



**Convention on Migratory Species
Memorandum of Understanding for the
Conservation of Cetaceans and their
Habitats in the Pacific Islands Region**

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***CURRENT STATE OF KNOWLEDGE
OF CETACEAN THREATS, DIVERSITY AND HABITATS
IN THE PACIFIC ISLANDS REGION
2009 REVISION***

Report submitted by the Whale and Dolphin Conservation Society

Current State of Knowledge of Cetacean Threats, Diversity and Habitats in the Pacific Islands Region, 2009 Revision

**A Report by the Whale and Dolphin Conservation Society for the Second Meeting of
the Signatories to the Memorandum of Understanding for the Conservation of
Cetaceans and Their Habitats in the Pacific Islands Region**

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1st July 2009

Current State of Knowledge of Cetacean Threats, Diversity and Habitats in the Pacific Islands Region, 2009 Revision

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The WDCS Commitment to CMS and the Pacific Cetacean MoU

WDCS, Whale and Dolphin Conservation Society, is an international non-governmental organization with cetacean protection activities spanning more than 25 countries around the world. WDCS expertise crosses the spectrum from conservation science and field research, to the development of habitat protection models and policy implementation.

WDCS and CMS have been working closely together since 2002. A formal *Partnership Agreement* was signed between WDCS and CMS in November 2005

The *Partnership Agreement* commits WDCS and CMS to working in Partnership towards the achievement of the 2010 target and cetacean conservation at the international level, including continuing to work with ASCOBANS (the Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas), ACCOBAMS (the Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area), the Pacific Cetaceans MoU (Memorandum of Understanding for the Conservation of Cetaceans and their Habitats in the Pacific Island Region), the Western African Aquatic Mammal MoU (Memorandum of Understanding Concerning the Conservation of the Manatee and Small Cetaceans of Western Africa and Macaronesia) and future CMS cetacean related agreements and MoUs in their development, resourcing, on-ground implementation and promotion.

Cetacean Liaison Group

WDCS has established and maintains the CMS Cetacean Liaison Group which assist the development, and where possible implementation, of a forward strategy of key science and political work that needs to be undertaken in each triennium to progress the cetacean related priorities of CMS CoP decisions, to provide advice and recommendations to CMS on cetacean issues, and to support existing relevant CMS processes such as the taxonomic working group on marine mammals within the Scientific Council.

Pacific Cetaceans MoU

As part of this commitment, WDCS has become a formal Collaborating Organisation to the Pacific Cetaceans MoU.

WDCS regards investment and focus on the activities of the Pacific Cetaceans MoU as being of critical importance, benefiting the Pacific Islands Region by:

- facilitating deeper region-wide cooperation to address issues of shared responsibility including threat reduction, habitat protection and the establishment of migratory corridors, research, monitoring, and information exchange, regional capacity building, the development of sustainable and responsible cetacean-based tourism;
- increasing international awareness and coordination about the issues and threats to cetaceans in the Pacific Islands Region;
- networking the Pacific Islands Region with other similar cetacean agreement regions, increasing technical information flow and capacity sharing; and
- providing an effective channel for international funding.

WDCS has completed this second report as a technical contribution to support the implementation of the Pacific Cetaceans MoU and the domestic work of Signatories, by providing a baseline of current knowledge of cetacean threats, diversity and habitats in the Pacific Islands Region.

We look forward to the ongoing development of this knowledge and to contributing to the implementation of the Pacific Cetaceans MoU and its Action Plan.

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Current State of Knowledge of Cetacean Threats, Diversity, and Habitats in the Pacific Islands Region, 2009 Revision

Executive Summary

This report provides a review of the current state of knowledge of cetacean diversity, habitat and threats in the Pacific Islands Region. The boundaries of the Pacific Islands Region (Chapter 1), as defined by the Convention of Migratory Species (CMS) Memorandum of Understanding (MoU) for the Conservation of Cetaceans and their Habitats in the Pacific Islands Region (CMS 2006), are the marine areas under the jurisdiction of each Country or Territory of the Pacific Islands Region, and extend to the area defined by the Noumea Convention, i.e., between the Tropic of Cancer and 60° South latitude, and between 130° East longitude and 120° West longitude. The region stretches over some 10,000 kilometres from east to west and 5,000 kilometres from north to south, with a combined economic exclusion zone (EEZ) of approximately 30 million km².

This region contains 22 Pacific Island Countries and Territories, as well as a portion of the Australian continent, both the North and South Islands of New Zealand, and a portion of the Hawaiian Islands. The region is purported to hold the most extensive and biologically diverse reefs in the world, the deepest ocean trenches, and the world's largest tuna fishery, as well as a range of globally threatened species such as sea turtles, dugongs and cetaceans (UNDP 1999).

Whilst there are unique differences across the region, the 22 Pacific Island Countries and Territories do share some common characteristics: small physical size, geographical isolation, endemic ecosystems vulnerable to destruction or damage, rapid human population growth rates, limited land area, dependence on marine resources, and economic and environmental vulnerability (SPREP 1992, SPREP/ESCAP 1996). In turn, these features give rise to a general list of priority environmental concerns for the region (Chapter 2), including loss of biodiversity, land degradation, freshwater resources,

degradation of coastal environments, pollution, poor environmental management, and climate change (SPREP 2004). This report provides an overview of these concerns as context for the investigation of direct, indirect and potential threats to cetaceans inhabiting the Pacific Islands Region (Chapter 3). Threats discussed in this chapter include climate change and habitat degradation, chemical pollution and disease, noise, cetacean tourism, fisheries bycatch and entanglement, fisheries depredation interactions, ship strikes, hunting, 'scientific whaling', drive hunts, and, live captures for display. In most cases the ability to further quantify and address these threats is heavily hampered by gaps in basic species knowledge, as well as lack of monitoring or assessment in the region. Nevertheless, the collation of known information is a practical beginning to future mitigation and abatement measures.

The diverse and expansive Pacific Islands Region serves as habitat to a multitude of cetacean species that selectively use the region on a year-round, seasonal, or more sporadic basis (Reeves et al. 1999). However, for a vast majority of cetacean species a detailed understanding of the life history, geographic range, and habitat of individuals and populations is lacking. An examination of country-specific cetacean diversity in the region was conducted (Chapter 4). This chapter acts as a checklist of cetacean diversity rather than an analysis of relative composition and densities of the cetacean fauna in this region as it is important to note that the information is heavily influenced by uneven effort both between countries, over time and towards given species. Nevertheless, this analysis does indicate that a core group of species made up the majority of cetacean records for the nations of the Pacific Islands Region.

Focussing on the 22 Island Countries and Territories (i.e., excluding records from

Australia, New Zealand and Hawaii) the list of species that appear to be resident or typically migrant are: minke whales (two species and multiple subspecies), sei whale, Bryde's whales (two species), blue whales (multiple subspecies), humpback whale, pygmy killer whale, short-finned pilot whale, Risso's dolphin, Fraser's dolphin, orca, melon-headed whale, false killer whale, pantropical spotted dolphin, striped dolphin, spinner dolphin, rough-toothed dolphin, bottlenose dolphin (two species), dwarf sperm whale, pygmy sperm whale, sperm whale, Blainville's beaked whale, and Cuvier's beaked whale.

It is plausible that ongoing taxonomic investigations may indicate that the current species and subspecies designations are inadequate to display the diversity of these records. In addition there are numerous rare and vagrant species with records within this same region: fin whale, common dolphins (two species), ginkgo-toothed beaked whale, snubfin dolphin, Indo-Pacific humpback dolphin, southern right whale, southern bottlenose whale, and tentative records of both Peale's dolphin and southern right whale dolphin.

Of course, the limited research efforts in this region coupled with the very large expanse of the Pacific Islands Region marine coverage makes it plausible that there may also be as yet unreported species that inhabit these waters. One such example is the numerous unconfirmed sightings of additional beaked whale species (for e.g., Reeves et al. 1999, Kahn 2004). In addition, the following cetacean species are recorded from Australian and New Zealand waters: southern right whale, dwarf minke whale, Antarctic minke whale, sei whale, Bryde's whale, blue whale, pygmy blue whale, fin whale, humpback whale, pygmy right whale, Hector's dolphin, short-beaked common dolphin, short-finned pilot whale, long-finned pilot whale, Risso's dolphin, Fraser's dolphin, hourglass dolphin, dusky dolphin, southern right whale dolphin, killer whale, melon-headed whale, false killer whale, rough-toothed dolphin, pantropical spotted dolphin, striped dolphin, pygmy sperm whale, dwarf sperm whale, sperm whale, spectacled porpoise, Arnoux's beaked whale, southern bottlenose whale, Andrew's beaked whale, dense beaked

whale, ginkgo-toothed whale, Gray's beaked whale, Hector's beaked whale, strap-toothed whale, lesser beaked whale, spade-toothed whale, Shepherds beaked whale, Cuvier's beaked whale, pygmy killer whale, Blainville's beaked whale, snubfin dolphin, Indo-Pacific hump-backed dolphin, spinner dolphin, Tasman's beaked whale, Indo-Pacific bottlenose dolphin, common bottlenose dolphin, Longman's beaked whale, Layard's beaked whale, and True's beaked whale.

It is hoped that this country-specific information will assist national management plans and objectives, as well as demonstrate the benefit of increased survey and monitoring efforts in uncovering the diversity of cetaceans that appear to be evident within Pacific Island waters. Finally, a complete listing of the species identified as occurring within the Pacific Islands Region was produced (Chapter 5). For each of cetacean species habitat description, subspecies classification, possible issues with identification, appendix listing (CMS and CITES and status (IUCN redlist) are listed. This list also includes some species not confirmed yet potentially present in the region.

The Pacific Islands Region

The boundaries of the Pacific Islands Region, as defined by the Convention of Migratory Species (CMS) Memorandum of Understanding (MoU) for the Conservation of Cetaceans and their Habitats in the Pacific Island region (CMS 2006), are the marine areas under the jurisdiction of each State or Territory of the Pacific Islands Region, and extend to the area defined by the Noumea Convention, i.e., between the Tropic of Cancer and 60° South latitude, and between 130° East longitude and 120° West longitude. The region stretches over some 10,000 kilometres from east to west and 5,000 kilometres from north to south, with a combined economic exclusion zone (EEZ) of approximately 30 million km² (Figure 1). This region contains 22 Pacific Island nations and territories, as well as a portion of the Australian continent, both the North and South Islands of New Zealand, and a portion of the Hawaiian Islands.

The Countries and Territories of the Pacific Islands Region are:

1. American Samoa
2. Australia
3. Cook Islands
4. Federated States of Micronesia
5. Fiji
6. French Polynesia
7. Guam
8. Kiribati
9. Marshall Islands
10. Nauru
11. New Caledonia and Dependencies
12. New Zealand
13. Niue
14. Northern Mariana Islands
15. Palau
16. Papua New Guinea
17. Pitcairn Islands
18. Samoa
19. Solomon Islands
20. Tokelau
21. Tonga
22. Tuvalu
23. Vanuatu
24. Wallis and Futuna

The limited land base of the 22 Pacific Island Countries and Territories is distributed among 200 high islands and 2,500 low islands and atolls. In

general, the islands increase in size from east to west (SPREP 2004). In total, the land area covers just over 500,000 km² – of which Papua New Guinea accounts for 83%, while Nauru, Pitcairn, Tokelau and Tuvalu each measure less than 30 km² (Figure 2).

Within the Pacific Island nations there are three distinct sub-regions, i.e., Polynesia, Micronesia and Melanesia. The size and ecological diversity of these countries is believed to decline from the southwest to the northeast, tapering from the larger and higher, forested islands of Melanesia to a high number of tiny, sparsely vegetated atolls scattered across the central Pacific. The three cultural areas have quite different access to economic opportunities. In general, Melanesian countries have almost all the land and land-based mineral resources, Micronesia occupies the greatest sea areas with the largest tuna resources, and Polynesian regions focus on agriculture and marine resources. In general, there is a high degree of economic and cultural dependence on the natural environment (SPREP 2004).

The vast and complex marine systems of the Pacific Islands Region contain an enormous array of diversity. The region is purported to hold the most extensive and biologically diverse reefs in the world, the deepest ocean trenches, deep-sea minerals, the world's largest tuna fishery, as well as a range of globally threatened species such as sea turtles, dugongs and cetaceans (UNDP 1999). The many thousands of islands are, with the exception of some larger Melanesian islands, entirely coastal in nature. The surrounding ecosystems include mangroves, lagoons, rocky shores, seagrass beds, estuarine lagoons and coral reefs (Bleakley 1995, SPREP 2004). Most islands have been formed as a result of either volcanic activity or coral reef

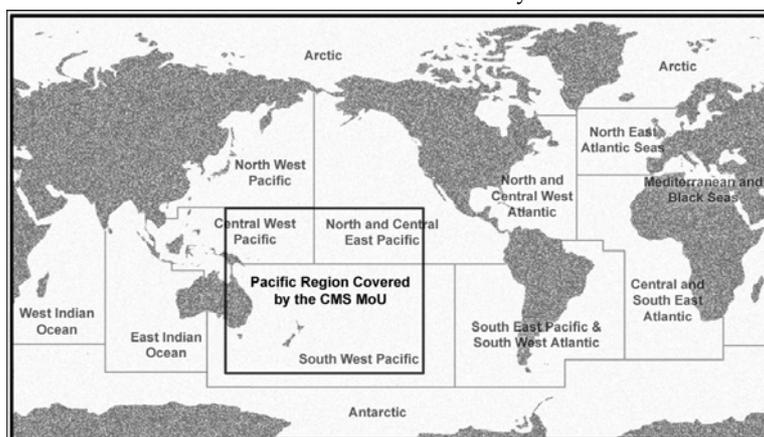


Figure 1. Geographic boundaries of the Pacific region

development. Islands in the Pacific may be classified into four general types: atolls, raised coral islands, volcanic islands and continental islands. It is possible to find intermediates between these types, such as a volcano surrounded by an atoll-like lagoon and barrier reef, or elevated reef attached to a continental or volcanic island (Dahl 1984). Island arcs form an almost continuous chain of islands or shallows stretching from New Zealand, through Tonga, the Solomon Islands, the Bismarck Archipelago, Palau and the Marianas to Japan. The island arcs are bounded on the east by deep trenches, the most distinctive of which are the Marianas Trench at 10,915 metres, the world's deepest. Other deep trenches in the area include Palau, Bougainville, New Hebrides, Tonga, and Kermadec (Bleakley 1995).

Sea surface temperatures in the Pacific Island Countries and Territories tend to be relatively warm throughout the year, e.g. waters just south of New Caledonia typically only drop to 22°C in the austral winter, and north of the Marianas waters remain at approximately 24°C during the northern winter. Summer months bring water temperatures in the high twenties both north and south of the equator

(Bleakley 1995). The salinity of waters in the region varies from approximately 34 to 36 parts per thousand. Lowest salinities occur in the western parts of Micronesia where rainfall is greater than evaporation. Evaporation exceeds precipitation around subtropical gyres in the north (around the Northern Mariana Islands) and south (east of French Polynesia) thereby maximizing salinity levels (Bleakley 1995).

Oceanographic features play a critical role in shaping the productivity and diversity of the region (Bleakley 1995). Equatorial currents are active in the region either side of the equator. The Northern Equatorial Current flows west as a zonal band between 8-10°N and the Tropic of Cancer to the west of 180°. The South Equatorial Current flows as a westerly current between the Tropic of Capricorn and 10°S. The Equatorial Current flows west between 5°N and 5°S and is generated by trade winds. Several jet streams and counter currents are also active in this area (Bleakley 1995). These systems enable nutrients to flow into the region from areas of upwelling off the coast of Peru and California. These waters quickly become impoverished as they are warmed at the surface and nutrients are consumed by

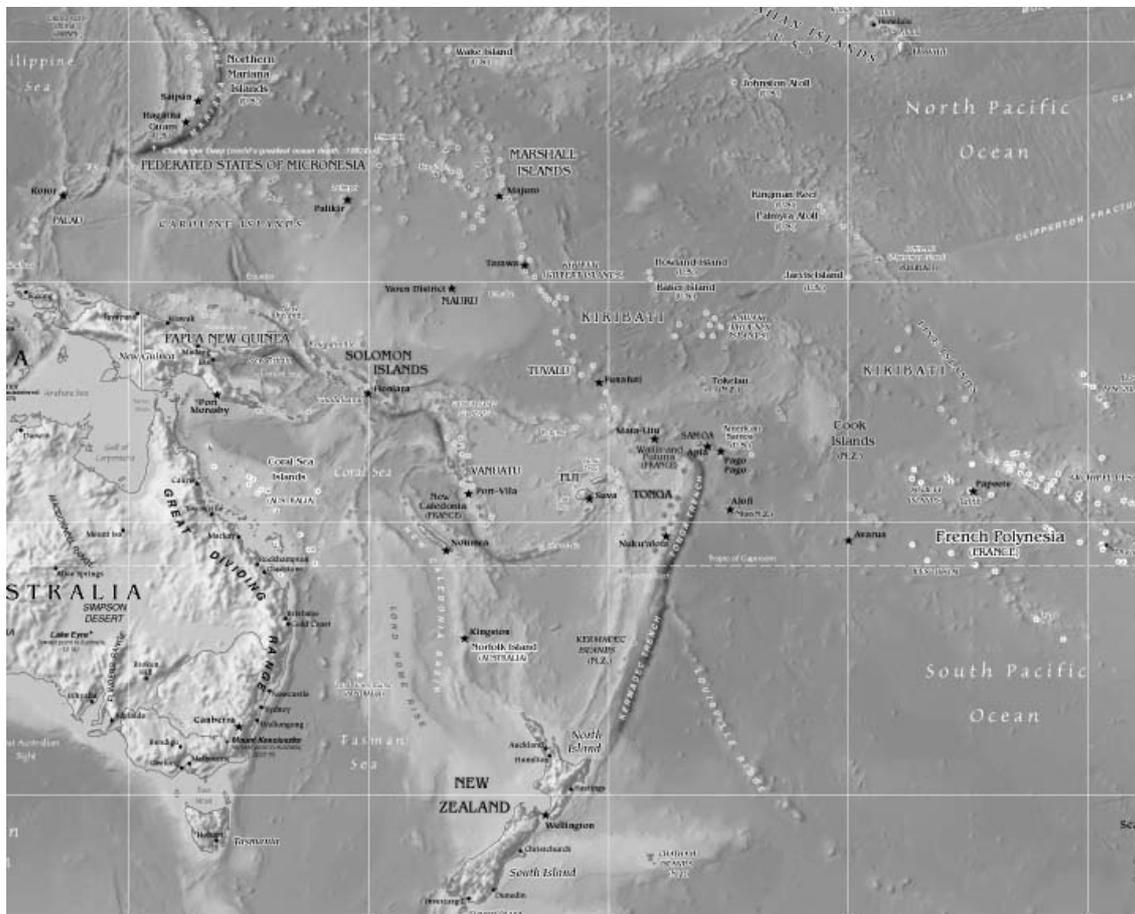


Figure 2. The Countries and Territories of the Pacific Islands Region

photosynthesis. On the equator, the divergence in the westward surface flow of the Equatorial Current as a result of the earth's rotation causes some upwelling of subsurface water, colder and richer in nutrients. The waters of the Pacific Region are generally considered nutrient poor although coastal waters are higher in nutrients as a result of weathering, leaching and runoff from islands. These inputs do play an important localized role in sustaining coastal marine ecosystems (Bleakley 1995). Major meteorological and oceanographic influences on the region are El Niño and La Niña. The effects of these phenomena on marine ecosystems and cetaceans are discussed further in Chapters 2 and 3.

Concerns and Threats for the Marine Environment in the Pacific Islands Region

Whilst there is strong diversity across the Pacific Islands Region, the 22 Pacific Island Countries and Territories do share some common characteristics: small physical size, geographical isolation, unique endemic ecosystems vulnerable to destruction or damage, rapid human population growth rates, limited land area, dependence on marine resources, and economic and environmental vulnerability (SPREP 1992, SPREP/ESCAP 1996). In turn, these features give rise to a general list of priority environmental protection and sustainable development issues for the region (SPREP 2004):

1. Loss of biological diversity
2. Land degradation
3. Lack of (and threats to) freshwater resources
4. Degradation of coastal environments
5. Land and sea-based waste and pollution
6. Poor environmental planning, management, and urbanization
7. Climate change

Each issue is briefly discussed below to provide context for the discussion on direct, indirect and potential threats to cetaceans inhabiting the Pacific Islands Region (Chapter 3). Focus has also been placed on those concerns that are of more immediate consequence to marine ecosystems. Several of the concerns mentioned in this section overlap and therefore appear under multiple headings.

Loss of Biological Diversity

In the Pacific Islands Region it has been demonstrated that there is a gradient of decreasing numbers of marine species from west to east, and a second gradient from warm equatorial waters to more temperate waters as distance from the equator increases (Dahl 1984). However it is acknowledged that overall the current understanding of biological diversity in the Pacific Islands is quite conservative (SPREP 2004). This assertion is in line with studies that estimate only 10% of tropical species have been described (UNEP 2004). Research that has been conducted in the

Pacific does infer relatively high levels of biological diversity. Examples include an exceptionally large number of species found within a single coral reef system, areas within Melanesia and Polynesia that have been identified as global biodiversity 'hotspots', and significant numbers of endemic bird species (Aswani and Hamilton 2004, SPREP 2004, UNEP 2004, Mittermeier et al. 2005). However, extinction rates in the region are amongst the highest in the world (SPREP 2004). In fact, the Pacific Islands Region has more globally threatened species per capita than any other region, including at least 858 species with a high probability of extinction in the medium-term (SPREP 2004). In the marine realm it has been assessed that 31% of Pacific Island coral reefs are at medium risk and 10% at high risk of further degradation (Bryant et al. 1998). The major threat to faunal biodiversity in the region is habitat loss through activities such as large-scale forest logging, commercial agriculture, land clearing and fires, clearance of wetlands and mangroves, mining, sedimentation and nutrient flows, and urbanization (Thaman 2002). Native species are also threatened by the introduction of alien invasive species. Besides habitat degradation the greatest threats to marine biodiversity are land-based sources of pollution (such as eroded soils, pesticides, heavy metals, nitrates and chlorinated hydrocarbons), overexploitation of living resources, and invasive species (Sherley 2000). It has been noted that introduced fishes, amphibians and crustaceans have impacted native marine and coastal biodiversity by altering habitats, competing for food and living space, introducing pathogens, and hybridising with native species (Eldredge 2000).

Land Degradation

Due to the limited amount of land area in the Pacific Islands Region, infrastructure development and urban sprawl have made significant contributions to land and coastal degradation (SPREP 2004). Such development has resulted in increased soil erosion and compaction, loss of ecosystems, pressures on food security, and sedimentation of water systems and reefs (Thaman 2002). In many cases unsustainable land-use practices such as

export market oriented cash cropping have progressed towards even more aggressive practices such as large-scale intensive developments including logging, mining, plantation, and grazing development. Extractive industries such as logging and mining are (or have) been significant industries in Countries and Territories including Fiji, Nauru, New Caledonia, Papua New Guinea and the Solomon Islands (McDaniel 2001). The development of the tourism industry in countries such as Fiji, the Cook Islands, French Polynesia, Tonga, Commonwealth of the Northern Mariana Islands and Guam again places stress on terrestrial development and space (Twining-Ward 2005).

Lack of (and Threats to) Freshwater Resources

Reserves of fresh potable water supplies are restricted throughout most of the Pacific Islands. These limited supplies are in part due to contamination of urban systems, industrial run-off, effluent, and poisoning of many river systems via extractive industries. Furthermore, in the low lying atolls land-cover loss and rising seas enable pollution to infiltrate the ground water lens. Limited water supplies have also been attributed to changes in the frequency and patterns of rainfall that have occurred in association with large-scale weather disruption events such as El Niño and La Niña (SPREP 2004).

Degradation of Coastal Environments

Uses and activities of the coastal zone typical for small Pacific Island Countries and Territories since the 1970s were associated with fishing, coastal shipping, port and harbour development, coastal construction (houses and hotels), infrastructure development (roads, power and water supply), sewage treatment and disposal, and rubbish dumping. During the 1980s and 1990s the intensity and scale of development increased with major hotels, water-based recreation such as diving, other tourism-related activities, intensive agriculture, industries and commerce, discharge of factory effluent, and increased waste disposal. In short, increased population densities combined with new technology and changing development priorities have had a

profound impact on coastal environments (Thaman 2002, SPREP 2004).

More specifically, the region's coastal and marine resources are threatened by (i) introduced marine species, (ii) ship wrecks and marine spills (oil, chemicals and other hazardous materials), (iii) ships' waste (oil, sewage, chemicals and garbage, antifouling paints on vessels), (iv) physical impacts and pollution from dredging, sand extraction and sea-bed mining, (v) nutrients derived from sewage, soil erosion and agricultural fertilizers, (vi) solid waste disposal particularly in urban areas, (vii) sedimentation resulting from land clearance and increased erosion, (viii) physical alterations through destruction of fringing reefs, beaches, wetlands and mangroves for coastal development and by sand extraction, (ix) over-exploitation of coastal food fisheries, particularly through destructive fishing methods (for e.g., 'Papua New Guinea weed', explosives, use of scuba gear when spear-fishing, and mechanized equipment), (x) cumulative breakdown in traditional protection mechanisms, and (xi) damage to tropical marine ecosystems from global climate change (Thaman 2002, Ram-Bidesi 2004, SPREP 2004, UNEP 2004). Fragmented laws, information gaps, and poor institutional framework exacerbate these impacts.

Waste and Pollution

Pollution from solid, hazardous and toxic wastes is now widely recognized as one of the major threats to sustainable development in the Pacific Islands Region (SPREP 2004). Many Pacific Island Countries and Territories do not have the capacity for waste management as there are inadequate mechanisms and legislation and lack of suitable available land for waste disposal. In addition, the last decade has seen an increase in the importation of goods and has resulted in dramatic shifts in the amount of plastics, cardboard, and paper matter in some countries. Increased urbanization also places greater demands on infrastructure including sewage, disposal of animal wastes (especially from pigs) and household garbage, power, communications and transportation services. In particular, inadequate sewage handling has severe health and environmental implications causing

degradation of river, sub-surface and coastal water quality (such as high coliform contamination) with adverse effects on recreational and fishing activities. The increased nutrient load to the marine environment also threatens the coral reef ecosystems, weakening the reef carbonate skeleton and smothering the reef with algae (SPREP 2004).

A study of persistent organic pollutants in the region found that considerable stockpiles exist in some countries and that a number of sites had been contaminated through past disposal or storage of these chemicals (SPREP/AusAID 1999). Incidents of dangerous pollutants being discharged illegally into streams and oceans have increased in synchrony with growing urbanization and establishment of manufacturing industries. Activities in the 1950 to 1960s, which led to widespread radioactive and chemical contamination of land, continued in the 1970s through to the 1980s in northern Polynesia and into the 1990s in the French Territories. Military nuclear testing has made parts of the Marshall Islands permanently uninhabitable. Furthermore, many northern PICTs have significant concerns over military materials remaining from World War II. The threats of waste and chemical pollution are aggravated in some cases by an absence of occupational health and safety guidelines, and a lack of disaster management technology for spills, fires, and chemical leaks (SPREP 2004).

Environmental Planning, Management, and Urbanization

In the Pacific Islands Region the population size grew by 1.9 million people between 1994 and 2004 although the distribution of population remained largely unchanged. Over five million people inhabit Papua New Guinea while Countries and Territories such as Niue and Tokelau have a total population of less than 2,000, and the Pitcairn Islands are inhabited by approximately 50 people. There is concern that in some areas population size exceeds the level that local resources can sustain. For example in South Tarawa, Kiribati, there is an estimated 1,596 persons per km² that makes it one of the highest population densities in the world (SPREP 2004). At times this rapid population growth has encouraged poor land use, overcrowding,

high intensity of land use, sprawled settlement, poorly timed and designed development, and resource use extraction. Degradation of ecosystems and resources is most evident where population density and economic activity are concentrated together, particularly around towns, alongside industries such as fisheries, logging, and mining (Mosley and Aalbersberg 2003).

Land use planning is crucial in areas where soils and substrate are either volatile in terms of disturbance or geological event, suffer from limitations to various nutrients for agriculture, and/or are subject to high rainfall. Lack of planning may lead to erosion, soil leaching, landslides and land structure decline. Issues of land tenure and resource access are also important considerations for sustainable development and planning in the region (SPREP 2004).

Climate Change

Pacific Island Countries and Territories are extremely vulnerable to many of the effects of climate change such as variations in weather and sea level rise. For the coastal communities where up to 70% of islanders live (Jones et al. 1999) the incidence of increased frequency of extreme weather events and natural disasters such as cyclones and floods is concerning. Areas under most threat have been identified as marine and coastal ecosystems, tourism assets, human settlements and infrastructure (IPCC 1998). Coupled with El Niño, the impacts have included water shortages and drought in Papua New Guinea, the Marshall Islands, Federated States of Micronesia, American Samoa, Samoa and Fiji. Current risks are likely to persist (Jones et al. 1999). Sea-level rise is obviously a major concern for the low-lying atoll islands as repercussions of encroachment are already being felt (Govt of Samoa 1999, Hsu 1999, Govt of the Republic of the Marshall Islands 2000, WWF 2003, Hunt 2002, Thaman 2002).

Additional potential impacts of climate change on the marine environment include sea temperature rise, changes in ocean circulation, changes in salinity, ocean acidification, changes in rainfall patterns, and an increase in storm frequency (Hansen et al. 2001, IPCC 2001, Sear et al. 2001, Hulme et al. 2002, ICES 2004, Bass et al. 2006). Although the biological

consequences of a changing climate upon the ocean are far from being understood, it is plausible there could be strong implications in terms of nutrient availability, biological productivity, and the structure and functions of marine ecosystems (Gillespie 2002). In the Pacific Islands Region there have already been noted impacts on coral reefs, tuna distribution, and mangrove systems (Hoegh-Guldberg et al. 2000, Lehodey 2001, Crosby et al. 2002, Hunt 2002, Thaman 2002, UNEP 2006). These marine ecosystem implications will be expanded on in the next chapter.

Threats to Cetaceans in the Pacific Islands Region

The diverse and expansive Pacific Islands Region serves as habitat to many cetacean species that selectively use the region on a year-round, seasonal, or more sporadic basis (Reeves et al. 1999). Despite relatively little research and sighting effort the number of species documented in the region is relatively high (Reeves et al. 1999, SPREP 2004). However, for a vast majority of cetacean species a detailed understanding of the life history, geographic range, and habitat of individuals and populations is lacking.

Global reviews of cetacean status and threats have given useful synopsis and context for serious cetacean threats (e.g., Rice 1998, Reeves et al. 2003, IUCN 2006) and provided a starting point for identifying threats to cetaceans in the Pacific Islands Region. However, in most cases the ability to further quantify and address these threats is heavily hampered by gaps in basic species knowledge, as well as lack of monitoring or assessment in the region. Nevertheless, the collation of known information is a practical beginning to future mitigation and abatement measures. Threats discussed in this chapter include climate change and habitat degradation, chemical pollution and disease, noise, cetacean tourism, fisheries bycatch and entanglement, fisheries depredation interactions, ship strikes, hunting, 'scientific whaling', drive hunts, and live captures for display. In the absence of specific regional information threats are discussed in a more global sense (Reeves et al. 2003).

Climate Change and Habitat Degradation

Global and region-wide impacts of climate change on the marine environment that have already been observed and are predicted to occur include temperature rise, sea-level increase, changes in ocean circulation, retreat in sea-ice, changes in salinity, increases in CO₂ concentrations, ocean acidification, changes in rainfall patterns, changes in climate pattern/variability, an increase in storm frequency and storm surges, an increase in wind speeds and changes in wave conditions, and extreme weather events

(Hansen et al. 2001, IPCC 2001, Sear et al. 2001, Hulme et al. 2002, ICES 2004, Bass et al. 2006, UNEP/CMS 2006). The projected increase in sea level rise of 0.09 to 0.88m for 1990 to 2100 (IPCC 2001) makes low-latitude tropical and subtropical coastlines highly susceptible. Important nursery grounds for many fish and invertebrate species such as coral reefs and atolls, salt marshes and mangrove forests, and submerged aquatic vegetation will be directly impacted by sea-level rise (IPCC 2001, UNEP 2006). Increased run-off due to both rainfall and inundation may also cause an increase in pollutants, including sewage, into the marine environment. Furthermore, decreased salinity due to increased rainfall will also likely affect the distribution and abundance of prey species. Increases in natural disasters also add to the factors that may increase coastal erosion and damage to coastal ecosystems (IPCC 2001). The consequences of climate change are being taken very seriously in the low-lying Pacific Island nations (e.g., Govt of Samoa 1999, Govt of the Republic of the Marshall Islands 2000, Thaman 2002) as in some cases the effects on regional marine ecosystems are already being observed (Hoegh-Guldberg et al. 2000, Lehodey et al. 2001, Crosby et al. 2002, Hunt 2002, Thaman 2002, UNEP 2006).

The potential impacts of climate change on cetaceans are in many cases speculative (Simmonds and Isaac 2007), but it is contended that they will be (i) direct, such as when a species may have to change their typical geographic distribution as a result of an oceanographic shift, and (ii) indirect, such as implications for reproductive success when prey distribution, abundance or composition is altered (Learmouth et al. 2006). A couple of examples of both direct and indirect impacts follow.

The distribution of Pacific Ocean tuna populations appears to change during the years when El Niño is in effect (Hunt 2002). This change in distribution is likely a result of changes in tuna prey such as krill. In an El Niño year the pressure gradient between the east and west Pacific Ocean lessens and therefore causes the equatorial waters of the Central and Western Pacific to become cooler. Lehodey (2001) note that tuna catches are highest in the western equatorial Pacific warm pool but can be displaced by as much as 50° of longitude eastward (which may alter the jurisdiction

of these catches from national waters to the high seas) during El Niño episodes. During La Niña years when the westerly trades blow more strongly, tuna catches tend to move westward (Hunt 2002). These changes in the marine ecosystem obviously have both direct and run-on effects to cetacean populations in the region.

Decline in the health of coral reef systems in areas of the Pacific Ocean has also raised serious concerns (Crosby et al. 2002, Hoegh-Guldberg et al. 2000). Notably, the reduction of calcification rates coupled with higher sea temperatures has intensified coral bleaching events. Many are particularly concerned about the implications of changes in ocean pH resulting from increased atmospheric carbon dioxide, or ocean acidification (Pörtner et al. 2004, Bass et al. 2006). An increase in CO₂ concentration will act to reduce the availability of carbonates necessary for the growth of corals and molluscs. The physiological effects are also implicated to adversely influence the metabolic function in sensitive creatures such as the ommastrephid squid (Pörtner et al. 2004). Increases in atmospheric CO₂ concentrations due to greenhouse gas emissions are partly to blame (Hunt 2002), although it has been noted that coral degradation is most aggravated in urban areas (Hoegh-Guldberg et al. 2000). Additional factors contributing to coral habitat decline include soil erosion and sedimentation of volcanic islands, coastal construction, sewage and industrial discharges, overfishing of subsistence resources and excessive commercial exploitation of other fisheries, increased flooding and discharge of fertilizers and toxic chemicals, and destructive fishing techniques, especially explosives. In addition, the corals themselves are being extracted for the marine aquarium and curio trade (Lovell and Tumuri 1999). In response to these imminent ecological problems many monitoring programs have been established in locations including American Samoa (Craig and Basch 2001), and Fiji (Harborne et al. 2001). It is probable that fish production will suffer as these reef habitats continue to be degraded or are lost (Hunt 2002). Once again the impact on the surrounding marine ecosystem is undetermined. However, continued poor waste and pollution management is a note of concern.

The Antarctic is the feeding ground of many of the great whale species that migrate to the Pacific Islands Region during their breeding season in the austral winter. However, these ecosystems are also undergoing significant changes as a result of global warming (Moline et al. 2004). Clapham et al. (1999) note that the blue whales' nearly exclusive dependence upon euphausiids, especially krill (*Euphausia superba*) in the Antarctic, could make blue whales vulnerable to large-scale changes in ocean productivity. Specifically, if the extent of sea ice decreases larval krill may not be able to endure the extended periods in which they do not have access to under-ice algae for feeding. Krill abundance has decreased in the northern western Antarctic Peninsula during the last decade (Fraser and Hofmann 2003). Furthermore, glacial melt-water runoff and reduced surface water salinities have also resulted in shifts in phytoplankton community structure along the Antarctic Peninsula (Moline et al. 2004). Changes in the spatial and temporal distribution and abundance of krill will have severe implications for marine species such as baleen whales that rely on krill as their main prey, or are important in their respective food webs.

The fate of cetaceans as a result of climate change is largely speculative, but the Intergovernmental Panel on Climate Change (IPCC) (2001) asserts that: "Wild species have three possible responses to climate change: (i) change geographical distribution to track environmental changes; (ii) remain in the same place but change to match the new environment, through either plastic response, such as shifts in phenology (for example timing of growth, breeding etc.), or, genetic response, such as an increase in the proportion of heat tolerant individuals; or (iii) extinction." It is therefore critical that projected impacts of climate change are taken into account when addressing conservation and management plans for cetaceans (Simmonds and Isaac 2007).

Chemical Pollution and Disease

Between June 1946 and October 1958, the Enewetak and Bikini Atolls of the Marshall Islands were used as testing grounds for 66 nuclear devices (Reeves et al. 1999). This testing produced close-in fallout debris that was contaminated with

quantities of radioactive fission and particle activated products, and unspent radioactive nuclear fuel that entered the aquatic environment of the atolls (Robinson et al. 1998). Today, the sediments in the lagoons are reservoirs for transuranics and some long-lived fission and activation products, although the larger amounts of contamination are associated with fine and coarse sediment material adjacent to the locations of the high yield explosions. Radionuclides are also distributed vertically in the sediment column to various depths in all regions of the lagoons (Robinson et al. 1998). Concentrations greater than fallout background levels are found in filtered water sampled over several decades from all locations and depths in the lagoons. Of particular importance is the fact that the long-lived radionuclides are accumulated to different levels by indigenous aquatic plants and organisms that are used as food by resident people and quite possibly animals. Various isotopes of plutonium have been found in reef fish including mullet, convict surgeonfish and goatfish (Robinson et al. 1998, Noshkin et al. 1998). The resultant long-term implications for the marine ecosystems and marine mammals in this area are unknown.

A comprehensive study of water quality of the U.S. Pacific Island territories revealed levels of contaminants in vacation beaches that have caused many beach closures (Dorfman 2004). Examples from Guam beaches indicate elevated levels of *Enterococcus* while estuarine areas are subject to organic enrichment, pathogens, increased salinity and nutrients, and high pH from municipal point sources and urban runoff. Information from Northern Mariana beaches indicates that runoff, and faulty septic and sewage systems are part of the reason for beach-water contamination. In addition, sedimentation from unpaved roads and development, stormwater and urban runoff, reverse osmosis discharges, and nutrients from golf courses and agriculture were cited as problematic in this area. In addition, landfills are believed to leach metals and synthetic organic compounds (Dorfman 2004).

High nutrient levels of phosphate and nitrate have been noted proximal to human activities along the Coral Coast of Vitu Levu, Fiji (Mosley and Aalsbersberg 2003)

in quantities believed to be harmful to coral reef ecosystems. Coupled with overfishing of herbivore species these elevated nutrient levels are believed to be a contributor to the recent widespread growth of macro-algae species along this coast. The authors noted that nutrient levels were highest at sites located near hotels and other populated sites (Mosley and Aalsbersberg 2003).

Mining operations in the Pacific Islands Region exist or historically have existed in Papua New Guinea, Fiji, Nauru, Solomon Islands and New Caledonia and are feared to be placing a heavy environmental toll on the landscape (SPREP 2004). Dumping of mine tailings into submarine canyons occurs very close to the Pacific Islands Region. More specifically, several large mines in Sulawesi, Indonesia dispose of their tailings in deep ocean canyons known to support populations of sperm whales and various beaked whales (Kahn 2000). In addition to point-source pollution, the atmospheric transport of contaminants from these operations also represents a danger.

The input of such toxins into the marine environment likely has grave consequences for cetaceans. A recent global survey of toxicity levels in marine mammals has found that even in mid-Pacific regions where the environment was regarded as relatively pristine, persistent organic pollutants were found to be accumulating in sperm whales (Ferber 2005). In fact there is a growing concern that exposure to contaminants can increase susceptibility to disease and affect reproductive performance in cetaceans (Reijnders et al. 1999). Although it is difficult to definitively assign cause-and-effect between pollutants and cetacean response – possible sublethal effects include increased susceptibility to disease, impairment of reproduction and early development, immune suppression, cancer induction and mutagenic effects, changes in behaviour, and occurrence of epizootics (Reijnders et al. 1999). A few examples exist for the Pacific Islands Region. In New Zealand waters a Hector's dolphin died from complications associated with *Aspergillus fumigatus* infection of the lungs (Duignan and Jones 2005). Analysis of samples from *Tursiops aduncus* individuals in the Solomon Islands suggests the presence of *Brucella* spp. or a *Brucella*-like organism (Tachibana et al. 2006) in this region also. Furthermore, Omata et al.

(2005) detected the presence of *Toxoplasma gondii* for this same species, again in the Solomon Islands region. East of the Pacific Islands Region (in Peruvian waters) tattoo skin lesions characteristic of poxvirus infection were found in small cetaceans captured in the gillnet fisheries (Van Bressem and Van Waerebeek 1996). Infected species included *Lagenorhynchus obscurus*, *Delphinus capensis*, *Phocoena spinipinnis*, and *Tursiops truncatus*. The pattern of prevalence was indicative of an endemic infection. Serological evidence from these same species types again in Peruvian waters also indicated the presence of Brucella species antibodies (Van Bressem et al. 2001). More recently, raised and ovoid skin lesions have been observed on humpback whales in the waters of American Samoa although the cause of these marks is unknown (Mattila and Robbins, 2008). Finally, a recent necropsy of a beaked whale in Cook Islands indicated a plastic bag in the stomach (SPWRC 2007).

Noise

Underwater noise can be lethal or chronically damaging to cetaceans (Simmonds et al. 2004, Jasny et al. 2005, Weilgart 2007). Sublethal effects of noise such as vacating former feeding and mating grounds (Morton and Symonds 2002, Weller et al. 2002), changing migratory routes (e.g. Richardson et al. 1995), or altering calls (Miller et al. 2000) may also have impacts on fitness and health of individuals. Major concerns regarding underwater noise for cetaceans are shipping and boat traffic, seismic activity, and military activity (Simmonds et al. 2004, Jasny et al. 2005). All three sources have been documented in the Pacific Islands Region although the ability to quantify the extent and ramifications of these noise sources is difficult. Of greatest concern are situations in which heavy vessel traffic, seismic testing, dredging, and, military activities occur in or near areas where cetacean populations engage in vital activities such as calving, calf-rearing, resting, migration, and feeding (Simmonds et al. 2004). In French Polynesia, a harbor entrance deepening project including coral blasting took place during the peak migration of humpback whales (SPWRC 2008).

In general it has been asserted that ocean background noise levels have doubled every decade for the last six decades in some areas (IWC 2004). This increase has been primarily attributed to shipping activity (IWC 2004) and it is plausible that noise levels in the Pacific Islands are in line with this global average. Other noise pollution sources include seismic air guns used in marine exploration activities that in some instances are thought to be a contributing factor to whale stranding events (Taylor et al. 2004, Engel et al. 2004). Estimates indicate that noise from the airguns can reportedly flood through a region of almost 300,000 km², raising noise levels 100 times higher on a continuous basis for days at a time (IWC 2004). In the Pacific region mining operations currently occur in Fiji, New Caledonia, Tonga, Papua New Guinea, the Solomon Islands and until recently Nauru (SPREP 2004). Although a majority of these operations are land-based, due to the small island size the associated noise issues of drilling, machinery and transport still present a noise source for the proximal and surrounding marine environment (Simmonds et al. 2004).

The deployment of low frequency active sonar (LFAS) and mid-frequency tactical sonar by the military is of particular concern due to the powerful nature of these systems (Simmonds 2004). Military operations involving the use of high-intensity sonar, explosive devices, and other intense noise sources pose both lethal and non-lethal threats to cetaceans (Whitehead and Weilgart 1995). Military training and testing activities have been conducted in the Line Islands, Marshall Islands, and French Polynesia (for nuclear weapons testing), with additional islands in Hawaii and elsewhere used for bombing (Crosby et al. 2002). Currently, LFAS activities have been restricted to an area around the Marshall Islands. Some cetacean species appear to be particularly susceptible to acoustic trauma – i.e., ziphiids and other deep diving species (Rowles et al. 2000). Notably in some areas there have been several mass strandings of Cuvier's beaked whales coincident with military exercises involving the use of very loud, low frequency and/or mid-frequency

tactical sonar activities (Frantzis 1998, Rowles et al. 2000). War games planned for regions around the Hawaiian Islands were stalled in July 2006 due to environmental concerns for marine life, particularly cetaceans (ENS 2006). The proposed expansion of military presence and operations in Guam will likely increase military activity in this region in the future (Pacific Islands Report 2007). Furthermore, Planned Training and Research, Development, Testing and Evaluation Activities Conducted within the Mariana Islands Range Complex is of recent concern (Federal Register notice 74 Reg. 11530 (Mar. 18, 2009)).

Cetacean Tourism

Cetacean tourism is a growing industry in the Pacific Islands Region that has provided economic opportunities in numerous locations (Hoyt 2001, O'Connor 2008). Commercial marine wildlife viewing operators are listed within Federated States of Micronesia (spinner dolphins, bottlenose dolphins, and pilot whales), Fiji (spinner dolphins), French Polynesia (spinner dolphins and other tropical dolphins), Guam (spinner dolphins, pilot whales), New Caledonia (humpback whales, spinner dolphins), Niue (humpback whales, spinner dolphins), Solomon Islands (tropical dolphins), and Tonga (humpback whales, pilot whales, spinner dolphins, sperm whales) (Hoyt 2001). Of particular note are the 84,000 whale watchers that visit Guam for cetacean tourism as this constitutes more than 75% of such tourists to the Pacific Islands Region (O'Connor 2008). Many operations also exist within Australia (humpback whales, dwarf minke whales, bottlenose dolphins, Indo-Pacific humpbacked dolphins, southern right whales), New Zealand (sperm whales, dusky dolphins, Hector's dolphins, bottlenose dolphins, common dolphins, orcas, long-finned pilot whales, Bryde's whales, false killer whales, southern right whales, southern right dolphins, minke whales), and the Hawaiian Islands (humpback whales, spinner dolphins, bottlenose dolphins, short-finned pilot whales, sperm whales) (Hoyt 2001). Many of these tours include close interactions, including swimming, scuba diving and snorkelling with cetaceans (Samuels et al.

2003). In some instances animals have become habituated: for example, food provisioning to bottlenose dolphins in Tangalooma (Orams 1995) and Indo-Pacific humpback dolphins in Tin Can Bay. In Australia, swim-with operators work within the Great Barrier Reef with dwarf minke whales (Valentine et al. 2004) and bottlenose dolphins at Port Stephens and Port Phillip Bay. Around New Zealand dusky dolphins, bottlenose dolphins, common dolphins, and Hector's dolphins are the subject of swim-with operations. In-water operations also exist in various locations of French Polynesia (melon-headed whale and humpback whales), Tonga (humpback whales; Orams 2001, 2004), New Caledonia (humpback whales; Garrigue and Virly 2000), and Niue (spinner dolphins and humpback whales). Swim-with operations in Hawaii focus on spinner dolphins and pilot whales.

Although these operations signify an important way of making money, it is important to note that intensive, persistent, and unregulated vessel traffic that focuses on animals while they are resting, feeding, nursing their young, or socializing can disrupt those activities, and possibly cause long-term problems for populations (Reeves et al. 2003, Bejder et al. 2006). Notably, it has recently been asserted that one of the worldwide threats to flora and fauna is tourism (IUCN 2000, UNEP/CMS 2006). Studies of the effects of vessel-based tourism within New Zealand waters has found important behavioural responses such as decreased resting and socialising behaviour (Constantine et al. 2004) and increased diving (Lusseau 2003) in bottlenose dolphins, mass movement of cetaceans away from areas where boat-based tourism occurs (Lusseau 2005), and a variety of behavioural changes in common dolphins (Neuman and Orams 2005). Hector's dolphins have also shown avoidance behaviour and changes in dispersion of the group (Bejder et al. 1999). Lusseau and Higham (2003) have also looked at behavioural responses to boats in the context of spatial and temporal norms of the population under study. Studies in southeastern Australia have revealed avoidance behaviour of bottlenose dolphins as a response to tour boat presence (Hale 2002) as well as a lack of compliance to watching and interaction regulations by the operators (Scarpaci 2003, 2004). Off Shark

Bay, Western Australia, Bejder (2005) has demonstrated significant impact on the reproductive success of bottlenose dolphins targeted by tourism. Humpback whales in eastern Australian waters have also shown responses to commercial whale watching operators – in particular pods that contain calves (Corkeron 1995). The necessity of sound and appropriate management strategies, including enforcement of any measures, is vital for the sustainability of Pacific Islands Region whale watching operations. A strong step forward on this front was the release of regional Pacific Islands Guidelines for Whale and Dolphin Watching in 2008 (SPREP/Operation Cetaces/IFAW/FFEM 2008).

Fisheries: Introduction

The Food and Agricultural Organization (FAO) of the United Nations divides the world's oceans into 18 fishing areas. The Pacific Islands Region covers all or part of four of these areas: the Western Central Pacific, the Southwest Pacific, the Eastern Central Pacific, and Southeast Pacific. The Western Central Pacific area produces the highest catches of these four regions and also has a significant bearing on the economies of several Pacific Island nations (SPREP 2004). In fact, the fisheries industry contributes an average of 11% of the GDP of all Pacific Islands nations. The regional Western and Central Pacific tuna fishery is the world's largest tuna fishery and showed an approximately 230% increase from 1976-1996. However, the economic returns to Pacific nations through fishing access fees from foreign fleets represent a relatively small proportion of an approximately 1.7 billion (US) dollar industry (Preston 1997). Coastal fisheries are an important resource for local communities' in terms of food, lifestyle, custom, and employment. On average 77% of coastal fisheries landings are utilized for home consumption (World Bank 2000) although there are limited management or protection mechanisms in place to sustain and monitor coastal fisheries.

A general summary of fish landings, species, and gear types of the four relevant FAO regions is presented below (Sea Around Us 2006). In the Western Central Pacific over 3 million tonnes of fish are landed annually. More than half of this catch is from tuna and billfish species, with

yellow-fin tuna being the greatest contributor. Hooks, purse seines and troll lines are the most common gear type although bottom trawls, gillnets, squid hooks, mid-water trawls, and, traps are also used. In the Southwest Pacific catches are smaller with just less than 400,000 tonnes being landed annually. Blue grenadier, Wellington flying squid, and, the southern blue whiting make up a majority of these catches. Approximately 50% of catches are derived through destructive bottom trawling activities. Portions of both the Eastern Central Pacific and Southeast Pacific areas fall outside of the Pacific Islands Region. Catches in the Eastern Central Pacific are primarily from tuna (yellow-fin, skipjack, and big eye) yet with totals of approximately 750,000 tonnes the production does not match that of the Western Central Pacific. Finally, the Southeast Pacific catches are dominated by the Inca scad – in fact of the over 2.2 million tonnes of fish landed in this region per year almost 1.5 million is from this species. The most common fishing methods are purse seine and mid-water trawls, although gillnets and hooks are also used (Sea Around Us 2006).

Fisheries: Bycatch and entanglement

Fishing gear bycatch and entanglement is regarded as a very serious threat to cetaceans worldwide (Northridge 1991, Lewison et al. 2004, Read et al. 2006). However, the estimate of cetacean bycatch within the Pacific Islands is limited by the small amount of fishing vessel monitoring (Lawson 2001). Onboard observer programs do exist within the region but their overall coverage is not extensive. Specifically, on average less than 1% of all long-line fishing vessels within the western, central and South Pacific waters had independent observers aboard between 1987 and 2000 (Lawson 2001). Between 1994 and 2000, the maximum observer coverage on purse-seiners was only 5%, and for a single year of coverage (1988) observers were present aboard line-and-pole boats in the Solomon Islands for just 2% of total fishing trips (Lawson 2001). Such level of observer coverage is inadequate to reflect the actual bycatch situation. Major gaps in current observer coverage include data from distant-water long-liners of Korea and Taiwan, and

Japanese vessels fishing in international waters. Coverage of certain domestic fleets of Pacific Island nations has also been poor. Some assert that the bycatch of domestic fleets is less than that of distant foreign fleets (Chapman 2001) but the limited datasets fail to confirm or deny this.

The sections below provide details on bycatch and entanglement of cetaceans divided into individual gear-types when sufficient information was available. Records containing less specific information on gear type and/or information follow. Finally records on bycatch and entanglement from the Hawaiian Islands are presented for comparative purposes.

a. Long-line

Lawson (2001) summarized observer bycatch data held by the Oceanic Fisheries Program (OFP) of the Secretariat for the Pacific Community (SPC) from the western and central Pacific tuna fisheries. However, in the western Pacific, observer activity on the long-line vessels remains low and is not considered adequate to provide reliable indications of overall levels of bycatch and discards (Manzurek 2004).

The long-line observer data held by the OFP were obtained from eight observer programs, i.e. the national programs of Australia (1987–1997), Federated States of Micronesia (1992–1999), Marshall Islands (1995, 1997), New Zealand (1987–1999), Palau (1999), Papua New Guinea (1999) and Solomon Islands (1996, 1998–1999), and the SPC regional program (1992–2000). This final program covered long-liners operating in the waters of American Samoa, Cook Islands, Fiji, Federated States of Micronesia, French Polynesia, Kiribati, Marshall Islands, New Caledonia, Papua New Guinea, Palau, Samoa, Solomon Islands and Tonga. Most data were derived from Australian and New Zealand monitoring schemes (42.6 and 38.2 percent respectively) while other national programs and the SPC program accounted for approximately 10 percent each. Bycatch data was largely presented as summary and overall data, so it was difficult to attribute species information to location or fishing nation. However, species that were recorded within the collective datasets included: *Tursiops truncatus*, *Delphinus delphis*, *Lagenorhynchus obscurus*, *Megaptera novaeangliae*, *Orcinus orca*, and *Physeter*

macrocephalus. In addition there were five unidentified *Delphinidae*, one unidentified whale, and eight unidentified marine mammals. Country information indicated that the South Pacific nations reported twelve marine mammals, New Zealand caught 330 individuals (primarily pinnipeds), and Australia recorded none. It was noted that Australia's report seemed incomplete (as bird and reptile numbers were also unusually low) and this data was being further investigated for accuracy. Of the marine mammals that were bycaught, a total of 20 were retained, 320 were discarded and for 2 individuals this information was unknown. Of the discarded marine mammals, twenty were already dead and four were of unknown condition while the remainder were reported to be alive. Again, species and location were not attached to this information, which makes it of limited use. More recently Molony (2005) has collated records from 1980–2004 for long-line observer data in the SPC region. Species (and number recorded) for this period were: bottlenose dolphin (3), common dolphin (3), dusky dolphin (1), humpback whale (2), Risso's dolphin (7), short-finned pilot whale (4), sperm whale (2), spinner dolphin (2), 'blackfish' (2), dolphins/porpoise (unidentified) (2), and whale (unidentified) (11). This information did not include condition of the animal. Obviously this data overlaps with Lawson's (2001) review.

Williams (1996) summarized bycatch numbers of the western and central Pacific tuna fisheries and noted that on rare occasion catches of *D. delphis* and other (unidentified) marine mammals occurred, as well as 'possible' catches of *P. crassidens* within the long-line fisheries of the western and central sub-tropical Pacific (WSP). Long-line fisheries in the western and central tropical Pacific (WTP) on rare occasion take unidentified marine mammals. *O. orca* takes within the western and central temperate Pacific (WteP) have also been documented from long-lining vessels.

The distant-water fleets of Taiwan have been reported to have 'relatively frequent cetacean interactions within the Pacific Islands Region (Donoghue et al. 2003). During 1994–1995 a total of 100 cetaceans were landed at two Taiwanese fishing ports as a result of long-line operations. Of these,

23 had been hooked in the mouth or throat region, 11 had been entangled, and 53 had been harpooned, while poor condition of 13 carcasses prohibited deciding the nature of the interaction. Most of the pantropical spotted (*S. attenuata*), spinner (*S. longirostris*) and striped (*S. coeruleoalba*) dolphins appeared to have died after becoming entangled in lines. A very small proportion (i.e., less than 1%) of the total number of cetaceans landed at either port were 'blackfish' (i.e., killer, false killer, pilot, or possibly pygmy killer or melon headed whales), although none of the deaths could be attributed directly to long-line gear. It is likely that these numbers are conservative as cetaceans may have been discarded at sea or consumed onboard. Hence, the number of carcasses recorded at the fishing ports should be considered an underestimate of the total number killed (Donoghue et al. 2003). Fatal entanglement in a long-line net within Federated States of Micronesian waters was cited in regard to a recently discovered *Mesoplodon ginkgodens* carcass (Dalebout et al. 2008). This case also suggests the prevalence of illegal, unreported and unregulated (IUU) takes as the carcass was only discovered upon inspection in Guam during which the captain indicated intention to sell the animal in Taipei.

In New Zealand waters, entanglements in long-line fishing gear have been documented for humpback whales (SPWRC 2005), orca and sperm whales (M. Donoghue pers comm.). Humpbacks and sperm whales have also become entangled in Hawaii (Manzurek 2004). These Hawaiian records did result in successful disentanglements, yet the ultimate fate of these animals is unknown. Recently, a mother-calf humpback whale pair was reported to be trailing long-line gear (SPWRC 2008). Although the gear was removed the fate of these animals is uncertain.

b. Purse-seine

The purse-seine observer data held by the OFP (Lawson 2001) were obtained from seven observer programs, i.e. the national programs of the Federated States of Micronesia (1994–1999), Nauru (1996), Papua New Guinea (1996–1999) and Solomon Islands (1998–1999), and the regional programs of the Federated States of Micronesia Arrangement (1998–2000),

SPC (1995–2000) and the US treaty (1994–2000). The US Treaty data account for 66.6 percent of the data, the national programs account for 24.6 percent and the other regional programs make up 8.8 percent. These purse seine fisheries reported a total of 127 marine mammals as bycatch: 24 when nets were set without any school association, 41 when the net was set on a drifting log or debris, 45 when a raft, fish aggregating device or payoa was set on (32 if drifting, 13 if anchored), 15 when on a whale, and 1 each when a whale shark or unknown conditions were set on. No species were identified in any of the bycatch incidents and all individuals were reportedly discarded (Lawson 2001). Post-release survivorship, if any, is unknown for these records. Although not bycatch it is also interesting to note that in 102 of 6580 instances a whale was observed in association with the school of fish set on. In addition, Coan et al. (1999) reported that U.S. tuna purse-seiners caught 12 cetaceans (classified as 'porpoise/dolphin') in the central-western Pacific during 1988. Eleven of the twelve animals were discarded at sea. It is unclear whether this information was included in Lawson's (2001) summary. More recently Molony (2005) has collated records from 1980-2004 for purse-seine observer data in the SPC region. Species (and number recorded) for this period were: bottlenose dolphin (18), common dolphin (24), pygmy killer whale (1), short-finned pilot whale (2), spinner dolphin (4), 'blackfish' (19), unidentified whale (5), and unidentified dolphins/porpoises (33). This information did not include condition of the animal and once again, it overlaps in content with Lawson's (2001) review.

c. Drift-nets

A few records exist for drift-net fishing, although the global moratorium (on high-seas drift-net fishing) as well as concern by South Pacific countries of the navigational hazards, and prevalence of 'ghost net' fishing has largely limited this fishing practice (Wright and Doulman 1991). In one case prior to the moratorium, four Taiwanese drift-net vessels were running a trial fishery for squid in New Zealand's EEZ in early 1981. Inspection of the vessels during their fishing operations documented a frozen common dolphin and southern pilot whale in addition to shark, tuna and mackerels aboard the vessel. As a result,

licences were suspended. In a second case, there are general reports of hourglass dolphin (*Lagenorhynchus cruciger*) deaths in South Pacific driftnets, although specific geographic information is not available (Goodall et al., 1997). Little is known about the incidental catch of marine mammals in historical driftnet fishing for tuna in the Pacific region (Sharples et al. 1991, Richards 1994).

d. Gill-nets

Information on gillnet fisheries throughout most of the South Pacific Ocean is inadequate to judge effects on marine mammals although some assert that bycatch is relatively probable in areas where cetacean habitat intersects with gillnet deployment (Nitta 1994). However, it is reported that from 1984 to 1988, at least 230 Hector's dolphins were killed in groundfish gillnets by commercial and amateur fishermen in the Canterbury region. Over 90% of catches occurred during the austral summer, and younger animals were particularly vulnerable to entanglement (Dawson 1991). Based on a sensitivity analysis, Martien et al. (1999) predicted the extinction of the North Island population within the next few decades unless gillnet fishing effort was substantially reduced (Dawson et al. 2001). Entanglement in fishing gear, especially gillnets in deep water (e.g., for billfish and tuna), is cited as one of the most significant threats to ziphiids, including Cuvier's beaked whales (Reeves et al. 2003). Human-related mortality of *Orcaella heinsohni* in north-eastern Australian waters is largely attributed to drowning in inshore gillnets set across creeks, rivers and shallow estuaries for barramundi and threadfin salmon (Parra et al. 2002).

e. Other gear types

Some reports show that both long- and short-beaked common dolphins are also captured in New Zealand commercial nets (Duignan and Jones 2005) and bottlenose dolphins have been observed entangled and stranded on the shore. Hector's dolphins, bottlenose dolphins and common dolphins are reported to be taken in both trawl and set net fisheries in New Zealand waters and numbers reported by fishermen are believed to be underestimates (Cawthorn 1988). It is believed that up to 100 Hector's dolphins were taken and not

reported in some fisheries/regions (Cawthorn 1988). Fisheries capture of *Tursiops* sp. in a set-net mesh and an inshore finfish fishery has taken place in the Gulf of Carpentaria, Australia (Haines and Limpus 2001, Limpus et al. 2002). Finally, a few Hourglass dolphins were reported to be taken in set nets off New Zealand (Goodall et al. 1997), and at least four humpback whales were entangled in crayfish pot lines off Kaikoura between 2003 and 2006 (SPWRC 2004, Donoghue pers. comm.).

f. Unspecified gear types and general concerns

Dawbin (1972) reported that Irrawaddy dolphins were taken accidentally in fishing nets in the Gulf of Papua, and false killer whales had been taken between Papua New Guinea and Australia. Some mortality of spectacled porpoises (*Phocoena dioptrica*) occurs in fishing gear, but the scale of this mortality relative to abundance and population recruitment is unknown (Reeves et al. 2003). Small numbers of *Peponocephala* are taken in nets and by harpooning throughout the tropics (Reeves et al. 2003). In January 2004 a humpback whale was found dead on the coast near Kaikoura. This whale had a large, fresh wound across its back consistent with entanglement in a rope or line, but whether the cause of death was related to this injury or not is uncertain (SPWRC 2004). *Tursiops* sp. have been washed ashore entangled in fishing net of unidentified origin in Australia (Limpus et al. 2002). Poole (1993) also reported that rough-toothed dolphins were implicated in interactions with fisheries in French Polynesia.

g. Bycatch in Hawaii

The incidence of marine mammal interactions is documented in a consistent manner for the Hawaiian long line fishery and may provide insights into species susceptible to bycatch and entanglement in the Pacific Islands Region given the proximity (and partial inclusion) of this region (NMFS 2001, 2002, 2003, 2004, 2005, Bass and Clemens 2005). This information is summarized below.

Between 2001 and 2005 thirty-eight individuals were recorded in interactions with long-line vessels (NMFS 2001, 2002, 2003, 2004, 2005). Five animals were released dead and thirty-three were

released injured. Animals that died as a result of interaction included – two false killer whales, one Blainville’s beaked whale (*Mesoplodon densirostris*), one bottlenose dolphin, and a pantropical spotted dolphin. The remaining animals released injured from their interactions comprised: 2 unidentified whales, 6 unidentified cetaceans, 4 short-finned pilot whales, 2 Risso’s dolphins, 1 Blainville’s beaked whale, 15 false killer whales, and 3 humpback whales. The serious injury and mortality rate of false killer whales as a result of pelagic longlining is considered above the ‘potential biological removal’ (PBR) levels set by the National Marine Fisheries Service (Caretta et al. 2005). Recent analysis of historical survey data indicates a possible decline in this species around the main Hawaiian Islands since 1989 (Leatherwood et al. 2009). A legislative review confirms that in the Hawaii longline fishery (shallow-set targeting swordfish and deep-set targeting tunas), an average of 30 cetaceans from seven species (six odontocetes and one mysticete - humpback whale) were killed or seriously injured annually between 1995 and 2005 yet at this time no take reduction team has been formed (Moore et al. 2009). Additionally, in 2005, a Risso’s dolphin, a Bryde’s whale and an unidentified whale were each released injured after interactions within the shallow set fisheries.

Other reports of fishery interactions with protected cetaceans have also previously been reported for Hawaiian fisheries (Nitta and Henderson 1993). Specifically, bottlenose dolphins, rough-toothed dolphins and possibly false killer whales take bait from troll fisheries for billfish (Nitta et al. 1993).

h. Bycatch in Australian shark control nets

New South Wales (NSW) and Queensland (QLD) are the only two states in Australia that have shark control programs. Nets and/or baited drum-lines are set off beaches along the coastline with the purpose of keeping sharks active in feeding and territorial movements up and down the coast away from swimming beaches. In NSW the shark control program relies solely on beach meshing to achieve this goal while QLD employs both mesh nets and baited drum-lines. Between 1967 and 1992 at least 544 cetaceans were

caught in shark nets set for bather protection along the Queensland coast (Paterson 1990). Species that have been (and continue to be) caught in these nets include: *D. delphis*, *O. heinsohni*, *Sousa chinensis*, *S. longirostris*, *Tursiops* sp., and possibly *P. crassidens* and *Megaptera novaeangliae* (Bannister 1977, Paterson 1990, Haines and Limpus 2000, Haines and Limpus 2001, Humane Society International 2002, Limpus et al. 2002). In NSW an average of 5.75 dolphins (speculated to be primarily bottlenose and common dolphins) were caught per year between 1966 and 1981 (Humane Society International 2002). Regulations to reduce bycatch such as net attendance rules and gear modifications have been introduced, but enforcement is lacking in remote areas (Hale 1997).

Fisheries: Depredation Interactions

In the past decade fishermen from Pacific Island Countries and Territories have become increasingly concerned about the potential effects of the removal of hooked fish or bait from long-lines by cetaceans (termed depredation), however, the extent and complexity of the issue is not well understood (Donoghue et al. 2003) and incidence reports have not been scientifically verified. Anecdotal reports of depredation have been given from various locations including the Cook Islands, Samoa, Federated States of Micronesia, Fiji, Papua New Guinea, the northern Coral Sea, and New Zealand, with a variety of cetacean species reported to be involved. Specifically, orcas, false killer whales, pilot whales, and sperm whales were highlighted by the fishermen as being the most problematic. Additionally, rough-toothed dolphin, spinner dolphin, pantropical spotted dolphin, bottlenose dolphin, Risso’s dolphin, striped dolphin, common dolphin, and Fraser’s dolphin may occasionally be involved in interactions (Donoghue et al. 2003). Tuna long-line vessels are the fishing vessels where depredation most often occurs.

It is unclear whether reported increases in removal of fish and bait is due to an increase in the number of cetaceans in the fishing areas, the result of learned behaviour being transferred from one group of cetaceans to another, the incidence of shark damage being falsely attributed to

cetacean interactions, an actual increase in this activity in the region, or, an increase in reporting (Donoghue et al. 2003). Despite these uncertainties, the possible and/or perceived financial loss by individual fisherman can and do lead to actions that harm cetaceans. Some dangerous and inappropriate techniques have been used to deter marine mammals from interacting with the fishing lines: shooting and harpooning of animals, and the use of 'tuna bombs' (underwater explosives). These techniques are not always fatal, although deaths have occurred. Some fishermen also hang parts of bodies of cetaceans on lines in an attempt to deter others from coming close (Donoghue et al. 2003).

Ship Strikes

Although collisions with motorized ships are a recognized source of cetacean fatality and injury, until recently there has been little comprehensive or global assessment of these activities (Laist et al. 2001, Jensen and Silber 2003, Van Waerebeek et al. 2006) although regional and species-specific reviews have appeared (e.g., Best et al. 2001, Tregenza et al. 2002). Because records are accumulated from a variety of sources including historical records, stranding databases published reports and personal observations, a constant issue for examining the occurrence of ship strike injuries in cetaceans is quality of data and condition of carcasses when autopsies are performed (Laist et al. 2001, Jensen and Silber 2003, Van Waerebeek et al. 2006). Furthermore, it is also plausible that vessels may strike floating carcasses. Therefore, at times it is difficult to definitively determine the cause of death of an animal even when it appears to have injuries consistent with a ship strike (Van Waerebeek et al. 2006).

Van Waerebeek et al. (2006) compiled records of ship strike records for small cetaceans worldwide and large whales in the Southern Hemisphere. A majority of the summary below is taken from this report, but it is important to note that records were sourced on an opportunistic basis. Hence, the authors recognize that this report is heavily weighted towards areas and countries where expertise is available to document such records, reporting legislation is in place, and,

research, survey and/or whale watching boats frequent.

Within the Pacific Islands Region twelve different species have been documented as suffering collisions with ships. Several of the great whale species such as the Bryde's whale, sei whale, and the pygmy blue whale experienced fatal collisions that were not discovered until reaching port. In this case it could be confirmed that all of these collisions were made within the New Zealand EEZ. A dead minke whale has also been found in New Zealand with ship-strike wounds. In addition, several humpback whales have been struck (some by whale-watching vessels) in Hawaiian waters (Weinrich 2005).

Several beaked whales have also shown injuries of ship collisions (Van Waerebeek et al. 2006). Once again, all of these records come from New Zealand. Stranded Cuvier's beaked whale, Arnoux's beaked whale, Andrew's beaked whale and Hector's beaked whale individuals each showed signs of trauma, injury or bruising indicative of an interaction with a vessel that was possibly the cause of the fatality. Deep indentations and scars observed during a sighting of a Gray's beaked whale adult suggested a non-fatal ship or propeller collision had previously occurred.

For smaller cetaceans a few additional records exist. An Indo-Pacific humpback dolphin was killed by a propeller, and washed ashore in Queensland, Australia (Stranding Database, Queensland). Vessel collisions are also a factor in the mortality of the threatened Hector's dolphins in New Zealand (Stone and Yoshinaga 2000). Orcas with known home range around New Zealand has been noted to have a series of deep scars in their lumbar-caudal regions which suggest they were caused by propellers (Visser 1999). Another juvenile orca was observed to be hit by a boat and sustain serious injuries from which it submerged and did not resurface (Visser 1999b). Again in New Zealand waters, a solitary *Tursiops* sp. individual was noted to display a ship collision injury (Gales et al. 2003). In 1985 a specimen of *Kogia* sp. was found stranded on the beach of Plum in the extreme southwest of New Caledonia reportedly displaying wounds incurred by the propeller of a boat (Sylvestre 1988). Finally, collisions between high-speed ferries and whales have been reported in French Polynesian waters (Miller 2003)

with a humpback whales being involved in at least some cases (SPWRC 2008).

Hunting

Commercial whaling probably began in the tropical Pacific Ocean in the early to mid 1800s (Reeves et al. 1999). Unrestricted whaling left southern right whales virtually commercially extinct by 1850, and the larger population of sperm whales severely diminished. During the 19th century whaling effort was additionally directed towards humpback whales proximal to numerous Pacific Island nations (i.e., Tonga, Fiji, New Caledonia, French Polynesia, and Kiribati) (Reeves et al. 1999). Eventually effort was shifted to Bryde's whales as humpback quotas were decreased (Reeves et al. 1999). Baker and Clapham (2002) estimated that between 1904 and 1980 approximately two million whales were killed in the Southern Hemisphere. This figure includes over 200,000 humpbacks, 350,000 blue whales, almost 400,000 sperm whales, and 725,000 fin whales (Baker and Clapham 2002).

Of further detriment to species' recovery were the illegal and unreported takes by Russia from shortly after World War II until the late 1970s (Baker and Clapham 2002). This falsification included the omission of over 45,000 humpbacks and 3,300 southern right whales (Tormosov et al. 1998) from official records. Between 80 and 95% of the estimated number of individuals in each of these commercially whaled species were killed during this period (Baker and Clapham 2002). A more specific re-analysis of unreported humpback whales taken indicates that 22,569 and 7,195 whales were taken from the foraging/ wintering Areas V and VI respectively (as per IWC definitions) between 1947 and 1973 (Clapham et al. 2009). Additional humpback whaling was undertaken by Tonga throughout the 20th Century until banned by royal decree in 1978 (Orams 2004). In response to only small numbers of humpback whales being observed in the Pacific Islands Region, the Oceania subpopulation was listed as Endangered by the IUCN in 2008 (Childerhouse et al. 2008).

Recent information (Perrin 2006) indicates Bryde's whales (possibly also Omura's whales) were taken by pelagic Philippines operations working within the

Federated States of Micronesia and Palau. In addition some takes have been made by native Pacific Islanders for cultural reasons (Reeves et al. 1999). Many of these exploited whales are present now in only relatively low numbers while the status and abundance of other species remains depleted but unknown (Reeves et al. 2003).

'Scientific' Whaling

Although the International Whaling Commission (IWC) placed a moratorium on commercial whaling (coming into effect in 1986), the United States, Japan, Norway and Iceland have all at some time issued scientific permits to conduct lethal sampling, and Norway and Iceland now allocate themselves commercial whaling quotas each year. Japan is the only nation that conducts whaling activities for commercial purposes in Southern Hemisphere waters (www.iwcoffice.org).

Japanese 'scientific' whaling in the Southern Hemisphere commenced in 1987 and has continued to the present day under two JARPA (Japanese research in the Antarctic) programs. JARPA I was conducted between the 1987/1988 and 2004/2005 seasons and resulted in the lethal sampling of approximately 6800 Antarctic minke whales (IWC 2006). This program was reviewed in December 2006, by which time JARPA II had already commenced (www.iwcoffice.org). On an annual basis JARPA II proposes to kill up to 935 ($850 \pm 10\%$) Antarctic minke whales (from the Eastern Indian Ocean and Western South Pacific IWC-defined stocks), 50 humpback whales (from D and E IWC-defined stocks) and 50 fin whales (from the Indian Ocean and the Western South Pacific IWC-defined stocks) for a period of 16 years. This program is preceded by a 2-year feasibility study in which a maximum of 935 Antarctic minke whales and ten fin whales will be killed and sampled in each season. The first year of the feasibility study was conducted during the austral summer 2005/2006 and resulted in 853 minke whales and 10 fin whales being killed (IWC 2006).

It is plausible that some humpback whales that will be taken during Japanese 'scientific' whaling activities in the Antarctic migrate to the Oceania region for breeding purposes during the austral winter (Chittleborough 1965). Breeding

populations of humpbacks in several of the Pacific Islands Region sites remain low and well below pre-exploitation levels (Walsh and Paton 2003, Garrigue et al. 2004, SPWRC 2004). Hence, the future JARPA II 'scientific' whaling activities on humpbacks in the Southern Ocean potentially pose a serious threat for further decline or even local extinction of Pacific Islands Region humpback whale populations (SPWRC 2004). The effects of the JARPA programs for fin and minke whales are difficult to assess due to the absence of any agreed abundance estimates for these species (IWC 2006). Furthermore, concentrated and region-wide studies on stock structure, habitat requirements, and, life-history characteristics for these two species have not been conducted in the Pacific Islands Region.

Bryde's whales and Omura's whales have also been taken in the Pacific Islands Region under scientific permit. Previous to the IWC moratorium Japan took 120 Bryde's and Omura's whales in the Coral Sea during the 1976 Antarctic season (October-November). Seven of these (Omura's whales) were taken just south of the Solomon Islands and 113 were taken in the waters between Fiji and New Zealand (Kawamura 1977). Once again, due to an incomplete understanding of the distribution of the two species in the region it is difficult to assess the implications of these takes.

Drive Hunts

A drive hunt for small cetaceans has been practiced in certain islands of the Solomon Islands group for many years (Reeves et al. 1999). A majority of dolphins taken in this hunt (termed 'porpoise hunts') are apparently long-beaked oceanic forms, including spinner, pantropical spotted, striped, common and rough-toothed dolphins (Dawbin 1972). The primary objective of these hunts is to obtain teeth that are used as local currency and for collars or headbands and necklaces, as well as to obtain meat. Risso's dolphin have also been taken on occasion, but due to their lower tooth count they were apparently of lesser value to the Malaitans (Dawbin 1966). Other species involved in the hunt have included melon-headed whale (whose teeth were the most highly prized) and Fraser's dolphin (Takekawa

1996, Reeves et al. 1999). Takekawa (1996) indicated that the take of melon-headed whale was reduced in response to a population decline. An average of 840 (approximate range = 50 – 2000) small cetaceans were taken per year at the islands of Fanalei from 1976 to 1993 (Reeves et al. 1999). More recent reports indicate that the hunts now occur about three times a year, mostly in the Malaita area, when 100-200 animals may be taken per hunt (Ross et al. 2003). It has also been suggested that 'porpoise' teeth were imported from Micronesia to the Solomon Islands around the middle of the 20th century but no further details of this hunt are available (Reeves et al. 1999).

Reeves et al. (1999) also refer to several other drive hunts in the Pacific Islands Region including the Mariana Islands (during the late 19th and early 20th century), Gilbert Islands (where some drive hunting occurred until the 1980s), the western Caroline Islands, French Polynesia (believed to focus on spinner dolphins), and Papua New Guinea. Akimichi's (1993) review of cetacean hunting in Oceania includes references to the driving or harpooning of small cetaceans at Manus, Malaita, Tuamotu, Marquesas, Tonga, the Caroline Islands, and Mokil in eastern Micronesia. Singular occurrences of cetacean hunting have also been recorded. People in the Marshall Islands and Kiribati hunted small cetaceans for food, particularly after the animals have become disoriented and trapped inside atoll lagoons (Nitta 1994). Reeves et al. (1999) reported on a Fraser's dolphin allegedly speared in Fiji, and Rancurel (1973) noted that a pilot whale was stranded on the reef and killed by native fishermen at Efate, Vanuatu in 1972.

Live Captures for Display

During 2003 more than one hundred dolphins were live-captured in waters surrounding the Solomon Islands and then kept in sea pens in several locations including on the Island of Gela off the capital Honiara (Ross et al. 2003). In the same year 28 Indo-Pacific bottlenose dolphins were exported from Solomon Islands to Mexico for display in a tourist facility (Ross et al. 2003). It was reported that one of the individuals died a week after arriving in Mexico, another within a

month, with several others demonstrating very poor condition (WDCS 2006). In 2002-2003 a local company with a dolphin holding facility near Honiara requested that 45-55 pantropical spotted dolphins taken in the drive hunt at Fanalei be kept alive and penned in a local bay. Of these, 12 were transported to a display facility in the Florida Islands, near Honiara. Ten of the dolphins died during transport and another died in the holding pen some time after arrival (Reeves and Brownell, 2009).

Concern for welfare of these animals and the scale of exports prompted a fact-finding visit by the IUCN/SSC Cetacean and Veterinary Specialist groups (Ross et al. 2003). From this two-day visit it was determined that 24 dolphins were being held at Gavutu, one of which was a pantropical spotted dolphin, the others of which were mostly or entirely Indo-Pacific bottlenose dolphins. The team also learned of additional dolphins that had either been released or transferred to a facility at Honiara prior to the site visit. The team observed 17 dolphins, all *T. aduncus*, at the Honiara facility (Reeves and Brownell, 2009). The precise circumstances of the capture(s), including when they occurred, were unknown, but the capture method was believed to be in seine nets from a small motorboat (Ross et al. 2003). In 2004, at least 40 dolphins were held in the Solomon Islands sea pens (Fisher and Reeves 2006). Several individuals were reported to have died - including a calf that became entangled in the sea pen netting.

The export of dolphins was banned by the Solomon Islands government in 2003 and many, if not all, of the animals being held in the Gavutu and Honiara facilities (and that had not died or escaped) were subsequently released. However, the export ban was challenged and overturned in 2007. At present the Ministry of Fisheries allows up to 100 dolphins, of any species, to be exported per year (Reeves and Brownell, 2009). Since that time 28 dolphins have been exported to United Arab Emirates and 7 more have been exported to the Philippines. The continuing export of dolphins from the Solomon Islands has stimulated global interest and generated concern about the potential conservation implications. The IUCN Global Plan of Action for the Conservation of Cetaceans states that as a

general principle, small cetaceans should not be captured or removed from a wild population unless that specific population has been assessed and shown capable of sustaining the removals. In response, IUCN convened a specialist workshop in August 2008 with the principal goal of elaborating on the elements of an assessment of Indo-Pacific bottlenose dolphins that would allow an assessment to be made in regard to sustainable level of take (due to capture or removal). The Solomon Islands was used as a case study for this workshop (Reeves and Brownell, 2009).

Several other facilities within the Pacific Island nations hold cetaceans in captivity. In January 2002, 'Dolphin Bay', a facility displaying 11 dolphins, opened in Palau. This facility offers interaction programs such as swimming with dolphins and dolphin-assisted therapy. Reports suggest the animals in this facility were exported from Japan after being captured in drive-hunts (WDCS 2006). In early 1994 a facility live-captured seven small cetaceans (3 rough-toothed dolphins and 4 melon-headed whales) in Tahitian waters and held them in a sea pen in the Moorea lagoon (Reeves et al. 1999). The melon-headed whales did not adjust to captivity and were released within a few weeks of capture but two were reported to have died shortly thereafter. At the start of 1996 two of the rough-toothed dolphins remained within the facility (Reeves et al. 1999). At times cetaceans (primarily *Tursiops* and *Pseudorca*) have been taken under licence in Australian waters for public display (Bannister 1977). Oceanariums still exist in Queensland (Sea World: 30 bottlenose dolphins and 1 Indo-Pacific humpback dolphin), and New South Wales (Pet Porpoise Pool: 3 bottlenose dolphins) (Gales et al. 2003). Additionally, bottlenose dolphins are fed in a program at Tangalooma, and several Indo-Pacific humpback dolphins are provisioned in Tin Can Bay (Gales et al. 2003). Finally, a facility in Port Moresby, Papua New Guinea, previously had at least one dolphin in residence. Details of which species this was were not provided and the facility is now closed (Reeves et al. 1999).

Summary

This review presents an initial collation of threats to cetaceans in the Pacific Islands

Region. However, it is plausible that in some cases the lack of monitoring and reporting has failed to highlight the severity of the issues discussed above. Another caveat to this review chapter is that the data presented on cetacean threats has often been collected opportunistically. This mode of assessment clearly produces bias towards instances where records are documented and reported consistently, research is conducted, and/or cetacean tourism is present. This uneven method of collation may also open the possibility of certain threats being left undocumented and therefore omitted at this point. In addition, it is important to note that the impact of individual pressures is heightened in many instances where it is likely that threats act in concert and cumulatively. Translating these ambiguities to enable an assessment of threats to cetaceans within the region is therefore extrapolative, yet necessary to develop appropriate strategies to enable long-term conservation of cetaceans and their habitats in the Pacific Islands Region.

Checklist of Country-specific Cetacean Records in the Pacific Islands Region

Although a basic overview of the cetacean species found within the Pacific Islands Region has been explored (Reeves et al. 1999) country-specific diversity records for the Pacific Islands Countries and Territories are not well established. The primary reason for the relatively unknown status, geographic distribution and population structure of most cetaceans in the Pacific Islands is the lack of directed research that has been conducted across the region. Therefore this initial examination of country-specific cetacean diversity in the region necessarily is a collation of records that have subsequently been referenced to geographic location and reliability. It is important to realize that the information provided is heavily influenced by uneven effort both between countries and also over time. Hence, this chapter acts as a checklist of cetacean diversity rather than an analysis of relative composition and densities of the cetacean fauna in this region.

A concentrated effort was made to collect all references relating to cetaceans within the Pacific Islands Region. Records were garnered from a variety of sources including peer-reviewed journals, field reports, museum stranding records, whaling ship reports, internal records, personal unpublished sightings and communications, anecdotal reports and newspaper reports. A particularly useful resource for this undertaking was Reeves et al. (1999) in a document entitled "Marine Mammals in the Area Served by the South Pacific Regional Environment Programme (SPREP)". This review provided substantial summarization of historical knowledge, unpublished anecdotal sightings, and museum records. The information within the comprehensive Reeves et al. report has been accepted and transposed to fit within the present report. However, the current chapter adds to the Reeves et al. (1999) review in several ways:

(1) As information gathering for the Reeves et al. report concluded in 1996 this chapter incorporates research and records from this time until the present.

(2) The South Pacific region focused on by Reeves et al. (1999) represents a portion of the Pacific Islands Region yet not all of it.

Therefore, a broader geographic range is covered in this chapter. The boundaries of the Pacific region are the marine areas under the jurisdiction of each State or Territory of the Pacific Islands Region, and extend to the area defined by the Noumea Convention, as the area between the Tropic of Cancer and 60° South latitude and between 130° East longitude and 120° West longitude. The region stretches over 10,000 km from east to west and 5,000 km from north to south, with a combined EEZ of close to 30 million km². See Chapter 1 for more details.

(3) An attempt has been made to qualify each cetacean record included in this chapter. This classification was intended to provide a means of indicating relative confidence in a given record in terms of current presence of a particular cetacean species within a given nation's waters. Three classifications of records were designated.

Class 1 refers to a relatively recent field (or specimen record) confirmation of the given species within the EEZ of a nation.

Class 2 refers to a potential Class 1 record that is either dated, or may be marginally outside of a given EEZ.

Unconfirmed refers to records that either were not definitively identified, have not been confirmed by field observations, are from an unobserved stranding event (which therefore may not indicate geographic distribution of the species), or were anecdotal reports that for various reasons may be difficult to corroborate.

Understandably not all records fell easily into these general characterizations. However, attempts were made to ensure that classifications were relatively consistent in regard to the level of confidence in present-day distribution.

(4) Each record has been converted into a country-specific reference. When only island name and not nation was given for a record, care was taken to correctly trace this record to a given country. Records given only as a latitude-longitude location were assessed by best approximation as to their position within a given EEZ. For simplicity some records that did not add to geographic distributional information are omitted from this chapter; many additional citations appear in the References chapter. Records from Australia, New Zealand and the Hawaiian Islands are presented only as species listings falling into the Class 1

criteria listed above. These listings are presented for comparison purposes and also to facilitate potential listings for neighbouring nations.

Country-specific listings for cetacean records are listed below. Information on land and EEZ area for each Pacific Island nation was sourced from SPREP (2006) and the BBC (2006). Each table provides a list of both the scientific names and common names for records (with references) that could be attributed to a given EEZ.

Records have been adapted in instances where there are noted difficulties with individual species identification or subspecies differentiation, and/or instances where taxonomic nomenclature is unresolved or has changed. Specifically, *Tursiops*, *Delphinus*, and *Kogia* individuals have been listed as "sp." in cases where there was insufficient genetic or morphological evidence provided to determine species. In the case of *Kogia* sp. the common name used is "diminutive sperm whale". When insufficient evidence for minke whale sightings was presented, records have been listed as *Balaenoptera* sp. regardless of which species or subspecies was inferred by the author. The same is true for Bryde's whales – with the additional inclusion of sei whale and Omura's whale records - when insufficient evidence for separation exists. In these cases the combined Omura's, Bryde's and sei records are referred to as "Bryde's-like" whales. This step was deemed necessary due to historic difficulties with distinguishing these species from one another at sea. Finally, in cases where the UNEP-WCMC has listed species these have been retained.

American Samoa

Land Area (km²): 200

Sea Area (EEZ) (thousands of km²): 390

American Samoa is comprised of five main islands (Tutuila, Ta'u, Ofu, Olosega, and Rose atoll) and a few rocky outcrops.

A recent collation of research in American Samoan waters outlines the variety of cetacean diversity in these waters (Craig 2005). Much of the research efforts have focussed on humpback whales (Craig 2005, SPWRC 2005, Robbins and Mattila 2006) and it has been found that this species is present on a seasonal-basis in American Samoan waters primarily between August and October.

Additional survey work has positively identified sperm whales, short-finned pilot whales, and false killer whales at sea (Craig 2005). Prior field observations and stranding events have also noted these species in American Samoa waters (Reeves et al. 1999). Skulls and/or stranding records have also been reported for rough-toothed dolphin, bottlenose dolphin and Cuvier's beaked whale (Craig 2005). American Samoa was also one of the regions in which Kasamatsu et al. (1995) recorded relatively high encounter rates of minke whales. These sightings were made during October and December. Unpublished reports of orca seen "on occasion", and both spinner and pantropical dolphins seen "commonly" in American Samoa waters were relayed in Reeves et al. (1999). In addition dwarf sperm whales have recently also been reported within these waters (D. Johnston, pers. comm.).

Records of Cetaceans in the Waters of American Samoa		
Scientific Name Common Name	Citations	Class
<i>Balaenoptera sp.</i> Minke whale	Kasamatsu et al. 1995, Craig 2005	1
<i>Megaptera novaeangliae</i> Humpback whale	Reeves et al. 1999, UNEP-WCMC 2003, Craig 2005, Robbins and Mattila 2006	1
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Reeves et al. 1999, Craig 2005	1
<i>Orcinus orca</i> Orca	Reeves et al. 1999, Craig 2005	2
<i>Pseudorca crassidens</i> False killer whale	Craig 2005, Robbins and Mattila 2006	1
<i>Stenella attenuata</i> Pantropical spotted dolphin	Reeves et al. 1999, Craig 2005	2
<i>Stenella longirostris</i> Spinner dolphin	Reeves et al. 1999, Craig 2005, Robbins and Mattila 2006	2
<i>Steno bredanensis</i> Rough-toothed dolphin	Craig 2005, Robbins and Mattila 2006	2
<i>Tursiops sp.</i> Bottlenose dolphin	Reeves et al. 1999, Craig 2005	1
<i>Physeter macrocephalus</i> Sperm whale	Lever 1964, Grant 1995, Reeves et al. 1999, Craig 2005	1
<i>Ziphius cavirostris</i> Cuvier's beaked whale	Craig 2005	2
Unconfirmed Species		
<i>Kogia sima</i> , Dwarf sperm whale (D. Johnston pers. comm.)		

Cook Islands

Land Area (km²): 237

Sea Area (EEZ) (thousands of km²): 1,830

The 15 volcanic islands and coral atolls of the Cook Islands are scattered over 2 million square kilometres of the South Pacific, between American Samoa to the west and French Polynesia to the east.

Cetacean research in the Cook Islands region has focussed on humpback whales, with their presence in the region being concentrated during the austral winter months (SPWRC 2000 – 2005, Hauser et al. 2000, Hauser 2002, Olavarria et al. 2003, SPWRC 2007-2009). Humpback population substructure is unresolved in the Cook Islands, as individuals have not been re-sighted in other Pacific Island locations (SPWRC 2004). A checklist of other cetaceans within the Cook Islands has been developed in conjunction with humpback whale surveys (SPWRC 2004). Sighting, photographic and genetic evidence has been gathered for spinner dolphin, Fraser’s dolphin, and Blainville’s beaked whale. Sighting and photographic evidence is available for bottlenose dolphin (species unspecified), melon-headed whale, short-finned pilot whale, orca, Cuvier’s beaked whale, sperm whale, and blue whale. Sighting records exist for pantropical spotted dolphin, common dolphin (species uncertain), minke whale (*B. acutorostrata* subspecies), and sei whale (SPWRC 2004). In addition a *Balaenoptera bonaerensis* individual was reported to Hauser (2002), and Kasamatsu et al. (1995) has sighted *Balaenoptera* sp. in this area. A sighting of a Bryde’s-like whale has also been recorded (Hauser 2000). A rare sighting of several individuals near Palmerston Atoll, apparently from the genus *Lagenorhynchus* has also been documented (Leatherwood et al. 1991). The species could not be unequivocally verified (Van Waerebeek et al. 1997) although Leatherwood et al. (1991) believed it to be *Lagenorhynchus australis*. The Cook Islands Biodiversity database (2006) also lists Risso’s dolphin, false killer whale, striped dolphin, and bottlenose dolphin (*Turiops* sp.) as being present in Cook Islands waters.

Records of Cetaceans in the Waters of Cook Islands		
Scientific Name Common Name	Citation	Class
<i>Balaenoptera</i> sp. Minke whale	SPWRC 2004	2
<i>Balaenoptera musculus</i> Blue whale	SPWRC 2004	2
<i>Megaptera novaeangliae</i> Humpback whale	Hauser et al. 2000, Olavarria et al. 2003, SPWRC 2009	1
<i>Delphinus</i> sp. Common dolphin	SPWRC 2004	2
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	SPWRC 2004	1
<i>Lagenodelphis hosei</i> Fraser’s dolphin	Hauser 2002, SPWRC 2004	1
<i>Orcinus orca</i> Orca	Reeves et al. 1999, SPWRC 2004	1
<i>Peponocephala electra</i> Melon-headed whale	Hauser 2002, SPWRC 2004	1
<i>Stenella attenuata</i> Pantropical spotted dolphin	SPWRC 2004	1
<i>Stenella longirostris</i> Spinner dolphin	SPWRC 2004	1
<i>Physeter macrocephalus</i> Sperm whale	Hauser 2002, SPWRC 2004, SPWRC 2008	1
<i>Mesoplodon densirostris</i> Blainville’s beaked whale	SPWRC 2004	1
<i>Ziphius cavirostris</i> Cuvier’s beaked whale	SPWRC 2004, SPWRC 2008	1
Unconfirmed Species		
<i>Balaenoptera</i> sp., “Bryde’s -like” whale (Hauser 2000)		

Balaenoptera borealis, Sei whale (SPWRC 2004)
Grampus griseus, Risso's dolphin (Cook Islands Biodiversity database 2006)
Lagenorhynchus sp. (tentatively - Peale's dolphin) (Leatherwood et al. 1991)
Pseudorca crassidens, False killer whale (Cook Islands Biodiversity database 2006)
Stenella coeruleoalba, Striped dolphin (Cook Islands Biodiversity database 2006)
Tursiops sp., Bottlenose dolphin (Cook Islands Biodiversity database 2006)

Federated States of Micronesia

Land Area (km²): 701

Sea Area (EEZ) (thousands of km²): 2,780

Micronesia, in the western Pacific, consists of some 600 islands grouped into four states: Kosrae, Pohnpei, Chuuk (Truk) and Yap.

To date there have been no dedicated surveys to study the marine mammal diversity within the waters of the Federated States of Micronesia. Therefore it is primarily anecdotal reports that have been used to identify species within these waters. Bryde's-like whales were reported from a tuna vessel within the FSM EEZ during June and July of 1982. This observation is tentative as these whales were initially identified as sei whales yet the record was later amended (Reeves et al. 1999). However confirmed individuals have been seen north of New Guinea in the vicinity of Nauru. Bryde's whales have also been reportedly seen in relatively high densities along the equator between 130°E and 180°W in the mid 1970's (Ohsumi 1978). Furthermore, Bryde's whales were taken in the Philippine fishery for Bryde's whales from 1983-1986, including from locations proximal to the Caroline Islands located within FSM. However, it could not be definitively determined whether these were Bryde's whales or Omura's whales (Perrin 2006). Since 1988 ecotourism ventures have relied upon the presence of spinner dolphins, bottlenose dolphins and pilot whales (assumed to be short-finned) in FSM waters (Hoyt 2001). Miyazaki and Wada (1978) reported herds of Fraser's dolphins (40 - 50 individuals) associated with schools of melon-headed whales. Documented sightings of sperm whale in the vicinity of FSM have been established as well as several anecdotal reports (Patterson and Alverson 1986). An unconfirmed report of orcas occurring near Yap was also reported in Rock (1993). The general distribution of striped dolphins includes FSM (Perrin et al. 1994), and Miyazaki and Wada (1978) confirm their presence in the region. Distribution records of *Stenella attenuata* suggest that this species occurs in Micronesian waters (Gilpatrick et al. 1987) and a single skull of a *Ziphius cavirostris* was found in Ponape, Micronesia (Reeves et al. 1999). Recent discovery of a *Mesoplodon ginkgodens* carcass aboard a Chinese fishing vessel indicates the presence of this species in FSM waters (Dalebout et al. 2008).

Records of Cetaceans in the Waters of the Federated States of Micronesia		
Scientific Name	Citation	Class
Common Name		
<i>Balaenoptera</i> sp. Bryde's-like whale	Eldredge 1991, Patterson and Alverson 1986, Perrin 2006	1
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Patterson and Alverson 1986, Hoyt 2001	1
<i>Lagenodelphis hosei</i> Fraser's dolphin	Miyazaki and Wada 1978, Eldredge 1991	1
<i>Peponocephala electra</i> Melon-headed whale	Miyazaki and Wada 1978, Eldredge 1991	1
<i>Stenella coeruleoalba</i> Striped dolphin	Eldredge 1991, Miyazaki and Wada 1978	1
<i>Stenella longirostris</i> Spinner dolphin	Eldredge 1991, Hoyt 2001	1
<i>Tursiops</i> sp. Bottlenose dolphin	Hoyt 2001	2
<i>Physeter macrocephalus</i> Sperm whale	Eldredge 1991, Patterson and Alverson 1986	2
<i>Mesoplodon ginkgodens</i>	Dalebout et al. 2008	1

Gingko-toothed beaked whale		
Unconfirmed Species		
<i>Orcinus orca</i> , Orca (Eldredge 1991, Rock 1993)		
<i>Stenella attenuata</i> , Pantropical spotted dolphin (Gilpatrick et al. 1987 in Wiles 2005)		
<i>Ziphius cavirostris</i> , Cuvier's beaked whale (Reeves et al. 1999)		

Fiji

Land Area (km²): 18,333

Sea Area (EEZ) (thousands of km²): 1,290

The Pacific nation of Fiji experiences a tropical climate and contains over 800 volcanic and coral islands.

In 1976, between October and November, a Japanese whaling expedition caught Bryde's whales (*Balaenoptera brydei*) in a region just south of the Fiji EEZ (Kawamura 1980). Bryde's whales were also observed during the same expedition between New Caledonia and Fiji (Ohsumi 1978). Recent genetic analysis of samples taken during this trip indicates that these animals represent a genetically distinct subpopulation (Kanda et al. 2007). In late October and early November of 1977, Japanese whalers observed, marked and killed Bryde's whales in a large area between the Tuamotu Archipelago and Fiji. More recent anecdotal observations indicate that Bryde's-like whales do visit the Fijian EEZ (Paton and Gibbs 2002). Paton and Gibbs (2002) also indicated that Dawbin (1959) occasionally observed sei whales in Fijian waters and physically tagged seven individuals between 1956 and 1958, although no data was recovered from these discovery tags. A report from Ohsumi (1977) also indicated that sei whales had been observed in this region although location may not have definitively been within Fijian waters.

Anecdotal reports indicate that fin whales have been sighted in waters just south of Fiji (Paton and Gibbs 2002) and are supported by Japanese whaling ship records (Ohsumi 1979). These same surveys reported minke whales, as did more recent Japanese sighting surveys (Kasamatsu et al. 1995) and anecdotal observations (Paton and Gibbs 2002, C. Miller pers. comm.). Sperm whales have been well documented in Fijian waters historically. Townsend (1931, 1935) indicated that individuals were sighted year-round although at higher rates during the winter and spring. Unpublished surveys of Dawbin (reported in Paton and Gibbs 2002) in the mid-fifties also reported sperm whales. Discovery tags were deployed during this time period but none were recovered. More recent anecdotal reporting indicates that this species is still seen on occasion in Fiji. Blue whales may also be occasional visitors to Fiji as a survey by Ohsumi (1979) indicated that a pair of blue whales was sighted west of Tonga.

Recent visual sighting surveys from a land-based site in Levuka, Ovalau during 2003 confirmed the presence of humpback whale, sperm whale, short-finned pilot whale, false killer whale, pantropical spotted dolphin, and spinner dolphin (Gibbs and Paton 2003 in Bourke and Powell 2004). Reeves et al. (1999) indicated anecdotal reports of short-finned pilot whales, orca, bottlenose dolphins, Fraser's dolphin (a single photograph from the 1930's), and common dolphin (although this sighting was possibly due south of the Fiji EEZ). Rough-toothed dolphins have also been sighted on occasion in Fijian waters (Paton and Gibbs 2002). A recent stranding of a female Blainville's beaked whale near Viti Levu was confirmed by genetic analysis (Leslie et al. 2005). Finally, in the CITES register (UNEP-WCMC 2003) the geographic range of *Kogia breviceps* included Fiji, yet no further reference was provided to substantiate this range.

Records of Cetaceans in the Waters of Fiji		
Scientific name	Citation	Class
<i>Balaenoptera</i> sp. Minke whale	Ohsumi 1979, Kasamatsu et al. 1995, Paton and Gibbs 2002	1
<i>Balaenoptera</i> sp. "Bryde's-like" whale	Dawbin 1959, Ohsumi 1979	2
<i>Balaenoptera edeni</i> Bryde's whale	Ohsumi 1978, Kawamura 1980, Paton and Gibbs 2002, Kanda et al. 2007	1

<i>Balaenoptera physalus</i> Fin whale	Ohsumi 1979, Paton and Gibbs 2002	2
<i>Megaptera novaeangliae</i> Humpback whale	Dawbin 1964, Paterson 2001, Paton and Gibbs 2002, SPWRC 2009	1
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Dawbin 1974, Gibbs and Paton 2003, SPWRC 2009	1
<i>Pseudorca crassidens</i> False killer whale	Paton and Gibbs 2002, Gibbs and Paton 2003, SPWRC 2009	1
<i>Stenella attenuata</i> Pantropical spotted dolphin	Gibbs and Paton 2003, UNEP-WCMC 2003	1
<i>Stenella longirostris</i> Spinner dolphin	Gibbs and Paton 2003, Bourke and Powell 2004, SPWRC 2009	1
<i>Tursiops</i> sp. Bottlenose dolphin	Reeves et al. 1999, SPWRC 2009	2
<i>Physeter macrocephalus</i> Sperm whale	Lever 1964, Paton and Gibbs 2002	1
<i>Mesoplodon densirostris</i> Blainville's beaked whale	Leslie et al. 2005	2
Unconfirmed Species		
<i>Balaenoptera musculus</i> , Blue whale (Ohsumi 1979)		
<i>Delphinus</i> sp., Common dolphin (Reeves et al. 1999)		
<i>Lagenodelphis hosei</i> , Fraser's dolphin (Baker 1983 in Reeves et al. 1999)		
<i>Orcinus orca</i> , Orca (Anonymous 1995)		
<i>Steno bredanensis</i> , Rough-toothed dolphin (Paton and Gibbs 2002)		
<i>Kogia breviceps</i> , Pygmy sperm whale (UNEP-WCMC 2003)		

French Polynesia

Land Area (km²): 3,521

Sea Area (EEZ) (thousands of km²): 5,030

French Polynesia is made up of 118 volcanic and coral islands and atolls. There are five island groups - the Society islands, the Tuamotu archipelago, the Gambier islands, the Marquesas islands and the Tubuai islands.

Numerous recent sighting surveys within French Polynesian waters have added to the understanding of cetacean diversity within this nation's waters (Gannier 2000 and 2002a, Laran and Gannier 2001). In addition specific effort has been invested in humpback whale research (Poole 1993, Bourreau and Gannier 2001, Gannier 2004, Olavarría et al. 2005, SPWRC reports 2000-2009) as well as some directed studies towards smaller odontocetes (Gannier and West 2005, Gannier and Petiau 2006). Humpback whale investigations have highlighted that on occasion some individuals from French Polynesia are sighted in other parts of the Pacific Islands Region (Garrigue et al. 2002).

Small boat surveys off the Society Islands during the years 1996 to 1999 confirmed the presence of humpback whale, sperm whale, dwarf sperm whale, Blainville's beaked whale, Cuvier's beaked whale, spinner dolphin, rough-toothed dolphin, short-finned pilot whale, melon-headed whale, Fraser's dolphin, bottlenose dolphin and Risso's dolphin (Gannier 2000). Over the austral summer of 1998-1999 within the Marquesas Islands pantropical spotted dolphin, spinner dolphin, bottlenose dolphin, melon-headed whale, rough-toothed dolphin, Risso's dolphin, orca, false killer whale, short-finned pilot whale, and, pygmy killer whale were sighted (Gannier 2002a). Historical records also exist for short-finned pilot whale (Rancurel 1973).

UNEP-WCMC (2003) reports French Polynesia is part of the geographic range of fin and Bryde's-like whales. A species of common dolphin, minke whale, sei whale, and blue whale have all tentatively been identified as occurring within French Polynesian waters, yet have not been confirmed (SPWRC 2004). Rorquals (species unknown) have also been reported (Kasamatsu et al. 1995).

Records of Cetaceans in the Waters of French Polynesia		
Scientific Name Common Name	Citation	Class
<i>Megaptera novaeangliae</i> Humpback whale	Lefèvre et al. 1999, Gannier 2000 and 2004, Bourreau and Gannier 2001, Olavarria et al. 2003, SPWRC 2009	1
<i>Feresa attenuata</i> Pygmy killer whale	Gannier 2002a, SPWRC 2004	1
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Rancurel 1973, Gannier 2000 and 2002a, SPWRC 2004, 2007	1
<i>Grampus griseus</i> Risso's dolphin	Gannier 2000 and 2002a, SPWRC 2004	1
<i>Lagenodelphis hosei</i> Fraser's dolphin	Gannier 2000, SPWRC 2004, 2007	1
<i>Orcinus orca</i> Orca	Gannier 2002a, Eldredge 1991, SPWRC 2004	1
<i>Peponocephala electra</i> Melon-headed whale	Gannier 2000 and 2002a, SPWRC 2004, 2007	1
<i>Pseudorca crassidens</i> False killer whale	Gannier 2002a, SPWRC 2004	1
<i>Stenella attenuata</i> Pantropical spotted dolphin	Gannier 2002a, SPWRC 2004	1
<i>Stenella longirostris</i> Spinner dolphin	Gannier 2000 and 2002b, SPWRC 2002, 2004, 2007	1
<i>Steno bredanensis</i> Rough-toothed dolphin	Gannier 2000 and 2002a, SPWRC 2002, 2004, and 2007, Gannier 2003, Gannier and West 2005	1
<i>Tursiops</i> sp. Bottlenose dolphin	Gannier 2000 and 2002a, Brasseur et al. 2002, SPWRC 2004	1
<i>Kogia</i> sp. Diminutive sperm whale	Gannier 2000, SPWRC 2004, 2007	1
<i>Physeter macrocephalus</i> Sperm whale	Jacquet et al. 1996, Gannier 2000, SPWRC 2004	1
<i>Mesoplodon densirostris</i> Blainville's beaked whale	Gannier 2000, SPWRC 2004, 2007	1
<i>Ziphius cavirostris</i> Cuvier's beaked whale	Gannier 2000, SPWRC 2004	1
Unconfirmed Species		
<i>Balaenoptera</i> sp., Minke whale (A. Gannier pers. comm.)		
<i>Balaenoptera edeni</i> , Bryde's whale (UNEP-WCMC 2003)		
<i>Balaenoptera physalus</i> , Fin whale (UNEP-WCMC 2003)		

Guam

Land Area (km²): 541

Sea Area (EEZ) (thousands of km²): 218

Guam is the largest and most southerly of the Mariana Islands in the western Pacific Ocean. The country is divided into a northern plateau and a southern chain of volcanic hills.

Cetacean records for the small nation of Guam include numerous stranding records. More specifically, the following species have been reported in a stranding or beaching event: Bryde's-like whale, pygmy sperm whale, dwarf sperm whale, orca, melon-headed whale, sperm whale, striped dolphin, and spinner dolphin (Eldredge 1991, Kami and Lujan 1976, Reeves et al. 1999, Trianni and Kessler 2002). It is difficult to be certain whether these species inhabit Guam on a regular basis as they may have been washed ashore.

Spinner dolphins have been observed swimming in the Saipan Lagoon (Trianni and Kessler 2002). Kami and Hosmer (1982) indicated that short-finned pilot whales were very common around Guam and others confirmed their presence in these waters (Birkeland 1977 *in* Reeves et al. 1999). Miyazaki and Wada (1978) reported on the presence of Risso's dolphin in this area. The geographic range of dwarf sperm whale includes Guam (UNEP-WCMC 2003). Humpback whales have also been sighted in Guam waters yet it is unclear whether these individuals are northern or southern hemisphere humpback whales (Eads 1991, Eldredge 1991).

The US Navy conducted line-transect surveys in the Marianas Islands region (including Guam) between January and April, 2007 (Thorson et al. 2007). These surveys were designed to estimate marine mammal and sea turtle density and covered over 11,000km of track-line as well as more than 700 hours of acoustic monitoring. Cetacean species identified visually during these surveys included: short-finned pilot whale, melon-headed whale, false killer whale, and sperm whale.

Records of Cetaceans in the Waters of Guam		
Scientific Name Common Name	Citation	Class
<i>Megaptera novaeangliae</i> Humpback whale	Eads 1991, Eldredge 1991	2
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Birkeland 1977, Kami and Hosmer 1982, Eldredge 1991, Thorson et al. 2007	1
<i>Grampus griseus</i> Risso's dolphin	Miyazaki and Wada 1978, Eldredge 1991, Miyashita et al. 1996	2
<i>Peponocephala electra</i> Melon-headed whale	Thorson et al. 2007	1
<i>Pseudorca crassidens</i> False killer whale	Thorson et al. 2007	1
<i>Stenella longirostris</i> Spinner dolphin	Eldredge 1991, Trianni and Kessler 2002	2
<i>Kogia</i> sp. Diminutive sperm whale	Kami and Lujan 1976, Eldredge 1991, Reeves et al. 1999, UNEP-WCMC 2003, Eldredge 2003	2
<i>Physeter macrocephalus</i> Sperm whale	Eldredge 1991, Reeves et al. 1999, Thorson et al. 2007	1
<i>Ziphius cavirostris</i> Cuvier's beaked whale	D. Johnston pers. comm., NOAA Pacific Islands Region Office 2007	1
Unconfirmed Species		
<i>Balaenoptera</i> sp., Bryde's-like whale (Eldredge 1991, Eldredge 2003)		
<i>Balaenoptera borealis</i> , Sei whale (D. Johnston pers. comm.)		
<i>Orcinus orca</i> , Orca (Kami and Hosmer 1982)		
<i>Peponocephala electra</i> , Melon-headed whale (Kami and Hosmer 1982, Eldredge 2003)		
<i>Stenella attenuata</i> , Pantropical spotted dolphin (Wada 1981)		
<i>Stenella coeruleoalba</i> , Striped dolphin (Eldredge 1991, Eldredge 2003)		
<i>Tursiops</i> sp., Bottlenose dolphin (Wada 1981)		

Kiribati

Land Area (km²): 811

Sea Area (EEZ) (thousands of km²): 3,550

The 33 atolls that make up Kiribati - the former Gilbert Islands - occupy a vast area in the Pacific. They stretch nearly 4000 km from east to west, more than 2000 km from north to south, and span the Equator.

The State of the Environment report for Kiribati (Wilson 1994) listed five species as occurring within the EEZ: Fraser's dolphin, spinner dolphin, blue whale, southern right whale, and sperm whale. Recent reports indicate that spinner dolphins are present in both the Line Islands and Phoenix Islands (Reeves et al. 1999, Stone et al. 2001). The first record of Fraser's dolphin in

the central Pacific occurred within Kiribati waters northeast of the Phoenix Islands along the equator (Perrin et al. 1973). The presence of Fraser’s dolphin has also been indicated by Miyazaki and Wada (1978) and within the UNEP-WCMC (2003). Quite a number of whaling records indicate that sperm whalers were active in Kiribati waters – particularly along the equator or “along the line” as it is often referred (*see* Lever 1964, Reeves et al. 1999). More recent observations indicate that this species is still relatively common around both the Line and Phoenix Islands (Dufault and Whitehead 1995, Reeves et al. 1999). All five of these cetacean species are considered threatened or endangered by the Kiribati government.

Reports of orca have included the area between the Phoenix Islands and Tonga, as well as a single male seen in 1995 in the vicinity of Baker Island just north of the Kiribati EEZ (Miyashita et al. 1995). Four melon-headed whales washed ashore at Palmyra Island (just north of the Line Islands) in 1964. One skull was collected for a museum from this event (Reeves et al. 1999). Another skull of a *Ziphius cavirostris* individual was retrieved from the Phoenix Islands and remains in a collection (Reeves et al. 1999). Although an unusual inclusion, southern bottlenose whales have been observed “northeast of the Phoenix Islands along the equator” in the mid-1960s yet again in the same general vicinity more recently (Reeves et al. 1999), although these may have been tropical bottlenose whales, *Indopacetus pacificus*. A range map of rough-toothed dolphins (Miyazaki and Perrin 1994) indicates several records near the Line Islands. Sightings from commercial tuna seiners of pilot whales (assumed by distribution to be *G. macrocephalus*) placed them close to the northern Line Islands (Patterson and Alverson 1986 *in* Reeves et al. 1999). A skeleton was found in the northwest Line Islands of *Pseudorca crassidens* (Reeves et al. 1999).

Pantropical spotted dolphins have been anecdotally recorded north of the western Phoenix Islands (Reeves et al. 1999) and a specimen from this same region has been identified (Perrin 1975). An unpublished record cited in Reeves et al. (1999) indicates that striped dolphins may also be present within Kiribati as a sighting made from near the Gilbert Islands is mentioned. Several stranding events, sightings and museum specimens of common bottlenose dolphins (*T. truncatus*) have been recorded around both the northern Line Islands and the Phoenix Islands (Reeves et al. 1999) and a recent survey in the Phoenix Islands identified the common bottlenose dolphin as the most frequently sighted cetacean during 21 days of survey work (Stone et al. 2001). This survey also sighted an unidentified beaked whale and a possible humpback whale, but these records could not be confirmed.

Additional records may have been obtained during the “Voyage of the Odyssey” (*see* www.pbs.org/odyssey) that travelled through Kiribati waters. Logbook reports from this trip indicate other species of cetacean were seen within Kiribati waters, including Blainville’s beaked whales.

Records of Cetaceans in the Waters of Kiribati		
Scientific Name Common Name	Citation	Class
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Patterson and Alverson 1986, Odyssey logbook report 2000	2
<i>Lagenodelphis hosei</i> Fraser’s dolphin	Perrin et al. 1973, Miyazaki and Wada 1986, Wilson 1994, UNEP-WCMC 2003	1
<i>Orcinus orca</i> Orca	Miyashita et al. 1995	2
<i>Stenella attenuata</i> Pantropical spotted dolphin	Perrin 1975, Reeves et al. 1999	2
<i>Stenella longirostris</i> Spinner dolphin	Wilson 1994, Reeves et al. 1999, Stone et al. 2001	1
<i>Steno bredanensis</i> Rough-toothed dolphin	Miyazaki and Perrin 1994	2
<i>Tursiops</i> sp. Bottlenose dolphin	Patterson and Alverson 1986, Reeves et al. 1999, Stone et al. 2001	1
<i>Physeter macrocephalus</i> Sperm whale	Lever 1964, Patterson and Alverson 1986, Eldredge 1991, Wilson 1994, Dufault and Whitehead 1995, Reeves	1

	et al. 1999	
<i>Hyperoodon planifrons</i> Southern bottlenose whale	Wade and Gerrodette 1993, Reeves et al. 1999	2
Unconfirmed Species		
<i>Balaenoptera musculus</i> , Blue whale (Wilson 1994)		
<i>Eubalaena australis</i> , Southern right whale (Wilson 1994)		
<i>Mesoplodon densirostris</i> , Blainville's beaked whale (Odyssey logbook report 2000)		
<i>Mesoplodon ginkgodens</i> subsp. (?), (Dalebout et al. 2007)		
<i>Peponocephala electra</i> , Melon-headed whale (Reeves et al. 1999)		
<i>Pseudorca crassidens</i> , False killer whale (Reeves et al. 1999)		
<i>Stenella coeruleoalba</i> , Striped dolphin (Reeves et al. 1999)		
<i>Ziphius cavirostris</i> , Cuvier's beaked whale (Reeves et al. 1999)		

Marshall Islands

Land Area (km²): 181

Sea Area (EEZ) (thousands of km²): 2,131

The Marshall Islands consist of two chains of coral atolls, together with more than 1,000 islets, just north of the Equator.

A checklist of mammal fauna in the Marshall Islands identified a number of marine species in these waters (Reese 1984): minke whale, sei whale, blue whale, fin whale, common dolphin, short-finned pilot whale, orca, pantropical spotted dolphin, and bottlenose dolphin. There is also a record for sei whale (Reese 1984). However these individuals were later believed to be Bryde's whales (Reeves et al. 1999). Historical records refer to humpback whales in this region (Kellogg 1928) and this species is presently listed in UNEP-WCMC (2003) as having the Marshall Islands constitute part of its range. A group of sperm whales was sighted near Bikini Atoll in 1947 (unpublished account *in* Reeves et al. 1999), but more recent reports have not been documented. Other odontocete sightings in the area include a group of 5 melon-headed whales, striped dolphins and spinner dolphins, although not much detail is provided (Reeves et al. 1999). Lastly, a skull of a *Steno bredanensis* is at the US National Museum, being collected from Rongerik Atoll in 1946 (Reeves et al. 1999).

Records of Cetaceans in the Waters of the Marshall Islands		
Scientific Name Common Name	Citation	Class
<i>Balaenoptera</i> sp. Minke whale	Reese 1984, Crawford 1993	2
<i>Balaenoptera musculus</i> Blue whale	Reese 1984, Crawford 1993	2
<i>Balaenoptera physalus</i> Fin whale	Reese 1984, Crawford 1993	2
<i>Megaptera novaeangliae</i> Humpback whale	UNEP-WCMC 2003, Kellogg 1928 <i>in</i> Wiles 2005	2
<i>Delphinus</i> sp. Common dolphin	Reese 1984, Crawford 1993	2
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Reese 1984, Crawford 1993	2
<i>Orcinus orca</i> Orca	Reese 1984, Crawford 1993	2
<i>Peponocephala electra</i> Melon-headed whale	Eldredge 1991	2
<i>Stenella attenuata</i> Pantropical spotted dolphin	Reese 1984, Crawford 1993	2
<i>Stenella coeruleoalba</i> Striped dolphin	Reeves et al. 1999	2

<i>Stenella longirostris</i> Spinner dolphin	Eldredge 1991	2
<i>Tursiops</i> sp. Bottlenose dolphin	Reese 1984, Crawford 1993	2
Unconfirmed Species		
<i>Balaenoptera</i> sp., Bryde's-like whale (Patterson and Alverson 1986)		
<i>Steno bredanensis</i> , Rough-toothed dolphin (Reeves et al. 1999)		
<i>Physeter macrocephalus</i> , Sperm whale (Reeves et al. 1999)		

Nauru

Land Area (km²): 21

Sea Area (EEZ) (thousands of km²): 320

Nauru is a remote uplifted coral formation that is one of the smallest nations on earth.

Nauru has limited records that can definitively be attributed to its relatively small EEZ. Bryde's whales marked with discovery tags in the general vicinity of Nauru (Ohsumi 1978) were later killed on Japanese pelagic whaling grounds (Ohsumi 1978, 1979, 1980). In 1976 a herd of melon-headed whales was sighted (and a female collected) north of Nauru (Miyazaki and Wada 1978). This group was reported as swimming with a very large (400-500) group of Fraser's dolphins (Miyazaki and Wada 1978). *Ziphius cavirostris* has been sighted in areas around Nauru (Miyazaki and Wada 1978) although these records were qualified by noting the difficulty of identifying these cryptic species at sea. Finally, large numbers of sperm whales were historically sighted off Nauru (Lever 1964, Berzin 1972), but there have been no subsequent sightings of this species.

Records of Cetaceans in the Waters of Nauru		
Scientific Name Common Name	Citation	Class
<i>Balaenoptera</i> sp. Bryde's-like whale	Ohsumi 1978, Eldredge 1991	2
<i>Lagenodelphis hosei</i> Fraser's dolphin	Miyazaki and Wada 1978	2
<i>Peponocephala electra</i> Melon-headed whale	Miyazaki and Wada 1978	2
<i>Physeter macrocephalus</i> Sperm whale	Lever 1964, Berzin 1972, Eldredge 1991	2
Unconfirmed Species		
<i>Orcinus orca</i> , Orca (Eldredge 1991)		
<i>Ziphius cavirostris</i> , Cuvier's beaked whale (Miyazaki and Wada 1978)		

New Caledonia and Dependencies

Land Area (km²): 18,576

Sea Area (EEZ) (thousands of km²): 1,740

A French overseas territory in the Pacific, New Caledonia is comprised of the islands of New Caledonia, the Isle of Pines, the Loyalty Islands, Walpole Island, and the d'Entrecasteaux and Chesterfield reef complexes, and Belep islands.

The cetacean fauna of New Caledonia is one of the most studied in the Pacific Islands. Most survey work has concentrated on the migratory humpback whales which breed in New Caledonian waters during the austral winter (Dawbin 1964, Eldredge 1991, Garrigue and Gill 1994, Gill et al. 1995, Garrigue and Greaves 2000, Garrigue et al. 2001, Paterson 2001, Garrigue et al. 2002, SPWRC reports 2002-2009, Olavarria et al. 2003, Garrigue et al. 2004, Baker et al. 2005, Palsbøll et al. 2005). Numerous matches have been made between individual humpbacks seen in New Caledonian waters and those in Tonga, Eastern Australia, Vanuatu, New Zealand and French Polynesia (Garrigue et al. 2002).

Sighting, photographs and genetic samples have recently been taken from spinner dolphin, bottlenose dolphin, false killer whale, Indo-Pacific bottlenose dolphin, sperm whale, humpback, dwarf minke whale, and pygmy blue whale species within New Caledonian waters (SPWRC 2004, Garrigue 2006). Sighting and photographic data have been collected for pantropical spotted dolphin and Risso's dolphin, and photographic and genetic information exists for stranded individuals of Blainville's beaked whale, pygmy sperm whale, dwarf sperm whale, short-finned pilot whale, pygmy killer whale, and melon-headed whale (SPWRC 2004, Garrigue 2006). Sighting data also exists for orca (SPWRC 2004). A genetic sample has been obtained from a stranded *Ziphius cavirostris* (Garrigue 2006) in these waters and a rough-toothed dolphin (C. Garrigue pers. comm.). Furthermore, sei whales have been reported as occurring in the region (Borsa 2006). Documented evidence for the presence of dwarf minke whale (*B. acutorostrata*) and the common bottlenose dolphin (*T. truncatus*) has also been published (Garrigue and Greaves 2001), and Kawamura (1980) reported on catches of Bryde's whale being taken in a southeast area of New Caledonia waters. Short-beaked common dolphins were reported to occur within New Caledonian waters by Heyning and Perrin (1994). Possible spinner dolphins, 'Prodelphinus', described as a long-beaked dolphin by Rancurel (1973), have also been reported. Lastly, New Caledonia is listed as part of the geographic range of the Antarctic minke whale in UNEP-WCMC (2003).

Records of Cetaceans in the Waters of New Caledonia		
Scientific Name Common Name	Citation	Class
<i>Balaenoptera acutorostrata</i> subsp. Minke whale	Arnold et al. 1987, Garrigue and Greaves 2001, SPWRC 2008	1
<i>Balaenoptera bonaerensis</i> Antarctic minke whale	UNEP-WCMC 2003, Borsa 2006	2
<i>Balaenoptera borealis</i> Sei whale	Borsa 2006	2
<i>Balaenoptera</i> sp. Bryde's-like whale	Kawamura 1980, Reeves et al. 1999	1
<i>Balaenoptera musculus breviceauda</i> Pygmy Blue whale	Clua 2002, Garrigue et al. 2003, Borsa and Hoarau 2004	1
<i>Megaptera novaeangliae</i> Humpback whale	Dawbin 1964, Eldredge 1991, Garrigue and Gill 1994, Gill et al. 1995, Garrigue and Greaves 2000, Garrigue et al. 2001, Paterson 2001, Garrigue et al. 2002, Olavarria et al. 2003, Garrigue et al. 2004, Baker et al. 2005, Palsbøll et al. 2005, SPWRC 2009	1
<i>Delphinus</i> sp. Common dolphin	Heyning and Perrin 1994, Reeves et al. 1999	2
<i>Feresa attenuata</i> Pygmy killer whale	Garrigue 2006	1
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Garrigue and Greaves 2001, Bustamante et al. 2003, UNEP-WCMC 2003	1
<i>Grampus griseus</i> Risso's dolphin	Garrigue and Greaves 2001, UNEP-WCMC 2003	1
<i>Orcinus orca</i> Orca	Garrigue and Greaves 2001	1
<i>Peponocephala electra</i> Melon-headed whale	Garrigue 2006	1
<i>Pseudorca crassidens</i> False killer whale	Greaves and Garrigue 1999, SPWRC 2004, SPWRC 2008	1
<i>Stenella attenuata</i>	Garrigue and Greaves 2001, UNEP-	1

Pantropical spotted dolphin	WCMC 2003	
<i>Stenella longirostris</i> Spinner dolphin	Garrigue and Greaves 2001	1
<i>Steno bredanensis</i> Rough-toothed dolphin	Garrigue, unpubl., SPWRC 2007	1
<i>Tursiops aduncus</i> Indo-Pacific bottlenose dolphin	Hale et al. 2000, Garrigue 2006, SPWRC 2008	1
<i>Tursiops truncatus</i> Common bottlenose dolphin	Garrigue and Greaves 2001	1
<i>Kogia breviceps</i> Pygmy sperm whale	Sylvestre 1988, Bustamante et al. 2003, SPWRC 2009	1
<i>Kogia sima</i> Dwarf sperm whale	Rancurel 1973, Reeves et al. 1999, SPWRC 2004, Garrigue 2006	1
<i>Physeter macrocephalus</i> Sperm whale	Garrigue and Greaves 2001, UNEP- WCMC 2003, SPWRC 2008	1
<i>Mesoplodon densirostris</i> Blainville's beaked whale	Garrigue and Greaves 2001, UNEP- WCMC 2003, Borsa 2005	1
<i>Ziphius cavirostris</i> Cuvier's beaked whale	Garrigue 2006	1
Unconfirmed Species		
<i>Delphinus delphis</i> , Common dolphin (Borsa 2006)		

Niue

Land Area (km²): 259

Sea Area (EEZ) (thousands of km²): 390

Niue is a small coral atoll with steep limestone cliffs along coast, central plateau situated in the South Pacific Ocean, east of Tonga.

The small island of Niue is situated amid regions where research has been conducted (i.e., Tonga, American Samoa and Cook Islands) yet has not itself been subject to dedicated surveys. Reports from Japanese researchers (Kasamatsu et al. 1995) indicated that minke whales were present from American Samoa and Niue east to Tahiti, although species was not indicated. However, Constantine (1999a) documented records that indicated *Balaenoptera acutorostrata* individuals were seen on rare occasion in offshore waters. Constantine's (1999a) report also indicated that spinner dolphins were seen year-round. This residency in Niue waters is reinforced by the small ecotourism industry that has developed around this species (Hoyt 2001). Humpbacks are seen seasonally in these waters (Constantine 1999a, Reeves et al. 1999). Three species that were cited as being rarely observed within these waters were orca, false killer whale, and pilot whale (believed to be short-finned) (Constantine 1999a). Ohsumi (1979) describe the distribution of sperm whales in this area as beginning in the west (Fiji) and extending east to the waters between Niue and Raratonga.

Records of Cetaceans in the Waters of Niue		
Scientific Name Common Name	Citation	Class
<i>Balaenoptera</i> sp. Minke whale	Kasamatsu et al. 1995, Constantine 1999a, SPWRC 2009	1
<i>Megaptera novaeangliae</i> Humpback whale	Constantine 1999a, Reeves et al. 1999, SPWRC 2002, 2004, 2009	1
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Constantine 1999a	2
<i>Orcinus orca</i> Orca	Constantine 1999a	1
<i>Pseudorca crassidens</i> False killer whale	Constantine 1999a	1

<i>Stenella longirostris</i> Spinner dolphin	Constantine 1999a, Hoyt 2001, SPWRC 2009	1
<i>Physeter macrocephalus</i> Sperm whale	Ohsumi 1979	2

Northern Mariana Islands

Land Area (km²): 471

Sea Area (EEZ) (thousands of km²): 777

The Commonwealth of the Northern Mariana Islands is a chain of 16 islands that extend 563 km in the northwest Pacific. The northern islands are composed of volcanic rock, the southern islands of madreporite limestone covering a volcanic base.

Horwood (1987) reported that two sei whales (Bryde's-like whales) were tagged in the vicinity of the Northern Mariana Islands. Japanese sighting surveys and tuna vessels have also recorded short-finned pilot whales, Risso's and rough-toothed dolphins within this area (Patterson and Alverson 1986, Miyashita et al. 1995). A recent encounter again confirmed rough-toothed dolphins associated with a large (500-700 individuals) group of melon-headed whales (Jeffersen et al. 2006). Spinner dolphin presence has also been confirmed in the Northern Marianas Islands (D. Johnston pers. comm.). More dated records provide evidence that Cuvier's beaked whale, common dolphin and false killer whale have been observed in the Mariana and Bonin Islands areas (Masaki 1972).

UNEP-WCMC (2003) notes Northern Mariana Islands as part of the geographic range of *Kogia breviceps*, while Kami and Lujan (1976) noted an anecdotal report of small sperm whales (species not given) being driven from a shallow lagoon onto shore. The UNEP-WCMC (2003) also includes the Northern Mariana Islands as part of the geographic range of bottlenose dolphins and humpback whales. The presence of the latter species was tentatively confirmed in Reeves et al. (1999) who indicated that northern hemisphere populations (specifically the Asian stock) might move into these waters during the austral summer. Humpback whale presence has been confirmed by recent observation (D. Johnston pers. comm.).

Japanese whalers took sperm whales from around the NMI area in the 1980s, (Kasuya and Miyashita 1988) and other sighting surveys around this region indicated that orca and striped dolphin had been observed although both of the species identifications were made in locations close to the outer boundary of the NMI EEZ (Miyashita et al. 1995 and 1996).

The US Navy conducted line-transect surveys in the Marianas Islands region (including Guam) between January and April, 2007 (Thorson et al. 2007). These surveys were designed to estimate marine mammal and sea turtle density and covered over 11,000km of track-line as well as more than 700 hours of acoustic monitoring. Within Commonwealth of the Northern Marianas Islands the following species were confirmed visually: Sperm whale, Bryde's-like whale, short-finned pilot whale, rough-toothed dolphin, pantropical spotted dolphin, spinner dolphin, striped dolphin, and humpback whale. In addition, an unidentified beaked whale was recorded.

Records of Cetaceans in the Waters of the Northern Mariana Islands		
Scientific Name Common Name	Citation	Class
<i>Balaenoptera</i> sp. 'Bryde's-like' whale	Thorson et al. 2007	2
<i>Balaenoptera borealis</i> Sei whale	Norris et al. 2007	2
<i>Balaenoptera</i> sp. 'Minke-like' whale	Norris et al. 2007	2
<i>Megaptera novaeangliae</i> Humpback whale	Eldredge 1991, Reeves et al 1999, UNEP-WCMC 2003, Thorson et al. 2007	1
<i>Feresa attenuata</i> Pygmy killer whale	Norris et al. 2007	2
<i>Globicephala macrorhynchus</i>	Miyashita et al. 1995, Thorson et al.	1

Short-finned pilot whale	2007	
<i>Grampus griseus</i> Risso's dolphin	Miyashita et al. 1996	1
<i>Peponocephala electra</i> Melon-headed whale	Jeffersen et al. 2006	1
<i>Pseudorca crassidens</i> False killer whale	Masaki 1972 (in Wiles 2005), Norris et al. 2007	2
<i>Stenella attenuata</i> Pantropical spotted dolphin	Thorson et al. 2007	1
<i>Stenella coerulealba</i> Striped dolphin	Thorson et al. 2007	1
<i>Stenella longirostris</i> Spinner dolphin	Stinson 1994, Thorson et al. 2007	1
<i>Steno bredanensis</i> Rough-toothed dolphin	Miyashita et al. 1996, Jeffersen et al. 2006, Thorson et al. 2007	1
<i>Kogia</i> sp. Diminutive sperm whale	Kami and Lujan 1976, UNEP-WCMC 2003	2
<i>Physeter macrocephalus</i> Sperm whale	Kasuya and Miyashita 1988, Eldredge 1991, Thorson et al. 2007	1
<i>Ziphius cavirostris</i> Cuvier's beaked whale	Masaki 1982 in Eldredge 2003	2
Unconfirmed Species		
<i>Balaenoptera</i> sp., 'Bryde's-like' whale (Horwood 1987, Eldredge 2003)		
<i>Delphinus</i> sp., Common dolphin (Masaki 1972 in Eldredge 1991)		
<i>Orcinus orca</i> , Orca (Miyashita et al. 1995)		
<i>Pseudorca crassidens</i> , False killer whale		
<i>Stenella coeruleoalba</i> , Striped dolphin (Miyashita et al. 1996)		
<i>Tursiops truncatus</i> , Common bottlenose dolphin (UNEP-WCMC 2003)		
<i>Ziphiid</i> sp., unknown beaked whale (Thorson et al. 2007)		

Palau

Land Area (km²): 488

Sea Area (EEZ) (thousands of km²): 629

More than 200 volcanic and coral islands, many of them surrounded by a single barrier reef, make up the northern Pacific nation of Palau.

Anecdotal reports dominate the cetacean listing available for Palau. Such reports include a pod of orcas photographed in April 1993 (Rock 1993 in Reeves et al. 1999) and it was inferred from local reports that their presence was not unusual. Other reports also affirm the presence of orca in Palau (Iwashita 1963, Reeves et al. 1999) as did relatively recent community consultations that identified both orca and sperm whale in the region (PCS 2003). Melon-headed whales have been documented to strand on the Palau coast (Donaldson 1983). Anecdotal reports have also placed short-finned pilot whales (in Reeves et al. 1999) and striped dolphins (Miyazaki and Wada 1978) in Palau waters, but further details around each of these sightings are not given.

Dated records for false killer whale and pantropical spotted dolphin have been reported (Eldredge 1991). Reports of Risso's, Fraser's, and spinner dolphins and Cuvier's beaked whale that appear to be within (or very close to) the Palau EEZ were summarized by Eldredge (1991). Finally, careful review of whaling records showed that takes of Bryde's-like whales occurred within the Palau EEZ in the 1980s (Perrin 2006).

Records of Cetaceans in the Waters of Palau		
Scientific Name	Citation	Class
Common Name		
<i>Balaenoptera</i> sp. Bryde's-like whale	Eldredge 1991, Perrin 2006	2
<i>Orcinus orca</i>	Iwashita 1963 in Visser and	2

Orca	Bonoccorso 2003, Rock 1993, PCS 2003	
<i>Stenella coeruleoalba</i> Striped dolphin	Miyazaki and Wada 1978	2
Unconfirmed Species		
<i>Balaenoptera</i> sp., Minke whale (A. Bauman pers. comm.)		
<i>Feresa attenuata</i> , Pygmy killer whale (A. Bauman pers. comm.)		
<i>Globicephala macrorhynchus</i> , Short-finned pilot whale (Reeves et al. 1999, Wiles 2005)		
<i>Grampus griseus</i> , Risso's dolphin (Eldredge 1991, A. Bauman pers. comm.)		
<i>Lagenodelphis hosei</i> , Fraser's dolphin (Eldredge 1991)		
<i>Peponocephala electra</i> , Melon-headed whale (Donaldson 1983, Eldredge 1991, A. Bauman pers. comm.)		
<i>Physeter macrocephalus</i> , Sperm whale (PCS 2003, Wiles 2005)		
<i>Pseudorca crassidens</i> , False killer whale (Eldredge 1991, A. Bauman pers. comm.)		
<i>Stenella attenuata</i> , Pantropical spotted dolphin (Eldredge 1991)		
<i>Stenella longirostris</i> , Spinner dolphin (Eldredge 1991, A. Bauman pers. comm.)		
<i>Tursiops</i> sp., Bottlenose dolphin (A. Bauman pers. comm.)		
<i>Ziphius cavirostris</i> , Cuvier's beaked whale (Eldredge 1991, Wiles 2005)		

Papua New Guinea

Land Area (km²): 462,243

Sea Area (EEZ) (thousands of km²): 3,120

Papua New Guinea encompasses the eastern half of the island of New Guinea, as well as the Bismarck Archipelago, the Trobriand Islands, Samarai Island, Woodlark Island, D'Entrecasteaux Islands, the Louisiade Archipelago, and the northernmost Solomon Islands of Buka and Bougainville.

Two dedicated marine mammal surveys have been conducted in Kimbe Bay, West Britain, to investigate diversity within this region (Munday 1994, Visser 2003). Munday's work summarized previous sightings and reports as well as his own records to produce a preliminary cetacean checklist of sperm whale, short-finned pilot whale, orca, false killer whale, melon-headed whale, bottlenose dolphin, and spinner dolphin. In addition anecdotal reports of humpback and pygmy killer whale were documented. Sightings and acoustic data taken by Visser (2003) in a similar region during April 2003 confirmed seven species: pygmy sperm whale, Cuvier's beaked whale, bottlenose dolphin, Indo-Pacific bottlenose dolphin, pantropical spotted dolphin, spinner dolphin and Risso's dolphin. Preliminary work conducted by Visser identified an additional four species (i.e., melon-headed, false killer whale, short-finned pilot whale, and orca). Tentative identifications of Blainville's beaked whale and rough-toothed dolphin were also made.

Bryde's whales were documented to receive discovery tags around the PNG region (Ohsumi 1978). Large numbers of both Fraser's dolphins and melon-headed dolphins were sighted between New Guinea and Micronesia in the mid 70s (Miyazaki and Wada 1978) and more recently Fraser's dolphins have again been sighted (Odyssey web logbook 2001). Snubfin dolphins may frequent Papua New Guinean waters, as incidental takes in the Gulf of Papua have been noted (Dawbin 1972, Stacey and Arnold 1999) and the account for this species lists PNG within its geographic range (UNEP-WCMC 2003, Beasley et al. 2005). Papua New Guinea is also listed as part of the geographic range of the southern right whale dolphin (UNEP-WCMC 2003), almost certainly erroneously.

The presence of the Indo-Pacific humpback dolphin in Papua New Guinean waters is another unique addition to the Pacific Islands cetacean fauna (Dawbin 1972, Jefferson and Karczmarski 2001, UNEP-WCMC 2003). However, its presence has been documented only in areas of close proximity to Papua New Guinea rather than directly in the EEZ.

Records of Cetaceans in the Waters of Papua New Guinea		
Scientific Name	Citation	Class
<i>Balaenoptera borealis</i> Sei whale	Odyssey logbook 2001	1

<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Munday 1994, Visser 2002	1
<i>Grampus griseus</i> Risso's dolphin	Visser 2003	1
<i>Lagenodelphis hosei</i> Fraser's dolphin	Miyazaki and Wada 1978, Odyssey logbook 2001	1
<i>Orcaella heinsohni</i> Snubfin dolphin	Dawbin 1972, Mitchell 1975, UNEP-WCMC 2003	2
<i>Orcinus orca</i> Orca	Munday 1994, Visser and Bonoccorso 2003	1
<i>Peponocephala electra</i> Melon-headed whale	Munday 1994, Reeves et al. 1999, Visser 2002, UNEP-WCMC 2003	1
<i>Pseudorca crassidens</i> False killer whale	Munday 1994, Visser 2002	1
<i>Sousa chinensis</i> Indo-Pacific humpback dolphin	Dawbin 1972, Jefferson and Karczmarski 2001, UNEP-WCMC 2003	2
<i>Stenella attenuata</i> Pantropical spotted dolphin	UNEP-WCMC 2003, Visser 2003	1
<i>Stenella longirostris</i> Spinner dolphin	Munday 1994, Visser 2003, Visser and Bonoccorso 2003,	1
<i>Tursiops</i> sp. Bottlenose dolphin	Munday 1994, Visser 2003	1
<i>Kogia</i> sp. Diminutive sperm whale	Visser 2003	1
<i>Physeter macrocephalus</i> Sperm whale	Lever 1964, Berzin 1972, Dawbin 1972, Munday 1994, Visser and Bonoccorso 2003	1
<i>Ziphius cavirostris</i> Cuvier's beaked whale	Visser 2003	1
Unconfirmed Species		
<i>Balaenoptera</i> sp., Bryde's-like whale (Ohsumi 1978)		
<i>Feresa attenuata</i> , Pygmy killer whale (Munday 1994)		
<i>Lissodelphis peronii</i> , Southern right whale dolphin (UNEP-WCMC 2003) (see text)		
<i>Megaptera novaeangliae</i> , Humpback whale (Munday 1994)		
<i>Mesoplodon densirostris</i> , Blainville's beaked whale (Visser 2003)		
<i>Steno bredanensis</i> , Rough-toothed dolphin (Visser 2003)		

Pitcairn Islands

Land Area (km²): 39

Sea Area (EEZ) (thousands of km²): 800

The Pitcairn Island group is a British overseas territory in the south-central Pacific Ocean and includes Pitcairn, Henderson, Ducie, and Oeno islands.

Very few records exist for the four coral islands that constitute the Pitcairn group. A biodiversity report for this UK territory did not list any marine mammals for the region (Proctor and Fleming 1999). The first cetacean surveys took place last year through land-based observation points and were able to confirm the presence of humpback whales in these waters (Horswill, in prep). These are the first confirmed sighting of humpbacks in these waters although sources indicate that Pitcairn group was part of the geographic range of this species (IUCN 2006) and anecdotal reports indicated their presence (G. Wragg, pers. comm.). Concurrent interviews and anecdotal sightings also indicated the presence of *Globicephala macrorhynchus* within the Pitcairn group. This species was also reported in Reeves et al. (1999) and referenced to unpublished data by S. Leatherwood as the source of this information. Sperm whale is also believed to historically occur within this remote group of islands (Lever 1964).

Interviews also indicated minke whales (*Balaenoptera* sp.) and a Cuvier's beaked whale carcass within these waters (Horswill, in prep).

Records of Cetaceans in the Waters of the Pitcairn Islands		
Scientific Name Common Name	Citation	Class
<i>Megaptera novaeangliae</i> Humpback whale	Horswill (in prep)	1
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Reeves et al. 1999, Horswill (in prep)	1
Unconfirmed Species		
<i>Balaenoptera</i> sp., Minke whale (G. Wragg pers. comm.)		
<i>Physeter macrocephalus</i> , Sperm whale (Lever 1964)		
<i>Ziphius cavirostris</i> , Cuvier's beaked whale (Horswill, in prep)		

Samoa

Land Area (km²): 2,935

Sea Area (EEZ) (thousands of km²): 120

The Independent State of Samoa is made up of nine volcanic islands, two of which - Savai'i and Upolu - comprise a vast majority of the land area.

The Division of Environment and Conservation (Ministry of Natural Resources and Environment) of Samoa holds records for species that have stranded on their shores (Samoa Stranding Database 2006). Current specimen records indicate the following have been stranded and/or sighted in Samoan waters: sperm whale, minke whale, short-finned pilot whale, dwarf sperm whale, and Cuvier's beaked whale. Concentrations of orcas have also been recorded within the Samoan EEZ (Miyashita et al. 1995). Japanese fishing vessels indicated that minke whales were sighted in the Samoan region (Kasamatsu et al. 1995). Genetic samples were taken from humpback whales, rough-toothed dolphin, spinner dolphin, short-finned pilot whale, and common bottlenose dolphin in Samoan waters (Childerhouse 2005). Humpback whales have also been studied during additional work in Samoan waters (SPWRC 2002, 2004, 2006). Photographs of humpbacks taken in 2001 have been matched in individuals seen in Tonga and American Samoa. Acoustic and visual surveys conducted in these waters in 2001 suggested the presence of humpback whale, sperm whale, false killer whale, and spinner dolphin (Noad et al. unpublished). This survey work also observed some unidentified beaked whales that were tentatively believed to be Blainville's beaked whales (Noad et al. unpublished, Bourke and Powell 2003). Other reports suggest that pantropical spotted dolphins may occur within Samoan waters (Paton and Gibbs 2002). In-country surveys around Upolu including visual, acoustic and genetic sampling was repeated in 2006 and 2007 and confirmed the presence of humpback whales and spinner dolphins (Ward et al. 2006, Ward and Asotasi 2007). Similar surveys in Savaii indicated the presence of spinner dolphins and sperm whales (Ward et al. 2008).

Records of Cetaceans in the Waters of Samoa		
Scientific Name Common Name	Citation	Class
<i>Balaenoptera acutorostrata</i> 'Minke-like' whale	Ward et al. 2006	2
<i>Balaenoptera edeni</i> Bryde's whale	SPWRC 2002, 2004	2
<i>Megaptera novaeangliae</i> Humpback whale	Paterson 2001, Paton and Gibbs 2002, Noad et al. unpub., Ward et al. 2006, Ward and Asotasi 2007	1
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Paton and Gibbs 2002, Childerhouse 2005	1
<i>Grampus griseus</i>	SPWRC 2002, 2004	2

Risso's dolphin		
<i>Lagenodelphis hosei</i> Fraser's dolphin	SPWRC 2004	2
<i>Orcinus orca</i> Orca	Miyashita et al. 1995	1
<i>Peponocephala electra</i> Melon-headed whale	SPWRC 2004, SPWRC 2009	2
<i>Pseudorca crassidens</i> False killer whale	Paton and Gibbs 2002, Noad et al. unpub.	1
<i>Stenella coeruleoalba</i> Striped dolphin	SPWRC 2004	2
<i>Stenella longirostris</i> Spinner dolphin	Paton and Gibbs 2002, Childerhouse 2005, Noad et al. unpub., Ward et al. 2006, Ward and Asotasi 2007, Ward et al. 2008	1
<i>Steno bredanensis</i> Rough-toothed dolphin	SPWRC 2004, Childerhouse 2005	1
<i>Tursiops</i> sp. Bottlenose dolphin	Bourke and Powell 2003, UNEP-WCMC 2003, SPWRC 2004, Childerhouse 2005	1
<i>Kogia sima</i> Dwarf sperm whale	Olavarría et al. 2005, Samoa Stranding Database 2006	1
<i>Physeter macrocephalus</i> Sperm whale	Townsend 1935, SPWRC 2004, Noad et al. unpub., Ward et al. 2008	1
<i>Ziphius cavirostris</i> Cuvier's beaked whale	Samoa Stranding Database 2006	1
Unconfirmed Species		
<i>Balaenoptera</i> sp., Minke whale (Kasamatsu et al. 1995 in Paton and Gibbs 2002)		
<i>Mesoplodon</i> sp., Beaked whale sp. (Olavarría et al. 2005)		

Solomon Islands

Land Area (km²): 28,370

Sea Area (EEZ) (thousands of km²): 1,340

This island country of the southwestern South Pacific Ocean includes the islands of Guadalcanal, Malaita, San Cristobal, Choiseul, Santa Isabel, and Rennell; the Russell, Florida, Shortland, Santa Cruz, and New Georgia island groups; and small islands and reefs.

A rapid ecological assessment of Solomon Island marine cetaceans and associated habitats took place during May and June of 2004 (Kahn 2004). Acoustic and visual surveys identified spinner dolphin, pantropical spotted dolphin, common bottlenose dolphin, Indo-Pacific bottlenose dolphin, orca, Risso's dolphin, rough-toothed dolphin, short-finned pilot whale, Mesoplodon beaked whale, *Balaenoptera* sp. (tentatively indicated to be Bryde's-like or sei whale) and sperm whale. Several unidentified beaked whales were also observed. Irrawaddy dolphin was also listed within the literature review of species occurring within the Solomon Islands (Hill 1989 in Kahn 2004), although this may have been the snubfin dolphin, *O. heinsohni*. Recent interviews indicated that the presence of *Orcaella* sp. may be more widespread than previously thought (Bass 2009).

In addition, four photo-identification surveys focused on *Tursiops aduncus* have been carried out along the northern coast of Guadalcanal during the summer of 2005 (see Reeves and Brownell, 2009). During discussion, the researcher indicated reports of this species in other parts of the Solomon Islands yet noted that species identification for such reports was uncertain.

Anecdotal reports of possible blue whales (Kahn 2004) are supported by Japanese sighting surveys (Ohsumi and Shigemune 1993 in Shimada and Pastene 1995) that encountered over 40 individuals in August 1957. Other mysticetes sighted within the waters of the Solomon Islands include Bryde's-like and sei whales (Miyazaki and Wada 1978, Ohsumi 1981). However, the *B.*

borealis record is tentative as there is a possibility it may have been a misidentified Bryde's or Omura's whale (see Chapter 5 for more detail).

Sperm whales have been recorded throughout the region with the bulk of sightings being recorded during the spring, summer and autumn (Berzin 1972, Shimada and Pastene 1995). Berzin (1972 in Reeves et al. 1999) reported that Soviet "research whalers" saw groups of 100 - 200 sperm whales in the Solomon Island region during the Northern Hemisphere spring and summer periods of the 1960's.

Most of the cetaceans taken in the Solomon drive fishery are reported to be long-beaked oceanic forms, including spinner, pantropical spotted, striped, common (*Delphinus delphis*) and rough-toothed dolphins, along with false killer whales (Dawbin 1972, Takekawa 1996). Risso's dolphins and melon-headed whales have also been taken on occasion as have bottlenose dolphins (Takekawa 1996). In addition short-finned pilot whales have been reported around the Solomon Islands (Dawbin 1974, Shimada and Pastene 1995). A sighting cruise in late November and early December of 1993 observed a pod of five killer whales and 30 Fraser's dolphins off the southeastern end of the Solomon Archipelago. Two pods of false killer whales totalling 17 individuals off the Pacific side of the Solomon's were also observed (Shimada and Pastene 1996). Recent genetic analysis indicates that 5 bottlenose dolphin skull specimens that were sourced from the Solomon Islands were believed to be Indo-Pacific bottlenose dolphins or *Tursiops aduncus*-type (Kurihara and Oda 2007). In addition, a skull of a Cuvier's beaked whale was found at Treasury Harbour (Dawbin 1972), and Dawbin (1974 in Reeves et al. 1999) referred to a record of a Blainville's beaked whale from the Solomon Islands but provided no details. Lastly, the Solomon Islands have been identified as part of the geographic range of humpback whales (UNEP-WCMC 2003).

Records of Cetaceans in the Waters of Solomon Islands		
Scientific Name Common Name	Citation	Class
<i>Balaenoptera musculus</i> Blue whale	Ohsumi and Shigemune 1993 in Shimada and Pastene 1995	2
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Shimada and Pastene 1995, Kahn 2004	1
<i>Grampus griseus</i> Risso's dolphin	Shimada and Pastene 1995, Kahn 2004	1
<i>Lagenodelphis hosei</i> Fraser's dolphin	Shimada and Pastene 1995	2
<i>Orcaella heinsohni</i> Snubfin dolphin	Hill 1989 in Kahn 2004, Bass 2009	2
<i>Orcinus orca</i> Orca	Shimada and Pastene 1995, Kahn 2004	1
<i>Peponocephala electra</i> Melon-headed whale	Shimada and Pastene 1995	2
<i>Pseudorca crassidens</i> False killer whale	Dawbin 1972, Shimada and Pastene 1995	2
<i>Stenella attenuata</i> Pantropical spotted dolphin	Dawbin 1972, Shimada and Pastene 1995, Kahn 2004	1
<i>Stenella coeruleoalba</i> Striped dolphin	Dawbin 1972, Takekawa 1996	2
<i>Stenella longirostris</i> Spinner dolphin	Shimada and Pastene 1995, Kahn 2004	1
<i>Steno bredanensis</i> Rough-toothed dolphin	Dawbin 1972, Kahn 2004	1
<i>Tursiops</i> sp. Bottlenose dolphin	Kahn 2004, Kurihara and Oda 2007	1
<i>Physeter macrocephalus</i> Sperm whale	Berzin 1972, Shimada and Pastene 1995	1

Unconfirmed Species
<i>Balaenoptera</i> sp., Bryde's-like whale (Miyazaki and Wada 1978, Ohsumi 1981)
<i>Balaenoptera</i> sp., Bryde's-like whale (Shimada and Pastene 1995, Reeves et al. 1999)
<i>Delphinus</i> sp., Common dolphin (Dawbin 1972)
<i>Megaptera novaeangliae</i> , Humpback whale (UNEP-WCMC 2003)
<i>Mesoplodon densirostris</i> , Blainville's beaked whale (Dawbin 1974)
<i>Ziphius cavirostris</i> , Cuvier's beaked whale (Dawbin 1974)

Tokelau

Land Area (km²): 12

Sea Area (EEZ) (thousands of km²): 290

The Polynesian territory of New Zealand consists of three coral atolls - Atafu, Nukunonu and Fakaofu.

Only two records were found for the waters within the EEZ of the small nation of Tokelau. The first is a tentative record of *Orcinus orca* that was reported in small concentrations between the Phoenix Islands of Kiribati and Tonga - it is possible that these observations included Tokelauan waters (Miyashita et al. 1995). There is more certain evidence of sperm whale within this region, albeit rare; a single male was observed in Tokelau in October of 1992 (Dufault and Whitehead 1995).

Records of Cetaceans in the Waters of Tokelau		
Scientific Name Common Name	Citation	Class
<i>Physeter macrocephalus</i> Sperm whale	Dufault and Whitehead 1995	1
Unconfirmed Species		
<i>Orcinus orca</i> , Orca (Miyashita et al. 1995)		

Tonga

Land Area (km²): 649

Sea Area (EEZ) (thousands of km²): 700

Tonga is an archipelago of more than 170 islands spread over four major island groups - Tongatapu, Ha'apai, Vava'u and the Niuaus.

Tongan waters are well known for their yearly humpback migration (Dawbin 1964, Eldredge 1991, Paterson 2001, SPWRC 2002, Olavarria et al. 2003, SPWRC 2004, Eriksen et al. 2005) and many whale watch operators make use of this cycle (Orams 2001 and 2004).

Researchers have documented additional cetacean species within these waters (SPWRC 2004). Specifically, spinner dolphins have been sighted, photographed and genetic samples taken. Sighting and photographs have been made of bottlenose dolphin, melon-headed whale, orca, pygmy killer whale, false killer whale, and sperm whale. Sightings of Risso's, short-finned pilot and minke subspecies have been made, and a genetic sample from a dwarf minke whale has been obtained.

Incidental reports also place false killer whales and sperm whales within Tongan waters in the early 1990s (Reeves et al. 1999, Dufault and Whitehead 1995). A group of about 40 common dolphins were sighted southwest of Tonga during a 1992 survey, but the location was not overly specific (Reeves et al. 1999).

Records of Cetaceans in the Waters of Tonga		
Scientific Name Common Name	Citation	Class
<i>Balaenoptera acutorostrata</i> subsp. Dwarf minke whale	SPWRC 2004	1
<i>Balaenoptera bonaerensis</i> Antarctic minke whale	SPWRC 2002 and 2004	2

<i>Balaenoptera borealis</i> Sei whale	D. Donnelly, pers. comm.	2
<i>Megaptera novaeangliae</i> Humpback whale	Dawbin 1964, Eldredge 1991, Paterson 2001, SPWRC 2002, Olavarria et al. 2003, SPWRC 2004, Eriksen et al. 2005	1
<i>Delphinus delphis</i> Common dolphin	SPWRC 2009	1
<i>Feresa attenuata</i> Pygmy killer whale	SPWRC 2004	1
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Hoyt 2001, SPWRC 2004	1
<i>Grampus griseus</i> Risso's dolphin	SPWRC 2004	1
<i>Orcinus orca</i> Orca	Visser and Bonoccorso 2003, SPWRC 2004	1
<i>Peponocephala electra</i> Melon-headed whale	SPWRC 2004	1
<i>Pseudorca crassidens</i> False killer whale	Reeves et al. 1999, SPWRC 2004, Childerhouse 2005	1
<i>Stenella attenuata</i> Pantropical spotted dolphin	SPWRC 2004	1
<i>Stenella longirostris</i> Spinner dolphin	UNEP-WCMC 2003, SPWRC 2004, C. Miller pers. comm., SPWRC 2008	1
<i>Tursiops</i> sp. Bottlenose dolphin	SPWRC 2004	1
<i>Physeter macrocephalus</i> Sperm whale	Dufault and Whitehead 1995, SPWRC 2004	1
Unconfirmed		
<i>Steno bredanensis</i> , rough-toothed dolphin (L. Eyres, pers. comm.)		

Tuvalu

Land Area (km²): 26

Sea Area (EEZ) (thousands of km²): 900

Tuvalu is a group of nine low-lying islands that includes five atolls and four coral islands.

The small nation of Tuvalu has only a limited number of cetaceans recorded within the large EEZ. Sightings from Japanese whaling vessels (Miyashita et al. 1995) refer to small concentrations of orca between the Phoenix Islands of Kiribati and Tonga, and both Tuvalu and Samoa lie directly between these two locations. Historically the distribution of *Physeter macrocephalus* was purported to include an area along the south side of one of Tuvalu's islands - Ellice Island (Berzin 1972). More recently a stranded sperm whale was documented in 2007 (V. Iese, pers. comm.). Tuvalu is also recorded as part of the geographic range of pantropical spotted dolphin according to the UNEP-WCMC checklist (2003). Boat-based surveys conducted in 2007 and 2008 represented some of the first focused work on large marine species diversity and confirmed the presence of spinner dolphins, pantropical spotted dolphin as well as a single sightings of *Kogia* sp (Oremus et al. 2007, Childerhouse and Wheeler 2008). Additional interviews substantiated the presence of both killer whales and minke whales to visiting researchers (Childerhouse and Wheeler 2008). Additional anecdotal sightings indicate that bottlenose dolphins may be present in Tuvaluan waters also (Anonymous 2006, Reeves 2006).

Records of Cetaceans in the Waters of Tuvalu		
Scientific Name	Citation	Class
Common Name		

<i>Balanoptera</i> sp. 'Minke-like' whale	Childerhouse and Wheeler 2008	2
<i>Orcinus orca</i> Orca	Miyashita et al. 1995, Childerhouse and Wheeler 2008	2
<i>Stenella attenuata</i> Pantropical spotted dolphin	UNEP-WCMC 2003, Oremus et al. 2007	2
<i>Stenella longirostris</i> Spinner dolphin	Oremus et al. 2007	1
<i>Tursiops</i> sp. Bottlenose dolphin	Anon. 2006, Reeves 2006	2
<i>Kogia</i> sp. Diminutive sperm whale	Oremus et al. 2007	2
<i>Physeter macrocephalus</i> Sperm whale	Berzin 1972, SPWRC 2008, V. Iese, pers. comm.	1
Unconfirmed		
<i>Pseudorca crassidens</i> , false killer whale, V. Iese, pers. comm.		
<i>Ziphiid</i> sp., beaked whale, V. Iese, pers. comm.		

Vanuatu

Land Area (km²): 12,190

Sea Area (EEZ) (thousands of km²): 710,000

Vanuatu is a string of more than 80 islands once known as the New Hebrides. The two largest islands, Espiritu Santo and Malakula account for nearly one half of the total land area.

A number of cetacean species have been found in Vanuatu waters. A very large mass stranding of an estimated 231 melon-headed whales occurred on Malekula Island in November of 1972 (Rancurel 1973). One month later a stranded female short-finned pilot whale was found on the nearby island of Efate (Rancurel 1973) and photographic evidence confirms this identification. A possible sighting of Bryde's-like whales in these waters was reported by Ohsumi (1978) as individuals were taken in the waters between Fiji and New Caledonia. A portion of the Vanuatu EEZ was also described as containing "noticeable concentrations" of Bryde's-like whales (Ivashin 1980). Historical records indicate that large aggregations of sperm whales were seen off Vanuatu (Berzin 1972). Humpback whales were also seen in Vanuatu waters historically (Dawbin 1964) as well as more recently (SPWRC 2004). Pantropical spotted dolphins (? Check if spinners) have also been sighted and photographed (Declotre 1995, SPWRC 2005).

Bottlenose dolphins have been reported between Fiji and Papua New Guinea as well as in New Caledonian waters (Reeves et al. 1999) so it would seem that Vanuatu waters would also be included in their range. A recent report from a dive trip indicated the presence of bottlenose dolphins in Vanuatu waters (R. Barrell pers. comm.). More recent surveys in Vanuatu waters have confirmed the presence of many of the above species, and also indicated that orcas use these waters (C. Garrigue pers. comm.). Finally, Vanuatu is indicated as a geographic range state for striped dolphin (UNEP-WCMC 2003).

Records of Cetaceans in the Waters of Vanuatu		
Scientific Name Common Name	Citation	Class
<i>Megaptera novaeangliae</i> Humpback whale	Dawbin 1964, SPWRC 2004	1
<i>Globicephala macrorhynchus</i> Short-finned pilot whale	Rancurel 1973, SPWRC 2004	2
<i>Orcinus orca</i> Orca	C. Garrigue pers. comm.	2
<i>Peponocephala electra</i> Melon-headed whale	Rancurel 1973, SPWRC 2004	1
<i>Stenella attenuata</i> Pantropical spotted dolphin	SPWRC 2004	1

<i>Stenella longirostris</i> Spinner dolphin	Delcloitre 1995, SPWRC 2004	1
<i>Tursiops</i> sp. Bottlenose dolphin	Reeves et al. 1999	2
<i>Physeter macrocephalus</i> Sperm whale	Berzin 1972, SPWRC 2004	1
Unconfirmed Species		
<i>Balaenoptera</i> sp., Bryde's-like whale (Ohsumi 1978, Ivashin 1980) <i>Stenella coeruleoalba</i> , Striped dolphin (UNEP-WCMC 2003)		

Wallis and Futuna

Land Area (km²): 255

Sea Area (EEZ) (thousands of km²): 300

Consists of primarily volcanic islands including Wallis, Futuna and Alofi as well as approximately 20 islets.

The nation of Wallis and Futuna has had no directed research into marine mammal diversity. A speculative cetacean record was the historical distribution range of sperm whales noted to include the region south of Ellice Islands (Tuvalu) to the north of the Fiji Islands (Berzin 1972) which would likely encompass Wallis and Futuna waters. In addition personal communication with C. Garrigue has indicated that humpback whales are also present in these waters.

Records of Cetaceans in the Waters of Wallis and Futuna		
Scientific Name Common Name	Citation	Class
<i>Megaptera novaeangliae</i> Humpback whale	C. Garrigue pers. comm.	1
Unconfirmed Species		
<i>Physeter macrocephalus</i> , Sperm whale (Berzin 1972)		

Australia

Species recorded within Australian waters (Bannister et al. 1996, Smith 2001, Ross 2006):

spectacled porpoise, minke whale, Antarctic minke whale, sei whale, Bryde's-like whale, blue whale, fin whale, Arnoux's beaked whale, pygmy right whale, common dolphin, southern right whale, pygmy killer whale, short-finned pilot whale, long-finned pilot whale, Risso's dolphin, southern bottlenose whale, Indo-Pacific beaked whale, pygmy sperm whale, dwarf sperm whale, Fraser's dolphin, hourglass dolphin, dusky dolphin, southern right whale dolphin, humpback whale, Longman's beaked whale, Andrew's beaked whale, Blainville's beaked whale, ginkgo-toothed beaked whale, Gray's beaked whale, Hector's beaked whale, Layard's beaked whale, True's beaked whale, snubfin dolphin, orca, melon-headed whale, sperm whale, false killer whale, Indo-Pacific hump-backed dolphin,

pantropical spotted dolphin, striped dolphin, spinner dolphin, rough-toothed dolphin, Tasman's beaked whale, Indo-Pacific bottlenose dolphin, common bottlenose dolphin, Cuvier's beaked whale.

New Zealand

Species recorded within New Zealand waters (Department of Conservation 2006, A. Van Helden, pers. comm):

southern right whale, dwarf minke whale, Antarctic minke whale, sei whale, Bryde's whale, blue whale, pygmy blue whale, fin whale, humpback whale, pygmy right whale, Hector's dolphin, short-beaked common dolphin, short-finned pilot whale, long-finned pilot whale, Risso's dolphin, Fraser's dolphin, hourglass dolphin, dusky dolphin, southern right whale dolphin, killer whale, melon-headed whale, false killer whale, rough-toothed dolphin,

panropical spotted dolphin, striped dolphin, bottlenose dolphin, pygmy sperm whale, dwarf sperm whale, sperm whale, spectacled porpoise, Arnoux's beaked whale, southern bottlenose whale, Andrew's beaked whale, dense beaked whale, ginkgo-toothed whale, Gray's beaked whale, Hector's beaked whale, strap-toothed whale, lesser beaked whale, spade-toothed whale, Shepherds beaked whale, and Cuvier's beaked whale.

USA, Hawaii

Species recorded within Hawaiian waters (U.S.) (Carretta et al. 2008):

Rough-toothed dolphin, Risso's dolphin, Common bottlenose dolphin, Pantropical spotted dolphin, spinner dolphin striped dolphin, Fraser's dolphin, melon-headed whale, pygmy killer whale, false killer whale, killer whale, short-finned pilot whale, Blainville's beaked whale, Cuvier's beaked whale, Longman's beaked whale, pygmy sperm whale, dwarf sperm whale, sperm whale, blue whale, fin whale, Bryde's whale, Sei whale, minke whale.

Pacific Islands Region Country-specific Cetacean Record Summary

After analysis of records it became apparent that a core group of species made up the majority of cetacean records for the Pacific Islands Region. Focussing on the 22 Island Countries and Territories (i.e., excluding records from Australia, New Zealand and Hawaii) the species that appear to be resident or typically migrant are minke whales (two species and multiple subspecies), sei whale, Bryde's-like whales (two species), blue whales (multiple subspecies), humpback whale, pygmy killer whale, short-finned pilot whale, Risso's dolphin, Fraser's dolphin, orca, melon-headed whale, false killer whale, pantropical spotted dolphin, striped dolphin, spinner dolphin, rough-toothed dolphin, bottlenose dolphin (two species), dwarf sperm whale, pygmy sperm whale, sperm whale, Blainville's beaked whale, and Cuvier's beaked whale. It is plausible that ongoing taxonomic investigations may indicate that the current species and subspecies designations are inadequate to display the diversity of these records. In

addition there are numerous rare and vagrant species with records within this same region: fin whale, common dolphins (two species), ginkgo-toothed beaked whale, snubfin dolphin, Indo-Pacific humpback dolphin, southern right whale, southern bottlenose whale, and tentative records of both Peale's dolphin and southern right whale dolphin. Of course, the limited research efforts in this region coupled with the very large expanse of the Pacific Islands Region marine coverage makes it plausible that there may also be as yet unreported species that inhabit these waters. One such example is the numerous unconfirmed sightings of additional beaked whale species (e.g., Reeves et al. 1999, Kahn 2004). In addition, the following cetacean species are recorded from Australian and New Zealand waters: southern right whale, dwarf minke whale, Antarctic minke whale, sei whale, Bryde's whale, blue whale, pygmy blue whale, fin whale, humpback whale, pygmy right whale, Hector's dolphin, short-beaked common dolphin, short-finned pilot whale, long-finned pilot whale, Risso's dolphin, Fraser's dolphin, hourglass dolphin, dusky dolphin, southern right whale dolphin, killer whale, melon-headed whale, false killer whale, rough-toothed dolphin, pantropical spotted dolphin, striped dolphin, pygmy sperm whale, dwarf sperm whale, sperm whale, spectacled porpoise, Arnoux's beaked whale, southern bottlenose whale, Andrew's beaked whale, dense beaked whale, ginkgo-toothed whale, Gray's beaked whale, Hector's beaked whale, strap-toothed whale, lesser beaked whale, spade-toothed whale, Shepherds beaked whale, Cuvier's beaked whale, pygmy killer whale, Blainville's beaked whale, snubfin dolphin, Indo-Pacific hump-backed dolphin, spinner dolphin, Tasman's beaked whale, Indo-Pacific bottlenose dolphin, common bottlenose dolphin, Longman's beaked whale, Layard's beaked whale, and True's beaked whale.

Cetacean Species in the Pacific Islands Region

Regular, irregular and sometimes vast migrations

The migration of many cetacean species is cyclical and predictable, coinciding with changes in season and recurring changes in food availability. Of course the period spent between the ends of a cetacean's migration often plays a very important part of its life cycle yet it is useful to note that the migration routes of many species cross regularly between the national jurisdictions of coastal and island Countries and Territories. Some species regularly cross from national jurisdictions into the high seas. Other cetacean migrations are less predictable. There are movements within some of the enormous 'home ranges' which constitute migrations in the sense that such forays might involve the animal travelling the length and breadth of its normal home range, comprising several thousand kilometres and sometimes entirely on the high seas. Such journeys are often undertaken with less predictability. These movements can appear random, or driven by unique circumstances, and may not appear to be cyclic. However the subtleties and extent of such migrations are difficult to evaluate without continuously monitoring individuals and the components of their habitats to determine the impetus for such movements. For many species this data is not yet available. Such long journeys may still constitute migration under the working definition of CMS, even though the cyclical nature and predictability of these migrations may, at present, be unclear.

Considering species and populations

Many cetacean species inhabit vast marine regions. Some species are thought to have movements between populations on a regular basis, whereas other populations remain more distinct. Overlapping migrations may occur, but specific populations may remain isolated from each other genetically. The conservation status of a migratory species means the sum of the influences acting on the species that may affect its long-term distribution and abundance. For this reason the assessment of population status is

critical. There can be little doubt that there are a number of significant pressures which act independently and cumulatively to influence not only the migration of cetaceans but also their long-term population distribution abundance and survival.

Status and habitat of recorded and potential cetacean species in the Pacific Islands Region

Knowledge regarding population size, dynamics and migration patterns of cetaceans within the Pacific Islands is largely sparse with the possible exception of humpback whales (e.g., Garrigue et al. 2002). In this chapter, habitat descriptions are based on general reviews (i.e., Carwardine (1995) or Reeves et al. (1999, 2003) unless otherwise indicated), classifications to the level of subspecies have been adapted from Reeves et al. (2003), and IUCN classifications have been taken from the most recent Red List (IUCN 2006). Difficulties associated with individual species identification, subspecies differentiation, and recent nomenclature changes (which many records pre-date) are briefly discussed where appropriate. Table 2 provides status and species listing, whilst habitat and identification issues are listed in the text. Descriptions of the IUCN categories are provided in the Appendix.

Suborder Mysticeti

FAMILY Balaenidae

Eubalaena australis, Southern Right Whale

Habitat: Cold waters of temperate and subpolar Southern hemisphere waters.

Southern right whale populations are circumpolar between approximately 30° and 60°S with generalized movement from higher latitudes where feeding occurs in summer to warmer, lower latitudes for breeding in winter. During the austral winter this species can often be found close to the coast.

ID: It is reported that *Eubalaena japonica* may occur in northern areas of the Pacific Islands Region including the Hawaiian Islands (Reeves et al. 1999) and therefore may occasionally visit other northerly nations such as the Marshall Islands and the Northern Mariana Islands.

FAMILY Balaenopteridae

***Balaenoptera acutorostrata* subspp.,**

Common and dwarf minke whales

Habitat: Virtually worldwide in tropical, temperate, and polar waters of both hemispheres. It is probable but uncertain whether minke whale breeding occurs in discrete populations in the eastern and western South Pacific Ocean, or if individuals are perhaps assembled in open waters during the breeding season. The dwarf form apparently moves to high latitudes (at least 65°S) in summer.

ID: It is unclear whether records collated in this report consistently and accurately differentiate between the common minke whale and the dwarf form. Furthermore, some difficulty has been noted in distinguishing the *acutorostrata* species from Antarctic minke whale. The present convention is to regard this species as consisting of two, and possibly three subspecies; the North Atlantic population *B. a. acutorostrata*, the North Pacific population *B. a. scammoni*, and the 'dwarf' minke whale, *B. a. unnamed subsp.*, which is found in parts of the Southern Ocean (Rice 1998).

***Balaenoptera bonaerensis*, Antarctic minke whale**

Habitat: The Antarctic minke whale occurs in highest densities in the Antarctic during the summer feeding season. During the winter breeding season, individuals are believed to disperse in open ocean areas in tropical and subtropical latitudes (Kasamatsu et al. 1995).

ID: As mentioned under *B. acutorostrata* it is unlikely that all collected records differentiate between the common minke whale, the dwarf minke whale, and the Antarctic minke whale. Therefore, in cases where insufficient genetic and/or morphological evidence was provided the record was listed only as *Balaenoptera* sp.

***Balaenoptera borealis*, Sei whale**

Habitat: Worldwide distribution, but primarily in deep, temperate oceanic waters.

ID: The difficulty of distinguishing sei whales from Bryde's whales and Omura's whale has confounded much of the historical literature, and even some modern survey data. Reports in the literature from any time before the mid-1970s are suspect because of the frequent failure to

distinguish sei from Bryde's whales and Omura's whales, particularly in tropical to warm temperate waters where Bryde's whales are generally more common than sei whales (Reeves et al. 1999).

***Balaenoptera edeni*, Bryde's whale (*B. edeni/brydei* complex)**

Habitat: Bryde's whales are regarded as having a pantropical distribution, and in some areas (e.g., the western Pacific) they move seasonally into warm temperate latitudes.

ID: The difficulty of distinguishing Bryde's whales from Omura's whales and sei whales has confounded much of the historical literature, and even some modern survey data (Reeves et al. 1999, see sei whale ID also). The animals traditionally called Bryde's whales fall into two species (*B. edeni* and *B. omurai*, with large ('ordinary') and small forms of the former. Therefore in cases where insufficient genetic and/or morphological evidence was provided, the *B. edeni/brydei* records are not distinguished from one another.

***Balaenoptera omurai*, Omura's whale**

Habitat: Tropical waters of the far western Pacific waters and Southeast Asia (e.g., Solomon Sea, South China Sea, south-eastern Indian Ocean and possibly Southern Japan).

ID: This species was described only very recently (Wada et al. 2002). There has been difficulty in consistently distinguishing between sei, Bryde's whales (large and small forms) and Omura's whale (see above) therefore, several of the Bryde's and sei identifications are considered tentative.

***Balaenoptera musculus* subspp., Blue whales**

Habitat: Patchily distributed worldwide, mainly in cold waters and open seas.

ID: It is possible that both Antarctic true blue whales (*Balaenoptera musculus intermedia*) and 'pygmy' blue whales (*Balaenoptera musculus brevicauda*) are present in the Pacific Islands Regions, yet most records found did not distinguish to the sub-species level. Therefore, records in this report typically refer to blue whales, without further division.

***Balaenoptera physalus*, Fin whale**

Habitat: Worldwide distribution, but most common in temperate waters and in the Southern Hemisphere. It has been proposed that Fin whales tend to become widely dispersed in winter, with some possibly migrating into tropical waters, many being scattered in the open ocean in subtropical and sub-Antarctic waters, and some remaining in the Antarctic.

Megaptera novaeangliae, Humpback whale

Habitat: Humpback whales have a cosmopolitan distribution that generally involves long migrations between high-latitude summer feeding grounds and tropical breeding grounds (Clapham 2000). Several sites within the Pacific region have been identified as present-day wintering grounds for humpback whales presumed to belong to southern hemisphere populations. The Area V IWC-defined Antarctic stock of humpback whales has two migratory 'streams', one passing the east coast of Australia and the other passing New Zealand and Norfolk Island, the latter thought to winter in proximity to many of the Pacific Islands nations (Dawbin 1964). It is also possible that northern hemisphere individuals may migrate further south than Hawaii into the Pacific Islands Region.

FAMILY Neobalaenidae

Caperea marginata, Pygmy right whale

Habitat: Circumpolar distribution in both temperate and subantarctic waters of the Southern Ocean. Individuals are purported to occur both inshore and offshore with preferred temperature ranges reported to between 5 and 20°C (Baker 1985).

Suborder Odontoceti

FAMILY Delphinidae

Cephalorhynchus hectori, Hector's dolphin

Habitat: This species is endemic to New Zealand waters and occurs in the coastal waters, especially around the South island and the western coast of the North Island. The aggregate population is fragmented into at least three genetically isolated, regional groups.

Delphinus capensis, Long-beaked Common Dolphin

Habitat: The long-beaked common dolphin occurs in continental near-shore tropical and warm temperate waters of at least the Pacific, Atlantic, and western Indian oceans.

ID: At sea identification between long and short-beaked common dolphins is very difficult. Therefore, even though relatively few records exist for *D. capensis* it is possible that this species is more widespread than records indicate.

Delphinus delphis, Short-beaked common dolphin

Habitat: Warm temperate, subtropical, and tropical waters worldwide.

ID: At sea identification between long and short-beaked common dolphins is very difficult – however a majority of common dolphin records from the Pacific Islands Region indicate that the short-beaked subspecies is the more frequently sighted of the two. Very early records of this species could have been of almost any long-beaked tropical dolphin.

Feresa attenuata, Pygmy Killer Whale

Habitat: The pygmy killer whale is patchily distributed in tropical and subtropical offshore waters around the world.

ID: There has been some confusion with correctly identifying this species at sea particularly as there have been some possible confusion with other 'blackfish', in particular melon-headed whales.

Globicephala macrorhynchus, Short-finned Pilot Whale

Habitat: Tropical, subtropical, and warm temperate oceans around the world as well as cold-temperate North Pacific waters (Bernard and Reilly 1999). Different populations are purported yet not well described.

ID: Short-finned and long-finned pilot whales may be difficult to distinguish at sea, though distributional limits make the plausibility of *G. macrorhynchus* in the Pacific region higher than *G. melas*.

Globicephala melas, Long-finned Pilot Whale

Habitat: Cold temperate and subpolar waters of all oceans, except the North Pacific. One subspecies occurs in temperate to subantarctic waters of the Southern Hemisphere (Bernard and Reilly 1999).

ID: Short-finned and long-finned pilot whales may be difficult to distinguish at sea, though water temperatures make the likelihood of *G. melas* within much of the Pacific region low.

Grampus griseus, Risso's dolphin

Habitat: Deep tropical and warm temperate waters in northern and southern hemispheres, and notably in the Pacific sightings have been made in equatorial waters.

Lagenodelphis hosei, Fraser's dolphin

Habitat: Deep tropical and warm temperate waters of the Pacific, Atlantic, and Indian Oceans.

Lagenorhynchus australis, Peale's dolphin

Habitat: In general this species is only known to be endemic to coastal and shelf waters of the southern cone of South America, from central Chile to northern Argentina. However a single tentative sighting was made in Cook Island waters (Leatherwood et al. 1991).

Lagenorhynchus cruciger, Hourglass dolphin

Habitat: Oceanic circumpolar cold waters of the southern hemisphere, predominantly between 45°S and 65°S.

Lagenorhynchus obscurus, Dusky dolphin

Habitat: Coastal temperate waters of New Zealand, southern Africa, South America, and, Australia (Gill et al. 2000).

Lissodelphis peronii, Southern Right Whale Dolphin

Habitat: Deep, cold temperate waters of the southern hemisphere, mainly between the Subtropical and Antarctic Convergence (Newcomer et al. 1996).

Orcaella heinsohmi, Snubfin dolphin

Habitat: Patchily distributed in shallow, near-shore tropical and subtropical marine waters of the Sahol Shelf from northern and eastern Australia, north to Papua New Guinea. Its distribution is centred on estuaries and mangrove areas.

ID: This species was very recently separated from the Irrawaddy dolphin (Beasley et al. 2005). The differentiation

potentially confounds historical *Orcaella* distribution records.

Orcinus orca, Orca or Killer whale

Habitat: All oceans of the world, particularly cold-temperate and polar. This cosmopolitan species occurs both sporadically and possibly seasonally in many parts of the Pacific region.

Peponocephala electra, Melon-headed whale

Habitat: This poorly known species is distributed in deep oceanic and deep nearshore waters at tropical and subtropical latitudes worldwide (Jefferson and Barros 1997).

Pseudorca crassidens, False killer whale

Habitat: Deep tropical, subtropical, and warm temperate waters, mainly offshore.

Sousa chinensis, Indo-Pacific humpback dolphin

Habitat: Shallow coastal waters of the Indian and Western Pacific Oceans. Humpback dolphins are coastal animals and are usually observed in water less than 20m deep.

Stenella attenuata, Pantropical spotted dolphin

Habitat: Tropical and some warm temperate waters of the Atlantic, Pacific, and Indian Oceans. This species lives in both coastal and oceanic waters. In the eastern tropical Pacific it occurs in tropical, equatorial and southern subtropical water masses and often in aggregations that include spinner dolphins, yellow fin tuna, skipjack tuna, and various oceanic bird species.

Stenella coeruleoalba, Striped dolphin

Habitat: Warm temperate, subtropical, and tropical waters around the world. The species appears to prefer areas with large seasonal changes in surface temperatures and thermocline depth, as well as seasonal upwelling.

Stenella longirostris, Spinner dolphin

Habitat: Tropical and subtropical waters in the Atlantic, Indian, and Pacific Oceans. Spinner dolphins occur in large schools throughout the tropics, with numerous locally resident populations centred around islands or archipelagos

(Norris et al. 1994, Perrin 1998). Subspecies *S. l. longirostris* occurs in all tropical seas, *S. l. orientalis* in pelagic waters of the eastern tropical Pacific, *S. l. centroamericana* in coastal waters of Central America, and there is morphological evidence for a fourth subspecies *S. l. roseiventris*, a dwarf form found in shallow, protected waters of inner Southeast Asia and northern Australia (Perrin et al. 1999).

***Steno bredanensis*, Rough-toothed dolphin**

Habitat: Deep tropical, subtropical, and warm temperate waters around the world. In some areas it occurs in aggregations with birds and near-surface fish schools (Poole 1993).

***Tursiops aduncus*, Indo-Pacific bottlenose dolphin**

Habitat: Shallow temperate to tropical waters.

ID: Morphologically distinguishing *Tursiops* species at sea is difficult and some records pre-date *Tursiops* species differentiation. Therefore, most *Tursiops* records in this report are not differentiated as species.

***Tursiops truncatus*, Common bottlenose dolphin**

Habitat: Widely distributed in cold temperate to tropical seas worldwide.

ID: Morphologically distinguishing *Tursiops* species at sea is difficult and some records pre-date *Tursiops* species differentiation. Therefore, most *Tursiops* records are not differentiated to the species level.

FAMILY Phocoenidae

***Phocoena dioptrica*, Spectacled porpoise**

Habitat: Fairly broad distribution in subantarctic and cold temperate waters of the Southern Hemisphere (Goodall and Schiavini 1995, Brownell and Clapham 1999). It is uncertain whether the animals near large islands and island groups constitute separate populations. Some sightings suggest that there may be some movement across expanses of open oceans.

FAMILY Kogiidae

***Kogia breviceps*, Pygmy sperm whale**

Habitat: Deep temperate, subtropical, and tropical waters beyond the continental shelf.

ID: There is some difficulty in distinguishing between *Kogia* species, especially in observations made at sea. Furthermore, several records in the report are sourced from stranding events that again confounds distribution records as these observations may not be consistent with typical geographic range.

***Kogia sima*, Dwarf sperm whale**

Habitat: Deep temperate, subtropical, and tropical waters of the northern and southern hemispheres. Species distribution is largely inferred from stranding events.

ID: There is some difficulty in distinguishing between *Kogia* species, especially in observations made at sea. Furthermore, several records in the report are sourced from stranding events that again confounds distribution records as these observations may not be consistent with typical geographic range.

FAMILY Physeteridae

***Physeter macrocephalus*, Sperm whale**

Habitat: Widely distributed in deep waters worldwide, both offshore and inshore.

FAMILY Ziphiidae

***Berardius arnuxii*, Arnoux's beaked whale**

Habitat: Deep offshore waters in the Southern Hemisphere, south of 34°S.

***Hyperoodon planifrons*, Southern bottlenose whale**

Habitat: Cold, deep waters of the southern hemisphere from Antarctica north to at least 30°S.

***Indopacetus pacificus*, Longman's beaked whale (or tropical bottlenose whale)**

Habitat: For a long time this species was known only from a few skeletal records although observations of this species in Pacific and Indian Oceans appears to be this species (Pitman et al. 1999, Pitman 2002).

***Mesoplodon densirostris*, Blainville's beaked whale**

Habitat: Widely distributed in warm temperate and tropical waters.

***Mesoplodonts* (beaked whales of the genus *Mesoplodon*)**

Habitat: Mesoplodonts are generally deep-water animals; they occur from cold temperate and sub-polar latitudes to the tropics.

ID: Individuals purported to be *Mesoplodon* are sometimes reported in Pacific Island nations yet their cryptic and shy behaviour often make species confirmation difficult. However, it is plausible that the following species are present in the region: Andrew's beaked whale (*Mesoplodon bowdoini*), Hubb's beaked whale (*Mesoplodon carlhubbsi*), Ginkgo-toothed beaked whale (*Mesoplodon ginkgodens*), Gray's beaked whale (*Mesoplodon grayi*), Hector's beaked whale (*Mesoplodon hectori*), Layard's beaked (or strap-toothed) whale (*Mesoplodon layardii*), True's beaked whale (*Mesoplodon mirus*), Pygmy beaked whale (*Mesoplodon peruvianus*), and Spade-toothed whale (*Mesoplodon traversii*).

Tasmacetus shepherdi, Tasman's beaked whale

Habitat: Cold temperate waters of the Southern Ocean.

Ziphius cavirostris, Cuvier's beaked whale

Habitat: Worldwide distribution in tropical, subtropical, and temperate waters.

Tentative Listing of Cetaceans present in waters of the Pacific Islands Region

Classifications of the living cetaceans, Order Cetacea, to the level of subspecies have been adapted from Reeves et al. 2003. Appendix and status listings have been taken from the following sources: <http://www.cms.int/documents/appendix/Appendices COP9 E.pdf>, <http://www.cites.org/eng/app/appendices.shtml>, and www.iucnredlist.org. Definitions of listed criteria are also available at these locations.

TAXON	VERNACULAR NAME	CMS Appendix	CITES Appendix	IUCN STATUS
Family Balaenidae, Right whales				
<i>Eubalaena australis</i>	Southern right whale	I	I	LC
<i>Eubalaena japonica</i>	North Pacific right whale (North Pacific)	I	I	EN
Family Balaenopteridae, Rorquals				
<i>Balaenoptera acutorostrata</i> subsp.	Common and dwarf minke whales	-	I (Exception - West Greenland population is in Appendix II)	LC
<i>Balaenoptera bonaerensis</i>	Antarctic minke whale	II	I	DD
<i>Balaenoptera borealis</i>	Sei whale	I/II	I	EN
<i>Balaenoptera edeni</i> (<i>B.edeni/brydei</i> complex)	Bryde's whale	II	I	DD
<i>Balaenoptera musculus</i>	Blue whale	I	I	EN
<i>B. musculus breviceauda</i>	Pygmy blue whale	-	-	DD
<i>B. musculus intermedia</i>	Antarctic blue whale	-	-	CR
<i>Balaenoptera omurai</i>	Omura's whale	II	-	DD
<i>Balaenoptera physalus</i>	Fin whale	I/II	I	EN
<i>Megaptera novaeangliae</i>	Humpback whale	I	I	LC
Family Neobalaenidae, pygmy right whales				
<i>Caperea marginata</i>	Pygmy right whale	II	I	DD
Family Delphinidae, marine (oceanic) dolphins				
<i>Cephalorhynchus hectori</i>	Hector's dolphin	-	II	EN
<i>Delphinus capensis</i>	Long-beaked common dolphin	-	II	DD
<i>Delphinus delphis</i>	Short-beaked common dolphin	-	II	LC
<i>Feresa attenuata</i>	Pygmy killer whale	-	II	DD
<i>Globicephala macrorhynchus</i>	Short-finned pilot whale	-	II	DD
<i>Globicephala melas</i>	Long-finned pilot whale	-	II	DD
<i>Grampus griseus</i>	Risso's dolphin	-	II	LC

<i>Lagenodelphis hosei</i>	Fraser's dolphin	II (Southeast Asia populations)	II	LC
<i>Lagenorhynchus australis</i>	Peale's dolphin	II	II	DD
<i>Lagenorhynchus cruciger</i>	Hourglass dolphin	-	II	LC
<i>Lagenorhynchus obscurus</i>	Dusky dolphin	II	II	DD
<i>Lissodelphis peronii</i>	Southern right whale dolphin	-	II	DD
<i>Orcaella brevirostris</i>	Irrawaddy dolphin	I/II	I	VU
<i>Orcaella heinsohni</i>	Snubfin dolphin	II	II	NT
<i>Orcinus orca</i>	Orca	II	II	DD
<i>Peponocephala electra</i>	Melon-headed whale	-	II	LC
<i>Pseudorca crassidens</i>	False killer whale	-	II	DD
<i>Sousa chinensis</i>	Indo-Pacific humpback dolphin	II	I	NT
<i>Stenella attenuata</i>	Pantropical spotted dolphin	II (eastern tropical Pacific and Southeast Asian populations)	II	LC
<i>Stenella coeruleoalba</i>	Striped dolphin	II (eastern tropical Pacific)	II	LC
<i>Stenella longirostris</i>	Spinner dolphin	II (eastern tropical Pacific and Southeast Asian populations)	II	DD
<i>Steno bredanensis</i>	Rough-toothed dolphin	-	II	LC
<i>Tursiops aduncus</i>	Indo-Pacific bottlenose dolphin	II (Arafura/Timor Sea populations)	II	DD
<i>Tursiops truncatus</i>	Common bottlenose dolphin	-	II	LC
Family Phocoenidae, Porpoises				
<i>Neophocaena phocaenoides</i>	Finless porpoise	II	I	VU
<i>Phocoena dioptrica</i>	Spectacled porpoise	II	II	DD
Family Kogiidae, diminutive sperm whales				
<i>Kogia breviceps</i>	Pygmy sperm whale	-	II	DD
<i>Kogia sima</i>	Dwarf sperm whale	-	II	DD
Family Physeteridae, sperm whale				
<i>Physeter macrocephalus</i>	Sperm whale	I/II	I	VU
Family Ziphiidae, beaked whales				
<i>Berardius armuxii</i>	Arnoux's beaked whale	-	I	DD
<i>Hyperoodon planifrons</i>	Southern bottlenose whale	-	I	LC
<i>Indopacetus</i>	Longman's beaked	-	II	DD

<i>pacificus</i>	whale			
<i>Mesoplodon bowdoini</i>	Andrew's beaked whale	-	II	DD
<i>Mesoplodon carlhubbsi</i>	Hubb's beaked whale	-	II	DD
<i>Mesoplodon densirostris</i>	Blainville's beaked whale	-	II	DD
<i>Mesoplodon ginkgodens</i>	Ginkgo-toothed beaked whale	-	II	DD
<i>Mesoplodon grayi</i>	Gray's beaked whale	-	II	DD
<i>Mesoplodon hectori</i>	Hector's beaked whale	-	II	DD
<i>Mesoplodon layardii</i>	Layard's beaked whale	-	II	DD
<i>Mesoplodon mirus</i>	True's beaked whale	-	II	DD
<i>Mesoplodon peruvianus</i>	Pygmy beaked whale	-	II	DD
<i>Mesoplodon traversii</i>	Spade-toothed whale	-	II	DD
<i>Tasmacetus shepherdi</i>	Tasman's beaked whale	-	II	DD
<i>Ziphius cavirostris</i>	Cuvier's beaked whale	-	II	LC

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