil	156-380				DD	I&II	II			
Southwest Atlantic			141		DD	I&II	II			
LAGENORHYNCHUS OBSCURUS – DUSKY DOLPHIN										
Patagonian coast	7,252		70-200/ 100		DD	nl	II			

AREA/ SPECIES	ABUND.EST.	Recent Update	BYCATCH ESTIMATE/ % POP. AFFECTED	Bycat > 2%	STATUS ¹			AGRMNT. IN PLACE? Int'l/ Regl/Bilat	PARTIES ² Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEM Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
coast			.96%-2.7%							
Punta Ninfas and Cabo Blanco, Argentina	6,628				DD	nl	II			
<i>CEPHALORHYNCHUS COMMERSONII</i> – COMMERSON'S DOLPHIN										
Southwest Atlantic	21,000		141-212/ .67%-1.0% 25-170/ .1%-.8%		DD	nl	I			
Tierra del Fuego	14,000		5-30/.03%- .2%		DD	nl	I			
<i>PONTOPORIA BLAINVILLEI</i> FRANCISCANA										
FMA I			110		DD	nl	I&II			
FMA II			375		DD	nl	I&II			
FMA III	42,078 (33,047 – 53,542)		1,374 (694- 2,215) 3.2%		DD	nl	I&II			
FMA IV	34,131 (16,360- 74,397)		651 (398- 1097) 1.9%		DD	nl	I&II			

PACIFIC AND INDIAN OCEANS

AREA 51 – WESTERN INDIAN OCEAN

SOUSA CHINENSIS – INDIAN HUMPBACK DOLPHIN

Natal coast	200		7.5/3.75%		DD	I&II	II	Reg	CS/FS	
Zanzibar (Tanzania)	71		5.6%		DD	I&II	II	Reg	CS/FS	
<i>TURSIOPS TRUNCATES</i> – BOTTLENOSE DOLPHINS										
Indian Ocean coast south of Natal SAfrica	250		20-23/8- 9%		DD		II	Reg	CS/FS	

AREA/ SPECIES	ABUND.EST.	Recent Update	BYCATCH ESTIMATE/ % POP. AFFECTED	Bycat > 2%	STATUS ¹			AGRMNT. IN PLACE? Int'l/ Regl/Bilat	PARTIES ² Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEMENT Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
Indian Ocean coast north of Natal S Africa	1,000		11-14/1- 1.4%		DD		II	Reg	CS/FS	
<i>TURSIOPS ADUNCUS</i> – BOTTLENOSE DOLPHINS										
Zanzibar (Tanzania)	161		8%				II	Reg	CS/FS	
<i>GRAMPUS GRISEUS</i> – RISSO'S DOLPHIN										
Western Indian Ocean	5,500 to 13,000		1,300/24% - 10%		DD		II	Reg	CS/FS	
AREA 57 – EASTERN INDIAN OCEAN										
<i>ORCAELLA BREVIROSTRIS</i> – IRRAWADDY RIVER DOLPHIN										
Chilka Lake, India	20-30				DD		II	Reg	CS/FS	
<i>PLATANISTA GANGETICA</i> GANGES RIVER DOLPHIN.										
Ganges River	600-700				EN	I&II	I&II	Reg	CS/FS	
AREA 61 – NORTHWEST PACIFIC										
<i>PHOCOENOIDES DALLI</i> – DALL'S PORPOISE										
Western N Pacific	141,800		643- 4,187/0.4- 3.0%		LR		II	Reg	CS/FS	
<i>NEOPHOCAENA PHOCAENOIDES</i> – FINLESS PORPOISE										
Inland Sea Japan	4,900		84/1.7%		DD EN	I&II	II	Reg	CS/FS	
<i>LIPOTES VEXILLIFER</i> - BAIJI										
Yangtze	100-300		5/1.6- 5.0%		CR	I&II				
AREA 71 – WESTERN CENTRAL PACIFIC										
<i>TURSIOPS ADUNCUS</i> – BOTTLENOSE DOLPHINS										
Northern Australia	700-1000		1700		nl	nl	II	Int'l/Reg	CS/FS/PS	
<i>STENELLA LONGIROSTRIS</i> – SPINNER DOLPHINS										
Northern Australia			1000		LR	nl	II	Int'l/Reg	CS/FS/PS	
Sulu Sea	30,000		1,500- 2,000/5		LR	nl	II	Int'l/Reg	CS/FS/PS	

AREA/ SPECIES	ABUND.EST.	Recent Update	BYCATCH ESTIMATE/ % POP. AFFECTED	Bycat > 2%	STATUS ¹			AGRMNT. IN PLACE? Int'l/ Regl/Bilat	PARTIES ² Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEMENT Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
			3,000/5-10%							
LAGENODELPHIS HOSEI—FRASER'S DOLPHIN										
Eastern Sulu Sea	8,700				DD	nl	II	Int'l/Reg	CS/FS/PS	
SOUSA CHINENSIS—INDO-PACIFIC HUMPBACK DOLPHIN										
Northern Australian—Central Section Great Barrier Reef	200		11-100/5.5-50%		DD	I&II	I	Int'l/Reg	CS/FS/PS	
ORCAELLA BREVIOSTRIS – IRRAWADDY (SNUBFIN) DOLPHIN										
Mahakam River, Indonesia	34-50		3/6-8%		CR		II			
Malampaya Sound, Palawan Philippines	77		2-5/2.5-6.5%		CR		II			
Mekong River	69		4/5.8		CR		II			
AREA 77 – EASTERN CENTRAL PACIFIC										
PSEUDORCA CRASSIDENS – FALSE KILLER WHALES										
Hawaiian stock	236		4-6/1.6-2.5%					Reg'l/Nat'l	FS (US)	
PHOCOENA SINUS – VAQUITA										
	567		35-39/6.2-6.9%		CR	I&II		BilatUS/Mex	CS/FS(US)	Biosphere reserve
AREA 81 – SOUTHWEST PACIFIC										
CEPHALORHYNCHUS HECTORI – HECTOR'S DOLPHIN										
South Island east	1,900		16/.8%		EN			Nat'l	CS	Sanctuary regs, voluntary pingers
South Island west	5,400							Nat'l	CS	Regs, pingers
CEPHALORHYNCHUS HECTORI MAUI – MAUI'S DOLPHIN										

AREA/ SPECIES	ABUND.EST.	Recent Update	BYCATCH ESTIMATE/ % POP. AFFECTED	Bycat > 2%	STATUS ¹			AGRMNT. IN PLACE? Int'l/ Regl/Bilat	PARTIES ² Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEMENT Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
North Island	100-150		3/3-2%		CR			Nat'l	CS	Protected area
AREA 87 – SOUTHEAST PACIFIC										
<i>LAGENORHYNCHUS OBSCURUS</i> – DUSKY DOLPHIN										
			500-1,800		DD		II	Nat'l/Reg	CS/FS	
<i>PHOCOENA SPINIPINNIS</i> – BURMEISTER'S PORPOISE										
			450-200		DD		II	Nat'l	CS/FS	

Following the problem assessment by region, the next step of the analysis examines actions that could be taken under a variety of mechanisms: U.S. law, agreements to which U.S. is a party, and areas with potential for negotiation of amendments to existing treaties or development of new instruments. In addition, the report examines actions the U.S. could pursue outside the legal and diplomatic arena, using grants programs, technology transfer, incentives, partnerships with the private and non-governmental organization sectors, and employing its convening power to foster information exchange.

Recommendations

Throughout this report the authors identify a combination of research needs and recommendations for agency action. With more than twenty recommendations provided in Chapter 6, but limited agency resources, priority setting is needed. While recognizing that there will be agency considerations, budget and policy guidance and diplomatic opportunities that will arise and that cannot be predicted here, the authors attempted to rank the recommended actions by using a set of scoring criteria.

The first overarching criterion analyses the level of risk to the population and the conservation benefit of implementing a particular recommendation. The subcriteria ask whether the recommendation:

1. Assists a critically endangered species;
2. Assists a species at risk (listed under the IUCN Red List);
3. Addresses unsustainable bycatch;
4. Aids a trans-boundary species;
5. Will help meet a critical research need (e.g., provide information on cetacean abundance or bycatch estimates).

The second overarching criterion evaluates the ease and effectiveness of implementation. The subcriteria query whether legal frameworks and capacity to implement mitigation measures exist:

1. Regional agreement is in place that can be used to implement the recommendation;
2. Bilateral agreement is in place that can bring about prompt action;
3. National legislation is in place that either requires enforcement or modification to strengthen conservation requirements;
4. Mitigation strategies or possible solutions are available to be used or tested;
5. Institutional capacity is such that intervention is feasible.

Each recommendation was analyzed, and a point value assigned based on the number of subcriteria that it satisfied. The results of that evaluation are graphed and summarized Chapter 7 (Table 7.1).

Top Priority

Ten recommendations fall within the Top Priority. Four of these can be categorized as bilateral negotiations that are either ongoing or should be initiated. They are the US/Mexico (MexBi) bilateral, the US/Canada bilateral (CanBi), negotiations related to Pelly Certification of Italy and other Mediterranean nations for the use of driftnets (MedDrift), and the initiation of bilateral negotiations (possibly in response to an MMPA Section 101 Pelly petition) with Peru to reduce cetacean bycatch and bring about greater enforcement of its national laws. The Canada, Mexico, and Mediterranean driftnet negotiations all have a lengthy history but joint efforts to take the necessary action to begin to resolve the bycatch problems have been slow. With additional effort substantial progress could be made to reduce cetacean bycatch through these negotiations over the next one to two years. The same is true if the Office of International Affairs initiated discussions with Peru similar to those that it has undertaken with Chile to reduce cetacean harvests. Peru has both the legal framework and the scientific infrastructure in place to better assess cetacean abundance and bycatch and to control it.

Three recommendations that occur in the Top Priority fall under actions that can be taken to reduce cetacean bycatch under existing multi-lateral agreements and will likely require two to three years of effort to achieve progress. These are: the Northwestern Atlantic Fisheries Organization (NAFO); Western Central Pacific Fisheries Commission (WCPFC); and a subset of the Western Central Pacific tuna/dolphin interactions. NAFO and the WCPFC have recently adopted resolutions to assess and mitigate sea turtle bycatch in longline and purse seine fisheries. In these agreements the Office of International Affairs can put forward a resolution (see example Appendix C) that calls upon member nations to estimate cetacean stock abundance and bycatch within their waters and to report the results of their findings back to the Secretariat of that particular agreement. It also could call upon member nations to take action where possible to reduce cetacean bycatch. The purpose of such a resolution is to use existing multilateral fisheries commissions or agreements as a mechanism to gather and share scientific information and to work collaboratively on techniques to reduce cetacean bycatch. In the situation where interactions are either suspected or scantily documented between purse seine fishing vessels fishing for tuna and dolphins, the WCPFC provides the framework to allow the U.S. to investigate the frequency and magnitude of this interaction and to mitigate any potential bycatch.

The final three recommendations will take three to five years to achieve and require either the adoption of new legislation or the negotiation of new multilateral agreements specifically focused on cetaceans within a particular geographic region such as the Pacific Ocean Multilateral Agreement or the Americas Multilateral Agreement. The cetacean bycatch legislation referred to here (Appendix E) was introduced in the 108th Congress. While many of its mandates calling for international negotiations to reduce cetacean bycatch overlap with

existing mandates in both the MMPA and the M-SFCMA, the provisions calling for the development of an international bycatch database are sorely needed and well worth the effort to secure passage of such legislation. This database could ultimately provide the baseline information needed by both the Office of International Affairs and the Office of Protected Resources to improve cetacean conservation and management and to meet the mandates of both the MMPA and the M-SFCMA. Section 108 provides the authority for the Secretary of Commerce to work through the Secretary of State to negotiate multilateral agreements to protect and conserve cetaceans. The areas most in need of such an agreement are the Pacific Ocean and the east and west coasts of Mexico, Central and South America. For these multilaterals, an agreement similar to the Inter-American Convention for the Protection and Conservation of Sea Turtles would provide an appropriate model. An international effort to negotiate this type of agreement would likely take five years to complete and ratify, yet it would provide the framework to assess cetacean abundance and bycatch and would likely have benefits beyond cetacean bycatch reduction including reducing direct harvests and consumption, preventing habitat degradation, and providing a mechanism to address issues such as climate change and the adverse impacts of anthropogenic sound and contaminants.

Second Tier Priority

The second tier priority includes adoption of a United Nations General Assembly Resolution on cetacean bycatch; workshop for science and technology transfer; an Indian Ocean Multilateral Agreement; modifications to the International Whaling Commission (IWC) to recognize its competence to manage small cetaceans; and investigations into West Coast of Africa tuna/dolphin interactions. While there is potentially great conservation benefit in either modifying the mandate of the IWC or negotiating a new cetacean specific multilateral, the likelihood of success is remote. The current membership composition of the IWC makes such changes unlikely and progress on the issues already identified through the Small Cetacean Subcommittee has been slow. In the Indian Ocean, the U.S. has little capacity or leverage to either spark negotiations for such an agreement (given the geography, it is unlikely that the U.S. would be a party to such an agreement) or to take action against nations like Sri Lanka or India for cetacean bycatch or harvests.

Within the next two to three years the U.S. could make progress in two areas. First, it could take a leadership role to hold a series of regional bycatch workshops, similar to the one held in La Jolla in the early 1990s. These workshops could review the status of cetacean populations and what is known about cetacean bycatch in each participating country. They could also become a forum to discuss the use of existing mitigation measures and testing and development of new technologies to reduce bycatch. This information provides the foundation for actions recommended in association with other bilateral and multilateral negotiations or agreements and mandates under the MMPA and the MS-FCMA. Second, the U.S. could use the framework of both ICCAT and SEAFO to investigate the interaction between tuna purse seine vessels fishing for tuna off the coast of West Africa and whales and dolphins. Allegations and sparse documentation of these interactions have existed for more than twenty years. By placing observers on tuna vessels fishing in these areas through the auspices of the RFMOs, the organizations could help document the occurrence of association of tuna schools with whales and dolphins and the frequency of encirclement and magnitude of any bycatch.

Finally, the Office of International Affairs could work to introduce a measure that calls upon parties to reduce cetacean bycatch as part of the sustainable fisheries resolution. This resolution relates to implementation of the provisions of the United Nations Convention for the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks and it recalls and reaffirms the provisions of this agreement and calls upon parties to take specific actions. Although U.N. resolutions are not binding, passage of a measure that includes precise

language on cetacean bycatch and requests that parties take a specified course of action (e.g. assess cetacean abundance, estimate bycatch, establish bycatch limits, and mandate bycatch mitigation) might provide impetus to regional fishery management bodies and parties to other regional agreements to carry out efforts described earlier for venues such as NAFO, ICCAT, WCPFC, and SEAFO.

Third Tier Low Priority

These recommendations fall in the bottom two quadrants of the graph and encompass five recommendations. Four of these call for continued work within existing multilateral agreements to elevate the issue of cetacean bycatch. They are: Southeast Atlantic Fisheries Organization; the Caribbean Specially Protected Areas and Wildlife Protocol; the Marine Mammal Action Plan in the Southeast Pacific Ocean; and the South Pacific Regional Environment Program. The three organizations all have some form of marine mammal/cetacean action plan that provides a framework from which to assess cetacean stock abundance and to estimate bycatch. Because these plans encourage technology transfer and scientific exchange they would be fertile ground for the regional workshops previously discussed. And although they ranked lower than the recommendations pertaining to action within the IWC, ocean multilaterals or the UN, they should likely be elevated in priority to the second tier, given the framework that already exists and the natural alignment with other recommendations.

Finally, for the reasons outlined in Chapter 6 and earlier in this chapter related to agreements in the Indian Ocean, efforts to achieve bycatch reduction through the Southwest Indian Ocean Fisheries Organization should be a low priority. The U.S. will have little leverage and a great deal of difficulty in affecting change within this agreement.

Conclusion

Based on the analysis the table below illustrates the ranking of recommendations and priorities. As part of an overall action plan to reduce cetacean bycatch and comply with the mandates under the MMPA and the M-SFCMA over the next one to three years, it is recommended that the Office of International Affairs focus its efforts on the short term top and second tier priorities.

Table ES.2 Priority Recommendations	
<i>Short Term (1-3 yrs)—Top Priorities--Bilateral Agreements</i>	
US/Mexico Bilateral	
US/Canada Bilateral	
Mediterranean Driftnets	
Peruvian Fisheries Bycatch	
Workshops for Science and Technology Transfer	
<i>Short Term (1-3 yrs)—Second Tier Priorities—Multilateral Agreements</i>	
Northwestern Atlantic Fisheries Organization	
Western Central Pacific Fisheries Commission	
Western Central Pacific--tuna/dolphin interactions	
Southeast Atlantic Fisheries Organization	

Table ES.2 Priority Recommendations
West Coast of Africa--tuna/dolphin interactions
Plan of Action for Marine Mammals in the Southeast Pacific Ocean
Caribbean SPAW Protocol
South Pacific Regional Environment Program
<i>Long Term (3-5 yrs)—Top Priorities—Multilateral Agreements</i>
Pacific Ocean Multilateral Agreement
Americas Multilateral Agreement
Bycatch Legislation
United Nations General Assembly Resolution
<i>Low Priority Recommendations</i>
Amend IWC
Southwest Indian Ocean Fisheries Commission
Indian Ocean Multilateral Agreement

CHAPTER 1. INTRODUCTION

Humans have exploited cetaceans (whales, dolphins, and porpoises) since primitive whaling activities began in Japan and Scandinavia many centuries ago. Now the threats facing cetaceans go beyond whaling, to include toxic pollution, acoustic noise, ship strikes, environmental change, global warming, and habitat degradation. Even though the complexity and magnitude of these threats are increasing, there are still few international mechanisms to address these threats. Little is being done under the authorities that do exist to bring about any significant improvement. Another difficulty arises in that there is no single international entity with the authority to govern and focus solely on cetacean conservation issues.

The U.S. Ocean Commission stated in its 2005 report: the “biggest threat to marine mammals worldwide is their accidental capture or entanglement in fishing gear (bycatch)⁹, which kills hundreds of thousands of them each year.”¹⁰ In particular, bycatch represents a major threat to the survival of cetaceans, particularly small cetaceans. Fishing gear, especially gillnets, indiscriminately catches an undetermined number of marine species, including dolphins and porpoises. Still, progress on assessing cetacean populations, quantifying cetacean bycatch, evaluating the scale and magnitude of this problem, identifying specific conservation actions, and reducing the mortality has been slow, sporadic, and limited to a few specific fisheries or circumstances.¹¹ Therefore, as a matter of priority, the focus of this report is the assessment and mitigation of global cetacean bycatch

Cetaceans, like many other animals, can be described as “migratory” because they spend several months each year traveling from one area to another, often covering vast distances in search of food, a particular climate, or a safe breeding ground. From a conservation and management perspective, migratory species are not exposed to specific threats because they do not confine themselves to one location; instead they periodically cross through a number of jurisdictions and encounter several threats as they do so. The level of protection afforded to cetaceans fluctuates according to their particular geographical location. Inevitably, migrating animals will pass through jurisdictions where cetacean conservation is less of a priority than in other areas. The protection of small cetaceans has largely been left to the domestic regimes of coastal states, and a number of nations have enacted legislation to protect dolphins and porpoises—particularly Australia, New Zealand, the United Kingdom, and the U.S.

⁹ Bycatch is defined in U.S. law as “fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch and release fishery management program.” 16 U.S.C.1802(2). The Marine Mammal Protection Act uses the term “take,” defined as “harass, hunt, capture, or kill...any marine mammal.” 16 U.S.C. 1362(13). Bycatch is defined internationally as “Fish or other fauna (e.g. birds or marine mammals) that are caught during fishing, but which are not sold or kept for personal use. In commercial fishing these include both fish discarded for economic reasons (economic discards) and because regulations require it (regulatory discards).” Organisation for Economic Co-operation and Development Glossary of Statistical Terms, 2001. Available at <http://stats.oecd.org/glossary/detail.asp?ID=252>. Last visited 3 May 2007. For purposes of this report, the term “bycatch” will be used to describe all types of incidental capture of marine mammals in fishing gear, rather than the MMPA terminology “take,” unless the discussion is about MMPA provisions. The term “incidental mortality” will be used when deaths are documented. However, it is generally understood that most bycatch of marine mammals results in death, with limited circumstances where live release is accomplished.

¹⁰ U.S. Commission on Ocean Policy. An Ocean Blueprint for the 21st Century. Final Report. Washington DC, 20004 ISBN#0-9759462-0-X at 306.

¹¹ Reeves R.R., Berggren, P., Crespo, E.A., Gales, N., Northridge, S.P., Notarbartolo di Sciara, G., Perrin, W.F., Read, A.J., Rogan, E., Smith, B.D., and Van Waerebeek, K. 2005. Global Priorities for Reduction of Cetacean Bycatch. World Wildlife Fund

With bycatch a serious and widespread threat to marine mammals, there is an urgent international need to develop alternative fishing gear and practices and, at the same time, put into place effective regional agreements that call for the assessment of cetacean populations, documentation of bycatch, and the implementation of mitigation measures ranging from temporal and spatial closures to deterrents. Greater involvement of inter-governmental bodies such as regional fishery management organizations, the United Nations Environment Program, The World Conservation Union (IUCN), and the Food and Agriculture Organization of the United Nations (FAO) is necessary. Because it requires a country to outline a series of specific measures to deal with such interactions, FAO's International Plan of Action model may provide a useful mechanism to address interactions between cetaceans and fisheries. In some regions, FAO is the only body competent to engage countries on a multinational level.

The Marine Mammal Protection Act of 1972¹² (MMPA) contains an international program that includes tools to address international threats to marine mammals. Specifically, the MMPA requires the Secretary of Commerce or the Secretary of the Interior, working through the Secretary of State, to "initiate negotiations as soon as possible for the development of bilateral or multinational agreements with other nations for the protection and conservation of all marine mammals."¹³ It also directs the federal government to encourage other agreements to protect specific ocean and land regions "which are of special significance to the health and stability of marine mammals" and to amend any existing treaty to make it consistent with the purposes and policies of the Act.¹⁴

The act's international provisions are particularly strong in the area of bycatch and provide the U.S. with the tools to take a leadership role in initiating negotiations with all foreign governments engaged in commercial fishing found to be unduly harmful to any species or population stock of marine mammal and in developing bilateral and multilateral treaties with such countries to protect marine mammals.¹⁵ However, with the exception of the provisions associated with the Agreement on the International Dolphin Conservation Program (AIDCP), rarely has the U.S. applied these measures nor has it taken actions to reduce marine mammal bycatch or to protect ecosystems abroad.

In 2006 the Congress reauthorized provisions of the Magnuson-Stevens Fishery Conservation and Management Act (M-SFCMA),¹⁶ the law governing how the U.S. manages fisheries within its Exclusive Economic Zone (EEZ). The reauthorization also directed substantial attention on fishing issues outside U.S. waters, particularly illegal, unregulated and unreported fishing (IUU) and bycatch. Although aimed primarily at strengthening U.S. leadership in international conservation and management of fisheries¹⁷ for purposes of leveling the playing

¹² Marine Mammal Protection Act of 1972, (16 U.S.C. 1361-1407, P.L. 92-522, October 21, 1972, 86 Stat. 1027) as amended.

¹³ 16 U.S.C 1378(a)(1)

¹⁴ 16 U.S.C 1378(a)(3)-16 U.S.C 1378(a)(4)

¹⁵ 16 U.S.C 1378 (a)(2)

¹⁶ 16 U.S.C. §§1801-1882 (1976), Pub. L. 94-265, as amended by H.R. 5946, Dec. 2006. Signed into law Jan 12, 2007.

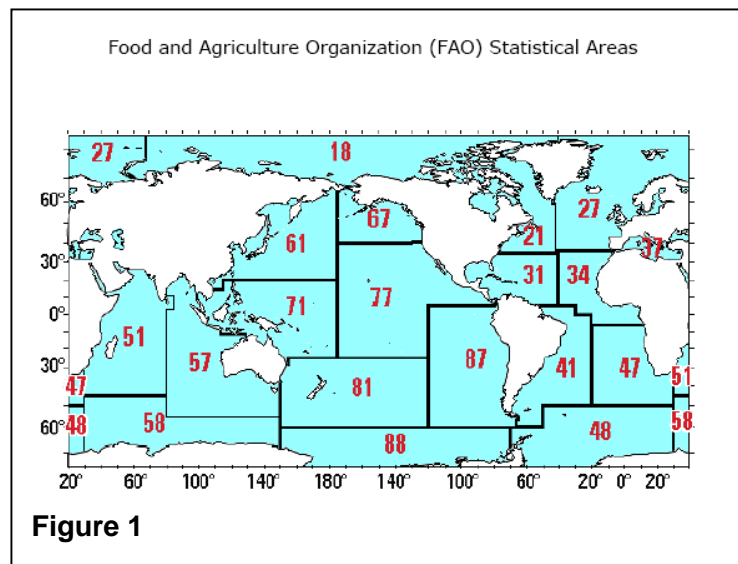
¹⁷ Report of the Committee on Commerce, Science & Transportation on S.2012, Magnuson-Stevens Fishery Conservation and Management Act Reauthorization Act of 2005. April 4, 2006. S. Rpt. 109-229. The Senate Report notes that restrictions placed on U.S. vessels to protect endangered or protected species "disadvantage U.S. fleets and fail to address the problem" because the harmful fishing practices continue by other fleets in high seas fisheries. S.Rpt. at 43.

field between the U.S. fleet and those of other nations, the new provisions have strong bycatch language calling for measures comparable to U.S. policy to protected species at risk, including marine mammals.

The Office of International Affairs of the NOAA National Marine Fisheries Service (NMFS) contracted development of a study that details steps it could take to engage foreign nations and multilateral organizations in reducing cetacean bycatch. The report produced under this contract reviews information on cetacean population abundance and documented bycatch, evaluates international cetacean conservation activities, describes the tools afforded through the MMPA and M-SA and international agreements relevant to cetacean conservation and bycatch, and makes recommendations for U.S. action.

Methodology

The project scope of work calls for an evaluation of the most significant threats to cetaceans, the affected species and the geographic areas of high risk, and the recommended actions from various independent institutions. The report is to identify gaps in conservation and management efforts related to threats to cetacean populations and identify opportunities for international action, cooperative research, and information exchange. The final element of the work is to develop a strategic plan of action for NOAA that identifies priorities for action, existing tools, necessary mechanisms, and required resources.



As a structure for examining bycatch of cetacean species, the report is organized geographically, using area designations similar to the Statistical Areas of the FAO (see Figure 1). This alignment enables the analysis to overlay the activity of the principal fisheries of the world and the existence of multi- or bi-lateral agreements on areas of cetacean occurrence or and documented bycatch. Part of the methodology includes a detailed review of cetacean abundance and bycatch within each statistical area (Appendix A) and every species at risk is summarized in Tables A1-A137.

This is followed by a distillation of

this information, placing a priority for action on species based on their status and the sustainability of the level of bycatch. The methodology then evaluates U.S. domestic authorities and international treaties and agreements. In this analysis, rising to priority level are instances where bycatch occurs in the absence of conservation measures, lack of enforcement of authorized measures, or lack of a policy framework for taking action. Where a policy framework is available, the analysis examines feasibility of implementing conservation measures and the likelihood of their success.

Chapter 2 describes incidental bycatch of cetaceans in fisheries by FAO statistical area and summarizes the species and areas of greatest interest. The analysis examines the areas and nature of bycatch and suggests which interactions represent the highest risk to these populations. It also discusses needs that have been raised in the literature by scientific or management bodies as necessary to assess the population abundance and status, estimate

and evaluate current bycatch levels, or mitigate cetacean bycatch. Chapter 3 describes the U.S. legal framework for international cetacean protection and management. Chapter 4 analyzes the international framework and tools that are available to the U.S., either unilaterally or multilaterally, to implement protection measures, initiate discussions or foster programs in high-risk areas. Exemplary agreements are discussed and similar regional schemes are listed in text boxes. Appendix B provides a list of parties to the agreements discussed, as of the date of this report. Chapter 5 compares the highest risk populations to agreements in place, parties to those agreements, and whether actions are being taken to reduce bycatch. It also identifies gaps in information and mitigation measures. This analysis is summarized in Table 5.1. Chapter 6 makes recommendations on the types of actions the United States could take or could urge upon states party to mutual marine mammal conservation agreements. It also examines actions the U.S. could pursue outside the diplomatic arena, using grants programs, technology transfer, incentives, partnerships with the private and non-governmental organization (NGO) sectors, and employing its convening power to foster information exchange. Appendices C, D and E provide sample language for resolutions and legislation discussed in Chapter 6. Chapter 7 concludes the report with a template for priority setting based on considerations of risk and feasibility and makes recommendations for high, second-tier and low priority action options.

CHAPTER 2. BYCATCH CRITICAL ISSUES

For decades scientists have known that large numbers of cetaceans are incidentally killed in fisheries each year throughout the world. The information provided in Appendix A substantiates this allegation and indicates an extensive worldwide interaction between cetaceans and fisheries. Most notably, in almost all the statistical areas where studies have been conducted, large numbers of small cetaceans, especially coastally distributed species, are affected by coastal gillnet, purse seine, trawl, and trap fisheries.

Most species of cetaceans have been recorded at some time caught in some type of fishing gear. However, very few studies, with the exception of a few in the U.S., have successfully assessed and quantified the actual impact of a fishery or fisheries bycatch on cetacean populations. Part of the problem is that only a very small proportion of cetacean catches are ever actually recorded using some type of quantifiable process or an independent observer program. Generally, data are still lacking on fisheries catch statistics, fishing capacity (number of vessels and fishers), and fishing effort in many regions of the world. Additionally, for most cetacean species, it is very difficult and costly to assess population size and trends or to assess the consequences of an uncertain and unpredictable bycatch rate. This problem is further compounded in developing nations where fisheries management does not rank high as a national priority, and thus funds are frequently unavailable to undertake such assessments. Furthermore, reporting significant cetacean bycatch may be a low priority, or politically unacceptable, in countries where fishery development is considered vital for food security or maintaining the balance of trade.

There are large areas of the world where it seems likely there may well be interactions between cetaceans and fisheries, but for which there are, as yet, no data, and no idea of any impact that such fisheries may cause. This lack of information on the impacts of a fishery does not imply, however, that there is no problem, especially since reporting of just a few individuals in a specific fishery may be indicative of a larger interaction. Only when scientists can accomplish a detailed study of the cetacean stock abundance, fishing effort, and the bycatch rate in each fishery can a thorough and accurate assessment be made.¹⁸

Such assessments are integral to the development of long-term solutions to mitigate bycatch. Solutions to the problem of cetacean entanglement have been sought in several parts of the world with a variety of techniques. No universal solution to the problem has been found, but in one or two cases some reduction in the numbers of cetaceans caught in gillnets has been accomplished through gear modifications (e.g., rigging driftnets to fish a few meters below the surface or increasing twine size) or technological aids (e.g., pingers). Because banning the use of gillnets worldwide is not an option and site-specific gear prohibitions are not always effective, approaches will have to be found on a fishery-by-fishery basis, and such solutions should consider socio-economic alternatives (e.g., eco-tourism opportunities).

For several cetacean species—including the harbor porpoise, vaquita, Hector's and Maui's dolphin, finless porpoise, hump-backed and bottlenose dolphins, Irrawaddy dolphins, dusky dolphin, and Burmeister's porpoise—operational interactions with fisheries may threaten their survival or recovery. The following sections review, by FAO statistical area, the known fisheries interactions for species for which the interaction is either unsustainable or may be approaching an unsustainable level. The descriptions highlight only those species that are considered a priority for this area, based on the level of incidental mortality. Text boxes highlight needs for

¹⁸ The estimates in the U.S. Ocean Commission Report were derived from extrapolations and models, and are not estimates of actual bycatch.

abundance estimates, observer data or recommended actions that have been drawn from the scientific literature, proceedings of scientific bodies, or available mitigation strategies (e.g., national laws, closed areas, or technological or gear modifications). A more thorough analysis and review of the literature for all cetaceans incidentally killed in fisheries in each FAO statistical area is provided in Appendix A.

Atlantic Areas and Populations Analyzed for Highest Risk

The following sections examine incidental bycatch of cetaceans in FAO statistical areas in the Atlantic. Where available, an assessment of the level of bycatch against estimated population is made. There are eight areas examined in the Atlantic, including the Mediterranean and Baltic Seas. Figure 2 shows the boundaries of these areas. Critical issues that arise include bycatch of critically endangered northern right whales and sperm whales, incidental mortality of harbor porpoises from populations numbering only in the hundreds of animals, and bycatch of numerous species of dolphins in fisheries from the northernmost reaches of the Atlantic south to Tierra del Fuego.

Developed nations such as the U.S., Canada and the European Union (EU), as well as developing countries such as Ghana and Caribbean Island nations, all have fisheries that interact with cetaceans. Challenges include gathering the most basic information on abundance and fishing effort to more complex technologic solutions and implementation of action plans. Necessary actions that have been identified in the literature or by scientific or management organizations are summarized in boxes for each area. High priority recommendations are included in Chapter 6.

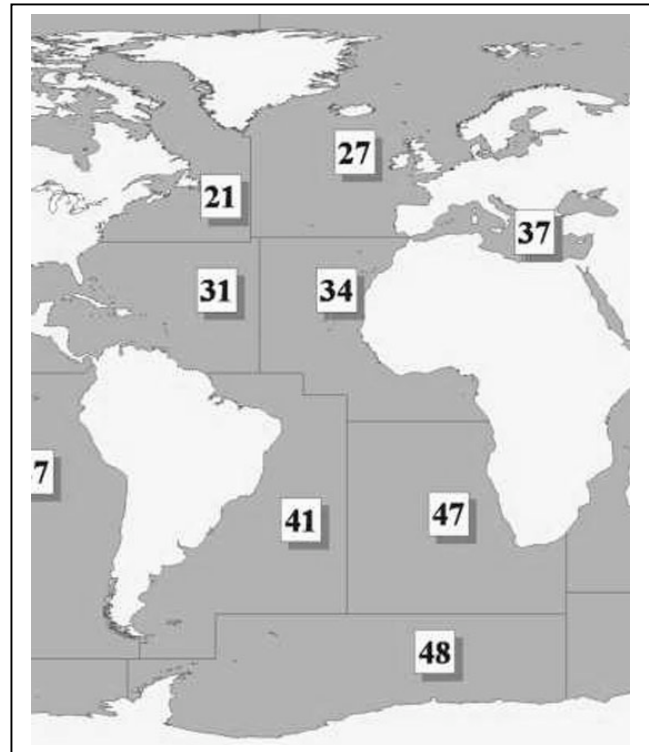


Figure 2: FAO Statistical Areas of the Atlantic

Area 21 Northwest Atlantic

Although the Northwest Atlantic includes the U.S. Exclusive Economic Zone (EEZ), because the focus of this report is international bycatch, the description for this area will focus only on international bycatch of shared cetacean stocks in the area. The assessment and mitigation of bycatch of these marine mammals within U.S. jurisdiction is governed under the MMPA and, as such, is not discussed here.

The species most affected by accidental entrapments in fishing gear in this area is the harbor porpoise. Catches of certain of the large whales, notably humpback and right whales, are also considered significant. The major fisheries involved with cetaceans are the Greenlandic driftnet fishery for salmon, the inshore trap and gillnet fisheries of Newfoundland (and probably elsewhere in eastern Canada, which remains comparatively less well-studied), Canadian herring weir fishery, and Canadian and U.S. gillnet fisheries and lobster trap fisheries.

The harbor porpoise may be most severely affected by gillnet fisheries in the Bay of Fundy–Gulf of Maine region, but also possibly in other gillnet and trap fisheries farther north. From 2000 through 2004, the total average annual mortality in Canadian fisheries is 55 animals (51 in the Canadian groundfish sink gillnet fishery and 4.4 in the Canadian herring weir fishery). This bycatch level is a significant decline from the high of 424 harbor porpoises incidentally killed in Canadian gillnets fisheries in 1993. The reduction in bycatch is due to a combination of closed areas and the implementation of pingers in the fishery beginning in 1996. In 2002, the Canadian Department of Fisheries and Oceans (DFO) suspended its Bay of Fundy monitoring program because of financial constraints. Without a monitoring program, it will be difficult to estimate overall bycatch.

In 1995, the International Whaling Commission (IWC) small cetacean subcommittee suggested that current levels of incidental mortality pose a serious threat to the harbor porpoise subpopulation in this area. However, subpopulations in the Gulf of St Lawrence, Newfoundland, Labrador, and Greenland are also subjected to large directed or incidental catch, but population status in these areas remains unknown. The U.S. must work with Canada to develop abundance and bycatch estimates for these stocks and an effective conservation plan for harbor porpoises.

Bycatch of right whales internationally is one of the leading causes of right whale mortality around the world. It is responsible for both the failure of the population to recover and its continuing current decline. While right whale bycatch numbers fewer than five animals per year, the precarious state of the population means this incidental mortality is considered a potential threat to population recovery. Northern right whales are entangled in cod traps, lobster trap lines, groundfish gillnets, and herring weirs at the rate of 1.2 whales per year (2000–2004). While this number may appear insignificant, it is unsustainable for a population that numbers only 300 animals. The DFO listed right whales as endangered under a Canadian Species At Risk Act, which is similar to the U.S. Endangered Species Act. DFO has developed a recovery plan and established a recovery-implementation team. The plan includes a number of recommendations to mitigate threats such as ship collisions and fishing gear entanglements, as well as recommendations on research, communications, whale watching, and regulations and enforcement. The U.S. right whale recovery plan calls on the federal government to engage in bilateral cooperative efforts with Canada to recover right whales.

Area 27 Northeast Atlantic

In the Northeast Atlantic, the major species affected by accidental catch in fishing gear are the harbor porpoise and the common dolphin. The fisheries that most frequently interact with cetaceans are gillnet fisheries, mainly set gillnet fisheries, which are distributed throughout coastal waters of this region and in some places extend for many tens of kilometers offshore. Trawls may also catch relatively large numbers of some species in some places (e.g., harbor porpoises in Shetland, common dolphins in mackerel mid-water trawls). Depending on tow times, most interactions with trawl fisheries result in death from drowning.

Overall, harbor porpoises are killed in more types of fishing gear, and possibly in larger numbers, than any other cetacean species in this area. Specifically, harbor porpoise bycatch from bottom-set gill nets is estimated as more than 7,000 animals annually in the North Sea. This exceeds 2 percent of the population and is considered unsustainable; in most cases, estimated mortality levels exceed the 1.7 percent of minimum population size established by the

Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS),¹⁹ indicating that past or current bycatch levels are unsustainable.

Of particular concern are harbor porpoise mortality levels in the Celtic Sea, where more than 6 percent of the minimum population estimates are killed annually as bycatch. Likewise, bycatch in the Northern and central North Sea, Northern North Sea, and Southern and central North Sea are at unsustainable levels amounting to 4.1, 5.0, and 4.3 percent, respectively, of the population estimates for those areas. Removal levels are lower in other areas. For example, in Danish and UK fisheries that use mitigation measures such as pingers, more recent analyses are based on much lower estimated bycatch. However, these comparisons are made between recent bycatch estimates and relatively old abundance estimates and therefore do not take into account the potential decrease of harbor porpoise numbers due to bycatch that occurred between the two estimates.²⁰ The true impact to the various harbor porpoise stocks cannot be assessed until more current estimates of both abundance and bycatch are gathered, and the latter must be acquired through an effective independent monitoring program. Only when these data are available can effective mitigation strategies be developed and evaluated over time.

Dolphins tend to be caught more often in pelagic trawls. For example, vessels using large pelagic trawls to target horse mackerel southwest of Ireland are known to catch white-sided and common dolphins and long fin pilot whales, with a bycatch rate of one dolphin per 93 towing hours. From 2001 through 2003, 91 common dolphins were caught in 313 hauls in the pelagic trawl fisheries for bass (southwest England).²¹

Identified Needs

Information: regular abundance surveys, estimates of bycatch rates in fixed gear fisheries, knowledge of stock structure and growth.

Monitoring: Entanglement monitoring in pair trawl and drift net fisheries.

Mitigation: Employ pingers.

Legal Framework: Develop and implement European-wide framework, including enforceable bycatch mortality limits.

Enforcement: Enforce existing EU and ASCOBANS regulations and policies

Prior to the introduction of EU legislation to ban the use of driftnets for tuna, dolphins—particularly striped and common—were caught in large numbers (more than 750 individuals in 1,420 hauls).²² The impact of this bycatch on common dolphins is unknown. Common dolphin populations don't appear to be declining in this region, even though bycatch of common dolphins still numbers around 1,000 animals annually. It has been suggested that harbor porpoise populations may have declined in some areas such as the Baltic and southern North Seas, but what role, if any, fisheries may have had in such a decline is not clear. Up-to-date abundance and bycatch estimates for common dolphins in ASCOBANS waters are needed to determine the potential impact of known high mortalities in pelagic trawls.

Recent studies indicate that mortalities of delphinids such as white-sided and white-beaked dolphins and pilot whales may be substantial in pelagic trawl fisheries operating in the North

¹⁹ Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas. Done at New York 17 March 1992. Not in force. Concluded under the Convention on Migratory Species. ASCOBANS is principally intended to address the problems of fishery bycatch in the Baltic and North Seas. The focal species of ASCOBANS is the harbor porpoise although a variety of other odontocetes are regular inhabitants of the region.

²⁰ Furthermore, removal levels may be substantially underestimated, because bycatch remains to be assessed in many fisheries operating in the same area (e.g., Norwegian gillnet fisheries).

²¹ Website for the Joint Nature Conservation Committee—Marine Mammal Bycatch.

²² *Id.*

Sea, the English Channel, the Celtic Shelf, and the Bay of Biscay.²³ Similarly, abundance estimates are either outdated or lacking for these species, and bycatch estimates are unreliable.

The bottlenose dolphin populations in the nearshore Atlantic waters of Europe number only in the tens of animals for each stock. This species (along with harbor porpoise) is listed on Appendix II of the EU's Habitats Directive (Council Directive 92/43/EEC) as requiring special conservation measures. There is cause for concern that this "population" is low and declining and therefore requires particular measures to ensure that it suffers no further incidental mortality. Incidental mortality estimates are largely not available for this species and should be made a priority given the small population size.

There are very few recent comprehensive studies on cetacean abundance or population sizes; very little is actually known about stock structure in this region.

Estimates of abundance are either out-dated or completely lacking for cetacean species in these waters (e.g., Risso's dolphin, long-finned pilot whales, and killer whales). Alternatively, estimates are only available for some small regions (e.g., the Celtic Sea for common dolphins or striped dolphins) or have been combined for several species (e.g., white-beaked and Atlantic white-sided dolphins). More up-to-date estimates of cetacean abundance are needed because current impact assessments based on the 1994 abundance estimates and more recent bycatch numbers cannot take into account the potential depletion of stocks resulting from bycatch and other factors over the last decade. Scientists agree that it is necessary to carry out further comprehensive surveys to estimate cetacean abundance in ASCOBANS waters at regular intervals.²⁴ Moreover, scientists have said that, given the high costs of such surveys and the problems of current estimation techniques in low-density areas, there is a need to further develop existing techniques to overcome these problems.²⁵

Additionally, monitoring cetacean entanglement is urgently needed for all single and pair pelagic trawling operations, particularly those targeting sea bass, mackerel, and horse mackerel in the Channel (as well as in the Celtic Sea and Bay of Biscay), especially between December and March where there is considerable evidence for high levels of bycatch. These include British, French, Dutch, Danish, and German fisheries, though there may be others.

Monitoring the various—usually relatively small—driftnet fisheries operating in the Baltic also is needed, as is expansion and continuation of existing observer programs of all bottom-set gillnet fisheries in the North and Baltic seas and adjacent waters, including the English Channel.

Identified Needs

Information: Research investigating stock structure and maximum population growth rates, document bycatch rates in set nets.

Monitoring: Monitoring in set net and drift net fisheries.

Mitigation: Employ pingers.

Legal Framework: Develop and implement European-wide framework, including enforceable bycatch mortality limits.

Enforcement: Enforcement strategy for European-wide implementation of EU and ASCOBANS regulations.

²³ Northridge S., 2003. Investigations into cetacean bycatch in a pelagic trawl fishery in the English Channel: preliminary results (SC/55/SM26). Berlin, Germany, (unpublished); 10.

²⁴ CEC, 2002b. Incidental catches of small cetaceans. Report of the second meeting of the subgroup on fishery and the environment (SGFEN) of the Scientific, Technical and Economic Committee for Fisheries (STECF). SEC(2002) 1134, Brussels, BL, Commission of the European Communities; 63.

²⁵ *Id.*, at 63.

Information about bycatch rates is especially needed for the Norwegian setnet fisheries and German fixed gear fisheries operating in the North Sea and in the Kiel & Mecklenburg Bight. Scientists within ASCOBANS recommend observer coverage of 5 percent to 10 percent of total fishing effort for all bycatch monitoring programs.

In March 2004, the European Commission introduced a new regulation aimed at reducing the bycatch of harbor porpoises in bottom-set gillnets and entangling nets. From the summer of 2005, pinger Use was to become mandatory on bottom-set gillnets or entangling nets in the North Sea and the Skaggerak & Kattegat region that were deployed from vessels greater than 12m in length. Similar rules were to apply to the western English Channel and South Western approaches from January 2006 and to the east English Channel from January 2007. This regulation also made provision for the monitoring of dolphin bycatch in trawl fisheries from January 2005 in the English Channel, Irish Sea, and off western Britain and Ireland and from January 2006 in the North Sea and west Scotland.

On a larger scale, EU Commission scientists have stressed that a European wide management framework, including legally accepted bycatch limits and enforcement strategies, must be developed and implemented. Scientists generally agree that using an approach similar to the MMPA's potential biological removal (PBR), incorporating the ASCOBANS management goal of maintaining stocks at 80 percent of the carrying capacity, is useful in determining critical bycatch mortality limits.²⁶ However, they point out that the development of species-specific critical mortality limits for species other than harbor porpoises is necessary. More research investigating stock structure and maximum population growth rates would be necessary to achieve this objective.

Area 31 Western Central Atlantic

The Western-Central Atlantic encompasses the Mid-Atlantic, Southeast Atlantic, and Gulf of Mexico, U.S. EEZ. The abundance and mortality estimates for these areas are summarized in the U.S. Atlantic and Gulf of Mexico Marine Mammal Stock Assessments and will not be reviewed here. Instead, this section will focus on the incidental mortality in the Caribbean and off the Yucatan Peninsula and Central America.

Identified Needs

Information: Collaborative studies to understand and document range and abundance.

Monitoring: Training activities to aid in documentation of fishery bycatch and directed catch.

Legal Framework: Regional networks and collaboration under UNEP regional seas.

There has been a limited effort to document cetacean bycatch in the Mexican side of the Gulf of Mexico and Caribbean Sea, Colombia, the Dominican Republic, French Guyana, Puerto Rico, and Venezuela. Despite these valuable efforts, the magnitude of threat posed to cetacean populations in the wider Caribbean region as a consequence of fisheries operations is difficult to assess, and published information on bycatch is scarce. Systematic survey effort in the Caribbean and tropical Atlantic has been very

limited; this results in sparse quantitative information on populations of cetaceans.

Small-scale and subsistence gillnet fisheries occur along the entire Gulf of Mexico and Caribbean. Cetacean species caught in these fisheries include pygmy sperm whale, tucuxi, Risso's dolphin, bottlenose dolphin, Atlantic spotted dolphin, killer whale, clymene dolphin,

²⁶ CEC, 2002b. Incidental catches of small cetaceans. Report of the second meeting of the subgroup on fishery and the environment (SGFEN) of the Scientific, Technical and Economic Committee for Fisheries (STECF). SEC(2002) 1134, Brussels, BL, Commission of the European Communities; 63.

spinner dolphin, and humpback whale. The annual incidental mortality has not been estimated for any species or fishery, and abundance estimates are sorely needed for most species.

In particular, studies call for scientific effort on *Sotalia* along coastal waters of Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guyana, Surinam, and French Guyana. A recent study of bycatch in the mouth of the Amazon indicated incidental mortality of more than 1,050 tucuxis in a single year. Along with franciscanas, tucuxis are the most commonly caught cetaceans in Brazilian coastal gillnet fisheries.²⁷ The tucuxi may also be the cetacean most commonly caught as bycatch in coastal fisheries of the southern Caribbean Sea.

Given the sparse nature of the data, it is difficult to identify the species most frequently involved in fishery interactions. The Caribbean regional seas program of the United Nations Environment Programme (UNEP) has recently promulgated a regional marine mammal action plan. It also has established a Regional Activity Centre (RAC) in Guadeloupe for implementation of the protocol on Specially Protected Areas and Wildlife (SPAW). It has been suggested that local scientists and UNEP's RAC/SPAW officials develop regional networks, collaborative studies, and training activities to understand and document the range and abundance of cetaceans and the impacts of fishery bycatch and directed catch on cetacean populations in the wider Caribbean.

Area 34 Eastern Central Atlantic

In 1997, the IWC Scientific Committee concluded that information on small cetaceans in Africa (outside southern Africa) is very sparse and that issues of cetacean fishery bycatch must be addressed.²⁸ Projects that have sampled landing sites of small-scale coastal fisheries in Ghana since 1998 show that bycatch and directed harvests of small cetaceans are commonplace and possibly increasing. The largest catches, by far, are the result of deployment of large-meshed drift gillnets targeting tuna, sharks, billfish, manta rays, and dolphins. The species most frequently caught are clymene (Ghanaians call it the "common dolphin"), bottlenose, pan-tropical spotted, Risso's, long-beaked common, and rough-toothed dolphins, together with short-finned pilot and melon-headed whales.²⁹ Dwarf sperm and Cuvier's beaked whales may also be caught with some regularity.

Identified Needs

Information: Research to establish the range, distribution, natural history, taxonomy, abundance, and fishery interactions of Atlantic humpback dolphins.

Monitoring: Systematic data collection supported by training and resources.

Mitigation: Close RAMSAR site to gillnet fishing; add humpback dolphin to conservation program.

Legal Framework: CMS, national wildlife agencies.

Enforcement: Ban or limit commerce in cetacean products.

²⁷ Beltrán, S. 1998. "Captura accidental de *Sotalia fluviatilis* (Gervais, 1853) na pescaria artesanal do Estuário Amazônico". M.Sc. thesis. Universidade do Amazonas, Manaus, Brasil. 100 pp.[In Portuguese] See also: Siciliano, S. 1994. Review of small cetaceans and fishery interactions in coastal waters of Brazil. *Report of the International Whaling Commission* (Special Issue) **15**: 241–250.

²⁸ IWC. 1998. Report of the scientific committee. Report of the International Whaling Commission **48**: 53–302.

²⁹ Reeves, Randall R., Smith, Brian D., Crespo, Enrique A., and Notarbartolo di Sciara, Giuseppe (compilers). (2003). *Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. ix + 139 pp.

Off Mauritania, common dolphins and *Stenella* (spp.) are caught by eastern European pelagic trawlers. It is estimated these fisheries catch a minimum of about 500 to 1,000 dolphins per year. The artisanal lobster fishery near the border between Mauritania and Morocco is estimated to catch 20 harbor porpoises and other dolphins annually.³⁰

Recent surveys sponsored by UNEP and the Convention on the Conservation of Migratory Species of Wild Animals (CMS or "Bonn Convention")³¹ in Senegal and Gambia indicate continuing bycatch and deliberate takes of small cetaceans in artisanal and semi-industrial fisheries. Most of the animals caught are bottlenose, Atlantic hump-backed, and long- and short-beaked common dolphins and, on Senegal's Petite Côte, harbor porpoises.³² The total bycatch in the artisanal fisheries in Senegal probably does not exceed 100 cetaceans per year.³³

In West Africa, bycatch threatens the continued existence of Atlantic humpback dolphins. While bycatch of humpback dolphins is well documented in other West African countries, bycatch monitoring of coastal fisheries in Ghana and Togo has failed to yield a single record because of the severely depleted population.³⁴ Research is needed to establish the range, distribution, natural history, taxonomy, abundance, and fishery interactions of Atlantic humpback dolphins. A high priority area for dedicated field investigations is Ghana's Volta River region and western Togo.

Conservation efforts are needed for Atlantic humpback dolphins. For example, if research indicates cross-border movements between Ghana and Togo, the chances of international attention and investment in humpback dolphin conservation may be greatly improved through the Bonn Convention. The Ghana and Togo fisheries and wildlife departments must become engaged and cooperate to ban or at least limit commerce in cetacean products (e.g., restrict consumption to local fishing communities). One action Ghana could take to facilitate humpback dolphin conservation would be to add this species to the conservation program of Ada Sanctuary at the mouth of the Volta (Songhor RAMSAR site) and perhaps prohibit gillnet fishing in this area.

With sufficient funding and appropriate training, it should be possible to achieve systematic data collection at the national level and, in turn, to make progress toward assessing trends and implementing sound conservation measures. In the longer term, introduction of tourism focused

³⁰ Maigret, J. 1994. Marine Mammals and Fisheries Along the West African Coast. In Gillnets and Cetaceans. Report of the International Whaling Commission. Special Issue 15.

³¹ Convention on the Conservation of Migratory Species of Wild Animals, Done at Bonn, 23 June 1979. Entered into force 11 January 1983. 19 ILM 15 (1980). See Chapter 3.

³² Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Drammeh, F., Jallow, A., Ndiaye, E., and Samba Ould Bilal, A.O. 2001a. Conservation efforts and field research on cetaceans in Senegal and The Gambia. Report to UNEP/CMS Secretariat, Bonn, Germany. See also Van Waerebeek, K., Ndiaye, E., Djiba, A., Diallo, M., Murphy, P., Jallow, A., Camara, A., Ndiaye, P., and Tous, P. 2000. A survey of the conservation status of cetaceans in Senegal, The Gambia and Guinea-Bissau. Report to UNEP/CMS Secretariat, Bonn, Germany. 80 pp.

³³ Maigret, J. 1994. Marine Mammals and Fisheries Along the West African Coast. In Gillnets and Cetaceans. Report of the International Whaling Commission. Special Issue 15.

³⁴ Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Drammeh, F., Jallow, A., Ndiaye, E., and Samba Ould Bilal, A.O. 2001a. Conservation efforts and field research on cetaceans in Senegal and The Gambia. Report to UNEP/CMS Secretariat, Bonn, Germany.

on dolphin watching seems feasible because species diversity is unusually high, seas are calm, and tourism to exotic Ghana is rising.³⁵

A new Dakar-based non-governmental organization, Conservation and Research of West African Aquatic Mammals, or COREWAM, and an interdepartmental Gambian Aquatic Mammal Working Group are now in place. These organizations and other scientists must work together to obtain baseline abundance data and establish seasonal patterns of distribution of coastal cetaceans at subregional, rather than national, scales. These organizations and national bodies must also systematically collect data at the national level to assess trends in bycatch and develop practical measures for the reduction of net entanglements. Such actions are crucial to the survival of cetacean communities—especially the Atlantic humpback dolphin.

Finally, since at least the late-1960s, scientists have speculated that dolphins are involved in the tuna purse seine fishery in the eastern tropical Atlantic Ocean. The tuna vessels are registered in several countries, including France, Spain, and the U.S., as well as in several West African countries. The levels of mortality, stock sizes, and even exact species involved are not known with certainty, and there is conflicting information on the extent of the problem. It has been suggested that dolphin mortality in this fishery could be very high, as many as 30,000 or more animals per year.³⁶ The species involved likely include several species of the genus *Stenella*, as well as common dolphins (*Delphinus* spp.).³⁷ Tuna–whale interactions are also known to occur, and baleen whales are considered good indicators of tuna schools.³⁸ Despite claims to the contrary, there is reason to suspect a serious problem that has been neglected for more than 30 years. Independent observer data on the composition and extent of bycatch need to be obtained and published. Although observer programs may already exist in this fishery, adequate information to assess cetacean bycatch is currently lacking.

Area 37 Mediterranean and Black Seas

The species most affected by interactions with fisheries in this area appear to be harbor porpoise, striped dolphins, and sperm whales. Bottlenose dolphins are also caught in a wide variety of gear and are reported to cause damage to some fisheries locally. Common dolphins are also caught in high numbers in some fisheries in the Alboran Sea. The fisheries with the greatest level of cetacean–fishery interactions are generally gillnet fisheries. One major driftnet fishery has been banned since 1992, but others continue on a smaller scale, and setnet fisheries are widespread. Illegal driftnet fishing poses a major threat to all of these species.

The Black Sea population of harbor porpoises is classified as Vulnerable on the IUCN Red List. Harbor porpoises in the Black Sea are isolated from Atlantic populations by a range hiatus in the Mediterranean Sea. Harbor porpoises that occur in Greek waters of the Aegean Sea may

³⁵ Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Drammeh, F., Jallow, A., Ndiaye, E. and Samba Ould Bilal, A.O. 2001a. Conservation efforts and field research on cetaceans in Senegal and The Gambia. Report to UNEP/CMS Secretariat, Bonn, Germany.

³⁶ Alverson, F.G. 1991. Tuna purse seine and gill/drift net fisheries in the oceans of the world and their relationship to tuna-dolphin, tuna-whale and tuna-whale shark associated schools. Unpublished Report Submitted to the CANAINPES Seccion Especializada en Pesca de Atun Programa Atun-delfin, Camara Nacional de la Industria Pesquera. 110 pp.

³⁷ Maigret, J. 1981. Introduction à l'étude des rapports entre les cétacés et la pêche thonière dans l'Atlantique tropical. *Bull. du Centre Natl. Rech. Oceanogr. Pêches Mouadhibou* **10**, 89–101.

³⁸ Alverson, F.G. 1991. Tuna purse seine and gill/drift net fisheries in the oceans of the world and their relationship to tuna-dolphin, tuna-whale and tuna-whale shark associated schools. Unpublished Report Submitted to the CANAINPES Seccion Especializada en Pesca de Atun Programa Atun-delfin, Camara Nacional de la Industria Pesquera. 110 pp.

belong to the Black Sea population or, alternatively, may be a remnant of a separate Mediterranean population.³⁹ Cetacean fisheries ended in the Soviet Union, Bulgaria, and Romania in 1966 but continued until 1983 in Turkey, mainly in the southeastern Black Sea.⁴⁰

Identified Needs

Information: Determine the distribution and abundance of harbor porpoise in the Mediterranean and Black seas and connecting waters. Assess bycatch and develop a conservation plan.

Legal Framework: Implementation of ACCOBAMS.

Enforcement: Enforce existing gear regulations.

Harbor porpoises in the Black Sea are also threatened by accidental killing in large-mesh bottom-set gillnets for turbot, sturgeon, and dogfish. At present, incidental mortality in fishing nets is the most serious threat to harbor porpoises, with the majority (95 percent) of recorded cetacean entanglements being porpoises. Mortality estimates are not available. However, available data indicate that the annual level of harbor porpoise bycatch may be in the thousands.⁴¹ This area needs a comprehensive effort to determine distribution patterns and to estimate abundance of harbor porpoises; it also needs a program—through interview surveys, visits to fish markets and landing sites, and on-board observer programs—to evaluate incidental catch and illegal hunting. Results of the

population and threat assessments should lead to the development of a basin-wide conservation plan.

Large numbers of sperm whales are known to have been killed incidentally in the high-seas driftnet fishery for swordfish, possibly reducing their abundance in the Mediterranean. Entanglement in high seas swordfish driftnets has caused and continues to cause considerable mortality since the mid-1980s.⁴² The recorded number of sperm whales found dead or entangled

³⁹ Frantzis, A., Gordon, J., Hassidis, G., and Komnenou, A. 2001. The enigma of harbor porpoise presence in the Mediterranean Sea. *Marine Mammal Science* 17, 937–944.

⁴⁰ From 1976 through 81, harbor porpoises accounted for 80% of the total catch of cetaceans in Turkey, with 34,000–44,000 killed annually. With an estimated loss rate (porpoises killed but not recovered) of 50% total mortality could have been as much as double these numbers. Illegal catches of unknown magnitude were also reported in 1990. Klinowska, M. 1991. *Dolphins, Porpoises, and Whales of the World. The IUCN Red Data Book*. IUCN, Gland, Switzerland and Cambridge, UK. See also IWC. 1992. Report of the scientific committee. *Report of the International Whaling Commission* 42, 51–270.

⁴¹ Commercial hunting of Black Sea cetaceans, including harbor porpoises, was banned in 1966 in the former U.S.S.R (present Georgia, Russia, and Ukraine), Bulgaria, and Romania and in 1983 in Turkey. The riparian states assumed international obligations to protect Black Sea cetaceans as contracting parties of the Convention on Biological Diversity (CBD), Convention on the Conservation of Migratory Species of Wild Animals (CMS), Convention on the Conservation of European Wildlife and Natural Habitats (Berne Convention), Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, Appendix II), and the Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea, and Contiguous Atlantic Area (ACCOBAMS). The harbor porpoise, *P. phocoena*, is mentioned in Annex II of the EC Directive No.92/43/EEC on the conservation of natural habitats of wild fauna and flora. In 1996, the Ministers of Environment of Black Sea countries adopted cetacean conservation and research measures within the framework of the Strategic Action Plan for the Rehabilitation and Protection of the Black Sea (paragraph 62). The harbor porpoise is included as Data Deficient in the regional Black Sea Red Data Book (1999). In 2002, however, it was listed as Endangered in the Provisional List of Species of the Black Sea Importance, an annex to the Black Sea Biodiversity and Landscape Conservation Protocol of the Bucharest Convention.

⁴² International Whaling Commission. 1994. Report of the workshop on mortality of cetaceans in passive fishing nets and traps. Rep. Int. Whal. Commn. (Spec. Iss.) 15:1–72. See also: Pace, D.S., Miragliuolo, A., Mussi, B. 2005.

from 1971 through 2004 in Spain, France, and Italy (combined) was 229. Surveys are needed to assess the abundance and distribution of sperm whales in the Mediterranean.

Likewise, large numbers of striped dolphins have been killed incidentally in the high-seas driftnet fishery for swordfish, possibly reducing their abundance in the Mediterranean. Entanglement in high seas swordfish driftnets has caused and continues to cause considerable mortality since the mid-1980s and may approach 1 percent of the population in the Alboran Sea and the Corsican–Ligurian Sea.⁴³ The recorded number of striped dolphins killed annually in driftnet fisheries may be in the thousands. With no recent estimates of abundance or incidental mortality available, surveys are needed to assess the abundance, distribution, and incidental mortality of striped dolphins in the Mediterranean.

Identified Needs

Information: Determine distribution and abundance of common dolphins; evaluate extent and risk posed by incidental mortality.

Monitoring: Monitor incidental mortality, develop bycatch estimates.

Mitigation: Eliminate driftnets in region.

Legal Framework: Implement ACCOBAMS actions and measures to regulate and reduce incidental mortality.

Enforcement: Enforce existing regulations on driftnets.

In the Mediterranean and Black seas, bottlenose dolphins occur in scattered inshore communities of perhaps 50–150 individuals. Incidental kills of bottlenose dolphins in trammel and gillnets occur frequently in some areas.⁴⁴ In some Mediterranean areas and the Black Sea, the incidental mortality rates are probably unsustainable.⁴⁵ There is a need for intensive population assessments in areas of the Mediterranean and Black seas and interconnecting waters where bottlenose dolphins are known to occur. Efforts are also required to monitor incidental catches (best accomplished through on-board observer programs).

Short-beaked common dolphins in the Mediterranean and Black seas have undergone a dramatic decline in abundance during the last few decades, and have almost completely disappeared from large portions of their former range, including the northern Adriatic Sea, Balearic Sea, Provençal basin, and Ligurian Sea.⁴⁶ No credible information exists on the abundance of common dolphins (and other cetaceans) in the Black Sea, but massive directed

Behaviour of a nursery group of entangled sperm whales (*Physeter macrocephalus*) off Capo Palinuro (Southern Tyrrhenian Sea, Italy). Abstracts, 19Th Annual Conference of the European Cetacean Society, La Rochelle, France, 2–7 April 2005:69.

⁴³ International Whaling Commission. 1994. Report of the workshop on mortality of cetaceans in passive fishing nets and traps. Rep. Int. Whal. Commn. (Spec. Iss.) 15:1–72. See also: Pace D.S., Miragliuolo A., Mussi B. 2005. Behaviour of a nursery group of entangled sperm whales (*Physeter macrocephalus*) off Capo Palinuro (Southern Tyrrhenian Sea, Italy). Abstracts, 19th Annual Conference of the European Cetacean Society, La Rochelle, France, 2–7 April 2005: 69.

⁴⁴ Silvani, L., Gazo, M., and Aguilar, A. 1999. Spanish driftnet fishing and incidental catches in the western Mediterranean. Biological Conservation 90, 79–85.

⁴⁵ Silvani L., Raich J., Aguilar A. 1992. Bottlenose dolphins, *Tursiops truncatus*, interacting with fisheries in the Balearic Islands, Spain. European Research on Cetaceans 6:32–34.

⁴⁶ UNEP/IUCN. 1994. Technical report on the state of cetaceans in the Mediterranean. Mediterranean Action Plan Technical Reports Series No. 82, United Nations Environment Programme (UNEP), Regional Activity Centre for Specially Protected Areas, Tunis. 37 pp.

killing, which continued to the early 1980s, is believed to have considerably reduced the population size.⁴⁷ Other than the reported bycatch of 145–200 common dolphins in the Spanish swordfish driftnet fishery in 1993–1994, the threats posed to common dolphins by accidental killing in fishing gear are virtually undocumented.

Pelagic driftnets have been prohibited in Spain since 1992, and their use has been limited by EU regulations since 2002. However, a reduced Italian fleet still fishes with such gear in an unregulated manner, as does a large Moroccan fleet and the French *tonnaille* vessels.⁴⁸ All of these operations are known to cause substantial cetacean mortality.

The Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)⁴⁹ calls for actions to address fishery bycatch for these species. ACCOBAMS came into force in 2001 and therefore is still in its early stages of development. In the near future, ACCOBAMS should coordinate among various national agencies and scientists to undertake the needed abundance surveys and to monitor incidental mortality to develop accurate bycatch estimates. Without such estimates, ACCOBAMS's ability to effectively regulate incidental mortality and develop conservation plans and measures will be severely diminished.

Area 41 Southwest Atlantic

The large number of species present and the wide range of geographical zones encompassed by this area make analyses difficult. The franciscana (*Pontoporia blainvillei*) is the most threatened cetacean species in the southwestern Atlantic Ocean. Although the franciscana is the species of greatest concern, the tucuxi has also experienced relatively high levels of incidental mortality in some areas.

Commerson's dolphins are also reportedly caught quite frequently in Argentina; again, however, the impact on populations is not known. Other species—including bottlenose, spinner, Risso's, rough-toothed, Atlantic spotted, and common dolphins and false killer, killer, pilot, minke, humpback, and southern right whales—have been caught in lower numbers; current bycatch estimates for these species are either nonexistent or extremely poor.

The major fisheries in this area with cetacean bycatch are shark gillnet and other inshore gillnet fisheries. Trawls and seines also take a proportion of cetaceans, but apparently to a lesser extent than do gillnets. Driftnet fisheries in southern Brazil are also of concern because of their potential to incidentally kill humpback, sperm, dwarf sperm, and pilot whales and spinner, Atlantic spotted, common, striped, clymene, and bottlenose dolphins.

Identified Needs

Information: Identify and delineate management units; acquire up-to-date abundance estimates for all populations in this region.

Monitoring: On-board observers.

Mitigation: Pingers.

⁴⁷ Buckland, S.T., Smith, T., and Cattanach, K. L. 1992. Status of small cetacean populations in the Black Sea: a review of current information and suggestions for future research. Report of the International Whaling Commission 42, 513–516.

⁴⁸ Imbert, G., Gaertner, J.-C., and Laubier, L. 2001b. Prevention à l'aide de repulsifs acoustiques des captures de dauphins par les thonilles. 10e Conference Internationale sur les cétacés Méditerranée de la RIMMO. Juan-les Pins 16–18 Nov. 2001 (Abstract).

⁴⁹ Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea, and Contiguous Atlantic Area. Done at Monaco, 1996. Entered into Force 2001. Source citation from CMS Secretariat.

Between 1 and 10 percent of the population of franciscana are incidentally killed in gillnet fisheries. The total estimated mortality throughout the range could be in the order of 1,500–2,000 animals per year. Most animals incidentally captured in fisheries are juveniles with an average age of one year, and 64 percent of the individuals are under three years.⁵⁰ There has been significant progress made in the assessment of franciscana populations, mostly because of strong collaboration among researchers from Brazil, Uruguay, and Argentina, but work must continue to secure a more accurate abundance estimate for each of the four management areas.

Although workshops have been held in that region to address scientific questions regarding the status of franciscana and to identify research and conservation priorities, there is still a need to gather biological information on ecology, genetics, and mortality rates. The range states must (at the national and provincial level) focus on monitoring and mitigation of franciscanas bycatch, including mechanisms to evaluate potential mitigation measures and their implementation and monitoring.

The IWC Scientific Committee's Subcommittee on Small Cetaceans discussed the status of franciscanas at the 2004 meeting of the IWC. That group recommended further testing, implementation trials, and development of both pingers⁵¹ and the replacement of gillnets with less harmful gear. The committee recommended developing educational programs with artisanal fishermen and fishing communities to promote awareness of the franciscana's vulnerability and to engage stakeholders in the search for solutions to the bycatch problem.

Pelagic trawls for hake and shrimp off Patagonia are harmful to pelagic dolphins such as dusky, short-beaked common, and Commerson's dolphins (*Lagenorhynchus obscurus*, *Delphinus delphis*, and *Cephalorhynchus commersonii*) that feed on anchovies, mackerels, or sardines.⁵² This fishery incidentally kills less than 1 percent of the Commerson's and common dolphin populations, and 1 to 2 percent of the dusky dolphin population.

In addition to pelagic trawling, a shore-based gillnet fishery operates seasonally for Patagonian blenny (*Eleginops maclovinus*), hoki (*Macruronus magellanicus*), and silversides (*Odonthestes* spp). This artisanal fishery operates off southern Santa Cruz and Tierra del Fuego, from Cabo Espíritu Santo in the north to Río Irigoyen. Neither local nor regional authorities has made any attempt to estimate cetacean mortality in this gillnet fishery.

Bycatch has not been a priority in fishery management. Since 2002, provincial government authorities have been calling for an assessment of cetacean and seabird bycatch to take place prior to expansion of the anchovy fishery southward from 41°S. Still, estimates of mortality levels or rates are sorely lacking. There is a clear need for detailed information on fleet characteristics and dynamics and on the numbers and species composition of the bycatch. On-board observers are essential to assessing bycatch and must be made a priority. Moreover, the impacts of fishery mortality on cetacean populations can only be assessed if abundance estimates are available. Consequently further research is needed to identify and delineate

⁵⁰ Culik, B.M. (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pp.

⁵¹ Pingers have shown promise for reducing bycatch mortality of franciscanas. Bordino, P., Kraus, S., Albareda, D., Fazio A., Palmerio, M. Mendez, A., and Botta, S. 2002. Reducing incidental mortality of franciscana dolphin *Pontoporia blainvillei* with acoustic warning devices attached to fishing nets. *Marine Mammal Science* 18:833–842.

⁵² Crespo, E.A., Koen Alonso, M., Dans, S.L., García, N.A., Pedraza, S.N., Coscarella, M.A., and González, R. 2000. Incidental catch of dolphins in mid-water trawls for southern anchovy off Patagonia. *Journal of Cetacean Research and Management* 2:11–16.

management units and acquire up-to-date abundance estimates for all populations in this region. Finally, range states should develop and test devices to prevent dolphins from entering trawls and possibly also to assess the effectiveness and feasibility of using pingers to reduce dolphin mortality in the gillnet fisheries.

Area 47 Southeast Atlantic

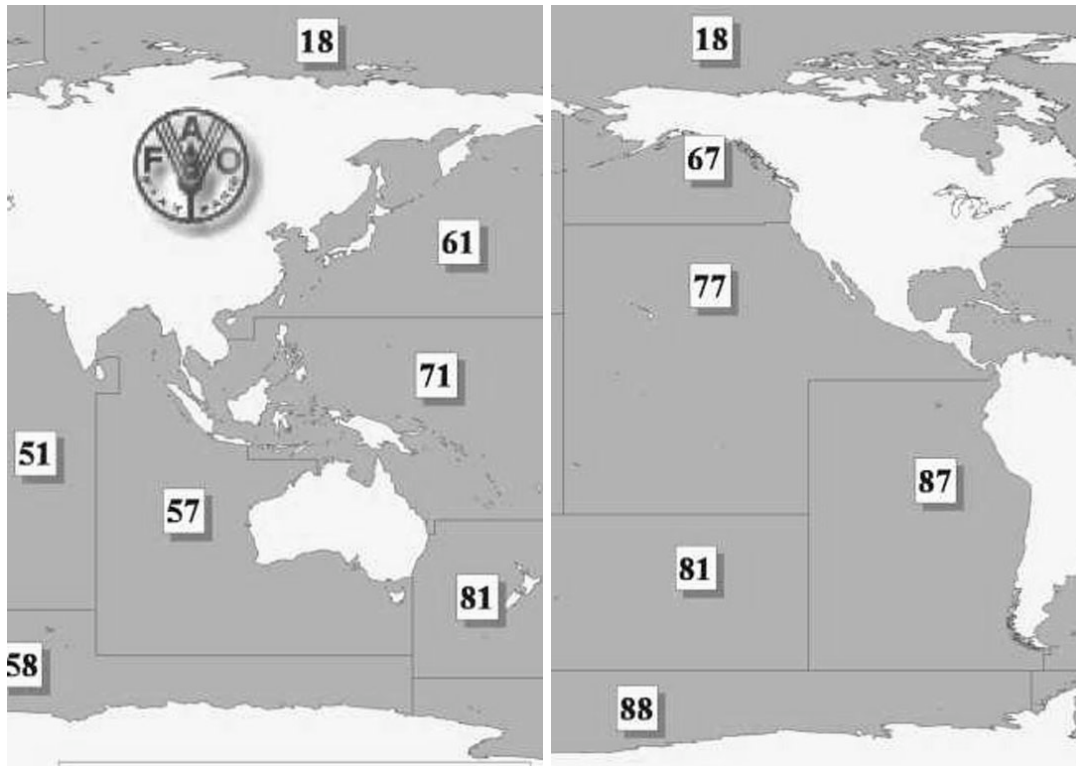
Few recent studies appear to have been made in this area. The recent revelation that a driftnet fishery has been operating off Tristan da Cunha for tuna, with concomitant incidental mortality of small whales and dolphins, suggests that there may also be considerable mortality to some as yet unidentified species. Incidental mortality to Heaviside's dolphin, which is restricted to the coastal zone of South Africa and Namibia, may also be an important interaction, but recent data on bycatch and population size are lacking.

Heaviside's dolphin is protected within the 200-mile Exclusive Fishery Zone of South Africa, where all delphinids are protected under the Sea Fisheries Act of 1973. Similar protection is provided in Namibia's 12-mile exclusive fishery zone (EFZ). The fisheries of concern are the inshore gillnet fishery and any coastal fisheries that may adversely affect Heaviside's dolphin. Neither the bycatch nor the abundance of this species is known, so there is a need for more thorough documentation. The St. Helena mullet and elephant fish fishery has caught only two dusky dolphins (*Lagenorhynchus obscurus*).

Pacific Areas and Populations Analyzed for Highest Risk

Nine FAO statistical areas make up the Pacific region, including the Indian Ocean, illustrated in Figures 3a and 3b. Where available, an assessment of the level of bycatch against estimated population is made. Many areas in the Pacific are characterized by lack of information about cetacean population size and incidental bycatch, making difficult an assessment of highest risk. Based on what is known about comparable fisheries and gear types elsewhere, it is likely that critical issues arise for a dozen species of marine and fresh water dolphins, three species of porpoise, and the false killer whale in the waters of 17 countries covering the entire Pacific Rim. Critical issues are summarized in the box below.

Developed nations such as the United States and Japan as well as developing countries such as Natal and Sri Lanka all have fisheries that interact with cetaceans. Challenges include gathering the most basic information on abundance and fishing effort to more providing complex technologic solutions and implementation of action plans. Critical issues that have been identified in the literature or by scientific and management organizations are summarized in the box below. Area specific recommendations also are drawn from the literature. High priority recommendations are included in Chapter 6.



Figures 3a & 3b: FAO Statistical Areas of the Western and Eastern Pacific

Critical Incidental Take Issues in the Pacific Ocean

- Spinner dolphins in Sri Lanka, drift and set gillnets in combination with direct harpooning
- Risso's dolphins in Sri Lanka, drift and set gillnets in combination with direct harpooning
- Bottlenose dolphins off the coast of Natal, South Africa, anti-shark gillnets; south coast of Zanzibar (Tanzania), drift and bottom-set gillnets
- Indo-Pacific humpback dolphins in Natal (south Africa), anti-shark nets; south coast of Zanzibar (Tanzania), drift and bottom-set gillnets; Madagascar and East Africa, coastal gillnets
- Ganges river dolphins in India and Bangladesh, gillnets
- Irrawaddy dolphins in Chilka Lake (India), gillnets; Bay of Bengal, heavy-mesh drift gillnets for elasmobranchs
- Dall's porpoise in direct harvests and salmon driftnets off Japan and Russia
- Finless porpoises in Korea and Japan, coastal nets and traps; in Inland Sea (Japan), gillnets; Yangtze River, gillnets and electrofishing; marine waters of China and SE Asia, coastal nets and traps
- Baijis in China, electrofishing and rolling hooks
- Spinner dolphins and Fraser's dolphins in the Philippines, driftnets for large pelagics and flying fish, purse seines for small pelagics
- Irrawaddy dolphins (marine), Philippines, *matang quarto* crab nets; (freshwater) Mekong River, Mahakam River, Songkhla Lake, and Ayeyarwady River, gillnets
- False killer whales, Hawaii, longlines
- Vaquitas, Gulf of California (Mexico), gillnets
- Hector's dolphins, North Island (New Zealand), coastal gillnets
- Dusky dolphins, Peru, drift gillnets
- Burmeister's porpoises, Peru, coastal gillnets

Area 51 Western Indian Ocean

In the western Indian Ocean (See Figure 4), incidental catch appears to be of spinner (4,000), spotted (1,500), common (1,000) and Risso's (1,300) dolphins. Catches of pygmy sperm whales (2,700), dwarf sperm whales (2,700), and bottlenose (500–1,250) dolphins are particularly high in the Sri Lankan fisheries. From 4 to 9 percent of the populations of bottlenose and humpback dolphins, respectively, are caught in shark nets to protect bathers along the Natal coast; this amounts to an unsustainable incidental bycatch. Finless porpoises and Irrawaddy dolphins may also be heavily affected by gillnet fisheries in Sri Lanka, India, and Pakistan, but studies in this region are insufficient to make a quantitative assessment.

Large numbers of at least 14 species of cetaceans have been killed in directed hunts and by entanglement in fishing gear in Sri Lanka, with spinner dolphins caught most frequently.⁵³ Scientists estimate that, from 1984 through 1986, some 350,000 gillnets accounted for between 8,042 and 11,821 bycatch mortalities around the Sri Lankan coast.⁵⁴ Other authors estimate that

the total annual catch for all cetaceans may be as high as 15,000 to 25,000 animals.⁵⁵ Additionally, many cetaceans are harpooned, and it appears that deliberate hunting may be increasing, possibly because of poor enforcement of legal protections for cetaceans enacted in Sri Lanka in 1993.⁵⁶ There is an immediate need to estimate population abundance for 14 cetacean species currently killed in Sri Lankan fisheries.

More than 2.5 million fishermen in the subcontinent of India deploy an estimated 1,216,000 passive gillnets annually, incidentally killing an estimated 1,000–1,500 cetaceans, 90 percent of

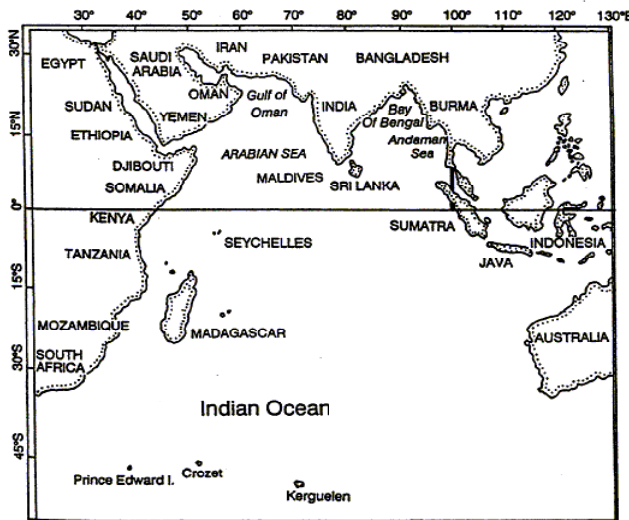


Figure 4: Indian Ocean

which are killed along the southwest coast. Most of these animals are spinner or common dolphins, although coastal fisheries in India also take a toll on Indo-Pacific humpback dolphin populations.⁴³ Continued monitoring of the entanglement of dolphins along the Indian coast is very important because the expanding coastal gillnet fishery may adversely affect some coastal dolphins such as the humpback dolphin. Incidental mortality in fisheries is thought to be a significant conservation problem for cetaceans in numerous areas along the

⁵³ Leatherwood, S., and Reeves, R.R. (eds.). 1989. Marine mammal research and conservation in Sri Lanka 1985–1986. UNEP Marine Mammal Technical Report 1, Nairobi, Kenya.

⁵⁴ Leatherwood, S. 1994. Report of the workshop on mortality in passive fishing nets and traps. Annex D. Re-estimation of incidental cetacean catches in Sri Lanka. In: W.F. Perrin, Donovan, G.P., and Barlow, J. (eds). *Gill-nets and Cetaceans. Reports of the International Whaling Commission, Special Issue 15*, pp. 64–65. Cambridge, UK: International Whaling Commission.

⁵⁵ Dayaratne, P., and de Silva, J. 1990. Drift gillnet fishery in Sri Lanka. Document TWS/90/19 presented at the Expert Consultation on Stock Assessment of Tuna in the Indian Ocean. Bangkok. 2–6 July 1990 8 pp.

⁵⁶ Ilankoon, A. 1997. Species composition, seasonal variation, sex ratio and body length of small cetaceans caught off west, southwest and south coast of Sri Lanka. *Journal of the Bombay Natural History Society* **94**, 298–306.

western shores of the Indian Ocean. Relatively few areas along the coast have been the focus of dedicated assessment efforts.

Additionally, the driftnet, shrimp trawl, gillnet, and seine fisheries in the waters of Pakistan, Iran, the Arabian Sea, the Arabian Gulf, and the Gulf of Oman have not been studied and may take cetaceans in numbers as large as in the Sri Lankan fishery.

Off the coast of East Africa there are several bycatch problems. First, dolphins (*Stenella* sp., *Steno bredanensis* and *Tursiops* sp.) are harpooned mainly for use as bait in a longline fishery for tiger sharks in Zanzibar (Tanzania). Small populations of Indo-Pacific bottlenose dolphins (*Tursiops aduncus*) and humpback dolphins (*Sousa chinensis*) inhabit waters off the south coast of Zanzibar. Until 1996, these dolphins were hunted for bait and human consumption—an activity that likely reduced the local populations of these animals. The best current abundance estimates for the two species are 161 bottlenose and 71 humpback dolphins.⁵⁷ In 2000, scientists documented cetacean bycatch in fishing gear around Zanzibar. An estimated six species of dolphins are killed year-round in drift- and bottom-set gillnets predominantly; these killings were from two villages off the south coast of Zanzibar. In 2000–2004, observer programs estimated that the annual anthropogenic mortality was 8 percent and 5.6 percent of the estimated number of Indo-Pacific bottlenose dolphins and humpback dolphins in the area, respectively.⁵⁸

Second, the Natal shark net fishery, although small, is also an important threat for local populations of bottlenose and humpback dolphins. Between 1980 and 1988 inclusive, 67 humpback dolphins died in shark nets to protect bathing beaches along the Natal coast, South Africa—or about 7–8 animals per year representing 3.5 to 4 percent of the population.⁵⁹ More recent estimates of both mortality and abundance are not available.

Urgent action is clearly needed to reduce the pressure on these East African populations that are likely already depleted. Bycatch mitigation is important to conserve both the dolphin populations and the long-term economies of the local communities for which dolphin-oriented tourism has become an important part of their livelihood.

Reliable and current data on cetacean populations and mortality rates are virtually nonexistent, making it impossible to assess the magnitude of the problem and to establish clear priorities for conservation. What is needed is a comprehensive program to study cetacean populations and the impacts from hunting and fishing activities in the western Indian Ocean. Researchers from the various nations bordering the Indian Ocean need to be trained and equipped to conduct at-sea surveys; collect biological samples; estimate the species age, identify sex composition of landed cetaceans; and assess fishing effort by area and season.

⁵⁷ Stensland, E. 2004. Behavioural ecology of Indo-Pacific bottlenose and humpback dolphins. Doctoral thesis, Stockholm University, Department of Zoology. ISBN: 91-7265-837-X. The hunt has since been replaced with dolphin-oriented tourism; in 2001, about 35 local boats were engaged in carrying passengers to watch dolphins. See: Amir, O.A., and Jiddawi, N.S., 2001. Dolphin tourism and community participation in Kizimkazi village, Zanzibar. Pp. 551–560 in M. Richmond and J. Francis (eds.), *Marine science development in Tanzania and Eastern Africa*. Proceedings of the 20th anniversary conference on advances in marine science in Tanzania, Zanzibar, Tanzania, IMS/ WIOMSA.

⁵⁸ Stensland, E. 2004. Behavioural ecology of Indo-Pacific bottlenose and humpback dolphins. Doctoral thesis, Stockholm University, Department of Zoology. ISBN: 91-7265-837-X.

⁵⁹ Jefferson, T.A., and Karczmarski, L. 2001. *Sousa chinensis*. *Mammalian Species* (American Society of Mammalogists) **655**, 9 pp. See also. Cockcroft, V.G. 1990. Dolphin catches in the Natal shark nets, 1980 to 1988. *South African Journal of Wildlife Research* **20(2)**, 44–51.

Finally, efforts are needed to assess populations, habitats, and bycatch in rivers or portions of rivers where the Ganges river dolphin occurs.

Area 57 Eastern Indian Ocean

Recent information on cetacean–fishery interactions in Area 57 is lacking. The following summary is based on what might be expected from previous studies and studies in other areas with comparable fisheries. A now-terminated Taiwanese shark and tuna gillnet fishery operated off Northern Australia and caught bottlenose dolphins, spinner dolphins, spotted dolphins, humpback dolphins and false killer whales, a proportion of which are in this area. The fishery was mainly located in Area 71 and is discussed under that section. Given the amount of gillnetting likely to occur in this region, accidental catches may adversely affect small coastal species such as the finless porpoise and Irrawaddy dolphin to some extent. The driftnet fisheries operating farther offshore—in the Bay of Bengal, for example—might be expected to catch spinner and spotted dolphins, at least, and perhaps other species. Driftnet fisheries in the southern Indian Ocean may catch a variety of species such as the spectacled porpoise, the southern right whale dolphin, and common dolphin. All of these fisheries require more detailed information on non-target catches.

Along the east coast of India, the expansion of marine fisheries results in large numbers of cetaceans dying in gillnets. Also, there is some indication that bottlenose dolphins (probably *T. aduncus*), and possibly Indo-Pacific humpback dolphins, are also being deliberately killed along the coast of Andhra Pradesh, eastern India, because the fishermen perceive them as competitors for diminishing fish resources.⁶⁰ Deliberate and incidental killing of cetaceans may be especially frequent along the east coast of India near major population centers (e.g., Calcutta and Madras), where the demand is high for fish and fishing employment. This eastern coastline, at least as far south as Vishakhapatnam, includes the westernmost range of the Irrawaddy dolphin. The only other known freshwater population—in Chilka Lake, India—has not been adequately assessed but is known to be subject to bycatch in gillnets and drag nets and may number as few as 50 remaining individuals. Consequently, there is a need for a rigorous monitoring program to document cetacean mortality of Irrawaddy dolphins in Chilka Lake and all cetaceans along the east coast of India.

Identified Needs

(Eastern & Western Indian Ocean)

Information: Reliable and current data on cetacean populations and mortality rates.

Monitoring: monitor entanglement in the Indian Ocean and establish bycatch estimates.

Mitigation: reduce mortality in drift- and bottom-set gillnets and shark nets.

Technology Transfer: train and equip scientists to conduct at-sea surveys; collect biological samples; estimate the species, age, and sex composition of landed marine mammals; and assess fishing effort by area and season.

Enforcement: enforce legal protections for cetacean in Sri Lanka.

⁶⁰ Reeves, Randall R., Smith, Brian D., Crespo, Enrique A., and Notarbartolo di Sciara, Giuseppe (compilers). (2003). *Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. ix + 139pp. at 62

Area 61 Northwest Pacific

The information in this section was derived from reports that Japan provided to the IWC on its directed hunts and incidental captures in Japanese fisheries, together with largely anecdotal accounts from Korean, Chinese, and Soviet fisheries. According to the FAO, Area 61 encompasses the most productive fishery waters in the world, and in 1999 accounted for 24.1 million tons of fish landings. China continues to report the largest landings of any fishing nation, most of which come from this area. As such, it is also an area of high levels of cetacean bycatch. Incidental catch in Vietnamese and Taiwanese fisheries would also be expected, but little information is available. Figures available for Japan might suggest some accuracy and reliability in estimating total bycatch, but the reported mortality is a minimum estimate and not corrected for total effort. Because of this enormous and unmonitored fishing effort, reported bycatch of cetaceans is likely to be grossly underestimated. Additionally, the IWC Scientific Committee has expressed concern that Japan (as well as other nations) may not be providing a complete reporting of all direct and incidental captures.

Identified Needs

Information: Stock structure information for Dall's porpoise, pilot whales and striped dolphins and systematic abundance survey throughout the range of the finless porpoise and better estimates of bycatch.

Monitoring: monitor bycatch in Chinese, Japanese, Vietnamese and Taiwanese fisheries.

Mitigation: eliminate electrofishing and rolling hooks and establish a protected area for finless porpoises in Dongting Lake or Poyang Lake .

In the 1980s, the estimated total bycatch for the Japanese, Taiwanese, and South Korean squid driftnet fishery was approximately 15,000–24,000 cetaceans per year. This mortality was particularly problematic for Pacific white-sided dolphins (6,100), Dall's porpoise (thousands or tens of thousands), and the northern right whale dolphin, which was reduced by 24 percent to 73 percent of its pre-exploitation size.⁶¹ The Bering Sea population of Dall's porpoise is estimated to have been reduced to somewhere between 78 percent and 94 percent of its pre-exploitation size, and the Western Pacific population to between 66 percent and 91 percent of its original size.⁶² In January 1993, a

United Nations moratorium on high seas driftnet fisheries went into effect—virtually eliminating this source of mortality (See Chapter 4 for description of the moratorium). However, large numbers of Dall's porpoises continue to die in driftnets within national waters of Japan and Russia, where the UN ban on driftnets does not apply. The estimated bycatch in the Japanese salmon driftnet fishery operating in the Russian EEZ totaled close to 12,000 for the period of 1993 through 1999, ranging from 643 to 3,149 on an annual basis.⁶³

More than 17,168 small cetaceans are caught by Japan each year in direct harvests. Dall's porpoise, Baird's beaked whale, pilot whales, and bottlenose and Risso's dolphins are all targets of directed fisheries. Catch levels for pilot whales and striped dolphins may be unsustainable if they are caught predominantly from one stock rather than several. While

⁶¹ Mangel, M. 1993. Effects of high seas driftnet fisheries on the northern right whale dolphin *Lissodelphis borealis*. *Ecol App* 3: 221–229

⁶² Reeves, Randall R., Smith, Brian D., Crespo, Enrique A., and Notarbartolo di Sciara, Giuseppe (compilers). (2003). *Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. ix + 139pp. at 62

⁶³ IWC. 2002c. Report of the standing sub-committee on small cetaceans. *Journal of Cetacean Research and Management* 4 (Supplement), 325–338.

available data indicate that, with the exception of the Dall's porpoise, the level of bycatch is less than 1 percent of each species, the absence of stock structure data and either absent or dated population estimates create significant uncertainty regarding whether these directed takes are adversely affecting these species. For nearly a decade the IWC Scientific Committee has expressed concern over the cumulative level of mortality of Dall's porpoise (14,992). Therefore, these catches highlight the need for an international agreement that regulates the direct harvests of small cetaceans.

The most severely affected species in this region is clearly the baiji, but fisheries may also threaten others such as the finless porpoise. For the baiji, there are many threats⁶⁴, but electrofishing is the greatest, and 5 of 12 documented deaths in the 1990s have been attributed to electrofishing.⁶⁵ Previously, the main cause of mortality was the use of a snagline fishing gear called "rolling hooks." While some types of rolling hooks are illegal, their use continues within the limited remaining range of the baiji. Efforts are needed to end electrofishing and eliminate all forms of rolling hooks within the baiji's range. During an expedition in 2006, scientists failed to find any baiji in the Yangtze River. There are reports that scientists may now declare the baiji "functionally extinct," making it the first aquatic mammal species to become extinct since the 1950s.⁶⁶

In the Yangtze, finless porpoises occur in the same areas as the critically endangered baiji and face similar threats. Although recent studies suggest a dramatic decline in abundance of finless porpoises, densities are said to remain relatively high in the mouths of Poyang and Dongting lakes. The Chinese government should consider establishing a protected area for finless porpoises in Dongting Lake or Poyang Lake and adjacent waters.

China's extensive fishing fleets use gear (e.g., gill and trawl nets) known to kill cetaceans. Some scientists believe that the incidental catch of some small cetaceans, especially finless porpoises, is high.⁶⁷ From 1985 through 1992, 114 finless porpoises were found off the coast of

⁶⁴ The Three Gorges Dam spans the Yangtze River at Sandouping, Yichang, Hubei province, China. Construction began in 1994. It will be the largest dam in the world, more than five times the size of the Hoover Dam. The reservoir began filling on June 1, 2003, and will occupy the present position of the scenic Three Gorges area, between the cities of Yichang, Hubei, and Fuling, Chongqing. Structural work was finished on May 20, 2006, nine months ahead of schedule. However, several generators still have to be installed, and the dam is not expected to become fully operational until 2009.

As with many dams, there is controversy over the costs and benefits of the Three Gorges Dam. Although there are economic benefits from flood control and hydroelectric power, there are also concerns about the future of more than 1.9 million people who will be displaced by the rising waters, the loss of many valuable archaeological and cultural sites, and the effects on the environment. It is believed that the dam is a contributing factor in the decline and possible "functional" extinction of the Chinese River Dolphin.

⁶⁵ Zhang, X., Wang Ding., Liu, R., Hua, Y., Wang, Y., Chen, Z., and Wang, L. 2001. Latest population of the baiji (*Lipotes vexillifer*) and its conservation in the Yangtze River, China. Pp. 41–53 in: [Proceedings of] Conference on Conservation of Cetaceans in China, March 2001, Shanghai. Published by Ministry of Agriculture, P.R. China.

⁶⁶ http://en.wikipedia.org/wiki/Chinese_River_Dolphin. Other scientists have noted, however, that conventional observation methods for sighting marine mammals may not be appropriate for the Yangtze, which not only is highly turbid, but also teeming with river traffic, making it nearly impossible to see any river dolphins even if any animals were present. Pers. Comm. David Cottingham, NOAA, March 2007.

⁶⁷ Parsons, E.C.M., and Wang, J.Y. 1998. A review of finless porpoises (*Neophocaena phocaenoides*) from the South China Sea. Pp. 287–306 in: The Marine Biology of the South China Sea. Proceedings of the Third International Conference on the Marine Biology of the South China Sea, Hong Kong, 28 October–1 November 1996 (ed. B. Morton). Hong Kong University Press.

western and northeastern KyU.S.hu, including part of the western inland sea of Japan: 84 were incidentally killed by fisheries—bottom gillnets killed 58; surface gillnets killed 17; trap nets killed 7; trawl nets killed 1, and drifting ghost nets killed 1.⁶⁸ Finless porpoises were also incidentally captured, most frequently in the coastal waters of China—totaling about 2,132 individuals in trawl, gillnet, and stow nets.⁶⁹ There is a tremendous need for a systematic abundance survey throughout the range of the finless porpoise and better estimates of bycatch for this species.

Numerically, the major fisheries that interact with cetaceans appear to be the smaller, salmon driftnet fisheries, but there are many other driftnet, gillnet, setnet, trap net, longline, and purse-seine fisheries in this area for which there is no information. Given the large and growing fisheries of Japan, China, Korea, and Taiwan, there is a need for systematic bycatch assessments in these diverse fisheries and for up-to-date abundance estimates.

Area 67 Northeast Pacific

Much of the Northeast Pacific Area 67 is made up of the U.S. EEZ off Alaska, Washington, and Oregon. It does, however, include areas off Canada and international waters outside the EEZs of Russia, Canada, and the United States. The United States and Canada account for 98 percent of all landings within the area.⁷⁰ This section will focus on international bycatch of shared cetacean stocks in the area, not on coastal stocks of cetaceans within the U.S. EEZ, which are managed under the MMPA and, as such, are not the subject of this report.

Many cetacean species interact with or are incidentally captured by commercial fisheries. Since the closure of the salmon and squid driftnet fisheries inside U.S. waters, the level of the mortality for cetacean species is less than 1 percent. Mortalities in fisheries in international waters in the area are poorly known. Fisheries include squid, pollock, salmon, halibut, cod, crab, and flatfish and use a variety of gear, including pelagic and bottom trawls, longlines, gillnets, driftnets, purse seines, and troll lines.

The major fisheries that interact with cetaceans are the inshore salmon gillnet fisheries, the Alaska pollock fishery, longline fishery, and various pot fisheries. When considered in relation to other fisheries in the Pacific, the incidental mortality of cetaceans in Northeast Pacific fisheries is inconsequential.

Area 71 Western Central Pacific

Roughly 1,700 bottlenose dolphins and 1,000 spinner dolphins are incidentally caught in gillnet, driftnet, and purse-seine fisheries in the western central Pacific. Also at risk are Irrawaddy dolphins. This region's fisheries are diverse and poorly documented. Nevertheless, coastal gillnets, especially driftnets for tunas and mackerels, are widely used. After a closure in Australian waters, the Taiwanese driftnet fishery relocated and continued fishing in Indonesian waters in the Arafura Sea. With no reduction in effort, high cetacean bycatch rates are probable.

Spinner and Fraser's dolphins experience substantial bycatch in Philippine fisheries. In the Philippines, scientists estimated that about 2,000 dolphins—primarily spinner, pan-tropical spotted, and Fraser's—were being killed each year by a fleet of five tuna purse seiners using fish-aggregating devices. The annual bycatch of small cetaceans in a single tuna driftnet fishery

⁶⁸ Kasuy, T. 1999. Finless porpoise—*Neophocaena phocaenoides* (Cuvier, G. 1829). *in*: Handbook of Marine Mammals (Ridgway, S.H., Harrison, S.R., eds.) Vol. 6: The second book of dolphins and porpoises, pp 411–442.

⁶⁹ Yang G. Zhou K, Xu, X, and Leatherwood, S. 1999. A survey on the incidental catches of small cetaceans in coastal waters of China. *Yingyong Shengtai Xuebao* 10: 713–716.

⁷⁰ David and Lucille Packard Foundation. 2001. Mapping Global Fisheries and Seafood Sectors. 34.

in Negros Oriental was estimated at about 400.⁷¹ Scientists estimate that even more cetaceans may be caught in round-haul nets. One estimate for the eastern Sulu Sea was 2,000–3,000 per year.⁷² Directed fisheries for small cetaceans were also reported, with as many as 200–300 dolphins caught annually in San Francisco and smaller numbers caught for bait in shark and chambered nautilus (*Nautilus pompilius*) fisheries in Palawan.⁷³ Currently there are no total bycatch estimates for the Philippines. Preliminary analyses of cetacean abundance surveys indicate that current bycatch is not sustainable.⁷⁴

There is still a need to continue efforts to assess incidental catch in the tuna purse seine and drift gillnet fisheries. The major need is for comprehensive monitoring and documentation of fishing effort and bycatch employing longitudinal monitoring of high-risk fleets with onboard observers and landing-site interviews. There should also be intensive surveys to assess cetacean abundance and threats in biodiversity hotspots such as the Tubbataha National Park and World Heritage Site and adjacent Cagayan Islands; there is also a need to conduct more extensive surveys under the auspices of the Convention on Migratory Species in the Sulu Sea and the Sulawesi Sea. Although the directed take of small cetaceans is believed to have declined as a result of protective legislation, monitoring has become more difficult because fishermen are secretive in disposing of their catch.⁷⁵

Incidental mortality in fisheries (e.g., gillnets, explosives) is likely the principal cause of depletion of Irrawaddy dolphin populations. The species has been seriously depleted in parts of Thailand.⁷⁶ Recent surveys indicate

Identified Needs

Information: Comprehensive cetacean abundance and bycatch surveys are needed for the Irrawaddy dolphin, Indo-Pacific humpback dolphin, Indo-Pacific bottlenose dolphin, finless porpoise, and spinner dolphin (and its dwarf form) in the Philippines, Indonesia, Thailand and throughout the region.

Monitoring: Incidental catch assessments in the tuna purse seine and drift gillnet fisheries; comprehensive monitoring and documentation of fishing effort and bycatch employing longitudinal monitoring of high-risk fleets with onboard observers and landing-site interviews.

Mitigation: prohibit the intentional killing of dolphins and provide alternative gear or employment options for fishermen in Malampaya Sound and the Mahakam River.

Legal Framework: Use the Convention on Migratory Species to conduct abundance surveys.

Enforcement: enforce Indonesian and Philippine laws that prohibit killing and live-capture and direct harvests of cetaceans.

⁷¹ Dolar, M.L.L. 1994. Incidental bycatch of small cetaceans in fisheries in Palawan, central Visayas and northern Mindanao in the Philippines. *Report of the International Whaling Commission* (Special Issue) **15**:355–363.

⁷² *Id.*

⁷³ *Id.*

⁷⁴ Dolar, M.L.L. 1999. Abundance, distribution and feeding ecology of small cetaceans in the eastern Sulu Sea and Tañon Strait, Philippines. PhD. dissertation, University of California, San Diego. Xxv + 241 pp. See also Perrin, W.F. 2002. Problems of marine mammal conservation in Southeast Asia. Proceedings of International Symposium 70th Anniversary of the Japanese Society of Fisheries Science. *Fisheries Science* **68**, Supplement 1:238–242.

⁷⁵ Dolar, *supra*, note 65.

⁷⁶ Andersen, M., and Kinze, C.C. 2000. Review and new records of the marine mammals and sea turtles of Indochinese waters. *Natural History Bulletin of the Siam Society* **48**, 177–184.

dramatic declines in range and abundance of the Mekong and Mahakam freshwater populations.⁷⁷

Irrawaddy dolphins in the Mahakam River, Indonesia, number fewer than 50 individuals and are listed as Critically Endangered by the IUCN.⁷⁸ Between 1995 and 2001, at least 37 dolphins died, primarily from entanglement in gillnets but also from vessel collisions and illegal hunting.⁷⁹ From 1997 through 1999, an average of three dolphins died per year from gillnet entanglements, representing between 6 percent and 8.8 percent of the population.⁸⁰

While Irrawaddy dolphins are protected from killing and live-capture according to Indonesian law, monitoring and enforcement are minimal. Further population monitoring is vitally important, as is a continued evaluation of the threats facing this population. But immediate action should be taken to eliminate fishery mortality by, at a minimum, prohibiting the intentional killing of dolphins and providing alternative gear or employment options for gillnet fishermen. Other options include establishing protected areas and deterrent measures, both of which should be examined.

Another small, geographically isolated group of animals living at the head of Malampaya Sound in Palawan, Philippines, numbers approximately 77 individuals (CV 27.4%) and is confined to a 133-square-kilometer area of the inner sound.⁸¹ This population should also be classified as Critically Endangered simply by virtue of its low numbers. Between February and August 2001, researchers confirmed that two dolphins were accidentally killed in bottom-set nylon gillnets Used to catch crabs (called *matang quatro* nets locally). They also received reports from local fishermen that as many as three additional dolphins were killed in these nets during the same period.⁸² These levels of bycatch are unsustainable and are threatening the existence of Irrawaddy dolphins in Malampaya Sound—the only known population of the species in the Philippines. The crab fishery provides substantial employment and income to the fishermen in Malampaya Sound, an economically depressed region. Despite a scientific recommendation that dolphin mortality in the crab fishery be eliminated or at least drastically reduced, promoting the conservation goal of reducing entanglement in *matang quatro* gillnets will require socio-economic alternatives to the crab fishery that ensure an equal or greater income to the fishermen. These efforts must be accompanied by long-term monitoring of dolphin abundance and mortality in Malampaya Sound.

Scientists believe that there may have been a dramatic decline in the abundance of Irrawaddy dolphins in the Mekong River, where the population is a high priority for Red List

⁷⁷ IWC. 2001a. Report of the standing sub-committee on small cetaceans. *Journal of Cetacean Research and Management* 3 (Supplement), 263–291.

⁷⁸ Krebs, D. 2002. Density and abundance estimates of the Irrawaddy dolphin, *Orcaella brevirostris*, in the Mahakam River of East Kalimantan, Indonesia: a comparison of survey techniques. *Raffles Bulletin of Zoology*, Supplement, 85–95.

⁷⁹ *Id.*

⁸⁰ *Id.*

⁸¹ Dolar, M.L.L., Perrin, W.F., Gaudio, J.P., Yaptinchay, A.A.S.P., and Tan, J.M.L. 2002. Preliminary report on a small estuarine population of Irrawaddy dolphins *Orcaella brevirostris* in the Philippines. *Raffles Bulletin of Zoology*, Supplement, 155–160.

⁸² *Id.*

assessment.⁸³ In the Mekong River from 2001 through 2003, an average of four dolphin deaths per year were attributed to gillnet entanglement; this represents 5.8 percent of a population estimated to number only 69 individuals.⁸⁴ There is a need for a coordinated, comprehensive, and credible rangewide assessment of the Mekong River dolphin population. The assessment should include an abundance estimate, a determination of range limits during various water stages, and an evaluation of habitat quality.

In Thailand, the Irrawaddy dolphin, finless porpoise, and Indo-Pacific humpback dolphin are probably the most severely affected species because of their near-shore distribution and susceptibility to entanglement. Recent surveys revealed that Irrawaddy dolphins have almost entirely disappeared from Songkhla Lake, a large lagoon system connected to the Gulf of Thailand that may have harbored a substantial resident dolphin population in the past.⁸⁵ In Songkhla Lake from 1990 through 2003, scientists believe at least 15 Irrawaddy dolphins were killed incidentally in gillnets from a population that may number as few as 8–15 individuals.⁸⁶ A dwarf form of the spinner dolphin has been described from specimens caught by shrimp trawlers operating in the Gulf of Thailand. If these animals belong to a discrete breeding population, the impact of the shrimp fishery alone could put that population in jeopardy.⁸⁷ Now, there is a need for at-sea surveys to assess cetacean abundance, distribution, and fishery “hotspots” in the Gulf of Thailand and Andaman Sea.

Finally, this area needs further research. In the Philippines, Indonesia, Thailand, and elsewhere in the western central Pacific, where relatively little is known about abundance, distribution, and bycatch levels of cetaceans such as the Irrawaddy dolphin, Indo-Pacific humpback dolphin, Indo-Pacific bottlenose dolphin, finless porpoise, and spinner dolphin (and its dwarf form), comprehensive cetacean abundance and bycatch surveys are needed to develop effective mitigation strategies.

Area 77 Eastern Central Pacific

Although the Eastern Central Pacific includes cetaceans that occur within the U.S. EEZ, the description for this area will focus only on bycatch of shared cetacean stocks in international waters or the EEZs of other nations.

The species most frequently caught in this area are the dolphins incidentally captured in the purse-seine fishery for yellowfin tuna: eastern and white belly spinner dolphins; northeastern offshore and southern–western offshore spotted dolphins; coastal spotted dolphins, and the northern, central, and southern common dolphin.⁸⁸ In 1989, the U.S. and international fleets in the Eastern Tropical Pacific tuna purse-seine fishery incidentally caught approximately 100,000

⁸³ Baird, I.G., and Mounsouphom, B. 1997. Distribution, mortality, diet and conservation of Irrawaddy dolphins (*Orcaella brevirostris* Gray) in Lao PDR. *Asian Marine Biology* **14**, 41–48.

⁸⁴ Beasley, I., Chooruk, S., and Piwpong, N. 2002. The status of the Irrawaddy dolphin, *Orcaella brevirostris*, in Songkhla Lake, southern Thailand, *Raffles Bulletin of Zoology*, Supplement 10: 75–83.

⁸⁵ *Id.*

⁸⁶ *Id.*

⁸⁷ *Id.*

⁸⁸ According to the National Marine Fisheries Service, although the number of coastal spotted dolphins reported caught by observers on class 6 purse seine vessels may be small, they may be caught more frequently by smaller purse seiners even though intentionally setting on dolphins with a vessel smaller than class 6 is technically prohibited. Personal communication with Brad Wiley, February 2007.

dolphins. In 2005, that mortality had declined significantly, to fewer than 1,200 dolphins. While the incidental mortality for each of these dolphin species still numbers in the low hundreds, the overall percentage of the population affected is less than 0.1 percent or the equivalent of the zero mortality rate goal in the U.S. MMPA. Nevertheless, within the Agreement on the International Dolphin Conservation Program (AIDCP) (see description in Chapter 3), the U.S. should advocate for updating the existing stock mortality limits to reflect the most recent and best available abundance estimates. Furthermore, the U.S. should continue to periodically conduct abundance surveys to investigate population trends and to support any modifications to the stock mortality limits that might be necessary.

Scientists are still concerned that despite the fact that reported dolphin mortality has been a very small fraction of population size, there is still no clear indication that either northeastern offshore spotted or eastern spinner dolphins are recovering. There are several hypotheses to explain this apparent failure to recover: cryptic effects of repeated chase and encirclement on survival or reproduction (internal injuries, stress, hyperthermia), separation of suckling calves from their mothers during the fishing process, unobserved or observed but unreported mortality, ecosystem or environmental changes, effects due to breakup of dolphin schools (increased predation, social disruption), ecological effects due to removing tuna from the tuna-dolphin association, and lags in recovery due to other inter-specific effects.⁸⁹

Much of the research to date to evaluate the cryptic mortality and cow/calf separation hypotheses has been based on data mining and modeling from information collected from 1970 through the 1990s, and not on direct observation in the present-day fishery. Among the parties to the AIDCP, there has been significant debate about the model's assumptions resulting in a general unwillingness to accept the results or take any further action to account for cryptic mortality in the stock mortality limits. If the U.S. is to make any progress on this issue, it must partner with both the Inter-American Tropical Tuna Commission and the other parties to undertake direct observational research to further test these hypotheses. This will require a substantial commitment of resources to design and execute a series of at-sea experiments to better understand why these dolphin populations are not recovering at the expected rate.

The most significant incidental mortality in the eastern central Pacific region occurs with bycatch of the vaquita in coastal gillnet fisheries and false killer whales in longline fisheries. The vaquita, endemic to the upper Gulf of California, Mexico, is considered critically endangered by the IUCN. Vaquitas, numbering in the low to mid-hundreds, are threatened with extinction by gillnet fisheries. The populations may be declining as commercial and artisanal fisheries for sciaenids, scombrids, shrimp, and elasmobranchs in the upper Gulf kill 35 to 40 vaquitas per year—6 to 7 percent of the population. According to recent estimates by the Southwest Fisheries Science Center, the

Identified Needs

Information: estimate vaquita abundance and trends; undertake abundance and quantitative bycatch estimates in coastal fisheries in Central America

Monitoring: monitor fishing activities and bycatch throughout the vaquita's range

Mitigation: extend the southern boundary of the Biosphere Reserve to cover the entire range of the vaquita and phase out gillnets and trawlers in the entire Biosphere Reserve

Legal Framework: convene a take reduction team for false killer bycatch in longlines and export mitigation measures internationally.

⁸⁹ NOAA information available online at <http://swfsc.noaa.gov/textblock.aspx?Division=PRD&ParentMenuId=248&id=1408>.

current estimate of annual mortality rate may be closer to 10 percent.⁹⁰

In 1992, President Carlos Salinas of Mexico created the Technical Committee for the Preservation of the totoaba (an endangered sciaenid fish) and vaquita. On 10 June 1993, the Government of Mexico established the Biosphere Reserve of the Upper Gulf of California and Colorado River Delta, in large part to protect the habitat of vaquitas and totoabas. The management plan for this reserve called for a ban on commercial fishing in its “nuclear zone.” In 1996, the Government of Mexico convened an international panel of experts to form a recovery team—the International Committee for the Recovery of the Vaquita. Regardless of which group, all of the various efforts have produced remarkably similar recommendations:

- To monitor fishing activities and bycatch throughout the vaquita’s range
- To estimate vaquita abundance and trends
- To take immediate action to eliminate incidental catch of vaquitas

More recently, the International Committee recommended that the southern boundary of the Biosphere Reserve be expanded to incorporate the known range of the vaquita; gillnets and trawlers be phased out in the entire Biosphere Reserve; effective enforcement of fishing regulations begin immediately; acoustic surveys for vaquitas be initiated; research on alternative gear types be started; public outreach and education be developed; consideration be given to the compensation of fishermen for lost income; research be initiated on vaquita habitat; and international and nongovernmental cooperation be fostered.⁹¹ Many scientists believe that banning gillnets in the entire range of the species is the single measure most likely to prevent extinction. This ban must be accompanied by socio-economic alternatives for the people whose incomes are adversely affected by any restrictions.

The impact of the longline fisheries off Hawaii is emerging as a potential problem for several species. National Marine Fisheries Service (NMFS) recognizes three stocks of false killer whales in the central Pacific: a Hawaiian stock within U.S. waters surrounding the Hawaiian archipelago, a Palmyra stock within U.S. waters surrounding Palmyra Atoll, and an undefined stock throughout international waters and the rest of the Pacific Islands Region. In recent years, mortality and serious injury from the Hawaiian and Palmyra stocks has exceeded sustainable levels (1.6 percent to 2.5 percent of the population).⁹² To date, NMFS has not established a bycatch reduction team, as required by the MMPA, to develop measures to mitigate and reduce this bycatch. Additionally, the number of false killer whales caught by international fisheries has not been estimated for any of these three stocks, but scientists are concerned that bycatch may have a significant impact on them. NMFS must take the first step—convene a bycatch-reduction team—to develop effective mitigation measures that can then be exported to other international fleets that take false killer whales and enforced through international regional fisheries management organizations.

As stated, cooperative international management programs have dramatically reduced overall dolphin mortality in the yellowfin tuna purse-seine fishery in the eastern tropical Pacific during the last 15 years. Although much attention has been given to the bycatch problem associated with the yellowfin tuna purse-seine fishery, comparatively little notice has been given to incidental catch of cetaceans in coastal and artisanal gillnet fisheries in nations that border

⁹⁰ Personal Communication, February 2007. Barbara Taylor, NOAA Southwest Fisheries Science Center.

⁹¹ Rojas-Bracho, L., and Jaramillo-Legorreta, A.M. 2002. Vaquita *Phocoena sinus*. Pp 1,277–1,280 in: *Encyclopedia of Marine Mammals* (eds. W.F. Perrin, B. Würsig, and J.G.M. Thewissen). Academic Press, San Diego, California.

⁹² The PBR for the Hawaiian stock is 1.0, and the estimated mortality is 4.4 animals.

the eastern tropical Pacific (eastern central Pacific). Although few quantitative data are available, the magnitude of the cetacean bycatch in coastal and artisanal gillnet fisheries of the eastern tropical Pacific is suspected to be high.⁹³ Because of the inshore nature of these fisheries, they tend to affect cetaceans that are already subject to other forms of exploitation and habitat degradation.

An exploratory study of artisanal gillnet fishery bycatch levels in relation to estimates of small cetacean abundance in the eastern tropical Pacific estimated overall annual mortality rates of 4.4 percent to 9.5 percent.⁹⁴ Even at the bottom end of this range, the mortality would be unsustainable—exceeding the recommended limit of 1 percent to 2 percent of the population abundance.⁹⁵ Scientists believe that mortality rates may be even higher for coastal subspecies (e.g., coastal spotted and Central American spinner dolphins (*S. a. graffmani* and *S. l. centroamericana*, respectively) because animals from these populations are likely over-represented, relative to their abundance, in the bycatch.⁹⁶ The report estimated that annual incidental mortality in artisanal gillnets was 16,596 in Costa Rica and 3,581 in Panama.⁹⁷ Nevertheless, information on bycatch in Guatemala, El Salvador, Honduras, and Nicaragua is still lacking.

These small cetacean species, which are not restricted to U.S. territorial waters, present a particular problem: no cooperative management agreements exist with Mexico to address the bycatch in widely dispersed, artisanal gillnet fisheries. These coastal fisheries involve many relatively small vessels and operate at subsistence or small-scale commercial levels. The same is true for the other Central American nations. The U.S. must work with Mexico, Costa Rica, Panama, Guatemala, El Salvador, Honduras, and Nicaragua, as well as local fishermen, scientists, and nongovernmental groups to jointly undertake abundance and quantitative bycatch estimates for these coastal fisheries. In particular, the U.S. must forge a cooperative management agreement with Mexico, because this is especially important for transboundary cetacean species, given the apparently dynamic nature of geographical stock boundaries. Until these goals are accomplished, the conservation and management actions that the U.S. is taking under the MMPA are at best hindered and at worst severely undermined.

Area 81 Southwest Pacific

Hector's dolphin is endemic to New Zealand. The total size of all populations is

Identified Needs

Information: Monitor abundance and distribution of Maui's and Hector's dolphins.

Monitoring: Observer program to estimate throughout the range of the dolphins.

Mitigation: Allow fishing only with gears and methods that do not catch Maui's dolphins; increase the size of the North Island sanctuary to include the harbors and bays and extend the offshore boundaries of both sanctuaries.

⁹³ Vidal O., Van Waerebeek K., and Findley L.T., 1994. Cetacean bycatch in coastal fisheries of the eastern tropical Pacific and the wider Caribbean: a preliminary review. Report of the International Whaling Commission (Special Issue) 15, 221–233.

⁹⁴ Palacios, D.M., and Gerrodette, T. 1996. Potential impact of artisanal gillnet fisheries on small cetacean populations in the Eastern Tropical Pacific. Southwest Fisheries Science Center Administrative Report LJ-96-11, La Jolla, California. 15 pp.

⁹⁵ Wade, P. 1998. Calculating limits to the allowable human-caused mortality of cetaceans and pinnipeds. *Marine Mammal Sci* 14: 1–37.

⁹⁶ Palacios, *supra*, note 86.

⁹⁷ *Id.*

estimated at approximately 7,400, with 7,270 (CV 16.2 percent) distributed around South Island⁹⁸ and some 100 individuals (called Maui's dolphins) off the west coast of North Island.⁹⁹ The IUCN lists the species as Endangered and the North Island population as Critically Endangered.

Hector's dolphins have been bycaught in gillnets throughout most of their range since gillnetting became widespread in New Zealand waters in the early 1970s. Scientists believe that gillnet mortality is causing continuing declines in all of the populations.¹⁰⁰ The Banks Peninsula Marine Mammal Sanctuary was created in 1988 to reduce bycatch off the Canterbury coastline on the east side of South Island. However, in 1997–1998, the estimated bycatch by commercial gillnetting vessels north and south of Banks Peninsula (fishing outside of the sanctuary area) was 16 Hector's dolphins (CV 39 percent).¹⁰¹ In view of continued recreational and commercial bycatch north and south of the sanctuary, New Zealand introduced regulations to prohibit recreational gillnetting along the Canterbury coastline from 1 October through 31 March. Commercial fishermen have developed a voluntary code of practice (COP) for reducing bycatch in the Canterbury area as an interim measure while a management plan for the species is prepared. Acoustic deterrents (pingers), specially developed for Hector's dolphin based on field studies of this species, are being used by Canterbury gillnet fishermen as part of the COP.¹⁰² Although there have been no reports of bycatch of Hector's dolphins in any of the nets using pingers, it is difficult to scientifically judge their effectiveness, and thus there is uncertainty about whether the pingers and COP are effective at reducing bycatch.

For Maui's dolphin, the situation is grave. Scientists have concluded that the population has been reduced to such low levels that in order for the North Island population to recover, human-induced mortality must be reduced to zero. In August 2001, the New Zealand Minister of Fisheries created a protected area that prohibits recreational and commercial gillnet fishing within four nautical miles of shore along a 400 km segment of the west coast of North Island. An observer program is also planned for trawlers and Danish seine vessels fishing in the area closed to gillnetting.

While there has been some progress, bycatch continues throughout most of the species range. Bycatch of Hector's and Maui's dolphins in gillnets must be reduced to sustainable levels. It is likely that additional measures will be necessary for Maui's dolphins such as allowing fishing only with gears and methods known not to catch Maui's dolphins (e.g., replace gillnetting or trawling with line fishing). Additionally, New Zealand should consider increasing the size of the existing protected areas—to include the harbors and bays in the North Island sanctuary and

⁹⁸ Slooten, E., Dawson, S., and Rayment, W. 2002. Quantifying abundance of Hector's dolphins between Farewell Spit and Milford Sound. Published Client Report on Contract 3076, funded by Conservation Services Levy. Department of Conservation, Wellington, New Zealand. dsis35.pdf.

⁹⁹ Russell, K. 1999. "The North Island Hector's dolphin: a species in need of conservation". Unpublished M.Sc. thesis, University of Auckland.

¹⁰⁰ Martien, K.K., Taylor, B.L., Slooten, E., and Dawson, S. 1999. A sensitivity analysis to guide research and management for Hector's dolphin. *Biological Conservation* **90**, 183–191.

¹⁰¹ Baird, S.J., and Bradford, E. 2000. Estimation of Hector's dolphin bycatch from inshore fisheries, 1997–1998 fishing year. Published Client Report on Contract 3024, Conservation Services Levy. Available: www.doc.govt.nz/cons/scires/csl.pdf.

¹⁰² Reeves, Randall R., Smith, Brian D., Crespo, Enrique A., and Notarbartolo di Sciara, Giuseppe (compilers). 2003. *Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. ix + 139 pp. at 88

extend the offshore boundaries of both sanctuaries. Finally, New Zealand should implement a statistically robust observer program throughout the species range to verify whether and when bycatch has been reduced to sustainable levels, and it should continue to monitor abundance and distribution of Hector's and Maui's dolphins to assess exposure to threats and the effectiveness of management efforts.

Area 87 Southeast Pacific

The dusky dolphin, Burmeister's porpoise, the Chilean dolphin, and possibly southern right whale dolphins and Peale's and Commerson's dolphins are perhaps the most frequently captured species by a variety of fisheries in this area. Scientists have estimated that between 10,000 and 20,000 small cetaceans per year die in Peruvian fisheries, and most of these are dusky dolphins; the bycatch is large enough to cause serious concern for the continued existence of these species.¹⁰³ Changes in the catch composition suggest that the regional population of dusky dolphins is depleted.¹⁰⁴ In addition, a growing concern in Peru is the demand for dolphin meat and blubber to be used as shark bait.¹⁰⁵

Identified Needs

Information: Abundance of Peale's, Chilean, and Commerson's dolphins off Chile and Dusky dolphins and Burmeister's porpoise off of Peru.

Monitoring: In Chile and Peru studies of fishery-related mortality of cetaceans, including the nature, species composition, and levels of bycatch. A coastal port survey for discarded remains and boat-based observers to document entanglement and evaluate current fishery-caused mortality.

Enforcement: In Peru, enforce existing laws; in Chile re-evaluate the extent to which cetaceans are still caught for bait.

Clearly the most important fisheries are the coastal gillnet fisheries, especially the driftnet fisheries that operate along the entire west coast of South America. With the exception of Pucusana in Peru, these fisheries and bycatches are virtually undocumented. Directed take of cetaceans for crab bait may also be an important source of mortality, but recent quantitative information on this is lacking.

In Ecuador, the estimated cetacean bycatch in 1993 for the fleets in Puerto Lopez, Santa Rosa, Manta, and Anconcito was between 2,500 and 5,000.¹⁰⁶ However, if the mortality levels are similar in other

¹⁰³ Van Waerebeek, K., Van Bresseem, M.F., Alfaro-Shigueto, J., Sanino, G.P., Montes, D., and Ontón, K. 1999. A preliminary analysis of recent captures of small cetaceans in Peru and Chile. International Whaling Commission, Cambridge, UK. Document SC/51/SM17. See also: Van Waerebeek, K., Alfaro-Shigueto, J., Montes, D., Onton, K., Santillan, L., Van Bresseem, M.-F., and Vega, D. 2002. Fisheries-related mortality of small cetaceans in neritic waters of Peru in 1999–2001. International Whaling Commission, Scientific Committee Document SC/54/SM10, Cambridge, UK.

¹⁰⁴ Van Waerebeek, K., Alfaro-Shigueto, J., Montes, D., Onton, K., Santillan, L., Van Bresseem, M.-F., and Vega, D. 2002. Fisheries related mortality of small cetaceans in neritic waters of Peru in 1999–2001. International Whaling Commission, Scientific Committee Document SC/54/SM10, Cambridge, UK.

¹⁰⁵ Van Waerebeek, *supra*, note 95.

¹⁰⁶ Felix, F., and Samaniego, J. 1994. Incidental catches of small cetaceans in artisanal fisheries of Ecuador. Report of the International Whaling Commission (Special Issue) 15:475480.

artisanal ports in Ecuador, the total bycatch in 1993 may have been two to three times greater.¹⁰⁷ Other scientists place estimated mortality at 6,377 small cetaceans.¹⁰⁸ The most affected species are common dolphins, spotted dolphins, and pilot whales.

In Chile, the hunting of Peale's, Chilean, and Commerson's dolphins for crab bait in southern Chile and the harpooning and net entanglement of various species off central and northern Chile has been a concern. Point-sampling at fishing ports in central and northern Chile in 1998 indicated fishery-related killing—including illegal directed takes—in 80 percent of the specimens found of at least five small cetacean species (Burmeister's porpoise, pygmy sperm whale, long-beaked common dolphin, pygmy beaked whale, and long-finned pilot whale). This deliberate killing combined with bycatch mortality also has contributed to declines in abundance of Commerson's dolphins and Peale's dolphins.

Under an agreement between NMFS and the Fishery Subsecretary of Chile, the Chilean government agreed to take measures to decrease the impacts of crab fisheries on marine mammals.¹⁰⁹ These measures included programs to evaluate the scale of the problem, educate the fishing community concerning the ecological effects of the crab fisheries, and provide alternative sources of bait.¹¹⁰ Some action has been taken on all of these aspects. Today a proportion of the bait consists of fish or fishery by-products, either obtained by the fishermen themselves or provided through government agencies within a legal framework.¹¹¹ The practice of using dolphins and other marine mammals as bait is reported to have declined in recent years, due in part to the fact that legal bait has been more readily available and in part to measures taken by government agencies; however, a certain amount of illegal fishing and baiting is believed to continue.

Nevertheless, there is a clear need for researchers in Chile to initiate or continue studies of fishery-related mortality of cetaceans, including the nature, species composition, and levels of bycatch in order to evaluate the likely implications for cetacean conservation. Researchers should also investigate the geographical distribution, scale, economics, and dynamics of the crab fisheries in southern South America and re-evaluate the extent to which cetaceans are still caught for bait. Field surveys to assess the status of dolphin populations in the crab fishing areas are needed.

In Peru, cetaceans are still being caught incidentally in gillnets, in purse seines, and with harpoons.¹¹² Bycatch remains high, presumably unchanged from earlier levels because no bycatch reduction measures have been implemented.¹¹³ Directed take was believed to be increasing from a low immediately after 1990, when a dolphin conservation law was implemented and the Peruvian government officially closed markets for dolphin meat.¹¹⁴ In

¹⁰⁷ *Id.*

¹⁰⁸ Palacios, D.M., and Gerrodette, T. 1996 Potential impact of artisanal gillnet fisheries on small cetacean populations in the Eastern Tropical Pacific. Southwest Fisheries Science Center Administrative Report LJ-96-11, La Jolla, California. 15 pp.

¹⁰⁹ Reeves, Randall R., Smith, Brian D., Crespo, Enrique A., and Notarbartolo di Sciara, Giuseppe (compilers). (2003). *Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC.

¹¹⁰ *Id.*

¹¹¹ *Id.*

¹¹² Van Waerebeek, *supra*, note 95.

¹¹³ In the period 1990 through 1993, the bycatch in Peruvian fisheries ranged from 15,000 to 20,000 small cetaceans.

¹¹⁴ Van Waerebeek, K., and Reyes, J.C. 1994. Post-ban small cetacean bycatch off Peru: a review. Report of the International Whaling Commission (Special Issue) 15:503–520.

1994, a second, more stringent small cetacean conservation law was enacted that assigned joint responsibility for enforcement to district and provincial authorities. Today there may be an increasing use of cetacean meat as bait in the shark fishery. Dolphins are rarely landed openly on shore; they are instead hidden and sold clandestinely or transferred at sea to shark-fishing boats.¹¹⁵

The species of most concern continues to be the dusky dolphin, which is caught in the greatest numbers, and Burmeister's porpoise, a species endemic to coastal southern South America. In the 1990s, in Peru alone, annual directed take of Burmeister's porpoise and dusky dolphin each amounted to 500 to 2,000 animals, based on direct accounts of landings. The continuous decline of dusky dolphins as a proportion of the overall cetacean catch since 1985 (when recording began), with roughly constant fishing effort, is consistent with the hypothesis that abundance of this species has been decreasing off central Peru.¹¹⁶

Authorities in Peru remain unconvinced that any action beyond merely outlawing commerce is needed to reduce the mortality of cetaceans in fisheries. Consequently, in Peru there is still a need for reliable estimates of total fishing mortality for each species in Peruvian waters. Scientists need better information on stock structure and reliable estimates of abundance for the affected stocks. Total mortality caused by fisheries should be estimated using an on-board-observer-sampling scheme of some kind, in combination with information about total fishing effort. Reeves et al., recommend an independent observer scheme that consists of a three-part effort:

- A coastal port survey for discarded remains to evaluate current fishery-caused mortality relative to former levels, using the same criteria.
- Boat-based observers in areas where large numbers of porpoises were killed in the past to document entanglement dynamics (gear-related, temporal, and circumstantial factors).
- An estimate of current Burmeister's porpoise bycatch by extrapolation from the observed bycatch per unit of effort, which could be applied to data from the nationwide census of artisanal fisheries in September 2004.
- Compilation, analysis, and publication of substantial existing datasets that are relevant to this problem.

Finally, there is a need for aggressive enforcement of the existing measures. Peru is a disturbing case study for incidences where bycatch of small cetaceans becomes a market in cetacean meat and a gateway to direct harvests. If dusky dolphins and Burmeister's porpoises are to survive, mortality of these species must be drastically reduced and the existing laws fully enforced.

¹¹⁵ Van Waerebeek, *supra*, note 95. See also: Van Waerebeek, K., Alfaro-Shigueto, J., Montes, D., Onton, K., Santillan, L., Van Bresseem, M.-F., and Vega, D. 2002. Fisheries-related mortality of small cetaceans in neritic waters of Peru in 1999–2001. International Whaling Commission, Scientific Committee Document SC/54/SM10, Cambridge, UK.

¹¹⁶ *Id.*

CHAPTER 3. U.S. TOOLS FOR INTERNATIONAL CONSERVATION

The Marine Mammal Protection Act of 1972 provides some of the tools necessary to engage in activities to mitigate cetacean bycatch beyond the U.S. EEZ. From the inception of the MMPA, the Congress placed a strong injunction on the Department of State to develop “new arrangements for protection of these animals [marine mammals] and of ocean ecosystems that are significant to their welfare.”¹¹⁷ Congress also acknowledged that “unilateral action by the U.S.” affecting any species or subspecies of marine mammals could be fruitless unless other nations involved in the taking of marine mammals work with the U.S. to preserve and protect these creatures.”¹¹⁸

Marine Mammal Protection Act

Section 101 Embargo Provisions (non-tuna dolphin embargo provisions)

The MMPA requires a general prohibition of “taking” (harassment, hunting, capture, killing or attempt thereof) and importation into the U.S. of marine mammals, except where an exception is explicitly authorized. The act’s stated goal is that the incidental kill or serious injury of marine mammals in the course of commercial fishing be reduced to insignificant levels approaching zero.¹¹⁹ The MMPA is enforced by the National Marine Fisheries Service (NMFS) of the National Oceanic and Atmospheric Administration (NOAA) of the Department of Commerce. The U.S. Customs Service, within the Department of Homeland Security enforces the provisions regarding importation.

Section 101(a)(2) of the MMPA authorizes limited incidental taking of marine mammals by U.S. fishermen in the course of commercial fishing pursuant to a permit issued by NMFS, in conformity with and governed by certain statutory criteria in sections 103, 104, and 118 and implementing regulations. Section 101(a)(2) of the MMPA also states, “The Secretary of Treasury shall ban the importation of commercial fish or products from fish which have been caught with commercial fishing technology which results in the incidental kill or incidental serious injury of ocean mammals in excess of U.S. standards“. This prohibition is mandatory. Subparagraph (A) requires the Secretary to “insist on reasonable proof from the government of any nation from which fish or fish products will be exported to the U.S. of the effects on ocean mammals of the commercial fishing technology in use for such fish or fish products exported from such nation to the U.S.”¹²⁰

Outside the tuna-dolphin issue, these provisions have been only used once to bring about reductions in cetacean bycatch or direct harvests. Protecting marine mammals from direct takes, such as for crab bait as discussed in Chapter 2, was the primary focus of discussions during the initiation of a bilateral agreement between the U.S. and Chile in the 1990s. Since those initial meetings, the two sides have discussed conducting joint research on cetaceans and Chile has received information from the U.S. on whale watching regulations. The U.S. has requested information from Chile regarding its marine mammal data collection and research programs.

¹¹⁷ Report 92-707 House of Representatives, 92d Congress, 1st Session page 18

¹¹⁸ Report 92-863 Senate 92d Congress 2d Session page 10

¹¹⁹ 16 U.S.C 1372 (a)(2)

¹²⁰ 16 U.S.C 1372 (a)(2)(A)

Section 108 International Provisions

The MMPA requires the Secretary of Commerce, working through the Secretary of State, to initiate negotiations “as soon as possible” for the development of bilateral or multilateral agreements with other nations for the protection and conservation of all marine mammals covered by the MMPA.¹²¹

Many of the provisions in section 108 relate to bycatch reduction, calling on the Secretary of State to initiate negotiations with all foreign governments engaged in commercial fishing found to be unduly harmful to any species or population stock of marine mammal to develop bilateral and multilateral treaties with such countries to protect marine mammals.¹²² Likewise, this subsection also calls upon the Secretary of State to enter into international arrangements (either through the Inter-American Tropical Tuna Commission or such other bilateral or multilateral institutions) for the conservation of marine mammals caught incidentally in the course of harvesting yellowfin tuna with purse seines.¹²³

The final two provisions of section 108(a) call on the Secretary of State to seek to amend any existing international treaty to which the U.S. is a party for the protection and conservation of any species of marine mammal, to make such treaty consistent with the purposes and policies of the MMPA, and to seek an international ministerial meeting on marine mammals by July 1, 1973, to negotiate a binding international convention for the protection and conservation of all marine mammals.¹²⁴

With the exception of the provisions related to the Inter-American Tropical Tuna Commission, these provisions have gone largely unused by either the Department of Commerce or Department of State. Congressional oversight has focused on the incidental capture of dolphins in tuna purse-seine nets and not on other forms of international bycatch. Therefore, with limited resources provided to both agencies, the priority has been action to reduce the bycatch of dolphins in the yellowfin tuna fishery and very little effort has been expended to initiate bilateral discussion, modify existing international treaties, or initiate a new international convention to address other forms of global bycatch.

Magnuson-Stevens Fishery Conservation and Management Act

In 2006 the Congress reauthorized provisions of the Magnuson-Stevens Fishery Conservation and Management Act (M-SFCMA),¹²⁵ the law governing how the U.S. manages fisheries within its EEZ. The reauthorization also directed substantial attention on fishing issues outside U.S. waters, particularly illegal, unregulated and unreported fishing (IUU) and bycatch. Although aimed primarily at strengthening U.S. leadership in international conservation and management of fisheries¹²⁶ for purposes of leveling the playing field between the U.S. fleet and

¹²¹ 16 U.S.C. § 1378(a)(1)

¹²² 16 U.S.C. § 1378 (a)(2)(A)

¹²³ 16 U.S.C. § 1378 (a)(2)(B)

¹²⁴ 16 U.S.C. § 1378 (a)(4) and (5)

¹²⁵ 16 U.S.C. §§1801-1882 (1976), Pub. L. 94-265, as amended by H.R. 5946, Dec. 2006. Signed into law Jan 12, 2007.

¹²⁶ Report of the Committee on Commerce, Science & Transportation on S.2012, Magnuson-Stevens Fishery Conservation and Management Act Reauthorization Act of 2005. April 4, 2006. S. Rpt. 109-229. The Senate Report notes that restrictions placed on U.S. vessels to protect endangered or protected species “disadvantage U.S. fleets

those of other nations, the new provisions have strong bycatch language applicable to marine mammals.

The international title of the reauthorization creates a new section in the M-SFCMA, authorizing the Secretary to promote improved monitoring and compliance for high seas fisheries or fisheries governed by international or regional fishery management agreements.¹²⁷ Among other provisions, the section calls for improved communication and information exchange among law enforcement organizations, an international monitoring network, an international vessel registry, expansion of remote sensing technology, technical assistance to developing countries and support of a global vessel monitoring system for large vessels by the end of 2008.¹²⁸

Section 403 of the reauthorization's international provisions amends the High Seas Driftnet Fisheries Enforcement Act by adding four new sections: a requirement for a biennial report on international compliance; action to strengthen regional fishery management organizations; identification and listing of nations whose vessels participate in IUU fishing; and identification and listing of nations that "fail to end or reduce bycatch of protected living marine resources by using regulatory measures that are comparable to those of the United States, taking into account different conditions."¹²⁹ The amendment defines "protected living marine resource" to mean non-target fish, sea turtles, or marine mammals that are protected under U.S. law or international agreement.¹³⁰

The listing provisions are very comparable to certification under the Pelly and Packwood amendments (see below). The Secretary of Commerce determines whether a nation has taken appropriate corrective action in response to illegal fishing, gives the offending party notice and opportunity for comment, and then certifies to Congress whether it has provided documentary evidence of corrective action.¹³¹ A similar procedure is required for bycatch of protected living marine resources in international waters or of a protected resource shared by the U.S. The certification must demonstrate that:

- the vessels have had bycatch in the prior year,
- the relevant organization has failed to implement measures to reduce such bycatch,
- the nation is not a party to a relevant organization, or
- the nation has not adopted a bycatch reduction program comparable to that of the U.S.¹³²

After a notification and consultation process that gives the international community time to respond under relevant agreements, amend existing treaties or develop new instruments, the list of certified nations is provided to Congress and the sanctions of the Driftnet Enforcement Act

and fail to address the problem" because the harmful fishing practices continue by other fleets in high seas fisheries. S.Rpt. at 43.

¹²⁷ Section 207(a)

¹²⁸ Section 207(b) (1) – (7).

¹²⁹ S.Rpt. 109-229 at 45, H.R. 5946, Sec. 610.

¹³⁰ H.R. 5946, Sec. 610(e)

¹³¹ H.R. 5946, Sec. 609.

¹³² H.R. 5946, Sec. 610(a)(1)-(3)

may be applied.¹³³ An alternative procedure allows for certification on a shipment-by-shipment or shipper-by-shipper basis of fish or fish products.

The measure calls for the Secretary of Commerce and Secretary of State to provide assistance to nations or organizations to help them develop gear and management plans that will reduce bycatch.¹³⁴

International Dolphin Conservation Protection Act

The history of the dolphins dying in tuna purse-seine nets is a lengthy one and will not be repeated in this report. This issue was one of the driving forces behind the enactment of MMPA.¹³⁵ As stated earlier, the law created a ban upon “the importation of commercial fish or products from fish which have been caught with commercial fishing technology which results in the incidental kill or incidental serious injury of ocean mammals in excess of U.S. standards.”¹³⁶ In 1984 and 1988, Congress amended section 101(a)(2) of MMPA to require governments of nations that export yellowfin tuna harvested in the purse-seine fishery in the Eastern Tropical Pacific Ocean (ETP) to provide documentary evidence that the government has adopted a regulatory program governing the taking of marine mammals that is comparable to that of the U.S. and that the average rate of incidental taking of the harvesting nations is comparable to that of the U.S.

Subsequently, Mexico, an embargoed nation, and the EU, an embargoed intermediary nation, requested that a dispute-settlement panel be established pursuant to the General Agreement on Tariffs and Trade (GATT). The GATT panels issued decisions in favor of Mexico and the EU, but the GATT Council did not adopt either decision. This decision precipitated, in 1992, enactment of the International Dolphin Conservation Act of 1992 (IDCA).¹³⁷ The IDCA amended the MMPA to (1) impose a five-year moratorium on the harvesting of tuna with purse-seine nets deployed on or to encircle dolphins; and (2) lift the tuna embargo for those nations that made a declared commitment to implement the moratorium and take other steps to reduce dolphin mortality. No nation issued intent to honor the provisions of the IDCA.¹³⁸

In October of 1995, the U.S. and eleven other nations signed the Panama Declaration. In this declaration these nations made commitments to strengthen the protection of dolphins and negotiate a new binding agreement to establish the IDCP, but only if the U.S. amended its laws to (1) lift the embargoes imposed under the MMPA; (2) permit the sale of both dolphin-safe and non-dolphin safe tuna in the U.S. market; and (3) change the definition of “dolphin safe tuna” to mean “tuna harvested without dolphin mortality.”

In 1997, Congress enacted the IDCPA,¹³⁹ which revised the criteria for banning imports by amending the MMPA. Pursuant to this amendment, nations are permitted to export tuna to the U.S. if a nation provides documentary evidence that it (1) participates in the IDCP and is a member (or applicant member) of the Inter-American Tropical Tuna Commission; (2) is meeting

¹³³ H.R. 5946, Sec. 610(c)(5)

¹³⁴ S.Rpt. 109-229 at 12.

¹³⁵ Pub. L. No. 92-522, 86 Stat. 1027

¹³⁶ 16 U.S.C.A. § 1371(a)(2)

¹³⁷ Pub. L. No. 102-523, 106 Stat. 3425 (1992).

¹³⁸ H.R. Rep. No. 105-74(I), at 14, 1997 U.S.C.C.A.N. at 1632.

¹³⁹ Pub. L. No. 105-42, 111 Stat. 1122 (1997).

its obligations under the IDCP and the Inter-American Tropical Tuna Commission; and (3) does not exceed certain dolphin mortality limits.¹⁴⁰

As a result of amendments to the MMPA made by the IDCPA, the trade restrictions for intermediary countries were eliminated, and provisions were put in place to lift the embargoes on yellowfin tuna harvested by setting purse-seine nets on dolphins in the eastern Pacific Ocean. Since then, the embargoes were lifted for Ecuador, Mexico, and El Salvador. Spain also has been issued an affirmative finding and can export to the U.S. yellowfin tuna caught in the ETP using purse seines. To date the following nations remain embargoed: Belize, Bolivia, Colombia, Guatemala, Honduras, Nicaragua, Panama, Vanuatu, Venezuela, and Peru. Currently, there are no intermediary nations identified by NMFS subject to import prohibitions.¹⁴¹

Whaling Convention Act

The Whaling Convention Act of 1949¹⁴² authorizes the Secretary of Commerce to enforce the provisions of the International Convention for the Regulation of Whaling and to issue regulations necessary for this purpose. Regulations can be found at 50 CFR Parts 230 and 351. The Secretary is authorized and directed to administer and enforce all provisions of the convention, this act, and regulations promulgated pursuant to this act. In conducting the duties prescribed under this act, the Secretary of Commerce cooperates with other agencies of the federal government, state governments, or other independent institutions. The Secretary may also cooperate with any agency from any other government of any party to the convention.

Under this act, it is illegal for any person under U.S. jurisdiction to engage in any act prohibited or not do any act required by the convention, this act, or any regulations promulgated by the Secretary of Commerce pursuant to this act. It is also illegal to ship, transport, purchase, sell, offer for sale, import, export, or have in possession any whale or whale products taken in violation of the convention, this act, or any regulation promulgated by the Secretary of Commerce pursuant to this act. The prohibitions of this act do not preclude the taking of whales for scientific investigation, with the approval of the Secretary.

To the extent that the convention applies to the U.S., the Secretary of Commerce issues regulations deemed necessary to further the goals of the convention.

As part of the international program anticipated under the act, Section 917(c) calls for appropriate bilateral agreements with Mexico and Canada for the protection and conservation of whales.¹⁴³ Even though no specific bilaterals have ever been negotiated, considerable cooperative research on marine mammals has taken place between the U.S. and Mexico in addition to work conducted under the tuna-dolphin program. Examples include population surveys for vaquita, gray whales, Gulf of Mexico bottlenose dolphins, and cooperative surveys of pinniped populations. Collaborative research has taken place on genetic studies for California sea lions, bottlenose dolphins, and sperm whales. The countries have also exchanged information on marine mammal bycatch from their respective longline observer programs and on coordinating responses to marine mammal strandings.

¹⁴⁰ Id. at § 4, 111 Stat. at 1123-1124 (codified at 16 U.S.C.A. 1371(a)(2)(B)).

¹⁴¹ <http://swr.nmfs.noaa.gov/psd/embargo2.htm>

¹⁴² 16 USC 916-9161; Act of August 9, 1950, as amended

¹⁴³ 16 U.S.C. 917(c). However, this provision is generally thought to be superceded by the MMPA.

Endangered Species Act

The U.S. Endangered Species Act (ESA) was enacted in 1973 to provide for the conservation of species “which are in danger of extinction throughout all or a significant portion of their range.”¹⁴⁴ The act operates through listings of species as either threatened or endangered, which then triggers action for protection of critical habitat and development of recovery plans. In addition to its provisions for protecting and recovering these species within U.S. jurisdiction, ESA reaches beyond U.S. borders to protect endangered species both through its own provisions and through U.S. implementation of the Convention on International Trade in Endangered Species (CITES). CITES operates primarily by controlling trade of listed species. Species are listed under various appendices, depending on their status. See Chapter 4 for a full discussion of the provisions of the treaty.

International Cooperation under the ESA

The U.S. president, with the foreign country’s consent, may use foreign currencies to provide assistance for any listed endangered or threatened species, which may include acquisition of lands, waters or interests therein. These currencies must be used in preference to funds appropriated under §1542 of the Act.

Additionally, the Secretary of Commerce, through the Secretary of State, must encourage foreign countries to provide for the conservation of fish, wildlife and plants, including listed species; enter into bilateral or multilateral agreements for this purpose; encourage and assist foreign persons who take fish, wildlife and plants for import to the U.S. for commercial or other purposes to develop and carry out conservation procedures. Further, the Secretary of Commerce may provide personnel and financial assistance for the training of foreign personnel and for research and law enforcement, and may conduct law enforcement investigations and research abroad as necessary to carry out the Act.¹⁴⁵

For purposes of the Convention on International Trade in Endangered Species of Wild Fauna and Flora, the Secretary of the Interior is designated as the management authority and the scientific authority, with the functions of the authorities to be carried out by the U.S. Fish and Wildlife Service. The Secretary of the Interior must give advice and make determinations under Article IV of CITES based on the best available biological information derived from professionally accepted wildlife management practices, but is not required to make population estimates. If the United States votes against including a species under CITES and does not enter a reservation pursuant to CITES, the Secretary of State must submit a report to the appropriate Senate and House committees.

The Secretary of Interior in cooperation with the Secretary of State and other secretaries, represents the U.S. regarding the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere (the Western Convention). The Interior Secretary must take steps to implement the Western Convention, including developing personnel resources and programs, identifying species, habitats, and cooperative measures to ensure that species of migrating birds will not become threatened or endangered, and by identifying measures for the protection of wild plants.

¹⁴⁴ 16 U.S.C. 1531-1543 (1976), Pub. L. 93-205, 87 Stat. 884, as amended.

¹⁴⁵ 16 U.S.C. 1537.

Agency Action

The MMPA places authority for protection of marine mammals in the Department of Commerce. Since 1972, the management authority has been delegated through NOAA to NMFS, Office of Protected Resources.

Many of the agency's ESA activities involve its duty to develop strategies for the conservation and survival of endangered and threatened species. In the area of marine mammals, the ESA and the MMPA offer similar management authority for endangered and threatened marine mammal species or stocks. Section 4(f) of the ESA requires the development and implementation of recovery conservation plans, while §115 of the MMPA mandates conservation plans modeled after the ESA for listed species. NMFS has recovery or conservation plans in place for North Pacific fur seals, Hawaiian monk seals, Steller sea lions, right whales, blue whales, and humpback whales. Consultations occur on an ongoing basis, under §7 of the ESA, with federal action agencies to avoid or mitigate the impacts of their activities on listed species. NMFS also reviews nonfederal activities that may affect listed species and issues §10 permits for incidental bycatch.

Pelly Amendment

In the years after the signing of the Convention for the Regulation of Whaling, it became clear the convention had no clear mandate for conservation.¹⁴⁶ The U.S. used instead the leverage it could apply through the MMPA, the Pelly Amendment and the Packwood Amendment to the Fishery Conservation and Management Act. Under these laws various official determinations about foreign government policies or production practices are deemed certifications under Pelly and are handled like any other certification. Some of these determinations involve international treaties and some do not.

The 1971 Pelly Amendment to the Fishermen's Protective Act¹⁴⁷ authorizes the U.S. president to prohibit the importation of products from countries that allow fishing operations that diminish the effectiveness of an international fishery conservation program or that engage in trade or taking that diminishes the effectiveness of an international program for endangered or threatened species. Specifically, the Secretary of Commerce, upon determination that foreign nationals are conducting fishing operations in a way that diminishes the effectiveness of international fishery conservation programs, is directed to certify such to the president. The secretary also has the responsibility to certify to the president when foreign nationals are engaging in trade or taking in a manner that diminishes the effectiveness of any international program for endangered or threatened species. Upon receipt of certification, the President may direct the Secretary of the Treasury to prohibit the importation into the U.S. of any products from the offending country for a period of time the President determines and to the extent prohibition is sanctioned by the General Agreement on Tariffs and Trade. The secretary also periodically reviews the activities of the offending nations to determine if the reasons for the certification still prevail. If the reasons no longer prevail, the secretary revokes the certification and publishes a notice thereof in the *Federal Register*.

While the Pelly Amendment is the most noteworthy section of the act for wildlife conservation purposes, the act also provides for federal reimbursement of money paid by owners to secure the release of fishing vessels improperly seized by foreign countries. In

¹⁴⁶ Bean, M. 1983. *The Evolution of National Wildlife Law*. Praeger. New York. 448 pages, at 265.

¹⁴⁷ 22 U.S.C. 1978

addition, the act sets up a fund to compensate owners for damage to or destruction of their fishing vessel or gear.

Under Section 1821 of the Fishery Conservation and Management Act of 1976, also known as the Packwood-Magnuson Amendment, a certification by the Secretary of Commerce that foreign nationals are “engaging in trade or taking” that diminishes the effectiveness of the International Whaling Convention is deemed a Pelly certification. The only way this provision expands potential application of Pelly is by mandating certification for trade in whales even though they may not be endangered.

Under the MMPA amendments of 1988, the Secretary of Commerce must certify under Pelly any nation whose yellowfin tuna is embargoed whenever the embargo continues for more than six months.

If, under the Fishery Conservation Amendments of 1990, the Secretary of Commerce finds that a nation is engaging in trade in unlawfully taken anadromous fish or fish products, that finding is deemed a Pelly certification.

History of Pelly Applications Related to Marine Mammals

This subsection provides a short case history of a few Pelly episodes related to marine mammals. For purposes of the following, the authors deem as successful those episodes where the Pelly threat led to a significant concurrent change in the target country’s policy in the direction sought by the U.S. government. Thus a commitment to greater adherence to international standards by a foreign government would be deemed successful.

1974—Japan and Soviet Union

In 1974, the Secretary of Commerce certified Japan and the Soviet Union for exceeding the International Whaling Commission’s (IWC) minke whale quota for 1973–1974. Both countries had objected to the IWC quota, however, and were therefore not legally bound by it. In announcing that he had decided against imposing sanctions, President Ford explained that both countries had voted for the 1974–1975 quotas, which incorporated conservation improvements. He also explained that imposing sanctions against Japan would result in higher prices for American consumers. These episodes are rated as successful because the two countries agreed to the IWC quota for the next year.

1986—Norway

In 1986, the Secretary of Commerce certified Norway for violating the IWC moratorium on commercial whaling. Norway had objected to the zero quotas and was therefore not bound by them. Less than a month after the Pelly certification, Norway announced that it would suspend commercial whaling after the 1987 season and would reduce its catch for that year. President Reagan then decided not to impose sanctions. This episode is rated as successful because Norway agreed to suspend commercial whaling after that season.

1990—Norway

In 1990, the Secretary of Commerce certified Norway for taking minke whales in violation of IWC research criteria. In announcing that he would not impose sanctions, President Bush stated that Norway was making progress in its “program and presentation” and noted current efforts to improve United States–Norwegian scientific consultations. This episode is rated as unsuccessful because Pelly did not affect Norway’s whale-hunting behavior.

1993—Norway

In August 1993, the Secretary of Commerce certified Norway for violating the IWC zero catch limit on minke whales by killing 157 whales. Norway argued that the minke whale was not endangered. The IWC, however, included this whale in its zero catch limit. Moreover, the minke whale is on CITES Appendix I. Norway also argued that it was not legally bound by the zero catch limit because it had entered a reservation under IWC procedures. In October 1993, President Clinton stated that, although “Norway’s action is serious enough to justify sanctions,” he would nevertheless not impose them. This episode is rated as unsuccessful because Pelly did not affect Norway’s behavior.

1996—Canada

In December 1996, the Secretary of Commerce certified Canada for allowing its Inuit to take two bowhead whales from a highly endangered stock in the eastern Canadian arctic. Neither hunt was authorized by the IWC, which had expressed particular concern about whaling in the eastern Canadian arctic, where bowhead stocks are not known to be recovering. Canada was not a member of the IWC, withdrawing in 1982 and stating at the time that it no longer had any direct interest in the whaling industry or in the related activities of the IWC. This episode is rated as unsuccessful because Pelly did not affect Canada’s behavior—it did not cease hunting nor did it return to the IWC.

2004—Iceland

In 2003, Iceland announced that it would begin a lethal, research whaling program and planned to take 250 minke, fin, and sei whales for research purposes. On June 16, 2004, the Secretary of Commerce certified Iceland for its lethal research whaling. The U.S. and a majority of the IWC nations questioned the scientific validity of Iceland’s research whaling program. Iceland reduced its proposed take to 38 minke whales and actually killed 36 whales. President Bush did not impose trade sanctions on Icelandic products for the whaling activities, but directed U.S. delegations to seek ways to halt these whaling operations in its bilateral discussions with Iceland. This episode is deemed unsuccessful as Iceland announced its intention to resume commercial whaling.

CHAPTER 4. INTERNATIONAL AGREEMENTS RELATED TO BYCATCH

The previous chapter discussed U.S. law and policy that provide mechanisms for action to reduce bycatch of marine mammals in fishing operations. The U.S. is party to numerous international agreements related to marine mammal protection as well as to fishery agreements that have bycatch-reduction provisions. Another source of authority for action or diplomatic initiatives is the collection of regional agreements to which the U.S. is party. The increasing role of regional fishery management organizations in reaching out to both coastal states and fishing nations, whether they are contracting parties or not, may provide an additional venue for discussion of marine mammal bycatch in fisheries. Finally, the 2006 amendments to the Magnuson-Stevens Fishery Conservation and Management Act place a considerable burden on the U.S. to evaluate bycatch in international fisheries and take action to press fishing nations to reduce incidental catch of protected species such as cetaceans.

This report does not describe all of these instruments. The agreements discussed here and in Chapter 5 are included in Appendix B with lists of the parties to each instrument. In 1997, the U.S. Marine Mammal Commission published a *Compendium of Selected Treaties, International Agreements and Other Relevant Documents* related to marine mammal and wildlife conservation. This exhaustive resource provided the basis for much of the material covered. The following section concentrates on a few international tools and the relevant agreements that relate to the “hot spots,” or areas where the most significant incidental bycatch requires urgent action, based on the analysis presented in Chapter 5.

The global framework for conservation of living marine resources includes agreements that apply to all the seas, some that cover specific seas or regions, and some that govern ocean areas that are used by numerous coastal and flag nations. This chapter provides a compilation of agreements that relate directly to cetacean bycatch, or might be applied to actions to reduce cetacean bycatch. It presents global agreements for wildlife, fisheries and the marine environment first then discusses regional agreements for wildlife, fisheries and the environment. Finally, the chapter examines the emergence of an increased role for regional fishery management organizations in bycatch reduction, and the creation of several new regional fishery management organizations (RFMOs) that might be tasked with preventing bycatch of non-target species and protected species in the course of fishing.

Background

For centuries, customary international law and practice embraced the concept of *mare liberum*, freedom of the seas. Many assumptions that flowed from this principle continued until as recently as the 1980s and 1990s: anyone possessing the wherewithal to ply the seas and cast nets was free to fish; anyone wanting to impose restrictions on fishing bore the burden of proof to demonstrate the activity was harmful; fish, like wildlife, belonged to the state, which was the decision-maker on issues of access and other rights in the living resources of the sea. Even the inception of the International Whaling Commission in the 1940s was for the purpose of “regulating whaling,” an activity that was seen as just another kind of fishing.

It was not until the 1970s that international public opinion raised the notion that marine mammals were species of “special concern.” This era saw the beginning of a policy shift toward protecting marine mammals, rather than managing their exploitation.

In addition to agreements that are aimed specifically at protecting marine mammals, it is necessary to examine fishery management in an international context through several important agreements that changed the traditional freedom of seas approach to fisheries and led to the

emergence of the precautionary approach. These include the fishing provisions of the 1982 Convention on the Law of the Sea¹⁴⁸ (UNCLOS), the so-called U.N. Fish Stocks Agreement (UNFSA),¹⁴⁹ and the FAO Code of Conduct for Responsible Fisheries (Code of Conduct).¹⁵⁰ Sections briefly summarize a number of other important international and regional agreements that govern fisheries, including the Convention on the Conservation of Antarctic Marine Living Resources¹⁵¹, the International Convention for the Conservation of Atlantic Tunas,¹⁵² the Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean,¹⁵³ and the North Atlantic Fisheries Organization.¹⁵⁴

The role of regional fishery management organizations is explored as a tool for managing resources that cross jurisdictions and as a means to access decision-making bodies that may be able to influence fishing methods that pose harm to cetacean populations through bycatch. The emerging influence of trade, labeling, certification, product tracking, and similar regimes on international fishery management and their potential for reducing marine mammal bycatch are examined in Chapter 6.

International Tools for Reducing Bycatch

For most of human history people have seen the ocean as a frontier to be explored or a limitless and unchangeable source of fish. Hugo Grotius first expressed the philosophy of freedom of the seas in an anonymously published essay in November 1608 in defense of the rights of the Dutch East India Company to trade in waters claimed by Spain or Portugal.¹⁵⁵ Historically, fishing fleets took advantage of access to the richest fishing grounds—relatively shallow areas on the continental shelf—no matter where they were. It was not until after World War II that within their own waters, states exercised control over who fished and how much they caught. Beyond the territorial zone, access to fisheries continued to remain open and subject only to such regulations as their flag state imposed.¹⁵⁶ In the early nineteenth century, increased exploitation of fisheries led several coastal states to enter explicit bilateral and multilateral

¹⁴⁸ The Third United Nations Convention on the Law of the Sea, Dec. 10, 1982, 21 I.L.M. 1245. (Entered into force 16 November 1994.)

¹⁴⁹ The Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, *Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks*. U.N. Doc. A/Conf./164/37.

¹⁵⁰ United Nations Food and Agriculture Organization. Code of Conduct for Responsible Fisheries. Rome. 1995.

¹⁵¹ Convention on the Conservation of Antarctic Marine Living Resources, 20 May 1980. 33 U.S.T 3476.

¹⁵² International Convention for the Conservation of Atlantic Tunas. Done at Rio de Janeiro, 14 May 1966. 20 U.S.T 2887.

¹⁵³ Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. Done at Honolulu, 5 September 2000. Available at <http://www.wcpfc.int/>. Last accessed 17 November 2006.

¹⁵⁴ The Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries. Done at Ottawa 24 October 1978. Senate Executive Treaty Series 96th Cong. 1st Sess. (Entered into force 1 January 1979.)

¹⁵⁵ Hugo Grotius, *Mare Liberum or The Freedom of the Seas or the Right Which Belongs to the Dutch to Take Part in the East Indian Trade*, Oxford University Press (New York 1916).

¹⁵⁶ Burke, *The New International Law of Fisheries*, 2-6 Clarendon Press (Oxford 1994).

agreements to conserve and manage fisheries.¹⁵⁷ However, even where a multilateral institution was created by such agreements, the fishing nations and the coastal states generally were not willing to confer on such institutions the authority needed to enforce the rules. Therefore, few of the world's fisheries were subjected to meaningful management.¹⁵⁸

Over the past 40 years, the international law of fisheries has evolved from absolute freedom of the seas and unencumbered access to fishing, through assertion and extension of the rights of coastal states to protect their fisheries and fleets, to some limitations on fishing fleets operating in the zones of coastal states, to consensual limitations on vessels operating on the high seas, and finally to the current situation, where the right of freedom of fishing is restricted.

Attempts at widespread international agreement on fishery management were unsuccessful until the 1982 United Nations Conference on the Law of the Sea (UNCLOS III). With it came recognition of the extension of coastal state jurisdiction to 200 miles, and for the first time, the freedom of fishing on the high seas was circumscribed. In addition to reaffirming the right of coastal states to manage the living marine resources within their 200-mile zones, the convention placed qualifications on the rights of distant water fishing fleets fishing on the high seas.

UNCLOS III: Fishery Management Provisions of the Law of the Sea Treaty (Fisheries Articles 56, 61, 63, 64)

The 1982 UN Convention on the Law of the Sea is the overarching body of law covering every aspect of marine endeavor from transportation to pollution to military issues to scientific research. In its sections on protection of living marine resources, the Convention sets out the rights and responsibilities of coastal states and flag states with regard to fishing. While the Convention conferred economic rights over resources to coastal states, it preserved the traditional notion of freedom of fishing on the high seas. Although the Convention only entered into force in 1994, its provisions and policies have been recognized as customary international law since the late 1980s.¹⁵⁹

Article 56 of the Convention gives coastal states sovereign rights over resources out to 200 miles.¹⁶⁰ This includes the authority to conserve and manage living resources.¹⁶¹ The coastal nation must ensure, using best scientific information available and conservation and management measures, that the living resources of the EEZ are not threatened by overexploitation.¹⁶² The Convention adopts MSY as the goal for maintaining or restoring exploited populations.¹⁶³ The coastal state is to collect, contribute and exchange scientific

¹⁵⁷ Louis B. Sohn & Kristen Gustafson, *The Law of the Sea* 115 (1984).

¹⁵⁸ William Burke, Remarks at University of Washington on Fisheries Law, at 3-1 (1992), cited in Iudicello and Lytle (1994).

¹⁵⁹ David Hunter, James Salzman and Durwood Zaelke, "International Environmental Law and Policy," Foundation Press (2002) at 659.

¹⁶⁰ UNCLOS, *supra* note 1 at Art. 56.

¹⁶¹ *Id.* at Art. 61.

¹⁶² *Id.* at Art. 61(2).

¹⁶³ *Id.* at Art. 61(3). "The concept of maximum sustainable yield recognizes that fisheries must be managed so that fish stocks can be sustainably caught year after year without causing the population of fish stocks to decline. 50 CFR

information, catch and effort statistics with other concerned states.¹⁶⁴ Access to the zone by foreign fleets is solely within coastal state discretion and subject to its laws and regulations, including requirements for licensing, observers and other conservation measures; compliance with conservation and management measures is required.¹⁶⁵ The convention directs states to seek coordinated measures necessary to conserve stocks that occur within the zones of two or more coastal states, or adjacent to their zones.¹⁶⁶ With regard to highly migratory species, UNCLOS calls for cooperation through international organizations, and where none exists, for the establishment of such organizations “with a view to ensuring conservation and promoting the objective of optimum utilization of such species throughout the region, both within and beyond the exclusive economic zone”.¹⁶⁷ The 1982 conference even imposed new obligations on high seas fishing states. While freedom of fishing on the high seas continues in principle, the Convention can be read as imposing a dual responsibility on fishing nations: conservation and cooperation with coastal states.¹⁶⁸

Even though the 1982 LOS Convention provided a new framework for better fisheries management, the extended jurisdiction of coastal states to 200 miles was insufficient to protect ocean fisheries.¹⁶⁹ As fleets, technology and the demand for fish and fishery products grew, it became clear by the late 1980s that the world’s fish populations could not withstand continuing rapid and often uncontrolled exploitation and development. Reports of violence, confrontations between fishing nations, uncontrolled fishing on the high seas, and—for the first time in history—several consecutive years of declines in world catches led to a series of meetings and conferences where fishery experts called for action to control high seas fishing. In 1991, the Committee on Fisheries (COFI) called for the development of new concepts to foster responsible, sustained fisheries.¹⁷⁰ This was followed by an International Conference on

602.11(d)(1)... Scientists assume that population levels at 40% of unfished abundance (or biomass) are close to MSY, and that populations are overfished when levels fall below half the MSY level, roughly 20% of unfished abundance.” However, MSY does not necessarily signify healthy fish populations, and should be viewed as a minimum target used in conjunction with precautionary and ecosystem management approaches. See Tim Eichenberg and Mitchell Shapson, “The Promise of Johannesburg: Fisheries and the World Summit on Sustainable Development, 34 Golden Gate University Law Review 587 at 624-626.

¹⁶⁴ UNCLOS, *supra* note 1, at Art. 61(5).

¹⁶⁵ *Id.* at Art. 62.

¹⁶⁶ *Id.* at Art. 63.

¹⁶⁷ *Id.* at Art. 64.

¹⁶⁸ Louis B. Sohn & Kristen Gustafson, *The Law of the Sea* 115 (1984). UNCLOS imposes duties on all states to take “such measures for their respective nationals as may be necessary for the conservation of the living resources of the high seas,” Article 117; to cooperate “in the conservation and management of living resources” of the high seas, Article 118; and to “maintain or restore populations of harvested species at levels which can produce maximum sustainable yield,” Article 119.

¹⁶⁹ FAO. *The State of World Fisheries and Aquaculture 2004* at Preface. Available at http://www.fao.org/sof/sofia/index_en.htm. Last accessed 9 May 2006.

¹⁷⁰ “The Committee on Fisheries (COFI), a subsidiary body of the FAO Council, was established by the FAO Conference at its Thirteenth Session in 1965. The Committee presently constitutes the only global inter-governmental forum where major international fisheries and aquaculture problems and issues are examined and recommendations addressed to governments, regional fishery bodies, NGOs, fishworkers, FAO and international community, periodically on a world-wide basis. COFI has also been used as a forum in which global agreements and non-binding instruments were negotiated.” Available at <http://www.fao.org/fi/body/cofi/cofi.asp>. Last accessed 3 May 2007.

Responsible Fishing in Cancun, Mexico in 1992, where participants adopted a Declaration stating that “States should cooperate...to establish, reinforce and implement effective means and mechanisms to ensure responsible fishing on the high seas.”¹⁷¹ These efforts culminated in the 1992 UN Conference on Environment and Development in Rio de Janeiro.¹⁷² Ten years later, at the World Summit on Sustainable Development, 191 nations agreed to a series of targets and timetables to restore depleted fish stocks, manage fishing capacity prevent IUU fishing, and create marine protected areas.¹⁷³

UNCED or the “Earth Summit,” concluded in June with the adoption of a list of recommendations, including a chapter on the marine environment. Specifically, Chapter 17.C of Agenda 21 called for the UN to find ways to conserve fish populations and prevent international conflicts over fishing on the high seas, consistent with the provisions of the Law of the Sea.¹⁷⁴

Code of Conduct for Responsible Fisheries

The FAO, recognizing these developments, “recommended the formulation of a global Code of Conduct for Responsible Fisheries which would...establish principles and standards applicable to the conservation, management and development of all fisheries.”¹⁷⁵ The FAO Conference adopted the Code unanimously on October 31, 1995. In its 12 Articles, the Code covers both policy and technical matters including fisheries management, fishing operations, aquaculture, coastal area development, research and trade.

The Code is voluntary, and to be adopted by parties through national legislation, but some provisions are binding because of their relation to other legal instruments.¹⁷⁶ The Code is directed toward all persons concerned with conservation, management or development of fisheries, processing, marketing or any “users of the aquatic environment in relation to fisheries.”¹⁷⁷ It provides principles and standards for every aspect of fisheries from aquaculture to capture, from research to fishing operations, processing to trade.¹⁷⁸

For the first time, the Code attaches an obligation to the freedom to fish, and calls for users of living marine resources to use them “in a responsible manner so as to ensure effective conservation and management.”¹⁷⁹ Inter-generational equity appears in the fishery context for the first time, as well, with the call for maintaining the diversity of fishery resources for “present and future generations” as well as for “food security, poverty alleviation and sustainable

¹⁷¹ International Conference on Responsible Fishing. Declaration of Cancun. Done at Cancun, Mexico 8 May 1992.

¹⁷² United Nations Conference on Environment and Development (1992) (hereinafter UNCED).

¹⁷³ See generally, www.johannesburgsummit.org, and “Report of the World Summit on Sustainable Development, available at <http://ods-dds-ny.un.org/UNDOC/GEN/N02/636/93/PDF/No263693.pdf>. Although the WSSD set a number of ambitious fishery timetables, it generally fell short of expectations and mechanisms to ensure the timetables are met. See Eichenberg and Shapson, *supra* note 28 at 588 and 624-636.

¹⁷⁴ Agenda 21 (UN Doc. A/CONF.151/26 (Vol. I-III)).

¹⁷⁵ FAO Code of Conduct, *supra* note 141.

¹⁷⁶ *Id.* at Art. I, 1.

¹⁷⁷ *Id.* at Art. II, 2.

¹⁷⁸ *Id.* at Art. I, 3.

¹⁷⁹ *Id.* at Art. VI, 1.

development.”¹⁸⁰ The Code urges effort controls, ecosystem management, the precautionary approach, selective fishing gear, habitat protection, and use of the best scientific information.¹⁸¹ It calls for not only monitoring and control of flag state vessels, but also cooperation at all levels and among jurisdictions, and cooperation to prevent disputes.¹⁸² In procedural recommendations, as well as substantive ones, the Code is far ahead of traditional fishery agreements. States are urged to conduct transparent decision making processes, education and training, provide safe and fair working conditions, and recognize and protect the rights of subsistence, small-scale and artisanal fishers.¹⁸³

Articles 7 through 12 provide specific guidance to states and interested parties on operational and technical matters. These have been further elaborated by a series of technical guidelines from the FAO. Many of the provisions provide further detail on the principles by setting out how, for example, application of the precautionary approach would occur in fishery management measures.¹⁸⁴

Management objectives include maintaining or restoring stocks to MSY, avoiding excess fishing capacity, protecting biodiversity and endangered species, assessing and mitigating adverse impacts from human activities, and minimizing pollution, waste, discards, ghost fishing, and bycatch. The Code recommends assessment of whole ecosystems and interrelationships, and directs states to consider the whole stock unit over its entire area of distribution.¹⁸⁵

Straddling Stocks Agreement

The most significant outcome of the fishery management directives from Agenda 21 was the Straddling Stocks Agreement (UN Fish Stocks Agreement or UNFSA)¹⁸⁶. This agreement has been called a “sea change” in international fishery management.¹⁸⁷ According to the UN, the agreement is considered to prescribe: “generally recommended international minimum standards” for conservation. As of August 2005, 52 states and the European community had become parties.¹⁸⁸

Following a conference to address the problems of high seas fishing convened on April 19, 1993, delegates met six times in negotiating sessions over the next two years, concluding a

¹⁸⁰ *Id.* at Art. VI, 2.

¹⁸¹ *Id.* at Art. VI, 3-8.

¹⁸² *Id.* at Arts. VI, 10-12; VI,15.

¹⁸³ *Id.* at Arts. VI, 13; VI, 16-18.

¹⁸⁴ *Id.* at Art. VI, 5.

¹⁸⁵ *Id.* at Arts II, VIII.

¹⁸⁶ Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982, Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (Status: entered into force December 2001)

¹⁸⁷ David Freestone. "International Fisheries Law: Who is Leading Whom?" The Magnuson Stevens Act: Sustainable Fisheries for the 21st Century? Tulane Law School Symposium, 7-9 Sept 1997. New Orleans, LA.

¹⁸⁸ UN, Chronological List of Ratifications. April 2007. Available at http://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm. Last visited 3 May 2007.

document that was open for signing on 4 December 1995. The Agreement establishes detailed minimum international standards for the conservation and management of straddling fish stocks and highly migratory fish stocks. It calls for compatible measures and effective high seas compliance and enforcement. It was the first time an international fishing agreement shifted focus from producing maximum food for humans to sustainable fishing, ecosystem protection, conservation of biodiversity, and the precautionary approach to fishery management.¹⁸⁹ It also is the first agreement to produce an actual methodology for the precautionary approach, setting up reference points, targets, and limits.¹⁹⁰ Most significantly, it denies (for party nations) unqualified access to fish on the high seas.¹⁹¹

The guiding principle that governs the 1995 Agreement is the duty to cooperate. This core concept is given specific new meaning, and the coastal nations and distant-water fishing nations of each region are now required to share data and manage the straddling fisheries together. Article 7(2) requires that "[c]onservation and management measures established for the high seas and those adopted for areas under national jurisdiction shall be compatible in order to ensure conservation and management of the straddling fish stocks and highly migratory fish stocks in their entirety" (emphasis added). This duty gives the coastal state a leadership role in determining the allowable catch to be taken from a stock that is found both within and outside its exclusive economic zone, as evidenced by the requirement in Article 7(2)(a) that contracting parties "take into account" the conservation measures established by the coastal state under Article 61 of the Law of the Sea Convention for its EEZ "and ensure that measures established in respect of such stocks for the high seas do not undermine the effectiveness of such measures." This polite diplomatic language indicates clearly that catch rates outside a 200-nautical-mile exclusive economic zone cannot differ significantly from those within the EEZ.

The UN Agreement does all this without creating a new international structure, relying instead on existing regional agreements and organizations, and calling for mechanisms to strengthen them. Where such agreements or organizations do not exist, the Agreement directs states to create them.¹⁹² The Agreement elaborates on the fundamental principle, established in the Convention, that States should cooperate to ensure conservation and promote the objective of the optimum utilization of fisheries resources both within and beyond the exclusive economic zone.¹⁹³

The agreement provided for subsequent conferences to assess the adequacy of the provisions and propose ways to strengthen its implementation. These conferences have resulted in declaration of additional objectives such as considering the regional, subregional and

¹⁸⁹ The approach includes these general features: identifying precautionary reference points for each stock, identifying in advance what measures will be adopted if reference points are exceeded, adopting cautious management for developing fisheries, monitoring impact on non-target species, and adopting emergency measures if continued fishing would increase the risk of depletion caused by a natural event. Freestone, *supra*, note 178.

¹⁹⁰ Fish Stocks Agreement, *supra* note 177 at Article 6, Annex II.

¹⁹¹ *Id.* at Article XVIII.

¹⁹² *Id.* at Art. VIII, 5.

¹⁹³ United Nations website. Available at http://www.un.org/Depts/los/convention_agreements/convention_overview_fish_stocks.htm. Last accessed 3 May 2007. Despite its many innovations, the Fish Stocks Agreement still suffers some of the limitations similar to other international fishery agreements such as the absence of major fishing nations and reliance on flag state enforcement. Eichenberg and Shapson, *supra* note 154 at 610.

global implementation of the Agreement. Informal consultations of states parties have met annually to continue review and oversight of the implementation of the agreement.¹⁹⁴

The following is a summary of the provisions of the Straddling Stocks Agreement:

Management Goal: The management goal of the UN Agreement, expressed in Article 2, is "to ensure the long-term conservation and sustainable use" of straddling fish stocks and highly migratory fish stocks.

Precautionary Approach: Article 6 and Annex II describe the precautionary approach. The core of the precautionary approach is to act cautiously but expeditiously when information is "uncertain, unreliable, or inadequate," in the words of the UN Agreement. The UN Agreement describes a process for applying this approach that includes the following general features:

- a) identifying precautionary reference points for each stock of fish;
- b) identifying in advance management measures that will be adopted if reference points are exceeded;
- c) adopting "cautious" management measures for developing fisheries, until information allows setting reference points;
- d) monitoring the impact of fishing on non-target species and developing plans to conserve them;
- e) adopting emergency measures if continued fishing would increase the risk of depletion caused by a natural event.

Compatibility of Measures: Article 7 requires compatibility between conservation measures on the high seas and those in the exclusive economic zones (EEZ) of coastal States. Among other considerations in determining compatibility, States are to take into account the biological unity of stocks and the distribution of the stocks, the fisheries, and the geography of the region. If compatible measures are not achieved, States are to use the procedures for dispute resolution identified in the UN Agreement.

Elements of Regional Agreements: According to Article 9, regional arrangements are to identify the stocks under management, the area of application, and the way in which a regional regime will obtain scientific advice.

Functions of Regional Regimes: Article 10 identifies 13 specific functions that may be summarized as follows:

- developing conservation measures in a timely manner;
- obtaining scientific advice;
- collecting, analyzing, and disseminating fisheries data;
- monitoring and enforcing conservation measures;
- insuring full cooperation of national agencies in implementation;
- identifying how new members will be accommodated; and
- promoting peaceful settlement of disputes.

¹⁹⁴ See, e.g. resolutions, report of 2006 conference, ICSP5/UNFSA/REP/INF.1. 26 April 2006. Available at http://www.un.org/Depts/los/convention_agreements/fishstocksmeetings/icsp5report.pdf.

Transparency: Article 12 calls for transparency in decision making by regional regimes and for the participation of intergovernmental and nongovernmental organizations, subject to procedural rules that are not "unduly restrictive."

Membership: Article 17 calls upon State members of regional regimes to request that non-participating States join the regime and to take action to deter activities that undermine the effectiveness of regional conservation regimes.

Flag State Responsibilities: Article 18 enumerates eight obligations of flag States, including maintaining an accessible registry of vessels authorized to fish on the high seas, requirements for vessel and gear marking and for timely reporting of catch and other information, national inspection and observer schemes, and measures to insure transshipment at sea does not undermine conservation measures.

Enforcement: Article 19 enumerates five obligations of flag States in enforcing regional conservation measures. Articles 20-23 describe procedures by which Flag States and other States should collaborate in enforcing regional conservation measures, and provides authority for States to board fishing vessels of other States. Article 21 identifies eight specific activities that qualify as serious violations, including failing to maintain accurate records of catch, fishing in closed areas or seasons, or using prohibited fishing gear. Regional regimes may identify other serious violations.

Developing States: Articles 24-26 of the UN Agreement call for providing financial and technical assistance to developing States for management under the Agreement. Conservation measures are not to place an undue burden on developing States.

Dispute Resolution: Articles 27-32 call for States to settle disputes through peaceful means of their choice, and describe procedures for settling disputes.

Information Collection and Analysis: Article 14 describes five principal obligations of States for collecting and providing information and cooperating in scientific research. Annex I provides specific types of data that should be collected on fisheries and vessels, and describes obligations for frequent reporting by vessels, verification of data, and data exchange.

Other Obligations: Article 5 briefly describes 12 general tasks, some of which are described in greater detail elsewhere in the UN Agreement. Tasks that do not receive significant additional treatment in the UN Agreement include:

- Assess the impacts of fishing and other factors on target, associated, or dependent stocks;
- adopt measures to maintain or restore associated or dependent species above levels "at which their reproduction may become seriously threatened";
- minimize pollution, waste, discards, catch by lost or discarded gear, and bycatch;
- protect biodiversity;
- adopt measures to prevent or eliminate over-fishing and overcapitalization;
- consider the interests of artisanal and subsistence fishermen.

The U.N. Straddling Stocks Agreement has broken significant new ground in defining and refining what had heretofore been lip service to the "precautionary principle." UNCLOS, the Code of Conduct and the U.N. Straddling Stocks Agreement all anticipate and recommend formation of regional organizations and agreements to carry out their provisions. Because the Code is voluntary, using existing regional regimes and organizations to promote conservation

measures is likely to be the most effective route. Some of the newer organizations created since the Straddling Stocks Agreement went into force go even beyond its groundbreaking provisions.

Finally, although each of the agreements calls for the “best available scientific evidence” as the basis for decision-making, in most cases the information is limited at best. Perhaps the first and most important task for promoting conservation would be to use the provisions of the agreements that promote data collection, information sharing, and scientific research.

The Straddling Stocks Agreement calls explicitly for work to assess the impacts of fishing and other factors on target, associated, or dependent stocks and for members to minimize bycatch and protect biodiversity. The Code of Conduct includes in its management objectives protecting biodiversity and endangered species and minimizing bycatch.

Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas

At the same time the FAO was developing the Code of Conduct for Responsible Fisheries, it was responding to growing concerns, highlighted during the Earth Summit, about incursions on coastal states’ EEZs, confrontations between distant water fleets and coastal states, violations of fishing agreements, reflagging to avoid compliance with applicable rules, and general dissatisfaction with increasing fishing pressure on the high seas that was likely to affect stocks or fishing fleets in adjacent EEZs. In November 1993, the parties to the FAO Conference 27th Session adopted the Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas.¹⁹⁵ They made clear that the provisions of the agreement were part of the Code, where the Compliance Agreement is referenced as one of the exceptions to the voluntary nature of the Code.¹⁹⁶

The Compliance Agreement applies to all fishing vessels on the high seas, with a few exceptions for small vessels. Flag States are called upon to ensure that vessels flying their flag do not engage in activity that undermines the effectiveness of international conservation and management measures. The Agreement requires a party to authorize the use of its flag by fishing vessels, and parties may not authorize vessels unless they can exercise control over them, nor may they authorize vessels with previous compliance problems. Significantly, the authorization to fly the flag constitutes an authorization to fish on the high seas, and can be withdrawn: “Where a fishing vessel that has been authorized to be used for fishing on the high seas by a Party ceases to be entitled to fly the flag of that Party, the authorization to fish on the high seas shall be deemed to have been canceled.”¹⁹⁷

Parties are required to ensure that vessels are clearly marked, that they can be identified, and fulfill record keeping and information sharing obligations. Parties are required to take enforcement measures against vessels acting in contravention to the Agreement, and are urged to use serious sanctions, “of sufficient gravity as to be effective in securing compliance...and to deprive offenders of the benefits accruing from their illegal activities.”¹⁹⁸

¹⁹⁵ Food and Agriculture Organization of the United Nations. Agreement To Promote Compliance with International Conservation and Management Measure by Fishing Vessels on the High Seas. 1993. (hereinafter Compliance Agreement)

¹⁹⁶ FAO Code of Conduct, *supra* note 162 at Article I, 1.

¹⁹⁷ Compliance Agreement, *supra* note 54 at Art. III, 4.

¹⁹⁸ *Id.* at Art. III, 8.

Parties are directed to urge non-Parties to adopt consistent measures, and to exchange information about non-Parties whose activities undermine the effectiveness of international conservation and management measures.¹⁹⁹

International Agreements Relating to Wildlife

The highly migratory nature of cetaceans and the need for multilateral cooperation to protect them was recognized as early as the 1940s. The treaties examined here include two that have provisions that may apply to cetaceans in addition to the International Convention for the Regulation of Whaling.

International Convention for the Regulation of Whaling (IWC)²⁰⁰

The International Whaling Commission (IWC) was established under the International Convention for the Regulation of Whaling of 1946. Currently, 71 nations including the United States are parties to the IWC. The purpose of the Convention is to provide for the proper conservation of whale stocks and the orderly development of the whaling industry. (Preamble)

The main duty of the IWC is to keep under review and revise as necessary the measures laid down in the Schedule to the Convention. These govern the whaling conduct of member nations throughout the world. These measures, among other things, provide for the complete protection of certain species; designate specified areas as whale sanctuaries; set limits on the numbers and size of whales which may be taken; prescribe open and closed seasons and areas for whaling; and prohibit the capture of suckling calves and female whales accompanied by calves. The compilation of catch reports and other statistical and biological records is also required.

In addition, the Commission encourages, co-ordinates and funds whale research, publishes the results of scientific research and promotes studies into related matters such as the humaneness of the killing operations.

The IWC currently operates a moratorium on commercial whaling, in force since 1986, although there are exceptions for aboriginal subsistence needs and scientific purposes and parties to the Convention may object to the operation of the moratorium (for example, Norway has entered such an objection and sets quotas for a commercial hunt of minke whales every year).

Small cetaceans occupy a precarious position within the IWC framework. The 1946 Convention does not define a 'whale', although a list of names in a number of languages of a dozen whales was annexed to the Final Act of the Convention. Some governments take the view that the IWC has the legal competence to regulate catches only of these named great whales. Others believe that all cetaceans, including the smaller dolphins and porpoises, also fall within IWC jurisdiction. It is agreed that the Scientific Committee can study and provide advice on the small cetaceans.

Consequently, to date there is no universal agreement on the competency of the IWC to regulate interactions with these animals. Nevertheless, the Scientific Committee has

¹⁹⁹ *Id.* at Art. V, 1.

²⁰⁰ International Convention for the Regulation of Whaling, Done at Washington, 2 November 1946. 4 Bevans 248, TIAS 1849. For amendments to the schedule see Appendix B.

investigated many species and carried out major reviews of significant directed and incidental catches of small cetaceans, and the mortality of cetaceans in passive fishing nets and traps. The IWC does recognize the need for further international co-operation to conserve and rebuild depleted stocks of small cetaceans.

Each year the Scientific Committee, through its sub-committee on small cetaceans, identifies priority species/regions for consideration by a review. Topics considered include distribution, stock structure, abundance, seasonal movements, life history, ecology, and directed and incidental takes.

Since 1990 the IWC has adopted 17 resolutions directed at small cetaceans, specific small cetacean issues (e.g. baiji, vaquita, Dall's porpoise, striped dolphins and harbor porpoise), and small cetacean bycatch.²⁰¹

Bonn Convention on Migratory Species of Wild Animals²⁰²

The Convention on the Conservation of Migratory Species of Wild Animals (also known as CMS or Bonn Convention) seeks to conserve terrestrial, marine and avian migratory species throughout their range. It is an intergovernmental agreement concluded under the aegis of the United Nations Environment Program, concerned with the conservation of wildlife and habitats on a global scale. CMS acts as a framework Convention. Arrangements concluded under it may vary from legally binding treaties (called Agreements) to less formal instruments, such as Memoranda of Understanding, and can be adapted to the requirements of particular regions. The development of models tailored according to the conservation needs throughout the migratory range is a unique capacity of CMS.

The Convention was signed in Bonn on 23 June 1979, came into force on 1 November 1983, and since its membership has grown steadily to include 99 (as of 1 December 2006) parties from Africa, Central and South America, Asia, Europe and Oceania (see Appendix B). The U.S. is not a signatory, but has signed a memorandum of understanding for Indian Ocean turtles, a less formal mechanism for meeting the goals of the agreement.

At the heart of the Convention lies the concept that wild animals constitute a common natural heritage for humankind, and should therefore be protected for the benefit of future generations. The CMS recognizes that "each generation of man holds the resources of the earth for future generations and has an obligation to ensure that this legacy is conserved and, where utilized, is used widely"(Preamble). Responsibility for this is vested in the individual States party, who are under an obligation to ensure that such species should be protected as they pass through their national jurisdictions (Article I).

To this end, Article II sets out the fundamental principles of the CMS, which are essentially two-fold:

Parties to the Convention must ensure that they take action specifically to protect those migratory species that are endangered, and those deemed to have an "unfavourable conservation status". This is not confined solely to guarding against the further depletion of the numbers of such species, but also to take individual or collective action to avoid the further degradation of their natural habitats.

²⁰¹ <http://www.iwcoffice.org/meetings/resolutions/resolutionmain.htm>

²⁰² Convention on the Conservation of Migratory Species of Wild Animals. Done at Bonn 23 June 1979. 19 ILM 15 (1980).

Article II(2) creates a more general duty to take action to avoid **any** migratory species becoming endangered.

Under Article II(3), these aims are to be achieved by requiring the parties to promote, co-operate in and support research in relation to migratory species; endeavor to provide immediate protection for endangered migratory species; and endeavor to conclude agreements to allow for the conservation and management of migratory species classed as having an "unfavorable conservation status".

Migratory species threatened with extinction are listed on Appendix I of the Convention. CMS Parties strive towards strictly protecting these animals, conserving or restoring the places where they live, mitigating obstacles to migration, and controlling other factors that might endanger them. Besides establishing obligations for each State joining the Convention, CMS promotes concerted action among the Range States of many of these species. Additional protection is provided through Article III (5), which prohibits the taking of animals listed in Appendix I—this translates into an absolute ban on the hunting of any Appendix I species.²⁰³

There are currently six species of cetacean listed in Appendix I, namely the blue whale, humpback whale, bowhead whale, Northern right whale, Southern right whale and Franciscana.

Migratory species that need or would significantly benefit from international co-operation are listed in Appendix II of the Convention. For this reason, the Convention encourages the Range States to conclude global or regional Agreements to protect species listed in Appendix II of the Convention. There are thirty-three species of cetaceans currently listed in Appendix II.

With regard to cetaceans, Article V(4)(f) lays down specific requirements for Article IV(3) Agreements that have been concluded in respect of cetaceans. Under this provision, such agreements should: "at a minimum, prohibit, in relation to a migratory species of the Order Cetacea, any taking that is not permitted for that migratory species under any multilateral agreement and provide for accession to that Agreement by States that are not Range States of that migratory species".

The Agreements according to Article V(5) should include the review of the species' conservation status and coordinated conservation and management plans; research and the exchange of information; maintenance, restoration and protection of habitats; restriction of impediments to migration; co-operative action against illegal taking and emergency provisions to strengthen conservation measures. Although States party have concluded three Article IV(3) Agreements since the Bonn Convention came into force(17), none of these affect cetaceans.

Article IV(4) provides that States party "are encouraged to take action with a view to concluding agreements for any population or geographically separate part of the population of any species or lower taxon of wild animals, members of which periodically cross one or more national jurisdictional boundaries." Article IV(4) agreements are therefore wider and more general than Article IV(3) Agreements. Agreements formed under Article IV(4) are very different to the Agreements envisaged by Article IV(3). For instance, the scope of Article IV (4) Agreements encompasses a wide range of animals; Article IV(4) agreements do not apply to the restricted list of Appendix II species; and the definition of the type of animals subject to such an agreement is far wider than that of a "migratory species" for the purposes of the CMS.

²⁰³ Article III(5) is subject to exceptions, however, namely if the taking of such animals is for scientific purposes; to enhance the propagation or survival of the affected species (for example capture for breeding programs); to accommodate the needs of traditional subsistence users of such species; or if extraordinary circumstances so require.

To date eight Agreements have been concluded under Article IV(4) of the CMS, of which two are directly relevant to the issue of cetacean conservation. These are the Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas, 1991 (ASCOBANS) and the Agreement on the Conservation of Cetaceans of the Mediterranean and Black Seas, 1996 (ACCOBAMS)(See Sections 2.1.1 and 2.1.2).

Convention on International Trade in Endangered Species

The Convention on International Trade in Endangered Species of Wild Fauna and Flora²⁰⁴ (CITES) is a multilateral treaty regarding the export, import and transit of certain species of wild animals and plants. Its aim is to ensure that international trade in specimens of wild animals and plants does not threaten their survival. The goal of the convention is to prevent overexploitation of listed species whose survival is jeopardized. (Article II)

The convention on International Trade in Endangered Species entered into force July 1, 1975. As of December 2006, 169 nations, including the U.S., were parties. CITES is constructed to use Appendices that list species based on a set of criteria. Parties to CITES are not allowed to trade in species listed in the appendices of the Convention, except in accordance with the Convention. (Article II). Appendix I lists species threatened with extinction, (Article III) and Appendix II lists species that may become threatened with extinction unless trade is subject to regulation. (Article IV) Commercial trade is generally prohibited for Appendix I species, and requires both import and export permits. (Article III, 2) Commercial trade in Appendix II species requires an export permit verifying that trade will not be detrimental to the survival of the species. (Article IV, 2-6) "CITES allows the imposition of bans against the export of listed species to any signatory nation in order to diminish the economic incentives for continued taking" of the species.²⁰⁵

More than 20 cetaceans are listed on Appendix I of CITES, and Appendix II includes a zero annual export quota for live specimens from the Black Sea population of *Tursiops truncatus* removed from the wild and traded for primarily commercial purposes. Assessment of marine species has become a priority of the International Union for the Conservation of Nature (IUCN), which began a comprehensive regional assessment of marine species groups in 2006. The IUCN publishes the Red List of Threatened Species, which in 2006 included 65 cetaceans (both marine and freshwater).²⁰⁶

Other agreements on environment and wildlife that are not discussed here, but that may have relevance to protection of cetaceans, include the Convention on Biological Diversity, Agenda 21 Oceans Chapter, Convention on the Conservation of the Living Resources of the Southeast Atlantic,

²⁰⁴ Convention on International Trade in Endangered Species of Wild Fauna and Flora (Done at Washington 3 March 1973. Entered into force 1 July 1975. 27 UST 1087, TIAS 8249)

²⁰⁵ Global Marine Biological Diversity: A strategy for Building Conservation into Diversity (Elliot A. Norse ed., 1993) at 209.

²⁰⁶ IUCN http://www.iucn.org/themes/ssc/biodiversity_assessments/indexgmsa.htm. Last accessed 17 November 2006.

Regional Marine Mammal Agreements

Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas (ASCOBANS)²⁰⁷

As noted above, the thrust of the Convention on Migratory Species is to encourage member nations to conclude regional agreements under the umbrella convention that deal with specific problems. The First Meeting of the CMS Conference of the Parties held in 1985 initiated the development of ASCOBANS by passing a resolution urging CMS Parties to conclude an Agreement for two species of small cetaceans from the Baltic and North Sea: the bottlenosed dolphin (*Tursiops truncatus*) and the harbor porpoise (*Phocoena phocoena*). ASCOBANS was concluded on 13 September 1991 in Stockholm, Sweden, and entered into force on 29 March 1994. (The U.S. is neither a party to the agreement nor signatory to the MOU.) The Agreement applies to species initially considered, as well as all species, subspecies or populations of small cetaceans in the Baltic Sea and North Sea, with the exception of the Sperm whale (*Physeter macrocephalus*). The flagship species of the Agreement is the harbor porpoise.

The Agreement area covers the marine environment of 15 Range States, including the European Community, around the shores of the Baltic and North Seas. The Fourth Meeting of the Parties, held in Esbjerg, Denmark, in August 2003, agreed to extend the Agreement area farther west to cover parts of the North Atlantic and to incorporate waters adjacent to Ireland, Portugal and Spain. Once this amendment to the Agreement enters into force, the extension will close the gap for some species of small cetaceans between the Agreement areas of ASCOBANS and its sister agreement, the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS). (See below.)

The ASCOBANS includes a conservation and management plan that briefly describes the conservation, research and management measures that should be applied by the Parties. This plan foresees measures towards the mitigation of marine pollution and the reduction of bycatch, surveys and research about species ecology and population status and the establishment of an international database. Additionally, the plan further calls for Parties to adopt national laws to prohibit the intentional taking and killing of small cetaceans where such regulations are not already in force. General guidelines on public awareness and participation are also included in the plan.

The first major study of small cetaceans in this area took place in 1994, after ASCOBANS came into force, when scientists from the Sea Mammal Research Unit at St. Andrews University launched the SCANS project.²⁰⁸ SCANS identified nine species of small cetaceans resident within the Convention area²⁰⁹ (along with four species of whales), and identified three main threats to their survival: bycatch, pollution and environmental change.

²⁰⁷ Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas ASCOBANS entered into force in 1994.

²⁰⁸ Hammond PS, Benke H, Berggren P, Borchers DL, Buckland ST, Collet A, Heide-Jørgensen M-P, Heimlich-Boran S, Hiby AR, Leopold MP, Øien N, 1995a. Distribution and abundance of harbour porpoises and other small cetaceans in the North Sea and adjacent waters. Life, LIFE 92-2/UK/027, European Community LIFE Programme; 242 pp. See also Hammond PS, Heimlich-Boran S, Benke H, Berggren P, Collet A, Heide-Jørgensen MP, Leopold MP, 1995b. The distribution and abundance of harbour porpoises and other small cetaceans in the North Sea and adjacent waters. (SC/47/SM30). (unpublished); 21.

²⁰⁹ Namely the Harbour porpoise, Bottlenose dolphin, White-beaked dolphin, Atlantic white-sided dolphin, Common dolphin, Striped dolphin, Long-finned pilot whale, Risso's dolphin and Killer whale.

ASCOBANS conservation and management plan prescribes, in general terms, the measures that parties are to introduce. The conservation and management plan is in five parts and States must:

- Introduce conservation and management measures that strive to: prevent the release of substances that constitute a potential threat to small cetaceans, modify fishing gear to reduce bycatch, and prevent fishing apparatus from becoming a hazard to cetaceans, regulate activities affecting food sources and preventing other types of disturbance – especially of an acoustic nature.
- Cooperate in research activities to assess the status and movements of populations, locate areas of special importance to their survival and to identify present and potential threats to small cetaceans.
- Endeavor to establish an effective reporting system for bycatch and strandings.
- Endeavor to establish under national law a prohibition on taking and killing small cetaceans, supported by an obligation to immediately release any animals that have been caught.
- Provide information to the general public to encourage the reporting of sightings and strandings, and to encourage fishermen to report any bycatch of small cetaceans.

The conservation and management plan is implemented through a series of specific Resolutions passed during the Meetings of the Parties. The following resolutions contain measures to reduce bycatch.

- ***The Resolution on the Implementation of the Conservation and Management Plan*** called for Parties to establish an independent observer scheme to assess bycatch, conduct research into feeding habits, and set up a sightings survey for the harbor porpoise population in the Baltic Sea.
- ***The Resolution on the Incidental Take of Small Cetaceans*** set as the immediate short-term objective of the Agreement, to restore or maintain stocks to 80 percent of the carrying capacity, with a view to eventually preventing *all* anthropogenic removals. In the interim, it established a maximum allowable bycatch level at 2 percent of the population abundance estimate, with the possibility that this would be reduced if the population were severely depleted.
- ***Resolution on the Incidental Take of Small Cetaceans 2000*** reduced the bycatch limit for the harbor porpoise to 1.7 percent, with a view towards a further reduction. It also stated that the ultimate goal of ASCOBANS is the reduction of bycatch to less than 1 percent of the best population estimate, in line with the IWC guidelines.
- ***The Jastarnia Plan***, a recovery plan for the depleted harbor porpoise stocks within the convention area establishes guidelines to assist in the recovery of harbor porpoise.

Agreement on the Conservation of Cetaceans of the Black Sea, and the Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS)²¹⁰

CMS adopted a regional approach for cetacean conservation in the Mediterranean and Black Seas.²¹¹ ACCOBAMS, concluded in 1996 and entered into force on 1 June 2001, binds the countries of two sub-regions to work together on an environmental problem of common concern. ACCOBAMS covers an area that includes the Black Sea, Mediterranean Sea and the Atlantic coasts of North Morocco and South Portugal. The Agreement area includes 28 Range States. ACCOBAMS covers large and small cetaceans and applies to all cetaceans that have a range that lies entirely or partly within the Agreement area or that accidentally or occasionally frequent the Agreement area.²¹² Species covered include the harbor porpoise, striped dolphin, short-beaked common dolphin, false killer whale, killer whale, long-finned pilot whale, Blainville's beaked whale, Cuvier's beaked whale, sperm whale, dwarf sperm whale, Northern right whale, minke whale, sei whale, fin whale and humpback whale.²¹³

The Agreement aims to reduce threats to all cetaceans in these waters and to promote closer cooperation amongst Parties with a view to conserving all cetacean species present in the area. ACCOBAMS calls also on its members to enforce legislation to prevent the deliberate taking of cetaceans in fisheries by vessels under their flag or within their jurisdiction, and to minimize incidental catches.

ACCOBAMS' objectives, set out in Article II, state: "Parties shall take coordinated measures to achieve and maintain a favorable conservation status for cetaceans. To this end, Parties shall prohibit and take all necessary measures to eliminate...any deliberate taking of cetaceans and shall co-operate to create and maintain a network of specially protected areas to conserve cetaceans."²¹⁴

Additionally, annexed to the Agreement is a comprehensive conservation plan in Article II (3) that covers six substantive areas:

²¹⁰ Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area. ACCOBAMS entered into force in 2001

²¹¹ The Action Plan for the Conservation of Cetaceans in the Mediterranean Sea was developed, within the framework of the Mediterranean Action Plan, following concerns about the status of cetaceans in the region. The Action Plan was adopted at the seventh Ordinary Meeting of the Parties of the Barcelona Convention, in Cairo, in October 1991. The main objectives of the Action Plan were the protection and conservation of cetacean habitats, including feeding, breeding and calving grounds; and the protection, conservation and recovery of cetacean populations in the Mediterranean Sea Area. Within these two broad objectives, a number of general priorities were recommended, including: prohibition of deliberate taking; prevention and elimination of pollution; elimination of incidental catches in fishing gear; prevention of over-exploitation of fishery resources; protection of feeding, breeding and calving grounds; monitoring, research and data collection and dissemination with regard to biology, behavior, range and habitats of cetaceans; and educational activities aimed at the public at large and fishermen. Although the Action Plan remains an instrument of reference for the Mediterranean coastal States, it is of limited relevance now and has in any case effectively been superseded by the 1996 ACCOBAMS Agreement.

²¹² Article I(2).

²¹³ Defined as "animals, including individuals, of those species, subspecies or populations of Odontoceti and Mysticeti".

²¹⁴ Article II(1).

1. *The adoption and enforcement of national legislation.* Parties are to develop and implement measures to minimize the effects of fisheries activities on cetaceans, with a specific ban on the use of driftnets more than 2.5km in length; to introduce regulations to prevent discarded fishing gear becoming a hazard; to conduct impact assessment on activities affecting cetaceans and cetacean-watching; to regulate the discharge of pollutants and to endeavor to strengthen or create institutions to further implement the Agreement.
2. *Assessment and management of human-cetacean interactions.* Parties are required to co-operate in the collection of data and research into activities like fishing, tourism, industry and pollution.
3. *Habitat protection.* Parties must "endeavor to establish and manage specifically protected areas" relating to cetacean feeding grounds and habitats, which should be designated as protected under the framework of the Convention for the Protection of the Mediterranean Sea Against Pollution 1976.
4. *Research and monitoring.* Parties are to take coordinated action to monitor the status and trends in cetacean populations, especially for those species for which there is little scientific data currently available; determine migration routes, feeding and hunting areas to identify localities in which human activities may need to be restricted; evaluate the feeding requirements of cetaceans and adapt fishing activities accordingly; develop research programs for sick and wounded animals and develop passive acoustic techniques to monitor cetacean populations.
5. *Capacity building, collection and dissemination of information, training and education..* Parties are to co-operate in order to, *inter alia*, develop data collection schemes; prepare lists of national bodies with expertise in cetaceans; list the current and potential protected areas; compile a directory of applicable national and international laws; develop information-sharing initiatives on a sub-regional level; improve public awareness of cetacean issues and develop training programs for cetacean management.
6. *Responses to emergency situations.* Parties are to co-operate whenever possible and necessary to develop and implement emergency measures "when exceptionally unfavorable or endangering conditions occur". In particular they must prepare for an unexpected danger to cetaceans in the area, such as a major pollution incident; evaluate their capacity to rescue sick and wounded animals and prepare codes of practice. The parties may also receive advice from their relevant Co-ordination unit to develop mechanisms to give rapid protection to especially vulnerable cetacean populations should an emergency situation arise.

ACCOBAMS has committed to investigating competitive interactions between dolphins and fisheries; creating a by-catch database; developing pilot conservation and management actions for areas containing critical habitats for cetaceans; developing methods for evaluating habitat degradation; developing conservation plans for cetaceans of the Black Sea and for certain species in the Mediterranean Sea; conducting a survey of sperm whale populations in the Mediterranean; identifying sites of conservation importance for whales in the Mediterranean; and developing training and education schemes.

The International Sanctuary for Mediterranean Mammals

The Sanctuary was created by a tripartite agreement between the Governments of France, Italy and Monaco to mitigate the threats to cetaceans from bycatch (especially from the

increased use of driftnets), maritime traffic or urbanization and industrialization of coastal areas. The Agreement was signed on 25 November 1999 in Rome and entered into force in February 2002.

The agreement forming the Sanctuary coordinates the concerted actions taken by the three countries within the ACCOBAMS Agreement area. To ensure that all Mediterranean countries respect its objectives, the Sanctuary has been designated a Specially Protected Area of Mediterranean Importance under a protocol of the Barcelona Convention. The Sanctuary covers the Tyrrheneo-Corsican-Provencal part of the Mediterranean Sea and includes both littoral and pelagic waters.

Agreement on the International Dolphin Conservation Program (AIDCP)

The Agreement on the International Dolphin Conservation Program was signed in Washington on 15 May 1998 and entered into force on 15 February 1999, following ratification by four States, as required: Ecuador, Mexico, Panama, and the United States. To a large extent the agreement is simply a formalization of two earlier voluntary agreements (the La Jolla Agreement and the Panama Declaration). However, the 1998 agreement developed, extended and formalized the earlier agreements.

The purpose of the AIDCP is to ensure the long-term sustainability of tuna stocks in the eastern Pacific Ocean, as well as living marine resources related to the tuna fisheries; to seek ecologically sound means of capturing large yellowfin tunas not in association with dolphin; progressively reduce the incidental dolphin mortalities in the tuna fishery of the eastern Pacific Ocean to levels approaching zero; and to avoid, reduce and minimize the incidental catch and the discard of juvenile tuna and the incidental catch of non-target species, taking into consideration the interrelationship among species in the ecosystem. [Preamble, Article II].

The Agreement applies to typical dolphins (family *Delphinidae*) associated with the yellowfin tuna fishery in the Agreement Area. [Article I(1) and (2)] In practice, the principal species concerned are spotted and, to a lesser extent, common and spinner dolphins, although other species, including striped and bottlenose dolphins, are also relevant. The convention area included The Eastern Pacific Ocean, specifically as bounded by the coastline of North, Central, and South America and by the following lines: (a) The 40°N parallel from the coast of North America to its intersection with the 150°W meridian; (b) the 150°W meridian to its intersection with the 40°S parallel; and (c) the 40°S parallel to its intersection with the coast of South America. [Article III, Annex I].

A system of dolphin mortality limits (DMLs) is the principal means by which dolphin mortality is reduced under the agreement. These work by setting a basic objective of limiting total incidental dolphin mortality in the purse seine tuna fishery to no more than 5,000 individuals annually and using the basic approach of allocating DMLs to vessels. The Agreement establishes per-stock per-year dolphin mortality caps with the objective of achieving a limit of 0.1 percent of the minimum estimated abundance of stocks (N_{min}) from the year 2001 onwards (an objective which was achieved). The Agreement contains various provisions which require parties to manage their DMLs in a responsible manner and provides for the reallocation of DMLs that have either not been used or have been forfeited during a particular year because of irresponsible use.

In addition to the DML system, the Agreement includes provisions for the establishment of a system that provides incentives to vessel captains to continue to reduce incidental dolphin mortality, with the goal of eliminating mortality; the establishment and implementation of a system for the tracking and verification of tuna harvested with and without mortality or serious

injury of dolphins; the exchange of scientific research data collected by the parties pursuant to the Agreement on a full and timely basis; and the conduct of research for the purpose of seeking ecologically sound means of capturing large yellowfin tuna not in association with dolphins.

The Protocol Concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (SPAW)

The SPAW Protocol's purpose is to protect the marine environment of the Gulf of Mexico and Caribbean Sea, including the areas surrounding the U.S. mainland off the coast of Florida and the Gulf States and territories in the Caribbean region. This Protocol is an outgrowth of the Cartagena Convention, and is one of three Protocols called for by and developed under the Cartagena Convention. The Convention establishes general legal obligations for the protection and preservation of the marine environment of the Caribbean region. Geographically, it covers the marine environment of the Gulf of Mexico, the Caribbean Sea and areas primarily within 200 nautical miles of the Atlantic coasts of 20 countries and island territories. Twenty-eight countries of the Wider Caribbean Region are eligible to become Parties to the Cartagena Convention and its Protocols. Currently, 12 countries are Parties to the SPAW Protocol, while five others are non-Party Signatories.

The SPAW Protocol also encompasses internal waters extending up to the fresh water limit, and any related terrestrial areas (including watersheds) that a party may wish to designate. It requires parties to establish protected areas and to take specified protection and management measures therein, as necessary and appropriate to carry out the provisions of the Protocol, and in conformity with national laws and regulations and international law.

The United States ratified the SPAW Protocol on April 16, 2003, with two reservations and an understanding along with ratification. One of the reservations is needed to ensure that our application of Article 11 of the Protocol is consistent with provisions of the Marine Mammal Protection Act (MMPA) and the Endangered Species Act (ESA) that allow for the limited taking of species listed in Annex I and II for the purpose of public display, scientific research, rescue and rehabilitation, or as incidental catch related to fishing operations. The second reservation is to Article 13, which could be interpreted to require environmental assessments for non-Federal activities not covered by the National Environmental Policy Act of 1969, as amended (NEPA). The Understanding would state that the provisions of the Protocol do not apply to non-native species. There are three Annexes that contain the lists of 481 endangered and threatened species of flora and fauna covered by Article 11 of the Protocol. The United States notified the depositary that the Protocol will not apply to six species of fauna and flora that do not require the protection provided by the Protocol in U.S. territory. It is envisioned that the Annexes will be treated separately as an Executive Agreement.²¹⁵

Discussion of Regional Marine Mammal Agreements

The regional agreements relating to cetacean conservation are still very much in their infancy, but it is clear that ACCOBAMS is the superior instrument, in terms of both its scope and its potential for establishing strong and workable conservation measures in relation to cetaceans. Similarly, the U.N. Straddling Stocks Agreement and the conventions and RFMOs that have been created in its model provide the most precautionary, transparent, mandatory

²¹⁵ <http://www.state.gov/g/oes/rls/rm/2002/9991pf.htm>

frameworks. These agreements even provide mechanisms for coastal states to enforce regulations against fishing nations, a tool that gets around the historic weakness of consensual international agreements that have depended on flag state enforcement against its own vessels.

To date, the various ASCOBANS initiatives have proved largely ineffective, with few parties willing to adopt specific national measures to enforce these principles. One possible reason for ASCOBANS weaknesses may be that it was the first agreement of its type to deal with issues of cetacean management. As such, it may be experimental, and its limitations may act to guide the development of future agreements. Nevertheless, imperfect as it is, ASCOBANS should be commended for introducing a new tier of protection for small cetaceans, whose status under international law is vulnerable given the controversy surrounding the IWC's competence to regulate small cetaceans.

ACCOBAMS uses more prescriptive terms, imposes strong obligations on states to conserve *all* cetaceans in this area, requires the use of the precautionary principle, and works to acquire necessary scientific data about cetaceans in these waters. The initial implementation of the ACCOBAMS conservation plan shows a clear determination to introduce effective conservation measures within the convention area. In particular it has established clear and workable targets for bycatch reduction. ACCOBAMS will need to develop effective sanctions to deter noncompliance, especially with regard to fishing regulations where a number of range states have an alarming track record of noncompliance.²¹⁶

As for the future of regional cooperation in relation to the conservation and management of cetaceans, there is cause for tentative optimism. There have been some initial moves toward creation of a similar agreement for small cetaceans in West Africa, although this is a long way from becoming a reality. While the agreements do have the potential to prescribe far-reaching measures, much will depend upon the enthusiasm of the other range states that have yet to join; the current climate of indifference, however, does not auger well for this. Likewise, the expansion of the regional agreements into contiguous areas also looks unlikely, given the current attitudes of Iceland, Greenland, and the Faroe Islands in relation to the exploitation of cetaceans.

One eventual goal for the agreements is that they will form an interlocking series of regional initiatives to protect species of cetaceans around the planet. While there are undoubtedly localities in which the conditions for future expansion are favorable, such as Australasia and parts of South America, real questions remain about whether such Agreements may be concluded in the areas where they are most needed. There are currently moves under the auspices of the Bonn Convention to conclude an agreement for small cetaceans and sirenians in central and West Africa²¹⁷ and also for small cetaceans and dugongs of Southeast Asia.²¹⁸ At present, regional action would appear to be most needed in Asia where river dolphins are critically endangered, although the range states remain lukewarm to the idea of implementing conservatory measures for small cetaceans in particular. With populations of these animals now feared to have fallen to the low hundreds, the formation of a tessellating system of global minimum standards is arguably now more pressing than ever.

²¹⁶ "Sustaining Small Cetaceans: A Preliminary Evaluation of the ASCOBANS and ACCOBAMS Agreements" in Alan Boyle and David Freestone (eds.) *International Law and Sustainable Development*, (Oxford University Press, 1999) at 233, cited in, The conservation and management of small cetaceans in Europe: an analysis of the ASCOBANS and ACCOBAMS Agreements. Available online at <http://www.derechomaritimo.info/pagina>.

²¹⁷ Recommendation 7.3 adopted by the Conference of the Parties at its Seventh Meeting in September 2002.

²¹⁸ Recommendation 7.4, adopted at the same meeting.

International Agreements Related to the Marine Environment

UN Resolution Prohibiting Large-Scale Pelagic Driftnet Fishing²¹⁹

Large scale, high seas driftnets were recognized in the 1980's as a significant cause of incidental take of marine mammals, birds, turtles, and non-target fish species. This gear was banned internationally by United Nations resolutions in 1989, 1990 and 1991.²²⁰

Until they were outlawed, driftnets were used in the North Pacific and on the high seas where single vessels were capable of deploying driftnets ranging from up to 40 miles in length. In the North Pacific in the years from 1976 to 1989, 2 million miles (3.2 million km) of net were set per season.²²¹ With more than enough netting to encircle the earth set each night, not only were target fish caught (squid, tuna, and billfish) but approximately 100,000 dolphins and porpoises, hundreds of thousands of seabirds, sharks, sea turtles and salmon were also caught. (The Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean significantly reduced pelagic driftnet fishing and is discussed below in the section on regional fishery agreements.)

Although the driftnet fleet operated under requirements set by a multi-national agreement relating to salmon fishing, that agreement did not address incidental take of birds and marine mammals.²²² Additionally, the fleets were frequently found by U.S. enforcement to be catching salmon and steelhead in violation of the provisions of the governing treaty. In 1987, due to continued compliance problems with the Japanese, Koreans and Taiwanese, the U.S. Congress passed the Driftnet Impact Monitoring, Assessment, and Control Act, (Driftnet Act) calling for negotiations with the nations driftnetting in the North Pacific to establish monitoring and enforcement agreements by June 29, 1989.²²³ If these nations refused to come to the bargaining table, they risked trade sanctions. The Driftnet Act required further research into the nature and extent of driftnet fishing to facilitate the development of effective solutions to the problem.²²⁴

The Driftnet Act also addressed the control of driftnet debris. Congress assigned the Secretary of Commerce with three responsibilities: establishment of controls for marking, registry, and identification of foreign driftnets so that the original vessel can be identified if their gear is lost, abandoned, or discarded; development of alternative materials for making driftnets "for the purpose of increasing the rate of decomposition," and the implementation of a bounty

²¹⁹ United Nations General Assembly Resolution 45/197 on Large Scale Pelagic Driftnet Fishing and Its Impact on the Living Marine Resources of the World's Oceans and Seas, New York, 1990. 21 December 1990. Took effect in 1992. Report: A/46/645/ADD.6.

²²⁰ UN Resolution A/RES/45/197, 21 December 1990. See also, UN Resolution A/RES/44/225, 22 December 1989.

²²¹ Simon P. Northridge with the United Nations Environment Programme. "Driftnet fisheries and their impacts on non-target species; a worldwide review." FAO 1991.

²²² Pacific Salmon Treaty, March 18, 1985, U.S.-Can., 99 Stat. 7.

²²³ 16 U.S.C.A. § 1822.

²²⁴ 16 U.S.C.A. § 1826 (f) relating to 22 U.S.C.A. § 1978 authorizing, *inter alia*, the banning of the import of fish products from offending nations.

system, so that people who find, retrieve, and return to the Secretary of Commerce lost, abandoned, or discarded driftnets and other plastic fishing materials may receive payment.²²⁵

Driftnetting had also become a major concern in the South Pacific. After several nations had banned driftnet fishing in their waters, 20 nations in the South Pacific negotiated and signed the Convention for the Prohibition of Fishing with Long Driftnets in the South Pacific (the Wellington Convention).²²⁶ This Convention endorsed a ban on driftnets as of May 1991, prevented the violators from crossing their waters, and denied access to food, fuel and facilities of the signing nations. The Wellington Convention set the stage for international efforts to end driftnetting.

On December 22, 1989, the United Nations General Assembly passed Resolution 44/225, promoted by the U.S. and New Zealand, calling for an end to driftnetting by June 30, 1992, and an end in the South Pacific by 1991.²²⁷

Although Resolution 44/225 is non-binding under international law, its strength lies in the fact that it demonstrates a global consensus on the issue. However, it does not carry any sanctions or mechanisms for monitoring driftnet operations.

Throughout early 1990 conflicts continued between driftnet fishing nations and nations opposed to the practice. Reports surfaced of the introduction of driftnets into new areas such as the Caribbean. In December of that year the United Nations passed Resolution 45/197 restating concern about the practice of driftnetting and calling for a report on driftnetting.²²⁸

In June 1991, the observer data from two previous years of driftnetting were compiled and experts met in British Columbia to discuss the results. The numbers confirmed fears of massive numbers of marine mammals, sea birds, and non-target fish being killed by the driftnet fishery. Armed with the new data, the United States submitted a report to the UN condemning the use of large-scale pelagic driftnets, and soon thereafter introduced a resolution mandating a ban on their use by June 1992. Japan introduced a resolution to study the problem further, again suggesting that there may be 'effective management measures' available to continue the fishery. December 20, 1991 the UN General Assembly passed Resolution 46/215, which stated, without exceptions, that large-scale high seas driftnetting end by 1992.²²⁹ The December 31, 1992 deadline affects the high seas of the world's oceans and seas, including enclosed seas and semi enclosed seas. It should be noted, though, that much driftnetting continues, within EEZs, in many nations including the U.S.

The UN reaffirmed its stance on driftnets in 1995, particularly in the context of unauthorized fishing in national zones, the effects of driftnets on bycatch mortality, and the adoption of the Code of Responsible Fishing, as the General Assembly again passed a driftnet resolution. The resolution reaffirms the global moratorium on high seas driftnet fishing, urges nations to take greater enforcement responsibility and to impose sanctions, refers to the Compliance

²²⁵ 16 U.S.C.A. § 1822 note, PL 100-220, 1987 HR 3674 Sec 4007 (b), (c).

²²⁶ The Wellington Convention done at Wellington, New Zealand. 17 May 1991. Available at <http://www.oceanlaw.net/texts/summaries/wellington.htm>. Last visited 3 May 2007.

²²⁷ UN Resolution A/RES/44/225, 22 December 1989.

²²⁸ UN Resolution A/RES/45/197, 21 December 1990.

²²⁹ UN Resolution A/RES/46/215, 31 December 1992

Agreement and states' responsibilities under that convention, and makes a high priority of improvement of monitoring and enforcement.²³⁰

Convention on the Conservation of Antarctic Marine Living Resources

The principal instrument for management of fisheries in the Southern Ocean is the 1980 Convention on the Conservation of Antarctic Marine Living Resources (CCAMLR).²³¹ By the time it came into force, CCAMLR had inherited significantly damaged fish stocks—12 of 13 assessed fish stocks were considered depleted.²³² The convention was established mainly in response to concerns that an increase in krill catches in the Southern Ocean could have a serious effect on populations of krill and other marine life; particularly on birds, seals, whales, and fish, which mainly depend on krill for food.

Current members of the Commission are Argentina, Australia, Belgium, Brazil, Chile, the European Union, France, Germany, India, Italy, Japan, Namibia, Republic of Korea, Norway, New Zealand, Poland, Russian Federation, South Africa, Spain, Sweden, Ukraine, United Kingdom, United States, and Uruguay. Bulgaria, Canada, Cook Islands, Finland, Greece, Mauritius, Netherlands, Peru, and Vanuatu have acceded to the convention, so are parties, but not members of the commission.

The purpose of CCAMLR is to ensure conservation of Antarctic marine living resources in the high seas within the area south of 60° S latitude and the Antarctic Convergence.²³³ Unlike most other conventions on fisheries, in Article II CCAMLR defines rational use to mean use in accordance with these conservation principles:

- Prevention of decreases in the size of any harvested population to levels below those which ensure stable recruitment;
- Maintenance of ecological relationships among harvested, dependent, and related populations of Antarctic marine living resources and the restoration of depleted populations;
- Prevention of changes or minimization of the risk of changes in the marine ecosystems that are not potentially reversible over two to three decades.²³⁴

A Commission coordinates research, gathers and analyzes catch and effort statistics, identifies and evaluates conservation measures, adopts conservation measures based on the best scientific evidence, and implements observer and inspection programs.²³⁵ The Commission, not states parties, places observers on fishing vessels. Commission membership is open to the original participants in the negotiations, and countries who have acceded to the

²³⁰ UN Resolution A/RES/50/25, 4 Jan 1996.

²³¹ CCAMLR, *supra* note 142.

²³² Kwame Mfodwo, Summaries and evaluations of selected regional fisheries management regimes. Prepared for the Pew Charitable Trusts. Unpublished manuscript. February 1998 (transcript available with the author).

²³³ CCAMLR, *supra* note 142 at Article I, II.

²³⁴ *Id.* at Article II (3).

²³⁵ *Id.* at Article X.

convention, upon approval of an application and indication of its willingness to abide by conservation measures that are in force under the convention.²³⁶

The Commission may designate open and closed seasons, quotas, and regulate gear.²³⁷ Decisions on matters of substance require a consensus. Observers from non-member countries and non-governmental organizations may attend most meetings with few restrictions, and may submit reports and views.

The Antarctic Scientific Committee includes representatives from countries that are members of the Commission. The Committee regularly assesses the status and trends of Antarctic marine living resources, the effectiveness of conservation measures, and has established programs such as developing precautionary measures for krill exploitation, ecosystem monitoring, and acquiring catch and effort data.²³⁸

In design, CCAMLR is considered one of the most advanced of fisheries conservation regimes in the world.²³⁹ The treaty is consistent in many respects with the UN Agreement on Straddling Stocks. Besides a conservation-based management goal, the treaty also includes significant elements of the precautionary approach, including conservation controls over exploratory and new fisheries.²⁴⁰ CCAMLR's observer and inspection programs are considered among the most developed in international fisheries management organizations. For example, members may board vessels of other members for the purposes of inspection; if a breach of CCAMLR rules is detected, the flag state must inform CCAMLR of the action it has taken against the offender.²⁴¹ CCAMLR also requires flag states to maintain an accessible registry of vessels, to insure that vessels are properly marked, and to report catch and other information in a timely fashion.²⁴²

CCAMLR has focused significant effort on the assessment and avoidance of incidental mortality of Antarctic marine mammals in commercial fisheries. However, the priority has been the reduction of seabird bycatch in longline fisheries, through establishment of the Ad hoc Working Group on Incidental Mortality Associated with Fishing.²⁴³ As part of its continued efforts to minimize seabird mortality in longline fisheries, in 1996 CCAMLR published an educational book for fishers that promotes practical ways in which longline fishers can reduce incidental catches of seabirds in bottom longline operations.²⁴⁴ The publication includes the CCAMLR conservation measures that establish seabird bycatch mitigation measures for longline fisheries. To date CCAMLR has not adopted bycatch mitigation strategies for small cetaceans.

²³⁶ CCAMLR. Website at <http://www.ccamlr.org>. Last updated May 2006. Accessed 3 May 2007.

²³⁷ *Id.* at Article IX(2).

²³⁸ *Id.* at Articles XIV, XV.

²³⁹ Mfodwo, *supra* note 222.

²⁴⁰ CCAMLR, *supra* note 142 at Article IX.

²⁴¹ *Id.* at Article XXIV.

²⁴² *Id.* at Article XX.

²⁴³ CCAMLR. Website at [WG-IMAF](#). Accessed 15 March 2007.

²⁴⁴ CCAMLR. Website at [Fish the Sea, Not the Sky](#). Accessed 15 March 2007.

Regional Agreements Related to the Marine Environment

South Pacific Regional Environment Program (SPREP) Agreement

SPREP, a regional organization established by the governments and administrations of the Pacific region, has existed for more than twenty years to protect and improve the South Pacific environment and to ensure sustainable development in that region. It has grown from a small program attached to the South Pacific Commission (SPC) in the 1980s into the Pacific region's major intergovernmental organization charged with protecting and managing the environment and natural resources. The U.S. territories of American Samoa, Guam and the Commonwealth of the Northern Mariana Islands, are located within the SPREP region. The State of Hawaii is also closely linked to the Pacific basin by geography, history, economics and politics. SPREP provides for increased cooperation among the United States, Australia, New Zealand, France and twenty-one island States and territories of the South Pacific region in addressing issues affecting the environment and development in the region.

SPREP's mandate is to promote cooperation in the Pacific islands region and to provide assistance in order to protect and improve the environment and to ensure sustainable development for present and future generations. SPREP's focus is on sustaining Pacific islands ecosystems.

In the Solomon Islands, locals hunt dolphins long-snouted oceanic forms, including spinner, pan-tropical spotted, striped, common and rough-toothed dolphins, along with false killer whales and other small cetaceans. The animals are herded into confined bays where they are killed, with the primary objective of obtaining their teeth and meat. Dolphin teeth have long served as currency throughout Malaita and Makira. They are also woven into collars or headbands used in blood bounties. Dolphins are also harvested for the aquarium trade. Dolphins are also captured in the Solomons for traditional shell money and there is the issue of bycatch in fishing fleets. At the moment SPREP has no specific requirements for bycatch reduction.

Regional Fishery Management Organizations

Commission for the Conservation of Antarctic Marine Living Resources
Commission for the Conservation of Southern Bluefin Tuna
Commission for Inland Fisheries of Latin America (FAO)
Fishery Committee for the Eastern Central Atlantic
Forum Fisheries Agency
General Fisheries Commission for the Mediterranean
Indian Ocean Tuna Commission
Inter-American Tropical Tuna Commission
International Baltic Sea Fishery Commission
International Commission for the Conservation of Atlantic Tunas
International Pacific Halibut Commission
North Atlantic Salmon Conservation Organization
Northeast Atlantic Fisheries Commission
Northwest Atlantic Fisheries Organization
North Atlantic Salmon Conservation Organization
North East Atlantic Fisheries Commission
North Pacific Anadromous Fish Commission
Pacific Salmon Commission
Latin American Fisheries Development Organization
South Pacific Permanent Commission
Southeast Asian Fisheries Development Center
Southeast Atlantic Fisheries Organization
Southwest Indian Ocean Fisheries Commission
Secretariat of the Pacific Community
Western Central Atlantic Fishery Commission
Western and Central Pacific Fisheries Convention

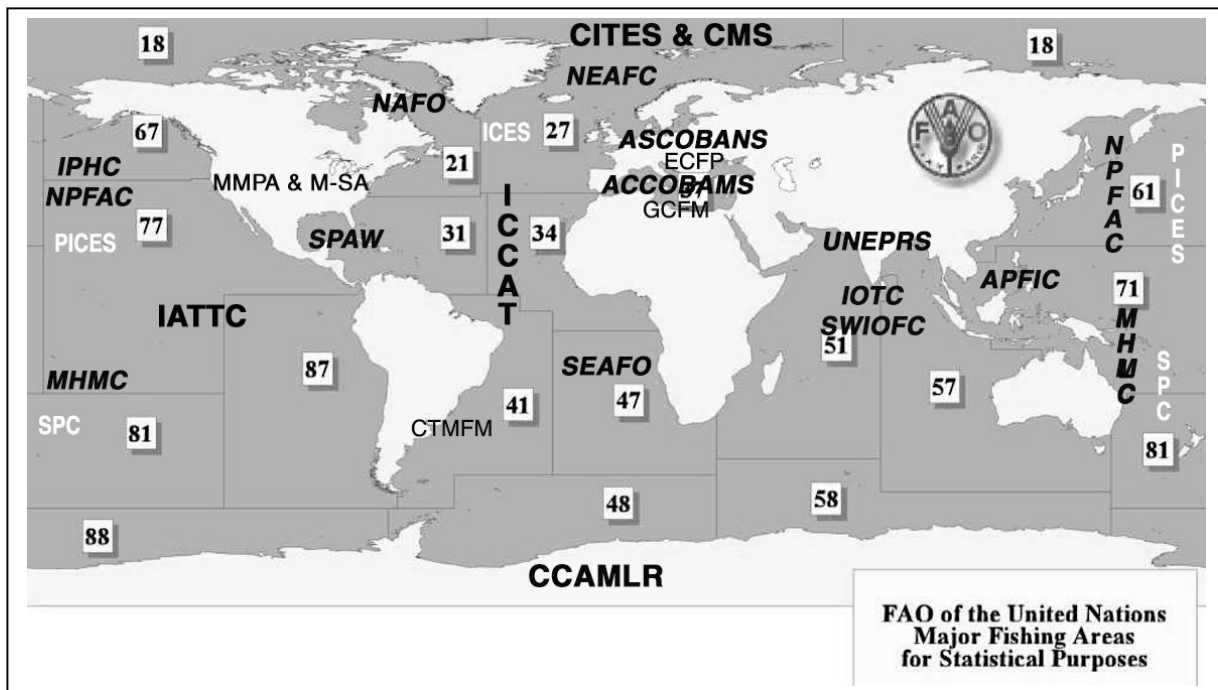
Regional Fisheries Agreements Having Potential to Address Bycatch

Although regional fishery management organizations have existed since the 1940s and earlier, their importance has increased significantly with the adoption of treaties such as the Straddling Fish Stocks Agreement, which call for creation of such bodies. In its Oceans Atlas, FAO editors point out that "under existing international law, and within the current paradigm for the governance of high seas fisheries to regulate straddling, highly migratory and high seas fish

stocks, [Regional Fishery Management Organizations] provide the only realistic mechanism for the enhanced international cooperation in their conservation and management.²⁴⁵ Specific regional agreements that may have potential to address cetacean bycatch are discussed in Chapter 5. The box lists regional fishery management organizations recognized by the FAO.

As of late 2006, there were 44 regional fishery bodies including RFMOs, advisory bodies and scientific bodies. These organizations have, among other responsibilities, collecting and distributing fishery statistics, stock assessment, setting catch quotas, limiting vessels allowed in the fishery, regulating gear, allocation, research oversight, monitoring and enforcement.²⁴⁶ Figure 5 shows areas where RFMOs operate.

Figure 5. Map of RFMO Areas of Operation



Although the implementation of many of the regional agreements hinges upon the effectiveness of the relevant RFMO, the success of these organizations has been the exception rather than the rule. The RFMOs are only as strong as the members make them, and rely on flag state enforcement of their provisions. Criticisms and shortcomings of these bodies include inconsistent authority, failure by key fishing interests to join the RFMO or abide by its rules, illegal, unreported and unregulated fishing, lack of equity and disparate interests between developed states and developing states, conflicts of interest among parties, lack of funding and lack of political will.²⁴⁷

²⁴⁵ Regional Fishery Organizations, Oceans Atlas USES: Fisheries and Aquaculture. <http://www.oceansatlas.com/servlet/CDSServlet?status=ND0yOTQ>, updated 25 Aug. 2000, accessed 8 May 2006).

²⁴⁶ Devaney, P.L. Regional Fisheries Management Organizations: Bringing Order to Disorder, in, Papers on International Environmental Negotiation Vol. XIV, L.E. Susskind and W.R. Moomaw, eds. Harvard, 2005. Available at www.pon.org/downloads/ien14_Devaney.pdf. Last accessed 12 November 2006. See also, FAO Oceans Atlas, Regional Fishery Organizations. <http://www.oceansatlas.com/servlet/CDSServlet?status=ND0yOTQ>. Last accessed 8 May 2007.

²⁴⁷ *Id.*

Devaney concludes that RFMOs could be made more effective through audits, performance review and improvements through neutral bodies such as the FAO. She recommends a stronger role for port states in enforcement, the use of technology such as vessel monitoring systems to track fishing, and modifying incentives for membership to ensure participation by all interested parties.²⁴⁸

The following section describes one or two major regional fishery agreements or organizations in each of the North Atlantic, South Atlantic, North Pacific, South Pacific, Indian and Southern Ocean regions. The discussion is not exhaustive, but is provided as illustrative of agreements that may have potential to address cetacean bycatch. Additional agreements in the ocean regions are listed in boxes.

The Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries

The convention established the Northwest Atlantic Fisheries Organization (NAFO).²⁴⁹ Although the convention applies to the whole of the northwest Atlantic, the regulatory powers of NAFO include only the high seas beyond the Exclusive Economic Zones of its members.²⁵⁰ This regulatory area is divided into six sub-areas. NAFO's members are Bulgaria, Canada, Cuba, Denmark, Europe Union (EU), France (in respect of St. Pierre et Miquelon) Iceland, Japan, Korea, Norway, Russia, and the United States.²⁵¹

A general council oversees the organization and coordinates the legal, financial, and administrative affairs of NAFO.²⁵² A scientific council serves as a forum for analysis and consultation among scientists from the member states.²⁵³ The Fisheries Commission decides on management and conservation measures, with the purpose of ensuring consistency in the EEZs of member states.²⁵⁴

Atlantic Ocean Agreements and Organizations

Convention for Fisheries & Conservation of Living Resources of the Black Sea
Convention on Conduct of Fishing Operations in the North Atlantic
Convention on Future Multilateral Cooperation in the Northeast Atlantic Fisheries
EU Fisheries Agreement (Common Fisheries Policy)
General Fisheries Council for the Mediterranean
International Convention for the Conservation of Atlantic Tunas
International Convention for the Northwest Atlantic Fisheries
International Council for the Exploration of the Sea
North Atlantic Salmon Conservation Organization
Regional Convention on Fisheries Cooperation Among

²⁴⁸ *Id.*

²⁴⁹ *Supra*, note 145.

²⁵⁰ *Id.* at Article I.

²⁵¹ Estonia, Latvia, Lithuania, Poland, Portugal, Spain and Germany were contracting parties, but acceded to the European Union. Romania withdrew from the convention. NAFO website at <http://www.nafo.int/about/frames/about.html>. Last accessed 17 November 2006.

²⁵² *Supra* note 145 at Article II (a).

²⁵³ *Id.* at Article II (b), VI.

NAFO has jurisdiction over all fishes in the Regulatory Area with the exception of salmon, tunas, marlin, and the sedentary species of the continental shelf.²⁵⁵ NAFO currently provides for the conservation and management of stocks of American plaice, yellowtail flounder, cod, witch flounder, redfish, Greenland halibut, capelin, and squid. Stocks that straddle the Regulatory Area and Canada's EEZ, such as cod, American plaice, redfish, flounder, and Greenland halibut, are regular objects of diplomatic tension.²⁵⁶ Conflicts also have arisen with the vessels of non-parties, including Chile, Malta, Mauritania, Mexico, Panama, St. Vincent and the Grenadines, and Venezuela. Some of these vessels have reflagged from member states of NAFO to non-member states.²⁵⁷

In addition to these regional agreements, there are management regimes for highly migratory species in the Atlantic Ocean, such as salmon and tuna, which cross national boundaries, and for which management requires international cooperation.²⁵⁸

International Convention for the Conservation of Atlantic Tunas

The International Convention for the Conservation of Atlantic Tunas (ICCAT), entered into force 21 March 1969.²⁵⁹ ICCAT was established to provide an effective program of international cooperation in research and conservation in recognition of the unique problems related to the highly migratory nature of tuna and tuna-like species. The Convention area is defined as all waters of the Atlantic Ocean, including the adjacent seas.

The treaty established a Commission to carry out the objectives of the Convention. The Commission is responsible for providing internationally coordinated research on populations of tuna and tuna-like species and such other species of fishes exploited in tuna fishing in the Convention area as are not under investigation by another international fishery organization.²⁶⁰ Unlike Inter-American Tropical Tuna Commission, ICCAT does not have its own scientific staff.²⁶¹ Instead, ICCAT, through its rules of procedure, established a scientific body, the Standing Committee on Research and Statistics, to advise the Commission on research needs, conduct stock assessments, and provide management advice. The SCRS is composed of scientists from the ICCAT membership. Although the Convention provides that the Commission

²⁵⁴ *Id.* at Article I (4).

²⁵⁵ *Id.* at Article I (4).

²⁵⁶ Mfodwo, *supra* note 222.

²⁵⁷ *Id.*

²⁵⁸ In general, highly migratory species (HMS) have a "wide geographic distribution, both inside and outside the 200-mile zone, and ... undertake migrations on significant but variable distances across oceans for feeding or reproduction. They are pelagic species (do not live on the sea floor)..." UNCLOS Annex I "includes 11 tuna, 12 billfish species, pomfrets, 4 species of sauries, dolphinfish (*Coryphaena* spp.), oceanic sharks and cetaceans (both small and large)." FAO, Fisheries and Aquaculture Department. Highly Migratory Species Fact Sheet. Available at <http://www.fao.org/fi/website/FIRetrieveAction.do?dom=topic&fid=13686>. Last visited 3 May 2007. See also UNCLOS, *supra* note 139 at Annex 1 and Art. 64.

²⁵⁹ ICCAT, *supra* note 143.

²⁶⁰ *Id.* At Article IV(1).

²⁶¹ Michael L. Weber and Frances Spivy-Weber. "Proposed Elements for International Regimes to Conserve Living Marine Resources. Report in fulfillment of Marine Mammal Commission Contract no. T30916119. NTIS, Springfield, VA, October 1995.

may obtain technical and scientific information or services from any public or private individual or group, the Commission only rarely seeks scientific advice from other sources.²⁶²

With regard to conservation and management, the Commission may, on the basis of scientific evidence, make regulatory recommendations (Article VIII). With the decline in some large pelagic populations in the Atlantic Ocean, discussion and decisions within the Commission on stock management have become highly politicized.²⁶³

Promoting the conservation of large pelagics in the Atlantic Ocean under ICCAT can raise practical problems. For example, under the Atlantic Tunas Convention Act, the U.S. legislation that implements the Convention domestically, the U.S. government cannot alter a U.S. quota allocation adopted by ICCAT—even if the quota level agreed by ICCAT has been set at an unsustainable level.²⁶⁴ The U.S. can adopt more stringent measures, such as higher minimum sizes, larger closed areas, etc., however U.S. fishermen must be allowed the opportunity to catch their ICCAT quota.²⁶⁵ Although in its earlier years, ICCAT could not take action against non-members,²⁶⁶ in 2003, ICCAT adopted a comprehensive trade measures resolution that covers both members and non-members.²⁶⁷ Since the late 1990s, ICCAT has had quota compliance rules on the books that allow for the imposition of penalties, including trade sanctions, against members for quota overharvests in the swordfish and bluefin tuna fisheries.²⁶⁸ Sanctions have been applied to a member under the quota compliance rules once. The trade measures resolution has not yet been applied against an ICCAT member although several non-members have had sanctions placed against them under the 2003 measure and its predecessors.²⁶⁹

Convention on the Conservation and Management of Fishery Resources in the Southeast Atlantic Ocean

Until the late 1990s, there were no regional management regimes for fisheries in the Southeast Atlantic. Angola, Namibia, and South Africa had formed the Southern Africa Development Community (SADC), which includes a Marine Fisheries Policy and Strategy. These three coastal states of the southeast Atlantic negotiated access agreements with distant water fleets. In the late 1990s, Namibia, South Africa, and the United Kingdom began talks on

²⁶² *Id.*

²⁶³ Carl Safina. 1997. North Atlantic Fishery Resources at Risk. Prepared for the Pew Charitable Trusts. Unpublished manuscript. December 1997. 54 pages. See also, Carl Safina, *Song for the Blue Ocean*, Henry Holt and Co. (1997) at 92-99, which describes the difficulties of getting ICCAT members, especially Japan and Canada, to reduce quotas for bluefin tuna in 1992 despite scientific information showing a consistent 15-year decline.

²⁶⁴ The exact ATCA wording is "...no regulation promulgated under this section may have the effect of increasing or decreasing any allocation or quota of fish or fishing mortality level to the United States agreed to pursuant to a recommendation of the Commission." 16 U.S.C.A. 971(d)(c)(3).

²⁶⁵ *Id.*

²⁶⁶ Safina, *supra* note 253.

²⁶⁷ Resolution 94-9 by ICCAT on Compliance with the ICCAT Conservation and Management Measures (including Addendum). (Transmitted to Contracting Parties: January 23 1995).

²⁶⁸ Resolution 03-15 by ICCAT Concerning Trade Measures. (Transmitted to Contracting Parties: December 19, 2003).

²⁶⁹ Personal communication with Mark Wildman, NOAA Office of International Affairs, March 2007.

the formation of a new fisheries organization, called the Southeast Atlantic Fisheries Organization, for the conservation and management of deepwater straddling stocks. Eventually Angola, the European Community, Iceland, Namibia, Norway, Republic of Korea, South Africa, United Kingdom (on behalf of St. Helena and its dependencies of Tristan da Cunha and Ascension Islands) and the United States signed the agreement.²⁷⁰ States that have participated in the negotiations but have not signed the Convention are Japan, Russian Federation and Ukraine.

The Convention is one of the first regional fisheries agreements negotiated since the adoption of the UN Fish Stocks Agreement, and closely follows that model.²⁷¹ The convention seeks to ensure the conservation and sustainable management of the fishery resources of the Southeast Atlantic, and establishes the South-East Atlantic Fisheries Organization as the RFMO to implement the convention.²⁷²

The convention sets long-term conservation and sustainable use as a goal. Articles 2, 3, and 7 set out principles such as the precautionary approach, ecosystem management, protection of biological diversity, and protection of the marine ecosystem. Recognition of the special position of developing states is taken in Articles 12 and 21. Species covered are all but sedentary species within the coastal states' jurisdiction (Article 1). The geographic coverage of the convention is roughly FAO Statistical Area 47. The convention defines fishing more broadly than earlier instruments, taking in such activities as support operations, mother ships, transshipment and similar activities.²⁷³ The responsibilities of the Commission include setting quotas, allocating fishing rights, determining participants in the fishery and other management duties. The convention also creates a Scientific Committee and a Compliance Committee.²⁷⁴

Flag states are responsible for authorizing their vessels to fish in the convention area, for keeping a record of such authorizations, for reporting catches and monitoring compliance. In addition, port states are authorized to develop control measures, conduct inspections and deploy observers.

Other Atlantic Regional Regimes

There is some regional management structure in the southwest Atlantic, but not much. The Joint Technical Commission for the Argentina/Uruguay Maritime Front has regulatory authority to set quotas in the common fishing zone. The South Atlantic Fisheries Commission is a bilateral agreement between Argentina and the United Kingdom that manages fisheries through cooperative unilateral measures.

As in the southeast Atlantic, the principal managing organizations in the southwest Atlantic are national governments. Their programs may be summarized as follows:

²⁷⁰ Convention on the Conservation and Management of Fishery Resources in the Southeast Atlantic Ocean. Done at Windhoek. 20 April 2001. Entered into force April 2003 (hereinafter the Southeast Atlantic Convention). Available at <http://www.seafo.org>

²⁷¹ Hedley, C. The South-East Atlantic Fisheries Organization (SEAFO) Convention: an initial review. OceanLaw On-Line Paper No. 2, April 2001. Internet guide to International Fisheries Law. Available at <http://www.intfish.net/ops/2.htm>. Last accessed 17 November 2006.

²⁷² Southeast Atlantic Convention, *supra* note 260 at Art. 5.

²⁷³ *Id.* at Art. 1(h).

²⁷⁴ *Id.* at Article 14.

The United Kingdom manages the fisheries around the Falkland Islands, principally the squid fishery. Management is based upon scientific advice and is carried out through limitations on fishing effort, including area restrictions and bidding for access rights. Fishing effort on the high seas is restrained by linking access to squid within the fishery zone to voluntary restraints on the high seas.

Fisheries in Argentina are managed by the Secretary of Agriculture, Fisheries, and Nutrition. Annual quotas are set based on advice of the National Institute of Fisheries Research and Development. Fisheries in Uruguay are the responsibility of the National Institute of Fisheries. The principal management concern is hake. The Agriculture Ministry in Brazil is responsible for fisheries, although management of fisheries is delegated to the states and municipalities in principle. Although legislation and regulations exist, they have little practical effect on fisheries.

North Pacific Anadromous Fisheries Commission (NPAFC)

Canada, Japan, the Russian Federation, and the United States are the primary states of origin for anadromous stocks in the North Pacific Ocean. Stocks from Asia and North America mix on the high seas, making discrimination among stocks very difficult. Generally, states of origin have claimed salmon from their streams as their property and have insisted that other states must receive their permission to catch these salmon. States whose fisheries within their own EEZ intercept salmon from another State's streams claim they have rights to any fish in their EEZs.

The North Pacific Anadromous Fisheries Convention, which came into force in 1993, replaced the International Convention for the High Seas Fisheries of the North Pacific Ocean, to which the United States, Japan, and Canada belonged.²⁷⁵ Within the older convention, Japanese fishing for salmon on the high seas was increasingly restricted in order to reduce the capture of salmon from North American streams.²⁷⁶ In 1989, the Soviet Union announced that, effective in 1992, it was withdrawing permission to fish for salmon in its EEZ that it had granted to Japan since the 17th century.

The Soviets also provided the United States with a draft international agreement to establish a new organization for conserving North Pacific anadromous stocks.²⁷⁷ This led to a series of negotiations that produced the North Pacific Anadromous Fisheries Convention, which came into force in February 1993. The Convention established the North Pacific Anadromous Fish Commission (NPAFC), whose purpose is to promote the conservation of anadromous stocks of fish throughout their migratory range in the high seas area of the North Pacific Ocean and adjacent seas. The Convention also proposes the conservation of ecologically related species that interact with anadromous fish, including various marine mammals, seabirds, and non-anadromous fish species.

²⁷⁵ Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean. Done at Moscow 11 February 1992. Entered into force 16 February 1993. Senate Treaty Document 102-30, 102nd Cong. 2nd Sess. Hereinafter North Pacific Anadromous Fisheries Convention.

²⁷⁶ Mfodwo, *supra* note 222.

²⁷⁷ *Id.*

Among other improvements, the new Convention increases at-sea enforcement powers, authorizes strict enforcement at the point of sale, includes all countries of origin and fishing countries under one organization, and incorporates Russian scientific expertise and knowledge of Japanese fishing patterns.²⁷⁸ The founding members are Canada, Japan, the Russian Federation, and the United States. Non-member parties may join at the invitation of existing member states.

Besides prohibiting fishing for anadromous stocks on the high seas, the Convention also requires minimizing incidental taking of anadromous fish. The member states individually or collectively may take appropriate measures to prevent trafficking in illegally harvested Pacific salmon. The member states also are to intervene with non-parties whose fishing activities may adversely affect North Pacific anadromous fish. Article IV calls for the member states to prevent the reflagging of their fishing vessels.

Impacts on other species, restoration of other species, minimization of pollution, discards, and bycatch, and biodiversity protection all are reflected at least partially. The Convention authorizes timely conservation and the

language on enforcement is among the strongest and most advanced in the world. Member states may board the vessels of another member state on the high seas and seize the vessel if it is found in violation of the Convention. Besides providing authority to sanction non-parties that violate conservation measures, the Convention authorizes consultation with non-members.

Pacific Ocean Agreements and Organizations

Asia Pacific Fishery Commission

Asia-Pacific Economic Cooperation

Convention for a North Pacific Marine Science Organization

Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean

Convention for the Prohibition of Fishing with Long Driftnets in the South Pacific Ocean

Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

Eastern Pacific Ocean Tuna Fishing Agreement

Inter-American Tropical Tuna Commission

International Convention for the High Seas Fisheries of the North Pacific Ocean

International Pacific Halibut Commission

Latin American Organization for Fisheries Development

North Pacific Anadromous Fisheries Convention

Pacific Salmon Treaty

Permanent South Pacific Commission

South Pacific Commission

South Pacific Forum Fisheries Agency Convention

Southeast Asian Fisheries Development Center

²⁷⁸ *Id.*

Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea

The need for the Convention arose out of intensive fishing for pollock in an area of the Bering Sea that is outside the EEZs of the United States and the Russian Federation.²⁷⁹ Concerns about the impact of this fishing on pollock stocks within the EEZs of the United States and the Russian Federation led to a series of negotiations that began in 1991 and concluded in February 1994 among China, South Korea, Poland, the Russian Federation, and the United States.²⁸⁰ The convention's objectives are conservation, management, and optimum utilization of Bering Sea pollock, restoration of pollock to levels that will produce maximum sustainable yield, and cooperation in data gathering.

Rather than establishing a separate Secretariat, the Convention calls for annual meetings of the member states, between which the governments of the member states are to perform many of the functions of a Secretariat.²⁸¹ The only "internationalized" administrative structure is the Scientific and Technical Committee (STC), which is composed of at least one representative from each member state.²⁸² The STC is to provide the annual meeting of the member states with the assessments of Aleutian Basin pollock that are the basis for the harvest levels.

Principal functions of the annual meeting include setting the allowable harvest level for pollock in the area covered by the Convention and allocating this quota among the member states. The annual meeting also is to adopt other conservation and management measures, to establish terms and conditions for any trial fishing operations, to discuss cooperative enforcement measures, to review an observer program established by the member states, and to discuss scientific research in the region.²⁸³

All decisions of substance must be taken by consensus. If a member state considers a matter to be of substance, then it is to be voted upon in that way. Other decisions are taken by simple majority vote.

South Pacific Permanent Commission

The South Pacific Permanent Commission (CPPS) was established by the August 1952 Agreement of the Conference on the Use and Conservation of the Marine Resources of the South Pacific.²⁸⁴ The Agreement does not define a specific area of jurisdiction. The Agreement does state that the parties to the agreement—Ecuador, Peru and Chile—proclaim that each possesses sole sovereignty over the area of the sea and sea floor within 200 miles of its shores. A 1984 Declaration states that each state has responsibility for conservation and protection of living resources within their jurisdictions and beyond. The agreement applies to all living marine resources.

²⁷⁹ Suzanne Iudicello, Background Paper: Major Fisheries at Risk in the North Pacific Ocean. Prepared for the Pew Charitable Trusts. Unpublished manuscript. December 1997. Transcript available with author.

²⁸⁰ Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea. Done at Washington, D.C. 16 June 1995. Entered into force 8 December 1995. U.S. Treaty Document 103-27.

²⁸¹ Mfodwo, *supra* note 222.

²⁸² *Id.*

²⁸³ Iudicello, *supra* note 269.

²⁸⁴ 1952 Agreements on the Exploitation and Conservation of the Maritime Resources of the South Pacific. Done at Santiago, Chile, 18 August 1952. Available at <http://www.intfish.net/orgs/fisheries/cpps.htm>. Accessed June 30, 2007.

CPPS collaborates with FAO in collecting fisheries data for FAO Statistical Area 87. In 1985, CPPS signed an agreement with FAO to collaborate in research on living marine resources, staff training, dissemination of information, and scientific and technical meetings. Subsequent meetings of the parties resulted in an additional protocol, proposals for fishery regulation on the high seas adjacent to member countries, and a call for projects examining both artisanal and industrial fisheries.²⁸⁵

Forum Fisheries Agency

The Forum Fisheries Agency (FFA) was established by convention that went into force in July 1979. Members of the South Pacific Forum, as well as other states and territories on the recommendation of the Fisheries Committee, may join FFA.

According to the 1979 convention, the FFA was formed "to secure the maximum benefits from the living marine resources of the region for their peoples and for the region as a whole and in particular the developing countries," and "to facilitate the collection, analysis, evaluation and dissemination of relevant statistical scientific and economic information about the living marine resources of the region, and in particular the highly migratory species."²⁸⁶ FFA promotes harmonization of fisheries management in the region, cooperation regarding distant water fishing nations, cooperation in enforcement and surveillance, cooperation in marketing and in granting access to exclusive economic zones.

The sphere of influence of the FFA covers about 30 million square kilometers from the Republic of the Marshall Islands to New Zealand, and corresponds roughly to FAO statistical areas 74 and 81. The FFA addresses all living marine resources, but particularly highly migratory species.

In June 1988, the Treaty on Fisheries Between the Governments of Certain Pacific Island States and the Government of the United States came into force. This agreement had been concluded in 1987 at Port Moresby, Papua New Guinea, and was renewed for ten years in 1993.²⁸⁷ Under the agreement, fishing vessels from the United States are permitted into the fisheries jurisdictions of the 16 FFA member countries that are party to this treaty. Fees paid for this access are divided among the parties. The treaty was innovative in requiring U.S. vessels to comply with the same reporting and enforcement provisions on the high seas as applied within the exclusive economic zones of the member countries.²⁸⁸

Upon discovering large-scale driftnetting operations in the area, a 1989 meeting of the FFA in Kiribati issued the Tarawa Declaration calling for the end of such driftnetting. This led later to the Convention for the Prohibition of Fishing With Long Driftnets in South Pacific, which was concluded at Wellington, New Zealand, in November 1989 and came into force in May 1991.

In July 1992, members of the FFA concluded the Niue Treaty on Cooperation in Fisheries Surveillance in the South Pacific Region, which entered into force in May 1993. The principal purpose of the Niue agreement is to overcome the difficulties of enforcement in so large an area of ocean by, among other things, permitting reciprocal and joint enforcement and surveillance of

²⁸⁵ See, Galapagos Agreement. Available at <http://www.intfish.net/orgs/fisheries/cpps.htm>. Accessed June 30, 2007.

²⁸⁶ Basic convention documents and agreements are available at FFA Website. <http://www.ffa.int/node/266> Last accessed June 30, 2007.

²⁸⁷ Treaty on Fisheries Between the Governments of Certain Pacific Island States and the Government of the United States of America. Done at Port Moresby, 2 April 1987. Entered into force 15 June 1988. TIAS 11100.

²⁸⁸ *Id.* Articles 3-4.

measures adopted by individual countries. Subsequent agreements, annexes and projects have addressed tuna fishing, longline gear, surveillance and monitoring.

Asia Pacific Fishery Commission

The Asia Pacific Fishery Commission is an outgrowth of an agreement to establish the Indo-Pacific Fisheries Council in 1948 under the FAO. The commission, created in 1994, is to "promote the full and proper utilization of living aquatic resources by the development and management of fishing and culture operations."²⁸⁹ The APFIC's jurisdiction includes a large part of the area, the Asia-Pacific (FAO Statistical Area 71). Members include Australia, Bangladesh, Cambodia, China, France, India, Indonesia, Japan, Korea, Malaysia, Myanmar, Nepal, New Zealand, Pakistan, Philippines, Sri Lanka, Thailand, United Kingdom, United States of America, and Vietnam. Membership in the APFIC is widely open.

APFIC acts as consultative forum that works in partnership with other regional organizations and arrangements and members. It provides advice, coordinates activities and acts as an information broker to increase knowledge of fisheries and aquaculture in the Asia Pacific region to underpin decision-making. Among its functions, the commission is to review the state of fishery resources and to recommend measures and carry out programs to increase the efficiency of the fishing and aquaculture industries. The Commission also is to conserve and manage resources and protect them from pollution.

The Asia Pacific Fishery Commission has yet to make the transition from fishery development and promotion to stock conservation and rebuilding. It has not amended its charter to undertake management or conservation actions, but relies on the governments of member countries to do so. In the area under the commission's purview, there is no management structure for adjacent, or straddling stocks of fish.

Convention for the Conservation of Southern Bluefin Tuna

The Commission for the Conservation of Southern Bluefin Tuna²⁹⁰ arose from annual trilateral meetings among Australia, Japan and New Zealand (Weber 1998). The three countries had operated under a voluntary management agreement, but negotiated the formal convention in response to continued heavy fishing that had resulted in significant declines of mature fish throughout the 1980s.²⁹¹

Concerned that activity of non-party nations in the fishery was reducing the effectiveness of members' conservation and management measures, the parties in 1996 asked Taiwan, South Korea and Indonesia to become parties. On 17 October 2001 the Republic

**Indian Ocean
Agreements & Organizations**

- Indian Ocean Fishery Commission
- Indian Ocean Tuna Commission
- Southwest Indian Ocean Fisheries
Commission
- Western Indian Ocean Tuna Organization

²⁸⁹ APFIC Website at <http://www.apfic.org/>

²⁹⁰ Convention for the Conservation of Southern Bluefin Tuna. Done at Canberra, May 1993. Entered into force 20 May 1994 (hereinafter CCSBT).

²⁹¹ Commission for the Conservation of Bluefin Tuna. Website available at www.ccbt.org/docs/about.html. Last accessed 17 November 2006.

of Korea joined the Commission. The Fishing Entity of Taiwan's membership of the Extended Commission became effective on 30 August 2002.²⁹²

In 2003, the commission created membership status for countries with an interest in the fishery to participate in its activities as formal cooperating non-members. These parties must comply with the management and conservation objectives and agreed catch limits of the convention and may participate in discussions, but cannot vote. The Philippines was accepted as a formal cooperating non-member in 2004, and parties continue discussions with Indonesia and South Africa.²⁹³

The convention goal is conservation and optimum utilization of bluefin tuna.²⁹⁴ Though the scope of the agreement limits its attention to bluefin tuna, definitions include consideration of all "ecologically related species."²⁹⁵ By definition, the convention covers not just fishing activity, but support operations as well. States parties are required to enforce the provisions of the agreement, provide information including scientific and catch statistics and effort data, exchange scientific and fishing information, and report fishing by non-parties. Member countries are legally bound by decisions on total allowable catch and other conservation and management measures. Enforcement is by the parties on their flag vessels. Significantly, the treaty requires parties to take action to prevent vessels from transferring registration to avoid compliance with Commission decisions²⁹⁶ Member countries also must act to deter non-parties from activities that undermine the objectives of the treaty. The measures adopted by the CCSBT are not limited to the high seas, but apply to the EEZs of all member countries.

The commission's duties include gathering and disseminating scientific information, statistical data, and legal information. It adopts regulations, sets catch limits, allocates catch, and operates a monitoring system.²⁹⁷ All decisions are by unanimous vote.²⁹⁸ The convention created a Scientific Committee, and allows both non-party and NGO observers at meetings.

The Convention for the Establishment of an Inter-American Tropical Tuna Commission

The IATTC convention²⁹⁹ defines its area of competence as the Eastern Pacific Ocean, but does not further define the area, although conservation and management measures contain their areas of application, generally out to 150°W. The IATTC focuses on skipjack tuna, yellowfin tuna, and fish used as bait, although staff has studied bigeye tuna, black skipjack, bluefin tuna, albacore tuna and billfishes, as well as dolphins, turtles and sharks. Members are Costa Rica, Ecuador, El Salvador, France, Guatemala, Japan, Mexico, Nicaragua, Panama, Peru, Republic of Korea, United States, Vanuatu and Venezuela. Belize, Canada, China, Cook

²⁹² CCSBT *supra* note 280.

²⁹³ *Id.*

²⁹⁴ *Id.* at Article III.

²⁹⁵ *Id.* at Article II.

²⁹⁶ Mfodwo *supra* note 222.

²⁹⁷ CCSBT *supra* note 280 at Article VIII.

²⁹⁸ *Id.* at Article VII.

²⁹⁹ The Convention for the Establishment of an Inter-American Tropical Tuna Commission. Done at Washington, 31 May 1949. Entered into force 3 March 1950. 1 UST 230, TIAS 2044. (hereinafter IATTC).

Islands, the European Union, Honduras and Chinese Taipei are Cooperating Non Parties or Cooperating Fishing Entities.³⁰⁰

The IATTC is authorized to make recommendations to its members regarding measures that will maintain the fishes covered by the convention at levels that will permit maximum sustained catch. The Convention also calls for the IATTC to collect, analyze, and disseminate information regarding the catches and operations of vessels in the fishery. Unlike other tuna management regimes, the IATTC maintains an independent scientific staff that collects catch and other information and prepares recommendations for the member governments. IATTC has also carried out a program to estimate bycatch of non-target fishes and dolphins in the fishery.

At a September 1990 meeting in Costa Rica, representatives of Chile, Colombia, Costa Rica, Ecuador, El Salvador, France, Honduras, Japan, Mexico, Nicaragua, Panama, Spain, the United States, Vanuatu, and Venezuela agreed that the IATTC was the appropriate body to coordinate technical aspects of the program to reduce the incidental capture and mortality of dolphins in their exclusive economic zones and the adjacent high seas during purse seine operations. At a 1995 meeting, the member countries of the IATTC adopted a Declaration on Strengthening the Objectives and Operation of the IATTC, which called for implementing the UN agreement on straddling fish stocks and highly migratory fish stocks.

For comparison, see the Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean.³⁰¹ One of the first treaties developed after the UN Fish Stocks Agreement, it was the culmination of complex negotiations among 25 nations including small island nations and developed countries with active distant water fleets.³⁰² As of November 2004, Australia, China, Cook Islands, Federated States of Micronesia, Fiji Islands, Korea, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Papua New Guinea, Samoa, Solomon Islands, Tonga and Tuvalu had ratified or acceded to the Convention.³⁰³

Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean

The Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean creates the kind of regional organization foreseen in the Straddling Stocks Agreement.³⁰⁴ The 2000 Honolulu Convention covers much of the Pacific Ocean and governing territorial seas and exclusive economic zones as well as high seas areas. It creates a commission with authority to set catch limits and allocate catch quotas to fishing nations both within and outside the exclusive economic zones of coastal and island nations. Most significantly in relation to incidental capture of marine mammals, this fairly new treaty requires fishing of migratory species in the high seas to be compatible with the regulations that apply within adjacent exclusive economic zones. It relies on the precautionary approach as its basic foundation throughout. It is one of the new instruments that enables both flag-state and

³⁰⁰ IATTC website at <http://www.iattc.org/HomeENG.htm>. Accessed 17 November 2006.

³⁰¹ *Supra* note 144.

³⁰² See generally Violanda Botet, *Filling in one of the Last Pieces of the Ocean: Regulating Tuna in the Western and Central Pacific Ocean*, 41 VIRGINIA JOURNAL OF INTERNATIONAL LAW 787-813 (2001).

³⁰³ WCPF Convention, *supra* note 144.

³⁰⁴ Mfodwo *supra* note 222.

port-state enforcement, boarding and inspection rights, obligatory transponders on all high-seas fisheries, and regional observers on the vessels. President Bush requested advice and consent to ratification in May 2005,³⁰⁵ and the Senate Foreign Relations Committee held a hearing on it on September 29, 2005.³⁰⁶ Pending ratification, the U.S. has attended meetings in recent months as a “cooperating nonmember.”

The objective of the Convention is to ensure, through effective management, the long-term conservation and sustainable use of highly migratory fish stocks in the western and central Pacific Ocean, in accordance with the 1982 LOS Convention and the 1995 UN Fish Stocks Agreement. The Convention applies to the Western and Central Pacific Ocean.

The Convention on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean was opened for signature in September 2000, and entered into force on 19 June 2004. The Convention applies to all species of highly migratory fish stocks (as defined as in Annex I of the Law of the Sea Convention) or otherwise decided by the Commission.

The Convention provides a list of general principles that are closely modeled on the general principles contained in the Fish Stocks Agreement. These principles, *inter alia*, are: adopt measures to ensure long-term sustainability of highly migratory fish stocks and promote their optimum utilization; maintain or restore stocks at levels capable of producing maximum sustainable yield, taking into account fishing patterns, the interdependence of stocks; apply the precautionary approach; assess the impacts of fishing, other human activities and environmental factors on target stocks, non-target species, and species belonging to the same ecosystem or dependent upon or associated with the target stocks; adopt measures to minimize waste, discards, catch by lost or abandoned gear, pollution originating from fishing vessels, catch of non-target species, both fish and non-fish species, in particular endangered species and promote the development and use of selective, environmentally safe and cost-effective fishing gear and techniques; protect biodiversity in the marine environment; and take measures to prevent or eliminate over-fishing and excess fishing capacity. The general principles are to be applied by coastal States within areas under national jurisdiction in the Convention Area in the exercise of their sovereign rights for the purpose of exploring and exploiting, conserving and managing highly migratory fish stocks.

The Commission is also required to develop a regional observer program to collect verified catch data and other information, which is to consist of independent and impartial observers authorized by the Secretariat. All vessels which fish in the Convention Area, other than those which operate exclusively within waters under the national jurisdiction of the flag State, must be prepared to accept an observer from the regional observer program, if required by the Commission.

The Commission on the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific has taken action to reduce the bycatch of non-target fish, seabirds and sea turtles, but has taken no action to reduce any small cetacean bycatch.

The U.S. was heavily involved in the negotiation of this convention, and in December 2006 received Senate advice and consent to ratification and secured implementing legislation through Congress.

³⁰⁵ Press Release, George W. Bush, Message to the U.S. Senate Regarding WCPF Convention (May 16, 2005), available at <<http://www.whitehouse.gov/news/releases/2005/05/20050516-7.html>> (visited Sept. 4, 2005).

³⁰⁶ 151 Cong. Rec. S D990 (daily ed. Sept. 29, 2005)

Regional Scientific Organizations

ICES

The International Council for the Exploration of the Sea (ICES) was established in 1902, and provides scientific advice to member states in the North Atlantic in both European and North American regions. The organization annually analyzes about 70 stocks of commercially exploited fishes (Marashi 1996). ICES is considered the premier international organization researching marine living resources through its Advisory Committee on Fishery Management (ACFM). ICES also conducts research on pollution through its Advisory Committee on Marine Pollution.

Current members are Belgium, Canada, Denmark, Finland, France, Germany, Iceland, Ireland, Netherlands, Norway, Poland, Portugal, Spain, Sweden, United Kingdom, the United States, Russian Federation, Latvia, Lithuania, and Estonia.

ICES depends upon its members for much of the information that it collects, although there is no legal obligation on member states to provide information (Mfodwo 1998). It regularly conducts assessments of the state of the most important fish and shellfish stocks in the effective ICES area, the northeast Atlantic, including the Baltic but excluding the Mediterranean.

The principal decisionmaking body of ICES is the Council to which each member state may send two representatives. Member states provide most of ICES funding based on annual budgets approved by a majority vote. A Secretariat manages the day-to-day business of the commission and serves as a data center. ICES databases include a wide range of information on fisheries, including catch and effort data, discards, independent surveys, tagging data, and other matters.

ICES generally is viewed as a well-functioning organization with the capability of providing significant input into fisheries management where an appropriate political framework exists (Mfodwo 1998). It also has a highly developed ability to integrate environmental considerations into its fishery stock assessments, as through the recently established Working Group on the Ecosystem Effects of Fishing Activities. ICES also has begun evaluating the impacts of gear on the seabed of the northeast Atlantic and on marine mammals, seabirds, and benthic organisms.

PICES

After more than a decade of stop-and-start discussions, the Convention for a North Pacific Marine Science Organization (PICES) was established in December 1990. PICES's area of concern is the temperate and sub-Arctic region of the North Pacific Ocean northward of 30°N latitude. The purposes of PICES are:

- to promote and coordinate research on living resources in the North Pacific, including interactions with land and atmosphere, climate change, ecosystems, and the impacts of human activities;
- to promote collection and exchange of information.

Founding members are Canada, China, Japan, the Russian Federation, and the United States. Each member state appoints two delegates to the Governing Council, whose roles are as follows:

- to identify research priorities and problems as well as methods for the resolution of problems;
- to recommend coordinated research programs undertaken by the member states;
- to promote the exchange of scientific data, information, and personnel; and

- to consider requests to develop scientific advice.

The Governing Council may invite other states, organizations, and experts to attend scientific meetings as it wishes. Decisions are to be by consensus--considered as the absence of a formal objection--and where consensus is not possible, by a three-quarters majority vote. Constraints on the effectiveness of PICES include the non-binding nature of their recommendations and conflicts among the agendas of different member states.

SPC

The South Pacific Commission was established by an agreement signed at Canberra, Australia in 1947. The agreement came into force in 1948, was amended in 1952, 1954, and 1964, and was supplemented by protocols of understanding in 1974 and 1976. In November 1986, a Convention for the Protection of the Natural Resources of the South Pacific Region was adopted. In August 1995, the Convention came into force after Niue became the tenth party to ratify the agreement.

The Canberra agreement defined the area of competence as all those areas in the Pacific administered by the participating governments that lie wholly or in part south of the Equator, east from and including the Australian territory of Papua and the Trust Territory of New Guinea (now Papua New Guinea and Irian Jaya), and Guam and the Trust Territory of the Pacific Islands.

The Convention for the Protection of the Natural Resources of the South Pacific Region will apply to the 200-mile zone of 23 self-governing island nations and island territories, as well as those areas of high seas that are enclosed from all sides by these 200-mile zones.

The basic principle of the SPC has been "development relevant to need." Although the SPC addresses a wide range of issues, including agriculture and plant protection, rural development, education, health information and cultural exchanges, fisheries is its largest single activity. The SPC does not make management recommendations, although it does provide scientific advice to its members. It also provides a regional forum for discussion. Two Commission programs deal exclusively with tunas and billfishes, while five others deal with coastal fisheries. Many of these programs such as the observer program are carried out in cooperation with other entities.

The SPC has collected and analyzed catch statistics, and conducted research on tuna and billfish. The program includes observer activities, port sampling, collecting catch and effort data, and population assessment. The commission monitors catches of tuna and performs biological analysis of these data. It maintains a regional oceanic fisheries data base, and assesses interaction among regional oceanic fisheries, studies the population dynamics of ocean species, monitors the level of exploitation of tunas and billfishes and baitfishes, and assists countries in building expertise. TBAP also provides observers for foreign flag vessels.

CHAPTER 5. RISK ASSESSMENT ANALYSIS OF INTERNATIONAL SMALL CETACEAN BYCATCH AND TOOLS TO REDUCE BYCATCH

In this chapter, we attempt to further classify and rank problems and potential action mechanisms according to a set of criteria and to provide a clear rationale for each problem assigned high priority for funding and intervention. The problems are presented by region, as surfaced by the review of each of the FAO statistical areas evaluated in Chapter 2 and Appendix A. The tools also are presented by region and are drawn from the domestic tools presented in Chapter 3 and agreements evaluated in Chapter 4. Table 5.1 summarizes the analysis by showing species at risk in each statistical area. Species at risk are those species where the bycatch represents between one and two percent of the population estimate. The narrative in Chapter 5 focuses on those species where the bycatch is unsustainable—where the bycatch exceeds two percent of the population estimate. Table 5.1 also summarizes gaps in abundance and bycatch information, gaps in management frameworks and gaps in implementation or enforcement of existing measures. The following species are at risk:

- Northwest Atlantic—harbor porpoise, northern right whale
- Northeast Atlantic—harbor porpoise, common and striped dolphins
- Western Central Atlantic—tucuxi
- Eastern Central Atlantic—humpback dolphin
- Mediterranean and Black Sea—striped and common dolphins, sperm whale, and harbor porpoise
- Southwest Atlantic—tucuxi, dusky and Commerson’s dolphins, Franciscana
- Western Indian Ocean— Indian humpback dolphin, bottlenose dolphin, spinner dolphin, Risso’s dolphin
- Eastern Indian Ocean—Ganges river dolphin and Irrawaddy dolphin
- North Pacific—Dall’s porpoise and finless porpoise
- Sea of Japan—finless porpoise
- East and South China Seas and inland waters of Yangtze River—finless porpoise
- Yangtze River—baijis
- Western Central Pacific—bottlenose and spinner dolphins, Fraser’s dolphin, Indopacific humpback dolphins and Irrawaddy dolphin
- Mekong River, Mahakam River, Songkhla Lake, and Ayeyarwady River—Irrawaddy dolphins
- Eastern Central Pacific—False killer whale and Vaquita
- Southwest Pacific—Hector’s dolphin and Maui’s dolphin
- Southeastern Pacific—Dusky dolphin and Burmeister’s porpoise

Analytical Approach

In our criteria we considered the following: (1) the level of risk—whether a species’ or population’s survival is unsustainable, approaching an unsustainable level, or at risk from bycatch; (2) available legal mechanisms for action—whether the problem is being addressed effectively through national legislation, bilateral agreements, or international conventions; (3)

feasibility of intervention, based on institutional capacity within the country or region to effectively implement bycatch mitigation strategies and quantitative assessments to verify the risk; and (4) fisheries in which a currently available solution (technical, socio-economic, or a combination) appears feasible. Also, in this chapter, we have noted where the U.S. has capacity to participate or where it is not a party nation to applicable agreements and may need to find alternative approaches such as training and technical assistance, scientific support, grants, or economic incentive approaches.

As we undertook our analysis, a number of issues and problems emerged that apply to several regions. First, in areas where developing nations have instituted legislation making bycatch illegal, monitoring becomes increasingly difficult because fishermen dispose of bycaught cetacean carcasses clandestinely rather than bringing them to shore. Furthermore, in many regions, bycaught cetaceans have acquired a market value and are therefore brought ashore and sold for human consumption or bait, blurring the distinction between bycatch and direct harvests. This may occur despite prohibitions against the sale of cetacean products.³⁰⁷

Except for North America, western Europe, Australia, and New Zealand, very few nations have observer programs designed to monitor cetacean bycatch; consequently, the evidence for or estimates of bycatch tends to be anecdotal or non-quantitative, consisting of stranding reports, interviews, port monitoring, self-reporting by countries, and opportunistic observations by scientists and fishery observers.³⁰⁸ Such information can result in underestimates of bycatch. Innovative, rigorous analyses are necessary in all regions to secure credible estimates of bycatch levels and trends. Finally, in areas where there is intensive fishing effort, but little or no basic information on presence of cetacean species or their population abundance, bycatch may pose a serious conservation threat, yet the lack of quantitative observations makes it difficult to assess risk. Moreover, the fisheries in such areas are often small-scale and decentralized, making it difficult to evaluate fishing effort or to estimate or monitor cetacean bycatch rigorously.³⁰⁹ Adding to the intractability of this problem is the fact that where fisheries are coastal, local, or artisanal, international or even bi- or multi-lateral agreements do not provide mechanisms for action because these activities are solely within the purview of the coastal states.

³⁰⁷ Van Waerebeek, K., and Reyes, J.C. 1994. Post-ban small cetacean bycatch off Peru: a review. Report of the International Whaling Commission (Special Issue) 15:503–19. See also Van Waerebeek, K., Van Bresseem, M.-F., Félix, F., Alfaro-Shigueto, J., García-Godoes, A., Chávez-Lisambart, L., Ontón, K., Montes, D., and Bello, R. 1997. Mortality of dolphins and porpoises in coastal fisheries off Peru and southern Ecuador in 1994. *Biological Conservation* 81:43–49. Leatherwood, S., and Reeves, R.R., 1989. Marine mammal research and conservation in Sri Lanka 1985–1986. United Nations Environment Programme, Nairobi, Marine Mammal Technical Report 1, 138 pp. Dolar, M.L.L., Leatherwood, S.J., Wood, C.J., Alava, M.N.R., Hill, C.L., and Aragones, L.V. 1994. Directed fisheries for cetaceans in the Philippines. Report of the International Whaling Commission 44:439–449.

³⁰⁸ Leatherwood, S., and Reeves, R.R. 1989. Marine mammal research and conservation in Sri Lanka 1985–1986. United Nations Environment Programme, Nairobi, Marine Mammal Technical Report 1, 138 pp. See also Zerbini, A.N., and Kotas, J.E. 1998. A note on cetacean bycatch in pelagic driftnetting off southern Brazil. Report of the International Whaling Commission 48:519–24. Bordino, P., and Albareda, D. 2004. Incidental mortality of franciscana dolphin *Pontoporia blainvillei* in coastal gillnet fisheries in northern Buenos Aires, Argentina. International Whaling Commission, Cambridge, UK. Scientific Committee Document SC/56/SM11.

³⁰⁹ Donovan, G.P., 1994. Developments on issues relating to the incidental catches of cetaceans since 1992 and the UNCED conference. Report of the International Whaling Commission (Special Issue) 15:609–613.

AREA/SPECIES	ABUNDANCE ESTIMATE	Updated Recently	BYCATCH ESTIMATE/% POPULATION AFFECTED	Bycatch Mortality exceeds 2%	STATUS ³¹⁰			AGREEMENTS IN PLACE? International/ Regional/Bilateral	PARTIES ³¹¹ Coastal State/Flag State/Port State/(US)	MEASURES IMPLEMENTED? Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
ATLANTIC OCEAN, MEDITERRANEAN & BLACK SEAS										
AREA 21-NORTHWEST ATLANTIC										
<i>PHOCOENA PHOCOENA</i> - HARBOR PORPOISE										
Gulf of Maine/Bay of Fundy	89,700		55/year (2000-2004)		NE (VU-over all)		II	BILATERAL	US-Canada	Pingers
<i>EUBALAENA GLACIALIS</i> NORTHERN RIGHT WHALE										
	300		1.2/year		E	I & II	I&II	BILATERAL	US-Canada	
AREA 27-NORTHEAST ATLANTIC										
<i>PHOCOENA PHOCOENA</i> - HARBOR PORPOISE										
Northern and Central North Sea	61,335		2,700/4.1%		VU		II	Regional	CS/FS/PS	
Kattegat and Oeresund	36,046 (20,276-64,083)		83/0.2%		VU		II	Regional	CS/FS/PS	
Skagerrak	4,738		114/2.4%		VU		II	Regional	CS/FS/PS	Pingers
Kattegat	4,009		50/1.2%		VU		II	Regional	CS/FS/PS	
Kiel & Mecklenburg Bight	588 (240-1,430)				VU		II	Regional	CS/FS/PS	
Southwestern Baltic proper	599 (200-3,300)		13/2.1%		VU		II	Regional	CS/FS/PS	
Northern North Sea	98,564 (66,679-145,697)		5,000/5%		VU		II	Regional	CS/FS/PS	Pingers (DMK) gillnet fishery

³¹⁰ For IUCN Red List, Categories are: LC, Least Concern; LR, Lower Risk, NT Near Threatened; NE, Not Evaluated; DD, Data Deficient; VU, Vulnerable; EN, Endangered; CR, Critically Endangered. LR/cd, Conservation Dependent (cd). Taxa which are the focus of a continuing taxon-specific or habitat-specific conservation programme targeted towards the taxon in question, the cessation of which would result in the taxon qualifying for one of the threatened categories above within a period of five years. If listed on CITES, the Appendix is indicated as I, II or both. For the Convention on Migratory Species, Appendix II listings are shown.

³¹¹ The parties to the international, regional and bi-lateral agreements discussed in Chapters 4 and 5 and summarized in this table are listed in Appendix B.

AREA/SPECIES	ABUNDANCE ESTIMATE	Updated Recently	BYCATCH ESTIMATE/% POPULATION AFFECTED	Bycatch Mortality exceeds 2%	STATUS ³¹⁰			AGREEMENTS IN PLACE? International/ Regional/Bilateral	PARTIES ³¹¹ Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEMENTED? Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
										Aug - Oct
Southern & Central North Sea	169,888 (124,121-232,530)		7,493/4.3%		VU		II	Regional	CS/FS/PS	
Celtic Sea	36,280 (12, 828-102,604)		2,200/6.2%		VU		II	Regional	CS/FS/PS	
North Sea	268,800		3,410/1.3%		VU		II	Regional	CS/FS/PS	
DELPHINUS DELPHIS-COMMON DOLPHINS										
Celtic Sea	75,449 (22,900 - 284,900)				LC	nl	II	Regional	CS/FS/PS	
Bay of Biscay	61,888 (35,461 - 108,010)		410-419 /0.67%		LC	nl	II	Regional	CS/FS/PS	Driftnet fishery banned
Celtic Sea & Western Waters	101,205 (55,125 – 185,802)		356-835312 61313-200314/ 0.6-1.1%		LC	nl	II	Regional	CS/FS/PS	
STENELLA COERULEOALBA-STRIPED DOLPHINS										
Bay of Biscay	73,843		1193-152315 /1.6-1.56%		LR/cd	nl	II	Regional	CS/FS/PS	
Celtic Sea & Western Waters	66,825		136-528316 44317/ 0.27-0.79%		LR/cd	nl	II	Regional	CS/FS/PS	
AREA 31-WESTERN CENTRAL ATLANTIC										
SOTALIA FLUVIATILIS TUCUXI										
Cananea estuary	156-380				DD	I&II	II	Regional	CS (US)	Marine Mammal

AREA/SPECIES	ABUNDANCE ESTIMATE	Updated Recently	BYCATCH ESTIMATE/% POPULATION AFFECTED	Bycatch Mortality exceeds 2%	STATUS ³¹⁰			AGREEMENTS IN PLACE? International/ Regional/Bilateral	PARTIES ³¹¹ Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEMENTED? Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
	No estimate for rest of range									Action Plan under SPAW Protocol
AREA 34-EASTERN CENTRAL ATLANTIC										
<i>SOUSA TEUSZII</i> -ATLANTIC HUMPBACK DOLPHIN										
Dakhla Bay	Considered small				DD	I&II	II	Int'l/Regional	CS	
Parc National du Banc d' Arguin in Mauritania.	Considered small				DD	I&II	II	Int'l/Regional	CS	
Saloum delta, Senegal	100				DD	I&II	II	Int'l/Regional	CS	
Canal do Geba-Bijagos	< 1,000 animals				DD	I&II	II	Int'l/Regional	CS	
South Guinea					DD	I&II	II	Int'l/Regional	CS	
Cameroon					DD	I&II	II	Int'l/Regional	CS	
Gaboon Estuaries					DD	I&II	II	Int'l/Regional	CS	
Angola	Considered small				DD	I&II	II	Int'l/Regional	CS	
AREA 37-MEDITERRANEAN AND BLACK SEA										
<i>STENELLA COERULEOALBA</i> – STRIPED DOLPHINS										
Alboran Sea	14,736 (6,923 – 31,366)		145-201/1.2%		LR/cd	nl	II	Int'l/Regional	CS/FS/PS	Swordfish driftnet fishery banned
Corsican/Ligurian Sea	25,614 (15,377 – 42,685)		51-326 (+/-146) 0.19 – 1.3%		LR/cd	nl	II	Int'l/Regional	CS/PS	Swordfish driftnet fishery banned
Western Mediterranean	117, 880 (68,379-214,800)		14-15/0.006%		LR/cd	nl	II	Int'l/Regional	CS/FS/PS	
<i>DELPHINUS DELPHIS</i> -COMMON DOLPHINS										
Alboran Sea	14,736 (6,923 – 31,366)		145-201/1.2%		LC	nl	II	Regional	CS/FS/PS	Swordfish driftnet fishery banned
<i>PHYETER MACROCEPHALUS</i> —SPERM WHALE										
Mediterranean			7-14/year		VU	I	II	Regional	CS/FS/PS	Swordfish driftnet

AREA/SPECIES	ABUNDANCE ESTIMATE	Updated Recently	BYCATCH ESTIMATE/% POPULATION AFFECTED	Bycatch Mortality exceeds 2%	STATUS ³¹⁰			AGREEMENTS IN PLACE? International/ Regional/Bilateral	PARTIES ³¹¹ Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEMENTED? Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
										fishery banned
PHOCOENA PHOCOENA – HARBOR PORPOISE										
Azov Sea in total	2,922 (1,333–6,403)				DD		II	Regional	CS/FS/PS	
Kerch Strait	54 (12–245)				DD		II	Regional	CS/FS/PS	
NW, N and NE Black Sea within Ukrainian and Russian territorial waters	1,215 (492–3,002)				VU		II	Regional & National (EC Directive)	CS/FS/PS	
SE Black Sea < Georgian terr waters	3,565 (2,071–6,137)				VU		II	Regional	CS/FS/PS	
Central Black Sea> waters Ukraine/Turkey	8,240 (1,714–39,605)				VU		II	Regional	CS/FS/PS	
AREA 41-SOUTHWEST ATLANTIC										
SOTALIA FLUVIATILIS-TUCUXI										
Cananéia estuaryBrazil	156-380				DD	I&II	II			
Southwest Atlantic			141		DD	I&II	II			
LAGENORHYNCHUS OBSCURUS – DUSKY DOLPHIN										
Patagonian coast	7,252		70-200/ .96%-2.7%		DD	nl	II			
Punta Ninfas and Cabo Blanco, Argentina	6,628				DD	nl	II			
CEPHALORHYNCHUS COMMERSONII – COMMERSON'S DOLPHIN										
Southwest Atlantic	21,000		141-212/		DD	nl	I			

AREA/SPECIES	ABUNDANCE ESTIMATE	Updated Recently	BYCATCH ESTIMATE/% POPULATION AFFECTED	Bycatch Mortality exceeds 2%	STATUS ³¹⁰			AGREEMENTS IN PLACE? International/ Regional/Bilateral	PARTIES ³¹¹ Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEMENTED? Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
			.67%-1.0% 25-170/ .1%-8%							
Tierra del Fuego	14,000		5-30/.03%- .2%		DD	nl	I			
PONTOPORIA BLAINVILLEI FRANCISCANA										
FMA I			110		DD	nl	I&II			
FMA II			375		DD	nl	I&II			
FMA III	42,078 (33,047 – 53,542)		1,374 (694-2,215) 3.2%		DD	nl	I&II			
FMA IV	34,131 (16,360-74,397)		651 (398-1097) 1.9%		DD	nl	I&II			

PACIFIC AND INDIAN OCEANS										
AREA 51 – WESTERN INDIAN OCEAN										
SOUSA CHINENSIS – INDIAN HUMPBACK DOLPHIN										
Natal coast	200		7.5/3.75%		DD	I&II	II	Regional	CS/FS	
Zanzibar (Tanzania)	71		5.6%		DD	I&II	II	Regional	CS/FS	
TURSIOPS TRUNCATES – BOTTLENOSE DOLPHINS										
Indian Ocean coast south of Natal SAfrica	250		20-23/8-9%		DD		II	Regional	CS/FS	
Indian Ocean coast north of Natal S Africa	1,000		11-14/1-1.4%		DD		II	Regional	CS/FS	
TURSIOPS ADUNCUS – BOTTLENOSE DOLPHINS										
Zanzibar (Tanzania)	161		8%				II	Regional	CS/FS	

AREA/SPECIES	ABUNDANCE ESTIMATE	Updated Recently	BYCATCH ESTIMATE/% POPULATION AFFECTED	Bycatch Mortality exceeds 2%	STATUS ³¹⁰			AGREEMENTS IN PLACE? International/ Regional/Bilateral	PARTIES ³¹¹ Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEMENTED? Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
<i>GRAMPUS GRISEUS</i> – RISSO'S DOLPHIN										
Western Indian Ocean	5,500 to 13,000		1,300/24% - 10%		DD		II	Regional	CS/FS	
AREA 57 – EASTERN INDIAN OCEAN										
<i>ORCAELLA BREVIROSTRIS</i> – IRRAWADDY RIVER DOLPHIN										
Chilka Lake, India	20-30				DD		II	Regional	CS/FS	
<i>PLATANISTA GANGETICA</i> GANGES RIVER DOLPHIN.										
Ganges River	600-700				EN	I&II	I&II	Regional	CS/FS	
AREA 61 – NORTHWEST PACIFIC										
<i>PHOCOENOIDES DALLI</i> – DALL'S PORPOISE										
Western N Pacific	141,800		643-4,187/0.4-3.0%		LR		II	Regional	CS/FS	
<i>NEOPHOCAENA PHOCAENOIDES</i> – FINLESS PORPOISE										
Inland Sea Japan	4,900		84/1.7%		DD EN	I&II	II	Regional	CS/FS	
<i>LIPOTES VEXILLIFER</i> - BAIJI										
Yangtze	100-300		5/1.6-5.0%		CR	I&II				
AREA 71 – WESTERN CENTRAL PACIFIC										
<i>TURSIOPS ADUNCUS</i> – BOTTLENOSE DOLPHINS										
Northern Australia	700-1000		1700		nl	nl	II	Int'l/Regional	CS/FS/PS	
<i>STENELLA LONGIROSTRIS</i> – SPINNER DOLPHINS										
Northern Australia			1000		LR	nl	II	Int'l/Regional	CS/FS/PS	
Sulu Sea	30,000		1,500-3,000/5-10%		LR	nl	II	Int'l/Regional	CS/FS/PS	
<i>LAGENODELPHIS HOSEI</i> —FRASER'S DOLPHIN										
Eastern Sulu Sea	8,700				DD	nl	II	Int'l/Regional	CS/FS/PS	
<i>SOUSA CHINENSIS</i> —INDO-PACIFIC HUMPBACK DOLPHIN										
Northern Australian—Central Section Great Barrier Reef	200		11-100/5.5-50%		DD	I&II	I	Int'l/Regional	CS/FS/PS	

AREA/SPECIES	ABUNDANCE ESTIMATE	Updated Recently	BYCATCH ESTIMATE/% POPULATION AFFECTED	Bycatch Mortality exceeds 2%	STATUS ³¹⁰			AGREEMENTS IN PLACE? International/ Regional/Bilateral	PARTIES ³¹¹ Coastal State/Flag State/ Port State/(US)	MEASURES IMPLEMENTED? Monitoring Mitigation Observers Enforcement
					IUCN	CITES	CMS			
ORCAELLA BREVIOSTRIS – IRRAWADDY (SNUBFIN) DOLPHIN										
Mahakam River, Indonesia	34-50		3/6-8%		CR		II			
Malampaya Sound, Palawan Philippines	77		2-5/2.5-6.5%		CR		II			
Mekong River	69		4/5.8		CR		II			
AREA 77 – EASTERN CENTRAL PACIFIC										
PSEUDORCA CRASSIDENS – FALSE KILLER WHALES										
Hawaiian stock	236		4-6/1.6-2.5%					Reg'l/Nat'l legis	FS (US)	
PHOCOENA SINUS – VAQUITA										
	567		35-39/6.2-6.9%		CR	I&II		Bilateral US/Mex	CS/FS(US)	Biosphere reserve
AREA 81 – SOUTHWEST PACIFIC										
CEPHALORHYNCHUS HECTORI – HECTOR'S DOLPHIN										
South Island east	1,900		16/8%		EN			National legis.	CS	Sanctuary regs, voluntary pingers
South Island west	5,400							National legis	CS	Regs, pingers
CEPHALORHYNCHUS HECTORI MAUI – MAUI'S DOLPHIN										
North Island	100-150		3/3-2%		CR			National legis.	CS	Protected area
AREA 87 – SOUTHEAST PACIFIC										
LAGENORHYNCHUS OBSCURUS – DUSKY DOLPHIN										
			500-1,800		DD		II	Nat'l leg/Regional	CS/FS	
PHOCOENA SPINIPINNIS – BURMEISTER'S PORPOISE										
			450-200		DD		II	National legis.	CS/FS	

Atlantic Ocean

Major (in the top 20 for global, wild-capture landings) fisheries in the Atlantic include Atlantic herring, skipjack tuna, chub mackerel, Atlantic cod, Argentine shortfin squid, European pilchard, Gulf menhaden, European sprat, Atlantic mackerel, and European anchovy. Major fishing nations in the Atlantic are the U.S., Norway, Iceland, Denmark, Spain, and Canada. In the Atlantic Ocean, the major bycaught species and gear types in which this bycatch occurs are north Atlantic right whales off eastern North America, trap lines and gillnets; harbor porpoises in the North Sea, Celtic Sea, and Baltic Sea, gillnets; tucuxis in Caribbean coastal waters, gillnets; humpback dolphins in West Africa, coastal gillnets; sperm whales, striped dolphins, and short-beaked common dolphins in the Mediterranean, pelagic driftnets and gillnets; harbor porpoises in Black Sea, coastal gillnets; tucuxis in eastern South American coastal waters, gillnets; dusky and Commerson's dolphins in Argentina, coastal gillnets and midwater trawls and franciscanas in coastal gillnets.

Northwest Atlantic

In the Northwest Atlantic, the focal species for action is the North Atlantic right whale. The U.S. and Canada have developed a recovery plan for the species and have implementation teams; nevertheless, there is still a need for the U.S. to engage in bilateral discussions with Canada to achieve greater protection for the species. In addition, competent fishery bodies in the region that could play a role include the North Atlantic Fisheries Organization (NAFO) and the International Convention for the Conservation of Atlantic Tunas. Canada and the U.S., as well as fishing nations who operate in the area and might encounter right whales, are party to both those agreements³¹⁸ in the event of documentation of incidental catch outside the EEZs of U.S. and Canada. NAFO recently passed a resolution related to documentation of marine turtle bycatch in the region's fisheries³¹⁹ and might perform a similar function for additional documentation of cetacean bycatch.

Northeast Atlantic

In the Northeast Atlantic, harbor porpoise bycatch in bottom-set gillnets is estimated at nearly 15,000 animals per year. Of particular concern are harbor porpoise mortality levels in the Celtic Sea, where more than 6 percent of the minimum population estimates are killed annually as bycatch; in the Northern and central North Sea, Northern North Sea, and Southern and central North Sea where bycatch is at unsustainable levels amounting to 4.1, 5.0, and 4.3 percent, respectively, of the population estimates for those areas.

In this area, ASCOBANS provides a regional management framework for cetaceans. After its scientific documentation of bycatch problems, members of the agreement took a variety of actions to regulate fishing operations. Under the authority of the European Community Common Fisheries Policy, the EU imposed numerous bycatch reduction measures. In EU waters, closure of the albacore (*Thunnus alalunga*) driftnet fishery in the Bay of Biscay, Celtic Sea, and west of Ireland; prohibition of driftnets from 1 January 2004 (except in the Baltic Sea); and prohibition of

³¹⁸ U.S., Japan, Canada, France, Russia, United Kingdom, European Community, Iceland, Norway, Nicaragua, Guatemala, Senegal, Belize, Syria, St. Vincent, and the Grenadines.

³¹⁹ <http://www.nafo.int/publications/frames/general.html>

tuna purse-seine fishing on dolphins represent important measures to reduce bycatch.³²⁰ Denmark implemented a mandatory pinger program in certain North Sea bottom-set gillnet fisheries after undertaking rigorous studies of harbor porpoise (*Phocoena phocoena*) bycatch levels and conducting pinger trials.³²¹ In March 2004, the European Commission introduced a new regulation (Council Regulation [EC] No. 812/2004) aimed at reducing the bycatch of harbor porpoises in bottom-set gillnets and entangling nets. Beginning in the summer of 2005, pinger use was to become mandatory on bottom-set gillnets or entangling nets in the North Sea and the Skaggeak and Kattegat region of the Baltic deployed from vessels greater than 12 m in length. Similar rules were to apply to the western English Channel and South Western Approaches from January 2006, and to the east English Channel from January 2007. This regulation also made provision for the monitoring of dolphin bycatch in trawl fisheries from January 2005 in the English Channel, Irish Sea and off western Britain and Ireland, and from January 2006 in the North Sea and west Scotland.

However, within its framework for cooperation and research, ASCOBANS does not provide authority for actual regulation of fishing operations, even though it has documented how those operations affect cetacean bycatch. Action is up to individual parties of ASCOBANS for measures within their EEZs. Region-wide policy must come from the European Commission. Outside the EEZs of European countries, the North East Atlantic Fisheries Commission (NEAFC) and ICCAT govern fishery operations in international waters of the region. But these management regimes do not reach into coastal areas with documented bycatch. ICES, the International Commission for Exploration of the Seas, is the scientific arm for various management agencies in the Northeast Atlantic region; it assesses living marine species and monitors the health of the regional marine environment.

In order to address bycatch under a legally binding, Europe-wide management framework, either the EC or the members of ASCOBANS would have to establish legally accepted bycatch limits and enforcement strategies. Scientists generally agree that a PBR-type approach, incorporating the ASCOBANS management goal of maintaining stocks at 80 percent of the carrying capacity, is a useful means to determine critical bycatch mortality limits.³²² However, this would require the development of species-specific critical mortality limits for species other than harbor porpoises. More research investigating stock structure and maximum population growth rates is crucial to achieve this objective.

Scientists agree that it is necessary to carry out comprehensive surveys to estimate cetacean abundance, stock structure, and population growth rates in ASCOBANS waters at regular intervals.³²³ Additionally, monitoring cetacean entanglement is urgently needed for all bottom-set gillnet, single and pair pelagic trawling operations in British, French, Dutch, Danish, Norwegian, and German fisheries. Scientists within ASCOBANS recommend observer coverage

³²⁰ Kaschner, K. 2003. Review of small cetacean bycatch in the ASCOBANS area and adjacent waters – current status and future actions. Submitted to the Fourth Meeting of the Parties to ASCOBANS, Esbjerg, Denmark, 19–22 August 2003. Document MOP4/Doc.21 (S). Unpublished.

³²¹ Vinther, M. 1999. Bycatches of harbour porpoises (*Phocoena phocoena* L.) in Danish set-net fisheries. *Journal of Cetacean Research and Management* 1, 123–135. See also Larsen, F., and Rye Hansen, J. 2000. On the potential effects of widespread pinger use for the Danish North Sea gillnet fishery. IWC paper SC/52/SM27.

³²² CEC, 2002. Incidental catches of small cetaceans. Report of the second meeting of the subgroup on fishery and the environment (SGFEN) of the Scientific, Technical and Economic Committee for Fisheries (STECF). SEC (2002) 1134, Brussels, BL, Commission of the European Communities; 63.

³²³ *Id.*

of 5–10 percent of total fishing effort for all bycatch monitoring programs. Only then can the effectiveness of the various mitigation measures be evaluated and, if necessary, modified.

Given the existing mandated mitigation measures and the existence of ASCOBANS, U.S. action may not be necessary and indeed would be difficult because the U.S. is not party to any of the relevant agreements. Nevertheless, the Office of International Affairs staff could attend and observe the ASCOBANS meetings, serving in an advisory capacity, providing technology or information transfer from U.S. experience with similar problems (e.g., approaches developed through the MMPA's incidental bycatch–reduction teams).

Western Central Atlantic

In the Western Central Atlantic, it is difficult to assess the magnitude of the threat posed to cetacean populations in the wider Caribbean region as a consequence of fisheries operations. Published information on bycatch is scarce. There is a great need for a systematic survey effort in the Caribbean and tropical Atlantic to acquire cetacean population estimates and to identify the species most frequently involved in fishery interactions.

UNEP's Caribbean regional seas program has recently promulgated a regional marine mammal action plan. In addition, it has also established a Regional Activity Centre in Guadeloupe for implementation of the protocol on Specially Protected Areas and Wildlife (SPAW). The U.S. became a party to the agreement in 2003. It could work through SPAW to ensure the effective implementation of the marine mammal action plan, specifically those parts related to documenting the range and abundance of cetaceans and the impacts of fishery bycatch and directed catches on cetacean populations in the wider Caribbean. Particular emphasis should be given to investigating tucuxis (*Sotalia*) along coastal waters of Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guyana, Surinam, and French Guyana. A recent study of bycatch in the mouth of the Amazon indicated a kill of more than 1,050 tucuxis in a single year. Along with franciscanas, tucuxis are the most commonly caught cetaceans in Brazilian coastal gillnet fisheries.³²⁴ The tucuxi may also be the cetacean most commonly caught as bycatch in coastal fisheries of the southern Caribbean Sea.

As a member of the agreement, the U.S. could encourage incorporation into the marine mammal action plan the objective of acquiring additional information on populations, fishing effort, and level of incidental bycatch. At this early stage, in the development of the agreement, emphasis on improving marine mammal science, technology transfer, and information sharing would be useful. The U.S. could hold a regional workshop to bring together scientists and managers within the wider Caribbean to specifically develop an action plan to assess cetacean populations and to document bycatch.

In addition, the U.S. is a member of the West Central Atlantic Fisheries Commission (WCAFC). This body was created in 1973 under FAO auspices, and in 1999 responded to an FAO review to take actions to strengthen its functions and responsibilities.³²⁵ It is advisory only, but the U.S. could encourage revamping this body or creating a new one in the Caribbean

³²⁴ Beltrán, S., 1998. "Captura accidental de *Sotalia fluviatilis* (Gervais, 1853) na pescaria artesanal do Estuário Amazônico". M.Sc. thesis. Universidade do Amazonas, Manaus, Brasil. 100 pp. [In Portuguese] See also: Siciliano, S., 1994. Review of small cetaceans and fishery interactions in coastal waters of Brazil. Report of the International Whaling Commission (Special Issue) 15, 241–250.

³²⁵ FAO. 1999. Progress Report on the Implementation of Conference Resolution 13/97 (Review of FAO Statutory Bodies and the Strengthening of FAO Regional Fishery Bodies) COFI/99/4. During this review the FAO abolished the Regional Fisheries Advisory Committee for the Southwest Atlantic (CARPAS) and the Inland Fishery Committee for Latin America and the Caribbean (COPESCAL). Available at <http://www.fao.org/docrep/meeting/x0361e.htm>

region in accordance with more recent trends for regional fishery management organizations, incorporating more of the principles of the Straddling Stocks Agreement. The Secretariat of the Caribbean Community made such a recommendation in 2003.³²⁶ The international provisions of both the MMPA and the M-SFCMA call for this type of leadership to increase the tools available to bring fishing into compliance with the most recent international standards. A successor to the WCAFC could be a venue to advance a resolution on cetacean bycatch similar to what has been done for sea turtles in other fisheries organizations.

Should any documentation arise related to incidental bycatch of cetaceans during fishing on highly migratory stocks such as tuna or swordfish in the region, provisions of the Straddling Stocks Agreement might be raised in the ICCAT forum.

Eastern Central Atlantic

In the Eastern Central Atlantic, the clymene dolphin (Ghanaians call it the “common dolphin”), bottlenose, pantropical spotted, Risso’s, long-beaked common, and rough-toothed dolphins; short-finned pilot whale, melon-headed whale, dwarf sperm, and Cuvier’s beaked whale³²⁷ may all be caught in large-meshed drift gillnets targeting tuna, sharks, billfish, manta rays, and dolphins. But the species most threatened by bycatch in West Africa is the Atlantic humpback dolphin. There is a significant need to document the bycatch of humpback dolphins in West African countries, especially in the coastal fisheries in Ghana and Togo, which have failed to yield a single record because of the severely depleted population.³²⁸ Research is needed to establish the range, distribution, natural history, taxonomy, abundance, and fishery interactions of Atlantic humpback dolphins. A high priority area for dedicated field investigations is Ghana’s Volta River region and western Togo. The Convention on Migratory Species could be used to encourage the Ghana and Togo fisheries and wildlife departments to ban or at least limit commerce in cetacean products (e.g., restrict consumption to local fishing communities). Additionally, Ghana should be encouraged to protect humpback dolphins by adding this species to the conservation program of Ada Sanctuary at the mouth of the Volta (Songhor RAMSAR site) and perhaps declare this site closed to gillnet fishing.

The U.S. is a party to the (relatively) new Convention on the Conservation and Management of Fishery Resources in the South East Atlantic Ocean (SEAFO). This is one of the new agreements done in the model of the Straddling Stocks Agreement. It incorporates key measures such as the precautionary approach, ecosystem conservation, and bycatch reduction. It gives port states authority to develop control measures, conduct inspections, and deploy observers. That means the U.S. could place observers on vessels in these fisheries. The agreement calls for research to assess effects of fishing on non-target species. The U.S. could use this forum to advance a resolution requiring parties to document cetacean population abundance and bycatch and report back to the secretariat.

³²⁶ CARICOM Secretariat. 2004. A Common Fisheries Regime for the Caribbean Sea. July 2004.

³²⁷ Reeves, Randall R., Smith, Brian D., Crespo, Enrique A. and Notarbartolo di Sciara, Giuseppe (compilers). (2003). Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World’s Cetaceans. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. ix + 139 pp.

³²⁸ Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Drammeh, F., Jallow, A., Ndiaye, E. and Samba Ould Bilal, A.O. 2001a. Conservation efforts and field research on cetaceans in Senegal and The Gambia. Report to UNEP/CMS Secretariat, Bonn, Germany. See also Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Jallow, A.O., Ndiaye, E., Samba Ould Bilal, A.O., and Bamy, I.L. 2004. Distribution, status and biology of the Atlantic humpback dolphin *Sousa teuszii* (Kükenthal, 1892). Aquatic Mammals 30: 56–83.

Additionally, since at least the late 1960s, it has been speculated that dolphins are involved in the tuna purse-seine fishery in the eastern tropical Atlantic Ocean. The tuna vessels are registered in several countries, including France, Spain, and the U.S. as well as several West African countries. The levels of mortality, stock sizes, and even exact species involved are not known with certainty, and there is conflicting information on the extent of the problem. It has been suggested that dolphin mortality in this fishery could be very high, as many as 30,000 or more animals per year.³²⁹ The species involved likely include several species of the genus *Stenella*, as well as common dolphins (*Delphinus* spp.)³³⁰ Tuna-whale interactions are also known to occur, and baleen whales are considered to be good indicators of tuna schools.³³¹ Despite claims to the contrary, there is reason to suspect a serious problem that has been neglected for more than 30 years. Independent observer data on the composition and extent of the bycatch need to be obtained and published. Although observer programs may already exist in this fishery, adequate information to assess the cetacean bycatch is currently lacking. Section 16 USC 1385 (d)(1) of the MMPA sets up the conditions and documentation required in order to label tuna as “Dolphin Safe”. Fisheries outside the eastern tropical Pacific Ocean must provide certain documentation to import tuna into the U.S. if the “Secretary [of Commerce] has determined that a regular and significant association occurs between dolphins and tuna.”³³² The purpose of this language was to require the Secretary to investigate instances—such as the tuna-whale interactions suspected in the eastern tropical Atlantic where fisheries may be intentionally encircling, injuring, and possibly killing cetaceans—and use this information not only to govern the labeling of tuna, but also to bring about additional investigation and mitigation of any potential problem in forums such as ICCAT. Therefore, the U.S. can use both ICCAT and SEAFO to document the occurrence of intentional encirclement and, if necessary, devise and implement mitigation measures to bring the bycatch into compliance with the MMPA.

Mediterranean and Black Seas

In the Mediterranean, the focal species most affected by interactions with fisheries appear to be striped dolphin, common dolphin, harbor porpoise, and sperm whale. Both the Mediterranean and Black seas are covered by the ACCOBAMS agreement, and both have programs under the auspices of the UNEP Regional Seas Program. The Mediterranean UNEP program has more action plans and resources for cetacean conservation than does the Black Sea program, which is primarily focused on reversing decades of environmental degradation from pollution.

Incidental mortality of large numbers of sperm whales is known to have occurred in the high-seas driftnet fishery for swordfish, possibly reducing their abundance in the Mediterranean. Entanglement in high-seas swordfish driftnets kills between 7 and 14 sperm whales per year.³³³

³²⁹ Alverson, F.G., 1991. Tuna purse seine and gill/drift net fisheries in the oceans of the world and their relationship to tuna-dolphin, tuna-whale and tuna-whale shark associated schools. Unpublished Report Submitted to the CANAINPES Seccion Especializada en Pesca de Atun Programa Atun-delfin, Camara Nacional de la Industria Pesquera. 110 pp.

³³⁰ Maigret, J. 1981. Introduction à l'étude des rapports entre les cétacés et la pêche thonière dans l'Atlantique tropical. *Bull. du Centre Natl. Rech. Oceanogr. Pêches Mouadhibou* **10**, 89–101.

³³¹ Alverson, *supra* note 321. F.G., 1991.

³³² Section 1385(d)(1)(B)(i).

³³³ International Whaling Commission. 1994. Report of the workshop on mortality of cetaceans in passive fishing nets and traps. *Rep. Int. Whal. Commn. (Spec. Iss.)* 15:1–72. See also: Pace, D.S., Miragliuolo, A., Mussi, B. 2005. Behaviour of a nursery group of entangled sperm whales (*Physeter macrocephalus*) off Capo Palinuro (Southern

With no estimates available, surveys are needed to assess the abundance and distribution of sperm whales in the Mediterranean and the impact of this mortality on the Mediterranean sperm whale population.

Likewise, large numbers (perhaps approaching the thousands) of striped dolphins have been killed incidentally in the high-seas driftnet fishery for swordfish, possibly reducing their abundance in the Mediterranean. Incidental mortality may approach 1 percent of the population in the Alboran Sea and the Corsican–Ligurian Sea.³³⁴

Short-beaked common dolphins in the Mediterranean and Black seas have undergone a dramatic decline in abundance during the last few decades and have almost completely disappeared from large portions of their former range, including the northern Adriatic Sea, Balearic Sea, Provençal basin, and Ligurian Sea.³³⁵ No credible information exists on the abundance of common dolphins (and other cetaceans) in the Black Sea. Other than the reported bycatch of 145 to 200 common dolphins in the Spanish swordfish driftnet fishery in 1993–1994, the threats posed to common dolphins by accidental killing in fishing gear are virtually undocumented.

The Black Sea population of harbor porpoises is classified as vulnerable on the IUCN Red List. These animals are threatened by accidental killing in large-mesh bottom-set gillnets for turbot, sturgeon, and dogfish. Mortality estimates are not available. However, available data indicate that the annual level of harbor porpoise bycatch may be in the thousands.³³⁶

The Black Sea needs a comprehensive effort to determine distribution patterns and estimate abundance of harbor porpoise as well as an effort, through interview surveys, visits to fish markets and landing sites, and on-board observer programs, to evaluate incidental catch

Tyrrhenian Sea, Italy). Abstracts, 19Th Annual Conference of the European Cetacean Society, La Rochelle, France, 2–7 April 2005:69.

³³⁴ International Whaling Commission. 1994. Report of the workshop on mortality of cetaceans in passive fishing nets and traps. Rep. Int. Whal. Commn. (Spec. Iss.) 15:1–72. See also: Pace, D.S., Miragliuolo, A., Mussi, B. 2005. Behaviour of a nursery group of entangled sperm whales (*Physeter macrocephalus*) off Capo Palinuro (Southern Tyrrhenian Sea, Italy). Abstracts, 19Th Annual Conference of the European Cetacean Society, La Rochelle, France, 2–7 April 2005:69.

³³⁵ UNEP/IUCN. 1994. Technical report on the state of cetaceans in the Mediterranean. Mediterranean Action Plan Technical Reports Series No. 82, United Nations Environment Programme (UNEP), Regional Activity Centre for Specially Protected Areas, Tunis. 37 pp.

³³⁶ Commercial hunting of Black Sea cetaceans, including harbor porpoises, was banned in 1966 in the former U.S.S.R (present Georgia, Russia and Ukraine), Bulgaria, and Romania and, in 1983, in Turkey. The riparian states assumed international obligations to protect Black Sea cetaceans as contracting parties of the Convention on Biological Diversity (CBD), Convention on the Conservation of Migratory Species of Wild Animals (CMS), Convention on the Conservation of European Wildlife and Natural Habitats (Berne Convention), Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, Appendix II), and the Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS). The harbor porpoise, *P. phocoena*, is mentioned in Annex II of the EC Directive No.92/43/EEC on the conservation of natural habitats of wild fauna and flora. In 1996, the Ministers of Environment of Black Sea countries adopted cetacean conservation and research measures within the framework of the Strategic Action Plan for the Rehabilitation and Protection of the Black Sea (paragraph 62). The harbor porpoise is included as Data Deficient in the regional Black Sea Red Data Book (1999). However, in 2002, it was listed as Endangered in the Provisional List of Species of the Black Sea Importance, an annex to the Black Sea Biodiversity and Landscape Conservation Protocol of the Bucharest Convention.

and illegal hunting. Results of the population and threat assessments should lead to the development of a basin-wide conservation plan.

Work should be undertaken to determine the distribution and abundance of sperm whales and common and striped dolphins in the Mediterranean and Black seas and their connecting waters and efforts should be made to evaluate the extent and risk posed by incidental mortality in fishing operations. There may be several avenues to accomplish this basic assessment work.

Potential avenues for basic assessment work may exist under the UNEP Regional Seas, Protocol concerning Specially Protected Areas and Biological Diversity in the Mediterranean (Entry into Force: 12 December 1999). Through the UNEP Regional Seas, the Mediterranean Program has linkages with the FAO and a host of other entities that have responsibility for fisheries, protected species, biodiversity, and migratory species. They all have action plans.³³⁷ The ACCOBAMS Secretariat and Mediterranean Action Programme (SPA/RAC) signed a memorandum of understanding to coordinate the joint implementation of ACCOBAMS and the Barcelona Convention Action Plan on cetaceans.³³⁸ In addition, the Secretariat of ACCOBAMS is on the advisory committee for the Strategic Action Program for Biodiversity (SAP BIO) to provide coordination for protection of threatened Mediterranean marine species and species management. Other frameworks that could provide support to Mediterranean coastal states for the acquisition of data and implementation of Action Plans, conservation of threatened species, and for species management include RAMSAR, the Bonn Convention and CITES.

ACCOBAMS has the authority to address bycatch of cetaceans in the Mediterranean and Black seas. ACCOBAMS came into force only in 2001 and therefore is still in its early stages of development. In the near future, ACCOBAMS Secretariat should work with national agencies and scientists to undertake the needed abundance surveys and to monitor incidental mortality to develop accurate bycatch estimates. It should establish scientifically sound bycatch limits and enforcement strategies. Without such estimates and a management framework, ACCOBAMS' ability to effectively regulate incidental mortality and develop conservation plans and measures will be severely diminished. Although the U.S. is not a party nation to ACCOBAMS³³⁹, it could monitor progress and provide advice as the convention develops the conservation and management framework needed to address the threat of fisheries bycatch.

The high mortality of cetaceans in large-scale drift gillnet fisheries on the high seas has been largely eliminated, at least in some ocean regions, through decisive action by the United Nations General Assembly, which declared a global ban beginning in 1993 (See Chapter 3). However, the reach of this driftnet ban did not extend to several key areas such as the

³³⁷ For example, FAO cooperates with MAP in relation to responsible fishing through the General Fisheries Commission for the Mediterranean (GFCM); they have a memorandum of cooperation signed in 2000 with the Convention on Biological Diversity Executive Secretary for the harmonized implementation of the CBD and SPA Protocol in the Mediterranean and for the better implementation of the CBD program on the conservation and sustainable use of marine and coastal biological diversity. See also programs for assessments (e.g., NATURA).

³³⁸ http://www.unep.org/regionalseas/Programmes/UNEP_Administered_Programmes/Mediterranean_Region/default.asp. Accessed 15 January 2006.

³³⁹ The U.S. declined to join either ACCOBAMS or the Bonn Convention that underlies it because of concerns about the federal-state management relationship related to migratory waterfowl in the U.S. It has, however, become a member of specific protocols or MOUs negotiated under the Bonn Convention. Pers. Comm., NOAA OIA, March 2007.

Mediterranean Sea³⁴⁰ and EEZs where cetacean bycatch remains significant and where illegal driftnet fishing poses a major threat to all of these species.

Pelagic driftnets have been prohibited in Spain since 1995. On 8 June 1998, the EU Fisheries Council adopted Council Regulation 1239/98 banning the use of driftnets by 1 January 2002 in all waters falling within the jurisdiction of Member States, as well as outside those waters. The EU driftnet ban entered into force on 1 January 2002. On 26 November 2003, ICCAT adopted, at its 18th Annual Meeting in Dublin, Ireland, Recommendation (03-04), which prohibits the use of driftnets in fisheries for large pelagic species in the Mediterranean by its Contracting Parties, Cooperating Non-Contracting Parties, Entities, and Fishing Entities. In practical terms, the recommendation prohibits driftnet fishing on the high seas or in territorial waters and closes a driftnet fishing loophole that could be used by countries that are members of ICCAT but not the EU. At the 20th Session of the General Fisheries Commission for the Mediterranean (GFCM) on 21–25 February 2005, the Commission adopted, as Recommendation GFCM/2005/3(A), ICCAT Recommendation 03-04 prohibiting the use of driftnets for fisheries of large pelagics in the Mediterranean Sea.

Despite these restrictions several nongovernmental organizations (NGOs) continued to assert that as many as 600 vessels with driftnets from 7–9 km in length, were operating throughout the Mediterranean Sea. World Wildlife Federation (WWF)–International claimed that the Moroccan driftnet fleet, with 177 vessels, was killing thousands of dolphins and other vulnerable species such as sharks and sea turtles in the Alboran Sea and around the Straits of Gibraltar. The WWF also alleged that Italian, French, Turkish, and most probably other fishing fleets were using driftnets in breach of existing legislation and the United Nations driftnet moratorium.³⁴¹

In 2005, the U.S. confirmed the existence of a Moroccan driftnet fleet and began to work with the country on a plan to phase out Morocco's driftnet fleet. The U.S. has earmarked funds to help with some aspects of Morocco's driftnet elimination program. That same year, the EU and Morocco signed a new fisheries partnership agreement whereby 119 EU vessels were to be allowed to fish in Moroccan waters in exchange for EU compensation of approximately \$42 million per year, the proceeds of which are designed to fund the conversion of the Moroccan driftnet fleet to more sustainable fishing activities.

Turkey, on the other hand, is still fishing in violation of the ICCAT and GFCM driftnet ban, administering a fleet of fewer than 100 driftnet vessels, each less than 15 meters long with fishing nets that are 800–1,000 meters long, targeting swordfish off the southwest corner of Turkey. In order to accede to the EU, Turkey must, as a prerequisite, agree to adopt the common rules, standards, and policies that make up the body of EU law —this would include terminating its driftnet fleet.

Following an order of the U.S. Court of International Trade, the U.S., on 19 March 1999, identified Italy as a nation for which there was reason to believe its nationals or vessels were conducting large-scale driftnet fishing beyond the EEZ of any nation, pursuant to the U.S. High Seas Driftnet Fisheries Enforcement Act (the Act). This marked the second time the U.S.

³⁴⁰ Tudela, S., Guglielmi, P., El Andalossi, M., Kai Kai, A. and Francesc Maynou, A.H. 2003. Biodiversity impact of the Moroccan driftnet fleet operating in the Alboran Sea (SW Mediterranean). WWF Mediterranean Programme Office, Rome.

³⁴¹ Imbert, G., Gaertner, J.-C., and Laubier, L., 2001b. Prevention a l'aide de repulsifs acoustiques des captures de dauphins par les thonailles. 10e Conference Internationale sur les cetaces Mediterranee de la RIMMO. Juan-les Pins 16–18 Nov. 2001 (Abstract)

identified Italy pursuant to the Act (the first identification was in 1996). As a result of the identification, the U.S. began consultations with the government of Italy on 17 April 1999 to obtain an agreement to bring about the immediate termination of such activities. In July 1999, an agreement was reached. The 1999 driftnet agreement reiterated Italy's commitment to full implementation of the measures to combat large-scale high-seas driftnet fishing contained in the 1996 U.S.–Italy driftnet agreement. As a result of Italy's driftnet vessel conversion program (a product of the 1996 agreement), about 85 percent of Italy's driftnet fleet of 679 vessels were converted to other fishing methods or scrapped by March 2000. The Government of Italy expected the remaining vessels to continue to fish in Italian waters until the EU driftnet ban entered into force in 2002 (Italy is a member of the EU).

In 2003, the Italian government enacted legislation that required “compulsory dismissal or conversion” (boats could be scrapped or converted to another gear type) of the driftnet fishing licenses of the remaining 89 licensed driftnet vessels that did not participate in Italy's earlier driftnet conversion program. The legislation also seized and sealed the driftnets from all 89 vessels, cancelled the driftnet portions of the fishing licenses of all of the 89 remaining vessels, and deleted the names of those vessels from the EU Vessel Registry, which contains a unique registration number for each vessel.

Nevertheless, environmental groups continued to claim that Italian vessels were still fishing with driftnets in Mediterranean waters in 2005. In March 2005, the Royal Society for the Prevention of Cruelty to Animals (RSPCA) and the Humane Society International (HSI) reported that nine Italian driftnet vessels were fishing illegally (three may have been fishing in international waters). Additionally, in 2004, they identified in Ischia harbor 15 Italian vessels equipped with driftnets estimated to range in length from 9 to 84 kilometers. Of all of the vessels detected, five had the same registration numbers as vessels that had accepted the EU conversion buyout funds prior to the EU ban on driftnet fishing. Meanwhile, Oceana identified 37 Italian fishing vessels in six Italian ports and at sea with driftnets on board. Oceana reported that 18 of the 37 had previously received subsidies from the government of Italy to stop using driftnet gear.

Based on this information, the U.S. embarked on a series of bilateral and multilateral efforts to address this issue. In response, Italy told the U.S. that it strongly opposes illegal driftnet activities and that it is working with the GFCM to ban the use of driftnets in the Mediterranean Sea by non-European countries. Italy submitted a report to the U.S. detailing more than 189 driftnet violations and the seizure of 402 km of driftnets through the end of July 2005.

On the multilateral level, the U.S. appealed to the EC to take appropriate steps to strengthen enforcement of its driftnet ban. At the U.S.–EC high-level fisheries bilateral meeting in Washington, D.C., on 27 June 2005, the representative of the Directorate-General assured the U.S. delegation that the EC was actively engaged on this issue.

To date, the U.S. has continued to apply the provision of the High Seas Driftnet Fisheries Enforcement Act that denies entry of Italian large-scale driftnet vessels to U.S. ports and navigable waters. Since 29 May 1996, it has also required Italy to provide documentary evidence pursuant to the Dolphin Protection Consumer Information Act (16 USC 1371(a)(2)(E)) that certain fish and fish products it wishes to export to the U.S. are not harvested with large-scale driftnets on the high seas.

While the U.S. remains concerned by reports from conservation organizations in 2004 and 2005 that some Italian vessels and nationals may still be engaged in large-scale high-seas driftnet fishing; diplomatic actions and the threat of Pelly sanctions have not been effective at either deterring illegal driftnet fishing or bringing about Italy's full compliance with the various

international regulations banning driftnet fishing. The U.S. must continue efforts to work with Italy, the EC, and ICCAT to address this situation, but it should consider taking more aggressive action to sanction Italy under section 101 of the MMPA.

Southwestern Atlantic

The franciscana (*Pontoporia blainvillei*) is the most threatened species of small cetacean in the southwestern Atlantic Ocean. The tucuxis, dusky, and Commerson's dolphins also experience relatively high levels of incidental mortality; again, the impact on these populations is unknown. An estimated one to 10 percent of the population of franciscana is incidentally killed in gillnet fisheries (1,500–2,000 animals per year); most are juveniles aged one through three years.³⁴² There is still a great need to gather biological information on ecology, genetics, and mortality rates of franciscana. Additionally, range states should be encouraged to monitor and mitigate franciscanas bycatch.

Tucuxi are entangled in beach seines, shrimp and fish traps, and, more frequently, in set gillnets and driftnets throughout their range. They are frequently entangled in fishing gear, especially coastal gillnets in Brazil, and their flesh is used as bait in shark fisheries. Bycatch of tucuxis has been reported in gillnets in the Gulf of Venezuela. An estimated 938 animals were caught in drift nets from the port of Arapiranga during the summer of 1996 and an additional 125 caught during the winter.³⁴³ In 1999, the IWC estimated 141 tucuxis were incidentally caught in fisheries.³⁴⁴ Finally, pelagic trawls incidentally kill an estimated one percent to two percent of the populations of Commerson's and dusky dolphins, respectively.

There is a clear need for detailed information on fleet characteristics and dynamics and on the numbers and species composition of the bycatch. On-board observers are essential to assessing bycatch and must be made a priority. Moreover, the impacts of fishery mortality on cetacean populations can only be assessed if abundance estimates are available. Consequently, further research is needed to identify and delineate cetacean management units and acquire up-to-date abundance estimates for all populations in this region. Range states should develop and test devices to prevent dolphins from entering trawls and, if possible, assess the effectiveness and feasibility of using pingers to reduce dolphin mortality in the gillnet fisheries.

An FAO advisory committee (CARPAS) was established in the region in the 1970s, but was abolished in 1997 because of a long period of inactivity. A bilateral joint commission exists for the fisheries off Uruguay and Argentina to conduct assessments, fishery research, and other activities for the two nations' EEZ fisheries that operate off the coast seaward of the Rio de Plata—the Joint Permanent Commission for the Argentina/Uruguay Maritime Front (CTMFM).³⁴⁵ This bilateral joint commission may be an avenue to encourage information collection under the auspices of this organization. Given the absence of any regional fishery management organization, the region may be a candidate for creation of a new RFMO under the standards of the Straddling Stocks agreement or an agreement for the region similar to ASCOBANS or ACCOBAMS. Certainly the fisheries in the area in question migrate along the EEZs of Uruguay, Argentina, and Brazil. Finally, the U.S. has recently instituted a trawl bycatch reduction team to

³⁴² Culik, B.M., (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages.

³⁴³ IWC (2000) Annex K: Report of the Sub-Committee on small cetaceans, IWC, Cambridge, 2000

³⁴⁴ IWC (2003) Annex K: Report of the Sub-Committee on small cetaceans, IWC, Cambridge, 2003

³⁴⁵ <http://www.ctmfm.org/>

develop mitigation measures to reduce the serious injury and mortality of pilot whales and other pelagic dolphin species in trawl fisheries to levels approaching the zero mortality rate goal. The measures adopted by the trawl bycatch reduction team may provide the foundation for bilateral discussion with Argentina whereby the U.S. might provide technical and financial assistance to further test and implement these measures in the Argentine trawl fishery.

Pacific Ocean (Including Indian Ocean)

Major (in the top 20 for global, wild-capture landings) fisheries in the Pacific include Peruvian anchovy, Alaska pollock, skipjack tuna, chub mackerel, Japanese anchovy, Chilean jack mackerel, largehead hairtail, blue whiting, yellowfin tuna, capelin, Araucanian herring, and Akiami paste shrimp. Major fishing nations in the Pacific are China, Peru, Japan, Chile, U.S., Indonesia, Russian Federation, India, Thailand, Republic of Korea, Philippines, Malaysia, Mexico, Vietnam, and Taiwan.

Western Indian Ocean

In the western Indian Ocean, the incidental mortalities of spinner (4,000), spotted (1,500), common (1,000), and Risso's dolphins (1,300); pygmy sperm whales (2,700); dwarf sperm whales (2,700); and bottlenose dolphins (500–1,250) are particularly high in the Sri Lankan fisheries. With the exception of the Risso's dolphin, the magnitude of this bycatch for each of these species unknown because abundance estimates do not exist. The bycatch of Risso's dolphins is unsustainable, representing between 10-24 percent of the population.

The accidental mortality of bottlenose and humpback dolphins in anti-shark nets used to protect bathers along the Natal coast is unsustainable, amounting to 11–23 and 7–8 animals, respectively, per year or 9 percent of the bottlenose and 4 percent of the humpback dolphin population.³⁴⁶ Additionally, off the coast of East Africa, observer programs estimated that the annual incidental fishing mortality was 8 percent and 5.6 percent of the estimated number of Indo-Pacific bottlenose dolphins and humpback dolphins in the area, respectively.

Sri Lanka and India fisheries deploy more than 1.5 million gillnets and incidentally entangle more than 12,000 to 27,000 cetaceans annually.³⁴⁷ In 1993, Sri Lanka instituted legal protections for cetaceans, but poor enforcement of these laws has made them virtually meaningless.³⁴⁸ Incidental mortality in fisheries is thought to be a significant conservation problem; thus, continued monitoring of the entanglement of dolphins along the Sri Lankan and Indian coast is very important as the expanding coastal gillnet fishery may greatly affect these dolphin species.

Reliable and current data on cetacean populations and mortality rates are nonexistent, for all practical purposes, making it impossible to assess the magnitude of the problem in this area

³⁴⁶ Jefferson, T.A., and Karczmarski, L., 2001. *Sousa chinensis*. *Mammalian Species* (American Society of Mammalogists) **655**, 9 pp. See also Cockcroft, V.G., 1990. Dolphin catches in the Natal shark nets, 1980 to 1988. *South African Journal of Wildlife Research* **20(2)**, 44–51.

³⁴⁷ Leatherwood, S., 1994. Report of the workshop on mortality in passive fishing nets and traps. Annex D. Re-estimation of incidental cetacean catches in Sri Lanka. In: W.F. Perrin, G.P. Donovan, and J. Barlow (eds). *Gill-nets and Cetaceans. Reports of the International Whaling Commission, Special Issue 15*, pp. 64–65. Cambridge, UK: International Whaling Commission.

³⁴⁸ Ilangakoon, A., 1997. Species composition, seasonal variation, sex ratio and body length of small cetaceans caught off west, south-west and south coast of Sri Lanka. *Journal of the Bombay Natural History Society* **94**, 298–306.

and to establish clear priorities for conservation. What is needed is a comprehensive program to study cetacean populations and the impacts from hunting and fishing activities in the western Indian Ocean. Finally, efforts are needed to assess populations, habitats, and bycatch in rivers or portions of rivers where the Ganges River dolphin occurs.

Eastern Indian Ocean

In the eastern Indian Ocean, recent information on marine mammal–fishery interactions is lacking entirely. A now-terminated Taiwanese shark and tuna gillnet fishery operating off Northern Australia caught bottlenose dolphin, spinner dolphin, spotted dolphin, humpback dolphin, and false killer whale; other gillnet fisheries likely catch finless porpoise and Irrawaddy dolphin. The driftnet fisheries operating further offshore in the Bay of Bengal and the southern Indian Ocean may catch spinner dolphin, spotted dolphin, spectacled porpoise, southern right whale dolphin, and common dolphin.

On the eastern coast of India, as far south as Vishakhapatnam, is the westernmost range of the Irrawaddy dolphin and the only known freshwater population—in Chilka Lake India. This population is caught in gillnets and drag nets and may number as few as 50 remaining individuals. Consequently, there is a need for cetacean abundance surveys in rivers, lakes and along the east coast of this region as well as a rigorous monitoring program to document all cetacean mortality (especially of Irrawaddy dolphins in Chilka Lake). In general, this area would benefit from a regional management organization similar to ACCOBAMS, but for the entire Indian Ocean.

The Ganges River dolphin is listed as endangered by the IUCN and numbers 600-700 animals. Construction of 50 or more dams and barrages within the Ganges dolphin's historic range has drastically altered its habitat and fragmented the metapopulation. Deliberate killing of Ganges dolphins for meat and oil occurs in the middle Ganges near Patna, in the Kalni-Kushiyara River of Bangladesh, and in the upper reaches of the Brahmaputra.³⁴⁹ Bycatch estimates are not available and the demand for these products means that there is little incentive for fishermen to reduce the bycatch or to release dolphins that are still alive when found in nets. A particular problem is the use of dolphin oil as an attractant for catfish.

A regional management body could take the lead in coordinating efforts to assess cetacean populations, estimate bycatch, establish science-based bycatch management frameworks, research promising new bycatch mitigation technologies, and contribute to the enforcement of cetacean protective laws. However, no such instrument exists in the region. The UNEP Regional Seas Programme has a set of action plans for the South East Asian region, which includes the Indian Ocean, but there is no convention yet, and the action plans to date have concentrated on building capacity in the region and on sustainable development in the coastal zone. The work plan does not even include a nominal mention of biodiversity conservation or species protection.

A new regional fishery management organization—the South West Indian Ocean Fisheries Commission—was constituted under the auspices of the FAO in 2004, and its mandate is to concentrate on coastal fisheries of the region. In February 2006, parties were expected to

³⁴⁹ Smith, B.D. and Reeves, R.R. (eds.) 2000a. Report of the second meeting of the Asian river dolphin committee, 22–24 February 1997, Rajendrapur, Bangladesh. Pp.1–14 in: *Biology and Conservation of Freshwater Cetaceans in Asia* (eds. R.R. Reeves, B.D. Smith, and T. Kasuya). IUCN/SSC Occasional Paper No. 23, Gland, Switzerland and Cambridge, UK.

complete negotiations on an agreement for governing high-seas fisheries in the southern Indian Ocean (other than tuna, which are managed by the Indian Ocean Tuna Commission). The organization has set data collection as its highest priority, and it has responsibility for all living marine resources, not just fish. The organization will operate by the principles set out in the Code of Conduct for Responsible Fishing, including ecosystem approaches. The area of competence for the body, however, does not extend into the areas of the Indian Ocean adjacent to Sri Lanka, India, or other areas with critical issues of incidental bycatch.

Northwest Pacific

In the Northwest Pacific, incidental mortality in fisheries threatens Dall's porpoise, finless porpoise, and the Baiji. In the 1980s, the Japanese, Taiwanese, and South Korean squid driftnet fishery killed thousands to tens of thousands Dall's porpoise—reducing the Bering Sea population of Dall's porpoise to between 78 percent and 94 percent of its pre-exploitation size, and the Western Pacific population to between 66 percent and 91 percent of its original size.³⁵⁰ Today, large numbers of Dall's porpoises still die in driftnets within national waters of Japan and Russia, where the U.N. ban on driftnets does not apply. The estimated bycatch in the Japanese salmon driftnet fishery operating in the Russian EEZ totaled close to 12,000 for the period 1993 to 1999, ranging from 643 to 3149 on an annual basis.³⁵¹ In addition, more than 17,168 small cetaceans are caught by Japan each year in direct harvests. Dall's porpoise, Baird's beaked whale, pilot whales, and bottlenose and Risso's dolphins are all caught in directed fisheries. The IWC Scientific Committee has expressed concern over the level of harvests of Dall's porpoise (14,992 from 1998 through 2002). These harvests highlight the need for an international agreement that regulates the direct harvests of small cetaceans.

Fisheries incidental mortality in the Yangtze River threatens the continued existence of the baiji. Electrofishing is the greatest threat to this species where 5 of 12 documented deaths in the 1990s have been attributed to the practice.³⁵² Previously, the main cause of mortality was the use of a snagline fishing gear called "rolling hooks." While some types of rolling hooks are illegal, their use continues within the limited remaining range of the baiji. Efforts are needed to end electrofishing and eliminate all forms of rolling hooks within the baiji's range.

In the Yangtze, electrofishing also threatens finless porpoises. Additionally, China's extensive fishing fleets use gear such as gill and trawl nets, known to kill cetaceans, with the bycatch of finless porpoises being especially high.³⁵³ From 1985 through 1992, 114 finless porpoises were found off the coast of western and northeastern Kyushu, including part of the western inland sea of Japan: 84 were incidentally killed by fisheries—bottom gillnets killed 58;

³⁵⁰ Mangel M., 1993. Effects of high seas driftnet fisheries on the northern right whale dolphin *Lissodelphis borealis*. *Ecol App* 3: 221–229.

³⁵¹ IWC. 2002c. Report of the standing sub-committee on small cetaceans. *Journal of Cetacean Research and Management* 4 (Supplement), 325–338.

³⁵² Zhang, X., Wang Ding, Liu, R., Hua, Y., Wang, Y., Chen, Z., and Wang, L. 2001. Latest population of the baiji (*Lipotes vexillifer*) and its conservation in the Yangtze River, China. Pp. 41–53 in: [Proceedings of] Conference on Conservation of Cetaceans in China, March 2001, Shanghai. Published by Ministry of Agriculture, P.R. China.

³⁵³ Parsons, E.C.M., and Wang, J.Y., 1998. A review of finless porpoises (*Neophocaena phocaenoides*) from the South China Sea. Pp. 287–306 in: *The Marine Biology of the South China Sea*. Proceedings of the Third International Conference on the Marine Biology of the South China Sea, Hong Kong, 28 October–1 November 1996 (ed. B. Morton). Hong Kong University Press.

surface gillnets killed 17; trapnets killed 7; trawl nets killed 1; and drifting ghost nets killed 1.³⁵⁴ Finless porpoises were also incidentally captured most frequently in the coastal waters of China—totaling about 2,132 individuals in trawl, gillnet, and stow nets.³⁵⁵ There is a tremendous need for a systematic abundance survey throughout the range of the finless porpoise and for better estimates of bycatch for this species.

Overall, given the large and growing fisheries of Japan, China, Korea, and Taiwan, there is a desperate need for both systematic bycatch assessments in these diverse fisheries and up-to-date abundance estimates. The region needs a competent management organization that could take the lead in coordinating efforts to assess cetacean populations, estimate bycatch and direct harvest, establish science-based bycatch and direct harvest management frameworks, research promising new bycatch mitigation technologies, and contribute to the enforcement of cetacean protective laws. Two scientific bodies and several regional advisory bodies might provide venues for basic assessment efforts or information exchange. The North Pacific Marine Science Organization (PICES) provides similar services to those of ICES in the North Atlantic. The Secretariat for the Pacific Community operates in the southern hemisphere, and likewise maintains data, collects scientific information, fishery data and so forth. Depending on U.S. interests and relationships, advisory bodies that might provide access include the Asia-Pacific Fisheries Commission, the South Pacific Forum Fisheries Agency, and the Asia Pacific Fisheries Commission. None of these bodies follows the currently preferred Straddling Stocks paradigm. This would be a region that deserves scrutiny under the rubric of the 2006 amendments to the M-SFCMA, either as a location where the U.S. would seek improved communication and information exchange, or identification and listing as nations that “fail to end or reduce bycatch of protected living marine resources by using regulatory measures that are comparable to those of the United States.”³⁵⁶

Western Central Pacific

Roughly 1,700 bottlenose dolphins and 1,000 spinner dolphins are incidentally caught at unsustainable levels in gillnet, driftnet, and purse-seine fisheries in the western central Pacific off the coast of Australia. Perhaps 5 to 50 percent of the population of Indo-Pacific humpback dolphins are incidentally captured in offshore driftnets and in inshore gillnets set to protect bathers from sharks north of Brisbane Australian and along the central section of the Great Barrier Reef. However, because poor population and bycatch estimates these percentages are suspect.

Spinner and Fraser’s dolphins experience substantial bycatch in Philippine fisheries. In the Philippines, scientists estimated that about 2,000 dolphins—primarily spinner, pan-tropical spotted, and Fraser’s—were being killed each year, probably at unsustainable levels, by a fleet of five tuna purse-seiners using fish-aggregating devices.³⁵⁷ Scientists estimate that even more cetaceans may be caught in round-haul nets; one estimate for the eastern Sulu Sea was

³⁵⁴ Kasuy, T., 1999. Finless porpoise—*Neophocaena phocaenoides* (G. Cuvier, 1829). *in*: Handbook of Marine Mammals (Ridgway, S.H., Harrison, S.R., eds.) Vol. 6: The second book of dolphins and porpoises, pp 411–442 .

³⁵⁵ Yang G., Zhou, K, Xu, X, Leatherwood, S., 1999. A survey on the incidental catches of small cetaceans in coastal waters of China. *Yingyong Shengtai Xuebao* 10: 713–716.

³⁵⁶ S.Rpt. 109-229 at 45.

³⁵⁷ Dolar, M.L.L., 1994. Incidental bycatch of small cetaceans in fisheries in Palawan, central Visayas and northern Mindanao in the Philippines. *Rep. Int. Whal. Commn (Special Issue)* 15:355–63.

2,000–3,000 per year.³⁵⁸ Directed fisheries for small cetaceans were also reported, with as many as 200–300 dolphins caught annually in San Francisco and smaller numbers caught for bait in shark and chambered nautilus (*Nautilus pompilius*) fisheries in Palawan.³⁵⁹ Currently there are no total bycatch estimates for the Philippines, but preliminary analyses of cetacean abundance surveys indicate that current bycatch is not sustainable.³⁶⁰

Incidental mortality in fisheries (e.g., gillnets, explosives) is likely the principal cause of depletion of Irrawaddy dolphins. The species has been seriously depleted in parts of Thailand and the Philippines.³⁶¹ Recent surveys indicate dramatic declines in range and abundance of the Mekong and Mahakam freshwater populations.³⁶² Irrawaddy dolphins in the Mahakam River, Indonesia, number fewer than 50 individuals and are listed as Critically Endangered under IUCN. An average of three dolphins per year die from gillnet entanglements, representing between 6 percent and 8.8 percent of the population.³⁶³ The Irrawaddy dolphins living at the head of Malampaya Sound in Palawan, Philippines, number approximately 77 individuals (CV 27.4 percent). Between February and August 2001, five dolphins were accidentally killed in bottom-set nylon gillnets used to catch crabs (called *matang quatro* nets locally).³⁶⁴ These levels of bycatch are unsustainable and are threatening the existence of Irrawaddy dolphins in Malampaya Sound—the only known population of the species in the Philippines.

Scientists have recommended that Irrawaddy dolphin mortality be eliminated or at least drastically reduced in these fisheries. This will require the development of socio-economic alternatives to help promote the conservation goal of reducing entanglement and that alternative gear or employment options be provided to gillnet fishermen. These efforts must be accompanied by long-term monitoring of dolphin abundance and mortality in these areas.

Scientists believe that there may have been a dramatic decline in the abundance of Irrawaddy dolphins in the Mekong River, and the Mekong population is a high priority for Red List assessment.³⁶⁵ In the Mekong River from 2001 through 2003, an average of four deaths per

³⁵⁸ Dolar, M.L.L., 1994. Incidental bycatch of small cetaceans in fisheries in Palawan, central Visayas and northern Mindanao in the Philippines. Rep. Int. Whal. Commn (Special Issue) 15:355–63.

³⁵⁹ *Id.*

³⁶⁰ Dolar, M.L.L., 1999. Abundance, distribution and feeding ecology of small cetaceans in the eastern Sulu Sea and Tañon Strait, Philippines. Ph.D. dissertation, University of California, San Diego. Xxv + 241 pp. See also Perrin, W. F., 2002. Problems of marine mammal conservation in Southeast Asia. Proceedings of International Symposium 70th Anniversary of the Japanese Society of Fisheries Science. Fisheries Science 68, Supplement 1:238–242.

³⁶¹ Andersen, M., and Kinze, C.C., 2000. Review and new records of the marine mammals and sea turtles of Indochinese waters. *Natural History Bulletin of the Siam Society* **48**, 177–184.

³⁶² IWC. 2001a. Report of the standing sub-committee on small cetaceans. *Journal of Cetacean Research and Management* **3** (Supplement), 263–291.

³⁶³ Krebs, D., 2002. Density and abundance estimates of the Irrawaddy dolphin, *Orcaella brevirostris*, in the Mahakam River of East Kalimantan, Indonesia: a comparison of survey techniques. *Raffles Bulletin of Zoology*, Supplement, 85–95.

³⁶⁴ Dolar, M.L.L., Perrin, W.F., Gaudiano, J.P., Yaptinchay, A.A.S.P., and Tan, J.M.L., 2002. Preliminary report on a small estuarine population of Irrawaddy dolphins *Orcaella brevirostris* in the Philippines. *Raffles Bulletin of Zoology*, Supplement, 155–160.

³⁶⁵ Baird, I.G., and Mounsouphom, B., 1997. Distribution, mortality, diet and conservation of Irrawaddy dolphins (*Orcaella brevirostris* Gray) in Lao PDR. *Asian Marine Biology* **14**, 41–48.

year were attributed to gillnet entanglement, representing 5.8 percent of a population estimated to number only 69 individuals.³⁶⁶

Finally, this area needs further research efforts to collect basic information. In the Philippines, Indonesia, Thailand, and elsewhere in the western central Pacific, relatively little is known about abundance, distribution, and bycatch levels of cetaceans such as the Irrawaddy dolphin, Indo-Pacific humpback dolphin, Indo-Pacific bottlenose dolphin, finless porpoise, and spinner dolphin (and its dwarf form). Comprehensive cetacean abundance and bycatch surveys are needed in order to develop effective mitigation strategies. This region needs a regional management body that could take the lead in coordinating efforts to undertake such assessments, as well as establish science-based bycatch management frameworks, research promising new bycatch mitigation technologies, and contribute to the enforcement of cetacean protective laws. There is also the need for capacity building, especially in the U.S. territories and small island nations, to sustain efforts to assess cetacean abundance, evaluate bycatch, and promote fishery conservation and management. The Western and Central Pacific Fisheries Commission may provide a mechanism to address and possibly mitigate the bycatch that has been documented in the tuna purse-seine fishery in the Philippines. Additionally, U.S. may make progress in documenting cetacean bycatch in the Western and Central Pacific through passage of a cetacean bycatch resolution with the Western and Central Pacific Fisheries Commission (See Appendix C).

Eastern Central Pacific

In the Eastern Central Pacific, the vaquita suffers the most significant incidental mortality in coastal gillnet fisheries and the false killer whale in longline fisheries.

The vaquita is threatened with extinction by gillnet fisheries. This porpoise, endemic to the upper Gulf of California, Mexico, numbers only in the low to mid-hundreds and may be declining as commercial and artisanal fisheries in the upper Gulf kill 35 to 40 vaquitas per year—6 percent to 7 percent of the population. The designation, in 1993, of a Biosphere Reserve in the Upper Gulf of California and Colorado River Delta has done little to protect vaquitas—despite the management plan calling for a ban on commercial fishing in its “nuclear zone.” Even the recommendations of the International Committee for the Recovery of the Vaquita have gone unheeded.

More recently the International Committee recommended that the southern boundary of the Biosphere Reserve be expanded to incorporate the known range of the vaquita. Other recommendations were that gillnets and trawlers be phased out in the entire Biosphere Reserve, effective enforcement of fishing regulations begin immediately, acoustic surveys for vaquitas be initiated, research on alternative gear types be started, public outreach and education be developed, consideration be given to the compensation of fishermen for lost income, research be initiated on vaquita habitat, and international and nongovernmental cooperation be fostered.³⁶⁷

Many scientists believe that banning gillnets in the entire range of the species is the single measure most likely to prevent extinction. This ban must be accompanied by socio-economic alternatives for the people whose incomes are affected by any restrictions. In its bilateral talks with Mexico, the U.S. must develop an intergovernmental plan or bilateral agreement to

³⁶⁶ Beasley, I., Chooruk, S., and Pwpong, N., 2002. The status of the Irrawaddy dolphin, *Orcaella brevirostris*, in Songkhla Lake, southern Thailand, Raffles Bulletin of Zoology, Supplement 10: 75–83.

³⁶⁷ Rojas-Bracho, L., and Jaramillo-Legorreta, A.M., 2002. Vaquita *Phocoena sinus*. Pp. 1277–1280 in: *Encyclopedia of Marine Mammals* (eds. W.F. Perrin, B. Würsig, and J.G.M. Thewissen). Academic Press, San Diego, California.

implement the recommendations of the International Committee. The U.S. will have to provide the necessary financial assistance to implement and enforce the agreement. The Commission on Environmental Cooperation (CEC) under the North American Free Trade Agreement (NAFTA) promotes the effective enforcement of environmental law in Canada, Mexico and the U.S. as part of its mandate under a side agreement to NAFTA, the North American Agreement on Environmental Cooperation. Until 2003, the Commission had a grants fund, but it is no longer operational. The CEC has been called upon to step in to compel the three North American nations to follow their own or cooperative environmental laws. In one case, citizens groups asked the CEC to make a determination about whether Canada was enforcing its own law regarding species at risk. The case is still open and under consideration by the CEC Secretariat.³⁶⁸

The impact of the longline fisheries off Hawaii is emerging as a potential problem for several species. NMFS recognizes three stocks of false killer whales in the central Pacific: a Hawaiian stock within U.S. waters surrounding the Hawaiian archipelago, a Palmyra stock within U.S. waters surrounding Palmyra Atoll, and an undefined stock throughout international waters and the rest of the Pacific Islands Region. Mortality and serious injury from the Hawaiian and Palmyra stocks have exceeded sustainable levels (1.6 percent to 2.5 percent of the population).³⁶⁹ Of even greater concern is the undocumented number of false killer whales caught by international fisheries—a bycatch that may be significant. The U.S. must use both the Inter-American Tropical Tuna Commission and the Western-Central Pacific Fisheries Commission Tuna Treaty, as well as the MMPA, to advocate documentation of the problem and take measures to reduce the incidental mortality of false killer whales in tuna longline fleets. Whatever mitigation strategies are developed through research or bycatch reduction teams should be implemented internationally through these two regional fisheries management organizations. International bycatch provisions of the 2006 amendments to the M-SFCMA also provide a mechanism to initiate discussions with flag states in this region.

In the eastern tropical Pacific portion of the Eastern Central Pacific, what few quantitative data are available, indicate the magnitude of the cetacean bycatch in coastal and artisanal gillnet fisheries of the eastern tropical Pacific is high.³⁷⁰ Due to the inshore nature of these fisheries, they tend to affect cetaceans that are already subject to other forms of exploitation and habitat degradation. An exploratory study of artisanal gillnet fishery bycatch levels in relation to estimates of small cetacean abundance in the eastern tropical Pacific estimated overall annual mortality rates of 4.4–9.5 percent.³⁷¹ Scientists believe that mortality rates may be even higher for coastal subspecies (e.g., coastal spotted and Central American spinner dolphins, *S. a. graffmani* and *S. l. centroamericana*, respectively) because animals from these

³⁶⁸ Species at Risk. Submission ID: SEM-06-005, Party concerned: Canada. Date filed: 10/10/2006 Status: Open Latest update: 8 Feb. 2007. Available online at <http://www.cec.org/citizen/submissions/details/index.cfm?varlan=english&ID=114>. Last accessed 14 March 2007.

³⁶⁹ The PBR for the Hawaiian stock is 1.0, and the estimated mortality is 4.4 animals.

³⁷⁰ Vidal, O, Van Waerebeek K. and Findley L.T., 1994. Cetaceans and gillnet fisheries in Mexico, Central America and the wider Caribbean: a preliminary review. Report of the International Whaling Commission (Special Issue) 15, 221–233

³⁷¹ Palacios, D.M., and Gerrodette, T., 1996 Potential impact of artisanal gillnet fisheries on small cetacean populations in the Eastern Tropical Pacific. Southwest Fisheries Science Center Administrative Report LJ-96-11, La Jolla, California. 15 pp

populations are likely overrepresented, relative to their abundance, in the bycatch.³⁷² A NOAA–SWFSC report estimated annual incidental mortality in artisanal gillnets were 16,596 in Costa Rica and 3,581 in Panama.³⁷³ Information on bycatch in Guatemala, El Salvador, Honduras, and Nicaragua is still lacking.

These small cetacean species that are not restricted to U.S. territorial waters, and for which no cooperative management agreements exist with Mexico to address the bycatch in their coastal fisheries, present a particular problem. These artisanal gillnet fisheries are widely dispersed, involve many relatively small vessels, and operate at subsistence or small-scale commercial levels. The same is true for the other Central American nations. The U.S. must work with Mexico, Costa Rica, Panama, Guatemala, El Salvador, Honduras, and Nicaragua; and local fishermen, scientists, and nongovernmental groups to jointly undertake abundance and quantitative bycatch estimates for these coastal fisheries. In particular, the U.S. must forge a bilateral agreement with Mexico to cooperatively manage some of these cetacean species—especially the trans-boundary species. Additionally, the U.S. should consider developing a regional management organization of the “Americas” to conserve and manage cetaceans in Central and South America.

The U.S. should use its bilateral discussions with these nations, the existing Inter-American Tropical Tuna Commission (especially under the new provisions of the Antigua Convention) to advance proposals and resolutions to document cetacean abundance and bycatch. The U.S. should consider undertaking joint cetacean abundance surveys in Mexican waters and elsewhere throughout Central America. The U.S. could look for opportunities to engage in technology transfer and capacity building by partnering the staff of the Inter-American Tropical Tuna Commission, national universities, and the staff of NMFS Southwest Fisheries Science Center to conduct the need cetacean research and outreach to the fishing community.

Southwest Pacific

In the southwest Pacific, Hector’s dolphins number around 7,400, with 7,270 (CV 16.2 percent) distributed around New Zealand’s South Island³⁷⁴ and some 100 individuals (called Maui’s dolphins) off the west coast of North Island, New Zealand.³⁷⁵ According to IUCN, the species is listed as Endangered and the North Island population as Critically Endangered. In the South Island, the population is declining. The Banks Peninsula Marine Mammal Sanctuary, created in 1988 to reduce bycatch off the Canterbury coastline, has not achieved its goal—16 Hector’s dolphins (CV 39 percent) were captured in 1997–1998.³⁷⁶ Scientists have estimated

³⁷² Palacios, D.M., and Gerrodette, T., 1996 Potential impact of artisanal gillnet fisheries on small cetacean populations in the Eastern Tropical Pacific. Southwest Fisheries Science Center Administrative Report LJ-96-11, La Jolla, California. 15 pp

³⁷³ *Id.*

³⁷⁴ Slooten, E., Dawson, S., and Rayment, W., 2002. Quantifying abundance of Hector’s dolphins between Farewell Spit and Milford Sound. Published Client Report on Contract 3076, funded by Conservation Services Levy. Department of Conservation, Wellington, New Zealand. <http://csl.doc.govt.nz/dsis35.pdf>.

³⁷⁵ Russell, K., 1999. “The North Island Hector’s dolphin: a species in need of conservation”. Unpublished M.Sc. thesis, University of Auckland.

³⁷⁶ Baird, S.J., and Bradford, E., 2000. Estimation of Hector’s dolphin bycatch from inshore fisheries, 1997/98 fishing year. Published Client Report on Contract 3024, Conservation Services Levy. Available: www.doc.govt.nz/cons/scires/csl.pdf.

that, to meet the PBR-standard of the U.S., the north and south boundaries of the sanctuary must be extended 30 to 60 nautical miles.

For Maui's dolphin the situation is grave. Because Maui's dolphins have been reduced to such low levels, scientists concluded that human-induced mortality must be reduced to zero (from a bycatch of roughly three animals per year) to allow the North Island population to recover. In August 2001, the New Zealand Minister of Fisheries created a protected area that prohibits recreational and commercial gillnet fishing within four nautical miles of shore along a 400 km segment of the west coast of the North Island. An observer program is also planned for trawlers and Danish seine vessels fishing in the area closed to gillnetting. Even though Hector's and Maui's dolphins are species of concern, given the national laws and actions taken to date, there appears to be no role for the U.S. to take to promote greater conservation of this species.

Southeast Pacific

In the southeast Pacific, the dusky dolphin, Burmeister's porpoise, the Chilean dolphin, and possibly southern right whale dolphins and Peale's and Commerson's dolphins are the species most frequently captured by a variety of fisheries. Scientists have estimated that between 10,000 and 20,000 small cetaceans per year die in Peruvian fisheries, and most of these are dusky dolphins—this bycatch is large enough to cause serious concern for the continued existence of these species.³⁷⁷ The Peruvian bycatch of dusky dolphins and Burmeister's porpoise highlight the blurred boundaries between strictly incidental mortality and direct harvests for dolphin meat and blubber to be used as shark bait.³⁷⁸ Despite the Peruvian government's closure of markets for dolphin meat and other conservation laws, there is still an increasing use of cetacean meat as bait in the shark fishery. Dolphins are rarely landed openly on shore; instead, they are usually hidden and sold clandestinely or transferred to shark-fishing boats at sea.³⁷⁹

The species of most concern continue to be the dusky dolphin, which is caught in the greatest numbers, and Burmeister's porpoise. In the 1990s, in Peru alone, the annual directed harvest of Burmeister's porpoise and dusky dolphin each amounted to 500 to 2,000 animals, based on direct accounts of landings. Over a 15-year period dusky dolphins have fallen from 78 percent of the total catch to only 40 percent.³⁸⁰ This continuous decline of dusky dolphins as a proportion of the overall cetacean bycatch, with roughly constant fishing effort, is consistent with the hypothesis that abundance of this species has been decreasing off central Peru.³⁸¹

³⁷⁷ Van Waerebeek, K., Van Bresseem, M.F., Alfaro-Shigueto, J., Sanino, G.P., Montes, D., and Ontón, K. 1999. A preliminary analysis of recent captures of small cetaceans in Peru and Chile. International Whaling Commission, Cambridge, UK. Document SC/51/SM17. See also: Van Waerebeek, K., Alfaro-Shigueto, J., Montes, D., Onton, K., Santillan, L., Van Bresseem, M.-F., and Vega, D., 2002. Fisheries related mortality of small cetaceans in neritic waters of Peru in 1999–2001. International Whaling Commission, Scientific Committee Document SC/54/SM10, Cambridge, UK.

³⁷⁸ *Id.*

³⁷⁹ *Id.*

³⁸⁰ Van Waerebeek, K., Alfaro-Shigueto, J., Montes, D., Onton, K., Santillan, L., Van Bresseem, M.-F., and Vega, D., 2002. Fisheries related mortality of small cetaceans in neritic waters of Peru in 1999–2001. International Whaling Commission, Scientific Committee Document SC/54/SM10, Cambridge, UK.

³⁸¹ Van Waerebeek, *supra* note 369.

Authorities in Peru remain unconvinced that any action beyond merely outlawing commerce is needed to reduce the mortality of cetaceans in fisheries. Consequently, in Peru there is still a need for reliable estimates of total fishing mortality for each species in Peruvian waters and for better information on stock structure and reliable estimates of abundance for the affected stocks. Finally, there is a need for aggressive enforcement of the existing measures. Peru is a disturbing case study for incidences where bycatch of small cetaceans becomes a market in cetacean meat and a gateway to direct harvests. If dusky dolphins and Burmeister's porpoises are to survive, the mortality of these species must be drastically reduced and the existing laws fully enforced.

The existing intergovernmental organizations in the region include the IATTC and the Permanent Commission for the South Pacific (CPPC). The Permanent Commission does have action plans for conservation of biodiversity and protection of marine mammals. It is difficult to ascertain the effectiveness of this action plan, but the U.S could inquire about it and seek more details either in its bilateral discussions with Chile or within the IATTC. The Pacific in general, but also the west coast of Central and South America is in need of a regional management body that could require and coordinate efforts to assess cetacean populations, estimate bycatch, establish science-based bycatch management frameworks, research promising new bycatch mitigation technologies, and contribute to the enforcement of cetacean protective laws. This regional management body should be developed along the model of the Straddling Stocks Agreement. The U.S. could use its M-SFCMA mandate to make international efforts to reduce bycatch as a mechanism to participate in such a regional organization. Finally, given Peru's reluctance to undertake additional measures, the Office of International Affairs might consider taking action under the embargo provisions under section 101 of the MMPA or making Peru aware of its obligations under the new provisions of the M-SFCMA.

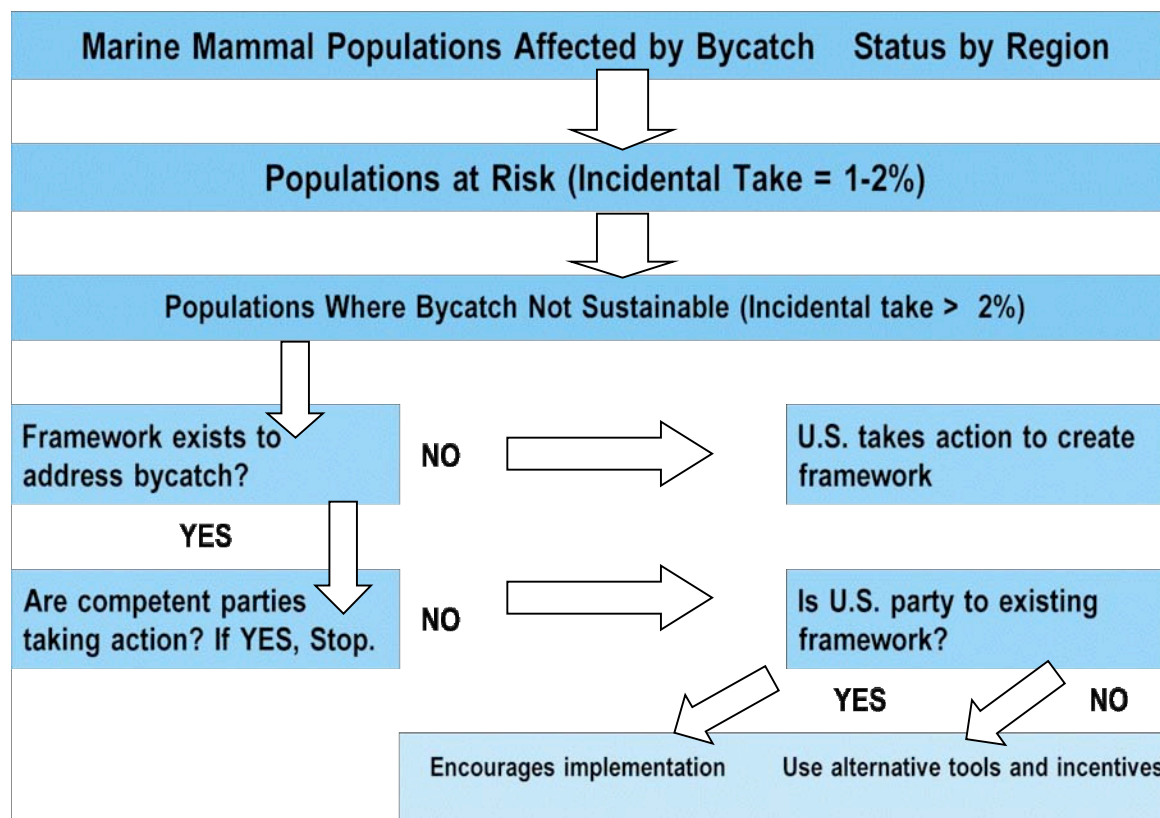
CHAPTER 6. RECOMMENDATIONS – ACTION PLAN

In Chapter 2, a review of the scientific literature summarized issues where incidental catch of marine mammals in fisheries is affecting populations already at risk. This summary highlighted needs that have been identified by scientific and management bodies such as national management agencies, the International Whaling Commission Scientific Committee, and nongovernmental organizations such as the IUCN. Chapter 5 further narrowed the scope of critical issues on a regional basis to populations where bycatch is unsustainable, where no regime exists to take action to reduce bycatch, or where measures exist, but have not been taken.

Table 5.1 points up where gaps occur in basic knowledge about abundance and bycatch, as well as gaps in the framework for management measures or implementation and enforcement of measures where a framework exists. Using the example of harbor porpoise in the Kiel & Mecklenburg Bight, it becomes clear that this animal has been assessed as vulnerable by the IUCN, but there is no recent abundance estimate, no estimate of bycatch mortality, and no mechanism to monitor bycatch in fisheries. Even though a regional agreement is in place, and though bordering states are parties to the agreement, no action has been taken to mitigate the effects of bycatch.

As illustrated by the above example, the analysis thus far has attempted to narrow the scope of possible U.S. action by starting with a description of all marine mammal problems that have been identified around the world, then examining the highest risk populations and the threats they face then focusing on threats posed by fishery bycatch. Further narrowing takes place by identifying whether competent parties are taking action, and if not, whether there is a role for the U.S. to play. Figure 6 illustrates how the narrowing of scope takes place.

Figure 6. Narrowing the Scope of Action Options



This chapter takes the gap analysis produced in Chapter 5, and examines the issues against legal pathways, rather than geographic regions, by posing the following questions:

- Does the United States have authority or capacity to act?
- Can the United States encourage action by relevant parties?
- Can the United States advocate amendment of an existing agreement or development of a new one?
- Can the United States use training and technical assistance, scientific cooperation, and similar actions in lieu of (or in addition to) legal action?

The recommendations provided in Chapter 6 are those of the authors, although they may also have been advocated by others and identified in Chapter 2. These recommendations represent actions to address not necessarily the most urgent problems, but the most urgent problems the U.S. has competence and capacity to address. Some of the recommendations have general application to the cetacean bycatch problem, and others are directed at specific areas and fishery interactions. The authors have made no assessment of whether fiscal resources exist to accomplish these actions.

The following narrative sections describe actions the U.S. could take to fill the gaps by using its own authority under MMPA or M-SFCMA, by engaging with its partners under international, bilateral or multilateral agreements, by encouraging the development of new agreements or new bycatch approaches under existing frameworks, and finally, where no treaty structure exists, by using incentives or other tools such as technology transfer. Proposed actions in the first sections have national mandates, legislative authority or U.S. policy behind them. The remaining set of proposals is a list of possibilities for actions that lie outside U.S. governmental authority, but might be advanced through the international community, diplomatic circles or public-private partnerships.

Without a doubt the one consistent need that permeates all species in all regions is the need for cetacean abundance and bycatch estimates. Estimates of total bycatch or bycatch rate are difficult to obtain, especially in developing countries where extensive coastal or artisanal fisheries account for most of the bycatch. Additionally, very low bycatch rates are difficult and costly to measure. Likewise, it is difficult and costly to obtain precise abundance estimates in low cetacean density areas. Capturing this information will require that fishery agencies, parties to international fisheries treaties, and regional fisheries management organizations incorporate bycatch monitoring and bycatch reduction measures into existing and future management regimes. Proposals for how this might be done are described below.

Actions Under MMPA Section 108

Section 108 (a)(1) of the MMPA calls upon the Secretary of Commerce through the Secretary of State to initiate negotiations as soon as possible for the development of bilateral or multinational agreements with other nations for the protection and conservation of all marine mammals covered under the MMPA.

Actions to propose new international bycatch treaties or multilateral agreements

Section 108 (a)(2)(A) calls upon the Secretary of State to initiate negotiations with all foreign governments engaged in commercial fishing found to be unduly harmful to any species or population stock of marine mammals to develop bilateral and multilateral treaties with such countries to protect marine mammals. There are several areas that would benefit from a regional management agreement similar to ASCOBANS or ACCOBAMS. Such an agreement should be based on the precautionary approach and should establish internationally the goal

and objectives of Sections 117 and 118 of the MMPA. Any international agreement should contain provisions to: (a) estimate the population and stock discrimination/structure of cetaceans within an agreement area, (b) estimate cetacean bycatch (including information on the sex, relative age, or life-stage of bycaught animals) through an independent observer program, (c) document and monitor fishing effort and areas and times of operation, (d) provide mechanisms to test and develop new technologies to reduce bycatch, (e) institute mechanisms for participation of all stakeholders in the development and review of conservation and management measures, (f) establish a risk-averse science-based method for setting bycatch limits (g) develop effective means for enforcement, and (h) incentives and disincentives to bring about compliance.

Three areas are high priorities for action: the Indian Ocean, Pacific Ocean, and North, Central, and South America (the Americas).

Indian Ocean

As discussed in Chapter 5, the commercial fisheries in the Western and Eastern Indian Ocean capture spinner dolphins, Risso's dolphins, bottlenose dolphins, hump-backed dolphins, Ganges river dolphins, and Irrawaddy dolphins at unsustainable rates. Moreover, there are few national laws and virtually no international protection. There is an overwhelming need to assess the various marine mammal populations, estimate bycatch throughout the entire Indian Ocean, establish science-based bycatch management frameworks, research promising new bycatch mitigation technologies, contribute to the enforcement of cetacean protective laws, estimate fishing effort, and describe the spatial and temporal characteristics of the fishery.

A regional management body could take the lead in coordinating and undertaking such efforts. The UNEP Regional Seas Programme does have a set of action plans for the South East Asian region, which includes the Indian Ocean. But there is no convention yet, and the action plans to date have concentrated on building capacity in the region, and on sustainable development in the coastal zone. The work plan does not even include a nominal mention of biodiversity conservation or species protection.

The greatest challenge to the development of an Indian Ocean regional cetacean agreement is the lack of any role for the U.S. because it is not a range state for such an agreement. With limited U.S. involvement, creation of such an agreement could fall to Australia and would require careful collaboration to achieve an agreement.

There are fishery agreements in the region, but most relate to high seas fisheries such as tuna, and do not apply to the nearshore areas where much of the bycatch of cetaceans occurs. However, to the degree that any of the offshore fisheries had interactions with cetaceans, either the Straddling Stocks Agreement or provisions of the M-SA would provide the U.S. leverage to begin discussions with flag and coastal states.

Pacific Ocean

The Pacific Ocean is ripe for a regional multilateral treaty to protect cetaceans. In this region, Dall's porpoise, finless porpoise, baiji, spinner dolphins, Fraser's dolphins, Irrawaddy dolphins and false killer whales are threatened by commercial fisheries and in some cases, directed harvests. The western Pacific presents a particular challenge as it is a mixture of driftnet catches off Russia and Japan, directed harvests for Dall's porpoise off Japan, and small-scale incidental captures of critically endangered species such as the baiji in the Yangtze River of China. For the most part, the coastal fisheries of Japan, China, Korea, and Taiwan have not

been described in any detail. Moreover, bycatch estimates reported to the International Whaling Commission are suspect and possibly underreported.

The western central Pacific presents its own set of challenges. Here the coastal fisheries of the Philippines and other south Pacific islands capture thousands of spinner, spotted and Fraser's dolphins in commercial fisheries; further complicating matters are the directed harvests of other cetacean species. In a completely different habitat, the Irrawaddy dolphins of the freshwater rivers of the Mekong, Mahakam, and Malalmpaya Sound are critically endangered and continually threatened by entanglement in small gillnet fisheries.

In addition, incidental mortality in fisheries in the central Pacific, Eastern central Pacific, Southwest Pacific, and the Eastern Tropical Pacific (discussed below) could potentially be regulated as part of a Pacific regional cetacean multilateral agreement. Such an agreement would need to call upon parties to conduct comprehensive cetacean stock assessments throughout the entire Pacific, provide annual estimates of bycatch in all fisheries, provide annual reports of the number of cetacean captured in directed harvests, and provide detailed fisheries data including the number of vessels, gear, landings, area and times of operation.

There are several fishery management agreements that apply in the region, including some to which the U.S. is a party. These provide linkage either through the bycatch prevention directives of the Straddling Stocks Agreement or might be fisheries to evaluate and possibly list under the M-SA. Nevertheless, this area may benefit from a Pacific-wide regional management agreement dedicated to addressing the threats to cetaceans.

The Americas (Atlantic and Pacific)

The incidental capture of cetaceans on both the Pacific and Atlantic coasts of South America is cause for concern. Along the Pacific coast of South America, dusky dolphins and Burmeister's porpoise, Chilean dolphins and Commerson's dolphins are captured in large numbers. The Peruvian laws that prohibit the sale of small cetaceans go virtually unenforced. The scope of the take is probably underestimated since port surveys alone cannot provide an accurate bycatch estimate given the clandestine sale or undisclosed transfer of carcasses at sea. Bait fisheries in Chile and Peru still exist and incidental mortality in Ecuadorian coastal fisheries is poorly documented but is thought to number in the thousands. Off Mexico and Central America, the incidental mortality of cetaceans in coastal fisheries is undocumented but preliminary estimates for some areas such as Costa Rica number more than ten thousand.

On the Atlantic coast of South America, tucuxis, dusky dolphins and Commerson's dolphins are taken in coastal gillnet and trawl fisheries; and Atlantic coast estimates of both cetacean abundance and bycatch are completely lacking for Mexico and Central America.

A regional agreement for North, Central, and South America would promote international scientific research, technology transfer (e.g. pingers and trawl bycatch reduction measures), and better compliance with national laws. For example, franciscanas range across the borders of Brazil, Uruguay, and Argentina and although protected by law in all three countries, a regional agreement would ensure consistency in addressing the bycatch problem. In 1991, the governments of Colombia, Chile, Ecuador, Panama, and Peru approved an Action Plan for the Conservation of Marine Mammals in the Southeast Pacific; but it appears little progress has been made in implementing this plan. Overall, Central and South America are in need of improved abundance estimates, stock delineation, and bycatch estimates for all cetaceans that inhabit Central and South America. In addition, better descriptions of fishing effort, operational time and areas are still needed for much of this region.

There is little in the way of regional cooperation in fishery management in this region,

and most of the action is taken at a national level. If the U.S. determines that these nations have bycatch of protected species, it could use the M-SA listing provisions to certify and leverage discussions for action.

Area/Issues That Would Benefit From A Bilateral Approach

The MMPA calls upon the Secretary of Commerce through the Secretary of State to initiate negotiations with foreign governments which are engaged in or which have persons or companies engaged in commercial fishing operations which are found by the Secretary of Commerce to be unduly harmful to any species or population stock of marine mammal, for the purposes of entering into bilateral and multilateral treaties with such countries to protect marine mammals...(16 U.S.C. 1378(a)(2)(A)). The Office of International Affairs should use its bilateral discussions to develop such agreements to reduce marine mammal bycatch. As a matter of priority are the bilateral discussions with Canada and Mexico.

U.S. – Mexico for vaquita and coastal gillnet fisheries

Since 1983, NMFS, NOAA, and the predecessor agency to the Mexican Secretaría de Mexico Ambiente, Recursos Naturales, y Pesca (SEMARNAP) have met annually to discuss bilateral fisheries issues. The countries have negotiated two active and one inactive memoranda of understanding (MOUs) between NMFS and SEMARNAP: (1) MEXUS-Gulf research program, (2) MEXUS-Pacífico research program, and an information exchange under an inactive MOU. The discussions have focused on conservation and management, including the protection of marine mammals and endangered species (especially turtles and mammals). Shark and shrimp management and bycatch reduction have also been discussed.³⁸²

Chapter 2 describes the long history of attempts to protect the vaquita. The most promising efforts are those of the International Committee (International Committee) for the Recovery of the Vaquita, which recommended that: the southern boundary of the Biosphere Reserve be expanded to incorporate the known range of the vaquita; gillnets and trawlers be phased out in the entire Biosphere Reserve; effective enforcement of fishing regulations begin immediately; acoustic surveys for vaquitas be initiated; research on alternative gear types be started; public outreach and education be developed; consideration be given to the compensation of fishermen for lost income; research be initiated on vaquita habitat; and international and non-governmental cooperation be fostered.³⁸³ Many scientists believe that banning gillnets in the entire range of the species is the single measure most likely to prevent extinction. Implementation of these recommendations, especially the ban, will require significant financial resources and must be accompanied by socio-economic alternatives for the people whose incomes are affected by any restrictions. Perhaps as a result, the Mexican government seems to lack the political will to decisively implement these recommendations. Nevertheless there has been some progress through a newly decreed special protection zone, financial support from the Ministry of the Environment to assist fishermen, the voluntary agreement of fishermen to phase out nets with meshes of more than 6 inches (144mm), and investigations into alternative gears and fishing methods for the shrimp fishery. Socio-economic assistance is critical to bring about the necessary changes in fishing habits and to support the ongoing buy-out of the larger meshed nets.

³⁸² <http://www.nmfs.noaa.gov/ia/bilateral/docs/U.S.-Mexico%2005.doc>

³⁸³ Rojas-Bracho, L. and Jaramillo-Legorreta, A.M. 2002. Vaquita *Phocoena sinus*. Pp.1277–1280 in: *Encyclopedia of Marine Mammals* (eds. W.F. Perrin, B. Würsig, and J.G.M. Thewissen). Academic Press, San Diego, California.

In the course of bilateral discussions the U.S. could offer economic assistance and even consider a debt for conservation swap to provide the funds necessary to implement these recommendations and to create socio-economic opportunities that will enable Mexico to, in particular, implement the ban on gillnets and to enforce the restriction. The International Committee should be the body that puts together an action plan to implement their recommendations, including an estimate of the costs. The government to government bilateral could become the vehicle to officially adopt such provisions through a specific bilateral agreement.

Canada for right whales

The U.S. holds bilateral meetings with Canada under the authority of the Magnuson Fishery Conservation and Management Act, 16 U.S.C. 1822(a), which authorizes the Secretary of State to negotiate international fisheries agreements, and 16 U.S.C. 1855(d), which authorizes the Secretary of Commerce to promulgate regulations necessary to carry out the Magnuson Act. The focus of the discussions is bilateral, multilateral and global fisheries conservation and management issues of benefit to both parties. The U.S. and Canada discuss coordination with regard to conservation and management of shared stocks (such as Pacific albacore, Pacific hake, and species of mutual concern in the Gulf of Maine) and coordination and strategies for improving conservation and management within the Northwest Atlantic Fisheries Organization (NAFO). Global fisheries issues of interest to the U.S. and Canada include various international fisheries management agreements and initiatives (such as the FAO International Plans of Action for Seabirds, Sharks, Capacity and IUU Fishing and the UN Fish Stocks Agreement).³⁸⁴

As stated previously, the North Atlantic right whale is a transboundary species and thus it faces similar conservation challenges in both U.S. and Canadian waters. NOAA has stated that it, “intends, with the appropriate federal agency or agencies, to initiate the negotiation of a bilateral Conservation Agreement with Canada to ensure that, to the extent possible, protection measures are consistent across the border and as rigorous as possible in their protection of right whales.”³⁸⁵ To date no specific language of such an agreement has been published and it is uncertain whether NOAA has begun these discussions.

It has been recommended both in the North Atlantic Right Whale Recovery Plan and by noted marine mammal scientists that NOAA should engage in such bilateral discussions. Bilaterally agreed-upon management policy, regular joint meetings, and cooperative action are essential for the protection of this critically endangered migratory species.³⁸⁶ It is recommended that NMFS expedite these discussions and develop a joint plan.³⁸⁷

³⁸⁴ <http://www.nmfs.noaa.gov/ia/bilateral/docs/US-Canada%20-%202005.doc>

³⁸⁵ Silber, GK and Bettridge S. 2006. United States' Actions to Reduce the Threat of Ship Collisions With North Atlantic Right Whales Prepared for the International Whaling Commission's Working Group on Ship Strikes and Presented at the International Whaling Commission's Conservation Committee, St. Kitts, 9 June 2006. National Marine Fisheries Service. Silver Spring, Maryland.

³⁸⁶ Sayles JS and Green DM 2005 Bilateral Action for Right Whales **Science** 9 December 2005: Vol. 310. no. 5754, pp. 1616 – 1618.

³⁸⁷ Currently, two National Marine Fisheries Service staff are members on the Canadian Right Whale recovery team—one from Northeast Regional Office and one from Northeast Fishery Science Center.

Bilaterals related to free trade negotiations

The U.S. is currently engaged in bilateral discussions on living marine resource issues with many countries and fishing entities, including Chile, China, Japan, Russia, Vietnam, Taiwan, and the European Union. The Office of International Affairs should elevate cetacean bycatch issues highlighted in this report in each of these bilateral discussions and request that these nations provide estimates of bycatch in their commercial fisheries and cetacean abundance estimates for cetaceans that interact with these fisheries. The Office of International Affairs should use these bilateral discussions as a vehicle to make progress to gather information and urge development of conservation and management measures to reduce cetacean bycatch.

Actions to amend existing agreements

Section 108 (a)(4) mandates that the Secretary of Commerce through the Secretary of State initiate the amendment of any existing international treaty for the protection and conservation of any species of marine mammal to which the U.S. is a party in order to make such treaty consistent with the purposes and policies of the Act.

The Convention for the Regulation of Whaling is perhaps the only international treaty that meets this standard. For years, non-whaling nations have attempted to expand the purview of the International Whaling Commission by introducing such issues and subcommittees as the Subcommittee on Small Cetaceans, Subcommittee on Whalewatching, and Working Group on Estimation of Bycatch and Other Human-Induced Mortality. While these bodies are valuable sources of information and provide opportunities for scientific exchange and recommendations, they have no real power to bring about compliance with any of their recommendations. Until the Convention for the Regulation of Whaling is modified to explicitly provide the IWC with authority to regulate both the direct and incidental harvest of small cetaceans, progress to address these issues through the IWC will be limited. The major obstacles to such an undertaking are that the U.S. and other non-whaling, conservation-minded nations no longer have the three-quarters majority needed to amend the convention and a growing majority that support the viewpoint that the IWC does not have competence over small cetaceans. Nevertheless, the Office of International Affairs should consider how it might modify the Convention to broaden the IWC's authority to regulate bycatch and to make the Convention more consistent with the purposes and policies of the MMPA, as it relates to bycatch in commercial fisheries.

Actions Under MMPA Section 101

Mediterranean Driftnets

The nations that still continue to fish illegally with driftnets are Morocco, Turkey and Italy. It appears that Morocco and the U.S. have devised a plan to convert the Moroccan driftnet fleet to more sustainable fishing practices.³⁸⁸

Turkey on the other hand is still fishing in violation of the ICCAT and GFCM driftnet ban, administering a fleet of fewer than 100 driftnet vessels, each less than 15 meters long, with fishing nets that are 800-1,000 meters long, targeting swordfish off the southwest corner of Turkey. On its face, it appears that Turkey may not be violating the UN Driftnet Moratorium.

³⁸⁸ 2005 Report Of The Secretary Of Commerce To The Congress Of The United States Concerning U.S. Actions Taken On Foreign Large-Scale High Seas Driftnet Fishing Pursuant To Section 206(E) Of The Magnuson-Stevens Fishery Conservation And Management Act, As Amended By Public Law 104-297, The Sustainable Fisheries Act Of 1996. Available at http://www.americanalbacore.com/documents/HSDN_Report_02_21_06.doc

Nevertheless, the U.S. must take action to better document and ascertain the scope and magnitude of this fishery. The U.S. should also require that Turkey provide documentary evidence under both Section 101(a)(2)(A) and (F).

Italy is still driftnet fishing, with reports of between 15 to 37 Italian vessels operating from six Italian ports illegally driftnet fishing. To date, the U.S. certified Italy under the Pelly Amendment but lifted that certification in 1997. The U.S. continues to apply the provision of the High Seas Driftnet Fisheries Enforcement Act that denies entry of Italian large-scale driftnet vessels to U.S. ports and navigable waters. Since 29 May 1996, it has also required Italy to provide documentary evidence pursuant to the Dolphin Protection Consumer Information Act (16 U.S.C. 1371(a)(2)(E)) that certain fish and fish products it wishes to export to the U.S. are not harvested with large-scale driftnets on the high seas.

The U.S. has expressed its concern that some Italian vessels and nationals may still be engaged in large-scale high seas driftnet fishing. However, "The United States believes that the efforts now in progress [diplomatic discussions and Italian enforcement action] need some time to come to fruition and that the ultimate result of these efforts will be the complete elimination of any residual large-scale high seas driftnet fishing by Italian vessels and nationals that may still be occurring in the Mediterranean Sea."³⁸⁹

Italy's violation of the various driftnet bans has been ongoing for more than a decade and diplomatic actions and threat of Pelly sanctions have not been effective at either deterring illegal driftnet fishing or bringing about Italy's full compliance with the various international regulations banning driftnet fishing. The U.S. must take action under Section 101(a)(2) (16 U.S.C 1371(a)(2)) to ban the imports of fish and fish products from Italy, and it must certify and impose Pelly sanctions on Italy for violating the driftnet moratorium and the provisions of ICCAT which ban driftnets.

There are several fishery management agreements that apply in the region, such as ICCAT, to which the U.S. is a party. These provide linkage either through the relevant management commission or the bycatch prevention directives of the Straddling Stocks Agreement. The U.S. also could use the provisions of the M-SA to evaluate these driftnet fisheries and possibly certify Italy, Turkey and Morocco as nations that "fail to end or reduce bycatch of protected living marine resources by using regulatory measures that are comparable to those of the U.S., taking into account different conditions."

Takes in Peruvian Fisheries

Between 10,000 and 20,000 cetaceans die each year in Peruvian fisheries. This fishing mortality is causing the decline of Dusky dolphins and may also threaten the long-term survival of Burmeister's porpoise. Authorities in Peru remain unconvinced that any action beyond those already taken to prohibit commerce is needed to reduce the mortality of cetaceans in fisheries. Peru's enforcement of its national laws is poor and action is necessary to prohibit the capture of small cetaceans for bait and food. Additionally, efforts are needed to reduce the bycatch. The U.S. should take action, similar to that taken with Chile in regard to the Chilean crab fishery, to engage in bilateral discussions with Peru to devise a cooperative agreement to reduce cetacean bycatch and direct harvest. The trigger for such discussions could be the threat of an embargo of Peruvian fish products under Section 101(a)(2)(A).

³⁸⁹ 2005 Report Of The Secretary Of Commerce To The Congress Of The United States Concerning U.S. Actions Taken On Foreign Large-Scale High Seas Driftnet Fishing Pursuant To Section 206(E) Of The Magnuson-Stevens Fishery Conservation And Management Act, As Amended By Public Law 104-297, The Sustainable Fisheries Act Of 1996. Available on line at http://www.americanalbacore.com/documents/HSDN_Report_02_21_06.doc

Actions Under M-SFCMA

Section 202(h)(1) of the Magnuson-Stevens Fishery Conservation and Management Act calls on the Secretary of State, in cooperation with the Secretary of Commerce, to seek to secure international agreements to establish standards and measures for bycatch reduction that are comparable to the standards and measures applicable to U.S. fishermen if they conclude that it is necessary and appropriate.

New provisions in the Magnuson-Stevens Act call for the U.S. to promote improved monitoring and compliance for high seas fisheries or fisheries governed by international or regional fishery management agreements.³⁹⁰ Among other provisions, the revised Act calls for improved communication and information exchange among law enforcement organizations, an international monitoring network, an international vessel registry, expansion of remote sensing technology, technical assistance to developing countries and support of a global vessel monitoring system for large vessels

There are several regional fisheries management agreements that may be vehicles to request that parties to such agreements assess cetacean populations and stocks, estimate bycatch, take measures to reduce bycatch and report their findings and actions back to the regional fisheries management secretariat.

The purposes of RFMOs and UNEP regional seas agreements are different. However, using both approaches would enable managers to come at the bycatch problem from both the side of improving fishery performance by using best practices to reduce bycatch, and work in concert with planners in the regional seas program to engage conservation, protection, and mitigation measures in the action plans.

Global Plan of Action for Marine Mammals

In the early 1980s UNEP and the Food and Agriculture Organization of the UN finalized and adopted a Global Plan of Action for Marine Mammals (MMA), the central goal of which is to generate a consensus among governments on which to base their policies for marine mammal conservation under the auspices of UNEP. Several Regional Seas Programmes have incorporated marine mammal conservation into their Action Plans and protocols—the Mediterranean, South-East Pacific, Wider Caribbean and Eastern Africa regions. These plans include development of regional and national management plans for threatened species, research and monitoring programs and establishment of marine parks and protected areas. More to the point, a few regional seas conventions have established regional action plans dealing specifically with marine mammals.³⁹¹ Wherever regional seas conventions exist, the Office of International Affairs should seek to participate in those conventions and work to advance marine mammal/cetacean action plans that will result in creating the necessary infrastructure and process to reduce cetacean bycatch.

The MMA should be revised and retooled to increase its relevance and usefulness. UNEP is in the process of revising and reevaluating the present relevance of this action plan given that nearly three decades have passed since it was first developed in 1978. UNEP is retooling the Marine Mammal Action Plan in consultation with CMS, CITES, the Convention on Biological Diversity, the regional seas conventions and action plans and relevant partner

³⁹⁰ Section 207(a)

³⁹¹ Notably, the Mediterranean has adopted action plans for the Mediterranean monk seal and cetaceans. The South-East Pacific has an Action Plan for the Conservation of Marine Mammals in the region, and the Caribbean Environment Programme has a Regional Management Plan for the West Indian Manatee.

organizations, including IUCN, in order to present a revised MMAP to the Fourth Global Meeting of Regional Seas Conventions and Action Plans. The Office of International Affairs should monitor and participate in this process wherever possible to ensure that the revised MMAP embodies the purposes and policies of the MMPA.

South Pacific Regional Environment Program

A recently formed Memorandum of Understanding (MoU) for the Conservation of Cetaceans and their Habitats in the Pacific Islands Region provides an institutional umbrella for Pacific Island Countries (PICs) to conserve Pacific Island whales and dolphins (cetaceans) and their habitats. It was negotiated under the auspices of the Convention on Migratory Species (CMS), in close collaboration with the Secretariat of the Pacific Regional Environment Programme (SPREP) based in Apia, Samoa and signed by Australia, Cook Islands, Federated States of Micronesia, Fiji, France, New Zealand, Niue, Samoa and Vanuatu. Contracting parties to CMS are Australia, Cook Islands, France, New Zealand and Samoa. The MoU's entry into effect is very timely and coincides with SPREP's review of its Whale and Dolphin Action Plan. The Action Plan will form an integral part of the MoU. The accompanying Action Plan calls upon signatories to reduce threats, respond to strandings and entanglements, and to protect habitat, including migratory corridors. Cooperation, information exchange, education and public awareness activities are also significant components of the Action Plan. In addition, signatories need to undertake more training, research and monitoring. Working towards sustainable and responsible cetacean-based tourism is another objective. The fisheries interaction objective is mostly focused on cetacean depredation of fish caught on longlines. An Action Plan from a SPREP Longline/Cetacean Interactions Workshop calls for further research into the species involved in depredation, extent of impact and possible methods for mitigation. To date, the signatories do not believe that bycatch and entanglement in fishing gear are a significant issue. The Office of International Affairs should work to expand this Action Plan to undertake the necessary cetacean abundance research and to more thoroughly document the frequency of cetacean bycatch.

Caribbean SPAW Protocol

The promulgation of a regional marine mammal action plan under UNEP's Caribbean regional seas program and the establishment in Guadeloupe of a Regional Activity Centre (RAC) for implementation of the protocol on Specially Protected Areas and Wildlife (SPAW Protocol), provide the International Affairs Office a means to develop regional networks, collaborative studies and training activities to promote scientific understanding of the cetaceans and cetacean bycatch and to further develop the scientific and technical capacity of the region.

The body that might fill the role of a RFMO in the Caribbean is the West Central Atlantic Fisheries Commission (WCAFC). Because it is advisory only, the U.S. might encourage efforts to revamp it in accordance with more recent trends for regional fishery management organizations, incorporating more of the principles of the Straddling Stocks Agreement. This region might be a place to use the resources provided in the M-SA amendments to foster creation of a new regional management body, to bring fishing into compliance with the most recent international standards. This region is adjacent to the U.S., includes U.S. territory, and would be a logical place to extend diplomatic, technical and conservation efforts.

Northwestern Atlantic Fisheries Organization

Even though NAFO's focus is on the conservation and management of stocks of commercially valuable groundfish and other species, the members—Bulgaria, Canada, Cuba, Denmark, European Union, France, Iceland, Japan, Korea, Norway, and Russia—can provide information critical to understanding the bycatch of cetaceans in these fisheries. Given NAFO's

on-going efforts to minimize bycatch and the fledging NAFO initiative on application of ecosystem considerations to the Organization's fisheries management decision-making, the organization would be a likely partner in helping to reduce cetacean bycatch. In 2006, NAFO passed a resolution calling upon contracting parties to generally support adoption and implementation of the FAO Guidelines to Reduce the Mortality of Sea Turtles in Fishing Operations, to provide information on existing domestic data collection (e.g., species identification, fate and condition at release, relevant biological information, and gear configuration) and/or observer training efforts relating to sea turtle interactions in NAFO-managed fisheries in the NAFO Convention Area. The resolution also calls upon NAFO Parties to consider, where appropriate, increasing cooperation both among NAFO Contracting Parties and with other regional, subregional and global organizations, to facilitate sharing of data and development of compatible and appropriate bycatch reduction measures. Such efforts may be enhanced by integration of sea turtle interaction data collection by NAFO observers.

The U.S. should propose a similar resolution for cetaceans within NAFO with particular emphasis on the bycatch of harbor porpoise.

Southeast Atlantic Fisheries Organization

The Commission has a broad range of fishery conservation and management functions (See Chapter 4), however, the types of conservation and management measures anticipated under the Convention include measures relating to the quantity of any species that may be caught; the areas and periods in which fishing may occur; the size and sex of any species that may be taken; the fishing gear and technology which may be used; the level of fishing effort; and the designation of regions and sub-regions.

SEAFO includes in its convention provisions that take into account the impact of fishing operations on ecologically related species such as seabirds, cetaceans, seals and marine turtles. It calls for conservation and management measures for species belonging to the same ecosystem as, or associated with or dependent upon, the harvested fishery resources. Parties are to ensure that fishery practices and management measures take into account the need to minimize harmful impacts on living marine resources as a whole and to protect biodiversity in the marine environment. In addition, the Scientific Committee is provided with the authority to assess the status and trends of relevant populations of living marine resources. Finally, the convention also has provisions for an observer program.

Recognizing the threats to cetaceans from fisheries that occur off the west coast of Africa, SEAFO appears to offer the vehicle to make progress towards assessing the cetacean populations of this region, the bycatch of the fisheries that operate here, and adopt effective monitoring and mitigation measures. The Office of International Affairs should participate in this fisheries organization and offer a resolution similar to that discussed for NAFO (See Appendix D).

Western Central Pacific

The new regional convention in this area calls for the adoption of measures to minimize waste, discards, catch by lost or abandoned gear, pollution originating from fishing vessels, catch of non-target species, both fish and non-fish species, and impacts on associated or dependent species, in particular endangered species. The agreement promotes the development and use of selective, environmentally safe and cost-effective fishing gear and techniques and protection of marine biodiversity. Of particular interest is the fact that this convention specifically provides for adoption of, "where necessary, conservation and management measures and recommendations for non-target species and species dependent on or associated with the target stocks, with a view to maintaining or restoring populations of

such species above levels at which their reproduction may become seriously threatened.” The scientific experts used by the Commission may also conduct assessments of highly migratory fish stocks, non-target species, and species belonging to the same ecosystem or associated with or dependent upon such stocks, within the Convention Area.

In short, the Western Central Pacific Fisheries Commission includes the provisions necessary to call upon Parties to assess cetacean populations, fisheries bycatch, and to develop and implement measures to reduce cetacean bycatch. In December 2005, the Commission adopted a resolution addressing sea turtle bycatch. The Office of International Affairs should put forward a resolution that calls upon nations to assess cetacean populations within their waters, estimate bycatch in their coastal fisheries, and provide this information to the Commission. An example of such a resolution is provided in Appendix C.

South West Indian Ocean

One of the newest commissions is the South West Indian Ocean Fisheries Commission (SWIOFC). Although it is only advisory at present, it will focus on coastal fisheries of East Africa and island states in the region, and has a mandate for responsible management and regional cooperation on fisheries policy. Its first priority will be data collection. There is not much leverage for the U.S. in this region.

Southeast Pacific Ocean

The Southeast Pacific region spans the entire length of the Pacific coast of South America from Panama to Cape Horn, encompassing tropical, sub-tropical, temperate and sub-antarctic systems and crossing the boundaries of five countries—Chile, Peru, Ecuador, Colombia and Panama. One of the initial activities in the region was the drafting of a regional diagnosis on the state of marine mammals based on the national consultation reports. The governments, with the purpose of enhancing the application in the South East Pacific of the Global Programme of Action for the Conservation, Management and Use of Marine Mammals, approved the Plan of Action for the Conservation of Marine Mammals in the South East Pacific. A meeting of experts held in Costa Rica in January 1995 resolved that there had been progress in terms of research, management and legislation to protect these species.

A Regional Course on Catch, Monitoring, Data Collection Techniques and Assessment of Marine Mammals Stocks took place in 1997, in Guayaquil, Ecuador. National studies have also been conducted on the development of techniques for monitoring marine mammal mortality rates. Several projects are currently being carried out to launch different campaigns with the purpose of increasing awareness among communities of artisanal fishermen and authorities.³⁹² Despite these many efforts, it is still difficult to determine what effect these assessments are having on the water to assess cetacean populations or monitor or reduce cetacean bycatch. This is an area where concrete information on the progress that has been made by each nation in implementing these action plans and assessments should be shared with the U.S. through bilaterals and through other regional fisheries management organizations such as the Inter-American Tropical Tuna Commission.

One approach that might be effective in this region is to create a forum for information exchange. At present, there is no nexus between the MMAP and the IATTC, nor is there feedback or data exchange between the regional seas program and the regional fishery management entity. The management structure in this area is well developed and has a long history of conservation and bycatch reduction through gear and best practices. The IATTC

³⁹² CPPS (2004) (Accessed 06/07/04) <http://www.cpps-int.org>. Last updated 21/05/04

would be an effective partner to engage in this region.

Actions Under MMPA Title III

Title III of the MMPA—International Dolphin Conservation Program—addresses the capture of dolphins in purse seine fisheries predominantly in the eastern tropical Pacific Ocean. However, Congress was concerned that the association, encirclement, and capture of dolphins in purse seine nets to capture tuna may occur in other oceans. References to this issue occur several times within this title. First, Congress states that it is the policy of the U.S. to “encourage observer coverage on purse seine vessels fishing for tuna outside of the eastern tropical Pacific Ocean in a fishery in which the Secretary has determined that a regular and significant association occurs between marine mammals and tuna, and in which tuna is harvested through the use of purse seine nets deployed on or to encircle marine mammals.” Likewise the Dolphin Protection Consumer Information Act’s labeling provisions state that it is unlawful to label a product ‘Dolphin Safe’ if it comes from a fishery where “the Secretary has determined that a regular and significant association occurs between dolphins and tuna (similar to the association between dolphin and tuna in the eastern tropical Pacific Ocean)...”³⁹³

Although neither Title III nor the Dolphin Protection Consumer Information Act explicitly require a determination and a list of fisheries for which the Secretary has determined that a regular and significant association occurs between dolphins and tuna, it is inferred that such determination should be made. Moreover, new language in the M-S reauthorization amendments also requires a determination to be made identifying and listing of nations that “fail to end or reduce bycatch of protected living marine resources by using regulatory measures that are comparable to those of the United States.” Insofar as was able to be determined, the NMFS has never taken action under Title III of MMPA. In the absence of such a determination, tracking and verification of tuna coming from other oceans than the ETP may be incomplete or flawed. The new international title of the M-SFCMA may provide needed impetus to investigate further. The paragraphs below summarize instances where the literature indicates some level of interactions with purse seine fisheries and cetaceans. The level and significance is poorly documented, but in most cases there are regional fishery management organizations that should be used to allocate the observer coverage necessary to define the scope and frequency of the interaction.

Western Central Pacific Ocean

In the Philippines, scientists estimated that about 2000 dolphins, primarily spinner, pantropical spotted, and Fraser’s, were being killed each year by a fleet of five tuna purse seiners using fish-aggregating devices. The annual bycatch of small cetaceans in a single tuna driftnet fishery in Negros Oriental was estimated at about 400.³⁹⁴ Similarly, there have been indications of dolphin bycatch immediately west of the 150°W Longitude, the line differentiating the eastern tropical Pacific and western central Pacific tuna treaties. The latter treaty should be the tool to investigate and mitigate the occurrence of bycatch in coastal purse seine fisheries like the Philippine purse seine fishery.

West Coast of Africa

For more than four decades scientists have speculated that dolphins are encircled and

³⁹³ 16 U.S.C 1385(d)(1)(B)(i)

³⁹⁴ Dolar, M.L.L. 1994. Incidental takes of small cetaceans in fisheries in Palawan, central Visayas and northern Mindanao in the Philippines. Rep. Int. Whal. Commn (Special Issue) 15:355-363.

captured in tuna purse seine fisheries in the eastern tropical Atlantic Ocean, especially off the west coast of Africa. The levels of mortality, stock sizes, and even exact species involved are not known with certainty although the interactions most likely include several species of the genus *Stenella*, as well as common dolphins (*Delphinus spp.*).³⁹⁵ It has been suggested that dolphin mortality in this fishery could be up to 30,000 or more animals per year.³⁹⁶ Tuna/whale interactions are also known to occur, and baleen whales are considered to be good indicators of tuna schools.³⁹⁷ Independent observer data are needed to define the composition and extent of the bycatch. The Office of International Affairs should work through ICCAT to either request that ecosystem working group of the Standing Committee on Research and Statistics SCRS to investigate, undertake a pilot study to conduct the research, or request greater levels of observer coverage necessary to define the extent of this problem.

Actions Under MMPA Title II

The Marine Mammal Commission was established under Title II of the MMPA. The Act calls upon the Commission to undertake a review and study of the activities of the U.S. pursuant to international conventions relating to marine mammals.³⁹⁸ The Commission is also required to recommend to the Secretary of State appropriate policies regarding existing international arrangements for the protection and conservation of marine mammals, and suggest appropriate international arrangements for the protection and conservation of marine mammals.³⁹⁹ Given these mandates, the Office of International Affairs might look to the Commission as a partner with whom to execute the recommendations in this report and to develop and further refine an annual strategy to reduce the international bycatch of cetaceans.

The Office of International Affairs might look to the Commission for its scientific expertise in developing international scientific programs or partnerships to begin to make progress on the research needs. The Office of International Affairs should also work with the Commission to develop resolutions and amendments to regional fishery management organizations that it might want the State Department to advance in these forums. Finally, the Commission might assist the Office of International Affairs in developing information for the reports mandated under the MMPA and Magnuson-Stevens Act. The Office of International Affairs could also work with the Commission to develop a strategy for each body to complete its mandates under both the MMPA and the Magnuson-Stevens Act.

Potential for New Legislation on Cetacean Bycatch

In the 109th Congress, Senator Barbara Boxer (D-CA) introduced S. 1224, the National Oceans Protection Act of 2005. The bill contains subtitle C—Cetacean and Sea Turtle Conservation Act of 2005 (Appendix E), which directs the Secretary of Commerce to enter into negotiations with countries that engage in commercial fishing operations that adversely impact

³⁹⁵ Maigret, J. 1981. Introduction à l'étude des rapports entre les cétacés et la pêche thonière dans l'Atlantique tropical. *Bull. du Centre Natl. Rech. Oceanogr. PêchesMouadhibou* **10**, 89–101.

³⁹⁶ Alverson, F.G. 1991. Tuna purse seine and gill/drift net fisheries in the oceans of the world and their relationship to tuna-dolphin, tuna-whale and tuna-whale shark associated schools. Unpublished Report Submitted to the CANAINPES Seccion Especializada en Pesca de Atun Programa Atun-delfin, Camara Nacional de la Industria Pesquera. 110pp.

³⁹⁷ *Id.*

³⁹⁸ 16 U.S.C. 1402 (a)(1).

³⁹⁹ 16 U.S.C. 1402 (a)(5).

cetaceans or sea turtles that result in agreements requiring such countries to reduce bycatch of such animals to at least sustainable levels. The bill, supported by the environmental community, further demonstrates Congress' interest in international cetacean bycatch and their desire to make progress in addressing the issue. The bill was never acted upon, but since introduction, subtitles of the National Oceans Protection Act have either been included in other introduced bills or enacted elsewhere.

In Appendix F⁴⁰⁰, a proposed draft bill, patterned after the legislation in Appendix E, is provided. Section 5 of the draft bill calls for the negotiation of bilateral and multilateral agreements with foreign governments to reduce cetacean bycatch to sustainable levels. The bill also contains two critical provisions—establishment of a grant program and a bycatch database—the need for which will be discussed elsewhere in this chapter. The grant program provides foreign entities with funding to develop fishing gear and methods to reduce bycatch. But the more critical need is for assessments of abundance and bycatch monitoring. The bycatch database would create a sorely needed resource to collect information on cetacean bycatch, the development and use of appropriate fishing gear and methods, and efforts to reduce cetacean bycatch. This database could be linked to other databases that are being developed as part of the Integrated Ocean Observing System (IOOS) and the Global Earth Observing System of Systems (GEOSS). Finally, the bill authorizes sorely needed funds dedicated to this program at the level of ten million dollars annually for the implementation of this program.

The Office of International Affairs should consider developing similar legislation as an Administration bill. It is highly likely the conservation community could be enlisted to help advocate introduction and passage of such legislation.

Actions through the United Nations

In May 2007, President George W. Bush urged the U.S. Congress to ratify the United Nations Convention on the Law of the Sea (UNCLOS), a departure from more than 20 years of U.S. policy in opposition to the treaty. UNCLOS is described in detail in Chapter 4, but in general, it provides a legal framework within which countries may agree to carry out activities in the oceans and seas. The General Assembly of the United Nations convened the Third United Nations Conference on the Law of the Sea, which adopted UNCLOS in 1982, after several preceding negotiating sessions. The General Assembly annually considers and reviews ocean affairs and the law of the sea based on annual comprehensive reports prepared by the Secretary-General.

In November 1999, the General Assembly established an open-ended informal consultative process in order to facilitate the annual review by the General Assembly, which includes consideration of the Secretary-General's annual report on oceans, UNCLOS, the UN Straddling Stocks Agreement, and issues of particular interest as well as consideration of any particular resolution or decision of the General Assembly, any relevant special reports of the Secretary-General and any relevant recommendations of the Commission on Sustainable Development.

Since 2001 the General Assembly has passed two UNCLOS resolutions each year. One, typically referred to as the Oceans and Law of the Sea Resolution, recalls and reaffirms provisions related to the UNCLOS and highlights specific actions that the General Assembly

⁴⁰⁰ While the previous legislation contained provisions for both sea turtles and cetaceans, for purposes of this report the authors focused these provisions only on cetaceans. Nevertheless, the same issues are also of concern to sea turtles and any legislation that moves forward should include provisions to reduce sea turtle bycatch.

either encourages, urges, or requests parties to undertake.⁴⁰¹ Similarly, the sustainable fisheries resolution relates to implementation of the provisions of the United Nations Convention for the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks and it recalls and reaffirms the provisions of this agreement and calls upon parties to take specific action.

For example, in 2006, the sustainable fisheries resolution:

Urges States, including those working through subregional or regional fisheries management organizations and arrangements, to implement fully the International Plan of Action for the Conservation and Management of Sharks, notably through the collection of scientific data regarding shark catches and the adoption of conservation and management measures, particularly where shark catches from directed and non-directed fisheries have a significant impact on vulnerable or threatened shark stocks, in order to ensure the conservation and management of sharks and their long-term sustainable use, including by banning directed shark fisheries conducted solely for the purpose of harvesting shark fins and by taking measures for other fisheries to minimize waste and discards from shark catches, and to encourage the full use of dead sharks;

Requests States and regional fisheries management organizations and arrangements to urgently implement, as appropriate, the measures recommended in the Guidelines to Reduce Sea Turtle Mortality in Fishing Operations 12 and the International Plan of Action for Reducing Incidental Catch of Seabirds in Longline Fisheries of the Food and Agriculture Organization of the United Nations in order to prevent the decline of sea turtles and seabird populations by reducing by-catch and increasing post-release survival in their fisheries, including through research and development of gear and bait alternatives, promoting the use of available by-catch mitigation technology, and promotion and strengthening of data-collection programmes to obtain standardized information to develop reliable estimates of the by-catch of these species.⁴⁰²

The Office of International Affairs could work to include similar language in the sustainable fisheries resolution that calls upon states to implement the MMAP (preferably the revised version) and to take urgent action to assess cetacean population within their waters, document cetacean bycatch and reduce bycatch. This approach provides top-down support through the General Assembly for the recommended actions that have been made at the bottom-up regional fisheries management agreement/organization level.

Incentives

Incentives can be combined with mandates to provide impetus for compliance with international agreements. In the past, countries have used access agreements, favorable trade status, development grants and other economic assistance (such as aid for construction of freezer or dock facilities) to encourage coastal states or flag states to change fishing behavior. In the current world fishery situation, incentives that fall in the realm of fishery development are

⁴⁰¹ See, e.g. UNGA Resolution on Oceans and Law of the Sea A/RES/61/222 (16 March 2007).

⁴⁰² 2006 UNGA Resolution on Sustainable Fisheries. A/RES/61/105.

not a tool of choice, but incentives that relate to capacity reduction or effort limitation might be considered. Technology transfers or research grants might be useful incentives. The FAO has ongoing programs examining buyouts and other mechanisms for capacity reduction in which the U.S. has been participating.

Favorable price or favorable trading partner status is another type of incentive, but must be considered carefully in light of rules on tariffs and trade. This is the flip side of import restrictions, trade sanctions or requirements that importers provide proof of origin for some fish (see, for example, the ICCAT requirements outlined in Chapter 4). One mechanism the private sector has employed in an effort to provide a price benefit for seafood products is certification that fish was caught in a sustainable manner. This approach varies from consumer-oriented programs such as seafood cards that urge shoppers and restaurant diners to choose items labeled “green,” to more rigorous industry-oriented programs such as certification by the Marine Stewardship Council. In this latter approach, an applicant fishery sector must prove through responses to a set of criteria, that it can achieve a score that translates as “sustainable.” The certification is done by a third-party examiner, and follows a rigorous review process.⁴⁰³ The criteria already include an assessment of bycatch and interaction with protected species, but scoring guidelines are created for each fishery under examination. In cases where cetacean bycatch is an issue, it might be useful to work with the MSC to place emphasis on at-risk cetaceans during creation of scoring guidelines. Although to date most of the fisheries that have undergone MSC assessment have been large, industrial fisheries, the organization has devoted study to methods for assessing smaller, coastal and artisanal fisheries, and is currently developing guidelines for such approaches. These cases may have application for cetacean protection in areas with coastal fisheries such as Asia and Africa.

Labeling programs, whether “dolphin safe,” country of origin, MSC, or other certification that the product was caught according to a set of rules and standards, are only as good as the infrastructure necessary to conduct and enforce the tracking and compliance. To the degree that standards for avoidance of cetacean bycatch can be integrated into existing, required programs for seafood tracking, this incentive could be an effective tool.

An opportunity to further consideration of cetacean bycatch as an element of sustainable seafood certification and labeling could be to conduct a session on incentives at an international seafood show or conference. In recent months major seafood retailers such as Wal*Mart have made a show of pushing sustainable seafood. They join the ranks of Whole Foods and others who have been on the “green” bandwagon longer, but have less of an impact on the market. In some cases, these major players have foundations and sources of funding that might be applied to research or gear investigation or technology transfer. The tremendous influence that buyers such as Wal*Mart have on the supply chain is not to be underestimated.

New Technology

Ocean observing via satellites is an emerging technology whose applications are only beginning to be employed in resource conservation. Data on temperature, salinity, and other geophysical and oceanographic information can be related to fronts where predators and prey are most likely to be found. The data that fishing fleets use to figure out where fishing is most productive can be used to predict where marine mammals are most likely to be fishing, too. It might be possible to delineate avoidance areas by overlaying time/place/temperature information gathered through the International Ocean Observing System. The Global Earth

⁴⁰³ A description of the MSC certification process is available online at [. See also, Eco-labelling in Fisheries: what is it all about? B. Phillips, T. Ward & C. Chaffee, eds. Blackwell Science, Oxford, UK. 2003.](#)

Observation System of Systems⁴⁰⁴ provides a framework to integrate numerous data sets that may provide insight into the interaction of fishing fleets and cetaceans. These new technologies offer precision and potential to integrate data that have not been available heretofore. It is important to bring this potential to the attention of scientific committees in regional and international management bodies.

Building Capacity for Assessments and Mitigation

Capacity building is a term that refers to the enhancement of human capabilities through a combination of education and infrastructure improvement. Capacity building is crucial to providing local scientists with the skills necessary to undertake research to make progress on conservation efforts to reduce cetacean bycatch. The Office of International Affairs should seek opportunities to expand programs of scholarships to study abroad, transfer technology, engage in collaborative research, and continue programs of professional development. Any training effort should involve practical field experience that results in products such as formal population assessments, management plans, or bycatch estimates. In the end, training programs will only be successful if they are accompanied by the opportunities for local researchers to use the skills that they develop to conduct cetacean research and conservation and bycatch reduction in that region. In addition, the infrastructure necessary to aid researchers in applying these skills must be available or be able to be easily developed. The Office of International Affairs should look for opportunities to facilitate workshops that bring together researchers from a particular region to address a particular cetacean bycatch issue so they may identify and agree on priorities, coordinate research activities, standardize methodology, and enhance the analytical skills of participants.

Below are examples of ongoing programs with which the Office of International Affairs could partner to achieve some of the research needs identified throughout this report.

Programs to develop aid to undertake or establish population assessment, bycatch estimation, and bycatch reduction programs

International cetacean bycatch reduction efforts are affected by the adequacy of the science and management capacity of every coastal nation. Well-trained scientists and high-quality laboratories and equipment contribute to our understanding of cetacean bycatch. There are a variety of U.S. programs designed to assist in ocean and coastal science capacity building. The U.S. Agency for International Development, as part of its mission to expand democracy and improve the lives of citizens in the developing world, sponsors programs that promote natural resource management.

Sea Grant International—the Need for International Internships

In its 2004 report the U.S. Commission on Ocean Policy recommended that: “Congress should significantly expand the National Sea Grant College Program as part of doubling ocean and coastal research funding.” President Bush’s U.S. Ocean Action Plan states, “In response to direct requests from interested foreign governments and universities, the Administration will conduct a donors conference in Latin America, hold a workshop in Southeast Asia, and develop a technical assistance plan in North Africa in order to help introduce and adapt the successful U.S. Sea Grant system of applied research, extension, and education to countries in these regions. Sea Grant will help create a global network of institutions dedicated to applying the knowledge and technologies that lead to sustainable forms of coastal and marine resource

⁴⁰⁴ A description of GEOSS is available online at <http://www.epa.gov/geoss/>

development and conservation.”

This statement demonstrates the reach of The National Sea Grant College Program, but the international reach of this program has been limited. The Office of International Affairs should work with Congress and the National Sea Grant College Program to strengthen the international component of Sea Grant. Through international internships Sea Grant could evolve to become a marine environmental stewardship version of the Peace Corps—a Sea Corps. From the viewpoint of international bycatch reduction, students could undertake international internships to foster global capacity to reduce cetacean bycatch worldwide by adapting the Sea Grant model of applied research, extension and education to international contexts. These internships could become the mechanism to train international scientists and provide nations with the tools and personnel needed to assess cetacean population abundance, estimate bycatch, and test promising mitigation measures.

Partnerships with Academia and Environmental NGOs

World Wildlife Fund (WWF) bycatch reduction efforts

World Wildlife Fund undertakes several programs to address bycatch. WWF's first International Smart Gear Competition was held in 2005. The competition brings together the fishing industry, research institutes, universities, and government, to “inspire and reward practical, innovative fishing gear designs that reduce sea turtles, birds, marine mammals, cetaceans and non-target fish.”⁴⁰⁵ In 2006, the competition drew more than 80 entries from 26 countries. An international panel of gear technologists, fisheries experts, and representatives of the seafood industry, fishermen, scientists, researchers and conservationists judged the entries. The annual award has been between \$25,000 and \$50,000 and has gone to research to modify longline, gillnet, and shrimp trawl fisheries or gear.

In January 2002, WWF organized an international workshop that brought together the world's leading scientists on cetacean bycatch to formulate a plan for making progress toward solving the global bycatch problem. This workshop resulted in a plan for reducing cetacean bycatch, an international strategy, the formation of a network, and the creation of a virtual Resource Center, which aims to assist fishermen, scientists, environmentalists and the public in working together to address cetacean bycatch. Working closely with WWF, the International Cetacean Bycatch Task Force conducts research and training in areas with the most severe bycatch problems, works with fishermen to develop cetacean-safe fishing techniques and actively advocates for more resources and attention in international policy arenas.

Duke University

Duke Center for Marine Conservation, through the Nicolas School of Environment and Earth Sciences, is involved in a global assessment of the impact of fisheries bycatch on marine mammals, seabirds, and sea turtles. The overall goal of the program is to reduce fisheries bycatch of these vulnerable species and promote sustainable fisheries. Through synthesis of existing data, collaboration and coordination of ongoing research efforts, Duke hopes to develop new approaches to bycatch assessment looking across gear types and taxa and to place bycatch into an oceanographic context.

⁴⁰⁵ Information available on line at [bycatch](#).

Society for Marine Mammalogy

In 1999 the International Society for Marine Mammalogy established a program to help support marine mammal research in economically disadvantaged countries. Individual awards of up to \$1000 may be made annually and each award may be renewed for up to three years. The grants are intended to support field research, the purchase of essential equipment, travel to field sites, or other fundamental research components.

Small grant programs

U.S. law has numerous provisions for grants and gear research. The Cetacean Conservation Act (Appendix E) contains provisions for a small grant program. The MMPA has provisions for research into gear development. In past years, the Saltonstall Kennedy Grant Program administered by NMFS has made bycatch avoidance research projects a themed priority. Although the program was cancelled in FY 2007 for lack of funding, it may be revived in the future. The annual budget and appropriations cycle usually spawns numerous line item projects that provide money for research into fishery bycatch of protected species. The Office of International Affairs should look for opportunities to either develop or use existing grant programs to fund the research needs identified in this report.

Additionally, the Office of International Affairs might look to develop a public/private partnership with external institutions and the fishing industry to either expand these existing programs or to initiate a new small grant program that would enable it to meet its obligations under the MMPA and the Magnuson-Stevens Act.

Additional Steps to Document Bycatch Worldwide

Workshop on bycatch similar to 1990 La Jolla event

In October 1990, the Workshop on Mortality of Cetaceans in Passive Fishing Nets and Traps was held in La Jolla, California. The idea for this workshop began six years earlier, but budget constraints delayed the workshop. The workshop included a symposium of contributed papers and consideration of incidental mortality in traps and other passive fishing gear. The International Whaling Commission Special Issue—Gillnets and Cetaceans that was published in 1994, remains an important, though dated, source of information on cetacean bycatch.

The WWF workshop held in Annapolis in January 2002 produced a recommendation that was forwarded to the IWC Subcommittee on Small Cetaceans; that recommendation was that countries should develop formal national plans of assessment to estimate bycatch rates. "Such Plans would include collection and analysis of data to describe fishing fleets, including the size of the fleet (number of vessels), fishing methods, fishing areas and measures of fishing effort. They should also include where appropriate bycatch monitoring schemes based on independent observations when possible."

The IWC Subcommittee on Small Cetaceans has proposed a series of regional workshops, sponsored by the IWC, to advance assessment and mitigation of cetacean bycatches. "The main thrust of the workshops would be to conduct the necessary assessment, monitoring and mitigation functions that will lead, where necessary, to the reduction of bycatch and alleviation of the conservation threat to the population or species under consideration."⁴⁰⁶

⁴⁰⁶ Annex L, Report of the Subcommittee on Small Cetaceans, IWC 2004.

The Subcommittee recognized that many advances have been made in the assessment and mitigation of cetacean bycatch since the 1990 IWC workshop and they questioned whether another workshop of the scope and scale of the 1990 workshop was appropriate. Given the case-specific nature of the problem, the comments of the Subcommittee seemed to support the recommendation of either a national plan (such as the plans of assessment) or a series of broad-based regional workshops focusing on regions where bycatch problems have been identified as a priority.

The Office of International Affairs should take the lead in this effort. The workshops should not be held in the US but in regions where the bycatch problem occurs. The workshops should include an assessment of the problem and consideration of appropriate mitigation and monitoring measures. Workshop participants should include international scientists/experts on cetacean bycatch, invited experts on the biology of the most affected species, local scientists, fishery managers, representatives of the fishing industry and non-governmental organizations and government decision makers. The Office of International Affairs should collaborate with the Convention on Migratory Species, the Committee on Fisheries of the UN Food and Agriculture Organization, IUCN, relevant international and regional fishery organizations in the development and execution of these workshops. Finally, these workshops should not be a one-time occurrence but should be repeated every several years.

CHAPTER 7. PRIORITY RECOMMENDATIONS

Throughout this report the authors identify a combination of both research needs (Chapters 2 and 5) and recommendations for agency action (Chapter 6). With more than twenty recommendations, and limited agency resources (staff and budget), it is necessary to set some priorities among the recommendations. While recognizing that there will be agency considerations, budget and policy guidance and diplomatic opportunities that will arise and that cannot be predicted here, the authors attempted to rank the recommended actions by using a set of scoring criteria. The information in Table 7.1 illustrates how to score the recommendations against two types of measures.

The first overarching criterion analyses the level of risk to the population and the conservation benefit of implementing a particular recommendation. The subcriteria ask whether the recommendation:

- Assists a critically endangered species;
- Assists a species at risk (listed under the IUCN Red List);
- Addresses unsustainable bycatch;
- Aids a trans-boundary species;
- Will help meet a critical research need (e.g., provide information on cetacean abundance or bycatch estimates).

The second overarching criterion evaluates the ease and effectiveness of implementation. The subcriteria query whether legal frameworks and capacity to implement mitigation measures exist:

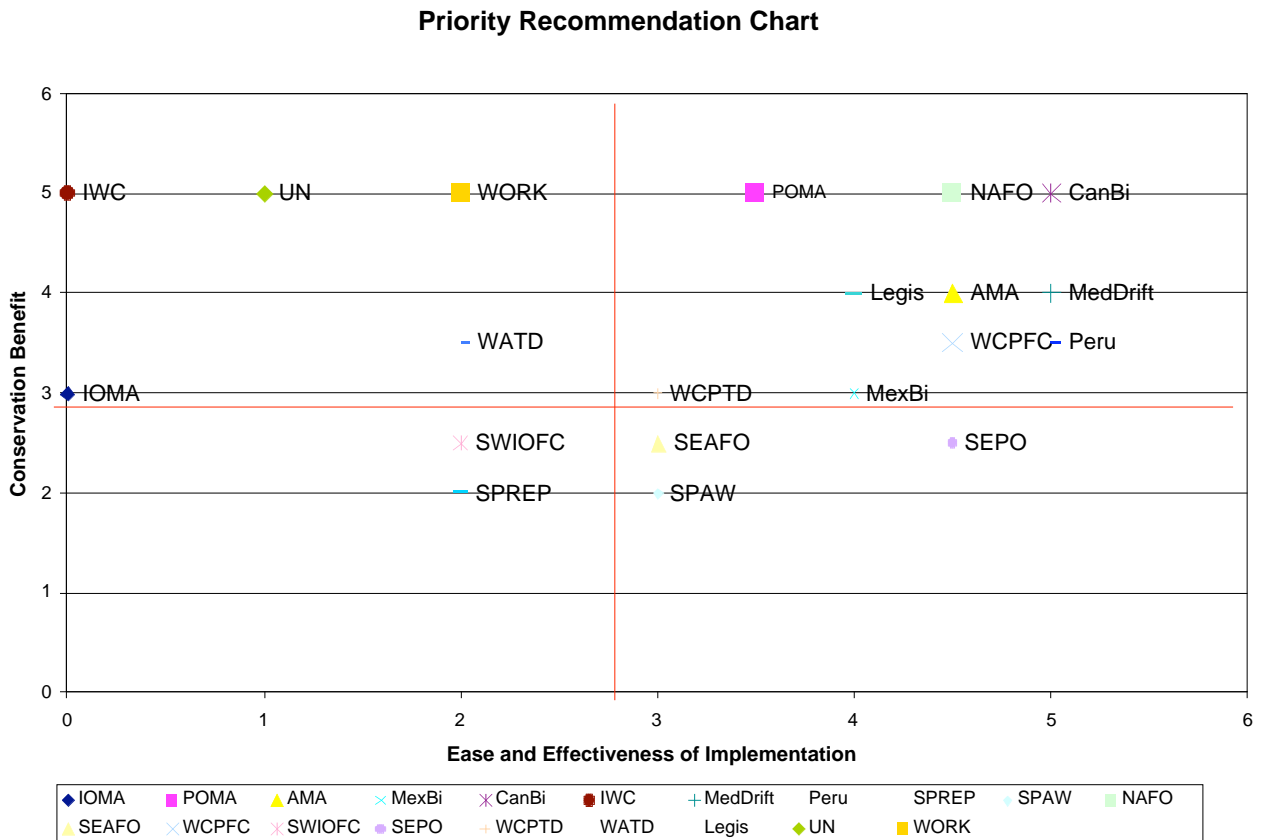
- Regional agreement is in place that can be used to implement the recommendation;
- Bilateral agreement is in place that can bring about prompt action;
- National legislation is in place that either requires enforcement or modification to strengthen conservation requirements;
- Mitigation strategies or possible solutions are available to be used or tested;
- Institutional capacity is such that intervention is feasible.

Each recommendation was analyzed, and a point value assigned based on the number of subcriteria that it satisfied. Those subcriteria denoted with a question mark indicate that, based on the literature, there is some level of uncertainty. In these situations, a half of a point was scored. The results of that evaluation are summarized in Table 7.1

Table 7.1 Analysis to Develop Priority Recommendations					
Recommendation Title	Acronym	Conservation Benefit Criteria	Total # of Pts	Ease/Effectiveness of Implementation Criteria	Total # of Pts
Indian Ocean Multilateral Agreement	IOMA	2,3,5	3		0
Pacific Ocean Multilateral Agreement	POMA	1,2,3,4,5	5	1,2,4,5(?)	3.5
Americas Multilateral Agreement	AMA	1,3,4,5	4	1,2,3,4,5(?)	4.5
US/Mexico Bilateral	MexBi	1,3,5	3	2,3,4,5	4
US/Canada Bilateral	CanBi	1,2,3,4,5	5	1,2,3,4,5	5
Amend IWC	IWC	1,2,3,4,5	5		0
Mediterranean Driftnets	MedDrift	2,3,4,5	4	1,2,3,4,5	5
Peruvian Fisheries Bycatch	Peru	2,3(?),4,5	3.5	1,2,3,4,5	5
South Pacific Regional Environment Program	SPREP	3,5	2	1,5	2
Caribbean SPAW Protocol	SPAW	3,5	2	1,4,5	3
Northwestern Atlantic Fisheries Organization	NAFO	1,2,3,4,5	5	1,2(?)3,4,5	4.5
Southeast Atlantic Fisheries Organization	SEAFO	3,4(?),5	2.5	1,2,4	3
Western Central Pacific Fisheries Commission	WCPFC	1,3,4,5(?)	3.5	1,2,3,4(?),5	4.5
Southwest Indian Ocean Fisheries Commission	SWIOFC	1,(?),3,5	2.5	1,3	2
Plan of Action for Marine Mammals in the Southeast Pacific Ocean	SEPO	3,4,(?),5	2.5	1,2,3,4,5(?)	4.5
Western Central Pacific--tuna/dolphin interactions	WCPTD	3,4,5	3	1,4,5	3
West Coast of Africa--tuna/dolphin interactions	WATD	2,3,4(?),5	3.5	1,4	2
Bycatch Legislation	Legis	1,2,3,4,5	4	1,2,4,5	4
United Nations General Assembly Resolution	UN	1,2,3,4,5	5	1	1
Workshops for Science and Technology Transfer	WORK	1,2,3,4,5,	5	4,5	2

The ranking is then graphed with Conservation Criterion on the y-axis and the Legal Framework Criterion on the x-axis. The following example demonstrates how the priorities may group into sectors that will serve as the basis for prioritization. Figure 7 shows the distribution of the various recommendations.

Figure 7. Priority Ranking Scheme



Discussion and Further Analysis of the Priorities

Top Priority

Ten recommendations fall within the Top Priority. Four of these can be categorized as bilateral negotiations that are either ongoing or should be initiated. They are the US/Mexico (MexBi) bilateral, the US/Canada bilateral (CanBi), negotiations related to Pelly Certification of Italy and other Mediterranean nations for the use of driftnets (MedDrift), and the initiation of bilateral negotiations (possibly in response to an MMPA Section 101 Pelly petition) with Peru to reduce cetacean bycatch and bring about greater enforcement of its national laws. The Canada, Mexico, and Mediterranean driftnet negotiations all have a lengthy history but joint efforts to take the necessary action to begin to resolve the bycatch problems have been slow. With additional effort substantial progress could be made to reduce cetacean bycatch through these negotiations over the next one to two years. The same is true if the Office of International Affairs initiated discussions with Peru similar to those that it has undertaken with Chile. Peru has both the legal framework and the scientific infrastructure in place to better assess cetacean abundance and bycatch and to control it.

Three recommendations that occur in the Top Priority fall under actions that can be taken to reduce cetacean bycatch under existing multi-lateral agreements and will likely require two to three years of effort to achieve progress. These are: the Northwestern Atlantic Fisheries Organization (NAFO); Western Central Pacific Fisheries Commission (WCPFC); and a subset of the Western Central Pacific tuna/dolphin interactions (WCPTD). NAFO and the WCPFC have

recently adopted resolutions to assess and mitigate sea turtle bycatch in longline and purse seine fisheries. Appendix C provides an example of a resolution that calls upon member nations to estimate cetacean stock abundance and bycatch within their waters and to report the results of their findings back to the Secretariat of that particular agreement. It also calls upon member nations to take action where possible to reduce cetacean bycatch. The purpose of such a resolution is to use existing multilateral fisheries commissions or agreements as a mechanism to gather and share scientific information and to work collaboratively on techniques to reduce cetacean bycatch. In the situation where interactions are either suspected or scantily documented between purse seine fishing vessels fishing for tuna and dolphins, the WCPFC provides the framework to allow the U.S. to investigate the frequency and magnitude of this interaction and to mitigate any potential bycatch.

The final three recommendations will take three to five years to achieve and require either the adoption of new legislation (Legis) or the negotiation of new multilateral agreements specifically focused on cetaceans within a particular geographic region such as the Pacific Ocean Multilateral Agreement (POMA) or the Americas Multilateral Agreement (AMA). The cetacean bycatch legislation referred to here and included in Appendix E has been introduced at least once in the 108th Congress. While many of its mandates calling for international negotiations to reduce cetacean bycatch overlap with existing mandates in both the MMPA and the M-SFCMA, the provisions calling for the development of an international bycatch database are sorely needed and well worth the effort to secure passage of such legislation. This database could ultimately provide the baseline information needed by both the Office of International Affairs and the Office of Protected Resources to improve cetacean conservation and management and to meet the mandates of both the MMPA and the M-SFCMA. Section 108 provides the authority for the Secretary of Commerce to work through the Secretary of State to negotiate multilateral agreements to protect and conserve cetaceans. The areas most in need of such an agreement are the Pacific Ocean and the east and west coasts of Mexico, Central and South America. For these multilaterals, an agreement similar to the Inter-American Convention for the Protection and Conservation of Sea Turtles would provide an appropriate model.⁴⁰⁷ One of the many measures called for in the Inter-American Convention is the “reduction, to the greatest extent practicable, of the incidental capture, retention, harm or mortality of sea turtles in the course of fishing activities, through the appropriate regulation of such activities, as well as the development, improvement and use of appropriate gear, devices or techniques, including the use of turtle excluder devices (TEDs)...”⁴⁰⁸ An international effort to negotiate this type of agreement would likely take five years to complete and ratify, yet it would provide the framework to assess cetacean abundance and bycatch and would likely have benefits beyond cetacean bycatch reduction including reducing direct harvests and consumption, preventing habitat degradation, and providing a mechanism to address issues

⁴⁰⁷ The Inter-American Convention is founded on the concepts of other critical international accords, such as the United Nations Convention on the Law of the Sea, the United Nations Conference on the Environment and Development and the Code of Conduct for Responsible Fisheries, adopted by the Conference of the Food and Agriculture Organization (FAO) of the United Nations in its 28th Session (1995). It complies with the measures established in other international instruments, such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora and the World Trade Organization. The Inter-American Convention compliments the Bonn Convention or CMS. All species of sea turtles found in the western hemisphere are listed in both Appendix I and Appendix II of the Bonn Convention, and the text of CMS includes many concepts fundamental to regional conservation of migratory marine animals, such as sea turtles. In the same vein, the Protocol concerning Specially Protected Areas and Wildlife to the Convention for the Protection and Development of the Marine Environment of the Wider Caribbean Region (known also as the Cartagena Convention) is totally complementary to the Inter-American Convention.

⁴⁰⁸ Article IV(h) of the Inter-American Convention to Protect and Conserve Sea Turtles.

such as climate change and the adverse impacts of anthropogenic sound and contaminants.

Second Tier Priority

The second tier priority—at the top left corner of the graph—includes adoption of a United Nations General Assembly Resolution on cetacean bycatch (UN); workshop for science and technology transfer (WORK); an Indian Ocean Multilateral Agreement (IOMA); modifications to the International Whaling Commission to recognize its competence to manage small cetaceans (IWC); and investigations into West Coast of Africa tuna/dolphin interactions (WATD). While there is potentially great conservation benefit in either modifying the mandate of the IWC or negotiating a new cetacean specific IOMA, the likelihood of success is remote. The current membership composition of the IWC makes such changes unlikely and progress on the issues already identified through the Small Cetacean Subcommittee has been slow. In the Indian Ocean, the U.S. has little capacity or leverage to either spark negotiations for such an agreement (given the geography, it is unlikely that the U.S. would be a party to such an agreement) or to take action against nations like Sri Lanka or India for cetacean bycatch or harvests.

Within the next two to three years the U.S. could make progress in two areas. First, it could take a leadership role to hold a series of regional bycatch workshops, similar to the one held in La Jolla in the early 1990s. These workshops could review the status of cetacean populations and what is known about cetacean bycatch in each participating country. They could also become a forum to discuss the use of existing mitigation measures and testing and development of new technologies to reduce bycatch. This information provides the foundation for actions recommended in association with other bilateral and multilateral negotiations or agreements and mandates under the MMPA and the MS-FCMA. Second, the U.S. could use the framework of both ICCAT and SEAFO to investigate the interaction between tuna purse seine vessels fishing for tuna off the coast of West Africa and whales and dolphins. Allegations and sparse documentation of these interactions have existed for more than twenty years. By placing observers on tuna vessels fishing in these areas through the auspices of the RFMOs, the organizations could help document the occurrence of association of tuna schools with whales and dolphins and the frequency of encirclement and magnitude of any bycatch.

Finally, the Office of International Affairs could work to introduce a measure that calls upon parties to reduce cetacean bycatch as part of the sustainable fisheries resolution. This resolution relates to implementation of the provisions of the United Nations Convention for the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks and it recalls and reaffirms the provisions of this agreement and calls upon parties to take specific actions. Although U.N. resolutions are not binding, passage of a measure that includes precise language on cetacean bycatch and requests that parties take a specified course of action (e.g. assess cetacean abundance, estimate bycatch, establish bycatch limits, and mandate bycatch mitigation) might provide impetus to regional fishery management bodies and parties to other regional agreements to carry out efforts described earlier for venues such as NAFO, ICCAT, WCPFC, and SEAFO.

Third Tier Low Priority

These recommendations fall in the bottom two quadrants of the graph and encompass five recommendations. Four of these call for continued work within existing multilateral agreements to elevate the issue of cetacean bycatch. They are: Southeast Atlantic Fisheries Organization (SEAFO); the Caribbean SPAW Protocol (SPAW); the Marine Mammal Action Plan in the Southeast Pacific Ocean (SEPO); and the South Pacific Regional Environment

Program (SPREP). SPAW, SEPO, and SPREP all have some form of marine mammal/cetacean action plan that provides a framework from which to assess cetacean stock abundance and to estimate bycatch. Because these plans encourage technology transfer and scientific exchange they would be fertile ground for the regional workshops previously discussed. And although they ranked lower than the recommendations pertaining to action within the IWC, IOMA, or the UN, they should likely be elevated in priority to the second tier, given the framework that already exists and the natural alignment with the WORK recommendation.

Finally, for the reasons outlined in Chapter 6 and earlier in this chapter related to agreements in the Indian Ocean, efforts to achieve bycatch reduction through the Southwest Indian Ocean Fisheries Organization should be a low priority. The U.S. will have little leverage and a great deal of difficulty in affecting change within this agreement.

Conclusion

Based on the analysis conducted in this chapter, Table 7.2 proposes four categories for priorities and lists the recommendations under each. As part of an overall action plan to reduce cetacean bycatch and comply with the mandates under the MMPA and the M-SFCMA over the next one to three years, it is recommended that the Office of International Affairs focus its efforts on the short term top- and second tier priorities.

Table 7.2 Priority Recommendations
<i>Short Term (1-3 yrs)—Top Priorities--Bilateral Agreements</i>
US/Mexico Bilateral (MexBi)
US/Canada Bilateral (CanBi)
Mediterranean Driftnets (MedDrift)
Peruvian Fisheries Bycatch (Peru)
Workshops for Science and Technology Transfer (WORK)
<i>Short Term (1-3 yrs)—Second Tier Priorities—Multilateral Agreements</i>
Northwestern Atlantic Fisheries Organization (NAFO)
Western Central Pacific Fisheries Commission (WCPFC)
Western Central Pacific--tuna/dolphin interactions (WCPTD)
Southeast Atlantic Fisheries Organization (SEAFO)
West Coast of Africa--tuna/dolphin interactions (WATD)
Plan of Action for Marine Mammals in the Southeast Pacific Ocean (SEPO)
Caribbean SPAW Protocol (SPAW)
South Pacific Regional Environment Program (SPREP)
<i>Long Term (3-5 yrs)—Top Priorities—Multilateral Agreements</i>
Pacific Ocean Multilateral Agreement (POMA)
Americas Multilateral Agreement (AMA)
Bycatch Legislation (Legis)
United Nations General Assembly Resolution (UN)
<i>Low Priority Recommendations</i>
Amend IWC (IWC)
Southwest Indian Ocean Fisheries Commission (SWIOFC)
Indian Ocean Multilateral Agreement (IOMA)

Appendix A. Review of Cetacean Incidental Mortality in International Fisheries

Increasing attention has been paid in the last decade or two to the ways in which fisheries may impact cetacean populations. Most research done recently has addressed the accidental killing of cetaceans in fishing operations, a source of mortality that has given rise to serious concerns about the status of several cetacean populations.¹ More than half of the fifty-seven initiatives recommended in the IUCN—The World Conservation Union’s Species Survival Commission Conservation Action Plan for the World’s Cetaceans deal with bycatch.² Conflicts between cetaceans and commercial fisheries are increasing in frequency and intensity because of increasing human populations and the demand for seafood as a protein source. However our knowledge about the global extent of cetacean bycatch is poor and fragmented and the significance of this bycatch to cetacean populations is lacking in most nations. Species including the baiji and the vaquita, and local populations of humpback dolphins, striped and bottlenose dolphins and the harbor porpoise were singled out as being unlikely to be able to sustain current catch levels.³

Conflicts between marine mammals and fisheries were reviewed on a worldwide basis in 1984 and 1991.⁴ Subsequently, numerous studies and investigations of marine mammal fishery interactions have been implemented around the world.⁵ The purpose of this Appendix is to summarize subsequent publications on this subject, and to demonstrate the overall scale of such conflicts. The International Whaling Commission estimates that kill rates of as low as 2 percent of a cetacean population may not be sustainable, depending on the life history of the species and the age and sex composition of the kill. Likewise the US Congress established as part of the MMPA the potential biological removal level (PBR), which establishes a sustainable bycatch limit for cetaceans at less than 2 percent of a cetacean population.⁶ These numbers were used as our benchmarks. Species at risk are those species where the bycatch represents between one and two percent of the population estimate. Species where the bycatch is unsustainable are those where the bycatch exceeds two percent of the population estimate.

¹ In January 2002 a group of experts on marine mammal bycatch concluded that “incidental capture in fishing operations is the major threat to whales, dolphins, and porpoises worldwide. Several species and many populations will be lost in the next few decades if nothing is done. Urgent national and international action is needed.” Read, A.J., and A.A. Rosenberg (convenors). 2002. Draft International Strategy for Reducing Incidental Mortality of Cetacean in Fisheries. <http://cetaceanbycatch.org/intlstrategy.cfm>.

² Reeves, Randall R., Smith, Brian D., Crespo, Enrique A. and Notarbartolo di Sciara, Giuseppe (compilers). (2003). *Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World’s Cetaceans*. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. ix + 139pp

³ Id. See also. Andrew J. Read, Phebe Drinker, Simon Northridge (2006) Bycatch of Marine Mammals in U.S. and Global Fisheries *Conservation Biology* 20 (1), 163–169.

⁴ Northridge, S.P., [1991] An updated world review of interactions between marine mammals and fisheries. FAO Fish. Tech. Paper 251 (Suppl 1). 58pp.

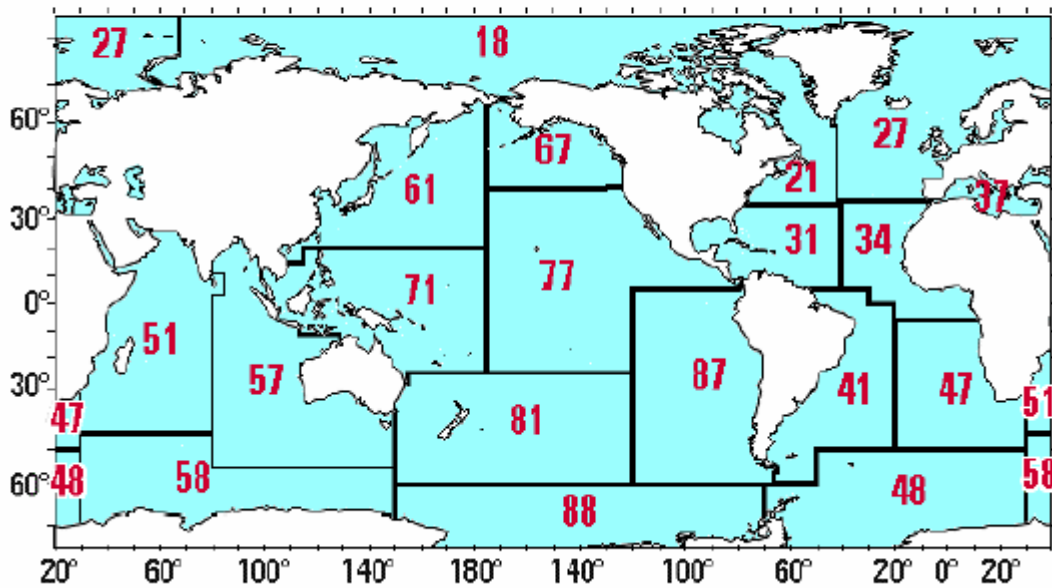
⁵ Northridge, S.P. and Hofman, R.J. 1999. Marine mammal interactions with fisheries. Pp.99–119 in: *Conservation and Management of Marine Mammals* (eds. J.R. Twiss, Jr. and R.R. Reeves). Smithsonian Institution Press, Washington, DC. See also Read, A.J., and A.A. Rosenberg (convenors). 2002. Draft International Strategy for Reducing Incidental Mortality of Cetacean in Fisheries. <http://cetaceanbycatch.org/intlstrategy.cfm>.

⁶ Wade, P.R. 1998. Calculating limits to the allowable human-caused mortality of cetaceans and pinnipeds. *Marine Mammal Science* 14:1-37

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The interactions are considered on the basis of FAO statistical areas, which are shown on the map below. The use of FAO statistical areas to discuss regional bycatch issues is carried throughout the report. Appendix A presents, in tabular format, for each cetaceans species for which there are documented bycatch records, estimates of species abundance and bycatch, as well as information on the type of fisheries that interact with or accidentally catch that cetacean species. The information in this Appendix provides the foundation for further analysis that are undertaken in Chapters 2 and 5 of this report.

Food and Agriculture Organization (FAO) Statistical Areas



AREA 21 NORTHWEST ATLANTIC

The Northwest Atlantic includes cetaceans within the US EEZ, since the focus of this report is international bycatch, and the assessment and mitigation of bycatch in the United States is governed under the MMPA, the description for this area will focus only on international bycatch of shared cetacean stocks.

Species	<i>Eubalaena glacialis</i> Northern right whale
Abundance Estimate	300
Fisheries	Right whales are entangled in cod trap, lobster trap lines, groundfish gillnets, herring weirs. A mother and calf were released from a herring weir in 1976.
Estimated Annual Mortality	1.2/yr 2000-2004

Species	<i>Balaenoptera physalus</i> Fin whale.
Abundance Estimate	2,814 (Georges Bank to mouth of Gulf of St. Lawrence)
Fisheries	Fin whale entangled in lobster trap lines (3), groundfish gillnets (6), a herring weir and a squid trawl (1) since 1976. ⁷
Estimated Annual Mortality	No recent estimates of mortality for fin whales outside the US EEZ are available. Up to 3 fin whales per year have been reported entangled in inshore fishing gear in Newfoundland, of those 5 out of 12 fin whales caught in inshore fishing gear in Newfoundland were dead. ⁸

Species	<i>Balaenoptera acutorostrata</i> Minke whale.
Abundance Estimate	Canadian East Coast (Georges Bank to the mouth of the Gulf of St. Lawrence) ⁹ 2,998 west Greenland central North Atlantic ¹⁰ 60,000 northeastern North Atlantic 120,000
Fisheries	Read reported interactions between minke whales and gillnets in Newfoundland and Labrador, cod traps in Newfoundland, and herring weirs in the Bay of Fundy. ¹¹

⁷ Read, A.J. 1994. Interactions between cetaceans and gillnet and trap fisheries in the northwest Atlantic. Rep. int. Whal. Commn Special Issue 15: 133-147.

⁸ NOAA (2006) Draft Atlantic Marine Mammal Stock Assessment Report at 28

⁹ NOAA (2006) Draft Atlantic Marine Mammal Stock Assessment Report at 28

¹⁰ IUCN Red List

¹¹ Read, A.J. 1994. Interactions between cetaceans and gillnet and trap fisheries in the northwest Atlantic. Rep. int.

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Estimated Annual Mortality¹² From 1991 through 1996 scientists observed no minke whales taken in fishing vessels operating in Canadian waters.¹³ During 1997 to 2001, there were no confirmed mortalities or serious injuries in Canadian waters as reported by the various, small-scale stranding and observer data collection programs in Atlantic Canada. No additional information is available on Canadian mortalities from 2002 to present. During 1980 to 1990, 15 of 17 minke whales were released alive from herring weirs in the Bay of Fundy. During January 1991 to September 2002, 26 minke whales were trapped in herring weirs in the Bay of Fundy. Of these 26, 1 died and several (number unknown) were released alive and unharmed.¹⁴

Species ***Megaptera novaeangliae* Humpback whale.**
Abundance Estimate Barents and Norwegian Sea 889

Fisheries Reports of collisions with fixed fishing gear set for groundfish around Newfoundland averaged 365 annually from 1979 to 1987 (range 174-813). An average of 50 humpback whale entanglements (range 26-66) was reported annually between 1979 and 1988, and 12 of 66 humpback whales that were entangled in 1988 died.¹⁵ Between 1979 and 1992, Newfoundland and Labrador, cod traps caused the most entanglements and entanglement mortalities--21% of humpbacks. Between 1975 and 1990, gillnets are primarily responsible for 20% of humpback

Whal. Commn Special Issue 15: 133-147.

¹² Additional, but somewhat dated information indicates that Lien et al (1987) estimated average entanglement rates of around 11 minke whales per year in Newfoundland's inshore fisheries. Between 1979 and 1985 58% of such entanglements were in cod traps and 21% in gillnets (O'Hara et al 1986). Lien et al report that around 75% of such entanglements are mortalities. Read suggests some possible mortality in Gulf of St. Lawrence set gillnet fisheries, and also reports two minke whale deaths in Bay of Fundy herring weirs between 1980 and 1990.

Other Fisheries--Six minke whales were reported entangled during 1989 in the now non-operational groundfish gillnet fishery in Newfoundland and Labrador. One of these animals escaped and was still towing gear, the remaining 5 animals died. Salmon gillnets in Canada, now no longer being used, had taken a few minke whales. In Newfoundland in 1979, one minke whale died in a salmon net. In Newfoundland and Labrador, between 1979 and 1990, it was estimated that 15% of the Canadian minke whale takes were in salmon gillnets. A total of 124 minke whale interactions were documented in cod traps, groundfish gillnets, salmon gillnets, other gillnets and other traps. The salmon gillnet fishery ended in 1993 as a result of an agreement between the fishermen and North Atlantic Salmon Fund (Read 1994). Five minke whales were entrapped and died in Newfoundland cod traps during 1989. The cod trap fishery in Newfoundland closed in 1993 due to the depleted groundfish resources (Read 1994).

¹³ Hooker, S.K., R.W. Baird and M.A. Showell. 1997. Cetacean strandings and bycatches in Nova Scotia, Eastern Canada, 1991-1996. Meeting document SC/49/O5 submitted to the 1997 International Whaling Commission meeting in Bournemouth, UK. Hooker *et al.* (1997) summarized bycatch data from a Canadian fisheries observer program that placed observers on all foreign fishing vessels operating in Canadian waters, on between 25% and 40% of large Canadian fishing vessels (greater than 100 feet long), and on approximately 5% of smaller Canadian fishing vessels. During 1991 through 1996, no minke whales were observed taken.

¹⁴ NOAA (2006) at 31

¹⁵ Lein, J., W. Ledwell, and J. Naven. 1988. Incidental entrapment in inshore fishing gear during 1988: A preliminary report to the Newfoundland and Labrador Department of Fisheries and Ocean, 15 pp.

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entanglements and entanglement mortalities in the Gulf of Maine.¹⁶

Estimated Annual Mortality

0.6/yr 2000-2004

Species

***Stenella coeruleoalba* Striped dolphin**

Abundance Estimate

Maryland to the Bay of Fundy 52,055 (CV = 0.57)

Fisheries

Gillnet, trap, and trawl fisheries

Estimated Annual Mortality

In review of Canadian gillnet and trap fisheries, no mortalities were documented.¹⁷ However, Baird reported two records of incidental mortality; in the late 1960's and early 1970's, two mortalities each, were reported in trawl and salmon net fisheries.¹⁸ Between January 1993 and December 1994, 36 Spanish deep-water trawlers, covering 74 fishing trips (4,726 fishing days and 14,211sets), were observed off the Grand Bank. A total of 47 incidental catches were recorded, which included two striped dolphins. The incidental mortality rate for striped dolphins was 0.014/set.¹⁹

Species

***Delphinapterus leucas* White whale.**

Abundance Estimate²⁰

North Water (Baffin Bay)	28,000
West Greenland	2,000
Cumberland Sound	485
Frobisher Bay	No info
Ungava Bay (endangered)	<50
West Hudson Bay (not at risk)	25,100
Foxe Basin	1,000
South Hudson Bay	1,299
James Bay	3,300
East Hudson Bay	1,014
St. Lawrence River (endangered)	1,238

¹⁶ Read, A.J. 1994. Interactions between cetaceans and gillnet and trap fisheries in the northwest Atlantic. Rep. int Whal. Commn Special Issue 15: 133-147.

¹⁷ Read, A.J. 1994. Interactions between cetaceans and gillnet and trap fisheries in the northwest Atlantic. Rep. int Whal. Commn Special Issue 15: 133-147.

¹⁸ Baird, R.W., S. K. Hooker, H. Whitehead, and R. Etcheberry. 1997. A Review of records of striped dolphins (*Stenella coeruleoalba*) from Canadian waters. IWC Doc. SC/49/SM4, 10 pp.

¹⁹ Lens, S. 1997. Interactions between marine mammals and deep water trawlers in the NAFO regulatory area. ICES CM 1997/Q:8. 10 pp.

²⁰ IWC (2000) Report of the Scientific Committee from its Annual Meeting 3-15 May 1999 in Grenada J. Cetacean Res. Manage 2(Suppl).

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Fisheries	Entanglement in inshore fisheries in Newfoundland, including entrapments in Gulf of St Lawrence groundfish gillnets, and in Canadian cod traps. ²¹	
Estimated Annual Mortality	No Mortality Estimates	
Species	<i>Globicephala melaena</i> Longfinned pilot whale	
Abundance Estimate	Maryland to the Bay of Fundy 15,728 ²²	
Fisheries	An unknown number of pilot whales have been entangled in Newfoundland, Labrador, and Bay of Fundy groundfish gillnets; Atlantic Canada and Greenland salmon gillnets; and Atlantic Canada cod traps. ²³	
Estimated Annual Mortality	<p>Between January 1993 and December 1994, 36 Spanish deep-water trawlers, were observed off the Grand Banks, they incidentally caught 1 long-finned pilot whale for an incidental mortality rate of 0.007 pilot whales /set.</p> <p>From 1991-1996, Canadian fisheries observer data indicated that long-finned pilot whales were bycaught (number of animals in parentheses) in bottom trawl (65); midwater trawl (6); and longline (1) gear. Recorded bycatches by year were: 16 in 1991, 21 in 1992, 14 in 1993, 3 in 1994, 9 in 1995 and 6 in 1996. Pilot whale bycatches occurred in all months except January-March and September.²⁴</p>	
Species	<i>Lagenorhynchus acutus</i> Atlantic white-sided dolphin.	
Abundance Estimate	Gulf of Maine Stock	51,640 (CV 0.38) ²⁵
	Gulf of St. Lawrence Stock	11,740 (CV=0.47)
	Labrador Sea Stock	No Abundance Estimate
Fisheries	White-sided dolphins were entangled in gillnet fisheries, longlines, herring weirs and trawls	
Estimated Annual Mortality	There is little information available that quantifies fishery interactions involving white-sided dolphins in Canadian waters. Two white-sided dolphins were reported caught in groundfish gillnet sets in the Bay of Fundy during 1985 to 1989, and 9 were reported caught in West Greenland between 1964 and 1966 in the now non-operational salmon drift nets. Several (number not specified) were also caught during the 1960's in the now non-operational Newfoundland and Labrador groundfish gillnets. From 1965 to 1982, a few (number not specified) were caught in	

²¹ Read, A.J. 1994. Interactions between cetaceans and gillnet and trap fisheries in the northwest Atlantic. Rep. int Whal. Commn Special Issue 15: 133-147.

²² Current estimate includes short-finned pilot whales as the two species cannot be differentiated during surveys.

²³ Read, A.J. 1994. Interactions between cetaceans and gillnet and trap fisheries in the northwest Atlantic. Rep. int Whal. Commn Special Issue 15: 133-147.

²⁴ Read, A.J. 1994. Interactions between cetaceans and gillnet and trap fisheries in the northwest Atlantic. Rep. int Whal. Commn Special Issue 15: 133-147.

²⁵ NOAA (2006) at 85

an experimental drift gillnet fishery for salmon off West Greenland.²⁶

From 1991 through 1996, an estimated 6 white-sided dolphins were observed entangled. One animal was from a longline trip south of the Grand Banks in November 1996 and the other 5 were captured in the bottom trawl fishery off Nova Scotia in the Atlantic Ocean; 1 in July 1991, 1 in April 1992, 1 in May 1992, 1 in April 1993, 1 in June 1993 and 0 in 1994 to 1996.²⁷

Canada is working on an estimation of small cetacean bycatch for Newfoundland fisheries using data collected during 2001 to 2003. White-sided dolphins were reported to have been caught in the Newfoundland nearshore gillnet fishery and offshore monkfish/skate gillnet fisheries.

One animal was caught but released alive in a herring weir.

Species	<i>Phocoena phocoena</i> Harbour porpoise.	
Abundance Estimate	Gulf of Maine/Bay of Fundy Stock	89,700 (CV = 0.22) ²⁸
	Gulf of St. Lawrence Stock	21,700 (CV=0.38) ²⁹
	Newfoundland and Greenland	No Abundance Estimate
Fisheries	Gulf of Maine/Bay of Fundy harbor porpoise entanglements have been in the Canadian Bay of Fundy groundfish sink gillnet and herring weir fisheries	
Estimated Annual Mortality	In Canada, the total average annual mortality between 2000 -2004 is 55 animals. The average annual mortality in the Canadian groundfish sink gillnet fishery (2000 – 2004) is 51 harbor porpoise The average annual mortality in the Canadian Herring Weir fishery (2000 – 2004) is 4.4 harbor porpoise. ³⁰	
	<i>Bay of Fundy Sink Gillnet</i>	
	During the 1980's, Canadian harbor porpoise bycatch in the Bay of Fundy sink gillnet fishery, was estimated at 94-116 in 1986 and 130 in 1989. ³¹ In 1993, an observer program provided a total bycatch estimate of 424 harbor porpoises (± 1 SE: 200-648) from 62 observed trips, (approximately 11.3% coverage of the Bay of Fundy trips); and in 1994, the bycatch estimate was 101 harbor porpoises (95% confidence limit: 80-122), from 171 observed trips (covering 49% of the gillnet trips). ³²	

²⁶ Read, A.J. 1994. Interactions between cetaceans and gillnet and trap fisheries in the northwest Atlantic. Rep. int Whal. Commn Special Issue 15: 133-147.

²⁷ NOAA (2006) at 89

²⁸ NOAA (2006) at 111

²⁹ NOAA (2006) at 111

³⁰ NOAA (2006) at 111

³¹ Trippel, E. A., J. Y. Wang, M. B. Strong, L. S. Carter, and J. D. Conway. 1996. Incidental mortality of harbour porpoise (*Phocoena phocoena*) by the gillnet fishery in the lower Bay of Fundy. Can. J. Fish. Aquat. Sci. 53:1294-1300.

³² Trippel, E. A., J. Y. Wang, M. B. Strong, L. S. Carter, and J. D. Conway. 1996. Incidental mortality of harbour porpoise (*Phocoena phocoena*) by the gillnet fishery in the lower Bay of Fundy. Can. J. Fish. Aquat. Sci.53:1294-1300.

During 1995, due to groundfish quotas being exceeded, the gillnet fishery was closed from July 21 to August 31. During the open fishing period of 1995, 89% of the trips were observed, approximately 30% of observed trips used pingered nets, and the estimated bycatch was 87 harbor porpoises.³³ During 1996, the Canadian gillnet fishery was closed during July 20-31 and August 16-31 due to groundfish quotas and the estimated bycatch was 20 harbor porpoises.³⁴ Trippel estimated that during 1996, gillnets equipped with acoustic alarms reduced harbor porpoise bycatch rates by 68% over nets without alarms.³⁵ During 1997, groundfish quotas again closed the fishery during portions of July and August, and a harbor porpoise time-area closure was implemented in September in the Swallowtail area- the estimated bycatch was 43 animals.³⁶ Again, in 1997, Trippel estimated that gillnets equipped with acoustic alarms reduced harbor porpoise bycatch rates by 85% over nets without alarms in the Swallowtail area of the lower Bay of Fundy.³⁷ For the years 1998-2001, the estimated annual mortality was 38 for 1998, 32 for 1999, 28 for 2000, and 73 for 2001.³⁸ Estimates of variance are not available. From 2002 to 2004 there is no bycatch estimate due to a lack of an observer program.

33 Trippel, E. A., J. Y. Wang, M. B. Strong, L. S. Carter, and J. D. Conway. 1996. Incidental mortality of harbour porpoise (*Phocoena phocoena*) by the gillnet fishery in the lower Bay of Fundy. *Can. J. Fish. Aquat. Sci.* 53:1294-1300.

34 Trippel, E. A., M. B. Strong, J. M. Terhune, and J. D. Conway. 1999. Mitigation of harbour porpoise (*Phocoena phocoena*) bycatch in the gillnet fishery in the lower Bay of Fundy. *Can. J. Fish. Aquat. Sci.* 56:113-123.

35 Trippel, E. A., M. B. Strong, J. M. Terhune, and J. D. Conway. 1999. Mitigation of harbour porpoise (*Phocoena phocoena*) bycatch in the gillnet fishery in the lower Bay of Fundy. *Can. J. Fish. Aquat. Sci.* 56:113-123.

36 DFO [Department of Fisheries and Oceans]. 1998. Harbour porpoise bycatch in the lower Bay of Fundy gillnet fishery. DFO Maritimes Regional Fisheries Status Report 98/7E. [Available from Department of Fisheries and Oceans, Resource management Branch, P.O. Box 550, Halifax, NS B3J 2S7, Canada.]

37 Trippel, E. A., M. B. Strong, J. M. Terhune, and J. D. Conway. 1999. Mitigation of harbour porpoise (*Phocoena phocoena*) bycatch in the gillnet fishery in the lower Bay of Fundy. *Can. J. Fish. Aquat. Sci.* 56:113-123.

38 Trippel, E.A., and Shepherd, T.D. 2004. By-Catch of Harbour Porpoise (*Phocoena phocoena*) in the Lower Bay of Fundy Gillnet Fishery from 1998-2001. DFO Res. Doc. 2004/2521.

39 Smith, G.J.D., A.J. Read, and D.E. Gaskin. 1983. Incidental catch of harbor porpoises, (*Phocoena phocoena*) in herring weirs in Charlotte County, New Brunswick, Canada. *Fish Bull.*, U.S. 81(3):660-2

40 Read, A.J. 1994. Interactions between cetaceans and gillnet and trap fisheries in the northwest Atlantic. *Rep. int. Whal. Commn Special Issue* 15: 133-147.

41 Neimanis, A.S., H.N. Koopman, A.J. Westgate, L.D. Murison and A.J. Read. 2004. Entrapment of harbour porpoises (*Phocoena phocoena*) in herring weirs in the Bay of Fundy, Canada. *J.Cet. Res. Manag.* 6(1):7-17.

42 Neimanis, A.S., H.N. Koopman, A.J. Westgate, L.D. Murison and A.J. Read. 2004. Entrapment of harbour porpoises (*Phocoena phocoena*) in herring weirs in the Bay of Fundy, Canada. *J.Cet. Res. Manag.* 6(1):7-17.

43 Neimanis, A.S., H.N. Koopman, A.J. Westgate, L.D. Murison and A.J. Read. 2004. Entrapment of harbour porpoises (*Phocoena phocoena*) in herring weirs in the Bay of Fundy, Canada. *J.Cet. Res. Manag.* 6(1):7-17.

44 Lesage, V., J. Keays, S. Turgeon, and S. Hurtubise. 2003. Incidental mortality of harbour porpoises in the gillnet fishery of the Estuary and Gulf of St. Lawrence in 2000-2002. Canadian Science Advisory Secretariat. Research Document 2003/069. Available at <http://www.dfo-mpo.gc.ca/csas/>

45 Lesage, V., J. Keays, S. Turgeon, and S. Hurtubise. 2003. Incidental mortality of harbour porpoises in the gillnet fishery of the Estuary and Gulf of St. Lawrence in 2000-2002. Canadian Science Advisory Secretariat. Research Document 2003/069. Available at <http://www.dfo-mpo.gc.ca/csas/>

Herring Weirs

Harbor porpoises are caught in Canadian herring weirs, but there have been no recent efforts to observe bycatch. In the 1980's, approximately 70 harbor porpoises became trapped annually and, on average, 27 died each year.³⁹ In 1990, at least 43 harbor porpoises were trapped in Bay of Fundy weirs.⁴⁰ In 1993, a cooperative program between fishermen and Canadian biologists was initiated; as a result, between 1992 and 1994, 206 of 263 harbor porpoises caught in herring weirs were released alive.⁴¹ Mortalities (and releases) were 11 (and 50) in 1992, 33 (and 113) in 1993, and 13 (and 43) in 1994.⁴² Since that time, an additional 682 harbor porpoises have been documented in Canadian herring weirs, of which 637 were released or escaped, 36 died, and 9 had an unknown status. Mortalities (and releases and unknowns) were 5 (and 60) in 1995; 2 (and 4) in 1996; 2 (and 24) in 1997; 2 (and 26) in 1998; 3 (and 89) in 1999; 0 (and 13) in 2000, 14 (and 296) in 2001, 3 (and 46 and 4) in 2002, and 1 (and 26 and 3) in 2003, and 4 (and 53 and 2).⁴³

Gulf of St. Lawrence gillnet

This fishery interacts with the Gulf of St. Lawrence harbor porpoise stock, not the Gulf of Maine/Bay of Fundy harbor porpoise stock. Using questionnaires to fishermen, scientists determined a total of 2,180 (95% CI 1012-3802) and 2,478 (95% CI 1591-3464) harbor porpoises were entangled in 2000 and 2001, respectively.⁴⁴ The largest takes were in July and August around Miscou and the North Shore of the Gulf of St. Lawrence. An at-sea observer program, conducted during 2001 and 2002, concluded that resulting bycatch estimates were unreliable, due to low observer coverage that was not representative of the fishing effort.⁴⁵

Newfoundland gillnet

This fishery interacts with the Newfoundland harbor porpoise stock, not the Gulf of Maine/Bay of Fundy harbor porpoise stock. Estimates of incidental catch of harbor porpoises are currently being calculated for 2001- 2003 for the Newfoundland nearshore cod and Greenland halibut fisheries, and the Newfoundland offshore fisheries in lumpfish, herring, white hake, monkfish and skate.

AREA 27 NORTHEAST ATLANTIC

There are very few recent comprehensive studies on cetacean abundance or population sizes in this area. The most recent abundance estimates are provided in the tables below. Note that the estimate of cetacean abundance in a specified survey region is not equivalent to an estimate of population size, as biological populations may extend over wider areas, or conversely may be contained within a sub-area of the survey region. Very little is actually known about stock structure in this region. Since abundance estimates are usually snapshots of animal density and abundance over a short period of time, the actual density or abundance of these highly migratory cetaceans within a survey region may vary considerably either seasonally or inter-annually if those animals range outside the survey area. For animals with seasonal migrations, an estimate of abundance in one part of the range should not be used as an indication of abundance throughout the year.

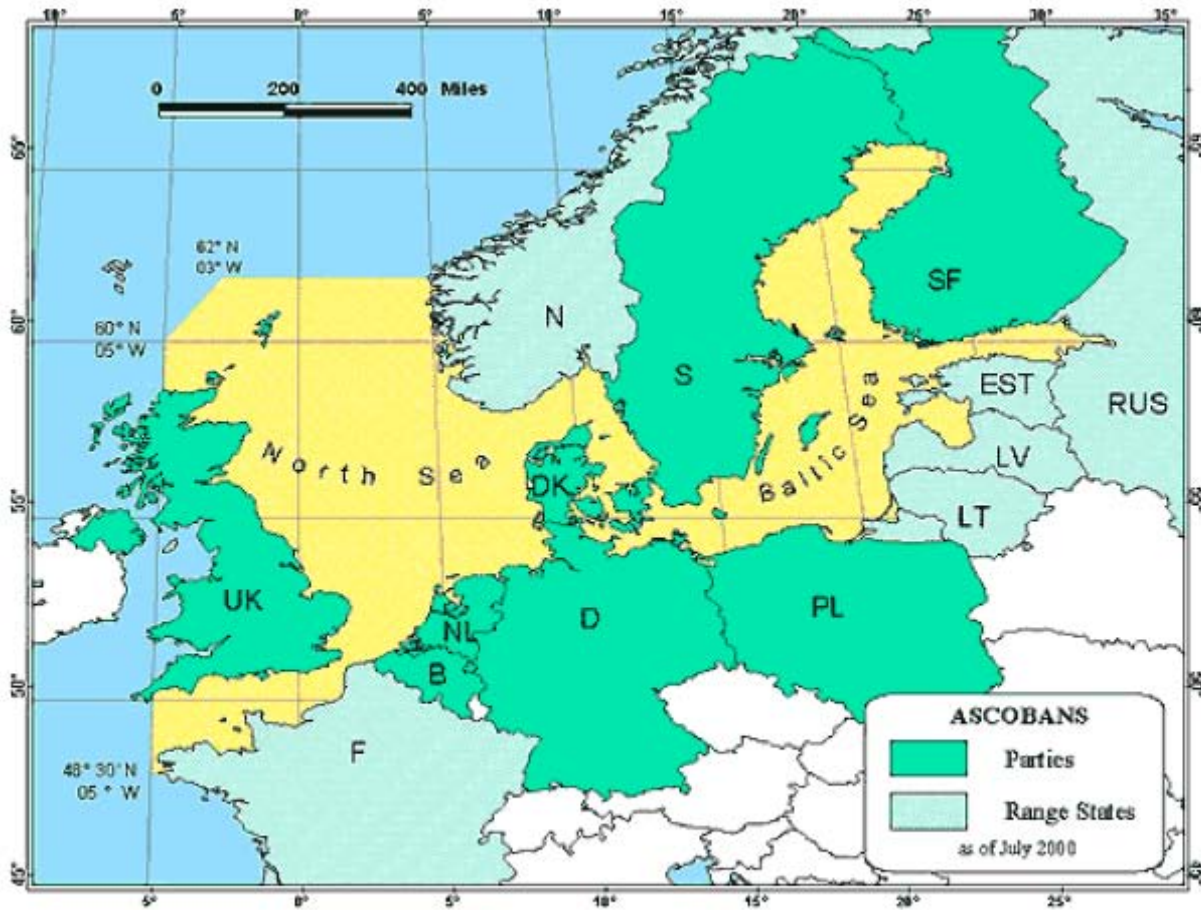


Fig. 1 – Area currently covered by the ASCOBANS agreement and ASCOBANS Parties and Range States

Species	<i>Phocoena phocoena</i> Harbor porpoise.	Fisheries	Mortality Est./% Take
Abundance Estimate ⁴⁶	Northern and Central North Sea Kattegat and Oeresund	61,335 36,046 (20,276-64,083)	Danish, UK gillnet fisheries for various species German, Danish, Swedish gillnet fisheries
			2,700 ⁴⁷ /4.1% 83 ⁴⁸ / .2%

⁴⁶ Hammond PS, Berggren P, Benke H, Borchers DL, Collet A, Heide-Jorgensen MP, Heimlich S, Hiby AR, Leopold MF, Oien N, 2002. Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. *Journal of Applied Ecology* 39:361-376.

⁴⁷ Harwood J, Andersen LW, Berggren P, Carlström J, Kinze CC, McGlade J, Metzals K, Larsen F, Lockyer CH, Northridge SP, Rogan E, Vinther M, Walton M, 1999. Assessment and reduction of the bycatch of small cetaceans in European waters (BY-CARE) - Executive summary. Report to the European Commission on contract CT05-0523, St. Andrews, Scotland, NERC Sea Mammal Research Unit.

⁴⁸ Not all included bycatch estimates are based on independent observer schemes. Kaschner K, 2001. Harbour porpoises in the North Sea and Baltic - bycatch and current status. Report for the Umweltstiftung WWF - Deutschland; 82.

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Skagerrak	4,738	Swedish gillnet fisheries for cod & Pollock	114 ⁴⁹ /2.4%
Kattegat	4,009	Swedish gillnet fisheries for cod & pollock	50 ⁵⁰ /1.2%
Kiel & Mecklenburg Bight	588 (240-1,430)	Included in Kattegat & Oeresund estimate above	
Southwestern Baltic proper	599 (200-3,300)	Danish, Finish, Polish & Swedish drift & bottom-set gillnet fisheries	13 ⁵¹ /2.1%
Northern North Sea	98,564 (66,679-145,697)	(north of 56°N) Danish, UK gillnet fisheries for various species	5,000 ⁵² /5%
Southern & Central North Sea	169,888 (124,121-232,530)	Danish, Swedish, UK, Belgian, Dutch, German gillnet fisheries for various species	7,493 ⁵³ /4.3%
Celtic Sea	36,280 (12, 828-102,604)	Irish gillnet fishery for hake (14- 22m vessels), UK gillnet fishery for hake (> 15 m vessels)	2,200 ⁵⁴ /6.2%

49 Abundance estimate derived using SCANS density estimates, scale-downed to Swedish EEZ Harwood J, Andersen LW, Berggren P, Carlström J, Kinze CC, McGlade J, Metuzals K, Larsen F, Lockyer CH, Northridge SP, Rogan E, Vinther M, Walton M, 1999. Assessment and reduction of the bycatch of small cetaceans in European waters (BY-CARE) - Executive summary.

Report to the European Commission on contract CT05-0523, St. Andrews, Scotland, NERC Sea Mammal Research Unit. See also: CEC, 2002a. Incidental catches of small cetaceans. Report of the meeting of the subgroup on fishery and the environment (SGFEN) of the Scientific, Technical and Economic Committee for Fisheries (STECF). SEC(2002) 376, Brussels, BL, Commission of the European Communities; 83.

50 Abundance estimate derived using SCANS density estimates, scale-downed to Swedish EEZ Harwood J, Andersen LW, Berggren P, Carlström J, Kinze CC, McGlade J, Metuzals K, Larsen F, Lockyer CH, Northridge SP, Rogan E, Vinther M, Walton M, 1999. Assessment and reduction of the bycatch of small cetaceans in European waters (BY-CARE) - Executive summary. Report to the European Commission on contract CT05-0523, St. Andrews, Scotland, NERC Sea Mammal Research Unit. See also: CEC, 2002a. Incidental catches of small cetaceans. Report of the meeting of the subgroup on fishery and the environment (SGFEN) of the Scientific, Technical and Economic Committee for Fisheries (STECF). SEC(2002) 376, Brussels, BL, Commission of the European Communities; 83

51 Not all included bycatch estimates are based on independent observer schemes. Kaschner K, 2001. Harbour porpoises in the North Sea and Baltic - bycatch and current status. Report for the Umweltstiftung WWF - Deutschland; 82.

52 Mean Annual Estimated Take between 1987-2001. Harwood J, Andersen LW, Berggren P, Carlström J, Kinze CC, McGlade J, Metuzals K, Larsen F, Lockyer CH, Northridge SP, Rogan E, Vinther M, Walton M, 1999. Assessment and reduction of the bycatch of small cetaceans in European waters (BY-CARE) - Executive summary. Report to the European Commission on contract CT05-0523, St. Andrews, Scotland, NERC Sea Mammal Research Unit.

53 Not all included bycatch estimates are based on independent observer schemes. Kaschner K, 2001. Harbour porpoises in the North Sea and Baltic - bycatch and current status. Report for the Umweltstiftung WWF - Deutschland; 82.

54 Bycatch mortalities do not include other set net fisheries or other fisheries in the same area. UK & Irish fishing effort decreased in recent years, CEC, 2002a. Incidental catches of small cetaceans. Report of the meeting of the subgroup on fishery and the environment (SGFEN) of the Scientific, Technical and Economic Committee for Fisheries (STECF). SEC(2002) 376, Brussels, BL, Commission of the European Communities; 83.

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North Sea	268,800	Danish gillnets for cod, turbot, hake	2,971 ⁵⁵	1.3%
		UK gillnets for cod, skate, turbot, sole	436	

Species	<i>Lagenorhynchus acutus</i> Atlantic white-sided dolphin			
Abundance Estimate ⁵⁶	Celtic Shelf ⁵⁷	833	(159- 4,360)	
	Central North Sea ⁵⁸	9,242	5,344-15,981)	
	Northern North Sea ⁵⁹	1,685	(690 – 4,113)	
	Northern North Sea	74,626	(35,000–160,000)	
	West of Ireland	490	(1,134–10,015)	
Fisheries	White-side dolphins are susceptible to capture in mid-water trawl fisheries.			
Estimated Annual Mortality	In 1996 and 1998 respectively, the Irish driftnet fishery for albacore caught 2 and 15 white-sided dolphins. ⁶⁰			
	Approximately 196 (5 – 493) white-sided dolphins have been caught in pelagic trawl fisheries for horse mackerel and mackerel southwest of Ireland. ⁶¹ Small numbers have been taken by Spain in the deep water trawl fishery for Greenland halibut.			
	In 1999, bycatch in the Irish experimental pelagic pair trawl fishery for albacore off western Ireland and the southern Bay of Biscay resulted in the capture of two Atlantic white-sided dolphins. ⁶²			

⁵⁵ CEC, 2002a. Incidental catches of small cetaceans. Report of the meeting of the subgroup on fishery and the environment (SGFEN) of the Scientific, Technical and Economic Committee for Fisheries (STECF). SEC(2002) 376, Brussels, BL, Commission of the European Communities; 83. Impact based on combined current bycatch estimates of all Danish and most UK gillnet fisheries, does not include Norwegian, Dutch, Belgian, German and other UK fleets and is therefore likely an underestimate.

⁵⁶ Hammond PS, Berggren P, Benke H, Borchers DL, Collet A, Heide-Jorgensen MP, Heimlich S, Hiby AR, Leopold MF, Oien N, 2002. Abundance of harbor porpoise and other cetaceans in the North Sea and adjacent waters. *Journal of Applied Ecology* 39:361-376. See also: MacLeod K, 2001. The spatial and temporal distribution of cetaceans off the west coast of Scotland in relation to environmental factors: implication for marine management (Ph.D.). London: University of Greenwich.

⁵⁷ Estimate is for white-sided and white-beaked dolphins

⁵⁸ Estimate is for white-sided and white-beaked dolphins

⁵⁹ Estimate is for white-sided and white-beaked dolphins

⁶⁰ Lesage, V., J. Keays, S. Turgeon, and S. Hurtubise. 2003. Incidental mortality of harbour porpoises in the gillnet fishery of the Estuary and Gulf of St. Lawrence in 2000-2002. Canadian Science Advisory Secretariat. Research Document 2003/069. Available at <http://www.dfo-mpo.gc.ca/csas/>

⁶¹ Lesage, V., J. Keays, S. Turgeon, and S. Hurtubise. 2003. Incidental mortality of harbour porpoises in the gillnet fishery of the Estuary and Gulf of St. Lawrence in 2000-2002. Canadian Science Advisory Secretariat. Research Document 2003/069. Available at <http://www.dfo-mpo.gc.ca/csas/>

⁶² BIM. 2000. Diversification trials with alternative tuna fishing techniques including the use of remote sensing technology. Final report of EU Contract 98/010, Bord Iascaigh Mhara (BIM), Dun Laoghaire, Ireland.

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Species	<i>Tursiops truncatus</i> Bottlenose dolphin.	
Abundance Estimate	Moray Firth ⁶³	129 (110- 174)
	Brittany ⁶⁴	30
	Mont St. Michel ⁶⁵	6
	Arachon ⁶⁶	60
	French Coast ⁶⁷	250-300
	Cornwall ⁶⁸	15
	Dorset ⁶⁹	5
	Cardigan Bay ⁷⁰	135 (85-214)
	Shannon Estuary ⁷¹	113 (94-161)
	Dingle Bay ⁷²	12
Fisheries	Bottlenose dolphins have been reported caught in gillnets in the south of England in very small numbers, some mortality in Irish driftnet fisheries, and occasional captures in French fisheries.	
Estimated Annual Mortality	In 1996 and 1998 respectively, the Irish driftnet fishery for albacore caught 6 and 45 bottlenose dolphins. ⁷³	
	From 2000 to 2003, French reported between 9 – 10 bottlenose dolphins	

⁶³ Wilson B, Hammond PS, Thompson PM, 1999. Estimating size and assessing trends in a coastal bottlenose dolphin population. *Ecological Applications* 9:288-300.

⁶⁴ ICES, 1996. Report of the Study Group on Seals and Cetaceans in European Seas (CM 1996/N:01). ICES; 27.

⁶⁵ ICES, 1996. Report of the Study Group on Seals and Cetaceans in European Seas (CM 1996/N:01). ICES; 27.

⁶⁶ ICES, 1996. Report of the Study Group on Seals and Cetaceans in European Seas (CM 1996/N:01). ICES; 27.

⁶⁷ ICES, 2002. Report of the Working Group on Marine Mammal Population Dynamics and Habitat (CM 2002/ACE:02). ICES; 27.

⁶⁸ ICES, 1996. Report of the Study Group on Seals and Cetaceans in European Seas (CM 1996/N:01). ICES; 27.

⁶⁹ White R, Webb A, 1995. Coastal birds and marine mammals of mid Dorest. Peterborough, UK, Joint Nature Conservation Committee; 48.

⁷⁰ Baines ME, Reichelt M, Evans PGH, Shepherd B, 2002. Comparison of the abundance and distribution of harbor porpoise (*Phocoena phocoena*) and bottlenose dolphins (*Tursiops truncatus*) in Cardigan Bay, UK (Abstract). Liege, Belgium, ECS.

⁷¹ Ingram SN, 2000. The ecology and conservation of bottlenose dolphins in the Shannon estuary (Ph.D.). Cork, Ireland: University College.

⁷² ICES, 1996. Report of the Study Group on Seals and Cetaceans in European Seas (CM 1996/N:01). ICES; 27.

⁷³ Harwood, J., Andersen, L.W., Berggren, P., Carlström, J., Kinze, C.C., McGlade, J., Metzals, K., Larsen, F., Lockyer, C.H., Northridge, S., Rogan, E., Walton, M., Vinther, M., 1999. Assessment and reduction of the by-catch of small cetaceans (BY-CARE). Final report to the European Commission on FAIR-CT05-0523.

⁷⁴ Annex L. Report of the Sub-Committee on Small Cetaceans. 2004

⁷⁵ Annex L. Report of the Sub-Committee on Small Cetaceans. 2004

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incidentally caught in French fisheries in the Atlantic⁷⁴

From 2000 to 2003, Spain reported between 2 – 8 bottlenose dolphins incidentally caught in Spanish fisheries in the Atlantic⁷⁵

Species	<i>Delphinus delphis</i> Common dolphin.	
Abundance Estimate	Celtic Sea ⁷⁶	75,449 (22,900 - 284,900)
	Bay of Biscay ⁷⁷	61,888 (35,461 - 108,010)
	Celtic Sea & Western Waters ⁷⁸	101,205 (55125 – 185802)
Fisheries	Common dolphins are caught in Irish salmon driftnets, mackerel purse seines in the southwest of Britain, English midwater trawl research cruises in the Channel, and unidentified type of trawl in the Channel. There is a considerable accidental catch of small cetaceans in the English bottom set net fishery off the southwest coast of England. Catches of common dolphins in various French fisheries continue, and large numbers of animals with evidence of entanglement have washed up on French Atlantic coasts in the past few years. There is also a large French gillnet fishery in this area operating along similar lines to the English one, as well as several trawl fisheries.	
Estimated Annual Mortality ⁷⁹	Dutch horse mackerel	101 (4-214)
	French hake	203 (4-529)
	French tuna	95 (3-287)
	French bass	25 (1-83)
	French tuna driftnet	415 (265 – 564)
	UK tuna driftnet	61 (16 – 106)
	Celtic Sea hake gillnet	200 (4 – 500)

⁷⁶ Hammond PS, Berggren P, Benke H, Borchers DL, Collet A, Heide-Jorgensen MP, Heimlich S, Hiby AR, Leopold MF, Oien N, 2002. Abundance of harbour porpoise and other cetaceans in the North Sea and adjacent waters. *Journal of Applied Ecology* 39:361-376. See also: MacLeod K, 2001. The spatial and temporal distribution of cetaceans off the west coast of Scotland in relation to environmental factors: implication for marine management (Ph.D.). London: University of Greenwich.

⁷⁷ Goujon M, 1996. Captures accidentelles du filet maillant dérivant et dynamique des populations de dauphins au large du Golfe de Gascogne. Rennes Cedex, France: Ecole Nationale Supérieure Agronomique de Rennes. See also: Goujon M, Antoine L, Collet A, Fifas S, 1993. Approche de l'impact écologique de la pêche thonière au filet maillant dérivant en Atlantique nord-est. RI.DRV-93034, IFREMER; 47.

⁷⁸ Rogan E, 1999. Relationship between bycatch in the Irish drift-net fishery for albacore, dolphin population size and operational features - Chapter 5. In: Assessment and reduction of the bycatch of small cetaceans in European waters (BY-CARE) (Harwood J, Andersen LW, Berggren P, Carlström J, Kinze CC, McGlade J, Metuzals K, Larsen F, Lockyer CH, Northridge SP, Rogan E, Vinther M, Walton M, eds). St. Andrews, Scotland: NERC Sea Mammal Research Unit.

⁷⁹ Tregenza, NJC and Collet, A. 1998. Common dolphin *Delphinus delphis* bycatch in pelagic trawl and other fisheries in the North East Atlantic. *Report of the International Whaling Commission* 48: 453-459

The French driftnet fishery for albacore in the northeast Atlantic in the early 1990s caught between 420– 460 dolphins, apparently both white-sided and striped dolphins (1992, 410 (325-495); 1993, 419 (266-572)).

On the North coast of Spain, 7 common dolphins were caught in fishing gear between 1977 and 1987 and 11 common dolphins were caught in fishing nets in Portugal in 1980. Common dolphins are frequently caught in coastal Portuguese fisheries: 47% of those reported were from gillnet fisheries.

In 1996 and 1998 respectively, the Irish driftnet fishery for albacore caught 356 and 2,522 common dolphins.⁸⁰

In 1999, bycatch in the Irish experimental pelagic pair trawl fishery for albacore off western Ireland and the southern Bay of Biscay resulted in the capture of 127 common dolphins.⁸¹

From 1999-2001, bycatch in the pelagic trawl fisheries for mackerel, herring, bass, sprats, pilchards, blue whiting, and anchovy was 53 common dolphins—all of which were in the bass fishery in the Channel.

From 2000 to 2003, French reported from 41 – 218 common dolphins incidentally caught in French fisheries in the Atlantic.⁸²

From 2000 to 2003, Ireland reported from 1 – 16 common dolphins incidentally caught in Irish trawl fisheries in the Atlantic.⁸³

From 2000 to 2003, Spain reported from 3 – 77 common dolphins incidentally caught in Spanish fisheries in the Atlantic.⁸⁴

From 2000 to 2003, the United Kingdom reported between 12 – 72 common dolphins incidentally caught in UK trawl fisheries in the Atlantic.⁸⁵

⁸⁰ Harwood, J., Andersen, L.W., Berggren, P., Carlström, J., Kinze, C.C., McGlade, J., Metzals, K., Larsen, F., Lockyer, C.H., Northridge, S., Rogan, E., Walton, M., Vinther, M., 1999. Assessment and reduction of the by-catch of small cetaceans (BY-CARE). Final report to the European Commission on FAIR-CT05-0523.

⁸¹ BIM. 2000. Diversification trials with alternative tuna fishing techniques including the use of remote sensing technology. Final report of EU Contract 98/010, Bord Iascaigh Mhara (BIM), Dun Laoghaire, Ireland.

⁸² Annex L. Report of the Sub-Committee on Small Cetaceans. 2004

⁸³ Annex L. Report of the Sub-Committee on Small Cetaceans. 2004

⁸⁴ Annex L. Report of the Sub-Committee on Small Cetaceans. 2004

⁸⁵ Annex L. Report of the Sub-Committee on Small Cetaceans. 2004

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Species	<i>Stenella coeruleoalba</i> Striped dolphin	
Abundance Estimate	Bay of Biscay ⁸⁶	73,843 (36,113–150,990)
	Celtic Sea & Western Waters ⁸⁷	66,824 (37,583 - 118,813)
Fisheries	Striped dolphins are recorded “sporadically” in fishing gear in northern Spain, and in French and Portuguese Atlantic fisheries.	
Estimated Annual Mortality	Estimates of catches in the French albacore driftnet fishery for 1992/3 were 1,172 striped dolphins. ⁸⁸ In 1992, the fishery caught 1,193 (946-1440) striped dolphins and in 1993, it killed 1,152 (732-1572) dolphins. ⁸⁹ In 1995, the UK driftnet fishery for albacore caught 104 striped dolphins (38 – 169). ⁹⁰ In 1996 and 1998 respectively, the Irish driftnet fishery for albacore caught 136 and 964 striped dolphins. ⁹¹ In 1999, bycatch in the Irish experimental pelagic pair trawl fishery for albacore off western Ireland and the southern Bay of Biscay resulted in the capture of eight Striped dolphins. ⁹² From 2000 to 2003, French incidentally caught between 9 – 16 striped dolphins in French fisheries in the Atlantic ⁹³	

⁸⁶ Goujon M, Antoine L, Collet A, Fifas S, 1993. Approche de l'impact écologique de la pecherie thonière au filet maillant dérivant en Atlantique nord-est. RI.DRV-93034, IFREMER; 47.

⁸⁷ Rogan E, 1999. Relationship between bycatch in the Irish drift-net fishery for albacore, dolphin population size and operational features - Chapter 5. In: Assessment and reduction of the bycatch of small cetaceans in European waters (BY-CARE) (Harwood J, Andersen LW, Berggren P, Carlström J, Kinze CC, McGlade J, Metuzals K, Larsen F, Lockyer CH, Northridge SP, Rogan E, Vinther M, Walton M, eds). St. Andrews, Scotland: NERC Sea Mammal Research Unit.

⁸⁸ Tregenza, NJC and Collet, A. 1998. Common dolphin *Delphinus delphis* bycatch in pelagic trawl and other fisheries in the North East Atlantic. *Report of the International Whaling Commission* **48**: 453-459 See also: Goujon M, Antoine L, Collet A, Fifas S, 1993. Approche de l'impact écologique de la pecherie thonière au filet maillant dérivant en Atlantique nord-est. RI.DRV-93034, IFREMER; 47.

⁸⁹ Goujon estimates that the French driftnet fishery for tuna caught 1,722 (1365-2079) common, striped and bottlenose dolphins, and long-finned pilot whales in 1992; and 1,654 (1115-2393) common, striped and bottlenose dolphins, and long-finned pilot whales in 1993. Goujon M, Antoine L, Collet A, Fifas S, 1993. Approche de l'impact écologique de la pecherie thonière au filet maillant dérivant en Atlantique nord-est. RI.DRV-93034, IFREMER; 47.

⁹⁰ Tregenza, NJC and Collet, A. 1998. Common dolphin *Delphinus delphis* bycatch in pelagic trawl and other fisheries in the North East Atlantic. *Report of the International Whaling Commission* **48**: 453-459

⁹¹ Harwood, J., Andersen, L.W., Berggren, P., Carlström, J., Kinze, C.C., McGlade, J., Metuzals, K., Larsen, F., Lockyer, C.H., Northridge, S., Rogan, E., Walton, M., Vinther, M., 1999. Assessment and reduction of the by-catch of small cetaceans (BY-CARE). Final report to the European Commission on FAIR-CT05-0523.

⁹² BIM. 2000. Diversification trials with alternative tuna fishing techniques including the use of remote sensing technology. Final report of EU Contract 98/010, Bord Iascaigh Mhara (BIM), Dun Laoghaire, Ireland.

⁹³ Annex L. Report of the Sub-Committee on Small Cetaceans. 2004

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Species	<i>Globicephala melaena</i> Long-finned pilot whale.
Abundance Estimate ⁹⁴	East Greenland, Iceland, Jan Mayen, 778,000 Faroe Islands, & Western Coast of the British Islands
	Bay of Biscay 80,867
	East of 15°W 12,235 (3,924–38,148)
	West of 15°W 128,080 (45,241–362,640)
Fisheries	Pilot whales are commonly killed in gillnet, purse seines, trawl, and longline fisheries
Estimated Annual Mortality	An estimated 50-100 pilot whales are killed in gillnets off the coast of France ⁹⁵ One was reported drowned in a lobster creel line in Orkney in 1984, 1 in a purse seine off Scotland in 1986, three were reported in set gillnets off Cornwall (2 released alive), and there have been further unconfirmed reports of captures in purse seines off Cornwall and even a possible record of one in a demersal trawl in the same area. ⁹⁶ In 1996 and 1998 respectively, the Irish driftnet fishery for albacore caught 8 and 59 pilot whales. ⁹⁷ In 1999, bycatch in the Irish experimental pelagic pair trawl fishery for albacore off western Ireland and the southern Bay of Biscay resulted in the capture of eight long-finned pilot whales. ⁹⁸ From 2000 to 2003, French report between 1 – 2 pilot whales incidentally caught each year in French fisheries in the Atlantic. ⁹⁹

Species	<i>Lagenorhynchus albirostris</i> White-beaked dolphin
Abundance Estimate ¹⁰⁰	North Sea 7,856

⁹⁴ Buckland ST, Cattanach KL, Hobbs RC, 1993b. Abundance estimates of Pacific white-sided dolphin, Northern right whale dolphin, Dall's porpoise and Northern fur seal in the North Pacific, 1987-1990. International North Pacific Fisheries Commission Bulletin:387-407.

⁹⁵ International Whaling Commission. 1994. Report of the workshop on mortality of cetaceans in passive fishing nets and traps. Rep. Int. Whal. Commn. (Spec. Iss.) 15

⁹⁶ Northridge, S.P., and P.S. Hammond, 1999. Estimation of porpoise mortality in UK gill and tangle net fisheries in the North Sea and west of Scotland. Paper presented to the Scientific Committee of the International Whaling Commission, Grenada, May 1999. SC/51/SM42.

⁹⁷ Harwood, J., Andersen, L.W., Berggren, P., Carlström, J., Kinze, C.C., McGlade, J., Metzals, K., Larsen, F., Lockyer, C.H., Northridge, S., Rogan, E., Walton, M., Vinther, M., 1999. Assessment and reduction of the by-catch of small cetaceans (BY-CARE). Final report to the European Commission on FAIR-CT05-0523.

⁹⁸ BIM. 2000. Diversification trials with alternative tuna fishing techniques including the use of remote sensing technology. Final report of EU Contract 98/010, Bord Iascaigh Mhara (BIM), Dun Laoghaire, Ireland.

⁹⁹ Annex L. Report of the Sub-Committee on Small Cetaceans. 2004

¹⁰⁰ Øien N, 1993. Abundance of killer whales (*Orcinus orca*) in waters off Norway. Reykjavik, Iceland, (unpublished).

Worldwide Cetacean Bycatch/Appendices

Fisheries	White-beaked dolphins are caught in mid-water herring trawls and salmon driftnet fisheries
Estimated Annual Mortality	There is an unknown mortality of white-beaked dolphins off the Yorkshire coast (northeast England) every summer when Dutch midwater herring trawlers operate in that region. ¹⁰¹ There are also unconfirmed reports that this species is caught in Irish salmon driftnet fisheries.

AREA 31 WESTERN CENTRAL ATLANTIC

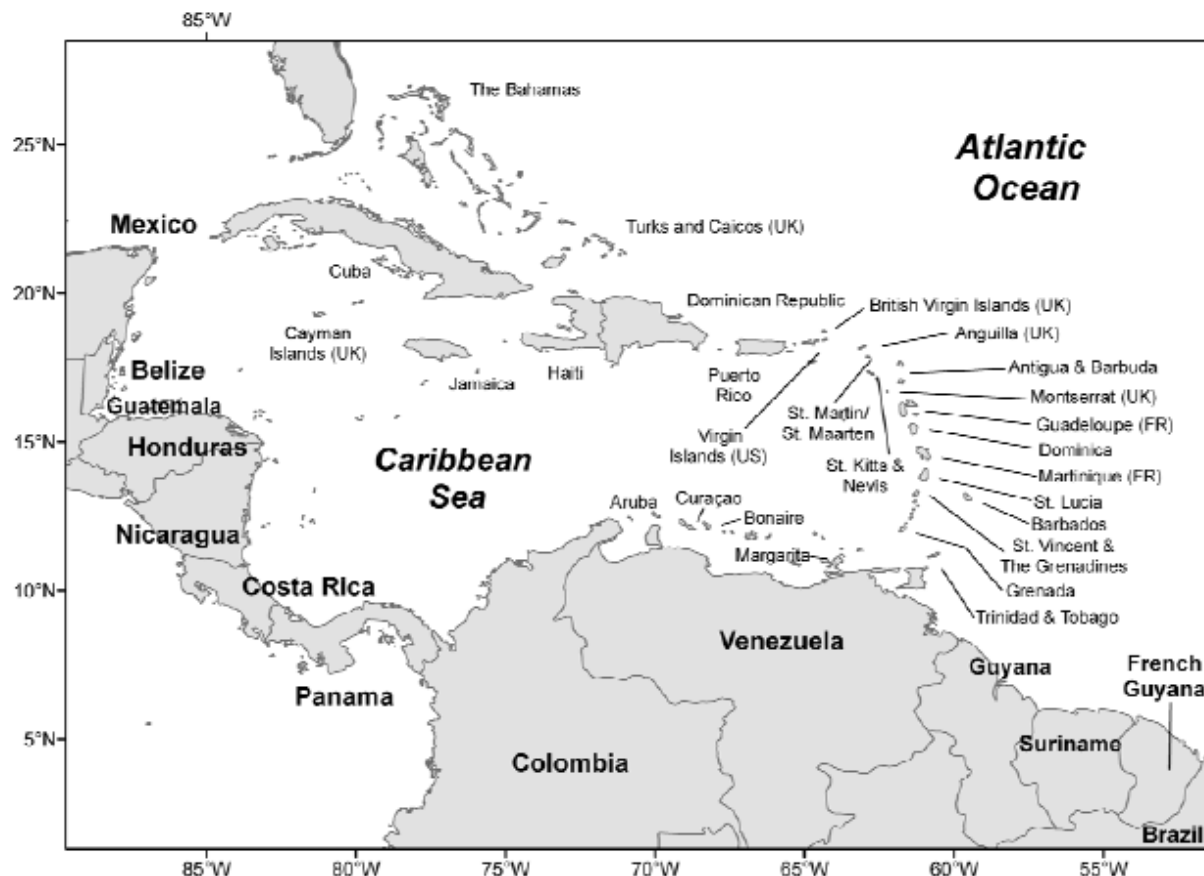


Fig. 2 Detailed map of the Caribbean Sea

Species	<i>Kogia breviceps</i> Pygmy sperm whale
Abundance Estimate	No Abundance Estimate
Fisheries	Entanglement mortality has been reported in Colombia and Puerto Rico. There was the capture of one individual taken in a coastal gillnet fishery in the Gulf of Morrosquillo, Colombia, in 1988

¹⁰¹ Northridge, S.P., and P.S. Hammond, 1999. Estimation of porpoise mortality in UK gill and tangle net fisheries in the North Sea and west of Scotland. Paper presented to the Scientific Committee of the International Whaling Commission, Grenada, May 1999. SC/51/SM42.

Worldwide Cetacean Bycatch/Appendices

Estimated Annual Mortality	No Estimate of Mortality
Species	<i>Sotalia fluviatilis</i> Tucuxi
Abundance Estimate	Cananéia estuary of Brazil 156-380 No Abundance Estimate for Any Other Region
Fisheries	Dolphins are frequently entangled in fishing gear, especially coastal gillnets, in Brazil, and their flesh is used as bait in shark fisheries. Bycatch of tucuxis has been reported in gillnets in the Gulf of Venezuela. Tucuxi are also captured in shrimp and fish traps and seine nets. Tucuxi are also incidentally captured in gillnets in French Guiana, and in a gillnet fishery in the mouth of the Sinu river, Colombia.
Estimated Annual Mortality	Dozens of tucuxis may be killed per year in Rio de Janeiro state based on strandings records collected at Atafona An estimated 938 animals were taken in drift nets from the port of Arapiranga during the summer of 1996 and a further 125 taken during the winter. ¹⁰²
Species	<i>Pseudorca crassidens</i> False killer whale.
Abundance Estimate	No Abundance Estimate
Fisheries	These whales are caught in coastal gillnets off southern and southeastern Brazil. They also interact with longline fisheries in southern Brazil.
Estimated Annual Mortality	No Estimate of Mortality
Species	<i>Orcinus orca</i> Killer whale
Abundance Estimate	No Abundance Estimate
Fisheries	A killer whale drowned in a driftnet in Trinidad waters of the Gulf of Paria. Killer whales interact with longline fisheries for swordfish, tuna and sharks off Brazil and some hooking and entanglement are known to occur.
Estimated Annual Mortality	No Estimate of Mortality
Species	<i>Globicephala macrorhynchus</i> Short-finned pilot whale.
Abundance Estimate	No Abundance Estimate
Fisheries	Pilot whales interact with longline fisheries off Brazil
Estimated Annual Mortality	No Estimate of Mortality

¹⁰² IWC (2000)Annex K: Report of the Sub-Committee on small cetaceans, IWC, Cambridge, 2000

Worldwide Cetacean Bycatch/Appendices

Species	<i>Peponocephala electra</i> Melon-headed whale	
Abundance Estimate	No Abundance Estimate	
Fisheries	A melon-headed whale that stranded at Los Roques, Venezuela had net marks on its body.	
Estimated Annual Mortality	No Estimate of Mortality	
Species	<i>Tursiops truncatus</i> Bottlenose dolphin	
Abundance Estimate	Margarita Islands off northern Venezuela	50
	Gandoca-Manzanillo Wildlife Refuge, Costa Rica	82
	Bocas del Toro, Panama	50
Fisheries	Bottlenose dolphins have been entangled in both gillnet and trawl fisheries in Honduras, Colombia, French Guiana, Trinidad, and Venezuela. There is evidence of bycatch of bottlenose dolphins in gillnets along much of the Brazilian coastline, where it is common for people to use dolphin meat as shark bait. Scientists have reported a possibly large incidental capture of small cetaceans, in the Brazilian gillnet fishery off of French Guiana that included bottlenose dolphins. ¹⁰³ A bottlenose dolphin was captured in a gillnet in a Colombian coastal fishery. Other gillnet fisheries in Mexico, for example may also be expected to impact bottlenose dolphins in this area.	
Estimated Annual Mortality	No Estimate of Mortality	
Species	<i>Grampus griseus</i> Risso's dolphin.	
Abundance Estimate	No Abundance Estimate	
Fisheries	Risso's dolphins are entangled and interact with longline fisheries in deep offshore waters of southern Brazil and with trawl and gillnet fisheries in Colombia	
Estimated Annual Mortality	No Estimate of Mortality	
Species	<i>Stenella coeruleoalba</i> Stripped dolphin.	
Abundance Estimate	No Abundance Estimate	
Fisheries	Bycatch has been reported in coastal gillnet fisheries in Brazil	
Estimated Annual Mortality	No Estimate of Mortality	

¹⁰³ Reeves, Randall R., Smith, Brian D., Crespo, Enrique A. and Notarbartolo di Sciara, Giuseppe (compilers). (2003). *Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. ix + 139pp

Worldwide Cetacean Bycatch/Appendices

Mortality

Species ***Stenella longirostris* Spinner dolphin.**
Abundance Estimate Fernando de Noronha Archipelago 700 (photo id)
Fisheries Spinner dolphins interact with driftnet fisheries off southern Brazil
Estimated Annual Mortality No Estimate of Mortality

Species ***Stenella frontalis* Atlantic spotted dolphin.**
Abundance Estimate No Abundance Estimate--considered abundant
Fisheries Spotted dolphins are incidentally captured in gillnets throughout much of its range off Brazil, Venezuela and Colombia-- particularly high bycatch occurs in coastal gillnets in southern Brazil.
Estimated Annual Mortality No Estimate of Mortality

Species ***Delphinus delphis* Common dolphin.**
Abundance Estimate No Abundance Estimate
Fisheries Common dolphins may be regularly caught in northeastern Venezuela and in coastal gillnets and driftnets in southern and southeastern Brazil
Estimated Annual Mortality No Estimate of Mortality

Species ***Sousa teuszii* Atlantic humpback dolphin**
Abundance Estimate¹⁰⁴ Dakhla Bay Considered small in size
Parc National du Banc d' Arguin in Mauritania.¹⁰⁵ Considered small in size
Saloum delta, Senegal¹⁰⁶ 100

¹⁰⁴ Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Jallow, A.O., Ndiaye, E., Samba Ould Bilal, A.O. and Bamy, I. L. 2004. Distribution, status and biology of the Atlantic humpback dolphin *Sousa teuszii* (Kükenthal, 1892). *Aquatic Mammals* 30: 56-83.

¹⁰⁵ Reeves, Randall R., Smith, Brian D., Crespo, Enrique A. and Notarbartolo di Sciara, Giuseppe (compilers). (2003). *Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. ix + 139pp

¹⁰⁶ Van Waerebeek, K., Ndiaye, E., Djiba, A., Diallo, M., Murphy, P., Jallow, A., Camara, A., Ndiaye, P., and Tous, P. 2000. A survey of the conservation status of cetaceans in Senegal, The Gambia and Guinea-Bissau. Report to UNEP/CMS Secretariat, Bonn, Germany. 80pp.

Worldwide Cetacean Bycatch/Appendices

	Canal do Geba-Bijagos ¹⁰⁷	Considered the largest stock, perhaps < a thousand animals
	South Guinea ¹⁰⁸	Unknown
	Cameroon	Unknown
	Gaboon Estuaries	Unknown
	Angola	Considered small
Fisheries	Atlantic humpback dolphins are caught in beach seines and shark nets in Senegal. Artisanal fisheries are diversifying and expanding rapidly in Dakhla Bay, southern Morocco/Western Sahara. Interactions with fisheries, possible depletion of food resources (through fisheries), competitive interactions with bottlenose dolphins, and population fragmentation may all be contributing to wipe out <i>S. teuszii</i> from Dakhla Bay and perhaps throughout southern Morocco. ¹⁰⁹	
Estimated Annual Mortality	No Estimate of Mortality In 1996, Senegal's Saloum Delta three carcasses, found together on a remote island, had rope tied around their tail stocks.	

AREA 37 MEDITERRANEAN AND BLACK SEA

Abundance estimates for the western Mediterranean basin were obtained in 1991-1992. Although dated, it is an improvement over the southern and eastern parts of the Mediterranean where abundance estimates are completely lacking. Other species known to occur in this area, but for which information on abundance estimates and fishery interactions are sparse include:

- *Pseudorca crassidens* False killer whale.
Di Natale refers to 2 false killer whales taken by longlines, in the Tyrrhenian Sea off the Calabrian coast.¹¹⁰
- *Megaptera novaeangliae* Humpback whale
There are four instances of humpback whale bycatch: (1) 1992, Gulf of Gabes, Tunisia; (2) 1993, Cavalaire, France; (3) 2004 Corfu Island, Greece; and (4) Siracusa, Sicily, Italy, (released alive).¹¹¹

¹⁰⁷ Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Drammeh, F., Jallow, A., Ndiaye, E. and Samba Ould Bilal, A.O. 2001a. Conservation efforts and field research on cetaceans in Senegal and The Gambia. Report to UNEP/CMS Secretariat, Bonn, Germany.

¹⁰⁸ Although the species' range may have been continuous historically, gaps in distribution are increasingly apparent. Ironically, although the species was discovered in the Cameroon Estuary in 1892, its presence in the northern Gulf of Guinea, a coastline of more than 2,000 km, has not been confirmed since then. Van Waerebeek, K., Barnett, L., Camara, A., Cham, A., Diallo, M., Djiba, A., Drammeh, F., Jallow, A., Ndiaye, E. and Samba Ould Bilal, A.O. 2001. Conservation efforts and field research on cetaceans in Senegal and The Gambia. Report to UNEP/CMS Secretariat, Bonn, Germany.

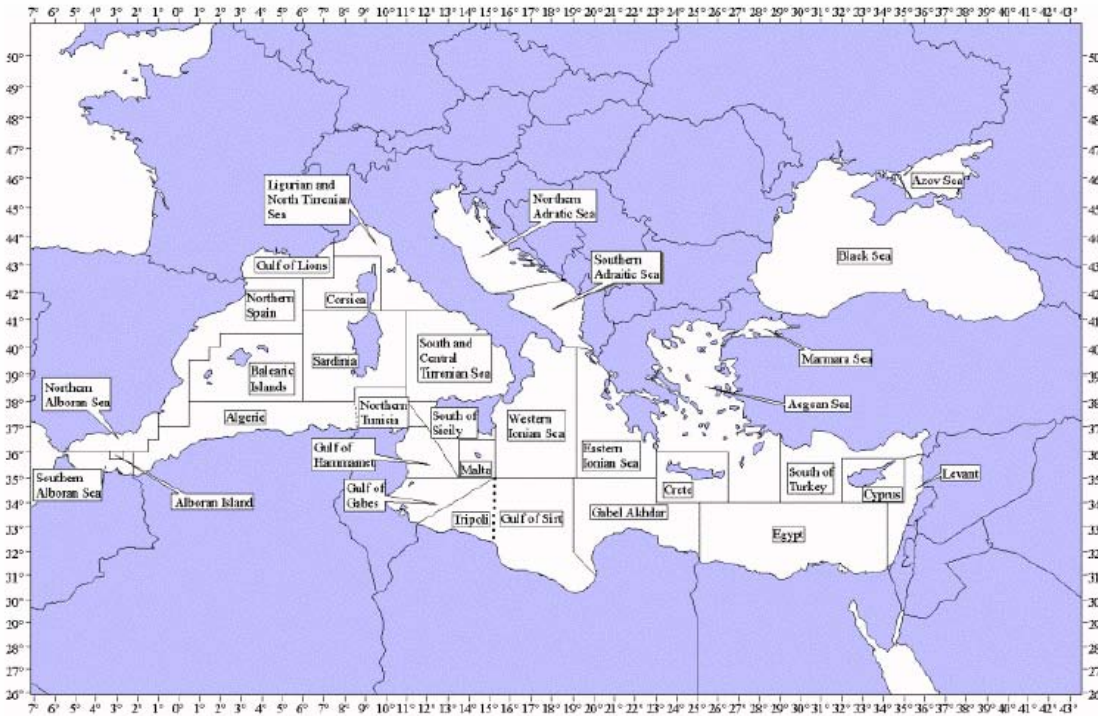
¹⁰⁹ Reeves, Randall R., Smith, Brian D., Crespo, Enrique A. and Notarbartolo di Sciara, Giuseppe (compilers). (2003). Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World's Cetaceans. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. ix + 139pp

¹¹⁰ Di Natale A., Mangano A. 1983. Killer whale, *Orcinus orca* (Linnaeus) and false killer whale, *Pseudorca crassidens* Owen, in the Italian seas. *Rapports de la Commission Internationale de la Mer Méditerranée* 28(5):181-182.

¹¹¹ Reeves R., Notarbartolo di Sciara G. 2006. The status and distribution of cetaceans in the Black Sea and Mediterranean Sea. IUCN Centre for Mediterranean Cooperation, Malaga, Spain 137pp.

Worldwide Cetacean Bycatch/Appendices

- *Steno bredanensis* Rough-toothed dolphin
There are two instances of bycatch involving rough-toothed dolphins: (1) 2002, Atlit shore, Israel, juvenile stranded after being bycaught; (2) 2003, Carmel Beach, Haifa, Israel, calf entangled in gillnet.



Species ***Globicephala melaena* Longfinned pilot whale**
 Abundance Estimate Strait of Gibraltar 260 – 270
 Fisheries Uncertain
 Estimated Annual Mortality Between 1978 and 1982, 26 pilot whales were caught in fishing and other gear in the western Mediterranean, at least 3 of them in tuna nets.¹¹² Pilot whales are caught in the swordfish driftnet fishery--7% of animals recorded by Notobartolo di Sciara were pilot whales.

Species ***Balaenoptera acutorostrata* Minke whale.**
 Abundance Estimate No Abundance Estimate
 Fisheries Minke whales are caught in driftnets.
 Estimated Annual Mortality 1978-1981 Italian seas 2 different records of incidental capture in driftnets, involving 4 whales¹¹³

¹¹² Northridge S. P. 1984. World review of interactions between marine mammals and fisheries. Fisheries Technical paper 251. Food and Agriculture Organization of the United Nations, Rome. 191 pp.

¹¹³ Di Natale A., Mangano A. 1981. Report of the progress of Project Cetacea. VI. July 1978 – October 1981. Memorie di biologia marina e di oceanografia. N. 5. Vol. 11. 49 pp.

Worldwide Cetacean Bycatch/Appendices

1998	Near Giens Peninsula, France	Standed after being caught in a net ¹¹⁴
1998	Toulon Region, France	Bycaught whale ¹¹⁵
2000	Akko, Israel	Calf found entangled in net ¹¹⁶
2002-2003	Al Hoceima, Morocco	Adult bycaught in pelagic driftnet ¹¹⁷
2004	Haifa, Israel	Calf found entangled in net ¹¹⁸

Species	<i>Ziphius cavirostris</i> Cuvier's beaked whale.
Abundance Estimate	No Abundance Estimate
Fisheries	Cuvier's beaked whales are occasionally incidentally caught in driftnets and longlines in the Mediterranean Sea.
Estimated Annual Mortality	The Spanish Mediterranean longlining fleet entangled (and released alive) only one unidentified beaked whale out of 798 sets. ¹¹⁹ In Italy, 13 whales were bycaught between 1986 and 1997. ¹²⁰

Species	<i>Physeter macrocephalus</i> Sperm whale.
Abundance Estimate	No Abundance Estimate, but likely in the hundreds of thousands and declining
Fisheries	Sperm whales are caught in the high-seas swordfish driftnet fishery.
Estimated Annual Mortality	Since the mid-1980s, entanglement in high seas swordfish driftnets has caused and continues to cause considerable mortality. ¹²¹ The number of sperm whales found dead or entangled from 1971 to 2004 in Spain,

¹¹⁴Robineau D. 2005. Cétacés de France. Fédération Française des Sociétés de Sciences Naturelles, Paris. 646 pp.

¹¹⁵Macé M., Bompar J.-M., Fabre J.-L., Bourcaud-Baralon C., Petit C. 1999. The minke whale, *Balaenoptera acutorostrata*, a new candidate for Mediterranean endemic species? European Research on Cetaceans 13:369.

¹¹⁶Scheinin A., Kerem D., Goffman O., Spanier E. 2004. Rare occurrences of cetaceans along the Israeli Mediterranean coast. FINS 1(1):19.

¹¹⁷Tudela S., Kai Kai A., Maynou F., El Andalosi M., Guglielmi P. 2004. Driftnet fishing and biodiversity conservation: the case study of the large-scale Moroccan driftnet fleet operating in the Alborán Sea (SW Mediterranean). Biological Conservation 121:65-78.

¹¹⁸Scheinin A., Kerem D., Goffman O., Spanier E. 2004. Rare occurrences of cetaceans along the Israeli Mediterranean coast. FINS 1(1):19.

¹¹⁹Valeiras J., Camiñas J. A. 2001. Captura accidental de mamíferos marinos en las pesquerías españolas de palangre de pez espada y túnidos en el Mediterráneo. II Simposium de la Sociedad Española de Cetáceos. SEC. Noviembre, Valsain, Segovia.

¹²⁰Centro Studi Cetacei. 1998. Cetacei spiaggiati lungo le coste italiane. XII. Rendiconto 1997. Atti. Soc. Ital. Sci. Nat. Museo civ. Stor. Nat. Milano, 139(II): 213-226.

¹²¹International Whaling Commission. 1994. Report of the workshop on mortality of cetaceans in passive fishing nets and traps. Rep. Int. Whal. Commn. (Spec. Iss.) 15:1-72. See also: Pace D.S., Miragliuolo A., Mussi B. 2005. Behaviour of a nursery group of entangled sperm whales (*Physeter macrocephalus*) off Capo Palinuro (Southern Tyrrhenian Sea, Italy). Abstracts, 19Th Annual Conference of the European Cetacean Society, La Rochelle, France, 2-7 April 2005:69.

France and Italy (combined) was 229.¹²²

The large majority of the strandings in Italy and Mediterranean Spain were caused by entanglement in driftnets, as evident from the presence of net fragments or characteristic marks on the whales' bodies¹²³ From 1986 to 1990, 56 sperm whales stranded due to entanglement.¹²⁴

Despite international and national regulations banning driftnets from the Mediterranean, illegal or quasi-legal driftnetting continues in the western Mediterranean (e.g., in France, Italy, and Morocco) and in the eastern basin (e.g., Greece and Turkey), continuing to threaten the species' survival in the region.

Species

***Tursiops truncatus* Bottlenose dolphin.**

Abundance Estimate¹²⁵

No Abundance Estimate—may be in the low 10,000s

Probably declining, reduced by 30% over the last 60 yrs.

Strait of Gibraltar	258 (CV 0.08) (226 – 316)
Alboran Sea (Spain)	584 (CV 0.28) (278-744)
Almeria (Spain)	279 (CV 0.28) (146–461)
Asinara Island National Park (Italy)	22 (CV 0.26) (22–27)
Balearic Islands & Catalonia (Spain)	7,654 (CV 0.47) (1,608-15,766)
Balearic Islands (Spain)	1,030 (CV 0.35) (415-1,849)
Alboran sea and Murcia	1288
Gulf of Vera (Spain)	256 (CV 0.31) (188–592)
Valencia (Spain)	1,333 (CV 0.31) (739-2,407)
Ionian Sea	48
Amvrakikos Gulf	152 (136-186)
Central Adriatic Sea (Kornati & Murtar Sea, Croatia)	14
North-eastern Adriatic Sea (Kvarneric, Croatia)	120

¹²² International Whaling Commission. 1994. Report of the workshop on mortality of cetaceans in passive fishing nets and traps. Rep. Int. Whal. Commn. (Spec. Iss.) 15:1-72. See also: Pace D.S., Miragliuolo A., Mussi B. 2005. Behaviour of a nursery group of entangled sperm whales (*Physeter macrocephalus*) off Capo Palinuro (Southern Tyrrhenian Sea, Italy). Abstracts, 19Th Annual Conference of the European Cetacean Society, La Rochelle, France, 2-7 April 2005:69.

¹²³ Lazaro F., Martin V. 1999. Sperm whales and drifting nets in the Mediterranean Sea: the example of the Balearic Islands. In: European Research on Cetaceans - 13. Proc. 13th Ann. Conf. ECS, Valencia, 20-24 April, 1999, pp. 118.

¹²⁴ Cagnolaro L., Notarbartolo di Sciara G. 1992. Research activities and conservation status of cetaceans in Italy. Boll. Mus. Ist. Biol. Genova, 56-57:53-85.

¹²⁵ Reeves R., Notarbartolo di Sciara G. 2006. The status and distribution of cetaceans in the Black Sea and Mediterranean Sea. IUCN Centre for Mediterranean Cooperation, Malaga, Spain 137pp.

Worldwide Cetacean Bycatch/Appendices

	North Adriatic Sea (Gulf of Trieste, Slovenia)	47
Fisheries	Bottlenose dolphins are incidentally caught in trammel, set gillnets, and drift gillnets	
Estimated Annual Mortality	In some Mediterranean areas the incidental mortality rates are probably unsustainable. ¹²⁶	
	Bycatch in trawl nets is relatively uncommon in most Mediterranean areas; but high mortality in bottom trawls has been reported from the coast of Israel. ¹²⁷	
	Dolphins die incidentally in purse seines and longlines, but the relative importance of mortality from these gear types on Tursiops at the basin level is probably low.	
	In 1991, 30 bottlenose dolphins were caught by artisanal gear and trawlers in the Balearic area. ¹²⁸	
Species	<i>Tursiops truncatus ponticus</i> Black Sea Bottlenose dolphin.	
Abundance Estimate ¹²⁹	No Abundance Estimate—may be in the low 10,000s	
	Probably declining, reduced by 30% over the last 60 yrs.	
	Turkish Straits System	495 (203–1,197)
	(Bosphorus, Marmara Sea and Dardanelles)	468 (184–1,186)
	Kerch Strait	76 (30–192)
		88 (31–243)
		127 (67–238)
	NW, N and NE Black Sea within Ukrainian and Russian territorial waters	4,193 (2,527–6,956)
	NE shelf area of the Black Sea	823 (329–2,057)
Fisheries	<i>T. t. ponticus</i> are captured in bottom-set gillnets for turbot (<i>Psetta maotica</i>), spiny dogfish (<i>Squalus acanthias</i>), sturgeon (<i>Acipenser</i> spp.) and sole (<i>Solea</i> spp.), purse seines for mullet (<i>Mugil</i> spp. and <i>Lisa</i> spp.) and anchovy (<i>Engraulis encrasicolus ponticus</i>), trammel nets and trap nets. Bottom-set gillnets take significant numbers, especially during the turbot fishing season between April and June.	
Estimated Annual	Although <i>T. t. ponticus</i> constituted no more than 3% of the totals in the reports from Black Sea countries during the 1990s, at present, incidental	

126 Silvani L., Raich J., Aguilar A. 1992. Bottlenose dolphins, *Tursiops truncatus*, interacting with fisheries in the Balearic Islands, Spain. *European Research on Cetaceans* 6:32–34.

127 Goffman O., Kerem D., Spanier E. 1995. Dolphin interactions with fishing-trawlers off the Mediterranean coast of Israel. Abstract. 11th Biennial Conference on the Biology of Marine Mammals, Orlando, FL. 14-18 December 1995.

128 Silvani, L., Raich, J. and Aguilar, A. 1992. Bottle-nosed dolphins, *Tursiops truncatus*, interacting with local fisheries in the Balearic Islands, Spain. *European Research on Cetaceans*: 32-33.

129 Reeves R., Notarbartolo di Sciarra G. 2006. The status and distribution of cetaceans in the Black Sea and Mediterranean Sea. IUCN Centre for Mediterranean Cooperation, Malaga, Spain 137pp.

Worldwide Cetacean Bycatch/Appendices

Mortality mortality in fishing gear is probably one of the main threats to *T. t. ponticus*.¹³⁰ At least 200-300 bottlenose dolphins were incidentally killed in Turkish fisheries each year.¹³¹ The estimated annual mortality of *T. t. ponticus* in gillnet fisheries in the Mediterranean is 110 to 455.¹³²

Species ***Grampus griseus* Risso's dolphin**

Abundance Estimate No Abundance Estimate

Fisheries Risso's dolphins are caught in longlines and gillnets in Spain and Italy.

Estimated Annual Mortality In the Mediterranean Sea, Risso's dolphins are among the cetacean species frequently entangled in fishing gear--catches in longlines (two individuals), set nets (in France) and driftnets in Italy.¹³³

Species ***Stenella coeruleoalba* Striped dolphin**

Abundance Estimate¹³⁴

Alboran Sea	14,736 (6,923 – 31,366) ¹³⁵
Western Mediterranean	117, 880 (68,379-214,800)
Corso-Ligurian basin	25,614 (15,377 – 42, 685)

No Abundance Estimate for the Eastern Mediterranean

Population trend is uncertain

Fisheries Striped dolphins are caught in the pelagic driftnet fishery

Estimated Annual Mortality Italian, Greek and Moroccan pelagic drift fishing vessels have high levels of incidental mortality.

In 1993 and 1994, the Swordfish driftnet fishery in the Eastern Gibraltar Straits captured 366 (268 – 464) and 286 (283 – 340) striped and common dolphins¹³⁶

The Spanish driftnet fishery in the Alborán Sea reportedly killed 145-183 striped dolphins per season in the early 1990s, this fishery was halted in

130 Birkun A. Jr. 2002b. Interaction between cetaceans and fisheries: Black Sea. Pp. 98-107 in: G. Notarbartolo di Sciara (Ed.), *Cetaceans of the Mediterranean and Black Seas: State of knowledge and conservation strategies*. ACCOBAMS Secretariat, Monaco, 219pp.

131 Öztürk B. (Comp.) 1999. *Black Sea Biological Diversity: Turkey*. United Nations Publ., New York. 144 pp.

132 Perrin WF, Donovan GP, and Barlow J (1994). Gillnets and Cetaceans. Report of the International Whaling Commission Special Issue 15. 629pp.

133 Notarbartolo di Sciara G. 1990. A note on the cetacean incidental catch in the Italian driftnet swordfish fishery, 1986-1988. Rep. Int. Whal. Commn 40:459.

134 Forcada J., Aguilar A., Hammond P.S., Pastor X., Aguilar R. 1994. Distribution and numbers of striped dolphins in the western Mediterranean Sea after the 1990 epizootic outbreak. Mar. Mammal Sci. 10(2):137-50.

135 Forcada, J. and Hammond, P.S. 1998. Geographical variation in abundance of striped and common dolphins of the western Mediterranean. Journal of Sea Research 39: 313-325.

136 Silvani, L., Gazo, M. and Aguilar, A. 1999. Spanish driftnet fishing and incidental catches in the western Mediterranean. Biological Conservation 90: 79 - 85

Worldwide Cetacean Bycatch/Appendices

1995.¹³⁷

Moroccan driftnet vessels kill more than 3,600 dolphins (striped and common, combined) in the Alborán Sea per year.¹³⁸

The Italian drift net (spadare) fishery is estimated to have killed thousands of striped dolphins per year through the early 1990s (1149 in 1990 and 1363 in 1991).¹³⁹ The Italian driftnet fishery in the Ligurian Sea has been banned since 1992, but illegal fishing may still contribute to striped dolphin fishery mortality in Italian waters.

In 2000, the French thonaille drift net fishery killed 326 (180-472) striped dolphins.¹⁴⁰

In 1994, the Spanish pelagic purse seine fishery off the SE Spanish Mediterranean coast had a bycatch of 300 striped dolphins.¹⁴¹

There are also reports of (but no estimates) widespread and significant striped dolphin mortality in at least pelagic purse seines, longlines, trawl, harpoon fishery and gillnets.¹⁴²

Species	<i>Delphinus delphis</i> Common dolphin.
Abundance Estimate	Alboran Sea 14,736 (6,923 – 31,366) ¹⁴³
Fisheries	Common dolphins appear to be regularly taken as bycatch in driftnets
Estimated Annual Mortality	Approximately 165 to 145 common dolphins were caught in 1993 and 1994 in the swordfish driftnet fishery representing 1.2% of the estimated population. Since then Spanish driftnetting has been banned but the Moroccan driftnetting effort increased from 200 to 400 vessels. ¹⁴⁴

¹³⁷ Silvani L., Gazo M., Aguilar A. 1999. Spanish driftnet fishing and incidental catches in the western Mediterranean. *Biol. Conserv.* 90:79-85.

¹³⁸ Tudela S., Kai Kai A., Maynou F., El Andalossi M., Guglielmi P. 2005. Driftnet fishing and biodiversity conservation: the case study of the large-scale Moroccan driftnet fleet operating in the Alboran Sea (SW Mediterranean). *Biol. Conserv.* 121:65-78.

¹³⁹ Di Natale A. 1995. Driftnets impact on protected species: observers data from the Italian fleet and proposal for a model to assess the number of cetaceans in the by-catch. *Col. Vol. Sci. Pap. ICCAT* 44(1):255-263. See also: Di Natale A., Notarbartolo di Sciarra G. 1994. A review of the passive fishing nets and trap fisheries in the Mediterranean Sea and of the cetacean bycatch. *Rep. int. Whal. Commn (Special Issue)* 15:189-202.

¹⁴⁰ Imbert, G., Gaertner, J.-C. and Laubier, L. 2001b. Prevention a l'aide de repulsifs acoustiques des captures de dauphins par les thonailles. 10e Conference International sur les cetaces Mediterranee de la RIMMO. Juan-les Pins 16-18 nov. 2001 (Abstract)

¹⁴¹ Silvani, L., Gazo, M. and Aguilar, A. 1999. Spanish driftnet fishing and incidental catches in the western Mediterranean. *Biological Conservation* 90: 79 - 85

¹⁴² Di Natale A. 1995. Driftnets impact on protected species: observers data from the Italian fleet and proposal for a model to assess the number of cetaceans in the by-catch. *Col. Vol. Sci. Pap. ICCAT* 44(1):255-263. See also: Di Natale A., Notarbartolo di Sciarra G. 1994. A review of the passive fishing nets and trap fisheries in the Mediterranean Sea and of the cetacean bycatch. *Rep. int. Whal. Commn (Special Issue)* 15:189-202.

¹⁴³ Forcada, J. and Hammond, P.S. 1998. Geographical variation in abundance of striped and common dolphins of the western Mediterranean. *Journal of Sea Research* 39: 313-325.

¹⁴⁴ Di Natale A. 1995. Driftnets impact on protected species: observers data from the Italian fleet and proposal for a model to assess the number of cetaceans in the by-catch. *Col. Vol. Sci. Pap. ICCAT* 44(1):255-263. See also: Di Natale

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No other estimate of mortality exist for other parts of the Mediterranean

Species	<i>Phocoena phocoena</i> Harbor porpoise
Abundance Estimate ¹⁴⁵	No Total Abundance Estimate—at least several thousands maybe 10,000-12,000 Probably declining
	Azov Sea in total 2,922 (1,333–6,403)
	Kerch Strait 54 (12–245)
	NW, N and NE Black Sea within Ukrainian and Russian territorial waters 1,215 (492–3,002)
	SE Black Sea within Georgian territorial waters 3,565 (2,071–6,137)
	Central Black Sea beyond territorial waters of Ukraine and Turkey 8,240 (1,714–39,605)
Fisheries	Almost all (>99%) of the porpoises are caught in bottom-set gillnets for turbot (<i>Psetta maotica</i>), spiny dogfish (<i>Squalus acanthias</i>) and sturgeon (<i>Acipenser</i> spp.). The peak occurs from April–June during the turbot season in the Azov Sea and Kerch Strait and throughout the shelf area of the Black Sea.
Estimated Annual Mortality	At present, incidental mortality in fishing nets is the most serious threat to harbor porpoise, with the majority (95%) of recorded cetacean entanglements being porpoises. Mortality estimates are not available; however, available data indicate that the annual level of harbor porpoise bycatch may be in the thousands. ¹⁴⁶

A., Notarbartolo di Sciara G. 1994. A review of the passive fishing nets and trap fisheries in the Mediterranean Sea and of the cetacean bycatch. Rep. int. Whal. Commn (Special Issue) 15:189-202.

¹⁴⁵Birkun A. Jr., Glazov D., Krivokhizhin S., Mukhametov L. 2002. Distribution and abundance of cetaceans in the Sea of Azov and Kerch Strait: Results of aerial survey (July 2001). P.73 in: Abstr. 16th Annual Conf. of the European Cetacean Society (Liege, 7-11 April 2002). See also: Birkun A., Jr., Glazov D., Krivokhizhin S., Nazarenko E., Mukhametov L. 2003. Species composition and abundance estimates of cetaceans in the Kerch Strait and adjacent areas of the Black and Azov Seas: The second series of aerial surveys (August 2002). Pp.271-272 in: Abstr. 17th Annual Conf. of the European Cetacean Society (Las Palmas de Gran Canaria, 9-13 March 2003).

¹⁴⁶ Commercial hunting of Black Sea cetaceans, including harbour porpoises, was banned in 1966 in the former USSR (present Georgia, Russia and Ukraine), Bulgaria and Romania, and in 1983 in Turkey. The riparian states assumed international obligations to protect Black Sea cetaceans as contracting parties of the Convention on Biological Diversity (CBD), Convention on the Conservation of Migratory Species of Wild Animals (CMS), Convention on the Conservation of European Wildlife and Natural Habitats (Berne Convention), Convention on the Protection of the Black Sea Against Pollution (Bucharest Convention), Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES, Appendix II), and the Agreement on the Conservation of Cetaceans in the Black Sea, Mediterranean Sea and Contiguous Atlantic Area (ACCOBAMS). The harbor porpoise, *P. phocoena*, is mentioned in Annex II of the EC Directive No.92/43/EEC on the conservation of natural habitats of wild fauna and flora. In 1996, the Ministers of Environment of Black Sea countries adopted cetacean conservation and research measures within the framework of the Strategic Action Plan for the Rehabilitation and Protection of the Black Sea (paragraph 62). The harbor porpoise is included as Data Deficient in the regional Black Sea Red Data Book (1999). However, in 2002 it was listed as Endangered in the Provisional List of Species of the Black Sea Importance, an annex to the Black Sea Biodiversity and Landscape Conservation Protocol of the Bucharest Convention.

AREA 41 SOUTHWEST ATLANTIC

In the southwest Atlantic, the problem of marine mammal bycatch has not been addressed by fisheries management authorities. A complicating factor in some countries is that cetaceans taken incidentally are frequently used for human food, oil, and bait and in fact the distinction between incidental and direct catch has been blurred. In many of these nations (especially Brazil), information is still almost entirely lacking on the scale and species composition of the bycatches, fishery characteristics, and fleet dynamics.

Species	<i>Sotalia fluviatilis</i> Tucuxi	
Abundance Estimate	Cananéia estuary of Brazil	156-380
	No Abundance Estimate For Any Other Region	
Fisheries	Tucuxi are reported to become entangled in beach seines and, more frequently, in set gillnets and driftnets throughout their range. These dolphins are frequently entangled in fishing gear, especially coastal gillnets, in Brazil, and their flesh is used as bait in shark fisheries. Bycatch of tucuxis has been reported in gillnets in the Gulf of Venezuela. Tucuxi are captured in shrimp and fish traps and seine nets. Tucuxi are also incidentally captured in gillnets in French Guiana, and in a gillnet fishery in the mouth of the Sinu river, Colombia.	
Estimated Annual Mortality	Dozens of tucuxis may be killed per year in Rio de Janeiro state based on strandings records collected at Atafona	
	An estimated 938 animals were caught in drift nets from the port of Arapiranga during the summer of 1996 and an additional 125 caught during the winter. ¹⁴⁷ In 1999, the IWC estimated 141 tucuxis were incidentally caught in fisheries. ¹⁴⁸	

Species	<i>Globicephala melas</i> Long finned pilot whale	
Abundance Estimate	No Abundance Estimate	
Fisheries	Pilot whales are entangled in longline, driftnet fisheries, and purse seines	
Estimated Annual Mortality	The pelagic shark driftnet fishery off southern Brazil incidentally caught 15 long-finned pilot whales in 1995 and 1997. ¹⁴⁹	
	Between 1980 and 1985, 6 pilot whales were entangled taken on longlines in Brazilian waters. ¹⁵⁰	

Species	<i>Lagenorhynchus obscurus</i> Dusky dolphin.
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¹⁴⁷ IWC (2000) Annex K: Report of the Sub-Committee on small cetaceans, IWC, Cambridge, 2000

¹⁴⁸ IWC (2003) Annex K: Report of the Sub-Committee on small cetaceans, IWC, Cambridge, 2003

¹⁴⁹ Zerbini, A.N. and Kotas, J.E. 1998. A note on cetacean bycatch in pelagic driftnetting off southern Brazil. *Report of the International Whaling Commission* 48, 519–524.

¹⁵⁰ Zerbini, A.N. and Kotas, J.E. 1998. A note on cetacean bycatch in pelagic driftnetting off southern Brazil. *Report of the International Whaling Commission* 48, 519–524.

Worldwide Cetacean Bycatch/Appendices

Abundance Estimate	Patagonian coast ¹⁵¹	7,252
	Punta Ninfas and Cabo Blanco, Argentina	6,628
Fisheries	Dusky dolphins are entangled in mid-water trawls for shrimp, squid, and hake, driftnet fisheries, longline fisheries, and purse seines	
Estimated Annual Mortality	Mid-water trawls for shrimp, squid, and hake off the Patagonian coast incidentally caught between 442-560 dusky dolphin in 1984. From 1992 to 1994, 70 to 200 dusky dolphins were incidentally killed in Patagonian trawl fisheries--the number decreased to 36 in 1994. ¹⁵² The catch was 70% mature or pregnant females and in the mid-1980s the bycatch represented 8% of the present population estimate. ¹⁵³	
	Dusky dolphins are caught in a purse seine fishery off the Argentine coast near Necochea; 50–100 dusky and common dolphins per year may be killed. An unknown number also becomes entangled in a similar purse seine fishery at Mar del Plata. ¹⁵⁴	
Species	Lagenorhynchus australis Peale's dolphin	
Abundance Estimate	No Abundance Estimate	
Fisheries	Peale's dolphins are caught in mid-water trawls and coastal gillnets	
Estimated Annual Mortality	Peale's dolphins have been caught in set nets in Tierra del Fuego, but the overall numbers involved are unknown. ¹⁵⁵	
	Peale's dolphins have been harpooned for crab bait in Argentina.	
Species	Delphinus delphis Common dolphin.	
Abundance Estimate	No Abundance Estimate	
Fisheries	Common dolphins are caught in mid-water trawls, coastal gillnets, and purse seines	
Estimated Annual Mortality	Common dolphins are caught with dusky dolphins, at a combined rate of about 50–100 a year in a purse seine fishery off Necochea, Argentina and in mid-water trawls on the Patagonia shelf. ¹⁵⁶	

¹⁵¹ Dans SL, Crespo EA, Garcia NA, Reyes LM, Pedraza SN, Alonso MK (1997) Incidental mortality of patagonian dusky dolphins in mid-water trawling: Retrospective effects from the early 1980s. *Report of the International Whaling Commission* 47, 699–703.

¹⁵² Crespo EA., Pedraza SN, Dans SL, Alonso MK, Reyes LM., García NA, Coscarella M, and Schiavini ACM. (1997) Direct and Indirect Effects of the Highseas Fisheries on the Marine Mammal Populations in the Northern and Central Patagonian Coast. *J. Northw. Atl. Fish. Sci.*, Vol. 22: 189–207

¹⁵³ Dans SL, Crespo EA, Garcia NA, Reyes LM, Pedraza SN, Alonso MK (1997) Incidental mortality of patagonian dusky dolphins in mid-water trawling: Retrospective effects from the early 1980s. *Report of the International Whaling Commission* 47, 699–703

¹⁵⁴ Crespo, E.A., Corcuera, J.F., and López Cazorla, A. 1994. Interactions between marine mammals and fisheries in some fishing areas of Argentina. *Report of the International Whaling Commission* (Special Issue) 15, 269–281.

¹⁵⁵ Crespo, E.A., Corcuera, J.F., and López Cazorla, A. 1994. Interactions between marine mammals and fisheries in some fishing areas of Argentina. *Report of the International Whaling Commission* (Special Issue) 15, 269–281.

¹⁵⁶ Id.

Species	<i>Cephalorhynchus commersonii</i> Commerson's dolphin
Abundance Estimate	Recent aerial surveys suggest that there are approximately 21,000 Commerson's dolphins along the entire coast, with 7,000 between 42-48°S and 14,000 in Tierra del Fuego. ¹⁵⁷
Fisheries	Commerson's dolphins are caught in mid-water trawls (in Chubut, Tierra del Fuego and Peninsula Valdez) and coastal gillnets.
Estimated Annual Mortality	Total bycatch estimates are not available, but 5-30 Commerson's dolphins die each year in nets set perpendicular to shore in eastern Tierra del Fuego; this fishery type also captures dolphins in the Argentinean provinces north of Tierra del Fuego and in the eastern strait of Megellan. ¹⁵⁸ From 1992 to 1994, the average annual mortality of Commerson's dolphins in mid-water trawls was 25-170 animals. ¹⁵⁹ In the 1999/2000, fishing season in the region of La Angelina and Ria Gallegos, Argentinean artisanal setnet fisheries killed 179 (141 – 212). ¹⁶⁰ Commerson's dolphins are also used as crab bait.

Species	<i>Phocoena spinipinnis</i> Burmeister's porpoise
Abundance Estimate	No Abundance Estimate
Fisheries	Burmeister's porpoise are caught in coastal or shark gill net fisheries
Estimated Annual Mortality	Total bycatch estimates are not available, but about 10–15 Burmeister's porpoises are reported killed annually in shark nets set at around 50m off Necochea. Some are also killed in set nets in Tierra del Fuego, and in coastal gillnets around Buenos Aires. In Uruguay, eight Burmeister's porpoises were drowned in shark gillnets since 1974. ¹⁶¹

¹⁵⁷The South American form of Commerson's dolphin is endemic to Patagonia in waters between 42°S and 55°S; its actual distribution is restricted to particular areas within that range. Pedraza, S.N., A.C.M. Schiavini, E.A. Crespo, S.L. Dans, and M.A. Coscarella. In review. Abundance of Commerson's dolphins (*Cephalorhynchus commersonii*) in the coasts of Patagonia (Argentina). *Journal of Cetacean Research and Management*.

¹⁵⁸ Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages. Crespo EA., Pedraza SN, Dans SL, Alonso MK, Reyes LM., García NA, Coscarella M, and Schiavini ACM. (1997) Direct and Indirect Effects of the Highseas Fisheries on the Marine Mammal Populations in the Northern and Central Patagonian Coast. *J. Northw. Atl. Fish. Sci.*, Vol. 22: 189–207

¹⁵⁹ Crespo EA., Pedraza SN, Dans SL, Alonso MK, Reyes LM., García NA, Coscarella M, and Schiavini ACM. (1997) Direct and Indirect Effects of the Highseas Fisheries on the Marine Mammal Populations in the Northern and Central Patagonian Coast. *J. Northw. Atl. Fish. Sci.*, Vol. 22: 189–207 See also: Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages.

¹⁶⁰ Iniguez MA, Hevia M, Gasparrou C, Tomsin AL and Secchi ER. (2003) Preliminary estimate of incidental mortality of Commerson's dolphin (*Cephalorhynchus commersonii*) in an artisanal setnet fishery in La Angelina beach and Ria Gallego, Santa Cruz, Argentina. *LAJAM* 2(2) 87-94. See also: Annex H, Small Cetacean Subcommittee (2004)

¹⁶¹ Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages. Crespo EA., Pedraza SN, Dans SL, Alonso MK, Reyes LM., García NA, Coscarella M, and Schiavini ACM. (1997) Direct and Indirect Effects of the Highseas Fisheries on the Marine Mammal Populations in the Northern and Central Patagonian Coast. *J. Northw. Atl. Fish. Sci.*, Vol. 22: 189–207

Species	<i>Australophocoena dioptrica</i> Spectacled porpoise.		
Abundance Estimate	No Abundance Estimate		
Fisheries	Spectacled porpoise are caught in coastal or shark gill net fisheries		
Estimated Annual Mortality	Total bycatch estimates are not available, but at least 34 animals were incidentally killed between 1975 and 1990 in coastal gill nets set in Tierra del Fuego. ¹⁶² There is also mortality in bottom and mid-water trawls off the coast of Chubut, Argentina.		
Species	<i>Inia geoffrensis</i> Boto		
Abundance Estimate	No Abundance Estimate		
Fisheries	Lampara seine nets and gillnets are most frequently responsible for incidental captures of Boto.		
Estimated Annual Mortality	Total bycatch estimates are not available or known, but are thought to have increased with increased fishing effort.		
Species	<i>Pontoporia blainvillei</i> Franciscana.		
Abundance Estimate ¹⁶³	FMA I	No Abundance Estimate	Total annual bycatch = 110
	FMA II	No Abundance Estimate	Total annual bycatch = 375
	FMA III	42,078 (33,047 – 53,542) ¹⁶⁴	Total annual bycatch = 1374 (694-2215)
	FMA IV	34,131 (16,360-74,397)	Total annual bycatch = 651 (398-1097)
Fisheries	The franciscana is caught in fairly large numbers in gillnets set for sharks along most of its coastal range.		
Estimated Annual Mortality	Between 2.1 – 10.8 % of the population is removed each year by the fishery. The total estimated mortality throughout the range could be in the order of 1,500-2,000 animals per year. Most bycaught animals are juveniles with an average age of one year and 64% of the individuals		

¹⁶² Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages. Crespo EA., Pedraza SN, Dans SL, Alonso MK, Reyes LM., García NA, Coscarella M, and Schiavini ACM. (1997) Direct and Indirect Effects of the Highseas Fisheries on the Marine Mammal Populations in the Northern and Central Patagonian Coast. J. Northw. Atl. Fish. Sci., Vol. 22: 189–207

¹⁶³ The IWC has divided, for management purposes, franciscana population into four Franciscana Management Units (FMUs) according to ecological, morphological, and genetic information. At least three populations have been differentiated genetically (FMU 1, 2, and 3-4). Levels of bycatch mortality are generally high throughout the franciscana's range. Removal rates, estimated by dividing the mean bycatch by the mean abundance, have ranged from 1.6% for FMU 4 to 3.3% for FMU 3. Secchi, E. R., Danilewicz, D. and Ott P. H. 2004. Applying the phylogeographic concept to identify franciscanas dolphin stocks: implications to meet management objectives. Journal of Cetacean Research and Management 5:61-68.

¹⁶⁴ Secchi, E.R., Ott, P.H., Crespo, E.A., Kinas, P.G., Pedraza, S.N., and Bordino, P. 2001. A first estimate of franciscana (*Pontoporia blainvillei*) abundance off southern Brazil. *Journal of Cetacean Research and Management* 3, 95–100.

were under three years.¹⁶⁵

Uruguay gillnet fisheries incidentally killed 235 franciscana in 1992-93 and 28 in 1998.¹⁶⁶

In Rio Grande do Sul and Buenos Aires fisheries, an estimated 700 and 500¹⁶⁷ franciscana are captured each year.¹⁶⁸ Incidental mortality of franciscana in coastal gillnet fisheries in northern Buenos Aires, Argentina from September to April, during a four-year period from 2000 – 2004 was 312 dolphins—seventy-one percent of these bycaught franciscanas were female and most (56%) were immature.¹⁶⁹

In 2000, Brazilian fisheries killed 1496 franciscana.¹⁷⁰

In a small-scale survey of fishers operating from the post of Rio Grande, logbook data obtained from 9 – 10% of the fleet, estimated the total number of dolphins taken as bycatch by the entire fleet to be 946 dolphins (CI 467 – 1525) in 1999 and 719 (CI 248 – 1413) in 2000. This data was further extrapolated to all of the fishing area, giving a total estimated bycatch of 1106 (578 – 1915) in 1999 and 992 (475 – 1832) in 2000.¹⁷¹

¹⁶⁵ Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages

¹⁶⁶ The reason for the decline is a decline in fish stocks and the fisheries that use nets with larger mesh (32-34 and 20-22 mm) have reduced their effort and nets with small mesh are being used instead. Also Uruguayan legislation protecting franciscana (Law 9481 and Decrees 26, 1/78, 586/79 and 565/81 are being enforced.

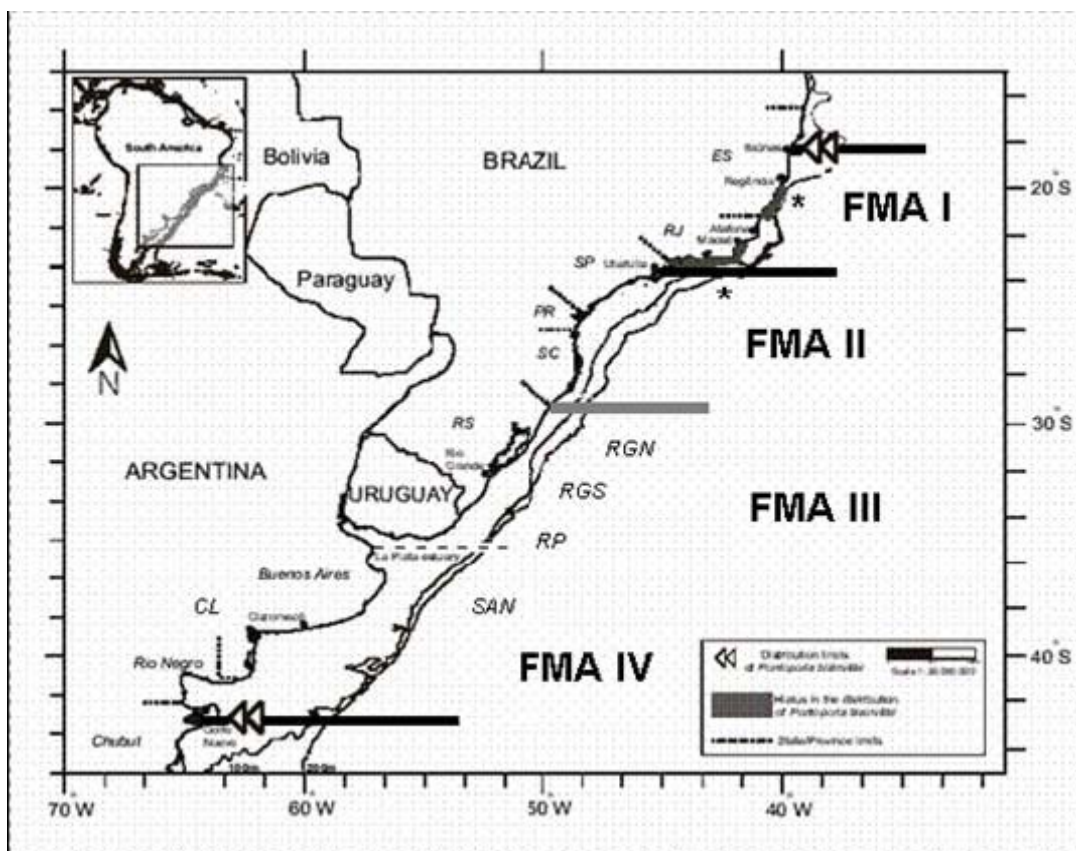
¹⁶⁷ From 2000 to 2003 Argentinean fisheries killed between 160 to 893 animals annually.

¹⁶⁸ Crespo EA (2002) Franciscana—*Potoporia blainvillei* In: Encyclopedia of marine mammals (Perrin WF, Wursig B, Thewissen JGM eds) Academic Press, San Diego, pp482-487

¹⁶⁹ Annex H, Small Cetacean Subcommittee (2004)

¹⁷⁰ Annex H, Small Cetacean Subcommittee (2004) Figures composed as follows: >850 (55) Caught in Southern Brazil – Gillnet. (It is only a rough estimate based on extrapolation. For the whole fleet. Data from only nine boats from a fleet of about 140-150) + 646 (48) from Rio Grande, southern Rio Grande do Sul.

¹⁷¹ Annex H, Small Cetacean Subcommittee (2004)

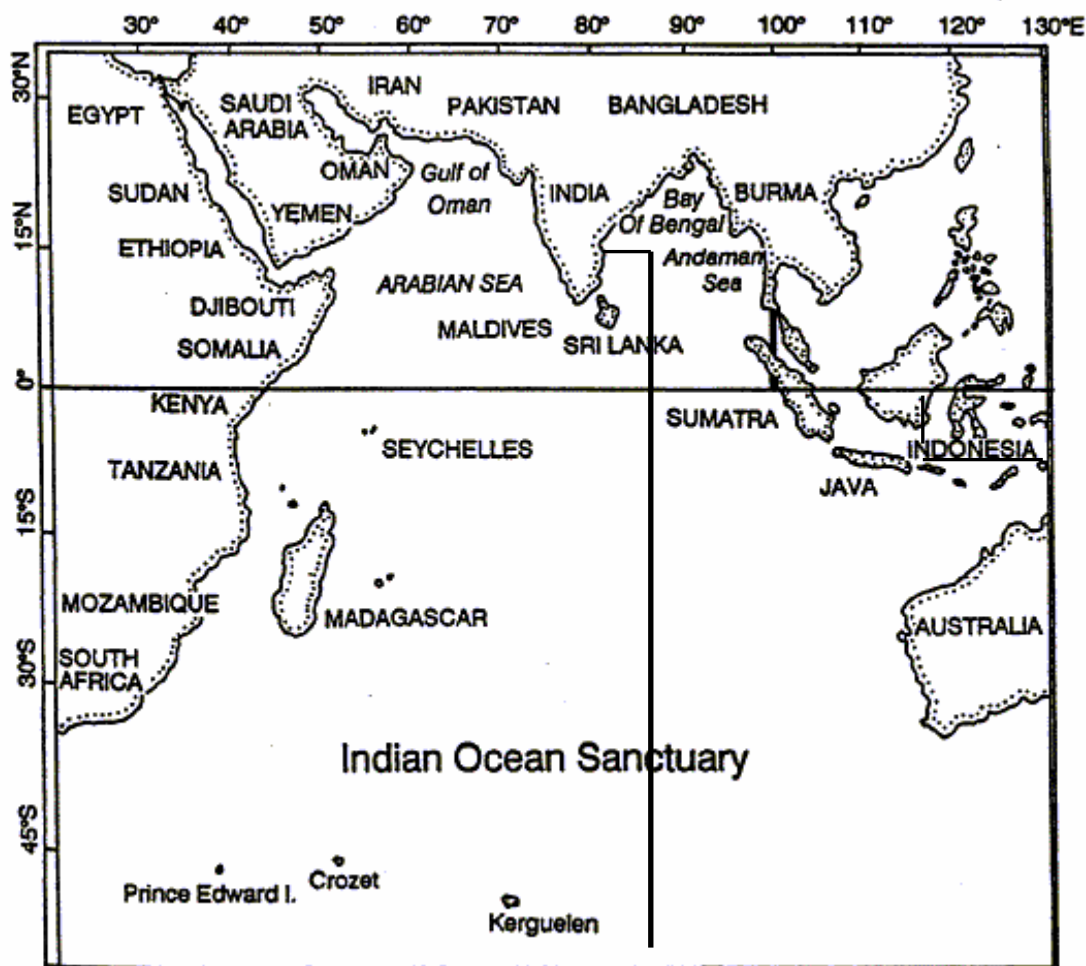


AREA 47 SOUTHEAST ATLANTIC

Species	<i>Cephalorhynchus heavisidii</i> Heaviside's dolphin
Abundance Estimate	No Abundance Estimate
Fisheries	Heaviside's dolphins are entangled in inshore gillnets off South Africa and Namibia. There are unconfirmed reports of animals taken in bottom trawl fisheries and beach seine nets
Estimated Annual Mortality	The estimated total kills of dolphins in 7,013 sets of Namibia in 1983 were 67 (<i>C. heavisidii</i> and <i>Lagenorhynchus obscurus</i> combined); whereas 57 were killed in South Africa. Other sources of incidental mortality were set nets close to the shore of Namibia, and a bottom trawl fishery. ¹⁷²

¹⁷² Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages.

AREA 51 WESTERN INDIAN OCEAN



Species	<i>Kogia breviceps</i> Pygmy sperm whale.
Abundance Estimate	No Abundance Estimate
Fisheries	Pygmy sperm whales are caught in Sri Lankan coastal gillnet and driftnet fisheries
Estimated Annual Mortality	Pygmy sperm whales are one of the major cetacean species caught in the Sri Lankan driftnet fisheries. Up to 6% of the landed catch consists of pygmy sperm whales, the total annual catch for all cetaceans has been estimated at 15,000 to 25,000, and therefore, total annual catches may reach 2,700 animals. ¹⁷³ Population impact of this catch is unknown. The IWC, in 1994, estimated that more than 80 pygmy sperm whales are

¹⁷³ Dayaratne, P. and de Silva J 1990. Drift gillnet fishery in Sri Lanka. Document TWS/90/19 presented at the Expert Consultation on Stock Assessment of Tuna in the Indian Ocean. Bangkok. 2-6 July 1990 8pp.

¹⁷⁴ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

Worldwide Cetacean Bycatch/Appendices

killed each year off the coast of Sri Lanka.¹⁷⁴

Species	<i>Kogia simus</i> Dwarf sperm whale.
Abundance Estimate	No Abundance Estimate
Fisheries	Dwarf sperm whales are caught in Sri Lankan coastal gillnet and driftnet fisheries
Estimated Annual Mortality	Dwarf sperm whales may represent up to 6% of the cetacean bycatch in the Sri Lankan driftnet fisheries. Therefore, total annual catches may reach 2,700 animals. ¹⁷⁵ The IWC, in 1994, estimated that more than 230 dwarf sperm whales are killed each year off the coast of Sri Lanka. ¹⁷⁶

Species	<i>Steno bredanensis</i> Rough-toothed dolphin
Abundance Estimate	No Abundance Estimate
Fisheries	Rough-toothed dolphins are caught in Sri Lankan coastal gillnet fisheries
Estimated Annual Mortality	This dolphin is taken in the Sri Lankan driftnet fishery in small numbers only, (5 recorded in total) with a maximum of only 2% in one sample, suggesting a catch of perhaps a few hundreds per year. ¹⁷⁷ The IWC, in 1994, estimated that more than 50 rough-toothed dolphins are killed each year off the coast of Sri Lanka. ¹⁷⁸

Species	<i>Sousa plumbea/chinensis</i> Indian humpback dolphin.
Abundance Estimate	No Total Abundance Estimate
	Plettenberg Bay, South Africa 25 ¹⁷⁹
	Natal coast 200 ¹⁸⁰
	Zanzibar (Tanzania), East Africa 71 (48-94) ¹⁸¹

¹⁷⁵ Dayaratne, P. and de Silva J 1990. Drift gillnet fishery in Sri Lanka. Document TWS/90/19 presented at the Expert Consultation on Stock Assessment of Tuna in the Indian Ocean. Bangkok. 2-6 July 1990 8pp.

¹⁷⁶ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

¹⁷⁷ Dayaratne, P. and de Silva J 1990. Drift gillnet fishery in Sri Lanka. Document TWS/90/19 presented at the Expert Consultation on Stock Assessment of Tuna in the Indian Ocean. Bangkok. 2-6 July 1990 8pp.

¹⁷⁸ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

¹⁷⁹ Ross GJB, Heinsohn GE, Cockroft VG 1994. Humpback dolphins-*Sousa chinensis* (Osbeck, 1765), *Sousa plumbea* (G. Cuvier, 1829) and *Sousa teuszii* (Kukenthal, 1892). In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 5: The first book of dolphins. Academic Press, London, pp 23-42.

¹⁸⁰ Ross GJB, Heinsohn GE, Cockroft VG 1994. Humpback dolphins-*Sousa chinensis* (Osbeck, 1765), *Sousa plumbea* (G. Cuvier, 1829) and *Sousa teuszii* (Kukenthal, 1892). In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 5: The first book of dolphins. Academic Press, London, pp 23-42.

¹⁸¹ Stensland, E. 2004. Behavioural ecology of Indo-Pacific bottlenose and humpback dolphins. Doctoral thesis, Stockholm University, Department of Zoology. ISBN: 91-7265-837-X.

Worldwide Cetacean Bycatch/Appendices

	South Eastern Cape coast of South Africa	466 ¹⁸²
	Bazaruto Archipelago, Mozambique	60 ¹⁸³
	Indus Delta	500 ¹⁸⁴
Fisheries	Indian humpback dolphins are caught in Sri Lankan coastal gillnet and driftnet fisheries, shark nets in Natal, Indian ocean coastal gillnets, and gillnets in offshore waters of Pakistan.	
Estimated Annual Mortality	Entanglements in gillnets have been reported from Djibouti, the Arabian Gulf, Indus delta and the south-west coast of India. This species also becomes entangled in Indian shark and catfish gillnet fisheries along the east coast of India.	
	Between 1980 and 1988, 67 humpback dolphins died in shark nets to protect bathing beaches along the Natal coast, South Africa—or about 7-8 animals per year. ¹⁸⁵	
	2.2 animals per year are captured in the Calicut gillnet fishery. Humpback dolphins are commonly entangled in coastal driftnet fisheries for seerfish and tunas on the Indian west coast, and in set nets and driftnets.	
	The IWC, in 1994, estimated that more than 100 hump-back dolphins died each year in fisheries off the Sri Lankan coast ¹⁸⁶ and more than 7.5 hump-back dolphins died annually in fisheries off the Indian Ocean coast of Africa. ¹⁸⁷	
Species	<i>Peponocephala electra</i> Melon-headed whale.	
Abundance Estimate	No Abundance Estimate	
Fisheries	Melon-headed whales are caught in Sri Lankan coastal gillnet and driftnet fisheries	
Estimated Annual Mortality	Three melon-headed whales were caught in the Sri Lankan driftnet fishery ¹⁸⁸ The IWC, in 1994, estimated that less than 10 melon-headed whales were caught annually in fisheries in the northern Indian Ocean. ¹⁸⁹	

182 Karczmarski, L., Winter, P.E.D., Cockcroft, V.G., and McLachlan, A. 1999. Population analyses of Indo-Pacific humpback dolphins *Sousa chinensis* in Algoa Bay, Eastern Cape, South Africa. *Marine Mammal Science* 15, 1115–1123.

183 Ross GJB, Heinsohn GE, Cockcroft VG 1994. Humpback dolphins-*Sousa chinensis* (Osbeck, 1765), *Sousa plumbea* (G. Cuvier, 1829) and *Sousa teuszii* (Kukenthal, 1892). In: *Handbook of Marine Mammals* (Ridgway SH, Harrison SR, eds.) Vol. 5: The first book of dolphins. Academic Press, London, pp 23-42.

184 Ross GJB, Heinsohn GE, Cockcroft VG 1994. Humpback dolphins-*Sousa chinensis* (Osbeck, 1765), *Sousa plumbea* (G. Cuvier, 1829) and *Sousa teuszii* (Kukenthal, 1892). In: *Handbook of Marine Mammals* (Ridgway SH, Harrison SR, eds.) Vol. 5: The first book of dolphins. Academic Press, London, pp 23-42.

185 Jefferson, T.A. and Karczmarski, L. 2001. *Sousa chinensis*. *Mammalian Species* (American Society of Mammalogists) 655, 9pp. See also. Cockcroft, V.G. 1990. Dolphin catches in the Natal shark nets, 1980 to 1988. *South African Journal of Wildlife Research* 20(2), 44–51.

186 Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

187 Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

188 Leatherwood, S. and Reeves, R.R. (eds.). 1989. *Marine mammal research and conservation in Sri Lanka 1985–1986*. UNEP Marine Mammal Technical Report 1, Nairobi, Kenya.

189 Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

Species	<i>Feresa attenuata</i> Pygmy killer whale.
Abundance Estimate	No Abundance Estimate
Fisheries	Pygmy killer whales are caught in Sri Lankan coastal gillnet and driftnet fisheries
Estimated Annual Mortality	Although they comprise less than 2% of all cetaceans caught in gillnet fisheries in Trincomalee, Sri Lanka and in villages on the southwest coast of Sri Lanka, fishery mortality may be 300-900 animals annually. ¹⁹⁰ The IWC, in 1994, estimated that less than 170 pygmy killer whales were killed annually in fisheries off the coast of Sri Lanka. ¹⁹¹

Species	<i>Pseudorca crassidens</i> False killer whale.
Abundance Estimate	No Abundance Estimate
Fisheries	False killer whales are caught in Sri Lankan coastal gillnet and driftnet fisheries, shark nets in Natal, and Indian ocean coastal gillnets
Estimated Annual Mortality	Between 1980 and 1988, 1 false killer whale died in shark nets to protect bathing beaches along the Natal coast, South Africa. ¹⁹² Catches in the Sri Lankan fishery included false killer whales representing up to 6% of one sample. ¹⁹³ The IWC, in 1994, estimated that more than 125 false killer whales were killed annually in fisheries off the coast of Sri Lanka. ¹⁹⁴

Species	<i>Lagenodelphis hosei</i> Fraser's dolphin
Abundance Estimate	No Abundance Estimate
Fisheries	Fraser's dolphins are caught in Sri Lankan coastal gillnet and driftnet fisheries, shark nets in Natal, and Indian ocean coastal gillnets
Estimated Annual Mortality	Between 1980 and 1988, 2 Fraser's dolphins died in shark nets to protect bathing beaches along the Natal coast, South Africa. ¹⁹⁵

190 Ross GJB, Leatherwood S 1994. Pygmy killer whale—*Feresa attenuata*. In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds) Vol. 5: The first book of dolphins. Academic Press, London, pp 387-404.

191 Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

192 Cockcroft, V.G. 1990. Dolphin catches in the Natal shark nets, 1980 to 1988. South African Journal of Wildlife Research 20(2), 44–51.

193 Dayaratne, P. and de Silva J 1990. Drift gillnet fishery in Sri Lanka. Document TWS/90/19 presented at the Expert Consultation on Stock Assessment of Tuna in the Indian Ocean. Bangkok. 2-6 July 1990 8pp.

194 Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

195 Cockcroft, V.G. 1990. Dolphin catches in the Natal shark nets, 1980 to 1988. South African Journal of Wildlife Research 20(2), 44–51.

196 Dayaratne, P. and de Silva J 1990. Drift gillnet fishery in Sri Lanka. Document TWS/90/19 presented at the Expert Consultation on Stock Assessment of Tuna in the Indian Ocean. Bangkok. 2-6 July 1990 8pp.

197 Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

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One Fraser's dolphin was caught in the Sri Lankan driftnet fishery¹⁹⁶

The IWC, in 1994, estimated that more than 10 Fraser's dolphins were killed annually in fisheries off the coast of Sri Lanka.¹⁹⁷

Species	<i>Tursiops truncatus</i> Bottlenose dolphin
Abundance Estimate	No Total Abundance Estimate
	Zanzibar (Tanzania), East Africa 161 (144-177) ¹⁹⁸
	Indian Ocean coast, South Africa, south of Natal 250
	Indian Ocean coast, South Africa, north of Natal 1,000
Fisheries	Bottlenose dolphins are caught in Sri Lankan coastal gillnet and driftnet fisheries, shark nets in Natal, Indian ocean coastal gillnets, gillnets in Madagascar, and there are unquantified entanglements in medium and large mesh gillnets in offshore waters of Pakistan.
Estimated Annual Mortality	Between 1980 and 1988, 271 bottlenose dolphins died in shark nets to protect bathers. ¹⁹⁹ Scientists suggested that current catch rates may approach 5% of the local population and therefore may threaten it. ²⁰⁰ Catches in India are reported quite frequently, and formed 33% of the total catch of cetaceans recorded in the gillnet fishery at Calicut. ²⁰¹ Bottlenose dolphins are one of the commonly caught dolphins in seerfish and tuna driftnet fisheries on the west coast of India, and in coastal gillnet fisheries for pomfrets and other species too. In Sri Lanka, this species was found to consist of between 5 and 25% of the total cetacean catch in four different surveys amounting to 1,250 to 10,000 animals. ²⁰² Although national legislation prohibits the capture of cetaceans, which were formerly taken with harpoons ²⁰³ an estimated 200-300 bottlenose

¹⁹⁸ Stensland, E. 2004. Behavioural ecology of Indo-Pacific bottlenose and humpback dolphins. Doctoral thesis, Stockholm University, Department of Zoology. ISBN: 91-7265-837-X.

¹⁹⁹ Cockcroft, V.G. 1990. Dolphin catches in the Natal shark nets, 1980 to 1988. *South African Journal of Wildlife Research* 20(2), 44–51.

²⁰⁰ Peddemors, V.M., Cockcroft, V.G., and Wilson, R.B. 1991. Incidental dolphin mortality in the Natal shark nets: a preliminary report on prevention measures. Pp.129–137 in: *Cetaceans and Cetacean Research in the Indian Ocean Sanctuary* (eds. S. Leatherwood and G.P. Donovan). UNEP Marine Mammal Technical Report No. 3. Nairobi, Kenya.

²⁰¹ Mohan, R.S.L. 1994. Review of gillnet fisheries and cetacean by-catches in the northeastern Indian Ocean. *Report of the International Whaling Commission* (Special Issue) 15, 329–346.

²⁰² Dayaratne, P. and de Silva J 1990. Drift gillnet fishery in Sri Lanka. Document TWS/90/19 presented at the Expert Consultation on Stock Assessment of Tuna in the Indian Ocean. Bangkok. 2-6 July 1990 8pp. See also Mohan, R.S.L. 1994. Review of gillnet fisheries and cetacean by-catches in the northeastern Indian Ocean. *Report of the International Whaling Commission* (Special Issue) 15, 329–346.

²⁰³ Leatherwood, S. 1986. *Whales, Dolphins and Porpoises of the Indian Ocean Sanctuary. A Catalogue of Available Information*. Hubbs Marine Research Centre Technical Report No. 87-197. San Diego: Hubbs Marine Research Center. 207pp.

²⁰⁴ De Lestang, J.N. 1993. Status of marine mammals in the eastern African region. Report to UNEP; *Regional Seas Reports and studies series*.

²⁰⁵ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

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dolphins are still killed annually by the Seychelles schooner fleet of some 20 vessels fishing at the edge of the Mahe Plateau and the outlying islands of the Seychelles group²⁰⁴

The IWC, in 1994, estimated that more than 500 bottlenose dolphins were caught in fisheries off the coast of Sri Lanka, 20-23 were killed in fisheries off the Indian Ocean coast of South Africa south of Natal, and 11-14 were killed in fisheries off the Indian Ocean coast of South Africa north of Natal.²⁰⁵

Species	<i>Grampus griseus</i> Risso's dolphin.
Abundance Estimate	5,500 to 13,000 ²⁰⁶
Fisheries	Risso's dolphins are caught in Sri Lankan coastal gillnet and driftnet fisheries
Estimated Annual Mortality	<p>In Sri Lanka, Risso's dolphins are the second most commonly bycaught cetacean in fisheries, providing fish and meat for human consumption and fish bait--stocks may be adversely affected.</p> <p>Risso's dolphins are caught frequently in the Sri Lankan fishery--between 6% and 16% of the total cetacean catch--or roughly 1,300 dolphins.²⁰⁷</p> <p>The IWC, in 1994, estimated that more than 1,300 Risso's dolphins were killed in fisheries off the coast of Sri Lanka.²⁰⁸</p>
Species	<i>Stenella longirostris</i> Spinner dolphin.
Abundance Estimate	No Abundance Estimate
Fisheries	Spinner dolphins are caught in Sri Lankan coastal gillnet and driftnet fisheries. This species is caught in Pakistani offshore deepwater gillnet fisheries and is commonly entangled in coastal driftnet fisheries for seerfish and tunas on the west coast of India, and is also entangled in other gillnet fisheries for sharks, pomfrets and other species.
Estimated Annual Mortality	Spinner dolphins are the most frequently caught species in the Sri Lankan fishery, where they formed between 33 and 47% of the total cetacean catch in for different surveys, or roughly 7,050-11,750 dolphins per year. ²⁰⁹

²⁰⁶ Kruse S, Caldwell DK, Caldwell MC 1999. Risso's dolphin- *Grampus griseus* (G Cuvier, 1812) In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 6: The second book of dolphins and porpoises, pp183-212

²⁰⁷ Dayaratne, P. and de Silva J 1990. Drift gillnet fishery in Sri Lanka. Document TWS/90/19 presented at the Expert Consultation on Stock Assessment of Tuna in the Indian Ocean. Bangkok. 2-6 July 1990 8pp.

²⁰⁸ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

²⁰⁹ Dayaratne, P. and de Silva J 1990. Drift gillnet fishery in Sri Lanka. Document TWS/90/19 presented at the Expert Consultation on Stock Assessment of Tuna in the Indian Ocean. Bangkok. 2-6 July 1990 8pp.

²¹⁰ Cockcroft, V.G. 1990. Dolphin catches in the Natal shark nets, 1980 to 1988. *South African Journal of Wildlife Research* 20(2), 44-51.

²¹¹ Mohan, R.S.L. 1994. Review of gillnet fisheries and cetacean by-catches in the northeastern Indian Ocean. *Report of the International Whaling Commission* (Special Issue) 15, 329-346.

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A single animal is reported from the Natal shark nets,²¹⁰ while in India, spinner dolphins made up more than 50% of the cetacean catch in the gillnet fishery.²¹¹

The IWC, in 1994, estimated that more than 4,000 spinner dolphins were entangled in fisheries off the coast of Sri Lanka.²¹²

Species	<i>Stenella coeruleoalba</i> Striped dolphin.
Abundance Estimate	No Abundance Estimate
Fisheries	Striped dolphins are entangled in Sri Lankan coastal gillnet and driftnet fisheries, shark nets in Australian, Indian ocean coastal gillnets, and unquantified catches in the offshore gillnet fisheries of Pakistan.
Estimated Annual Mortality	Between 1980 and 1988, 3 dolphins were entangled in the Natal shark nets to protect bathing beaches along the Natal coast, South Africa ²¹³ Striped dolphins are frequently entangled in the Sri Lankan driftnet fishery where between 6 and 11% of all cetaceans landed were found to be this species—900 to 2,750 ²¹⁴ The IWC, in 1994, estimated that more than 700 striped dolphins were killed in fisheries off the coast of Sri Lanka. ²¹⁵

Species	<i>Stenella attenuata</i> Pantropical spotted dolphin
Abundance Estimate	No Abundance Estimate
Fisheries	Spotted dolphins are entangled in Sri Lankan coastal gillnet and driftnet fisheries
Estimated Annual Mortality	Up to 27% of all cetaceans landed in Sri Lanka are spotted dolphins, suggesting a total annual catch between 4,050 and 6,750. ²¹⁶ The IWC, in 1994, estimated that more than 1,500 spotted dolphins were killed in fisheries in the Northern Indian Ocean. ²¹⁷

Species	<i>Delphinus delphis</i> Common dolphin.
Abundance Estimate	No Abundance Estimate

²¹² Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

²¹³ Cockcroft, V.G. 1990. Dolphin catches in the Natal shark nets, 1980 to 1988. *South African Journal of Wildlife Research* 20(2), 44–51.

²¹⁴ Dayaratne, P. and de Silva J 1990. Drift gillnet fishery in Sri Lanka. Document TWS/90/19 presented at the Expert Consultation on Stock Assessment of Tuna in the Indian Ocean. Bangkok. 2-6 July 1990 8pp.

²¹⁵ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

²¹⁶ Dayaratne, P. and de Silva J 1990. Drift gillnet fishery in Sri Lanka. Document TWS/90/19 presented at the Expert Consultation on Stock Assessment of Tuna in the Indian Ocean. Bangkok. 2-6 July 1990 8pp.

²¹⁷ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

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Fisheries	Common dolphins are entangled in Sri Lankan coastal gillnet and driftnet fisheries and Indian ocean coastal gillnets. Common dolphins also become entangled in driftnets and bottom set gillnets for pomfrets and other species in Indian.
Estimated Annual Mortality	Common dolphins form around 8% of the total cetacean catches in the Calicut gillnet fishery (14 were recorded in 5 years). ²¹⁸ The IWC, in 1994, estimated that more than 1,000 common dolphins were killed in fisheries in the Southwestern Indian Ocean, and 33 were entangled in fisheries the Indian Ocean coast of South Africa. ²¹⁹
Species	<i>Neophocaena phocaenoides</i> Finless porpoise.
Abundance Estimate	No Abundance Estimate
Fisheries	Finless porpoise are entangled in Sri Lankan coastal gillnet and driftnet fisheries, shark nets in Australian, and Indian ocean coastal gillnets. This species is commonly caught in seerfish and tuna driftnet fisheries throughout the west coast of India. Finless porpoises have been caught in a shrimp trawl in Pakistan in 1989, entangled in beach seines and stake nets for shrimp, and entangled in small and medium mesh finfish gillnets in shallow inshore waters of Pakistan.
Estimated Annual Mortality	No Estimate of Mortality

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Species	<i>Platanista gangetica</i> Ganges river dolphin.
Abundance Estimate	600-700 ²²⁰
Fisheries	Ganges river dolphins are entangled in gillnets. The dolphin was deliberately killed for its meat and oil, but that may have decreased. ²²¹
Estimated Annual Mortality	No Estimate of Mortality
Species	<i>Sousa plumbea/chinensis</i> Indian humpback dolphin.
Abundance Estimate	No Abundance Estimate-may be declining in Australian waters
Fisheries	Humpback dolphins are entangled in coastal gillnet and driftnet fisheries, gillnets set for sharks This species also becomes entangled in Indian

²¹⁸ Mohan, R.S.L. 1994. Review of gillnet fisheries and cetacean by-catches in the northeastern Indian Ocean. *Report of the International Whaling Commission* (Special Issue) **15**, 329–346.

²¹⁹ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

²²⁰ Reeves RR, Chaudhry AA. 1998. Status of the Indus River dolphin *Platanista minor*. *Oryx* 32: 35-44.

²²¹ Dolphin meat, intestines, and oil are used as fish attractant in the Ganges and Brahmaputra rivers of India and Bangladesh. In the Brahmaputra River, fishermen trail bound pieces of dolphin body parts alongside small boats while sprinkling the water with a mixture of oil and minced dolphin flesh. Small unbaited hooks are used to catch the fish as they come to the surface within the oil slick

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	shark and catfish gillnet fisheries along the east coast of India.
Estimated Annual Mortality	No Estimate of Mortality
Species	<i>Orcaella brevirostris</i> Irrawaddy (snubfin) river dolphin
Abundance Estimate	No Total Abundance Estimate Chilka Lake, India 20-30
Fisheries	Irrawaddy dolphins are incidentally captured in driftnet fishing nets in Bangladesh and India.
Estimated Annual Mortality	No Estimate of Mortality
Species	<i>Tursiops truncatus</i> Bottlenose dolphin
Abundance Estimate	No Total Abundance Estimate south-eastern Shark Bay ²²² 400 Cockburn Sound, Western Australia ²²³ 150
Fisheries	Bottlenose dolphins are entangled in shark nets in Australia, in anti-predator nets set around tuna feedlots in Port Lincoln, South Australia, and in shark and catfish gillnet fisheries off the east coast off India.
Estimated Annual Mortality	No Estimate of Mortality
Species	<i>Stenella longirostris</i> Spinner dolphin.
Abundance Estimate	No Abundance Estimates
Fisheries	Spinner dolphins are entangled in coastal gillnet and driftnet fisheries in the eastern Indian Ocean and shark and catfish gillnet fisheries in Indian waters.
Estimated Annual Mortality	No Estimate of Mortality
Species	<i>Delphinus delphis</i> Common dolphin.
Abundance Estimate	No Abundance Estimate
Fisheries	Common dolphins are entangled in Indian ocean coastal gillnets and Indian catfish and shark gillnet fisheries.

²²² Ross, GJB. 2006 Review of the conservation status of Australia' smaller whales and dolphins. Australian Government <http://www.deh.gov.au/coasts/publications/pubs/conservation-smaller-whales-dolphins.pdf>

²²³ Ross, GJB. 2006 Review of the conservation status of Australia' smaller whales and dolphins. Australian Government <http://www.deh.gov.au/coasts/publications/pubs/conservation-smaller-whales-dolphins.pdf>

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Estimated Annual Mortality No Estimate of Mortality

Species ***Neophocaena phocaenoides* Finless porpoise.**

Abundance Estimate No Abundance Estimate

Fisheries Finless porpoise are caught in Indian ocean coastal gillnets for shark and catfish and other coastal gillnet fisheries.

Estimated Annual Mortality No Estimate of Mortality

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Species ***Berardius bairdii* Baird's beaked whale.**

Abundance Estimate ²²⁴	Japanese Pacific coast	5,029/1.0%
	Sea of Japan	1,260/0.6%
	Okhotsk Sea	660/0.3%

Fisheries Baird's beaked whales have been caught in Japanese salmon driftnets and trap fisheries

Estimated Annual Mortality Historically, Japan's coastal whaling stations killed up to 40 Baird's beaked whales per year--now the industry operates with a quota of 8 for the Sea of Japan, 2 for the southern Okhotsk Sea and 52 for the Pacific coasts.²²⁵.

Over a 5 year period (1986 to 1990), at least 2 Baird's beaked whales were incidentally killed in Japanese trap nets.

From 1998 to 2003, Japan reported killing 62 Baird's beaked whales each year in directed hunts.²²⁶

In 1999, 2001, and 2002, Korea reported killing 1 Baird's beaked whales each year in gillnet fisheries in the East sea.²²⁷

Species ***Ziphius cavirostris* Cuvier's beaked whale.**

Abundance Estimate No Abundance Estimate

Fisheries Cuvier's beaked whales are caught in purse seine and gillnets fisheries

²²⁴ Katsuya T. 2002. Giant beaked whales. In: Encyclopedia of marine mammals (Perrin WF, Wursig, B, Thewissen JGM, eds.) Academic Press, San Diego, pp. 519-522.

²²⁵ Katsuya T. 2002. Giant beaked whales. In: Encyclopedia of marine mammals (Perrin WF, Wursig, B, Thewissen JGM, eds.) Academic Press, San Diego, pp. 519-522

²²⁶ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²²⁷ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

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Estimated Annual Mortality	In 1985 and 1986, two Cuvier's beaked whales were incidentally captured off the coast of Japan.	
Species	<i>Pseudorca crassidens</i> False killer whale.	
Abundance Estimate	Coastal waters of China and Japan	16,000 ²²⁸
Fisheries	False killer whales are caught in trawl, gillnet and stow gear and are occasionally killed in Japan for food. ²²⁹	
Estimated Annual Mortality	In 1988, two false killer whales were caught in Japanese trap nets. ²³⁰ Chinese coastal fisheries may capture hundreds of false killer whales. From 1998 to 2002, Japan reported killing 45, 5, 8, 26, and 7 false killer whales in directed hunts. ²³¹ In 2000 and 2002, Korea reported killing 1 false killer whale in gillnet fisheries in the East sea. ²³²	
Species	<i>Globicephala macrorhynchus</i> Short-finned pilot whale.	
Abundance Estimate	Northern form of short-finned pilot whales	5,300 ²³³
	Southern form of short-finned pilot whales	53,000 ²³⁴
Fisheries	Short-finned pilot whales are caught in Japanese gillnet fisheries and are occasionally harvested in Japan for food. ²³⁵	
Estimated Annual Mortality	From 1984 to 1988, pilot whales were killed in gillnets, primarily Japanese driftnets, at a rate of approximately 4 per year, and at a slightly	

²²⁸ Odell DK, McClune KM 1999. *Pseudorca crassidens* (Owen, 1846) In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 6: The second book of dolphins and porpoises, pp213-244

²²⁹ The largest documented fisheries interaction is in the waters around Iki Island, Japan, where over 900 false killer whales were killed in drive fisheries from 1965 to 1980 in an attempt to reduce interactions with the yellowtail fishery. Odell DK, McClune KM 1999. *Pseudorca crassidens* (Owen, 1846) In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 6: The second book of dolphins and porpoises, pp213-244

²³⁰ Odell DK, McClune KM 1999. *Pseudorca crassidens* (Owen, 1846) In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 6: The second book of dolphins and porpoises, pp213-244

²³¹ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²³² IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²³³ Bernard HJ, Reilly B. 1999. Pilot whales *Globicephala* Lesson, 1928. In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 6: The second book of dolphins and porpoises, pp245-280

²³⁴ Bernard HJ, Reilly B. 1999. Pilot whales *Globicephala* Lesson, 1928. In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 6: The second book of dolphins and porpoises, pp245-280

²³⁵ In 1982, the Japanese drive fishery at Taiji expanded and harpooning of the northern form was resumed off Sanriku and Hokkaido. Between 1982 and 1985, 1,755 whales of the southern form were killed, and 519 of the northern form were taken during this same period. From 1985 to 1989, Japan took a total of 2,326 short-finned pilot whales. The drive fishery in Japan and the harpoon fishery continue today. In 1997, Japan recorded a catch of 347 short-finned pilot whales. Olson PA, Reilly SB 2002. Pilot whales—*Globicephala melas* and *G. macrorhynchus*. In: Encyclopedia of marine mammals (Perrin WF, Wursig, B, Thewissen JGM, eds.) Academic Press, San Diego, pp. 898-903.

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Mortality	lower rate in trap nets. ²³⁶ Between 350 and 750 pilot whales die annually in passive nets and traps set by the Japanese fishery. ²³⁷ From 1998 to 2002, Japan reported killing 229, 394, 304, 342, 176 short-finned pilot whales each year in directed hunts. ²³⁸
Species	<i>Steno bredanensis</i> Rough-toothed dolphin.
Abundance Estimate	No Abundance Estimate
Fisheries	Rough-tooth dolphins are caught in driftnet, purse seine and gillnet fisheries and are killed in drive fisheries at Okonawa in the Ryukyus and in the home islands of Japan. ²³⁹
Estimated Annual Mortality	One rough-toothed dolphin was killed in an unspecified Japanese fishery in 1985.
Species	<i>Lagenorhynchus obliquidens</i> Pacific white-sided dolphin.
Abundance Estimate	No Abundance Estimate
Fisheries	White-sided dolphins were caught in gillnet fisheries, longlines and trawls. Japanese drive and harpoon fisheries kill hundreds or even thousands of Pacific white-sided dolphins. ²⁴⁰
Estimated Annual Mortality	In 1989, the estimated total bycatch for the Japanese squid driftnet fishery was approximately 6,100; in 1990, the total estimate for all driftnet fisheries combined was 5,759. ²⁴¹ In January 1993, a United Nations moratorium on these high seas driftnet fisheries went into effect.

²³⁶ Olson PA, Reilly SB 2002. Pilot whales—*Globicephala melas* and *G. macrorhynchus*. In: Encyclopedia of marine mammals (Perrin WF, Wursig, B, Thewissen JGM, eds.) Academic Press, San Diego, pp. 898-903.

²³⁷ Bernard HJ, Reilly B. 1999. Pilot whales *Globicephala* Lesson, 1928. In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 6: The second book of dolphins and porpoises, pp245-280

²³⁸ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²³⁹ From 1976 – 1981, 23 rough-tooth dolphins were captured in Okinawa. Miyazaki N. Perrin WF 1994. Rough-tooth dolphin *Steno bredanensis* (Lesson, 1828). In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 6: The second book of dolphins and porpoises, pp245-280

²⁴⁰ Jefferson TA, Leatherwood S, Webber MA 1993. FAO Species identification guide. Marine Mammals of the world. UNEP/FAO, Rome, 320pp

²⁴¹ Hobbs RC, Jones LL 1993. Impacts of high seas driftnet fisheries on marine mammal populations in the North Pacific. Int North Pacific Fish Comm Bulletin 53: 409-434.

²⁴² Brownell RL, Walker WA, Forney KA 1999. Pacific white-sided dolphin—*Lagenorhynchus obliquidens*. In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 6: The second book of dolphins and porpoises, pp57-84

²⁴³ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²⁴⁴ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

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Smaller catches of white-sided dolphins are reported in the Japanese land-based salmon driftnet fishery and in seine, set nets, and trap nets around Japan.²⁴²

From 1998 to 2002, Japan reported incidentally killing approximately one white-sided dolphin per year—no directed hunts were reported.²⁴³

From 1998 to 2003, Korea reported killing 7, 3, 4, 41, 53, and 18 Pacific white-sided dolphins each year in gillnets, set nets, trap nets and longline fisheries in the East sea.²⁴⁴

Species	<i>Tursiops truncatus</i> Bottlenose dolphin	
Abundance Estimate	Northwest Pacific	316,935 ²⁴⁵
Fisheries	Bottlenose dolphins are killed in drive fisheries in Taiwan and Japan for human consumption and bait. ²⁴⁶	
Estimated Annual Mortality	Incidental catches in Chinese fisheries reach several hundred per year. Incidental catches of bottlenose dolphins are roughly 6 per year in Japanese fisheries From 1998 to 2002, Japan reported killing 245, 658, 1,426, 247, and 729 bottlenose dolphins year in directed hunts—no incidental mortality was reported. ²⁴⁷ From 2000 to 2003, Korea reported killing 12, 3, 4, and 1, bottlenose dolphins each year in gillnets, set nets, trawl and purse-seine fisheries in the East and South Sea. ²⁴⁸	
Species	<i>Grampus griseus</i> Risso's dolphin	
Abundance Estimate	105,000	
Fisheries	In Japan, Risso's dolphins are killed for food and fertilizer in set nets and as a limited catch in the small-type whaling industry. ²⁴⁹	
Estimated Annual Mortality	Incidental catches in Chinese fisheries reach several hundred per year. About 2 Risso's dolphins per year are reported killed in fishing gear in	

²⁴⁵ Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages

²⁴⁶ The Japanese drive fishery off Iki Island and the Kii Peninsula takes several hundred bottlenose dolphins annually. Reported catches in Japanese drive fisheries of bottlenose dolphins were 230 in 1986; 1,813 in 1987; and 828 for 1988. Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages

²⁴⁷ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²⁴⁸ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²⁴⁹ Kruse S, Caldwell DK, Caldwell MC 1999. Risso's dolphin- *Grampus griseus* (G Cuvier, 1812) In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 6: The second book of dolphins and porpoises, pp183-212

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Japan. From 1998 to 2002, Japan reported killing 442, 489, 506, 474, and 386 Risso's dolphins each year in directed hunts—one Risso's dolphin was incidentally take in 2001 and 2002.²⁵⁰

From 1998 to 2003, Korea reported killing 7, 2, 20, 25, 2, and 2 Risso's dolphins each year in gillnets, set nets, trap nets and longline fisheries in the East Sea.²⁵¹

Species	Stenella longirostris Spinner dolphin
Abundance Estimate	No Abundance Estimate
Fisheries	In Japan, spinner dolphins were killed in drive fisheries in Japan. ²⁵²
Estimated Annual Mortality	Eleven dolphins were killed in Japanese gillnets in 1985--no spinner dolphins were reported caught between 1998 and 2003. ²⁵³

Species	Stenella coeruleoalba Striped dolphin	
Abundance Estimate ²⁵⁴	Japanese Pacific coast	821,000
	20° and 30° N	7,000
	30° and 40° N	350,000
	Near-shore Japanese waters	2,300
Fisheries	The Japanese have both drive and hand-harpoon fisheries for striped dolphins at several locations that date back to 1868-1912. ²⁵⁵ Striped dolphins are caught in driftnets, (presumably the Japanese large mesh or squid driftnet fisheries), trap nets and other types of gear.	
Estimated Annual Mortality	From 1998 to 2002, Japan reported killing 449, 596, 300, 484, and 642 striped dolphins a year in directed hunts—no incidental mortality was reported. ²⁵⁶	

²⁵⁰ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²⁵¹ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²⁵² Kruse S, Caldwell DK, Caldwell MC 1999. Risso's dolphin- *Grampus griseus* (G Cuvier, 1812) In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 6: The second book of dolphins and porpoises, pp183-212

²⁵³ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²⁵⁴ Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages

²⁵⁵ The catches were voluntarily reduced beginning in 1981 and have since varied between 358 (in 1987) and 4,883 (1981), averaging 2,830 during the period 1981-89. Between 1989-1993, the average catch has dropped to 1,028. Scientists report that the Japanese multispecies dolphin fisheries now receive an annual quota of 725. Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages at 289.

²⁵⁶ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

Species ***Stenella attenuata* Pantropical spotted dolphin**
 Abundance Estimate No Abundance Estimate
 Fisheries Spotted dolphins are caught in coastal gillnet and driftnet fisheries
 Estimated Annual Mortality From 1998 to 2002, Japan reported killing 460, 38, 39, 10, and 418 spotted dolphins a year in directed hunts—one incidental mortality was reported in 2002.²⁵⁷ No other mortality estimates are available.

Species ***Delphinus delphis* Common dolphin**
 Abundance Estimate No Abundance Estimate
 Fisheries In Japan, common dolphins were caught in gillnet fisheries in Japan.
 Estimated Annual Mortality Common dolphins are reported killed by Japanese vessels at a rate of approximately 20 per year, mainly in gillnets (IWC 1986–90). Catches are known to occur at a higher rate than this in the squid driftnet fishery, so presumably not all are reported.
 No common dolphins were reported taken by Japan between 1998 and 2003.²⁵⁸
 From 1998 to 2003, Korea reported killing 17, 25, 29, 62, 76, and 113 common dolphins each year in gillnets, set nets, trap nets, driftnet, and purse seine fisheries in the East Sea.²⁵⁹

Species ***Lissodelphis borealis* Northern right whale dolphin.**
 Abundance Estimate North Pacific 400,000
 Fisheries In Japan and Russia, northern right whale dolphins are caught in purse-seine operations and in salmon drift-net operations.
 Estimated Annual Mortality In the 1980s, the estimated total bycatch for the Japanese, Taiwanese, and South Korean squid driftnet fishery was approximately 15,000–24,000 per year and this mortality is considered to have depleted the population to 24–73% of its pre-exploitation size.²⁶⁰
 In January 1993, a United Nations moratorium on these high seas

²⁵⁷ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²⁵⁸ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²⁵⁹ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²⁶⁰ Mangel M. 1993. Effects of high seas driftnet fisheries on the northern right whale dolphin *Lissodelphis borealis*. Ecol App 3: 221-229

²⁶¹ Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages

²⁶² IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

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driftnet fisheries went into effect.

The total reported bycatch of northern right whale dolphins by Japan in 1987 was 261 individuals.²⁶¹

Reports of northern right whale dolphin accidental mortalities have increased since 1984, notably in gillnet fisheries, from 8 to 268 in 1988. About 2 more per year are reported caught in trapnet fisheries, but no northern right whale dolphins were reported bycaught between 1998 and 2003.²⁶²

Species	<i>Phocoenoides dalli</i> Dall's porpoise. ²⁶³	
Abundance Estimate ²⁶⁴	North Pacific and Bering Sea	1,186,000 ²⁶⁵
	Western North Pacific	141,800
	Off Japan (.50% truei-type)	104,000
	Sea of Okhotsk (all three stocks)	2,150
Fisheries	The Japanese have both drive and hand-harpoon fisheries for Dall's porpoise at several locations that date back to 1868-1912. ²⁶⁶ Dall's porpoise are caught in driftnets, (presumably the Japanese large mesh or squid driftnet fisheries), trap nets and other types of gear.	
Estimated Annual Mortality	Large numbers of Dall's porpoises were killed incidentally in salmon (north-western North Pacific and Bering Sea) and squid (central North Pacific and adjacent seas) driftnet fisheries, starting as long ago as the 1950s. Bycatches were in the thousands if not tens of thousands in the years prior to the United Nations ban on high-seas driftnet fishing came into effect at the end of 1992. ²⁶⁷	
	In addition, a large-scale hand-harpoon hunt for Dall's porpoises has existed in Japanese waters for many decades.	
	During the 1980s, this hunt intensified reportedly to compensate for the shortage of whale meat (due to the IWC whaling moratorium) and the reduced catch of striped dolphins (due to depletion from over-exploitation; see above). Between 1986 and 1989, approximately 11,500	

²⁶³ Two subspecies are recognized based on geographical variation in color patterns. *Dalli*-type animals (*P. d. dalli*) predominate in most of the species' range, except in a limited area of the western Pacific (between approximately 35°N and 54°N) where *truei*-type animals (*P. d. truei*) are more common. As many as eleven stocks have been proposed, each centered on what are thought to be major calving grounds

²⁶⁴ Houck WJ, Jefferson TA 1999. Dall's porpoise—*Phocoenoides dalli* (True, 1885) In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 6: The second book of dolphins and porpoises, pp443-472

²⁶⁵ Buckland ST, Cattanach KL, Hobbs RC 1993. Abundance estimates of Pacific white-sided dolphin, northern right whale dolphin, Dall's porpoise and northern fur seal in the North Pacific, 1987-1990. Int North Pacific Fish Comm Bull 53: 387-407.

²⁶⁶ The catches were voluntarily reduced beginning in 19812 and have since varied between 358 (in 1987) and 4,883 (1981), averaging 2,830 during the period 1981-89. Between 1989-1993, the average catch has dropped to 1,028. Scientists report that the Japanese multispecies dolphin fisheries now receive an annual quota of 725. Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages at 289.

²⁶⁷ IWC. 1992. Report of the scientific committee. *Report of the International Whaling Commission* 42, 51–270.

Dall's porpoises were removed each year by hunting from two stocks centered in the Okhotsk Sea.²⁶⁸ In 1989, the Japanese government established regulations for the hand-harpoon hunt, as a result reported catch levels decreased to fewer than 11,500 in 1992.²⁶⁹ Thereafter, the quota was increased to 17,700 per year, and the reported catch reached above 18,000 in 1997.²⁷⁰ The IWC has expressed concerns that this level may not be sustainable by populations in the western Pacific and adjacent seas.

Large numbers of Dall's porpoises die in driftnets within national waters of Japan and Russia, where the UN ban on driftnets does not apply. For the period 1993 to 1999, the estimated bycatch in the Japanese salmon driftnet fishery operating in the Russian EEZ totaled close to 12,000 and ranged from 643–3149 on an annual basis.²⁷¹

The Bering Sea population is estimated to have been reduced to somewhere between 78% and 94% of its pre-exploitation size, and the Western Pacific population to between 66% and 91% of its original size. In 1994, the IWC estimated that 741-4,187 animals were killed each year in the Western North Pacific.²⁷²

From 1998 to 2002, Japan reported killing 11,385, 14,807, 16,171, 16,650, and 15,949 Dall's porpoise a year in directed hunts, two and 169 incidental deaths were reported in 1998 and 1999 respectively.²⁷³

In 2001 and 2002, Korea reported killing 2 and 1 Dall's porpoise respectively in gillnets, set net, and driftnet fisheries in the East Sea.²⁷⁴

Species	<i>Phocoena phocoena</i> Harbor porpoise.
Abundance Estimate	No Abundance Estimate
Fisheries	In Japan and Russia, harbor porpoises are caught in trap and gillnet fisheries.
Estimated Annual Mortality	Harbor porpoises are reported killed in Japanese trap net fisheries, at a rate of approximately 20–30 per year, and in 1988, 71 were also reported bycaught in gillnets.

²⁶⁸ A total of 10,534 Dall's porpoise were taken in 1986, 13,406 in 1987, and 39,000 in 1988 from a population of approximately 105,000. IWC. 1991. Report of the scientific committee. *Report of the International Whaling Commission* 41, 51–219.

²⁶⁹IWC. 1994. Report of the scientific committee. *Report of the International Whaling Commission* 44, 41–201.

²⁷⁰IWC. 1999. Planning workshop to develop a research program to investigate pollutant cause-effect relationships in cetaceans – "Pollution 2000+." *Journal of Cetacean Research and Management* (Special Issue) 1, 55–72.

²⁷¹IWC. 2002c. Report of the standing sub-committee on small cetaceans. *Journal of Cetacean Research and Management* 4 (Supplement), 325–338.

²⁷² Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 25

²⁷³ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²⁷⁴ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

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Harbor porpoises are also caught in the salmon driftnet fishery at a much lower rate than Dall's porpoise, possibly in the tens of animals per year.

One harbor porpoise was incidentally killed in 2001 and 2 were incidentally killed in 2002.²⁷⁵

Species	<i>Neophocaena phocaenoides</i> Finless porpoise	
Abundance Estimate ²⁷⁶	Yangtze	2,700
	Inland Sea of Japan	4,900/1.7%
	Ariake/Tachibana Bay	3,100
	Omura Bay	200
Fisheries	The Japanese hunted finless porpoises in the East China Sea. The species is sold for human consumption in Korea. ²⁷⁷ Finless porpoises are entangled in a variety of nets in Japan.	
Estimated Annual Mortality	From 1985 to 1992, 114 finless porpoises were incidentally killed off the coast of western and north-eastern Kyushu, including part of the western inland sea of Japan: 84 were incidentally killed by fisheries—bottom gillnets killed 58; surface gillnets killed 17; trap nets killed 7; trawl nets killed 1 and drifting ghost nets killed 1. ²⁷⁸	
	Finless porpoises were incidentally captured most frequently in the coastal waters of China—totaling about 2,132 individuals in trawl, gillnet, and stow nets. ²⁷⁹	
	In 1994, the IWC estimated that 10-20 animals were killed each year in the Yangtze. ²⁸⁰	
	From 1998 to 2002, 6, 1, 20, 8, and 8 finless porpoises were incidentally taken in Japanese fisheries. ²⁸¹	
	From 1998, 1999, 2001 to 2003, Korea reported killing 2, 14, 7, 14, and 82 finless porpoises in gillnets and set net fisheries the East, South, and	

²⁷⁵ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²⁷⁶ Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages

²⁷⁷ Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages at 289.

²⁷⁸ Kasuy T. 1999. Finless porpoise--*Neophocaena phocaenoides* (G Cuvier, 1829). In: Handbook of Marine Mammals (Ridgway SH, Harrison SR, eds.) Vol. 6: The second book of dolphins and porpoises, pp411-442

²⁷⁹ Yang G, Zhou K, Xu X, Leatherwood S. 1999. A survey on the incidental catches of small cetaceans in coastal waters of China. Yingyong Shengtai Xuebao 10: 713-716

²⁸⁰ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 25

²⁸¹ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

²⁸² IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

Yellow Sea.²⁸²

Species	<i>Lipotes vexillifer</i> Baiji	
Abundance Estimate ²⁸³	Yangtze	13-100 with the annual rate of population decline at 10%
Fisheries	Baiji are incidentally killed in longline fisheries—electric fishing	
Estimated Annual Mortality	45.5% of known Baiji deaths have been caused by accidental catches on longlines which are intensively used in the winter throughout much of the Baiji's range. Interactions with fisheries appear to be a major threat to the survival of this species.	

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The Northeast Pacific includes cetaceans within the US EEZ, since the focus of this report is international bycatch, and the assessment and mitigation of bycatch in the United States is governed under the MMPA, the description for this area will focus only on international bycatch of shared cetacean stocks.

Species	<i>Eschrichtius robustus</i> Gray whale.	
Abundance Estimate	Eastern North Pacific Stock	18,813 (CV = 0.07) ²⁸⁴
Fisheries	Gray whales are caught in purse seine, gillnets, and pot fisheries.	
Estimated Annual Mortality	From 1999 to 2003, the mean annual mortality of gray whales in AK salmon purse seines, pot fisheries, CA white seabass gillnet fishery was >0.5, >1.2, and >0.2 animals respectively. ²⁸⁵ During that same period more than 3.6 gray whales died each year in unknown gillnet fisheries. ²⁸⁶	
	Since there are no Canadian observer programs, few data concerning the mortality of gray whales incidental to Canadian commercial fisheries are available. Data regarding the level of gray whale mortality related to commercial fisheries in Canadian waters, though thought to be small, are not readily available or reliable which results in an underestimate of the annual mortality for this stock. The estimated minimum annual mortality rate incidental to US commercial fisheries is 6.7 animals. ²⁸⁷	

Species	<i>Balaenoptera acutorostrata</i> Minke whale.	
Abundance Estimate	Alaska Stock	No Available Estimate

²⁸³ Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages

²⁸⁴ Angliss, R. P., and R. B. Outlaw. 2005. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 153

²⁸⁵ Angliss, R. P., and R. B. Outlaw. 2006. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 171,172

²⁸⁶ Id.

²⁸⁷ Id.

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Fisheries Fisheries include purse seine, gillnets, and pot fisheries

Estimated Annual Mortality In 1989, one minke whale mortality (extrapolated to 2 mortalities) was observed in the Bering Sea/Gulf of Alaska joint-venture groundfish trawl fishery, the predecessor to the current Alaska groundfish trawl fishery.

The Bering Sea/Aleutian Islands groundfish trawl fishery incurred one mortality of a minke whale in 2000; this extrapolates to an estimated 2 minke whale mortalities for that year. The total estimated mortality and serious injury incurred by this stock as a result of interactions with commercial fisheries is 0.32 (CV = 0.61).²⁸⁸

Since there are no Canadian observer programs, few data concerning the mortality of minke whales incidental to Canadian commercial fisheries are available.

Species ***Megaptera novaeangliae* Humpback whale.**

Abundance Estimate

Western North Pacific	394 (CV = 0.08) ²⁸⁹
Central North Pacific	4,004 (CV = 0.095) ²⁹⁰
CNP—Southeast Alaska	961 (CV = 0.12)

Fisheries Humpback whales are caught in purse seines, trawl, gillnet, and pot fisheries. Between 2000 and 2004, there were incidental serious injuries and mortalities of Western North Pacific humpback whales in Bering Sea/Aleutian Islands Pollock trawl and Bering Sea/Aleutian Islands sablefish pot fisheries.

In the Central North Pacific, in 1994, the incidental entanglement of a humpback whale was reported in the Southeast Alaska salmon purse seine fishery. Another humpback whale is known to have been incidentally entangled in this fishery in 1989. In 1996, a humpback whale was reported entangled and trailing gear as a result of interacting with the Southeast Alaska drift gillnet fishery. This whale is presumed to have died. Together, these two mortalities result in an annual mortality rate of 0.4 (0.2 + 0.2) humpback whales based on self-reported fisheries information.

Estimated Annual Mortality There were 33 reports of human-related mortalities or injuries to humpback whales from the Central North Pacific stock from 2001 to 2005. Of these, there were 24 incidents which involved commercial fishing gear, and 13 of those incidents involved serious injuries or mortalities. This estimate is considered a minimum because not all entangled animals strand and not all stranded animals are found, reported, or cause of death determined.²⁹¹ Average annual mortality from

²⁸⁸ Angliss, R. P., and R. B. Outlaw. 2006. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 206

²⁸⁹ Angliss, R. P., and R. B. Outlaw. 2006. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 178

²⁹⁰ Angliss, R. P., and R. B. Outlaw. 2006. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 187

²⁹¹ Angliss, R. P., and R. B. Outlaw. 2006. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 189

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observed fisheries was 0.20 humpbacks from the Western North Pacific stock.²⁹²

The estimated fishery-related minimum mortality and serious injury rate incidental to US commercial fisheries for the northern portion of the stock is 2.0 humpback whales per year, based on observer data from Alaska (0.20), stranding records from Alaska (1.8) The estimated minimum mortality and serious injury rate incidental to the commercial fisheries in Southeast Alaska is 1.0 humpback whales per year, based on stranding records from Alaska (1.0).²⁹³

Species	<i>Delphinapterus leucas</i> White whale.	
Abundance Estimate ²⁹⁴	Beaufort Sea Stock	39,258 (CV = 0.229)
	Eastern Chuckchi Sea Stock	3,710
	Eastern Bering Sea Stock	18,142 (CV = 0.24)
	Bristol Bay Stock	1,888 (CV = .20)
	Cook Inlet Stock	357 (CV = 0.107)
Fisheries	Fisher self-reports in the Bristol Bay salmon set gillnet and drift gillnet fisheries, from 1990 to 2000, recorded 1 mortality in both 1990 and 1991 from these fisheries. Larger fishery-related mortalities resulting from these fisheries have been recorded in the past. During the summer of 1983 the Alaska Department of Fish and Game documented 12 beluga whale mortalities in Bristol Bay related to drift and set gillnet fishing. ²⁹⁵	
Estimated Annual Mortality	No Estimates Available for Beaufort Sea Stock, Eastern Chuckchi Sea Stock, Eastern Bering Sea Stock, Cook Inlet Stock	
Species	<i>Orcinus orca</i> Killer whale.	
Abundance Estimate ²⁹⁶	Alaska Resident stock (includes Southeast AK, Prince William Sound, & Western AK)	1,123
	Eastern North Pacific Northern Resident Stock	216

²⁹² Angliss, R. P., and R. B. Outlaw. 2006. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 180 Note, however, that the stock identification is uncertain and the mortality may have involved a whale from the central North Pacific stock of humpback whales. Thus, this mortality is assigned to both the central and western stocks.

²⁹³ Angliss, R. P., and R. B. Outlaw. 2006. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p at 194

²⁹⁴ Angliss, R. P., and R. B. Outlaw. 2005. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 6

²⁹⁵ Frost, K. J., L. F. Lowry, and R. R. Nelson. 1984. Belukha whale studies in Bristol Bay, Alaska. Pp. 187-200 *In* Proceedings of the workshop on biological interactions among marine mammals and commercial fisheries in the Southeastern Bering Sea. Oct. 18-21, 1983, Anchorage AK. Alaska Sea Grant Rep. 84-1.

²⁹⁶ Angliss, R. P., and R. B. Outlaw. 2005. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 6

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	Gulf of Alaska, Aleutian Islands and Bering Sea Transient Stock	314
	West Coast Transient Stock	314
Fisheries	Although only small numbers of killer whales are caught in Bering Sea fisheries and there are no observed mortalities or serious injuries in the Gulf of Alaska, there are other interactions between the whales and the fisheries. Interactions between killer whales and longline vessels have been well documented. ²⁹⁷ Data collected from the Japan/U. S. cooperative longline research surveys operating in the Bering Sea indicate that interactions may be increasing and expanding into the Aleutian Islands region. ²⁹⁸ Since 1990, there have been no reported fishery-related standings of killer whales in Canadian waters and there are not reliable estimates of mortality in Canadian fisheries.	
Estimated Annual Mortality	The mean annual (total) mortality rate for all US fisheries for 1999-03 was 2.5 (CV = 0.37). The estimated minimum mortality rate incidental to the Bering Sea-Aleutian Islands (BSAI) flatfish trawl, BSAI Pollock trawl, BSAI Greenland turbot longline, and the BSAI Pacific cod longline is 2.3 animals per year, based exclusively on observer data. ²⁹⁹ The mean annual mortality rate incidental to U.S. commercial fisheries for the west coast transient stock is zero. ³⁰⁰	
Species	<i>Lagenorhynchus obliquidens</i> Pacific white-sided dolphin.	
Abundance Estimate	Central North Pacific	26,880 ³⁰¹
Fisheries	White-sided dolphins are caught in gillnet fisheries, longlines and trawls	
Estimated Annual Mortality	Between 1978 and 1991, thousands of Pacific white-sided dolphins were incidentally killed each year in high seas fisheries. Pacific white-sided	

²⁹⁷ Dahlheim, M. E. 1988. Killer whale (*Orcinus orca*) depredation on longline catches of sablefish (*Anoplopoma fimbria*) in Alaskan waters. NWAFC Processed Report 88-14, 31 pp. (available upon request -Alaska Fisheries Science Center, 7600 Sand Point Way NE, Seattle, WA 98115). See also Yano, K., and M. E. Dahlheim. 1995. Killer whale, *Orcinus orca*, depredation on longline catches of bottomfish in the southeastern Bering Sea and adjacent waters. Fish. Bull., U.S. 93:355-372.

²⁹⁸ Yano, K., and M. E. Dahlheim. 1995. Killer whale, *Orcinus orca*, depredation on longline catches of bottomfish in the southeastern Bering Sea and adjacent waters. Fish. Bull., U.S. 93:355-372. Killer whale predation on sablefish catch has been fairly consistent since 1988, and has occurred mainly east of 170° W in the eastern Bering Sea, and to a lesser extent in the northeast Aleutians. Sigler, M.F., C. R. Lunsford, J. T. Fujioka, and S. A. Lowe. 2002. Alaska Sablefish Assessment for 2003. In: Stock Assessment and Fishery Evaluation Report for the Groundfish Fisheries of the Bering Sea/Aleutian Islands Regions. North Pac. Fish. Mgmt. Council, Anchorage, AK, Section 5:229-294.

²⁹⁹ Angliss, R. P., and R. B. Outlaw. 2005. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 91 As the animals which were taken incidental to commercial fisheries have not been identified genetically, it is not possible to determine whether they belonged to the Eastern North Pacific Alaska Resident or the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient killer whale stock. Accordingly, these same mortalities are also reported for the Gulf of Alaska, Aleutian Islands, and Bering Sea Transient stock.

³⁰⁰ Angliss, R. P., and R. B. Outlaw. 2005. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 113

³⁰¹ Angliss, R. P., and R. B. Outlaw. 2005. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 117

³⁰² Note that no observers have been assigned to several of the gillnet fisheries that are known to interact with this

dolphins were frequently caught in the high seas squid driftnet fishery. Results from the 1989 Joint Observer Program indicated an observed catch rate on a sample of vessels which, if extrapolated, suggest a total catch of approximately 10,000 animals or more. The impact of this level of catch on the population is unknown. However, these fisheries have not operated in the central North Pacific since 1991.

There were no serious injuries or mortalities incidental to observed U.S. commercial fisheries from 2000-04.³⁰²

Species	<i>Phocoenoides dalli</i> Dall's porpoise.	
Abundance Estimate	Central North Pacific	83,400 (CV = 0.1) ³⁰³
Fisheries	Dall's porpoise were taken from gillnet fisheries, longlines and trawls	
Estimated Annual Mortality	From 1997-2001, the mean annual (total) mortality of Dall's porpoise was 5.4 (CV = 0.18) for the Bering Sea groundfish trawl fishery, 0.3 (CV = 0.61) for the Gulf of Alaska groundfish trawl fishery, and 0.2 (CV = N/A) for the Bering Sea groundfish longline fishery. In 1990, in the Alaska Peninsula and Aleutian Island salmon driftnet fishery, one Dall's porpoise mortality was observed which extrapolated to an annual (total) incidental mortality of 28 Dall's porpoise. Combining the estimates from the Bering Sea and Gulf of Alaska fisheries presented above (5.4 + 0.3 + 0.2 = 5.9) with the estimate from the Alaska Peninsula and Aleutian Island salmon drift gillnet fishery (28) results in an estimated annual incidental kill of 33.9 porpoise per year from the Alaska stock. ³⁰⁴	
	Large numbers of Dall's porpoises were killed incidentally in salmon (north-western North Pacific and Bering Sea) and squid (central North Pacific and adjacent seas) driftnet fisheries, starting as long ago as the 1950s. Bycatches were in the thousands if not tens of thousands in some years before the United Nations ban on high-seas driftnet fishing came into effect at the end of 1992. ³⁰⁵	

Species	<i>Phocoena phocoena</i> Harbour porpoise.	
Abundance Estimate	Southeast Alaska	17,076 (CV = 0.265) ³⁰⁶
	Gulf of Alaska	41,854 (CV=0.224) ³⁰⁷

stock, making the estimated mortality unreliable.

³⁰³ Angliss, R. P., and R. B. Outlaw. 2005. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 135

³⁰⁴ Angliss, R. P., and R. B. Outlaw. 2005. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 136

³⁰⁵ IWC. 1992. Report of the scientific committee. *Report of the International Whaling Commission* **42**, 51–270. at 212, 213.

³⁰⁶ Angliss, R. P., and R. B. Outlaw. 2006. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 137

³⁰⁷ Angliss, R. P., and R. B. Outlaw. 2006. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 141

	Bering Sea	66,078 (CV = 0.232) ³⁰⁸
Fisheries	Harbor porpoise have been caught in gillnet fisheries	
Estimated Annual Mortality	<p>During the period between 1990 and 1998, fisher self-reports from the Southeast Alaska salmon drift gillnet fishery resulted in an annual mean of 3.25 mortalities from interactions with commercial fishing gear. No mortalities from the Southeast Alaska stock of harbor porpoise incidental to commercial groundfish fisheries have been observed.</p> <p>Observers also monitored the Prince William Sound salmon drift gillnet fishery in 1990 and 1991, recording 1 mortality in 1990 and 3 mortalities in 1991. These mortalities extrapolated to 8 (95% CI 1-23) and 32 (95% CI 3-103) kills for the entire fishery, resulting in a mean kill of 20 (CV = 0.60) animals per year for 1990 and 1991. Logbook reports from Prince William Sound salmon drift gillnet fishery detail 6, 5, 6, and 1 harbor porpoise mortalities in 1990, 1991, 1992, and 1993, respectively. The extrapolated (estimated) observer mortality accounts for these mortalities.</p> <p>In 1999 and 2000, observers were placed on the Cook Inlet salmon set and drift gillnet vessels, one harbor porpoise mortality was observed in 2000--the mortality extrapolates to an estimated mortality level of 31.2 for that year, and an average of 15.6 per year when averaged over the two years of observer data.³⁰⁹</p> <p>In 2002, observers were placed on Kodiak Island set gillnet vessels. Two harbor porpoise mortalities were observed in this fishery. These mortalities extrapolate to an estimated mortality of 32.2 animals per year. Therefore, the estimated minimum annual mortality incidental to commercial fisheries is 68.³¹⁰</p> <p>One harbor porpoise mortality was observed in 2001 in the Bering Sea/Aleutian Islands flatfish trawl. The mean annual (total) mortality resulting from observed mortalities was 0.35 (CV = 0.65).³¹¹ During the period from 1981 to 1987, 7 harbor porpoise mortalities have resulted from gillnet entanglement in the area from Nome to Unalakleet, 3 were reported near Kotzebue from 1989 to 1990, and some take of harbor porpoise is likely in the Bristol Bay gillnet fisheries (Barlow et al. 1994). A similar set gillnet fishery conducted by subsistence fishers incidentally took 6 harbor porpoise in 1991 near Point Barrow, Alaska. When averaged over the period from 1981 to 1990, the resulting annual mortality attributable to subsistence gillnets is 1.4 porpoise $((7 + 3 + 6)/11 = 1.4)$.³¹²</p>	

³⁰⁸ Angliss, R. P., and R. B. Outlaw. 2006. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 146

³⁰⁹ Angliss, R. P., and R. B. Outlaw. 2006. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 142

³¹⁰ Id.

³¹¹ Angliss, R. P., and R. B. Outlaw. 2006. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 142

³¹² Angliss, R. P., and R. B. Outlaw. 2005. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 132

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Species	<i>Sousa chinensis</i> Indopacific humpback dolphin	
Abundance Estimate	Moreton Bay, Brisbane Aus	119-163
	Central Section Great Barrier Reef	200
Fisheries	Humpback dolphins are incidentally captured in inshore gillnets set across rivers and estuaries to catch barramundi and other fish; they are also captured in offshore driftnet fisheries.	
Estimated Annual Mortality	Shark nets killed 18 humpback dolphins between 1968 and 2001, 11 of which were from nets at Townsville and Cairns ³¹³	
	One animal was reported in a Taiwanese driftnet fishery for Spanish mackerel, tunas and sharks operating off northern Australia between 1974 and 1986. ³¹⁴	
	The IWC, in 1994, estimated that more than 100 humpback dolphins are killed in this area. ³¹⁵	
Species	<i>Pseudorca crassidens</i> False killer whale	
Abundance Estimate	No Abundance Estimate	
Fisheries	False killer whales are incidentally captured in Taiwanese pelagic gillnet fisheries in Australian territorial waters off northern Australia; Current threats include culling to protect finfish fisheries off western Japan. False killer whales are also incidentally captured in tuna purse-seine and other net and long-line fisheries elsewhere in Pacific Ocean including possible entanglement in driftnets lost or discarded in international waters.	
Estimated Annual Mortality	A single animal was reported in the Taiwanese driftnet fishery off Northern Australia. ³¹⁶	
	The IWC, in 1994, estimated that more than 11 false killer whales are incidentally killed in this area. ³¹⁷	
Species	<i>Tursiops aduncus</i> Bottlenose dolphin	

³¹³ Parra, G.J., Corkeron, P.J. and Marsh, H. (2002). The Indo-Pacific Indo-Pacific Humpbacked dolphin, *Sousa chinensis* (Osbeck, 1765) in Australian waters: a summary of current knowledge and recommendations for their conservation. 54th Annual Meeting of the International Whaling Commission, Shimonoseki, Japan, May 2002, SC/54/SM27.

³¹⁴ Harwood, M. B. and Hembree, E.D. (1987). Incidental catch of small cetaceans in the offshore gillnet fishery in northern Australian waters: 1981-1985. *Report of the International Whaling Commission*. 37: 363-367.

³¹⁵ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

³¹⁶ Harwood, M. B. and Hembree, E.D. (1987). Incidental catch of small cetaceans in the offshore gillnet fishery in northern Australian waters: 1981-1985. *Report of the International Whaling Commission*. 37: 363-367.

³¹⁷ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

Worldwide Cetacean Bycatch/Appendices

Abundance Estimate ³¹⁸	Moreton Bay, Brisbane Aus	334
	inshore waters off North Stradbroke Is	321
	open coastal waters off North Stradbroke Is.	700-1000
Fisheries	Bottlenose dolphins are incidentally captured, (possibly substantial) in the Taiwanese gillnet fishery and shark nets to protect bathers. Bottlenose dolphins are also caught in driftnet fisheries in Malabuhan, Siaton, and Negros Island.	
Estimated Annual Mortality	From 1974 to 1986, the Taiwanese gillnet fishery in the Arafura Sea and Timor Seas, northern Australia, incidentally caught an estimated 8400 <i>T. aduncus</i> , which comprised 60% of the total dolphin bycatch. ³¹⁹ The annual mortality perhaps exceeded 2000 animals—severely impacting local populations. As a result the fishery was closed in 1986. The IWC, in 1994, estimated that more than 1700 bottlenose dolphins are incidentally killed in this area. ³²⁰	
Species	<i>Stenella longirostris</i> Spinner dolphin	
Abundance Estimate ³²¹	Southern part of the Sulu Sea northeastern Malaysian waters	4,000
	Eastern Sulu Sea	30,000
Fisheries	Spinner dolphins are incidentally caught in gillnet fisheries, purse seine fisheries and driftnet fisheries in Malabuhan, Siaton, and Negros Island, and shark nets in Queensland. A small cetacean fishery kills some spinner Dolphins in the Solomon Islands, and they are incidentally killed in Thailand by shrimp trawls. ³²²	
Estimated Annual Mortality	Commercial and municipal purse seine fisheries based in the Philippines annually caught an estimated 1,500-2,000 and 2,000 to 3,000 dolphins respectively, including spinner dolphins. ³²³ Spinner dolphins comprised 35% of the identified cetaceans in the catch of the Taiwanese driftnet fishery in Northern Australian waters, suggesting a total mortality of at least 4900 spinner dolphins over 54	

³¹⁸ Ross, GJB. 2006 Review of the conservation status of Australia' smaller whales and dolphins. Australian Government <http://www.deh.gov.au/coasts/publications/pubs/conservation-smaller-whales-dolphins.pdf>

³¹⁹ Harwood, M. B. and Hembree, E.D. (1987). Incidental catch of small cetaceans in the offshore gillnet fishery in northern Australian waters: 1981-1985. *Report of the International Whaling Commission*. 37: 363-367.

³²⁰ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

³²¹ Dolar ML 1999. Abundance, distribution and feeding ecology of small cetacean in the Eastern Sulu Sea and Tanon Strait, Philippines. PhD Thesis, U of Cal, San Diego, USA

³²² Bannister, J.L., Kemper, C.M. and Warneke, R.M. (1996). *The Action Plan for Australian Cetaceans*. Australian Nature Conservation Agency: Canberra vii 242 pp.

³²³ Dolar, M.L.L. 1994. Incidental takes of small cetaceans in fisheries in Palawan, central Visayas and northern Mindanao in the Philippines. *Report of the International Whaling Commission (Special Issue)* **15**, 355–363.

³²⁴ Harwood, M. B. and Hembree, E.D. (1987). Incidental catch of small cetaceans in the offshore gillnet fishery in northern Australian waters: 1981-1985. *Report of the International Whaling Commission*. 37: 363-367.

³²⁵ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

months between 1974 and 1986.³²⁴ Total annual mortality for spinner dolphins numbered around 1000 and 20 dolphins in the purse seine and driftnet fisheries respectively.

The IWC, in 1994, estimated that more than 1000 spinner dolphins are incidentally killed in this area.³²⁵

Species	<i>Stenella attenuata</i> Pantropical spotted dolphin
Abundance Estimate	No Abundance Estimate
Fisheries	Spotted dolphins are incidentally captured in northern Australian fisheries; in Taiwanese gillnet fisheries, purse–seine fisheries in the Philippines, and in nets set to capture sharks for the protection of bathers.
Estimated Annual Mortality	<p>From 1974 to 1986, the Taiwanese gillnet fishery in the Arafura Sea and Timor Sea, operating within (northern)Australia’s Economic Exclusion Zone (EEZ), incidentally killed an estimated 560 <i>S. attenuate</i>, which comprised 4% of the total dolphin bycatch from that gillnet fishery.³²⁶</p> <p>Directed fisheries and incidental catch kill large numbers of spotted dolphin in the Philippines, where they used for human consumption. Spotted dolphins were caught in purse seine fisheries and a smaller driftnet fishery (for clupeids and needlefish) in the Visayan Sea in the Philippines. Total annual spotted dolphins mortality was <1000 animals in these three fisheries.³²⁷</p> <p>Spotted dolphins are caught in inshore shark nets in low numbers in Qld and NSW. There is also a drive fishery which operates in the Solomon Is. where Pantropical dolphins are the preferred catch.</p> <p>The IWC, in 1994, estimated that more than 130 spotted dolphins are incidentally or directly killed in this area.³²⁸</p>

Species	<i>Lagenodelphis hosei</i> Fraser's dolphin.
	Eastern Sulu Sea 8,700
Fisheries	Fraser’s dolphins are caught in two purse seine fisheries and a small driftnet fishery in the Visayan Sea in the Philippines.
Estimated Annual Mortality	<p>Fraser’s dolphins are incidentally captured in gillnet fisheries in the Philippines (second most frequently caught species there); they are also killed in harpoon fisheries in Indonesia and Taiwan</p> <p>They may also be incidentally and illegally captured within Australian</p>

³²⁶ Harwood, M. B. and Hembree, E.D. (1987). Incidental catch of small cetaceans in the offshore gillnet fishery in northern Australian waters: 1981-1985. *Report of the International Whaling Commission*. 37: 363-367.

³²⁷ Dolar, M.L.L. 1994. Incidental takes of small cetaceans in fisheries in Palawan, central Visayas and northern Mindanao in the Philippines. *Report of the International Whaling Commission (Special Issue)* 15, 355–363

³²⁸ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 27

³²⁹ Harwood, M. B. and Hembree, E.D. (1987). Incidental catch of small cetaceans in the offshore gillnet fishery in northern Australian waters: 1981-1985. *Report of the International Whaling Commission*. 37: 363-367.

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waters in northern Australia and entangled in driftnets set outside Australian Territorial Waters.³²⁹

Species	<i>Orcaella brevirostris</i> Irrawaddy (snubfin) dolphin
Abundance Estimate	No Total Abundance Estimate
	Mahakam River, Indonesia 34-50 ³³⁰
	Semayang Lake 100-150 ³³¹
	Malampaya Sound in Palawan, Philippines 77 ³³²
	North Queensland, Australia 38-46 ³³³
	Gulf of Carpentaria (Blue Mud Bay) 1,000 ³³⁴
	Mekong River 69
Fisheries	Irrawaddy dolphins are incidentally captured in northern Australian fisheries, in barramundi nets, for which little data on take is available, and in nets set to capture sharks for the protection of bathers.
Estimated Annual Mortality	From 1997-1999 an average of three dolphins died per year from gillnet entanglements, representing between 6 and 8.8 percent of the population. ³³⁵ In the Mekong River from 2001-2003, an average of four deaths per year were attributed to gillnet entanglement representing 5.8% of a population estimated to number only 69 individuals. ³³⁶ In Songkhla Lake, from 1990-2003, at least 15 Irrawaddy dolphins were killed accidentally in gillnets from a population that may number as few as 8-15 individuals. ³³⁷

³³⁰ Kreb, D. 2002. Density and abundance estimates of the Irrawaddy dolphin, *Orcaella brevirostris*, in the Mahakam River of East Kalimantan, Indonesia: a comparison of survey techniques. *Raffles Bulletin of Zoology*, Supplement, 85–95.

³³¹ Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages

³³² Dolar, M.L.L., Perrin, W.F., Gaudio, J.P., Yaptinchay, A.A.S.P., and Tan, J.M.L. 2002. Preliminary report on a small estuarine population of Irrawaddy dolphins *Orcaella brevirostris* in the Philippines. *Raffles Bulletin of Zoology*, Supplement, 155–160.

³³³ Freeland WJ, Bayliss P. 1989. The Irrawaddy River dolphin (*Orcaella brevirostris*) in coastal waters of the Northern Territory, Australia: Distribution, abundance and seasonal changes. *Mammalia* 53: 49-58

³³⁴ Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages

³³⁵ Kreb, D. 2002. Density and abundance estimates of the Irrawaddy dolphin, *Orcaella brevirostris*, in the Mahakam River of East Kalimantan, Indonesia: a comparison of survey techniques. *Raffles Bulletin of Zoology*, Supplement, 85–95.

³³⁶ Beasley, I., Chooruk, S., and Pwpong, N. 2002. The status of the Irrawaddy dolphin, *Orcaella brevirostris*, in Songkhla Lake, southern Thailand, *Raffles Bulletin of Zoology*, Supplement 10: 75-83.

³³⁷ Beasley, I., Chooruk, S., and Pwpong, N. 2002. The status of the Irrawaddy dolphin, *Orcaella brevirostris*, in Songkhla Lake, southern Thailand, *Raffles Bulletin of Zoology*, Supplement 10: 75-83.

³³⁸ Harwood, M. B. and Hembree, E.D. (1987). Incidental catch of small cetaceans in the offshore gillnet fishery in northern Australian waters: 1981-1985. *Report of the International Whaling Commission*. 37: 363-367.

Two dolphins were caught by the Taiwanese net fishery in the early 1980s.³³⁸

AREA 77 EASTERN CENTRAL PACIFIC

The Eastern Central Pacific includes cetaceans within the US EEZ, since the focus of this report is international bycatch, and the assessment and mitigation of bycatch in the United States is governed under the MMPA, the description for this area will focus only on international bycatch of shared cetacean stocks.

Species	<i>Eschrichtius robustus</i> Grey whale.	
Abundance Estimate	Eastern North Pacific Stock	18,813 (CV = 0.07) ³³⁹
Fisheries	Gray whales are incidentally caught in purse seine, gillnets, and pot fisheries.	
Estimated Annual Mortality	From 1999 to 2003, the mean annual mortality of gray whales in AK salmon purse seines, pot fisheries, CA white seabass gillnet fishery was >0.5, >1.2, and >0.2 animals respectively. ³⁴⁰ During that same period more than 3.6 gray whales died annually in unknown gillnet fisheries. ³⁴¹ Since there are no Mexican observer programs, few data concerning the mortality of gray whales incidental to Mexican commercial fisheries are available. Data regarding the level of gray whale mortality related to commercial fisheries in Mexican waters is thought to be small. The estimated minimum annual mortality incidental to US commercial fisheries is 6.7 animals. ³⁴²	

Species	<i>Megaptera novaeangliae</i> Humpback whales	
Abundance Estimate	Eastern North Pacific Stock	1,391 (CV = 0.22) ³⁴³
Fisheries	Humpback whales are incidentally caught in purse seine, gillnet, and pot fisheries.	
Estimated Annual Mortality	Numbers killed in international shark and swordfish driftnet fisheries are unknown, but, in view of the size of the population in this area (1000+ animals), any increase in driftnetting could cause a problem.	

Species	<i>Pseudorca crassidens</i> False killer whale.	
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³³⁹ Angliss, R. P., and R. B. Outlaw. 2005. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 153

³⁴⁰ Angliss, R. P., and R. B. Outlaw. 2006. Alaska marine mammal stock assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSAFSC-161, 250 p. at 171,172

³⁴¹ Id.

³⁴² Id.

³⁴³ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 167

Worldwide Cetacean Bycatch/Appendices

Abundance Estimate	Hawaiian Stock	236 (CV = 1.13) ³⁴⁴
	Eastern Tropical Pacific	47,921 (CV = 0.29) ³⁴⁵
Fisheries	False killer whales are captured in longlines and troll fisheries.	
Estimated Annual Mortality	Average 5-yr estimates of annual mortality and serious injury for 2000-2004 are 6.8 (CV = 0.36) false killer whales outside of U.S. EEZs, 4.2 (CV = 0.43) within the Hawaiian Islands EEZ, and 1.8 (CV = 0.53) within the EEZ of Palmyra Atoll. ³⁴⁶	
	Total estimated annual mortality and serious injury for all U.S. EEZs combined averaged 6.0 (CV = 0.35) between 2000 and 2004. ³⁴⁷	
	No estimates of mortality are available for international fisheries. This mortality may not be sustainable.	
Species	<i>Steno bredanensis</i> Rough-toothed dolphin.	
Abundance Estimate	Hawaiian Stock	19,904 (CV = 0.52) ³⁴⁸
	Eastern Tropical Pacific	47,921 (CV = 0.29) ³⁴⁹
Fisheries	Rough-toothed dolphins are captured in gillnet fisheries, purse seine fisheries, longlines, and trawls.	
Estimated Annual Mortality	Rough-toothed dolphins are taken in small number in the tuna purse seine fishery—21 were estimated killed during the period 1970-75 and 36 died in a single net haul in 1982. However, in recent years the mortality has been significantly less, in 1998, 1999, and 2001 there was no mortality and in 2000 and 2002, 27 and 5 rough-toothed dolphins died in the ETP purse-seine fishery. ³⁵⁰	
Species	<i>Globicephala macrorhynchus</i> Short-finned pilot whale.	
Abundance Estimate	California/Oregon/Washington Stock	304 (CV = 1.02) ³⁵¹

³⁴⁴ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 228

³⁴⁵ Gerrodette, T, Watters, G, Forcada J. 2005. Preliminary Estimates of 2003 Dolphin Abundance in the Eastern Tropical Pacific NOAA Tech. Memo. NMFSSWFSC-LJ-05-05. 27p at 14

³⁴⁶ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 229

³⁴⁷ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 229

³⁴⁸ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 196

³⁴⁹ Gerrodette, T, Watters, G, Forcada J. 2005. Preliminary Estimates of 2003 Dolphin Abundance in the Eastern Tropical Pacific NOAA Tech. Memo. NMFSSWFSC-LJ-05-05. 27p at 14

³⁵⁰ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

³⁵¹ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 135

Worldwide Cetacean Bycatch/Appendices

	Hawaiian Stock	8,846 (CV = 0.49)
	Eastern Tropical Pacific	160,000
Fisheries	Pilot whales are caught in gillnet fisheries, purse seine fisheries, longlines and trawls. Drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California, Mexico and may capture Pilot whales.	
Estimated Annual Mortality	The average 5-yr estimates of annual mortality and serious injury for 2000-2004 are 3.6 (CV = 0.69) short-finned pilot whales outside of the U.S. EEZs, and 0.6 (CV = 1.00) within the U.S. EEZ of Johnston Atoll. ³⁵²	
	Pilot whales are also caught in small numbers in the tuna purse seine fishery, one was captured in 2000 and 2002. ³⁵³	
	No estimates of mortality are available for international fleets	
Species	<i>Grampus griseus</i> Risso's dolphin.	
Abundance Estimate	California/Oregon/Washington Stock	16,066 (CV = 0.28) ³⁵⁴
	Hawaiian Stock	2,351 (CV = 0.65) ³⁵⁵
	Eastern Tropical Pacific	76,595 (CV = 0.21) ³⁵⁶
Fisheries	Risso's dolphins are entangled in gillnet fisheries, purse seine fisheries, longlines and trawls. Drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California, Mexico and may capture Risso's dolphins	
Estimated Annual Mortality	Rarely entangled in the tuna purse seine fishery in the eastern tropical Pacific. The last reported mortality in the tuna purse seine fishery was of 3 Risso's dolphins in 1999. ³⁵⁷	
	Average 5-yr estimates of annual mortality and serious injury for 1998-2002 in the Hawaiian-based longline fleet are 8.2 (CV = 0.66) Risso's dolphins outside of U.S. EEZs, and none within the Hawaiian Islands EEZ. ³⁵⁸ No estimates of mortality are available for other international longline fleets.	

³⁵² Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p.

³⁵³ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

³⁵⁴ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 91

³⁵⁵ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 199

³⁵⁶ Gerrodette, T, Watters, G, Forcada J. 2005. Preliminary Estimates of 2003 Dolphin Abundance in the Eastern Tropical Pacific NOAA Tech. Memo. NMFSSWFSC-LJ-05-05. 27p at 14

³⁵⁷ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

³⁵⁸ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 200

Species	<i>Lagenorhynchus obliquidens</i> Pacific white-sided dolphin.	
Abundance Estimate	California/Oregon/Washington Stock	59,274 (CV = 0.50) ³⁵⁹
	North Pacific	931,000 ³⁶⁰
Fisheries	Pacific white-sided dolphins are entangled in gillnet fisheries, purse seine fisheries, longlines and trawls. Drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California, Mexico and may capture Pacific white-sided dolphins	
Estimated Annual Mortality	Pacific white-side dolphins are rarely capture in the tuna purse seine fishery in the eastern tropical Pacific because most of the fishing takes place south of the range of these dolphins; there have been no reported entanglements in this fishery from 1999 though 2003. ³⁶¹ No other estimates of mortality are available.	

Species	<i>Lagenodelphis hosei</i> Fraser's dolphin.	
Abundance Estimate	Hawaiian Stock	16,836 (CV = 1.11) ³⁶²
	Eastern Tropical Pacific	289,500 ³⁶³
Fisheries	Fraser's dolphins are captured in gillnet fisheries, purse seine fisheries, longlines pot fisheries, and trawls.	
Estimated Annual Mortality	Fraser's dolphins are captured in small number in the tuna purse seine fishery; however, from 1999 to 2003 there have been no reported entanglements in this fishery. ³⁶⁴ In 2005, one dolphin was captured; ³⁶⁵ but no other estimates of mortality are available.	

Species	<i>Tursiops truncatus</i> Bottlenose dolphin	
Abundance Estimates	Eastern Tropical Pacific	277,568 (CV = 0.25) ³⁶⁶

³⁵⁹ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 87

³⁶⁰ Buckland ST, Cattanch KL, Hobbs RC 1993. Abundance estimates of Pacific white-sided dolphin, northern right whale dolphin, Dall's porpoise and northern fur seal in the North Pacific, 1987-1990. Int North Pacific Fish Comm Bull 53: 387-407.

³⁶¹ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

³⁶² Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 219

³⁶³ Gerrodette, T, Wade, PR. 1991. Monitoring Trends in Dolphin Abundance in the Eastern Tropical Pacific Analysis of 1989 data. (IWC SC/42/SM-42). Rep Int Whal Comm 41:511-515

³⁶⁴ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

³⁶⁵ Report of the International Dolphin Conservation Program. 2006. MOP-15-05 REV

³⁶⁶ Gerrodette, T, Watters, G, Forcada J. 2005. Preliminary Estimates of 2003 Dolphin Abundance in the Eastern Tropical Pacific NOAA Tech. Memo. NMFSSWFSC-LJ-05-05. 27p at 14

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	Hawaiian Stock	3,263 (CV = 0.60) ³⁶⁷	
Fisheries	Bottlenose dolphins are entangled in gillnet fisheries, purse seine fisheries, longlines and trawls. Drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California, Mexico and may capture bottlenose dolphins.		
Estimated Annual Mortality	Bottlenose dolphins are rarely caught in the tuna purse seine fishery in the eastern tropical Pacific. From 1998 to 2003 there were 29, 9, 4, 1, 10, and 4 deaths of bottlenose dolphins in this fishery. ³⁶⁸ In 2005, 7 bottlenose dolphins were incidentally killed in the tuna purse seine fishery. ³⁶⁹		
	Average 5-yr estimates of annual mortality and serious injury for 1998-2002 in the Hawaiian-based longline fleet are 5.8 (CV = 1.00) bottlenose dolphins outside of U.S. EEZs, and none within U.S. EEZs. ³⁷⁰ No other estimates of mortality are available.		
Species	<i>Stenella longirostris</i> Spinner dolphin.		
Abundance Estimate	Hawaiian Stock	2,805 (CV = 0.66) ³⁷¹	2005 Mortality
			0
	Eastern spinner dolphin	616,662 (CV = 0.22) ³⁷²	274/<0.04%
	Whitebelly spinner dolphin	441,711 (CV = 0.45) ³⁷³	115/0.03%
Fisheries	Spinner dolphins are entangled in gillnet fisheries, purse seine fisheries, longlines and trawls.		
Estimated Annual Mortality	See estimates above. In the eastern tropical Pacific, spinner dolphins have been incidentally killed in international tuna purse seine fisheries since the late 1950's. Between 1996 and 2005, annual fishing mortality of eastern spinner dolphins ranged between 224 and 469 animals, with an average of 356. ³⁷⁴		

³⁶⁷ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 204

³⁶⁸ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

³⁶⁹ Report of the International Dolphin Conservation Program. 2006. MOP-15-05 REV

³⁷⁰ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 204

³⁷¹ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 212

³⁷² Estimates for offshore spotted dolphins include mortalities of coastal spotted dolphins

³⁷³ Gerrodette, T, Watters, G, Forcada J. 2005. Preliminary Estimates of 2003 Dolphin Abundance in the Eastern Tropical Pacific NOAA Tech. Memo. NMFSSWFSC-LJ-05-05. 27p at 14

³⁷⁴ Report of the International Dolphin Conservation Program. 2006. MOP-15-05 REV

³⁷⁵ Report of the International Dolphin Conservation Program. 2006. MOP-15-05 REV

Worldwide Cetacean Bycatch/Appendices

Between 1996 and 2005, annual fishing mortality of whitebelly spinner dolphins ranged between 115 and 498 animals, with an average of 271.³⁷⁵

Species	<i>Stenella coeruleoalba</i> Striped dolphin.		
Abundance Estimate	California/Oregon/Washington Stock	13,934	(CV = 0.53) ³⁷⁶
	Hawaiian Stock	10,385	(CV = 0.48) ³⁷⁷
	Eastern Tropical Pacific	1,470,854	(CV = 0.15) ³⁷⁸
Fisheries	Striped dolphins are entangled in gillnet fisheries, purse seine fisheries, longlines and trawls. Drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California, Mexico and may capture Striped dolphins		
Estimated Annual Mortality	Striped dolphins are captured in the tuna purse seine fishery in the eastern tropical Pacific. From 1998 to 2003 there were 24, 5, 11, 3, 2, and 11 deaths of striped dolphins in this fishery. ³⁷⁹ In 2005, 15 striped dolphins were incidentally killed in the tuna purse seine fishery. ³⁸⁰		

Species	<i>Stenella attenuata</i> Spotted dolphin.		
Abundance Estimate	Hawaiian Stock	10,260 (CV = 0.41) ³⁸¹	2005 Mortality 0.8
	Northeastern offshore spotted	736, 737 (CV = 0.15) ³⁸²	271/<0.03%
	Western/southern offshore spotted dolphin	627,863 (CV = 0.31) ³⁸³	99/0.01%
	Coastal spotted dolphins	149,393 (CV = .027) ³⁸⁴	3/<0.01%

³⁷⁶ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 103

³⁷⁷ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 216

³⁷⁸ Gerrodette, T, Watters, G, Forcada J. 2005. Preliminary Estimates of 2003 Dolphin Abundance in the Eastern Tropical Pacific NOAA Tech. Memo. NMFSSWFSC-LJ-05-05. 27p at 14

³⁷⁹ IWC. 2003. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 5 (Suppl.) See also IWC. 2004. Report of the Scientific Committee, Annex K. J. Cetacean Res. Manage. 6 (Suppl.)

³⁸⁰ Report of the International Dolphin Conservation Program. 2006. MOP-15-05 REV

³⁸¹ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 208

³⁸² Estimates for offshore spotted dolphins include mortalities of coastal spotted dolphins

³⁸³ Gerrodette, T, Watters, G, Forcada J. 2005. Preliminary Estimates of 2003 Dolphin Abundance in the Eastern Tropical Pacific NOAA Tech. Memo. NMFSSWFSC-LJ-05-05. 27p at 14

³⁸⁴ Gerrodette, T, Watters, G, Forcada J. 2005. Preliminary Estimates of 2003 Dolphin Abundance in the Eastern Tropical Pacific NOAA Tech. Memo. NMFSSWFSC-LJ-05-05. 27p at 14

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Fisheries	Spotted dolphins are entangled in gillnet fisheries, purse seine fisheries, longlines and trawls.
Estimated Annual Mortality	See estimates above. In the eastern tropical Pacific, spotted dolphins have been incidentally killed in international tuna purse seine fisheries since the late 1950's. Between 1996 and 2005, annual fishing mortality of northeastern spotted dolphins ranged between 260 and 818 animals, with an average of 435. ³⁸⁵ Between 1996 and 2005, annual fishing mortality of western/southern spotted dolphins ranged between 99 and 1,044 animals, with an average of 383. ³⁸⁶

Species	<i>Delphinus delphis</i> Short-Beaked Common dolphin		
Abundance Estimate	California/Oregon/Washingt on Stock	449,846 (CV = 0.25) ³⁸⁷	2005 Mortality N/A
	Long-Beaked Common Dolphin	43,360 (CV = 0.72)	N/A
	Northern Common Dolphins	449,464 ³⁸⁸	114/<0.01%
	Southern Common Dolphins	1,525,207 ³⁸⁹	154/0.01%
	Central Common Dolphins	577,048 ³⁹⁰	57/<0.01%

Fisheries	Common dolphins are entangled in gillnet fisheries, purse seine fisheries, longlines and trawls. Drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California, Mexico and may capture common dolphins
Estimated Annual Mortality	See estimates above. In the eastern tropical Pacific, 'northern common dolphins' have been incidentally killed in international tuna purse seine fisheries since the late 1950's. Between 1996 and 2005, annual fishing mortality of northern common dolphins (potentially including both short-beaked and long-beaked common dolphins) ranged between 9 and 261 animals, with an average of 105. ³⁹¹ Although it is unclear whether these animals are part of the same population as short-beaked common dolphins found off California, they are managed separately--specifically

³⁸⁵ Report of the International Dolphin Conservation Program. 2006. MOP-15-05 REV

³⁸⁶ Report of the International Dolphin Conservation Program. 2006. MOP-15-05 REV

³⁸⁷ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 108

³⁸⁸ Report of the International Dolphin Conservation Program. 2006. MOP-15-05 REV

³⁸⁹ Report of the International Dolphin Conservation Program. 2006. MOP-15-05 REV

³⁹⁰ Report of the International Dolphin Conservation Program. 2006. MOP-15-05 REV

³⁹¹ Report of the International Dolphin Conservation Program. 2006. MOP-15-05 REV

³⁹² Report of the International Dolphin Conservation Program. 2006. MOP-15-05 REV

³⁹³ Report of the International Dolphin Conservation Program. 2006. MOP-15-05 REV

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for the management of dolphins involved in eastern tropical Pacific tuna fisheries.

Between 1996 and 2005, annual fishing mortality of central common dolphins ranged between 51 and 223 animals, with an average of 125.³⁹²

Between 1996 and 2005, annual fishing mortality of southern common dolphins ranged between 1 and 222 animals, with an average of 66.³⁹³

Species	<i>Phocoena sinus</i> Vaquita.
Abundance Estimate	567 ³⁹⁴
Fisheries	Vaquita are incidentally killed in coastal gillnet fisheries totoaba, sharks, rays, mackerels, croaker, and shrimp and shrimp trawls.
Estimated Annual Mortality	143 Vaquita were killed in various fishing operations between March 1985 and January 1994 with an annual incidental mortality of 35. From January 1993 to January 1995, the total estimated incidental mortality caused by the fleet of El Golfo de Santa Clara was 39 vaquitas per year, which is over 17% of the most recent estimate of population size. ³⁹⁵

Species	<i>Phocoenoides dalli</i> Dall's porpoise.
Abundance Estimate	California/Oregon/Washington Stock 449,846 (CV = 0.25) ³⁹⁶
Fisheries	Dall's porpoise are entangled in gillnet fisheries, longlines and trawls. Drift gillnet fisheries for swordfish and sharks exist along the entire Pacific coast of Baja California, Mexico and may capture Dall's porpoise.
Estimated Annual Mortality	No Estimates of Mortality

³⁹⁴Jaramillo Legorreta AM, Rojas Bracho L. Gerrodette T. 1999. A new abundance estimate for vaquitas: First step for recovery. *Mar Mamm Sci* 15: 957-973. In 1986-1993, line-transect boat surveys yielded an estimate of 503; in 1986-1989, aerial surveys yielded 885, 1991 aerial surveys yielded 572 animals, and 224 from a ship survey in 1993.

³⁹⁵ Vidal O, Brownell RL, Findley LT 1999. Vaquita—*Phocoena sinus* Norris and McFarland, 1958. In: *Handbook of Marine Mammals* (Ridgway SH, Harrison SR, eds.) Vol 6: The second book of dolphins and porpoises, pp 357-378

³⁹⁶ Carretta, JV, Forney, KA, Muto, MM, Barlow, J, Baker J, Hanson B, and Lowry MS. 2005. U.S. Pacific Marine Mammal Stock Assessments, 2005. U.S. Dep. Commer., NOAA Tech. Memo. NMFSSWFSC-388, 317 p. at 82

AREA 81 SOUTHWEST PACIFIC

Species ***Hyperoodon ampullatus* Southern bottlenose whale.**
 Abundance Estimate South of the Antarctic Convergence 599,300³⁹⁷
 Fisheries Southern bottlenose whales are entangled in driftnets in the Tasman Sea
 Estimated Annual Mortality No Estimates of Mortality

Species ***Delphinus delphis* Common dolphin**
 Abundance Estimate No Abundance Estimate--considered numerous
 Fisheries Common dolphins are entangled in New Zealand trawl fisheries. Common dolphins may also be captured in the albacore driftnet fishery in the Tasman Sea
 Estimated Annual Mortality In New Zealand, In 1994, 1996, and 1997 fisheries incidentally captured 9, 2, and 4 common dolphins respectively.³⁹⁸

Species ***Lagenorhynchus obscurus* Dusky dolphin**
 Abundance Estimate 12,000 to 20,000
 Fisheries Unknown numbers of dusky dolphins are caught in set nets in New Zealand.
 Estimated Annual Mortality Current catches in set nets appear to have decreased from those of the 1970s and 1980s but are estimated at one port to be 100-200 animals per year.³⁹⁹ In New Zealand, in 1996 and 1997, fisheries incidentally captured 1 dusky dolphin each year.⁴⁰⁰

Species ***Cephalorhynchus hectori*. Hector's dolphin⁴⁰¹**
 Abundance South Island—east coast⁴⁰³ 1900

³⁹⁷ Kasamatsu, F. and Joyce, G.G. 1995. Current status of odontocetes in the Antarctic. *Antarctic Science* 7, 365–379.

³⁹⁸ Report of the Scientific Committee. Annex I Report of the Standing Sub-Committee on Small Cetaceans 1999. *J Cetacean Res. Manage.* 1 Suppl. at 223

³⁹⁹ Jefferson TA, Leatherwood S, Webber MA 1993. *FAO Species identification guide. Marine Mammals of the world.* UNEP/FAO, Rome, 320pp

⁴⁰⁰ Report of the Scientific Committee. Annex I Report of the Standing Sub-Committee on Small Cetaceans 1999. *J Cetacean Res. Manage.* 1 Suppl. at 223

⁴⁰¹ Considered Endangered under the IUCN Red List

⁴⁰² Slooten, E., Dawson, S., and Rayment, W. 2002. Quantifying abundance of Hector's dolphins between Farewell Spit and Milford Sound. Published Client Report on Contract 3076, funded by Conservation Services Levy. Department of Conservation, Wellington, New Zealand. <http://csl.doc.govt.nz/dsis35.pdf>.

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Estimate ⁴⁰²	South Island—west coast	5400
Fisheries	Hector's dolphins are caught in coastal gillnets. While there are no quantitative estimates, several dolphins are killed each year in recreational gillnets, and there are at least occasional catches in trawl nets. ⁴⁰⁴	
Estimated Annual Mortality	In the mid-1980s an average of 57 Hector's dolphins were caught each year in gillnets in the Canterbury region. Between 1984 and 1988, incidental captures around the Banks Peninsula amounted to at least 223. In 1997-1998, the estimated bycatch by commercial gillnetting vessels north and south of Banks Peninsula was 16 Hector's dolphins (CV 39%). ⁴⁰⁵ In New Zealand, in 1994 and 1997 fisheries incidentally captured 8 and 2 Hector's dolphins respectively. ⁴⁰⁶	
Species	Cephalorhynchus hectori maui Maui's dolphin ⁴⁰⁷	
Abundance Estimate	Critically endangered	100-150
Fisheries	Set net fishing poses a major threat to Maui's dolphins. A significant number of Maui's dolphins have been caught and killed in gill nets since 1987 when the New Zealand Department of Conservation began investigating dolphin deaths. In the early 2000s over a 20 month period, six Maui's dolphins showed signs of having been entangled in nets.	
Estimated Annual Mortality	No estimates of mortality are available, but New Zealand has banned set netting along part of the North Island west coast and the Manukau Harbor entrance.	
Species	<i>Orcaella brevirostris</i> Irrawaddy (snubfin) river dolphin	
Abundance Estimate	No Abundance Estimate	
Fisheries	Irrawaddy dolphins are incidentally captured in driftnet fisheries and shark nets to protect bathers.	
Estimated Annual Mortality	In the Townsville area alone, 41 Irrawaddy (Snubfin) dolphins were caught in shark nets between 1968 and 1990; this number is almost certainly an underestimate, for another 55 unidentified "dolphins" or "porpoises" were caught in the nets in the same period, some of which are likely to be <i>Orcaella</i> . ⁴⁰⁸	

403 In 1989 the New Zealand government created the Banks Peninsula Marine Mammal Sanctuary off the east coast of the South Island.

404 Baird, S.J. and Bradford, E. 2000. Estimation of Hector's dolphin bycatch from inshore fisheries, 1997/98 fishing year. Published Client Report on Contract 3024, Conservation Services Levy. Available: www.doc.govt.nz/cons/scires/csl.pdf.

405 Baird, S.J. and Bradford, E. 2000. Estimation of Hector's dolphin bycatch from inshore fisheries, 1997/98 fishing year. Published Client Report on Contract 3024, Conservation Services Levy. Available: www.doc.govt.nz/cons/scires/csl.pdf.

406 Report of the Scientific Committee. Annex I Report of the Standing Sub-Committee on Small Cetaceans 1999. J Cetacean Res. Manage. 1 Suppl. at 223

407 Formerly known as North Island Hector's dolphin

408 Parra, G.J., Corkeron, P.J. and Marsh, H. (2002). The Indo-Pacific Indo-Pacific Humpbacked dolphin, *Sousa*

AREA 87 SOUTHEAST PACIFIC

Species	<i>Mesoplodon peruvianus</i> Peruvian beaked whale
Abundance Estimate	No Abundance Estimate
Fisheries	Peruvian beaked whales are entangled in the driftnet fishery for sharks off Peru ⁴⁰⁹
Estimated Annual Mortality	Ten Peruvian beaked whales have been recorded, at least 9 of which appear to have been captured in the Peruvian coastal driftnet fishery. ⁴¹⁰ No Estimates of Mortality

Species	<i>Physeter macrocephalus</i> Sperm whale
Abundance Estimate	Eastern Tropical Pacific and Ecuadorian EEZ 1,179
Fisheries	Sperm whales may be entangled in swordfish driftnets in Chile. Off north-central Chile, sperm whales are known to be attracted to longliners, reportedly to scavenge the targeted Patagonian toothfish (<i>Dissostichus eleginoides</i>), and fishermen shoot at them and use other means of deterrence. ⁴¹¹
Estimated Annual Mortality	Between 1987 and October of 1994, twenty strandings of sperm whales were recorded along the Ecuadorian coast, 11 cases involved interactions with fishing gear amounting to 1.4 whales per year; ⁴¹² however, no mortality estimates are available.

Species	<i>Kogia breviceps</i> Pygmy sperm whale
Abundance Estimate	No Abundance Estimate
Fisheries	There is a report a specimen from Peru which had apparently been captured by fishermen. ⁴¹³
Estimated Annual Mortality	No Estimates of Mortality

chinensis (Osbeck, 1765) in Australian waters: a summary of current knowledge and recommendations for their conservation. 54th Annual Meeting of the International Whaling Commission, Shimonoseki, Japan, May 2002, SC/54/SM27.

⁴⁰⁹Jefferson TA, Leatherwood S, Webber MA 1993. FAO Species identification guide. Marine Mammals of the world. UNEP/FAO, Rome, 320pp

⁴¹⁰Jefferson TA, Leatherwood S, Webber MA 1993. FAO Species identification guide. Marine Mammals of the world. UNEP/FAO, Rome, 320pp

⁴¹¹Reeves, Randall R., Smith, Brian D., Crespo, Enrique A. and Notarbartolo di Sciara, Giuseppe (compilers). (2003). *Dolphins, Whales and Porpoises: 2002–2010 Conservation Action Plan for the World's Cetaceans*. IUCN/SSC Cetacean Specialist Group. IUCN, Gland, Switzerland and Cambridge, UK. ix + 139pp. at 69

⁴¹²Haase B and Felix F. 1994. A note on the incidental catches of sperm whales (*Physeter macrocephalus*) in Ecuador. Report of the International Whaling Commission (Special Issue) 15:481-483.

⁴¹³Van Waerebeek K and Reyes, JC 1994 Interactions between small cetaceans and Peruvian Fisheries in 1988/89 and analysis of trends. Report of the International Whaling Commission (Special Issue) 15:481-502.

Species	<i>Feresa attenuata</i> Pygmy killer whale.
Abundance Estimate	No Abundance Estimate
Fisheries	A pygmy killer whale was killed in Peruvian coastal gillnets. ⁴¹⁴
Estimated Annual Mortality	No Estimates of Mortality
Species	<i>Globicephala macrorhynchus</i> Short finned pilot whale
Abundance Estimate	No Abundance Estimate
Fisheries	Short finned pilot whales are caught in gillnet and driftnet fisheries.
Estimated Annual Mortality	During the 1990s, the IWC estimated that less than 10 pilot whales died each year in coastal Peruvian fisheries. ⁴¹⁵ At least 5 pilot whales have died in driftnets in Peru in 1988/89. ⁴¹⁶ No total estimates of mortality are available.
Species	<i>Lagenorhynchus obscurus</i> Dusky dolphin
Abundance Estimate	No Abundance Estimate (Off the Peruvian coast, the Dusky dolphin is the third most abundant cetacean species.) ⁴¹⁷
Fisheries	Dusky dolphins are taken in Peruvian coastal gillnets.
Estimated Annual Mortality	In 1988 and 1989, 1,725 and 1,893 dusky dolphins were landed at the port of Pucusana, Peru. ⁴¹⁸ In 87 days during January-August 1994, 722 cetaceans were captured in multi-filament gillnets and landed at Cerro Azul, central Peru, of those 82.7% or 597 were dusky dolphins. ⁴¹⁹

⁴¹⁴ Van Waerebeek K and Reyes, JC 1994 Interactions between small cetaceans and Peruvian Fisheries in 1988/89 and analysis of trends. Report of the International Whaling Commission (Special Issue) 15:481-502.

⁴¹⁵ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 26

⁴¹⁶ Van Waerebeek K and Reyes, JC 1994 Interactions between small cetaceans and Peruvian Fisheries in 1988/89 and analysis of trends. Report of the International Whaling Commission (Special Issue) 15:481-502.

⁴¹⁷ Sanchez R, Aroas Schreiber M, Onton K 1998. Sightings of cetaceans in Peruvian sea and its relation with the main pelagic resources. Cruise RV Humboldt 9803-05 from Tumbes to Tacna. Inf Inst Mar Peru 135: 163-179

⁴¹⁸ Van Waerebeek K and Reyes, JC 1994 Interactions between small cetaceans and Peruvian Fisheries in 1988/89 and analysis of trends. Report of the International Whaling Commission (Special Issue) 15:481-502.

⁴¹⁹ The total kill estimate for a seven-month period, stratified by month, was 1,567 cetaceans. Peruvian fisheries both directed and incidental have killed thousands each year since 1985. In 1991-1993 period, an estimated 7000 animals per year were captured. Circumstantial evidence suggests that, after 1994, increasing enforcement reduced directed takes and illegal trade in meat, but also hampered monitoring.

⁴²⁰ Van Waerebeek K and Reyes, JC 1994 Post-ban small cetaceans takes off Peru: a review. Report of the International Whaling Commission (Special Issue) 15:503-519.

⁴²¹ Report of the Scientific Committee. Annex I Report of the Standing Sub-Committee on Small Cetaceans 1999. J Cetacean Res. Manage. 1 Suppl. at 223

Between 1990 and 1993, Peruvian fisheries landed 3,144 dusky dolphins at the major ports of Puscana, Cerro Azul, San Andres, and Ancon.⁴²⁰ In 1994, Peruvian fisheries incidentally killed 1,272 dusky dolphins.⁴²¹ In conclusion, during the 1990s, the IWC estimated that more than 1,800 dusky dolphins died each year in coastal Peruvian fisheries.⁴²²

Between November 1991 and June 1998, 510 dusky dolphins were landed at the port of San Juan, Peru—most of those animals were captured in 1992 in surface driftnets for cojinova. Capture rates were lower in 1995-1998 when fishers were using fixed bottom-setting gillnets.⁴²³

Data collected at 16 other ports showed high levels of dolphin and porpoise mortality persisted in coastal Peru at least until August 1994 when an unimplemented 1990 ban on small cetacean exploitation was renewed.

In 2000 and 2001 reported catches of dusky dolphins were 12 and 2 respectively.⁴²⁴ The lack of an abundance estimate precludes any assessment of population level impacts.⁴²⁵

Species	<i>Lagenorhynchus australis</i> Peale's dolphin
Abundance Estimate	No Abundance Estimate (Off the Falkland Islands and Chile coast, the Peale's dolphin is the most abundant cetacean species. ⁴²⁶ There has been a marked decrease in the number of sightings in areas of the extreme south where crab fishing takes place. ⁴²⁷
Fisheries	Peale's dolphins are entangled in nets off the coast of Chile and in Peruvian coastal gillnets.
Estimated Annual Mortality	Dolphins in Beagle Channel, the Magallanes, and southern Tierra del Fuego have been harpooned for crab bait since the 1970s. The scale of this killing was great enough to cause reduced abundance by the late 1980s. However, recent evidence suggests that this exploitation has declined and that some recovery may be occurring. ⁴²⁸ Information on

⁴²² Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 26

⁴²³ Majluf P, Babcock EA, Riveros JC, Schreiber MA, and Alderete W. Catch and Bycatch of Sea Birds and Marine Mammal in the small-scale fishery of Punta San Juan, Peru

⁴²⁴ Report of the Scientific Committee. Annex L Report of the Standing Sub-Committee on Small Cetaceans 2004. J Cetacean Res. Manage. 6 Suppl.

⁴²⁵ Van Waerebeek, K., Van Bresseem, M.-F., Félix, F., Alfaro-Shigueto, J., García-Godos, A., Chávez-Lisambart, L., Ontón, K., Montes, D., and Bello, R. 1997. Mortality of dolphins and porpoises in coastal fisheries off Peru and southern Ecuador in 1994. *Biological Conservation* 81, 43–49.

⁴²⁶ Sanchez R, Aroas Schreiber M, Onton K 1998. Sightings of cetaceans in Peruvian sea and its relation with the main pelagic resources. Cruise RV Humboldt 9803-05 from Tumbes to Tacna. *Inf Inst Mar Peru* 135: 163-179

⁴²⁷ Goodall, R.N.P., Norris, K.S., Schevill, W.E., Fraga, F., Praderi, R., Iñiguez Jr., M.A., and de Haro, J.C. 1997b. Review and update on the biology of Peale's dolphin, *Lagenorhynchus australis*. *Report of the International Whaling Commission* 47, 777–796.

⁴²⁸ Goodall, R.N.P., Norris, K.S., Schevill, W.E., Fraga, F., Praderi, R., Iñiguez Jr., M.A., and de Haro, J.C. 1997b. Review and update on the biology of Peale's dolphin, *Lagenorhynchus australis*. *Report of the International Whaling Commission* 47, 777–796.

population structure and the extent to which Peale's dolphins may still be used as crab bait is unknown. No estimates of total incidental mortality are available, however, the scale of Peale's dolphins entanglement in nearshore gillnets is not considered large.⁴²⁹

Species	<i>Tursiops truncatus</i> Bottlenose dolphin
Abundance Estimate	No Abundance Estimate
Fisheries	In Peru, coastal fisheries kill <i>Tursiops</i> for human consumption, using gillnets, purse seines, and harpoons. ⁴³⁰
Estimated Annual Mortality	<p>Bottlenose dolphins are entangled in gillnets in Peru; catches at Pucusana were estimated to total 30 in 1987.⁴³¹ In 1988 and 1989, 18 and 31 bottlenose dolphins were landed at the port of Pucusana, Peru.⁴³² Between 1990 and 1993, Peruvian fisheries landed 120 bottlenose dolphins at the major ports of Puscana, Cerro Azul, San Andres, and Ancon.⁴³³ In 1994, Peruvian fisheries incidentally captured 42 bottlenose dolphins.⁴³⁴</p> <p>Between November 1991 and June 1998, 75 bottlenose dolphins were landed at the port of San Juan, Peru—most of those animals were captured in 1992 in surface driftnets for cojinova. Capture rates were lower in 1995-1998 when fishers were using fixed bottom-setting gillnets.⁴³⁵</p> <p>In 1994, Ecuadorian fisheries incidentally killed 227 bottlenose dolphins.⁴³⁶</p>

⁴²⁹ There is also concern that the proliferation of salmon-culture facilities in southern Chile, especially along the indented coastline of Chiloé Island, is having a negative effect on Peale's dolphins. Morton, A.B. and Symonds, H.K. 2002. Displacement of *Orcinus orca* (L.) by high amplitude sound in British Columbia, Canada. *ICES Journal of Marine Science* 59, 71–80.

⁴³⁰ Although direct killing has noticeably decreased since dolphin hunting was banned by law in 1996, around a thousand dolphins and other small whales are still falling victim annually to fishermen to supply bait meat for the shark fishery. Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages

⁴³¹ Van Waerebeek, K., Reyes, J.C., Read, A.J., and McKinnon, J.S. 1990. Preliminary observations of bottlenose dolphins from the Pacific coast of South America. Pp.143–154 in: *The Bottlenose Dolphin* (eds. S. Leatherwood and R.R. Reeves). Academic Press, San Diego.

⁴³² Van Waerebeek K and Reyes, JC 1994 Interactions between small cetaceans and Peruvian Fisheries in 1988/89 and analysis of trends. Report of the International Whaling Commission (Special Issue) 15:481-502.

⁴³³ Van Waerebeek K and Reyes, JC 1994 Post-ban small cetaceans takes off Peru: a review. Report of the International Whaling Commission (Special Issue) 15:503-519.

⁴³⁴ Report of the Scientific Committee. Annex I Report of the Standing Sub-Committee on Small Cetaceans 1999. J Cetacean Res. Manage. 1 Suppl. at 223

⁴³⁵ Majluf P, Babcock EA, Riveros JC, Schreiber MA, and Alderete W. Catch and Bycatch of Sea Birds and Marine Mammal in the small-scale fishery of Punta San Juan, Peru

⁴³⁶ Report of the Scientific Committee. Annex I Report of the Standing Sub-Committee on Small Cetaceans 1999. J Cetacean Res. Manage. 1 Suppl. at 221

⁴³⁷ Report of the Scientific Committee. Annex L Report of the Standing Sub-Committee on Small Cetaceans 2004. J Cetacean Res. Manage. 6 Suppl.

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In 2000 and 2001 reported catches of bottlenose dolphins were 6 and 1 respectively.⁴³⁷ No estimates of total incidental mortality are available.

Species	<i>Grampus griseus</i> Risso's dolphin.
Abundance Estimate	No Abundance Estimate
Fisheries	Risso's dolphins are entangled in coastal gillnets.
Estimated Annual Mortality	At least one animal was landed at Pucusana in Peru. ⁴³⁸ No Estimates of Mortality

Species	<i>Lissodelphis peronii</i> Southern right whale dolphin.
Abundance Estimate	No Abundance Estimate--considered very common off Chile
Fisheries	Southern right whale dolphins are incidentally caught in driftnets off Peru and Chile. They are infrequently caught off the coasts of Peru and Chile where they are used for human consumption and crab bait. ⁴³⁹
Estimated Annual Mortality	During the 1990s, the IWC estimated that more than 5 southern right whale dolphins died each year off the Pacific coast of South America. ⁴⁴⁰ No Estimates of Mortality

Species	<i>Delphinus delphis</i> Common dolphin.
Abundance Estimate	No Abundance Estimate
Fisheries	Common dolphins are incidentally caught in coastal gillnets off Peru and Chile.
Estimated Annual Mortality	The estimated catches of common dolphins in coastal driftnets in Peru, were 264 in 1987, 155 in 1988 and 57 in 1989. ⁴⁴¹ During the 1990s, the IWC estimated that 50 to 150 common dolphins died each year in coastal Peruvian fisheries. ⁴⁴² Between 1990 and 1993, Peruvian fisheries landed 1087 common dolphins at the major ports of Pucusana, Cerro Azul, San Andres, and Ancon. ⁴⁴³

⁴³⁸ Van Waerebeek, K., Reyes, J.C., Read, A.J., and McKinnon, J.S. 1990. Preliminary observations of bottlenose dolphins from the Pacific coast of South America. Pp.143-154 in: *The Bottlenose Dolphin* (eds. S. Leatherwood and R.R. Reeves). Academic Press, San Diego.

⁴³⁹ Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages.

⁴⁴⁰ Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 26

⁴⁴¹ Van Waerebeek K and Reyes, JC 1994 Interactions between small cetaceans and Peruvian Fisheries in 1988/89 and analysis of trends. Report of the International Whaling Commission (Special Issue) 15:481-502.

⁴⁴² Report of the International Whaling Commission 1994 (Special Issue) Gillnets and Cetaceans. 15:629 pp at 25

⁴⁴³ Van Waerebeek K and Reyes, JC 1994 Post-ban small cetaceans takes off Peru: a review. Report of the International Whaling Commission (Special Issue) 15:503-519.

Species	<i>Cephalorhynchus eutropia</i> Chilean dolphin.
Abundance Estimate	No Abundance Estimate available--total population appears to be very small (low thousands at most).
Fisheries	The crab bait fishery in southern Chile and a variety of other fisheries (particularly coastal gillnet fisheries) are potentially serious threats. Some shooting and harpooning also occurs, and the dolphins are used for bait or human consumption. The species' status is uncertain. In addition to the mortality caused by entanglement and hunting, Chilean dolphins may now be excluded by salmon aquaculture operations from some of the bays and fiords that they traditionally inhabited. ⁴⁴⁴
Estimated Annual Mortality	In 1989, 51 Chilean dolphins were caught in Chilean bottom set gillnets. At Queule, near Valdivia, Chilean dolphins account for 45.8% of the dolphins caught in gillnets, translating into a catch of 65-70 animals at this port. ⁴⁴⁵ No estimates of total incidental mortality are available.
Species	<i>Cephalorhynchus commersonii</i> Commerson's dolphin
Abundance Estimate	No Abundance Estimate--thought to be abundant
Fisheries	Commerson's dolphin are caught in mid-water trawls and coastal gillnets. Commerson's dolphins are also used as crab bait.
Estimated Annual Mortality	No Estimates of Mortality
Species	<i>Phocoena spinipinnis</i> Burmeister's porpoise
Abundance Estimate	No Abundance Estimate
Fisheries	Burmeister's porpoise are frequently killed in set and drift gillnets. Some are killed deliberately in the Peruvian multi-species fishery that employs both gillnets and harpoons to take cetaceans for human consumption ⁴⁴⁶ and additional animals may be taken at least occasionally for crab bait in southern Chile. ⁴⁴⁷
Estimated Annual Mortality	Mortality in Peru is estimated at more than 450 animals per year and may be as high as 2,000 animals. ⁴⁴⁸ In 1988 and 1989, 383 and 331

⁴⁴⁴ Claude, M., Oporto, J., Ibáñez, C., Brieva, L., Espinosa P.C., and Arqueros, W.M. 2000. *La ineficiencia de la salmonicultura en Chile*. Aspectos sociales, económicos y ambientales. Registro de Problemas Públicos, Informe N° 1.

⁴⁴⁵ Culik BM (compiler). 2004. Review of Small Cetaceans. Distribution, Behavior, Migration and Threats. UNEP/CMS Secretariat, Bonn, Germany. 343 pages.

⁴⁴⁶ Van Waerebeek, K. and Reyes, J.C. 1994. Post-ban small cetacean takes off Peru: a review. *Report of the International Whaling Commission* (Special Issue) 15, 503-519.

⁴⁴⁷ Lescrauwaet, A.-C. and Gibbons, J. 1994. Mortality of small cetaceans and the crab bait fishery in the Magallanes area of Chile since 1980. *Report of the International Whaling Commission* (Special Issue) 15, 485-494.

⁴⁴⁸ Reyes JC 2002. Burmeister's porpoise. In: Encyclopedia of marine mammals (Perring WF, Wursig B, Thewissen JGM, eds) Academic Press, San Diego pp 177-179

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Burmeister's porpoise were landed at the port of Pucusana, Peru.⁴⁴⁹ Between 1990 and 1993, Peruvian fisheries landed 552 Burmeister's porpoise at the major ports of Puscana, Cerro Azul, San Andres, and Ancon.⁴⁵⁰ In 1994, Peruvian fisheries incidentally captured 224 Burmeister's porpoise.⁴⁵¹ In 2000, 2001, and 2003 reported catches of Burmeister's porpoise were 39, 14, and 125 respectively.⁴⁵² Scientists consider these levels unsustainable.

In 1989, 57 Burmeister's porpoise were caught in Chilean bottom set gillnets.

⁴⁴⁹ Van Waerebeek K and Reyes, JC 1994 Interactions between small cetaceans and Peruvian Fisheries in 1988/89 and analysis of trends. Report of the International Whaling Commission (Special Issue) 15:481-502.

⁴⁵⁰ Van Waerebeek K and Reyes, JC 1994 Post-ban small cetaceans takes off Peru: a review. Report of the International Whaling Commission (Special Issue) 15:503-519.

⁴⁵¹ Report of the Scientific Committee. Annex I Report of the Standing Sub-Committee on Small Cetaceans 1999. J Cetacean Res. Manage. 1 Suppl. at 223

⁴⁵² Report of the Scientific Committee. Annex L Report of the Standing Sub-Committee on Small Cetaceans 2004. J Cetacean Res. Manage. 6 Suppl.

APPENDIX B. Parties to International Treaties

Third United Nations Convention on the Law of the Sea, Dec. 10, 1982, 21 I.L.M. 1245. (Entered into force 16 November 1994.) As of June 2007, 155 countries were parties to the Law of the Sea. A chronological list of ratifications of, accessions and successions to the convention is available at http://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm#

The Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks, Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 Relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. U.N. Doc. A/Conf./164/37. A list of the 66 nations signatory to the Straddling Stocks Agreement is available at http://www.un.org/Depts/los/reference_files/chronological_lists_of_ratifications.htm#

Convention on the Conservation of Antarctic Marine Living Resources, 20 May 1980. 33 U.S.T. 3476. The original 12 contracting parties were United Kingdom, South Africa, Belgium, Japan, United States, Norway, France, New Zealand, Russia, Poland, Argentina, and Australia. Additional members are Brazil, Chile, European Community, Germany, India, Italy, Republic of Korea, Namibia, Spain, Sweden, Ukraine, and Uruguay. States Party to the Convention but not Members of the Commission are Bulgaria, Canada, Cook Islands, Finland, Greece, Mauritius, Netherlands, Peru, and Vanuatu.

International Convention for the Conservation of Atlantic Tunas. Done at Rio de Janeiro, 14 May 1966. 20 U.S.T. 2887. Algeria, Angola, Barbados, Brazil, Canada, Cape Verde, China, Cote d'Ivoire, Croatia, Equatorial Guinea, European Community, France (St. Pierre & Miquelon), Gabon, Ghana, Guatemala, Guinea-Conakry, Honduras, Iceland, Japan, Korea (Republic), Libya, Mexico, Morocco, Namibia, Nicaragua, Norway, Panama, Philippines, Russian Federation, Sao Tome and Principe, South Africa, Trinidad and Tobago, Tunisia, Turkey, United Kingdom (Anguilla, Bermuda, St. Helena, Turks and Caicos), United States, Uruguay, Vanuatu, Venezuela.

Convention for the Conservation and Management of Highly Migratory Fish Stocks in the Western and Central Pacific Ocean. Done at Honolulu, 5 September 2000. Entered into force 19 June 2004. Nineteen states signed the convention. Australia, Cook Islands, Federated States of Micronesia, Fiji, Republic of Kiribati, Republic of the Marshall Islands, Republic of Nauru, New Zealand, Niue, Papua New Guinea, Independent State of Samoa, Solomon Islands, Kingdom of Tonga and Tuvalu and the United States have ratified it.

Convention on Future Multilateral Cooperation in the Northwest Atlantic Fisheries. Done at Ottawa 24 October 1978. Senate Executive Treaty Series 96th Cong. 1st Sess. (Entered into force 1 January 1979.) Bulgaria, Canada, Cuba, Denmark, Europe Union (EU), France (in respect of St. Pierre et Miquelon) Iceland, Japan, Korea, Norway, Russia, and the United States. Estonia, Latvia, Lithuania, Poland, Portugal, Spain and Germany were contracting parties, but acceded to the European Union. Romania withdrew from the convention.

Convention on the Conservation and Management of Fishery Resources in the Southeast Atlantic Ocean. Done at Windhoek. 20 April 2001. Entered into force April 2003. Angola, Iceland, Namibia, Norway, Republic of Korea, South Africa, the United Kingdom (on behalf of St. Helena and its dependencies, Tristan Da Cunha and Ascension Island), the United States and the European Community.

Convention on the Conservation and Management of Pollock Resources in the Central Bering Sea. Done at Washington, D.C. 16 June 1995. Entered into force 8 December 1995. U.S. Treaty Document 103-27. Parties: China, South Korea, Poland, the Russian Federation, and the United States.

International Convention for the Regulation of Whaling, Done at Washington, 2 November 1946. 4

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Bevans 248, TIAS 1849. The original signatories to the convention were Argentina, Australia, Brazil, Canada, Chile, Denmark, France, Netherlands, New Zealand, Norway, Peru, Russia, United Kingdom, United States, Union of South Africa. Additional signatories since then are Antigua & Barbuda, Austria, Belgium, Belize, Benin,

Cambodia, Cameroon, China, People's Rep of, Costa Rica, Côte d'Ivoire, Croatia, Cyprus, Czech Republic, Dominica, Ecuador, Finland, Gabon, The Gambia, Germany, Greece, Grenada, Guatemala, Guinea-Bissau, Guinea, Rep of, Hungary, Iceland, India, Ireland, Israel, Italy, Japan, Kenya, Kiribati, Korea, Rep of, Laos, Luxembourg, Mali, Marshall Islands, Rep of Mauritania, Mexico, Monaco, Mongolia, Morocco, Nauru, Nicaragua, Oman, Palau, Panama, Portugal, San Marino, St. Kitts & Nevis, St. Lucia, St. Vincent & The Grenadines, Senegal, Slovak Republic, Slovenia, Solomon Islands, Spain, Suriname, Sweden, Switzerland, Togo, Tuvalu.

Convention for the Conservation of Anadromous Stocks in the North Pacific Ocean. Done at Moscow 11 February 1992. Entered into force 16 February 1993. Senate Treaty Document 102-30, 102nd Cong. 2nd Sess.

Convention on International Trade in Endangered Species of Wild Fauna and Flora (Done at Washington 3 March 1973. Entered into force 1 July 1975. 27 UST 1087, TIAS 8249) A list of 172 contracting parties in order of entry into force is available at <http://www.cites.org/eng/disc/parties/chronolo.shtml>

Agreement on the Conservation of Small Cetaceans of the Baltic and North Seas ASCOBANS entered into force in 1994. Parties include Albania, Bulgaria, Croatia, Cyprus, France, Georgia, Greece, Italy, Lebanon, Libya, Malta, Monaco, Morocco, Portugal, Romania, Spain, Syria, Tunisia, Ukraine.

Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area. ACCOBAMS entered into force in 2001. Parties are Belgium, Denmark, European Community, Finland, Germany, Netherlands, Poland, Sweden, United Kingdom.

Pacific Salmon Treaty, March 18, 1985, U.S.-Can., 99 Stat. 7. United States and Canada.

The Wellington Convention done at Wellington, New Zealand. 17 May 1991. Parties are Australia, Cook Islands, Federated States of Micronesia, Fiji, France, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Samoa, Solomon Islands, Tokelau, Tuvalu, United States, Vanuatu.

Convention on the Conservation of Migratory Species of Wild Animals. Done at Bonn 23 June 1979. 19 ILM 15 (1980).

1952 Agreements on the Exploitation and Conservation of the Maritime Resources of the South Pacific. Done at Santiago, Chile, 18 August 1952. Ecuador, Peru and Chile.

Treaty on Fisheries Between the Governments of Certain Pacific Island States and the Government of the United States of America. Done at Port Moresby, 2 April 1987. Entered into force 15 June 1988. TIAS 11100. The Treaty on Fisheries between the Governments of Certain Pacific Island States and the Government of the United States of America is a unique instrument in international fisheries law, being the only multilateral agreement between a distant-water fishing nation, on the one hand, and a group of coastal States, on the other hand, concerning access to the latter's fisheries zones. Thus, although multilateral in form, the agreement is in many respects bilateral in nature. Consultation is conducted through the South Pacific Forum Fisheries Agency, which has an open membership. As of 2005 members were Australia, Cook Islands, Federated States of Micronesia, Fiji, Kiribati, Marshall Islands, Nauru, New Zealand, Niue, Palau, Papua New Guinea, Solomon Islands, Tonga, Tuvalu, Vanuatu and Western Samoa.

Convention for the Conservation of Southern Bluefin Tuna. Done at Canberra, May 1993. Entered into force 20 May 1994 (hereinafter CCSBT). Australia, Japan and New Zealand Taiwan, South Korea. The Philippines was accepted as a formal cooperating non-member in 2004, and parties

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continue discussions with Indonesia and South Africa.

Asia Pacific Fisheries Commission. Members include Australia, Bangladesh, Cambodia, China, France, India, Indonesia, Japan, Korea, Malaysia, Myanmar, Nepal, New Zealand, Pakistan, Philippines, Sri Lanka, Thailand, United Kingdom, United States of America, and Vietnam.

The Convention for the Establishment of an Inter-American Tropical Tuna Commission. Done at Washington, 31 May 1949. Entered into force 3 March 1950. 1 UST 230, TIAS 2044. Members are Costa Rica, Ecuador, El Salvador, France, Guatemala, Japan, Mexico, Nicaragua, Panama, Peru, Republic of Korea, United States, Vanuatu and Venezuela. Belize, Canada, China, Cook Islands, the European Union, Honduras and Chinese Taipei are Cooperating Non Parties or Cooperating Fishing Entities.

ICES: Belgium, Canada, Denmark, Finland, France, Germany, Iceland, Ireland, Netherlands, Norway, Poland, Portugal, Spain, Sweden, United Kingdom, the United States, Russian Federation, Latvia, Lithuania, and Estonia.

PICES: Canada, United States, Japan, People's Republic of China, Russian Federation, Republic of Korea.

SPC: Australian territory of Papua and the Trust Territory of New Guinea (now Papua New Guinea and Irian Jaya), and Guam and the Trust Territory of the Pacific Islands.

APPENDIX C. Sample Cetacean Bycatch Resolution

RESOLUTION TO ASSESS AND MITIGATE THE IMPACT OF FISHING ON WHALES AND DOLPHINS

The Commission [insert name of the regional fisheries management organization]

In accordance with the Convention [insert the name of the convention under which the rfmo operates]:

Recognizing the ecological and cultural significance of all species of whales and dolphins in the convention area;

Noting the recent international scientific studies indicate that bycatch in commercial fisheries is one of the greatest threats facing whales and dolphins;

Recognizing the need to assess population abundance of and evaluate the incidental mortality of dolphins and whales during fishing operations in the convention area;

Aware that measures to reduce bycatch may require modified or new procedures, technologies, or management measures;

The [insert name of convention] Convention, resolves as follows:

1. Contracting Parties (CPs) [or other appropriate terminology for the Convention or Agreement] should collect, and provide to the Secretariat, all available information on whale and dolphin abundance and stock structure within their waters and within the Convention Area.
2. CPs should collect, and provide to the Secretariat, all available information on interactions with whales and dolphins in fisheries within the Convention Area and urges them to foster collaboration with other CPs in the exchange of information in this area.
3. Each CP should provide all information on its national legislation and international efforts to which it is a party to conserve whales and dolphins.
4. CPs should, as appropriate, individually and collectively, continue to enhance the implementation of their existing whale and dolphin mitigation measures using best available scientific information on mitigation techniques.
5. Beginning in 2008, CPs should provide to the Secretariat a detailing of whale and dolphin population and fishery interaction data (e.g., species identification, fate and condition at

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release, relevant biological information and gear configuration), including data collected by their respective national observer programs, in fisheries managed by [Name of the Convention] in the Convention Area and any marine mammal-specific training provided to these observers. This information will be compiled by the Secretariat and reported to the [Name of the Scientific Body or Bycatch Body within the Convention].

6. [Name of the Convention] should cooperate with other regional, subregional and global organizations to share data on whale and dolphin bycatch and to develop and apply compatible bycatch reduction measures as appropriate, given the migration patterns of many species of
7. As the [Name of the Convention] develops its regional observer program and considers improving observer coverage in the Convention Area, existing observer programs should be reviewed to ensure that the appropriate information on whale and dolphin interactions is being collected (e.g. species identification, fate and condition at release, relevant biological information and gear configuration).
8. The Secretariat, in cooperation with the [Name of the Scientific Body or Bycatch Body within the Convention], should develop a centralized bycatch and observer database to obtain better estimates of total catch and mortality of whales and dolphins by fisheries within the Convention Area.
9. The [Name of the Scientific Body or Bycatch Body within the Convention] should develop a program that includes: abundance research and research and development of gear alternatives, promotion of the use of available bycatch mitigation technology, promotion and strengthening of data collection programs to obtain standardized information to develop reliable estimates of the bycatch of whales and dolphins, biological research on whales and dolphins, including the identification of migration routes or other areas of spatial or temporal importance, industry education, development and promotion of safe handling techniques and other techniques to improve whale and dolphin conservation.
10. The [Name of the Scientific Body or Bycatch Body within the Convention] shall take practical steps necessary to improve monitoring and reporting of whales and dolphins interactions in the Convention Area, including the development of data standards and specifications and reporting requirements.
11. [Name of the Convention] will monitor the progress of CPs in applying this resolution and develop relevant strategies for the further consideration of the [Name of the Convention] in 2009. Information produced as a result of this resolution will be provided by the Secretariat to the FAO.

APPENDIX D. Sea Turtle Resolution Adopted at NAFO

Resolution to Reduce Sea Turtle Mortality in NAFO Fishing Operations

Proposal by the United States of America and Japan

Background/Explanatory Memorandum:

At its 26th Annual Symposium on Sea Turtle Biology and Conservation, the members of the International Sea Turtle Society (ISTS) adopted a resolution calling upon the world's regional fisheries management organizations (RFMOs) to urge their members to adopt and implement the FAO "Guidelines to Reduce the Mortality of Sea Turtles in Fishing Operations" (the FAO Guidelines). This ISTS resolution was forwarded to NAFO with a request for action.

It is generally agreed that RFMOs can play a valuable role in support of global adoption and implementation of the FAO Guidelines. Given NAFO's on-going efforts to minimize bycatch and the fledging NAFO initiative on application of ecosystem considerations to the Organization's fisheries management decision-making, NAFO should support global implementation of the FAO Guidelines as appropriate. As the waters of the Convention area include critical foraging habitat for the leatherback turtle (*Dermochelys coriacea*), adoption and implementation of the FAO Guidelines would be both proactive and precautionary.

Thus, it is proposed that, in addition to generally supporting adoption and implementation of the FAO Guidelines, NAFO Contracting Parties should provide information on existing domestic data collection (e.g., species identification, fate and condition at release, relevant biological information, and gear configuration) and/or observer training efforts relating to sea turtle interactions in NAFO-managed fisheries in the NAFO Convention Area.

NAFO should also consider, where appropriate, increasing cooperation both among NAFO Contracting Parties and with other regional, subregional and global organizations, to facilitate sharing of data and development of compatible and appropriate bycatch reduction measures. Such efforts may be enhanced by integration of sea turtle interaction data collection by NAFO observers.

Draft Proposal:

Resolution to Reduce Sea Turtle Mortality in NAFO Fishing Operations

Preamble:

Recognizing the cultural and ecological significance of sea turtles in the Northwest Atlantic Ocean;

Recognizing that the FAO Committee on Fisheries (COFI) endorsed “Guidelines to Reduce Sea Turtle Mortality in Fishing Operations” at its Twenty-sixth Session, held in March 2005, and that these guidelines are directed towards members and non-members of FAO, fishing entities, subregional, regional and global organizations, whether governmental or non-governmental concerned with fisheries management and sustainable use of aquatic ecosystems;

Further recognizing that implementation of these guidelines should be consistent with the Code of Conduct for Responsible Fisheries as well as with the Reykjavik Declaration on Responsible Fisheries in the Marine Ecosystem with regard to ecosystem considerations and based on the use of the best available science;

Taking into account the importance placed by the guidelines on research, monitoring, the sharing of information, and public education on sea turtles;

The Contracting Parties of NAFO resolve as follows:

1. NAFO Contracting Parties (CPs) should, as appropriate, individually and collectively implement the FAO “Guidelines to Reduce Sea Turtle Mortality in Fishing Operations” (the Guidelines) to reduce the incidental catch of sea turtles and ensure the safe handling of all turtles that are captured.
2. NAFO CPs should continue to enhance the implementation of their existing turtle mitigation measures using best available scientific information on mitigation techniques.
3. NAFO should encourage CPs to collect, and provide to the NAFO Secretariat, all available information on interactions with sea turtles in fisheries managed by NAFO in the NAFO Convention Area and urges them to foster collaboration with other CPs in the exchange of information in this area.
4. NAFO should cooperate with other regional, subregional and global organizations to share data on sea turtle bycatch and to develop and apply compatible bycatch reduction measures as appropriate.
5. Beginning in 2007, CPs should provide to the NAFO Secretariat a detailing of sea turtle fishery interaction data (e.g., species identification, fate and condition at release, relevant biological information and gear configuration), including data collected by their respective national observer programs, in fisheries managed by NAFO in the NAFO Convention Area and any sea turtle-specific training provided to these observers. This information will be compiled by the NAFO Secretariat and reported to the Scientific Council and to the Fisheries Commission.

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6. The Fisheries Commission should monitor the progress of CPs in applying this resolution and develop relevant strategies for the further consideration of the Commission in 2008. Information produced as a result of this resolution will be provided by the NAFO Secretariat to the FAO.

APPENDIX E. National Oceans Protection Act of 2005 (S. 1224)

National Oceans Protection Act of 2005 (Introduced in Senate)

Subtitle C--Cetacean and Sea Turtle Conservation

SEC. 331. SHORT TITLE.

This subtitle may be cited as the `Cetacean and Sea Turtle Conservation Act of 2005'.

SEC. 332. PURPOSES.

The purposes of this subtitle are--

- (1) to restore and perpetuate healthy populations of cetaceans and sea turtles by reducing bycatch of cetaceans and sea turtles to sustainable levels through the development of bilateral and multilateral efforts among the United States and other fishing nations;
- (2) to increase the technical capacity, financial resources, and political will necessary to reduce bycatch of cetaceans and sea turtles to sustainable levels globally;
- (3) to promote international standards and guidelines to reduce bycatch of cetaceans and sea turtles; and
- (4) to authorize financial resources for the purposes described in paragraphs (1) through (3).

SEC. 333. DEFINITIONS.

In this subtitle:

- (1) **APPROPRIATE FISHING GEAR AND METHODS**- The term `appropriate fishing gear and methods' means gear and methods used in fishing operations that are proven to be effective in reducing bycatch of cetaceans or sea turtles to sustainable levels.
- (2) **BYCATCH** - The term `bycatch' means the incidental mortality or serious injury of an animal that is not the target of a fishing operation that occurs in the course of the fishing operation.
- (3) **CETACEAN** - The term `cetacean' means an aquatic mammal that is a member of the order Cetacea, including whales, dolphins, and porpoises.
- (4) **INDEPENDENT EXPERTS**- The term `independent experts' means individuals with expertise in issues related to cetaceans or sea turtles including representatives of academic and scientific organizations, nongovernmental organizations that promote conservation of cetacean populations, and the fishing industry.
- (5) **POPULATION**- The term `population' means a distinct group of

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individuals of a species or smaller taxa in a common spatial arrangement that interbreed when mature.

(6) SEA TURTLE- The term `sea turtle' means a member of--

- (A) the family Cheloniidae; or
- (B) the family Dermochelyidae.

(7) SUSTAINABLE LEVELS- The term `sustainable levels' means, with respect to bycatch , a level of bycatch that, in combination with other mortality caused by humans, does not exceed the maximum number of individuals that may be removed from a population while allowing that population to recover to a level at which such population maintains its maximum productivity.

SEC. 334. INTERNATIONAL AGREEMENTS AND STANDARDS.

(a) International Agreements- The Secretary, with the consent of the President and in consultation with independent experts and with the Secretary of State, shall negotiate with foreign governments that are engaged in, or that have persons or companies engaged in, commercial fishing operations that are adversely impacting populations of cetaceans or populations of sea turtles for the purpose of developing bilateral or multilateral agreements that require such governments to reduce bycatch of cetaceans or sea turtles to at least sustainable levels.

(b) Standards- An international agreement negotiated under subsection (a) shall include provisions to promote the development and implementation of standards for commercial fishing operations that interact with cetaceans or sea turtles that--

- (1) require such operations to use appropriate fishing gear and methods; and
- (2) are intended to reduce bycatch of cetaceans and sea turtles to at least sustainable levels.

(c) United Nations- The Secretary may consult and coordinate with the Committee on Fisheries of the Food and Agriculture Organization of the United Nations in developing international agreements under subsection (a) or standards under subsection (b).

SEC. 335. RESEARCH AND DEVELOPMENT GRANTS.

(a) Authority- The Secretary is authorized to award grants and to provide other assistance that the Secretary determines is appropriate to an eligible person to carry out the research or development of appropriate fishing gear and methods, including appropriate fishing gear and methods for use--

- (1) in the North Sea, where harbor porpoise bycatch is severe;
- (2) in Mexico's Gulf of California, where the vaquita porpoise faces extinction unless gillnets are banned;
- (3) in the east coast of South America, including waters off the coasts of

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Brazil, Uruguay, and Argentina, where bycatch of franciscana dolphins is contributing to the precipitous decline of that species; or

(4) in areas where bycatch of sea turtles associated with longline fishing has been found to occur frequently, as follows:

- (A) The central Pacific Ocean.
- (B) The southern Pacific Ocean.
- (C) The southern Atlantic Ocean.
- (D) The Mediterranean Sea.

(b) Definitions- In this section:

(1) APPROPRIATE CONGRESSIONAL COMMITTEES- The term `appropriate congressional committees' means the Committee on Commerce, Science, and Transportation of the Senate and the Committee on Resources of the House of Representatives.

(2) FOREIGN PERSON DEFINED- The term `foreign person' means--

- (A) an individual who is not a United States citizen;
- (B) any corporation, partnership, business association, society, trust, organization, or other nongovernmental entity created or organized under the laws of a foreign country or that has its principal place of business outside the United States; or
- (C) any governmental entity of a foreign country.

(3) MARINE MAMMAL COMMISSION- The term `Marine Mammal Commission' means the Marine Mammal Commission established by section 201 of the Marine Mammal Protection Act of 1972 (16 U.S.C. 1401).

(c) Eligibility-

(1) IN GENERAL- The Secretary shall determine if a person, including any governmental entity or any foreign person, is eligible to receive a grant under this section.

(d) Application- A person seeking a grant under this section shall submit an application to the Secretary at such time, in such manner, and including such information as the Secretary may reasonably require.

(e) Terms and Conditions-

(1) IN GENERAL- A recipient of a grant or other financial assistance provided by the Secretary under this section shall agree to such terms and conditions as the Secretary determines are necessary to protect the interests of the United States.

(2) REQUIREMENT FOR CONSULTATION- The Secretary shall consult with the Marine Mammal Commission prior to determining the terms and conditions described in paragraph (1) for a recipient of a grant or other financial assistance to be used to reduce bycatch of cetaceans.

(f) Report- Not later than one year after the date of enactment of this Act, and annually thereafter, the Secretary shall submit a report to the appropriate

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congressional committees on the grants and other assistance provided under this section.

SEC. 336. BYCATCH DATABASE.

(a) Requirement for Database- The Secretary shall establish a database of bycatch data for cetaceans and sea turtles from fisheries around the world for the purpose described in subsection (b).

(b) Purpose of Database- The purpose of the database is to make information related to bycatch , including cetacean or sea turtles species affected by bycatch , the development and use of appropriate fishing gear and methods, and efforts to reduce the bycatch of cetaceans and sea turtles, available to scientists, resource managers, and the public.

(c) Availability- The Secretary shall make the database established pursuant to subsection (a) available by public posting through an Internet Web site.

SEC. 337. AUTHORIZATION OF APPROPRIATIONS.

There are authorized to be appropriated \$5,000,000 for each fiscal year 2005 through 2008 to carry out the provisions of this subtitle.

APPENDIX F. Sample Cetacean Bycatch Legislation

110th Congress

1st Session

S.

To promote the conservation of cetacean species, and for other purposes.

IN THE SENATE OF THE UNITED STATES

introduced the following bill; which was read twice and referred to the Committee on _____

A Bill

To promote the conservation of cetacean species, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE

This Act may be cited as the "Cetacean Conservation Act of 2007."

SEC. 2. FINDINGS.

Congress makes the following findings:

- (1) Cetaceans are a group of approximately 80 species of whales, dolphins, and porpoises that occur worldwide and are a biologically significant global resource. In the United States marine mammals are provided protection under the Marine Mammal Protection Act; some species are included on the Endangered Species Act of 1973 (16 U.S.C. 1531 et seq.). A number of species are listed as endangered by international agreements.
- (2) The maintenance of healthy cetacean populations is essential to the maintenance of healthy ocean ecosystems.
- (3) Cetaceans often inhabit international waters and are highly migratory, resulting in the management of a population of cetaceans frequently being shared by 2 or more countries.
- (4) Eco-tourism based on whale watching, enjoyed by millions of people around the world, has grown into more than a \$1,000,000,000 a year industry.
- (5) Many species of cetaceans are threatened with extinction. Bycatch of cetaceans in fishing

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operations is a major threat to cetaceans worldwide. Several species and many populations of cetaceans could be lost in the next few decades if nothing is done.

- (6) The final report of the United States Commission on Ocean Policy (2004) identifies the severity of threats to cetaceans posed by accidental capture in fishing gear. The Report states that the greatest threat to marine mammals worldwide is the accidental capture or entanglement in fishing gear, with hundreds of thousands of such mammals unintentionally killed each year.
- (7) The Report recommends that the United States use international agreements and other diplomatic means to strengthen protections for marine mammals, sea turtles, and other endangered marine species, including through the development and adoption of bycatch reduction methods.
- (8) Considerable advances have been made in a few fisheries to address the problem of cetacean bycatch. However, progress to address this problem in other fisheries has been slow or non-existent throughout much of the world, in many cases due to a lack of technical capacity, financial resources, and political will to combat the problem. Fishing pressure on cetaceans is increasing with the expansion of fishing fleets and the establishment of new fisheries.
- (9) From 1993 through 2006, the United States implemented measures that reduced cetacean bycatch in United States fisheries to less than one-third the previous rate of such bycatch.
- (10) It is appropriate for the United States to build on its success in reducing cetacean bycatch by leading an international effort to implement measures to reduce such bycatch around the world and to promote an international regulatory framework in which countries adopt standards for reducing bycatch that are comparable to the standards adopted by the United States.
- (11) Commercial fishing operations that are subject to United States regulations to reduce cetacean bycatch may be at a competitive disadvantage because, while the operations are required to mitigate such bycatch and bear the costs for doing so for most fisheries, the United States continues to allow the importation of fisheries products from countries that do not require comparable mitigation. U.S. longline fishermen represent at most no more than 2 percent of the total number of global pelagic longline fishermen.
- (12) Global standards and international agreements to reduce such bycatch would help remedy this imbalance, and the United States can be instrumental in providing guidance and support toward this goal.
- (13) Many developing countries require technical and financial assistance in order to effectively reduce cetacean bycatch.
- (14) Bycatch of cetaceans is occurring at unsustainable levels in many locations, including-----
--
 - (A) the North Sea, where harbor porpoise bycatch is severe;
 - (B) Mexico's Gulf of California, where the vaquita porpoise faces extinction unless gillnets are banned; and
 - (C) The east coast of South America, including waters off the coasts of Brazil, Uruguay, and Argentina, where bycatch of franciscana dolphins is contributing to the precipitous decline of that species.
- (15) An international effort led by the United States to increase technical capacity, financial resources, and political will necessary to reduce cetacean bycatch to sustainable levels globally and to develop international standards and guidelines to reduce such bycatch is necessary to ensure the conservation of cetaceans for the health of the world's oceans, the economic security of commercial fishing in the United States, and the enjoyment of future

generations.

SEC. 3. PURPOSES

The purposes of this Act are---

- (1) to restore and perpetuate healthy populations of cetaceans by reducing bycatch to sustainable levels through the development of bilateral and multilateral efforts among the United States and other fishing nations;
- (2) to increase the technical capacity, financial resources and political will necessary to reduce bycatch of cetaceans to sustainable levels globally;
- (3) to promote international standards and guidelines to reduce bycatch of cetaceans; and
- (4) to authorize financial resources for the purposes described in paragraphs (1) through (3).

SEC. 4. DEFINITIONS

In this Act:

- (1) APPROPRIATE FISHING GEAR AND METHODS.---- The term “appropriate fishing gear and methods” means gear and methods used in fishing operations that are proven to be effective in reducing cetacean bycatch to sustainable levels.
- (2) BYCATCH--- The term “bycatch” means the incidental mortality, serious injury, injury, or capture of an animal that is not the target of a fishing operation that occurs in the course of the fishing operation.
- (3) CETACEAN--- The term “cetacean” means an aquatic mammal that is a member of the order Cetacea, including whales, dolphins and porpoises.
- (4) INDEPENDENT EXPERTS--- The term “independent experts” means individuals with expertise in issues related to cetaceans including representatives of academic and scientific organizations, nongovernmental organizations that promote conservation of cetacean populations, and the fishing industry.
- (5) POPULATION--- The term “population” means a distinct group of individuals of a species or smaller taxa in a common spatial arrangement that interbreed when mature.
- (6) SUSTAINABLE LEVELS--- The term “sustainable levels” means, with respect to bycatch, a level of bycatch that, in combination with other mortality, does not exceed the maximum number of individuals that may be removed from a population while allowing that population to recover to a level at which such population maintains its maximum productivity.

SEC. 5. INTERNATIONAL AGREEMENTS AND STANDARDS

(a) INTERNATIONAL AGREEMENTS—The Secretary of Commerce, [with the consent of the President and] in consultation with independent experts and with the Secretary of State, shall negotiate with foreign governments that are engaged in, or that have persons or companies engaged in, commercial fishing operations that are adversely impacting populations of cetaceans for the purpose of developing bilateral or multilateral agreements that require such governments to reduce bycatch of cetaceans to at least sustainable levels.

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(b) STANDARDS.--- An international agreement negotiated under subsection (a) shall include provisions to promote the development and implementation of standards for commercial fishing operations that interact with cetaceans that---

- (1) require such operations to use appropriate fishing gear and methods; and
- (2) are intended to reduce bycatch of cetaceans to at least sustainable levels.

(c) UNITED NATIONS.--- The Secretary of Commerce may consult and coordinate with the Committee on Fisheries of the Food and Agriculture Organization of the United Nations in developing international agreements under subsection (a) or standards under subsection (b).

SEC. 6 RESEARCH AND DEVELOPMENT GRANTS.

(a) AUTHORITY---The Secretary of Commerce is authorized to award grants and to provide other assistance that the Secretary determines is appropriate to an eligible person to carry out the research or development of appropriate fishing gear and methods, including appropriate fishing gear and methods for use in areas that the Secretary deems as priorities for such research.

(b) DEFINITIONS.---In this section:

(1) APPROPRIATE CONGRESSIONAL COMMITTEES.---The term “appropriate congressional committees” means the Committee on Commerce, Science and Transportation of the Senate and the Committee on Resources of the House of Representatives.

(2) FOREIGN PERSON DEFINED.---The term “foreign person” means—

- (A) an individual who is not a United States citizen;
- (B) any corporation, partnership, business association, society, trust, organization, or other nongovernmental entity created or organized under the laws of a foreign country or that has its principal place of business outside the United States; or
- (C) any governmental entity of a foreign country.

(3) MARINE MAMMAL COMMISSION.--- The term “Marine Mammal Commission” means the Marine Mammals Commission established by section 201 of the Marine Mammals Protection Act of 1972 (16 U.S.C. 1401).

(c) ELIGIBILITY.---

(1) IN GENERAL.---The Secretary of Commerce shall determine if a person, including any governmental entity or any foreign person, is eligible to receive a grant under this section.

(d) APPLICATION---A person seeking a grant under this section shall submit an application to the Secretary of Commerce at such time, in such manner, and including such information as the Secretary may reasonably require.

(e) TERMS AND CONDITIONS.---

(1) IN GENERAL--- A recipient of a grant or other financial assistance provided by the Secretary of Commerce under this section shall agree to such terms and conditions as the Secretary determines are necessary to protect the interests of the United States.

(2) REQUIREMENT FOR CONSULTATION---The Secretary of Commerce shall consult

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with the Marine Mammal Commission prior to determining the terms and conditions described in paragraph (1) for a recipient of a grant or other financial assistance to be used to reduce bycatch of cetaceans.

- (f) REPORT--- Not later than one year after the date of enactment of this Act, and annually thereafter, the Secretary of Commerce shall submit a report to the appropriate congressional committees on the grants and other assistance provided under this section.

SEC. 7. BYCATCH DATABASE

(a) REQUIREMENT FOR DATABASE--- The Secretary of Commerce shall establish a database of bycatch data for cetaceans from fisheries around the world for the purpose described in subsection (b).

(b) PURPOSE OF DATABASE--- The purpose of the database is to make information related to bycatch, including cetacean species affected by bycatch, the development and use of appropriate fishing gear and methods, and efforts to reduce the bycatch of cetaceans, available to scientists, resource managers, and the public.

(c) AVAILABILITY--- The Secretary of Commerce shall make the database established pursuant to subsection (a) available by public posting through an Internet website.

SEC.8. AUTHORIZATION OF APPROPRIATIONS

There are authorized to be appropriated \$10,000,000 for each fiscal year 2007 through 2012 to carry out the provisions of this Act.