

A Review of the Literature Pertaining to Swimming with Wild Dolphins

Amy Samuels^{1,2}, Lars Bejder^{2,3}, and Sonja Heinrich⁴

¹ Daniel F. and Ada L. Rice Conservation Biology and Research Center,
Chicago Zoological Society, Brookfield IL, USA

² Woods Hole Oceanographic Institution, Woods Hole MA, USA

³ Dalhousie University, Halifax, Nova Scotia, Canada

⁴ University of Cologne, Cologne, Germany

prepared for the

Marine Mammal Commission
4340 East-West Highway, Room 905
Bethesda, Maryland 20814

Contract Number T74463123

April 2000

Contents

Introduction	1
Cetaceans That Are Typically Solitary and Seek Human Company (Lone, Sociable)	3
Cetaceans That Are Habituated to In-Water Encounters with Humans through Food Provisioning	5
Cetaceans That Are Habituated to In-Water Encounters with Humans	7
Cetaceans That Are Not Habituated to In-Water Encounters with Humans	9
Assessment of Research Methodologies	14
Conclusions and Recommendations	15
Acknowledgments	17
Swim-with-Dolphin Bibliography	18

List of Tables

Table 1.	Categories of the Excel database on literature pertaining to swimming with wild dolphins	27
Table 2.	Lone, sociable dolphins that are well documented	29
Table 3.	Cetaceans that are habituated to in-water encounters with humans through food provisioning (codes as in Table 1)	31
Table 4.	Cetaceans that are habituated to in-water encounters with humans (codes as in Table 1)	37
Table 5.	Cetaceans that are not habituated to in-water encounters with humans (codes as in Table 1)	43

Files on Accompanying Diskette

SWD Database.xls
SWD Library.enl

Introduction

The 1994 amendments to the U.S. Marine Mammal Protection Act define the term “harassment” as:

“Any act of pursuit, torment, or annoyance which —

- (i) has the potential to injure a marine mammal or marine mammal stock in the wild (Level A harassment), or
- (ii) has the potential to disturb a marine mammal or marine mammal stock in the wild by causing disruption of behavioral patterns, including, but not limited to, migration, breathing, nursing, breeding, feeding, or sheltering (Level B harassment).”

The National Marine Fisheries Service has promulgated regulations specifying that feeding marine mammals in the wild constitutes harassment. However, there exists a diversity of opinion as to what other types of interactions between humans and marine mammals may also constitute harassment. Of particular concern are programs in which humans enter the water to view, swim with, photograph, and touch wild marine mammals. In the United States, these activities commonly target bottlenose dolphins in Florida and spinner dolphins in Hawaii. In the Florida Panhandle, in-water encounters may be sustained by humans offering food to attract dolphins to a location where interaction can occur. In Hawaii, swimmers attempt to interact with dolphins and may disrupt critical dolphin activities.

Although swimming with wild cetaceans is growing in popularity, the impact of such activities on marine mammals is not well known. This literature review was conducted to determine what is known about the effects of swimming with wild dolphins on the animals’ behavior and well-being and to provide a body of scientific literature to facilitate informed management decisions. To this end, we tried to collect a complete set of current scientific documents that pertain to in-water encounters between humans and wild dolphins or whales. Each document was reviewed from the perspective of the targeted animals’ welfare. We included conference and workshop abstracts, working papers, popular books, magazine and newspaper articles, and information from Internet sites only when we were unable to obtain information from a published, more complete, and/or scientific source.

To assess the scope of swim-with operations on a global scale, we tried to chronicle all such activities. This proved impossible because there is an ever-growing list of newly initiated swim-with operations, and documentation may not exist for many situations. As an example, we recently learned by word of mouth about swim-with activities in Zanzibar and three additional swim-with sites in Australia. We were unable to find literature pertaining to these recently initiated programs; therefore, none is included in this review. With the growing popularity of swimming with wild cetaceans,

there are likely to be many such situations that are not described in the literature (e.g., Nachoum 1999).

The review is organized around the four basic categories of in-water encounters between humans and cetaceans. These involve encounters with:

- (1) dolphins that are typically solitary and seek human company, labeled in this report “lone, sociable”;
- (2) dolphins that are habituated to in-water interactions through food provisioning by humans, labeled “food-provisioned”;
- (3) cetaceans that tolerate or seek human swimmers for sustained interactions on a regular basis (not including food-provisioned or lone, sociable), labeled “habituated”; and
- (4) cetaceans that are not habituated to human swimmers, labeled “not habituated.”

Categories 1-3 involve animals that are habituated to interactions with humans (i.e., identified individual cetaceans that tolerate and/or seek repeated, sustained interactions with humans on a regular basis). The distinction for categories 1-3 is the means by which habituation to humans originated or is maintained. Category 4 includes situations in which cetaceans are presumed to be “unhabituated” because they have encounters with human swimmers that are (a) frequent or regular but the animals exhibit signs of disturbance, (b) infrequent or opportunistic (the animals may or may not show signs of disturbance), or (c) of undocumented frequency or regularity (e.g., because individual cetaceans have not been identified). Because each of the four categories is likely to result in different types of encounters, responses, and impacts, the categories are treated separately in this review.

The literature review consists of an Excel table (Excel 97, Microsoft) that summarizes key points from each reference; an Endnote library (Endnote Version 3.0, Niles Software) that lists each citation (both provided on the enclosed diskette); and this summary report. Each of the 151 references is summarized in the Excel database by entries into subject columns listed in Table 1. References that report on more than one swim-with situation have multiple entries in the Excel table, resulting in nearly 200 entries.

Of the 151 references, 107 are directly related to swimming with wild dolphins or whales. In addition, we included topics that are tangentially relevant, including:

- (5) swimming with captive dolphins, where details of human-dolphin interactions can be viewed continuously and at close range;
- (6) interactions of cetaceans with boats because (a) swim-with activities are often boat-based and it may not be possible to separate responses to swimmers from responses to boats, and (b) boat-based cetacean watching tours typically comprise a substantial proportion of the tourism impact;
- (7) swimming with sharks, which sometimes occurs as a case of mistaken identity;

- (8) swimming with dugongs and manatees; and
- (9) cooperative fisheries where humans and dolphins work together in the water to catch fish, a special case of category (3), “habituated” dolphins.

This is not meant to be an exhaustive review of these additional topics.

The Endnote library contains citations for all references included in the Excel database. Key words for searching the Endnote library include common and scientific names of marine mammals; location names; the dolphin’s given name for lone, sociable dolphins; “swim-with-dolphin”; “swim-with-whale”; “swim-with-sirenian”; “swim-with-shark”; “lone, sociable”; “food provisioning”; “habituated”; “unhabituated”; “commercial tour”; “boat traffic”; “whale watch”; “cooperative fishing”; etc. A list of related sources can be obtained by searching the Endnote library using the key words.

Cetaceans That Are Typically Solitary and Seek Human Company (Lone, Sociable)

Lockyer (1990) provided a comprehensive review of lone, sociable dolphins until 1988 (e.g., original sources include Burgess 1982, Doak 1981, 1988, Dobbs 1981, 1984, Holmes 1987, Lockyer 1978, Lockyer and Morris 1985a, 1985b, 1986, 1987a, 1987b, Munday 1967, Robson 1988, Webb 1978a, 1978b). Recent additions to this list include “Freddy” in England, “Pita” in Belize, “Tiao” and a *Sotalia fluviatilis* calf in Brazil, “JoJo” in Turks and Caicos, “Flipper” in Norway, “Holly” in the Egypt, “Maui” in New Zealand, “Wilma” and “Kuus” in Canada, and a pair of unnamed immature dolphins in the United Kingdom (Bilgre et al. 1999, Bloom 1991, Bloom et al. 1995, Cirilo et al. 1998, Clarke 1999, Constantine 1999a, Doak 1994, Dudzinski et al. 1995, Flanagan 1996, Goffman et al. 1999, Perrine 1990a, 1990b, 1998, Santos 1997, 1998, 1999, St John 1991, van der Toorn et al. 1992, Wood 1999). With the exception of “Sandy,” a *Stenella* sp.; “Wilma” and “Kuus,” two juvenile beluga whales, *Delphinapterus leucas*; and the *S. fluviatilis*, all are bottlenose dolphins, *Tursiops truncatus* or *T. aduncus*.

From the swimmer’s perspective, lone, sociable dolphins provide the greatest degree of contact. “Generally they are well-habituated to humans, so scaring them away is less of a worry than failing to provide adequate entertainment” (Perrine 1998). However, what constitutes “adequate entertainment” for these well-habituated dolphins can be problematic for both the dolphin and human swimmers.

Of the 26 lone, sociable dolphins that are well documented (15 males, 8 females, 3 of unknown sex; Table 2), most were reported to have near-daily interactions with humans and infrequent interactions with conspecifics. Eleven had periods of misdirected sexual behavior towards humans, buoys, and/or vessels; 15 directed aggressive behavior towards humans. Dolphin-to-human aggression sometimes resulted in serious human injury, such as a ruptured spleen, broken ribs, or even death (Perrine 1990a, Santos

1997). Seven lone, sociable dolphins were reported to cause damage to human property, primarily vessels and fishing gear. Aggression, damage to human property, and/or disruption of fishing operations resulted in conflict with local people in several cases.

Doak (1988) noted that “in the history of lone dolphins approaching human settlement, one thing is clear – it is highly dangerous for the dolphin.” Fourteen lone, sociable dolphins received injuries as a result of their habituation to humans and human activity. For example, “Freddy” was frequently entangled in fishing gear and three times had fishing hooks or line embedded in his body. “Nudgy” was speared and hit with oars. “Percy” had a fish hook in his eye. “Donald” and “Horace” received serious wounds from collisions with boats or propellers. “JoJo” was reported to have 37 injuries related to human interaction since 1992, including eight that were life-threatening. The original “Simo” in 109 AD was said to have been killed by local people when his popularity resulted in overcrowding of the town with dolphin tourists. Although this account may be fictional, his fate is not an uncommon one for lone, sociable dolphins. Four of the well-documented lone, sociable dolphins (“Opo,” “Nudgy,” “Dobbie,” and the “Costa Rican”) were known to be killed by humans. Neither of “Holly’s” two calves survived to age seven months (causes of death are unknown). Five other lone, sociable dolphins disappeared under mysterious circumstances (e.g., soon after local people complained about their disruptive behavior). These dolphins are presumed dead at human hands, and others like “JoJo” seemed destined for a fatal accident related to their habituation to humans.

In recent years, management actions appear to have improved the chances of survival for some of these dolphins. For example, Frohoff (1999) suggested that the success of a management program devised to “mitigate inappropriate human behavior” towards “Wilma” and “Kuus” was evident in the “relative absence of injuries incurred [by the belugas] from boat propellers during the time in which the programs were implemented.” In addition, “Maui” was reported to substantially reduce the frequency with which she interacted with humans, presumably as a result of New Zealand regulations coupled with voluntary restrictions on interaction with this particular dolphin instituted by local tour operators (Constantine 1999a).

Although the term “sociable” has been used to refer to dolphins that seek human company, the origin of the dolphins’ habituation to humans is not clear. Food provisioning does not appear to be a factor in the habituation of most lone, sociable dolphins. In fact, many are reported to refuse fish handouts from humans. “Donald” accepted fish from people but did not eat them (the sea bottom was said to be littered with dead fish). “Percy” and “Dorad” each caught their own fish, which they offered to humans. “Pita” is an exception; as a juvenile, she became habituated to humans who fed her after a shark injury; as an adult, however, Pita reportedly refused fish handouts (Dudzinski et al. 1995). An orphaned *S. fluviatilis* calf in Brazil also was reported to accept fish from fishermen, which Cirilo et al. (1998) suggested may be a common way that young dolphins learn to seek human company. “Holly” is another lone, sociable

dolphin that accepts fish handouts from humans, but food provisioning was initiated more than two years after her first encounter with humans (Goffman et al. 1999).

In a number of cases, the habituation process appears to have been initiated by a dolphin that displayed an interest in boat traffic. A few lone, sociable dolphins were quick to allow human contact, but for many, habituation to in-water encounters and touching by humans was a gradual process achieved through considerable effort on the part of humans. In several cases, it was noted that a dolphin initially shy of human contact would, after a lengthy habituation period by humans, become bold and initiate frequent sexual and aggressive behavior with humans. For example, Robson “set about establishing a personal relationship [with ‘Horace’]” and enticed the dolphin into shallow water to interact with people, but he later became concerned when the situation with “Horace” and swimmers got out of hand (Dobbs 1981).

Quantitative data that systematically document the behavior and daily life of a lone, sociable dolphin are provided in only one study. Bloom et al. (1995) conducted 24-hr watches of “Freddy” to monitor his activity budget, ranging, foraging, and acoustic behavior as well as his interactions with humans. Interactions with swimmers or boats occurred during approximately 34% of daylight observation periods, and “Freddy” responded positively to 62% of opportunities to interact with humans, sometimes abandoning foraging or rest to do so (Bloom et al. 1995). Aside from this study, there is anecdotal information only about the interactions of lone, sociable dolphins with humans or the effects of in-water encounters on each dolphin’s behavior and overall life. It is likely to be difficult, however, to design a study that would truly assess the impact of human interaction on these dolphins, given the considerable amount of time each dolphin spends with humans on a daily basis.

Cetaceans That Are Habituated to In-Water Encounters with Humans through Food Provisioning

Food provisioning is one method used to facilitate regular interaction with wild animals, including swimming with wild cetaceans. Bryant (1994) provided a comprehensive review, “Report to Congress on Results of Feeding Wild Dolphins: 1989-1994,” that left little doubt as to the detrimental effects of food provisioning on dolphin health and well-being. The present review is not intended as a duplication of that effort; however, we have added several recent references that strengthen the conclusion that uncontrolled food provisioning is harmful to wild cetaceans (Table 3).

We documented seven situations worldwide where food provisioning has facilitated the habituation of dolphins to human interaction including in-water encounters. In Brazil uncontrolled feeding of *S. fluviatilis* occurs at two locations, and people swim with at least one food-provisioned dolphin (Cirilo et al. 1998, Santos 1998, 1999). In the United States, where food provisioning of cetaceans is illegal, uncontrolled

feeding of wild *T. truncatus* still appears to be the primary basis for in-water encounters with dolphins in the Panhandle and Gulf coast regions of Florida (Colbert and Cunningham 1998, Colburn 1999, Flanagan 1996, Ford 1997, Samuels and Bejder 1998, Smith 1997, Spradlin et al. 1998). In Panama City, Florida, for example, many dolphins that interact with swimmers frequently accept fish handouts (Colburn 1999, Ford 1997, Samuels and Bejder 1998).

Food provisioning provides a basis for regular human interaction at four established sites in Australia. Three of these operations are state-licensed, and food provisioning is subjected to strict controls (*Tursiops* sp. at Bunbury, Monkey Mia, Tangalooma). A fourth (*Sousa chinensis* at Tin Can Bay) operates illegally without controls, albeit with the apparent knowledge of local authorities, even though humpback dolphins are a protected species (Corkeron 1998, Garbett and Garbett 1997, Wortel 1999). Uncontrolled in-water interactions between humans and wild food-provisioned dolphins occur in at least three of these sites.

Monkey Mia dolphins in Western Australia are the best documented of the food-provisioned dolphins. These dolphins are residents of a well-studied coastal community. Since the mid-1980s, they have been subjects of long-term behavioral research (e.g., Connor et al. 1992, Connor and Smolker 1985, Mann et al. in press, Mann and Smuts 1999), and they have been closely monitored by the Western Australian Department of Conservation and Land Management (CALM) (e.g., Donaldson 1998, EPA 1989, Trayler and Shepherd 1993, Wilson 1994, 1996). The Monkey Mia experience perhaps best illustrates the dangers of uncontrolled food provisioning for dolphins. Documented impacts (Connor et al. 1992, Connor and Smolker 1985, Edwards 1988, EPA 1989, Gawain 1982, Mann and Barnett 1999, Mann et al. in press, Mann and Smuts 1999, Trayler and Shepherd 1993, Wilson 1994, 1996) include the following:

- “Old Charlie,” the original Monkey Mia dolphin, was reported to have been killed by gunshot;
- seven dolphins disappeared and were believed dead as a result of pollution in the shallow waters where the dolphins waited to be fed;
- tourists have been bitten in the provisioning area;
- a calf was killed by a shark while her mother was in the provisioning area;
- a weaned juvenile became dependent on fish handouts and died;
- when compared with behavior away from the provisioning area, the frequency of maternal behavior was lower and the frequency of intraspecific aggression higher within the provisioning area; and
- provisioned females were found to have significantly lower calf survivorship than wild-feeding females in the same bay.

Although less is known about the Bunbury situation (Orams 1995, Smith 1999, Wilson 1994), risks to provisioned dolphins also are apparent there. After provisioning became a regular occurrence at Bunbury, there was an increased frequency in dolphins

stealing bait from fishing lines, and at least one dolphin was killed by fishermen at the time of this conflict (Wringe 1993a, 1993b).

As Wilson (1994) pointed out, “If the welfare of the dolphins were the sole concern, then provisioning... should cease [but] many human livelihoods now depend upon continuation of the meet-the-dolphin phenomenon.” Thus, at Monkey Mia, a review of the feeding policy led CALM to institute even stricter regulations to preserve the tourist experience while protecting the dolphins (Wilson 1994, 1996). Five years after initiating these regulations, each of the three food-provisioned females at Monkey Mia now has a surviving calf and a surviving juvenile offspring (CALM, unpublished data).

In all cases in which the history of habituation is known, it is the humans who have persisted in establishing food provisioning. Humans have sometimes taken advantage of the friendly overtures of one or more dolphins (e.g., “Old Charlie” in Monkey Mia, Australia [Edwards 1988, Gawain 1982, Lockyer 1990]) or the attraction of dolphins to fisheries bycatch (e.g., in the Florida Panhandle or Tin Can Bay, Australia [Ford 1997, Garbett and Garbett 1997]). In Tangalooma, Australia, considerable effort was put into enticing wild dolphins to come to a resort and to train them to accept regular fish handouts as a tourist attraction (Corkeron 1998, Green and Corkeron 1991, Orams 1994, 1995, Orams et al. 1996). Similarly, in Panama City, Florida, it is said that commercial operators “trained” dolphins to expect fish handouts at certain times of day at a specific location (Ford 1997).

None of the research on food-provisioned dolphins has focused on impacts of in-water encounters with humans. However, given the pervasive effects of food provisioning, it would not be easy to design a study that could partition which impacts are due to food provisioning and which are due to in-water encounters. In a brief study conducted in Panama City, the behavior of dolphins habituated through food provisioning was compared to that of unhabituated dolphins in the same location. Dramatic differences in behavior and ranging patterns were documented: in particular, over a period of several days, one juvenile dolphin was observed to interact with humans including swimmers during 74% of observations, was fed by humans at least once per hour, and had dangerous encounters involving humans or vessels once per 12 min (Samuels and Bejder 1998). Given the prevalence of food provisioning for habituated dolphins in this region (Colburn 1999, Samuels and Bejder 1998), it could not be determined whether these differences are due to food provisioning or to frequent in-water encounters with humans.

Cetaceans That Are Habituated to In-Water Encounters with Humans

We defined “habituated” to refer to groups of cetaceans in which many individuals have sustained interactions with human swimmers on a regular basis without pursuit by humans or the incentive of food provisioning. We documented four situations in which wild dolphins have become habituated to regular in-water encounters with

human swimmers (Table 4). Three involve swimming with bottlenose dolphins (i.e., Rockingham in Western Australia, Florida Keys in the United States, and Bonin, Ogasawara, and Mikura/Miyake Islands in Japan). The fourth case involves Atlantic spotted and bottlenose dolphins at Little Bahama Bank in the Bahamas. The spinner dolphins of Maravilla, Brazil, may be an additional example (Doak 1988), but this could not be confirmed. Dolphins that take part in cooperative fishing efforts with humans also belong in the “habituated” category because fishermen appear to form relationships with individual dolphins, and humans and dolphins work together in the water on a regular basis (e.g., Busnel 1973, Pryor et al. 1990) However, cooperative feeding is not directly relevant to the swim-with-dolphin issue and will not be discussed further in this review.

The origin of habituation to humans in the water was described in three cases. In the Florida Keys, tour operators target specific animals at specific locations for habituation, noting that “it takes some time to gain [the dolphins’] trust” (Henning 1993). In Rockingham, a tour operator reportedly spent more than six months to habituate specific dolphins for swim-with-dolphin tours (Orams 1995, Weir et al. 1996). In the Bahamas, curious dolphins frequented a wreck salvage operation in the 1970s, and subsequent filming of the dolphins led to organized swim-with-dolphin tours (St John 1988). These dolphins also have been subjects of underwater behavioral research since 1985 (Herzing 1991, 1996, 1999, Ransom 1998, Rossbach and Herzing 1997). In this case the dolphins made first contact, but it seems likely that habituation was a gradual process through repeated exposure to divers, researchers, filmmakers, and ecotourists in the water. Herzing (1999) describes “interactive” encounters between dolphins and researchers to promote “rapport and trust,” thereby facilitating close-up, in-water observations. Increasing habituation of these dolphins is suggested by the finding that in-water encounters have increased in duration over a 6-yr period (median encounter length ranged from 7 to 11 min); however, increased experience of the operators cannot be ruled out as an explanation for this finding (Ransom 1998).

For the human swimmer, habituated cetaceans are said to pose “little danger” and to provide an “opportunity for extended spontaneous interaction [and] to observe natural behaviors” (Perrine 1998). For the scientist, habituated cetaceans provide an opportunity to observe behavior closely and to identify individuals from an underwater vantage (Herzing 1991, 1996, 1999, Rossbach and Herzing 1997). Little has been documented about these experiences from the animals’ perspective. Ransom (1998) looked at dolphin responses to tour vessels in the Bahamas, an investigation pertinent to the swim-with-dolphin issue because “almost all swim-with-dolphin tours are conducted from a boat [and] it is almost impossible to isolate the dolphins’ response to swimmers from the confounding effect of vessel presence” (Constantine 1998). Ransom (1998) found that spotted dolphins changed their behavior 68% of the time when a boat approached; they were least likely to respond while socializing, and positive responses predominated (i.e., dolphins often approached the boat). One spotted dolphin calf was reported to have life-threatening wounds, presumably from a boat propeller (Ransom 1998). In the same study, bottlenose dolphins changed their behavior during 59% of approaches with negative responses predominating (i.e., dolphins typically avoided the boat).

Information about responses of habituated cetaceans to swimmers is anecdotal. Ransom (1998) reported an instance of intraspecific aggression among spotted dolphins when an assertive swimmer came between a presumed mother and calf. That spotted dolphins in the Bahamas “come to the humans, and can leave at any time they wish” (Würsig 1996) is presumed to indicate a degree of attraction to humans for the animals. However, the animals’ ability to choose to interact or not may be in part an artifact of the remote location where the number of tour vessels is not yet so great that operators compete for access to the animals (Herzing 1999). As Würsig (1996) noted: “This situation [in the Bahamas] would need stricter regulation only when the number of vessels and attendant underwater activity and noise increased, no longer allowing the animals to easily and comfortably 'escape.’”

There is little information about swim-with programs in Japan. Some dolphins there are likened to habituated dolphins in the Bahamas, in that they reportedly approach humans for sustained interactions on a regular basis (Dudzinski 1998). The literature for this region focuses on descriptions of the voluntary codes of conduct developed by local tour operators, researchers, and other involved parties (Barbosa 1999, Dudzinski 1998, 1999, Mori 1999, Shimomaki et al. 1999). How effective these codes are in safeguarding the dolphins is not yet demonstrated: “The rule is almost effective.... The problems are some of [whale-] watching participants [don't come to] the meeting and ignore the agreement” (Mori 1999).

There is very little information about swimming with wild dolphins in the Florida Keys (Frohoff and Packard 1995, Henning 1993). It is not possible to evaluate from the available literature the number of affected animals or whether all dolphins targeted by tour operators are habituated.

There is no published research that specifically addresses the impacts of regular, sustained in-water interactions with humans on habituated cetaceans. The habituation and accessibility of these animals to human observers makes them appropriate subjects for long-term study of the behavior of individual dolphins in the presence and absence of human swimmers. In addition, studies of the local communities to which habituated dolphins belong would provide information about what proportion of a given community is habituated, and whether there are certain individuals or age/sex classes that are more likely to seek, be affected by, or avoid human interaction.

Cetaceans That Are Not Habituated to In-Water Encounters with Humans

We defined “not habituated” to refer to cetaceans that have infrequent contact with humans and/or show disturbance reactions to the presence of vessels or swimmers. It was not always easy to make this distinction from the available literature. Animals are sometimes labeled as “habituated” because tour vessels have been in operation for many years, but research findings suggest that duration of exposure may not be the defining

feature. For example, research on dusky dolphins in Kaikoura, New Zealand, shows that “dolphin groups often react to vessels and do not appear to have greatly habituated despite nine years of tourism” (Würsig et al. 1997). Lack of habituation persists despite the fact that “humans are with the dolphin group during about 70% of daylight hours” (Würsig 1996). We considered the dwarf minke whales of the Great Barrier Reef to be “unhabituated” even though they initiate approaches to boats and swimmers (Arnold and Birtles 1998, 1999), because repeated encounters with the same individual whales may be rare (F. O’Neill, personal communication). In other cases, we classified animals as “unhabituated” because there was insufficient information to determine whether individual animals have repeated, sustained interactions with humans. With respect to the spinner dolphins of Kealakekua Bay, Hawaii, there are anecdotal reports that certain humans have formed long-term relationships with individual dolphins (McNarie 1999), but preliminary results of studies there suggest that resting dolphins are disturbed by human activity including tour boats, kayakers, and swimmers (Forest 1999, Green and Calvez 1999, Würsig 1996).

Unhabituated cetaceans that are the focus of swim-with activities are listed in Table 5. The list includes familiar swim-with situations and species (e.g., spinner dolphins in Hawaii [Barber et al. 1995, Forest 1999, Green and Calvez 1999, McNarie 1999, Psarakos and Marten 1999, Simonds 1991, Würsig 1996] and dusky, bottlenose, and common dolphins in New Zealand [Amante-Helweg 1996, Barr 1997, Barr and Slooten 1998, Constantine 1998, 1999a, 1999b, Constantine and Baker 1996, Doak 1994, Findlay 1997, Suisted 1999, Würsig 1996, Würsig et al. 1997, Yin 1999, Yin and Würsig 1999]). The list of unhabituated cetaceans also includes a number of less well-known sites and/or exotic species (e.g., Hector’s dolphins in New Zealand [Bejder and Dawson 1998, Bejder et al. 1999, Constantine 1998, 1999a], dense beaked whales near the Canary Islands [Ritter 1996, Ritter and Brederlau 1999], dwarf minke whales in the Great Barrier Reef [Aitken 1999, Arnold and Birtles 1998, 1999, Corkeron 1998, Nachoum 1999, Pirzl 1998], and sperm whales near the Azores and Canary Islands, and in the Caribbean and Mediterranean Seas [Constantine 1998, 1999a, IFAW 1997, Nachoum 1999, Ritter 1996]). There is insufficient information to determine if gray whales in Baja California, Mexico, belong in this category (Snyderman 1988), but gray whales elsewhere appear to be unhabituated to vessels (Duffus 1996, Obee 1998).

The “Diver’s Guide” advertises that swimming with unhabituated cetaceans incurs a “low risk of aggression” (Perrine 1998). However, a woman’s “near-death experience” with an unhabituated pilot whale suggests that swimming with any wild cetacean can be dangerous (Shane 1995, Shane et al. 1993).

The New Zealand swim-with-dolphin operations have received considerable scientific scrutiny, primarily evaluating responses of dolphin groups to vessel approaches. Research includes shore-based studies of dusky dolphins in Kaikoura and Hector’s dolphins in Porpoise Bay, and tour boat-based studies of bottlenose and common dolphins in the Bay of Islands. In Bay of Islands, 32% of vessel approaches to bottlenose dolphins resulted in a change in group activity with feeding being the activity

least likely to be disrupted and socializing most likely; 52% of approaches to common dolphins resulted in behavioral change with resting least likely and socializing most likely to change (Constantine and Baker 1996). In Kaikoura, 83% of approaches to dusky dolphins resulted in behavioral change, with interruptions to feeding and resting behavior (Würsig et al. 1997). Disrupted resting and feeding behavior did not resume after the boats departed (Barr 1997, Barr and Slooten 1998). In the presence of boats, dusky and Hector's dolphins formed more compact groups, and dusky dolphins frequently changed direction of travel or became active during their normally quiescent afternoon period (Barr 1997, Barr and Slooten 1998, Bejder and Dawson 1998, Bejder et al. 1999, Yin and Würsig 1999). Hector's dolphins appeared to be attracted to boats during the early part of an encounter, but tended to orient away from the vessel if the encounter lasted more than 70 min (Bejder and Dawson 1998, Bejder et al. 1999). Yin (1999) and others noted that dolphins interacting with swimmers or boats appeared to be a small subset of the group. Although Yin (1999) did not find a significant effect of boat presence on speed of group travel by dusky dolphins, she cautioned that "observable trends were evident that are potentially important enough that a conservative approach is recommended."

The New Zealand studies provide some information about responses of dolphin groups to swimmers in the water. Barr (1997) described a technique used in swim attempts with dusky dolphins to minimize the impact on the group: "When several dolphins stayed to interact with the swimmers... the boat's engine was turned off. In this way, the main pod of dolphins would continue swimming, leaving the boat & swimmers behind." For Hector's dolphins, 57% of in-water encounters were sustained (≥ 5 min) and classified as "non-disturbing"; 42% were classified as at least "potentially disturbing" (Bejder and Dawson 1998, Bejder et al. 1999). In addition, Constantine and Baker (1996) documented for bottlenose and common dolphins, respectively, that 60% and 31% of swim attempts were successful (i.e., at least 1 dolphin was within 5m of a swimmer), and 48% and 24% of swims resulted in sustained interactions (mean = 4.2 and 5.3 min). Sustained interactions are typically interpreted as evidence of attraction to humans. Bottlenose and common dolphins avoided 22% and 38% of swim attempts, with the operator's technique of approach to the dolphins having a significant effect on the group's response (Constantine and Baker 1996). Approach techniques that resulted in a high rate of sustained interaction were the same techniques that resulted in a high rate of avoidance, which led Constantine and Baker (1996) to recommend that minimizing disturbance to the dolphins be considered a higher priority in regulatory decisions than maximizing swim success. A follow-up study by Constantine (1999b) showed increased avoidance of swimmers by bottlenose dolphins between 1994-95 and 1997-98, which she attributed to the possibility that "individuals in the population becoming sensitised to swim attempts."

Research conducted in Port Phillip Bay, Victoria, Australia, was modeled on the Constantine and Baker (1996) study. Weir et al. (1996) found that 60% of swim attempts were successful (dolphins were nearby), but in only 17% of swims did dolphins interact with swimmers, whereas in 33% and 50% of swims, dolphins responded to swimmers by

avoidance or no change in behavior, respectively. As in New Zealand, Weir et al. (1996) found that the most disruptive operator techniques yielded the highest percentage of successful swims and the highest rate of avoidance. They noted that “extended observations [by sequential boats] see pods being disturbed for hours at a time without respite,” and reported situations with the dolphins being “hemmed in” by more than 20 boats (Weir et al. 1996). High rates of avoidance by Port Phillip Bay dolphins were observed in situations that are prohibited in New Zealand, which was suggested as evidence that New Zealand regulations are effective in minimizing disturbance to dolphins (Weir et al. 1996).

Dwarf minke whales in waters near Great Barrier Reef, Australia, are reported to initiate encounters with boats and swimmers, and even “slowed down...and maintained a position near swimmers” (Arnold and Birtles 1998, 1999). Encounters often last an hour, with one encounter with eight whales lasting over 11 hrs (Aitken 1999). Dwarf minke whales reportedly displayed no aggression towards humans during more than 30 monitored encounters, but did exhibit “disturbance” behaviors when swimmers tried to touch them (Arnold and Birtles 1998, 1999). Researchers have identified behaviors indicative of boat disturbance, including “veer away” and “speed up”(Arnold and Birtles 1998, 1999).

Two studies focused on unhabituated cetaceans in waters near the Canary Islands (Heimlich-Boran et al. 1994, Ritter 1996, Ritter and Brederlau 1999). A study of pilot whales in the Canary Islands focused on the behavior of individual animals and their responses to boats (Heimlich-Boran et al. 1994). In the presence of boats, pilot whales delayed rising to the surface and formed more compact groups; however, no information was provided about the increasingly popular “Swim-With-The-Whales” trips (Heimlich-Boran et al. 1994). In another study, Ritter (1996) conducted group-focal observations of in-water interactions between cetaceans and humans, making his observations from tour vessels and from the water: 46 cetacean encounters by commercial tour vessels resulted in 20% avoidance and 38% “intense” in-water encounters (i.e., cetaceans interacted with swimmers) with pilot whales or rough-toothed, spotted, or bottlenose dolphins. Ritter (1996) provided anecdotal information about swimming with such uncommon species as dense beaked whales, which “repeatedly made the impression of curious animals which do not generally avoid the presence of man,” and sei whales, which “seemed to tolerate the boat and were partially curious.” In a later report, Ritter and Brederlau (1999) described variable responses of beaked whales to boats and swimmers (e.g., in seven sightings, dense beaked whales remained distant or were curious and approached; groups were compact; whales oriented towards the boat or changed swim speed or direction to accommodate boat movements; whales breached, tail-slapped, spy-hopped, or frequently changed direction of travel; and in one instance, a group “sprinted several hundred meters with the animals repeatedly porpoising at high speed”). Ritter and Brederlau (1999) implied that swim-with activities may have been prohibited in the Canaries as of 1996.

Several researchers focused on responses of spinner dolphin groups to human activity in Kealakekua Bay and elsewhere in Hawaii, but results are preliminary (Barber et al. 1995, Forest 1999, Green and Calvez 1999, Psarakos and Marten 1999). Spinner dolphins enter protected bays in daytime to rest and socialize, critical activities that may be disrupted because the dolphins are readily accessible to large numbers of human swimmers and kayakers from shore (Würsig 1996). Forest (1999) compared the number of dolphins entering the bay prior to the onset of tourism in 1979-80 vs. 1993-94, and found that current attendance was 21% lower. This finding may suggest that the bay has become “a less suitable resting area,” but Forest (1999) noted that other explanations are possible. Forest (1999) also documented an increase in aerial activities when associated boats, kayakers, or swimmers are present, suggesting a potential disruption of resting behavior, and she found an overall decrease in aerial activities compared with 1979-80. The latter finding suggested that dolphins now have “reduced energy levels,” presumably due to increased tourist activity, but other interpretations are also possible (Forest 1999). Green and Calvez (1999) described corresponding diurnal activity patterns for humans and spinner dolphins in the bay: in the early morning, a few local people swim, and dolphins are interactive; at midday, there are many tourists and boats, and dolphins appear to avoid them; in the afternoon, there is decreased human activity, and the dolphins rest.

The available research on swimming with unhabituated cetaceans provides a first step in understanding the short-term impacts of swim-with-dolphin operations on these animals. These studies provided valuable information for making management decisions in New Zealand. For example, based on researchers’ concerns, guidelines were recently instituted to safeguard the midday rest periods of dusky dolphins (Yin 1999). However, recent findings from one of the few longitudinal studies, showing an increase in rates of avoidance over a several-year period, indicate that a long-term perspective is essential (Constantine 1999a, 1999b). Authors themselves have pointed out limitations in interpreting their research findings. Barr and Slooten (1998) noted for dusky dolphins: “It is very difficult to determine whether boats and swimmers affect dolphin behaviour when periods without boats and swimmers are so few and so brief... If dolphins take several hours to return to 'normal' behaviour after a boat visit, then almost all of the observations reported on here represent modified behaviour.” Constantine and Baker (1996) made observations in conditions that permitted data collection only when the research platform (a commercial tour vessel) was within 400m of dolphins; therefore, this study may have included only those dolphins tolerant of boat approaches. Bejder and Dawson (1998) made the general observation that “Despite the obvious need... no New Zealand cetacean population has received detailed study before being targeted by commercial whale or dolphin-watching operations. Hence, ‘before and after’ comparisons are impossible.” Yin’s results may have been biased by her method of selecting focal groups that are small and apart from other dolphin groups (Yin 1999, Yin and Würsig 1999).

In addition, studies of unhabituated cetaceans typically focus on (a) group activity (a necessity in shore-based theodolite studies and studies based from commercial vessels) and (b) responses to tour vessels. These are necessary first steps, but the next steps

include (a) a focus on details of cetacean/human in-water interactions and responses to swimmers, (b) a focus on the behavior of individual animals and identifying which individuals are particularly affected, (c) a long-term perspective to assess impacts of human activities, and (d) baseline “before” data before initiation of new programs.

Assessment of Research Methodologies

Gales (1999) noted that “the management of commercial swim-with-dolphin programs... has proceeded without clear scientific guidance. As is the case with most marine mammal/human interactions, the demand and growth of this industry has significantly outstripped the ability of scientists to develop and implement sufficiently sensitive tools that might provide some sound basis for management decisions.” This observation refers to the situation in Australia, but is valid elsewhere in the world, particularly in the United States. Even in New Zealand where there has been considerable scientific scrutiny to evaluate swim-with-dolphin activities, and wildlife managers have been responsive to scientists’ findings, research that focuses on impacts of these activities is in its infancy.

Most studies of swim-with situations focus on (a) responses of groups of cetaceans, and (b) dolphin responses to vessel approaches. These emphases are in part dictated by methodologies used (distant, shore-based observations; in-water or tour vessel-based observations) and are necessary first steps. But, as noted by several researchers (e.g., Constantine 1999a, Ransom 1998, Samuels and Bejder 1998, Yin 1999), this is only the tip of the iceberg, and more refined, in-depth, and longitudinal investigations are needed. Our lack of knowledge is further compounded by the fact that, for species already heavily impacted by human activity, there are insufficient data on baseline “undisturbed” behavior to be able to assess the impacts of swim-with activities. Also lacking from the literature are “before-and-after” studies that might document impacts of tourism on the animals or details of the habituation process.

The available research sets the stage for understanding effects of swim-with operations on the behavior and well-being of wild cetaceans. However, in addition to shore-based and commercial vessel-based studies of group behavior (e.g., Arnold and Birtles 1998, 1999, Barr 1997, Barr and Slooten 1998, Bejder and Dawson 1998, Bejder et al. 1999, Constantine 1999b, Constantine and Baker 1996, Forest 1999, Green and Calvez 1999, Ransom 1998, Ritter 1996, Ritter and Brederlau 1999, Weir et al. 1996, Würsig et al. 1997, Yin 1999, Yin and Würsig 1999), complementary studies are needed that focus on the behavior of individual animals as members of local communities (e.g., Heimlich-Boran et al. 1994, Samuels and Bejder 1998). Focal-animal follows of individual cetaceans may not be practical in all situations (e.g., groups of 700 dusky dolphins) but are likely to be feasible in many cases of habituated and unhabituated cetaceans. Use of the technique would complement and fill in the gaps in information obtained from existing methodologies. Such research might include (1) details of in-water interactions between dolphins and humans, including types and frequencies of

interactions; (2) comparisons of the behavior of the same individuals in the presence and absence of swimmers, (3) comparisons of the behavior of individuals that do and do not interact with swimmers in the same region or community, and (4) determining which individuals or age/sex classes and what proportion of local communities are more likely to interact with swimmers, be detrimentally affected by swimmers, or avoid swimmers. Conducted over periods of several years, such studies would provide valuable information about short- and long-term impacts of swim-with encounters on the lives of individuals, animals of different age/sex classes, activity states, or reproductive conditions, and cetacean communities.

Conclusions and Recommendations

We reviewed 151 sources that pertain to swimming with wild dolphins and whales including scientific and popular literature on cetaceans, sirenians, and sharks. Commercial tours that advertise swimming with wild cetaceans now occur worldwide including Australia, the Azores, the Bahamas, the Canary Islands, Dominica, Grenada, Japan, New Zealand, and the United States. New operations are initiated on a regular basis. At least 20 cetacean species are targeted in these activities. Dolphin species include Atlantic spotted, bottlenose, common, dusky, Hector's, humpback, Risso's, rough-toothed, spinner, striped, and Tucuxi, and whale species include pilot, false killer, killer, dwarf minke, minke, sei, dense beaked, and sperm.

With respect to swim-with situations in the United States, we have compiled a body of information from which scientists and wildlife managers can determine the scope of swim-with activity on a worldwide basis, and they can assess impacts – potential, probable, and demonstrated – of the various forms of swim-with activity on the welfare of targeted animals. Although what is known about swimming with wild cetaceans is far from a complete picture, we think that the available information is sufficient to make specific recommendations with respect to swim-with situations in the United States. Below we summarize our findings according to the four categories of cetaceans that have in-water encounters with humans: lone, sociable; food-provisioned; habituated; and not habituated.

Category 1: Lone, Sociable

Conclusion: Although lone, sociable dolphins typically make first contact with humans, habituation to humans and in-water encounters is usually a gradual process achieved through considerable effort on the part of humans. Unfortunately for the dolphins, habituation to humans puts the dolphins at risk of injury or death. Strict management programs may reduce this risk.

Recommendation: Lone, sociable dolphins of any species are particularly vulnerable to impacts of human activity, and all interactions with humans should be strictly prohibited and enforced in each situation.

Category 2: Food-Provisioned

Conclusion: Uncontrolled food provisioning is the primary basis for in-water encounters with dolphins at several locations worldwide. Research findings and anecdotal evidence are unequivocal that uncontrolled food provisioning is harmful to wild cetaceans. Whether there are detrimental effects of strictly controlled food provisioning has not yet been determined.

Recommendation: Enforcement of the no-feeding ban is urgently needed for food-provisioned bottlenose dolphins in the Florida Panhandle and Gulf coast areas.

Category 3: Habituated

Conclusion: There are a few locations where swim-with operations regularly interact with habituated dolphins. In some cases, the dolphins' "freedom of choice" to interact or not with humans is achieved through considerable effort on the part of humans to habituate the animals. There is virtually no research that specifically addresses short- or long-term impacts of regular swim-with operations on the behavior and well-being of habituated individuals or affected cetacean communities.

Recommendations: For habituated bottlenose dolphins in the Florida Keys, more information is needed to assess the extent of human activities, the number and identity of affected animals, the proportion of targeted animals that are habituated, the methods used for habituation, etc.

In the absence of the above information, and given the accessibility of these dolphins to large numbers of tourists, a precautionary approach is appropriate. The National Watchable Wildlife Program provides a set of explicit recommendations designed to minimize disruption to wildlife. These include viewing wild animals from a distance using binoculars, not attempting to interact with wild animals, avoiding areas critical for foraging, resting, parental care, etc. (Duda 1995).

Category 4: Unhabituated

Conclusion: There are several locations worldwide where tour operators provide opportunities for swimmers to interact with unhabituated dolphins and whales. In some cases, lack of habituation is likely to be related to the infrequency of encounters. In other cases, cetaceans remain unhabituated despite regular and long-term exposure to human activity. Several recent studies focus on responses of unhabituated cetacean groups to vessel approaches and swimmers. These studies provide a first step in assessing the impacts of this type of activity on the animals. Reports from Hawaii and overseas provide quantitative data and anecdotal information to indicate that swim-with operations are associated with

disruption to the behavioral patterns of targeted cetaceans, at least for some approaches and for some subset of approached animals. Results of longitudinal studies are only starting to emerge, but available findings point towards detrimental effects of tourist activity on targeted dolphins (Constantine 1999b, Forest 1999). For unhabituated cetaceans, studies have yet to be conducted that document details of human/cetacean in-water interactions or the short- and long-term impacts of swim-with activities on individual animals and affected cetacean communities. However, even in the absence of more specific information, a conservative interpretation of available data indicates that swim-with activities clearly constitute “harassment” as defined in the U.S. Marine Mammal Protection Act. Recent data show that even strict sets of regulations as in New Zealand may not be sufficient to safeguard the animals.

Recommendations: For unhabituated spinner dolphins in Hawaii, research results are preliminary but sufficient to indicate that these animals are disturbed by tourist activity in areas that are critical for their well-being. This clearly constitutes “harassment” as defined in the Marine Mammal Protection Act. Ideally, more research would be useful to determine what proportion and which individuals or age/sex classes are or are not affected by human activity. However, preliminary findings of detrimental effects, and the ready accessibility of these animals to human incursion, dictate a precautionary approach, even without further research. Watchable Wildlife guidelines would recommend that these animals not be approached at all in protected bays that are critical for rest.

Acknowledgments

We thank D. Charles, R. Constantine, E. Crowley, C. Flaherty, C. Hurter, C. McGarrity, M. Rabb, C. Recchia, H. Smith, T. Spradlin, and S. Yin for their help in finding sources for this literature review. We especially thank R. Mattlin and T. Spradlin for moral support throughout the lengthy process of compiling this report. AS is grateful to the Monkey Mia Resort, Monkey Mia Dolphin Information Centre, and Monkey Mia Wildlife Sailing, and LB and SH are grateful to the Woods Hole Oceanographic Institution for facilities and supplies used in the preparation of this report. This project was funded by Marine Mammal Commission contract T74463123 to AS at the Brookfield Zoo.

Swim-with-Dolphin Bibliography

- Acevedo, A. 1991. Interactions between boats and bottlenose dolphins, *Tursiops truncatus*, in the entrance to Ensenada De La Paz, Mexico. *Aquatic Mammals* 17: 120-124.
- Aitken, K. 1999. Whales and dolphins: Unforgettable and accessible. *Sport Diving* 74: 1-15.
- Amante-Helweg, V. 1996. Ecotourists' beliefs and knowledge about dolphins and the development of cetacean ecotourism. *Aquatic Mammals* 22: 131-140.
- Anderson, P. K. 1998. Commercial dugong tourism at Shark Bay. Pages 31. Department of Conservation and Land Management, Western Australia.
- Anon. 1998. The flip side of dolphins. Pages 10-12. *Geo*.
- Arnold, P. W., and R. A. Birtles. 1998. Towards sustainable management of the developing dwarf minke whale tourism in northern Queensland. Pages 21. International Whaling Commission Scientific Committee, SC/50/WW1.
- Arnold, P. W., and R. A. Birtles. 1999. Towards sustainable management of the developing dwarf minke whale tourism industry in northern Queensland. Pages 30. CRC Reef Research Centre, Great Barrier Reef Marine Park, 27.
- Barber, A., R. Barber, and M. Jackson. 1995. The presence of spinner dolphins (*Stenella longirostris*) affects human use and sex ratios of swimmers in Kealakekua Bay, Hawaii. *11th Biennial Conference on the Biology of Marine Mammals*. Society for Marine Mammalogy, Orlando, Florida.
- Barbosa, C. 1999. An example approach to the dolphin swimming/watching programs around Mikura Island, Japan. In K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Barr, K. 1997. The impacts of marine tourism on the behaviour and movement patterns of dusky dolphins (*Lagenorhynchus obscurus*) at Kaikoura, New Zealand. Pages 87. *MSc thesis*. University of Otago, Dunedin, New Zealand.
- Barr, K., and E. Slooten. 1998. Effects of tourism on dusky dolphins at Kaikoura. Pages 30. International Whaling Commission Scientific Committee, SC/50/WW10.
- Bejder, L., and S. M. Dawson. 1998. Responses by Hector's dolphins to boats and swimmers in Porpoise Bay, New Zealand. Pages 13. International Whaling Commission Scientific Committee, SC/50/WW11.
- Bejder, L., S. M. Dawson, and J. A. Harraway. 1999. Responses by Hector's dolphins to boats and swimmers in Porpoise Bay, New Zealand. *Marine Mammal Science* 15: 738-750.
- Bilgre, B. 1999. Underwater research of dolphins in Belize in K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Bilgre, B., T. Frohoff, A. Sanders, and K. Dudzinski. 1999. Observations of a lone sociable dolphin in Belize. In K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Blane, J. M., and R. Jaakson. 1994. The impact of ecotourism boats on the St Lawrence beluga whales. *Environmental Conservation* 21: 267-269.

- Bloom, P. 1991. The diary of a wild, solitary, bottlenose dolphin (*Tursiops truncatus*), resident off Amble on the north Northumberland coast of England, from April 1987 to January 1991. *Aquatic Mammals* 17: 103-119.
- Bloom, P. R. S., A. D. Goodson, M. Klinowska, and C. R. Sturtivant. 1995. The activities of a wild, solitary bottlenose dolphin (*Tursiops truncatus*). *Aquatic Mammals* 21: 19-42.
- Briggs, D. 1991. Impact on killer whales. Impact of human activities on killer whales at the rubbing beaches in the Robson Bight Ecological Reserve and adjacent waters during the summers of 1987 and 1989. Pages 37. Ministry of Parks, British Columbia.
- Bryant, L. 1994. Report to Congress on Results of Feeding Wild Dolphins: 1989-1994. Pages 23. National Marine Fisheries Service, Office of Protected Resources, Silver Spring, Maryland.
- Burgess, G. H. 1998. Diving with elasmobranchs: A call for restraint. *Shark News - Newsletter of the IUCN (International Union for the Conservation of Nature) Shark Specialist Group* 11: 1-4.
- Burgess, R. F. 1982. The dolphin that came in from the cold. Flippers in Philip's Inlet. *Oceans* 15: 13-15.
- Busnel, R. G. 1973. Symbiotic relationship between man and dolphins. *Transactions of the New York Academy of Sciences* 35: 112-131.
- Butler, S. 1992. Swimming with the manatees. Pages E3-4. *The Washington Post*, Washington, D. C.
- Cirilo, P. C. P., M. C. d. O. Santos, E. Zampirolli, A. F. C. Vicente, F. S. Alvarenga, and T. M. A. Pereira. 1998. Report on a lone sociable marine tucuxi dolphin, *Sotalia fluviatilis*, at Sao Vicente, southeastern Brazil. *Conference abstract, 8° Reuniao de trabalho de especialistas em mamíferos aquáticos da América do Sul, Brazil*, Recife, Brazil.
- Clarke, A. P. 1999. Club Med jeopardizing Turks and Caicos national treasure: JoJo. *Southeast Media Affiliates, Inc.*, 2 January 1999.
- Colbert, D. E., and P. A. Cunningham. 1998. Incidents of recorded bites by a wild bottlenose dolphin, *Tursiops truncatus*, known as "Beggar". Mote Marine Laboratory personal communication, 28 October 1998.
- Colburn, K. 1999. Interactions between humans and bottlenose dolphins, *Tursiops truncatus*, near Panama City, Florida. Pages 45. *Masters thesis*. Duke University, Durham, North Carolina.
- Connor, R. C., R. A. Smolker, and A. F. Richards. 1992. Dolphin alliances and coalitions. Pages 415-443 in A. H. Harcourt and F. B. M. de Waal, eds. *Coalition and alliances in humans and other animals*. Oxford University Press, Oxford.
- Connor, R. C., and R. S. Smolker. 1985. Habituated dolphins (*Tursiops* sp.) in Western Australia. *Journal of Mammalogy* 66: 398-400.
- Constantine, R. 1998. The whale and dolphin tourism industry in New Zealand: A review of management and research. Pages 13. International Whaling Commission Scientific Committee, SC/50/WW6.
- Constantine, R. 1999a. Effects of tourism on marine mammals in New Zealand. Pages 60. Department of Conservation, Science for Conservation.

- Constantine, R. 1999b. Increased avoidance of swimmers by bottlenose dolphins in the Bay of Islands, New Zealand. *Abstracts of the 13th Biennial Conference on the Biology of Marine Mammals*, Maui, Hawaii.
- Constantine, R., and C. S. Baker. 1996. Monitoring the commercial swim-with-dolphin operations in the Bay of Islands, New Zealand. Pages 54. Department of Conservation, Auckland, New Zealand.
- Corkeron, P. 1998. Whalewatching - Management and research in Australia. Pages 8. International Whaling Commission Scientific Committee, SC/50/WW5.
- Corkeron, P. J. 1995. Humpback whales (*Megaptera novaeangliae*) in Hervey Bay, Queensland: Behaviour and responses to whale-watching vessels. *Canadian Journal of Zoology* 73: 1290-1299.
- Davis, D., S. Banks, A. Birtles, P. Valentine, and M. Cuthill. 1997. Whale sharks in Ningaloo Marine Park: Managing tourism in an Australian marine protected area. *Tourism Management* 18: 259-271.
- Doak, W. 1981. *Dolphin dolphin*. Hodder and Stoughton, Auckland, New Zealand.
- Doak, W. 1988. *Encounters with whales and dolphins*. Hodder and Stoughton, Auckland, New Zealand.
- Doak, W. 1994. *Swimming with dolphins in New Zealand*. Hodder & Stoughton.
- Dobbs, H. 1981. *Save the dolphins*. Souvenir Press, London.
- Dobbs, H. 1984. *The magic of dolphins*. Lutterworth Press, Guildford, Surrey.
- Donaldson, B. 1998. Commercial dolphin tours in Red Cliff Bay, Monkey Mia: A pilot study. Pages 30. Department of Conservation and Land Management, Western Australia.
- Duda, M. D. 1995. *Watching Wildlife*. Falcon Press, Helena, Montana.
- Dudzinski, K. M. 1998. The best kept secret in dolphin swim programs is in Japan. *Whalewatcher* 31: 14-17.
- Dudzinski, K. M. 1999. Learning dolphin "etiquette" by understanding their rules of behavior and interaction. In K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Dudzinski, K. M., T. G. Frohoff, and N. L. Crane. 1995. Behavior of a lone female bottlenose dolphin (*Tursiops truncatus*) with humans off the coast of Belize. *Aquatic Mammals* 21: 149-153.
- Duffus, D. A. 1996. The recreational use of grey whales in southern Clayoquot Sound, Canada. *Applied Geography* 16: 179-190.
- Duffus, D. A., and P. Dearden. 1990. Non-consumptive wildlife-oriented recreation: A conceptual framework. *Biological Conservation* 53: 213-231.
- Duffus, D. A., and P. Dearden. 1993. Recreational use, valuation, and management, of killer whales (*Orcinus orca*) on Canada's Pacific coast. *Environmental Conservation* 20: 149-156.
- Edwards, H. 1988. The Monkey Mia dolphins. Pages 209-213 in R. Harrison and M. M. Bryden, eds. *Whales, Dolphins and Porpoises*. Facts on File Publications, New York.
- EPA. 1989. Disappearance of dolphins at Monkey Mia. Pages 16. Environmental Protection Authority, Bulletin No. 381, Western Australia.

- Findlay, K. 1997. A review of the effects of tourism activities on cetaceans. Pages 24. International Whaling Commission Scientific Committee, SC/49/029.
- Flanagan, P. 1996. Wild and dangerous: Why interacting with marine mammals in the wild can be harmful. *Soundings, Magazine of the International Marine Animal Trainers Association* 21: 26-32.
- Ford, B. K. 1997. An evaluation of uncontrolled public-dolphin interaction. *Soundings, Magazine of the International Marine Animal Trainers Association* 22: 10-11, 34.
- Forest, A. M. 1999. The Hawaiian spinner dolphin, *Stenella longirostris*: Effects of tourism in K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Frehsee, R. 1994. The flying dolphins of Roatan. *Skin Diver, January* : 120-22, 134-36.
- Frohoff, T. G. 1999. Conducting research on human-dolphin interactions: Captive dolphins, free-ranging dolphins, solitary dolphins, and dolphin groups in K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Frohoff, T. G., and J. M. Packard. 1995. Human interactions with free-ranging and captive bottlenose dolphins. *Anthrozoos* 8: 44-53.
- Gales, N. 1999. An overview of the management of commercial swim-with-dolphin programs in Australia. In K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Garbett, P., and D. Garbett. 1997. Some aspects of interaction between Indo-Pacific humpback dolphins (*Sousa chinensis*) and humans at Tin Can Bay, Queensland, Australia. Whales in Danger: Whales on the Net, Australian Whale Conservation Society, 17 February 1997.
- Gawain, E. 1982. More than half way. *Oceans* 15: 10-12.
- Gilchrist, I. G. 1967. Dolphin days. *Animals* 10: 104-107.
- Goffman, O., K. Lavalli, D. Kerem, and E. Spanier. 1999. Consequences of swimming with a lone female bottlenose dolphin (*T. aduncus*) in the Gulf of Eilat/Aqaba, Red Sea. In K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Green, A., and P. J. Corkeron. 1991. An attempt to establish a feeding station for bottlenose dolphins (*Tursiops truncatus*) on Moreton Island, Queensland, Australia. *Aquatic Mammals* 17: 125-129.
- Green, M., and L. Calvez. 1999. Research on Hawaiian spinner dolphins in Kealakekua Bay, Hawaii. In K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Heimlich-Boran, J. R., S. L. Heimlich-Boran, R. Montero, and V. Martin. 1994. An overview of whale-watching in the Canary Islands. *European Research on Cetaceans* 8: 37-39.
- Henning, C. 1993. Keys trip offers a chance to swim with wild dolphins. Pages 4F. *The Miami Herald*, Miami, Florida, 7 November 1993.
- Henningsen, T., and B. Würsig. 1992. Interactions between humans and dolphins in Galveston Bay, Texas. Pages 135-140 in J. J. Symoens, ed. *Whales: biology - threats - conservation*. Royal Academy of Overseas Sciences, Brussels, Belgium.

- Herzing, D. 1991. Who's watching who? *Sonar, Magazine of the Whale and Dolphin Conservation Society* 6: 8-10.
- Herzing, D., T. Frohoff, and M. Cesar. 1995. Summary of Workshop on Small Cetacean/Human Interactions: Research and Management. *11th Biennial Conference on the Biology of Marine Mammals*, Orlando, Florida, unpublished report.
- Herzing, D. L. 1996. Vocalizations and associated underwater behavior of free-ranging Atlantic spotted dolphins, *Stenella frontalis* and bottlenose dolphins, *Tursiops truncatus*. *Aquatic Mammals* 22: 61-79.
- Herzing, D. L. 1999. Minimizing impact and maximizing research during human/dolphin interactions in the Bahamas. In K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Holmes, B. 1987. A diary of my delightful dives with Dorad. *Diver* 32: 30-31.
- IFAW. 1997. Report of the workshop on the special aspects of watching sperm whales. Pages 36, Roseau, Dominica.
- Janik, V. M., and P. M. Thompson. 1996. Changes in surfacing patterns of bottlenose dolphins in response to boat traffic. *Marine Mammal Science* 12: 597-602.
- Kruse, S. 1991. The interactions between killer whales and boats in Johnstone Strait, B.C. Pages 149-159 in K. Pryor and K. S. Norris, eds. *Dolphin societies: Discoveries and puzzles*. University of California Press, Berkeley, California.
- Lockyer, C. 1978. The history and behaviour of a solitary wild, but sociable, bottlenose dolphin (*Tursiops truncatus*) on the west coast of England and Wales. *Journal of Natural History* 12: 513-528.
- Lockyer, C. 1990. Review of incidents involving wild, sociable dolphins, worldwide. Pages 337-353 in S. Leatherwood and R. R. Reeves, eds. *The Bottlenose Dolphin*. Academic Press, San Diego, California.
- Lockyer, C., and R. Morris. 1987a. Observations on diving behaviour and swimming speeds in a wild juvenile *Tursiops truncatus*. *Aquatic Mammals* 13: 31-35.
- Lockyer, C., and R. Morris. 1987b. Observed growth rate in a wild juvenile *Tursiops truncatus*. *Aquatic Mammals* 13: 27-30.
- Lockyer, C., and R. J. Morris. 1985a. Body scars of a resident, wild bottlenosed dolphin (*Tursiops truncatus*): Information on certain aspects of his behaviour. *Aquatic Mammals* 11: 42-45.
- Lockyer, C., and R. J. Morris. 1985b. A wild but sociable dolphin off Portreath, north Cornwall. *Journal of Zoology (London)* 207: 605-607.
- Lockyer, C., and R. J. Morris. 1986. The history and behaviour of a wild, sociable bottlenose dolphin (*Tursiops truncatus*) off the north coast of Cornwall. *Aquatic Mammals* 12: 3-16.
- Lynch, M. 1999. Shark attacks, wounds swimmer who joined dolphin pod. *The Miami Herald*, Miami, Florida, 28 July 1999.
- Mann, J., and H. Barnett. 1999. Lethal tiger shark (*Galeocerdo cuvier*) attack on bottlenose dolphin (*Tursiops* sp.) calf: Defense and reactions by the mother. *Marine Mammal Science* 15: 296-303.

- Mann, J., R. C. Connor, L. M. Barre, and M. R. Heithaus. in press. Female reproductive success in bottlenose dolphins (*Tursiops* sp.): Life history, habitat, provisioning, and group size effects. *Behavioral Ecology* .
- Mann, J., and B. Smuts. 1999. Behavioral development in wild bottlenose dolphin newborns *Tursiops* sp. *Behaviour* 136: 529-566.
- McNarie, A. D. 1999. A surfeit of love? *Ka'u Landing, A Magazine from the Island of Hawai'i* February: 15-17.
- Mori, K. 1999. Whale and dolphin watching and associated research programs in the Ogasawara Islands, Japan. In K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Morris, R. 1988. Human contact. Pages 204-206 in R. Harrison and M. M. Bryden, eds. *Whales, Dolphins and Porpoises*. Facts on File Publications, New York.
- Munday, G. R. 1967. Charlie revisited. *Animals* 10:354-356.
- Nachoum, A. 1999. Predators, mammals and us. DAP Web Services.
- Nelson, D. R., R. R. Johnson, J. N. McKibben, and G. G. Pittenger. 1986. Agonistic attacks on divers and submersibles by gray reef sharks *Carcharhinus amblyrhynchos*: Antipredatory or competitive. *Bulletin of Marine Science* 38: 68-88.
- NMFS. 1995. Flipper's myth proves harmful. *MMPA Bulletin* 6: 3.
- Nowacek, S. M. 1999. The effects of boat traffic on bottlenose dolphins, *Tursiops truncatus*, in Sarasota Bay. Pages 42. *Masters thesis*. University of California, Santa Cruz, California.
- Obee, B. 1998. Eco-tourism boom - How much can wildlife take? *Beautiful British Columbia* 40: 7-17.
- Orams, M. B. 1994. Tourism and marine wildlife: The wild dolphins of Tangalooma, Australia: A case report. *Anthrozoos* 7: 195-201.
- Orams, M. B. 1995. Development and management of a feeding program for wild bottlenose dolphins at Tangalooma, Australia. *Aquatic Mammals* 21: 137-147.
- Orams, M. B., G. J. E. Hill, and A. J. Bagioni. 1996. "Pushy" behavior in a wild dolphin feeding program at Tangalooma, Australia. *Marine Mammal Science* 12: 107-117.
- Perrine, D. 1990a. Humans with dolphin: Help or harm? *Sea Frontiers* March/April: 39.
- Perrine, D. 1990b. JoJo rogue dolphin? *Sea Frontiers* March/April: 33-41.
- Perrine, D. 1998. Divers and dolphins. *Sport Diver* 6: 41-47.
- Pirzl, R. 1998. Australian management of cetacean observation activities: A Commonwealth perspective. Pages 6. International Whaling Commission Scientific Committee, SC/50/SS2.
- Pryor, K., J. Lindbergh, S. Lindbergh, and R. Milano. 1990. A dolphin-human fishing cooperative in Brazil. *Marine Mammal Science* 6: 77-82.
- Psarakos, S., and K. Marten. 1999. A study of the Hawaiian spinner dolphins around Oahu in K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Ransom, A. B. 1998. Vessel and human impact monitoring of the dolphins of Little Bahama Bank. Pages 108. *Masters thesis*. San Francisco State University, San Francisco, California.

- Rice, N. 1981. Responses to man of free-ranging dusky dolphins (*Lagenorhynchus obscurus*). Pages 12. The Dolphin Action & Protection Group, No. 3, Cape Town, South Africa.
- Riley, D. 1993. Our love of dolphins has turned into a questionable affair. *Smithsonian* January: 58-67.
- Ritter, F. 1996. Abundance, distribution and behaviour of cetaceans off La Gomera (Canary Islands) and their interaction with whale-watching boats and swimmers. Pages 114. *Diploma thesis*. University of Bremen, Bremen, Germany.
- Ritter, F., and B. Brederlau. 1999. Behavioural observations of dense beaked whales (*Mesoplodon densirostris*) off La Gomera, Canary Islands (1995-1997). *Aquatic Mammals* 25: 55-61.
- Robson, F. 1988. *Pictures in the dolphin mind*. Reed Methuen, Birkenhead, Auckland, New Zealand.
- Rosbach, K. A., and D. L. Herzing. 1997. Underwater observations of benthic-feeding bottlenose dolphins (*Tursiops truncatus*) near Grand Bahama Island, Bahamas. *Marine Mammal Science* 13: 498-504.
- Samuels, A., and L. Bejder. 1998. Habitual interaction between humans and wild bottlenose dolphins (*Tursiops truncatus*) near Panama City Beach, Florida. Pages 13. Marine Mammal Commission, Silver Spring, Maryland.
- Samuels, A., and T. R. Spradlin. 1995. Quantitative behavioral study of bottlenose dolphins in swim-with-dolphin programs in the United States. *Marine Mammal Science* 11: 520-544.
- Santos, M. C. d. O. 1997. Lone sociable bottlenose dolphin in Brazil: Human fatality and management. *Marine Mammal Science* 13: 355-346.
- Santos, M. C. d. O. 1998. Hand-feeding wild *Sotalia*: A new matter of concern in Brazil? *Conference abstract, 8º Reuniao de trabalho de especialistas em mamíferos aquáticos da América do Sul, Brazil*, Recife, Brazil.
- Santos, M. C. d. O. 1999. Approaching wild dolphins in Brazil: Potential risks in a near future. In K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Seideman, D. 1997. Swimming with trouble. *Audubon* 99: 76-82.
- Shackley, M. 1992. Manatees and tourism in Southern Florida: Opportunity or threat? *Journal of Environmental Management* 34: 257-265.
- Shane, S. H. 1995. Human-pilot whale encounter: Update. *Marine Mammal Science* 11: 115.
- Shane, S. H., L. Tepley, and L. Costello. 1993. Life-threatening contact between a woman and a pilot whale captured on film. *Marine Mammal Science* 9: 331-336.
- Shimomaki, M., Mikura-Island Bottlenose Dolphin Research Group, and I. C. E. R. C. Japan. 1999. The number of dolphin watching boats limited per day, according to a "treaty" about dolphin watching operations in Mikura-Island waters. In K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Siciliano, S., J. J. Lailson-Brito, and A. d. F. Azevedo. in preparation. Killer whales (*Orcinus orca*) in shallow coastal waters of Rio de Janeiro, Brazil. International Whaling Commission Scientific Committee.

- Simonds, M. A. 1991. Dolphins and ecotourism: Determining Impacts. Pages 662-676 in J. A. Kusler, ed. *1st International Symposium on Ecotourism, 1989, 2nd International Symposium on Ecotourism and Resource Conservation, 1990*. Ecotourism and Resource Conservation, Merida, Mexico and Miami, Florida.
- Smith, C. 1997. Feeding dolphins makes many a moocher. *NOAA Report* October: 3, 6.
- Smith, H. 1999. Dolphin social behaviour in the presence of humans. Pages 14. *Independent study*. Murdoch University, Perth, Western Australia.
- Snyderman, M. 1988. Eyeball to eyeball with a 40 tonne whale. Pages 214-215 in R. Harrison and M. M. Bryden, eds. *Whale, Dolphins and Porpoises*. Facts on File Publications, New York.
- Spradlin, T. R., A. D. Terbush, and W. S. Smullen. 1998. NMFS update on human/dolphin interactions in the wild. *Soundings, Magazine of the International Marine Animal Trainers Association* 23: 25-27.
- St John, P. 1988. An interactive study with wild *Stenella frontalis*. *Aquatic Mammals* 14: 73-75.
- St John, P. 1991. Educating a wild dolphin. *Aquatic Mammals* 17: 5-11.
- Suisted, R. 1999. Management policies in New Zealand regarding wild dolphin swim programs. In K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.
- Sumner, A. 1999. Tourist bit by bull shark. *Key West Citizen*, Key West, Florida, 28 July 1999.
- Trayler, K., and R. Shepherd. 1993. Water quality at Monkey Mia, Shark Bay. *Landnote, Magazine of Conservation & Land Management* January: 1-10.
- van der Toorn, J., J. van der Toorn, and T. Schorpen. 1992. A friendly dolphin in Norway. *Soundings, Magazine of the International Marine Animal Trainers Association* Winter: 28.
- Watkins, W. A. 1986. Whale reactions to human activities in Cape Cod waters. *Marine Mammal Science* 2: 251-262.
- Webb, N. G. 1978a. Boat towing by a bottlenose dolphin. *Carnivore* 1: 122-129.
- Webb, N. G. 1978b. Women and children abducted by a wild but sociable adult male bottlenose dolphin. *Carnivore* 1: 89-94.
- Weir, J., W. Dunn, A. Bell, and B. Chatfield. 1996. An investigation into the impact of "dolphin-swim ecotours" in southern Port Phillip Bay. Pages 31. Dolphin Research Project Inc., Hampton, Victoria, Australia.
- Wells, R. S., and M. D. Scott. 1997. Seasonal incidence of boat strikes on bottlenose dolphins near Sarasota, Florida. *Marine Mammal Science* 13: 475-480.
- Whale-and-Dolphin-Conservation-Society. 1995. Review of swim-with-the-dolphin regulations. *11th Biennial Conference on the Biology of Marine Mammals*, Orlando, Florida, unpublished report.
- Wilson, B. 1994. Review of dolphin management at Monkey Mia. Pages 37. Department of Conservation and Land Management, Perth, Western Australia.
- Wilson, B. 1996. Supplementary review of dolphin management at Monkey Mia. Pages 8. Department of Conservation and Land Management, Perth, Western Australia.
- Wood, C. J. 1999. A period of human contact by two free-ranging bottlenose dolphins (*Tursiops truncatus*). *Marine Mammal Science* 15: 863-871.

- Wortel, K. 1999. Dolphin feeding in Tin Can Bay, Queensland, Australia. personal communication, 4 March 1999.
- Wringe, I. 1993a. Dolphin killed by blow: Vet. Pages 3. *West Australian*, Perth, Western Australia, 13 March 1993.
- Wringe, I. 1993b. Dolphin magic a mystery. Pages 4. *West Australian*, Perth, Western Australia, 20 September 1993.
- Würsig, B. 1996. Swim-with-dolphin activities in nature: Weighing the pros and cons. *Whalewatcher* 30: 11-15.
- Würsig, B., F. Cipriano, E. Slooten, R. Constantine, K. Barr, and S. Yin. 1997. Dusky dolphins (*Lagenorhynchus obscurus*) off New Zealand: Status of present knowledge. *Reports of the International Whaling Commission* 47: 715-722.
- Yin, S. E. 1999. Movement patterns, behaviors, and whistle sounds of dolphin groups off Kaikoura, New Zealand. Pages 77. Master's Thesis. Texas A&M University.
- Yin, S. E., and B. Würsig. 1999. Studying the human/dolphin interactions from cliff-side in Kaikoura, New Zealand. In K. M. Dudzinski, T. G. Frohoff, and T. R. Spradlin, eds. *Wild Dolphin Swim Program Workshop*, Maui, Hawaii.

Table 1. Categories of the Swim-with-Dolphin Database

	Category	Description
1	Habituation to swimmers	Cetaceans: 1 = not habituated, 2 = lone, sociable, 3 = habituated, 4 = food provisioned, 5 = captive, 6 = general, unspecified or whale-watch Other marine animals: 7 = sharks, 8 = Sirenians
2	Reference title	
3	Author	
4	Year	
5	Source	Journal, book title, etc
6	Species	Common & scientific name ¹
7	Location	City, country, etc
8	Human activity	TARGETED: FP = food provisioning, SW = in-water interaction, MA = mediated approach from platform Control: sc = controlled by scientists, uc = uncontrolled, r = controlled by regulations, g = existence of guidelines or voluntary codes of conduct UNTARGETED: HO = human encroachment into animal area, WF = waste feeding, HF = animal interference with human food production
9	Access	e.g., W = in water, B = from boat, L = from land, including standing in shallow water
10	Affected animals	Number of animals, age/sex class and identity
11	Duration	Dates of first & last contact; dates covered in report
12	Distance	Proximity of swimmers to animals, e.g., touch, within touching distance; examples of type of contact
13	Extent of human activity	Number of tour operators; tour schedule & average duration of human-animal encounters, etc
14	Types of impact & details	Details provided, when relevant, for the following categories: 1 = rest, 2 = forage, 3 = ranging & habitat utilization, 4 = migration, 5 = mating behavior, 6 = parental care, 7 = aggression towards conspecifics, 8 = other social behavior with conspecifics, 9 = reproductive success, 10 = health, 11 = human-induced mortality, 12 aggression towards other animal species, 13 = animal aggression towards humans, 14 = damage to human property, 15 = general behavior, other
15	Origin of habituation	IH = intentional by humans; UH = unintentional; NH = not habituated Duration & details of habituation process
16	Synopsis	Brief description of study methods & relevant results
17	Recommendations	Recommendations or action taken
18	Comments	Additional information, opinion, or quotes
19	Source type	Quantitative, descriptive, popular, peer-reviewed, etc

¹ Scientific names are recorded as in the reference unless known to be incorrect. There is confusion in the literature (and in this review) with respect to the correct species names for various forms of *Tursiops* (due to recent reclassification) and for sperm whales (*Aphyseter catodon* and *Aphyseter macrocephalus* are used by different authors to refer to the same species).

Table 2. Lone sociable dolphins that are well documented

All dolphins are Tursiops sp. unless the given name is annotated with an asterisk; other species are listed in "Comments."

	Dolphin	Age	Sexual w/ Humans	Aggression to Humans	Damage to Property	Risk to Dolphin	Dolphin Mortality	Habituation	Comments
Male	Costa Rican	adult?					yes	not provisioned	killed by fisherman after entanglement in net
	Donald (Beaky)	adult	yes	yes	yes	yes		not provisioned	took fish from people but did not eat; received serious injuries from propeller & from being shot
	Dorad (Funghi)	adult		yes				gradual; divers initiated	offered fish to divers
	Freddy	adult	yes	yes	yes	yes		gradual	exposed to sewage; entangled in fishing gear with fishing line imbedded 3 times
	Percy	adult (old?)	yes	yes	yes	yes	?	gradual, not provisioned	exposed to sewage; disappeared soon after conflict with locals
	Tiao	adult		yes			?		killed human swimmer; disappeared; Clarke 1999 suggests dolphin was killed "out of vengeance"
	Nudgy	subadult?		yes	yes	yes	yes	trapped in bay by storm; initial contact w/ dog	speared, hit with oars; conflict with locals resulted in dolphin being penned then died
	Horace	subadult?	yes	yes	yes	yes	?	initiated by humans	injured in ship collision; interacted with divers who set underwater explosions; disappeared soon after explosion
	Sandy*	subadult?	yes	yes		yes		gradual, not provisioned	Stenella sp.
	Dobbie	juvenile?					yes		did not allow touching; killed by rifle
	Indah	juvenile?							did not allow touching
	JoJo	juvenile	yes	yes	yes	yes			conflict with local resort; since 1992, received 37 boat-related injuries (8 life threatening)
	Kuus*	juvenile				yes			Beluga; management plan to minimize risk to dolphin
	Romeo	juvenile	yes	yes				initiated contact with bathers	1st contact with humans occurred after 2 other dolphins (companions?) died (one shot, one ingested plastic bag)
	Simo	juvenile	yes	yes			?		became ill then disappeared

Table 2. Lone sociable dolphins that are well documented

All dolphins are Tursiops sp. unless the given name is annotated with an asterisk; other species are listed in "Comments."

	Dolphin	Age	Sexual w/ Humans	Aggression to Humans	Damage to Property	Risk to Dolphin	Dolphin Mortality	Habituation	Comments
Female	Charlie	adult		no?	yes	yes		gradual, not provisioned	no touching?
	Holly	adult		yes			2 calves died	rapid, initiated by locals; provisioned after 2 yrs	periods of aggression to humans may be correlated with lactation; reason for calf deaths unknown
	Maui	adult?						not provisioned	management plan to minimize contact with humans
	Nina	adult	yes				?	rapid, not provisioned	dolphin found dead; "human agency was suspected"
	Jean-Louis	juvenile	yes			yes		not provisioned; swim- with human-initiated	did not allow touching
	Opo	juvenile		yes		yes	yes	not provisioned	mother believed killed by humans; dolphin found dead on day after Act of Parliament to protect her
	Pita	juvenile	yes	yes		yes		gradual, initially provisioned	left area, presumed with other dolphins
	Wilma*	juvenile				yes			Beluga; exhibited unspecified "risky" behavior with humans; management plan to minimize risk to dolphin
Unknown	Florida	unknown		yes					swimmer incurred ruptured spleen & broken ribs
	#8 & #10	juvenile						rapid	2 juveniles interacted with humans until conspecifics returned from summer migration; one recently weaned?

Table 3: Cetaceans that are habituated to in-water encounters with humans through food provisioning

Species	Location	Human Activity	Access	Duration	Affected Animals	Distance	Extent of Human Activities	Origin of Habituation
Bottlenose dolphin (Tursiops sp.)	Bunbury, Western Australia, Australia	FP-uc (feeding from private boats) & r (fed by staff); "dolphins had also been thrown fish by fishermen & other people for years" (Wringe 1993b); MA, SW, HF	W, B, L (standing in shallows)	feeding since 1960s; tourist center established in 1989; Smith study period: 2 mos in 1998-99	up to 6 dolphins regularly visit interaction area including 35+ yr old female & 3 adult males	Touch: e.g., one dolphin rested rostrum in woman's hand	70,000 tourists visit Bunbury per year; dolphins offered fish on near-daily basis; one dolphin spent 61% of time that she was in designated interaction zone within touching distance of humans	intentional: Evelyn Smith "the Dolphin Lady" threw fish off her jetty in 1960s; dolphins gradually allowed contact
Bottlenose dolphin (Tursiops sp., now Tursiops aduncus)	Monkey Mia, Shark Bay, Western Australia, Australia	previously FP-uc & sc, presently FP-r (state regulations), MA-uc (private boats) & g (local code of conduct for tour boats), SW-uc; HO: previously, pollution of interstitial water	W, B, L (standing in shallows)	daily provisioning began in late 1970s; provisioning regulated in 1986 & stricter controls added in 1994; 1st commercial tour vessel began in 1993; behavioral research since ca. 1985	presently 3 adult females & immature offspring; historically females & offspring of 3 matriline, 3 adult males; ca. 24 total since 1980s	provisioned dolphins allow people to touch; occasional dolphin visitors to beach are not fed & do not allow contact; boat approach to 50m	present: near-daily controlled feeding of 3-4 adult females in designated area, fed no more than 1/3 daily diet, fed in morning only; provisioned dolphins spend ca. 2.25 hrs per day at beach waiting to be fed; 2 commercial dolphin watch tours; average boat interaction time per provisioned dolphin = 60-90 min per day, per frequently-encountered non-provisioned dolphin = 60 min per day; average 25-30 private boats per day; 80,000-114,000 visitors annually during 1987-1994	intentional: fishermen tossed some of their catch to "Old Charlie" in exchange for help to school up fish; a fisherman's wife trained dolphin to be hand fed
now only Bottlenose dolphin (Tursiops truncatus); initially also Humpback dolphin (Sousa chinensis)	Tangalooma, Moreton Island, Queensland, Australia	initially FP-sc; presently FP-r (by hand, in designated area, state-licensed); WF: feeding near shrimp trawlers	W, B, L (waist-deep in shallows)	1st visits to resort in 1980s; several attempts to feed by scientists in 1989; feeding by hand at resort in 1992	9 dolphins are identified, usually 6-8 dolphins come to resort to be fed	Touch: dolphins nudge/push tourists; tourists touch/pat dolphins	feeding wild dolphins is now "a regular nightly occurrence at the resort"	intentional: several methods were tried to teach dolphins to accept fish hand-outs (e.g., fed from trawler, small boat, jetty, by hand)

Table 3: Cetaceans that are habituated to in-water encounters with humans through food provisioning

Location	Impact Details	Research Details
Bunbury, Western Australia, Australia	one provisioned female injured from entanglement in fishing line; following introduction of regular provisioning, there was an increase in frequency of close approaches to boats (begging) & stealing bait from fishing lines; reports of fishermen hitting dolphins with oars to prevent them from taking bait; fishermen threatened to kill dolphins that stole bait; 35+ yr old provisioned female "Saranna" was killed by a "powerful blow from a harpoon-like instrument... It's quite obvious that the dolphin was very close to the person when she was killed and I'd suggest that she was probably being hand-fed" (Wringe 1993a)	Smith (1999) showed that within designated interaction zone (1) potentially aggressive behavior near humans was rare; (2) dolphin avoidance was only infrequently followed by approach by humans; (3) dolphin tolerance of close human proximity was individually specific
Monkey Mia, Shark Bay, Western Australia, Australia	in provisioning area: decreased maternal behavior, increased mother-calf separation & intraspecific aggression; provisioned dolphins can be aggressive to people & bite especially when people tease; before controls instituted: provisioned dolphins fed inappropriate foods, one dolphin had fish hook in mouth, "Old Charlie" reported to have been shot; 7 dolphins disappeared (& presumed dead) after pollution in shallows where they often waited to be fed; one juvenile became dependent on fish hand-outs & died; one calf killed by shark while mother in provisioning area; significantly higher mortality of offspring of provisioned females when compared with wild-feeding females in same bay; presently: 32% of tour boat approaches result in group behavioral change; estimate disruption by boat occurs once per dolphin per day; anecdotal accounts of swimmers pursuing dolphins near provisioning area	Monkey Mia dolphins are best-documented of food-provisioned dolphins; detailed historical records plus numerous recent studies quantify impacts; Connor & Smolker (1985): as with studying chimps in Gombe, "this group of habituated dolphins... provides cetologists with a valuable 'window' through which to view dolphin behavior in a natural setting."; swim-with is opportunistic, no data on swim-with
Tangalooma, Moreton Island, Queensland, Australia	speculation that feeding from trawler didn't work because several male dolphins chased other dolphins away; dolphins were eventually trained to accept hand-feeding at resort; may have initially come to resort to catch fish attracted by jetty lights; also staff offered live fish with broken tails that couldn't escape; dolphins were attracted to an area they hadn't used previously which may have been avoided because of heavy use for water sports; 1st 2 dolphins to accept hand-feeding were lactating females; dolphins could be very "assertive" during feeds (i.e., "pushy", aggressive to humans)	detailed history of attempts to train dolphins to accept fish hand-outs; one study by Orams (1995) used subjective "pushiness" score to investigate factors that affected rate of dolphin-to-human aggression (number of dolphins present, especially males); no data on swim-with but feeding is conducted by people waist-deep in water

Table 3: Cetaceans that are habituated to in-water encounters with humans through food provisioning

Location	Recommendations	Comments	Related Sources
Bunbury, Western Australia, Australia	Smith (1999): in food provisioning, it is important to avoid inadvertent reinforcement of inappropriate behaviors, e.g., aggression to humans	Smith (1999): "it is important that the welfare of the animals and subsequently the human interactors are not jeopardised in order to create the ideal tourist attraction"	Wringe 1993ab; Wilson 1994; Orams 1995; Smith 1999
Monkey Mia, Shark Bay, Western Australia, Australia	Wilson (1994) recommended changes to feeding policy to improve survival of offspring of provisioned females: (1) reduce amount given to dolphins to $\leq 1/3$ estimated daily diet, (2) restrict daily period when handouts offered (mornings only), (3) high quality fish given to dolphins, (4) strict supervision of feedings & human interaction, (5) calves, young juveniles & males not fed, (6) eliminate all uncontrolled feeding (from boats, etc) via education & enforcement, (7) recruitment to come from juvenile daughters of provisioned females (who would normally associate with their provisioned mothers after weaning); (8) education & resources for rangers; (9) additional research on water quality & marine ecosystem, funding & facilities for research	"If welfare of the dolphins were the sole concern, then provisioning ...should cease [but] many human livelihoods now depend upon continuation of the meet-the-dolphin phenomenon" (Wilson 1994); since 1994 regulations, all 3 provisioned females now have surviving offspring	Gawain 1982; Edwards 1988; Connor & Smolker 1985; EPA 1989; Lockyer 1990; Connor et al 1992; Trayler & Shepherd 1993; Wilson 1994, 1996; Donaldson 1998; Mann & Smuts 1999, Mann & Barnett 1999, Mann et al. in press
Tangalooma, Moreton Island, Queensland, Australia	Management regime includes (1) all feeding supervised by staff, (2) in dedicated feeding area, (3) limited to resort guests with strict interaction procedures, (4) reliable source of fish, (5) attempted to have regular feeding time, then adjusted for tide, (5) restricted amount of fish given ($< 1/3$ estimated daily diet), (6) resort supports long-term research to monitor interactions & to develop educational program	"the Monkey Mia experience has been used in Queensland to ban establishment of any new dolphin feeding stations... and to establish conditions associated with the permit held by Tangalooma Island Resort for its feeding station" (Corkeron 1998); current human-dolphin interaction related to human-dolphin cooperative fishing in 1800s & present association between dolphins & shrimp trawlers; this is the "first time that human-dolphin interaction experiences have been used for the purposes of promoting tourism to a resort."	Green & Corkeron 1991; Orams 1994, 1995; Orams et al. 1996; Corkeron 1998

Table 3: Cetaceans that are habituated to in-water encounters with humans through food provisioning

Species	Location	Human Activity	Access	Duration	Affected Animals	Distance	Extent of Human Activities	Origin of Habituation
Indo-Pacific Humpback dolphin (Sousa chinensis)	Tin Can Bay, Queensland, Australia	FP-uc (by hand); SW-uc; MA-uc, FP is prohibited by regulations but not enforced; WF?	W, B, L (in shallows)	feeding begun ca. 1974; by 1992 adult female "Scar" was accepting fish by hand	1st dolphin = adult female "Scar", her calf "Junior" born ca. 1992; up to 8 dolphins; one w/ deformed jaw	Touch: children ride dolphin by holding onto dorsal fin	dolphins present on 88% of 731 days monitored; fish for hand-feeding purchased from kiosk; no quality or quantity control; "no controlling body managing the interaction"	intentional? Dolphins attracted to fisheries by catch then fishermen may have tossed fish; special relationship between dolphins & dog
Bottlenose dolphin (Tursiops truncatus)	Panama City & Fort Walton Beach, Florida Panhandle, USA	SW-uc, FP-uc (by hand & toss in water), MA-uc; FP is prohibited by regulations but not enforced; HF: provisioned dolphins have "learned to take the bait from fishers' hooks or even steal their catch"; WF: some provisioned dolphins may also follow shrimp boats	W, B, L	1st commercial feeding tour began in 1984; many operators by time of 1993 feeding ban; Samuels/Bejder & Colburn studies in summer 1998	in Panama City: coastal dolphins in vicinity of Shell Island; at least 7 individuals, including juveniles & adults	gradual acceptance of touching occurred after feeding began	commercial tours for feeding & swim-with-dolphins occur "just outside the East Jetty on almost any day"; during 3.5 mos in 1997, Florida Marine Patrol issued 6486 verbal warnings, 562 written warnings & 48 citations for illegal dolphin feeding; "habituated dolphins were engaged in interactions with humans during approximately 77% of the time they were under observation" (Samuels & Bejder 1998)	intentional: tour operator fed seagulls then threw fish to dolphins so passengers could view; may have targeted dolphins that followed shrimp boats; commercial operators "trained" dolphins to expect fish handouts at certain times at specific location
Bottlenose dolphin (Tursiops truncatus): "Moocher" & "Beggar"	Sarasota & Nokomis, Gulf coast, Florida, USA	FP-uc, SW-uc, MA-uc; FP is prohibited by regulations but not enforced	W, B	"Beggar" has been fed since at least 1990	2 dolphins: "Beggar" (male) & "Moocher"	Touch: people reaching to pet dolphin have been bitten by dolphin	"many individuals have been engaging in... feeding and harassing dolphins in Florida's Gulf of Mexico waters for many years" (Smith 1997)	
Tucuxi (Sotalia fluviatilis)	Sao Vicente & Cananéia estuary (sanctuary), Brazil	FP-uc (by hand), SW-uc	W, B	calf sited Nov 1997-Oct 1998; dolphins in sanctuary fed for 4+ years	one calf at Sao Vicente; up to 4 dolphins in sanctuary		in sanctuary, may be more than one dolphin hand-fed by more than one fisherman	intentional feeding by local fishermen; calf's habituation story may explain how immatures become "lone sociable"

Table 3: Cetaceans that are habituated to in-water encounters with humans through food provisioning

Location	Impact Details	Research Details
Tin Can Bay, Queensland, Australia	calf took fish from human hands at age 3 yrs & soon allowed people to touch; visited provisioning area without mother as soon as weaned; tourists try to climb on dolphins' backs	all reports are descriptive
Panama City & Fort Walton Beach, Florida Panhandle, USA	Samuels & Bejder 1998: a food provisioned juvenile dolphin was observed to forage naturally only once during nearly 6 hrs of observations on 3 days, same dolphin received fish handouts approx once per hour; "habituated dolphins remained... within [a] <1 nm ² area... In contrast, unhabituated dolphins traveled distances of several nautical miles during follows [in the same area]"; Colburn 1999 estimated that feeding occurs once every 3 min	Samuels & Bejder (1998): focal follows of dolphins near feeding area; found differences in behavior & ranging patterns of habituated vs non-habituated dolphins; one habituated juvenile dolphin interacted with humans (including swimmers) during 74% of observation time, was fed by humans at least once per hour, had an average of 4 vessels within close proximity, had dangerous encounters involving humans once per 12 min; virtually all interactions between dolphins & humans in this region appeared to be based on food provisioning; Colburn (1999): shore-based observations with vessel or swimmer as focal; on average, vessels spent 30 min in area, swimmers spent 22 min in water; only 14% of focal passengers had in-water interaction; of those, 42% engaged in high risk behavior with dolphins, especially passengers on vessels with low 'levels of control'; provisioning facilitated sustained human-dolphin interactions; dolphin feeding primarily done by private vessels but could not confirm no feeding by commercial vessels
Sarasota & Nokomis, Gulf coast, Florida, USA	9 recorded incidences of dolphin biting people in 1 yr; some injuries occurred while people simultaneously fed & tried to pet dolphin, dolphin presumably mistook the hand for a fish; one bite occurred while swimming with dolphin; some injuries were treated medically; potential impacts include eating inappropriate foods, making dangerous approaches to vessels or propellers, entanglement or being hooked in fishing gear, etc	all reports are descriptive
Sao Vicente & Cananéia estuary (sanctuary), Brazil	At Sao Vicente, anecdotal information suggests that an orphaned calf started to approach fishing boats & was hand-fed by fishermen; at Cananéia estuary, there are concerns that hand-feeding dolphins will lead to increased tourism in a sanctuary set aside for calving & breeding	anecdotal accounts: after mother was intentionally killed by a fisherman in late 1997, a young dolphin began approaching fishing boats in early 1998, was reported to swim with one person by May 1998, & was hand fed by June 1998; in sanctuary, one or more Sotalia have been hand-fed by one or more fishermen for several years

Table 3: Cetaceans that are habituated to in-water encounters with humans through food provisioning

Location	Recommendations	Comments	Related Sources
Tin Can Bay, Queensland, Australia		illegal & uncontrolled food provisioning & swim-with occurs with knowledge of local & state agencies even though humpback dolphins are protected species & provisioning of Tangalooma dolphins is strictly state-controlled; feeding station contributes significantly to economy of small fishing village, so "it seems very difficult for managers to shut it down" (Corkeron 1998)	Garbett & Garbett 1997; Corkeron 1998; Aitken 1999; Wortel 1999
Panama City & Fort Walton Beach, Florida Panhandle, USA	Colburn 1999: (1) NMFS-initiated education of commercial operators appeared to have good effect; need similar educational effort that targets private boaters; Samuels & Bejder 1998 and Colburn 1999: (2) need enforcement	"contrary to the statement by NMFS Enforcement that feeding at Shell Island is 'almost nonexistent', a minimum of 114 instances of feeding were observed in this study" (Colburn 1999); both studies were brief	Flanagan 1996; Ford 1997; Spradlin et al. 1997; Samuels & Bejder 1998, Colburn 1999
Sarasota & Nokomis, Gulf coast, Florida, USA		description of NMFS campaign to educate public about dangers of feeding wild dolphins with emphasis on "Moocher", the food provisioned dolphin at Nokomis	Flanagan 1996; Colbert & Cunningham 1998; Smith 1997
Sao Vicente & Cananéia estuary (sanctuary), Brazil	Cirilo et al. 1998 & Santos 1998 recommend: (1) educate local fishermen, (2) institute photo-ID effort to document numbers of affected dolphins, (3) establish methods to systematically follow food-provisioned calf so that local authorities can create guidelines to regulate human interactions to protect dolphin	Tucuxi is a new species of lone sociable/ food provisioned dolphin	Cirilo et al. 1998; Santos 1998

Table 4: Cetaceans that are habituated to in-water encounters with humans

Species	Location	Human Activity	Affected Animals	Duration	Distance	Extent of Human Activities	Origin of Habituation
primarily Atlantic spotted dolphin (<i>Stenella frontalis</i>); also bottlenose dolphin (<i>Tursiops truncatus</i>)	Little Bahama Bank, Bahamas	SW-g, uc, sc; MA-g, uc, sc (Oceanic Society guidelines)	initially 1 group, now 12+ groups including mothers & calves; identified individuals: 150 spotted, 30 bottlenose	1st interactions in 1970s; Herzing research since 1985; Ransom study 1992-97	Touch not permitted but swimmers sometimes tried to "grab hold of their dorsal fins"	in 1992, 5 commercial vessels conducted week long trips; in 1997, 9 vessels plus many private boats; site is somewhat protected from human activity by remote offshore location but increased vessel traffic from 2-12 boats in past 15 yrs; mean in-water encounter duration is 10 min; boats anchor & wait for dolphins to approach; when dolphins approach "of their own free will", tourists enter water	dolphins attracted to wreck salvage in 1970s, allowed girl to touch; filming of dolphins resulted in organized tours; first contact made by dolphins but habituation likely to be human-initiated thru close-up viewing for research & filming, e.g., "interactive" encounters with researchers to establish "rapport and trust"
Bottlenose dolphin (<i>Tursiops truncatus</i>), Spinner dolphin (<i>Stenella</i> sp.)	Ogasawara, Bonin Islands, Mikura/Miyake Islands, Izu Islands, Japan	SW-g (local guidelines)	some identified individual dolphins	dolphin tours in 1970s; swim-with on small-scale in 1987, large-scale by 1990s; identified individuals since 1994		10 whale-watch (includes swim-with) locations in Japan; in Ogasawara: 9000 people went whale-watching in 1998, 5-6 boats offer swim-with-dolphin tours; in Mikura, 10,000 swimmers during May-Sep 1997; may have 4-5 swim-with attempts made per group of dolphins	origin not reported: "the Mikura bottlenose dolphins are... known to consistently tolerate, and maybe even seek out, human swimmers"; not clear if all swim-with in Japan targets habituated dolphins
Bottlenose dolphin (<i>Tursiops truncatus</i>)	Florida Keys, USA	SW-g (operator guidelines); MA	resident dolphins, including calves; identified individuals	swim-with for 14 years? Frohoff & Packard study: 14 hrs during 1990-91	Touching not permitted by tour operator	tour operators are familiar with ranging patterns of several pods of dolphins so can readily find dolphins for tourists	intentional: "it takes some time to gain [the dolphins'] trust" (Henning 1993); not clear if all reports of swim-with in Keys are with habituated dolphins
Bottlenose dolphin (<i>Tursiops</i> sp.)	Rockingham, Western Australia	SW-r? (state permit); MA (using underwater motorised scooter to move among dolphins)	120-150 dolphins; identified individuals	since ca. 1992; first 2 yrs were pilot study then licensed		in Rockingham, swim-with is licensed to "a single operator working with a single population of dolphins, in a specific area"	intentional: local information indicates that tour operator spent 6+ mos trying to habituate dolphins

Table 4: Cetaceans that are habituated to in-water encounters with humans

Location	Impact Details	Research Details
Little Bahama Bank, Bahamas	an adult (presumably mother) "forced the calf to the bottom and held it there" after the calf persisted in interacting with an aggressive swimmer; another calf had life-threatening wounds presumably from boat propeller	Ransom 1998 analyzed encounter durations from 1992-97 & in 1996-97 observed group behavior in response to boats & swimmers from tour vessel & in water; found significant increase in encounter duration from 1992-97; possible explanations include: (1) dolphin habituation to swimmers, (2) dolphin tolerance of humans, or (3) increased operator experience; number of swimmers (up to 10) did not affect encounter length; fewer dolphins present at end vs beginning of encounters; spotted dolphins changed behavior 68% of time when boat approached, were least likely to change activity when socializing & 62% responses were positive (approach); bottlenose dolphins changed behavior 59% of time at boat approach, 40% responses were negative (avoid); note: "the data [might] only reflect those dolphins who are more tolerant of human traffic"
Ogasawara, Bonin Islands, Mikura/Miyake Islands, Izu Islands, Japan	swimmers & boats sometimes chase dolphins	not reported
Florida Keys, USA	swimmer injured by shark when jumped in water to swim with "dolphin pod"	Frohoff & Packard (1997) conducted 14 hrs of observations from tour vessel; noted that dolphin behavior with humans was similar to behavior used in intraspecific interactions; provided list of advantages & disadvantages for dolphins & swimmers
Rockingham, Western Australia		description of in-water encounters with dolphins at Rockingham; swimmers are towed behind a tour leader using an underwater scooter; pilot study results not published?

Table 4: Cetaceans that are habituated to in-water encounters with humans

Location	Recommendations	Comments	Related Sources
Little Bahama Bank, Bahamas	<p>Würsig 1996: "This situation would need stricter regulation only when the number of vessels, and attendant underwater activity and noise increased, no longer allowing the animals to easily and comfortably 'escape'"; Ransom 1998: research needed that will: (1) characterize the dolphins that do & do not interact with swimmers (e.g., age/sex class); (2) look at effects of swimmer numbers with larger number of swimmers; (3) look at swimmer behavior & dolphin responses; (4) look at long-term effects of increasing boat traffic on dolphin ranging patterns, reproductive success, etc</p>	<p>3 programs offered in Bahamas: (1) Oceanic Society Expeditions off Grand Bahamas Island allows "participants to assist research scientists... and have a close encounter with wild dolphins; (2) Wild Dolphin Project has volunteer helping researchers; (3) Underwater Explorers Society (UNEXCO): divers interact with captive dolphins in open ocean; "dolphins come to the humans, and can leave at any time they wish" (Würsig 1996); "The Bahamas... currently has a minimum marine mammal protection law with little enforcement abilities for in-water interactions." (Herzing 1999)</p>	<p>St John 1988; Herzing 1991, 1996, 1999; Simonds 1991; Würsig 1996; Rossbach & Herzing 1997; Ransom 1998</p>
Ogasawara, Bonin Islands, Mikura/Miyake Islands, Izu Islands, Japan	<p>"the Miyakejima Fishermen's Cooperative Association, dolphin guides, and boat captains collaborated to establish guidelines... these rules are enforced by unannounced patrols from the fishing cooperative"; guidelines include: (1) dolphin-watch boats belonging to fishermen's associations should abide by these rules; (2) dolphin-watch boats should not disturb coastal fisheries; (3) violations of these rules will be discussed & dealt with by fishermen's associations; (4) restrictions on number of boats per day based on swim vs watching only; day of week; season; holidays; "the rule is almost effective... The problems are some of [whale-] watching participants [don't come to] the meeting and ignore the agreement" (Mori 1999)</p>	<p>"in Japan, the primary limiting factors to more swim programs include the cetacean behavior and the water temperatures" Dudzinski 1998</p>	<p>Dudzinski 1998, 1999; Barbosa 1999; Mori 1999; Shimomaki et al. 1999</p>
Florida Keys, USA	<p>Frohoff & Packard 1997: (1) need to know more about basic behaviors such as fluke-slap to better interpret dolphin responses to humans; (2) research on swim programs should be conducted by independent, trained investigators using systematic approach to avoid bias; (3) need assessment of short- and long-term effects on dolphins & studies of intermediate swim program types (e.g., not-controlled captive); (4) underwater observations needed</p>	<p>in Florida Keys, "human-dolphin relationships lasting several years have been documented on several occasions" (are these lone, sociable dolphins or habituated groups?); "experience and sensitivity of each charter operator [offering dolphin encounters] varies from highly sensitive to unknowingly ignorant" (Simonds 1991); dolphins choose to interact or not (Henning 1993)</p>	<p>Simonds 1991; Henning 1993; Frohoff & Packard 1997</p>
Rockingham, Western Australia			<p>Orams 1995; Weir et al. 1996; Perrine 1998</p>

Table 4: Cetaceans that are habituated to in-water encounters with humans

Species	Location	Human Activity	Affected Animals	Duration	Distance	Extent of Human Activities	Origin of Habituation
humpback dolphin (Sousa sp.); bottlenose dolphin (Tursiops truncatus)	Mauritania, West Africa; Laguna, Santa Catarina, Brazil; elsewhere	SW-uc, during cooperative fishing efforts; animal assistance with human food production	in Brazil: 25-30 "good" dolphins that participate in fishery; at least 3 generations of dolphins	in Brazil since 1847	fishermen do not try to touch the dolphins, although in Brazil, some dolphins were deliberately marked for identification	in Brazil: fishing takes place all day every day with typically 30-40 fishermen & 1-4 dolphins present throughout daylight hours; dolphin-associated fishery reported to be primary source of income for ca. 100 families; in Mauritania, cooperative fishing is seasonal for mullet	in Mauritania intentional? E.g., fishermen "call" dolphins

Table 4: Cetaceans that are habituated to in-water encounters with humans

Location	Impact Details	Research Details
Mauritania, West Africa; Laguna, Santa Catarina, Brazil; elsewhere	dolphins chase fish in shallows while fishermen cast or set nets; dolphins take advantage of ensuing confusion caused by nets to catch fish to eat; in Brazil: fishermen never give fish to the dolphins; fishing is initiated by dolphins; in Mauritania, dolphins do not always arrive even though called	descriptive

Table 4: Cetaceans that are habituated to in-water encounters with humans

Location	Recommendations	Comments	Related Sources
Mauritania, West Africa; Laguna, Santa Catarina, Brazil; elsewhere		story of human-dolphin cooperative fishing efforts told by Pliny the Elder around 70 A.D.; regarding his writings about animals, Pliny the Elder was "believed to be credulously naïve and especially fond of the curious, the extravagant, and folk stories" (Busnel 1973)	Busnel 1973; Pryor et al. 1990

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Species	Location	Human Activity	Affected Animals	Duration	Distance	Extent of Human Activities	Origin of Habituation
Dusky dolphin (<i>Lagenorhynchus obscurus</i>)	Kaikoura, New Zealand	SW-r, MA-r (New Zealand regulations)	especially large, inshore groups; group size up to 750 dolphins; one distinctive individual seen on 3 occasions (Barr 1997)	1st commercial swim tours in 1989; year-round tours since 1994; Barr study: 1993-95; Yin study: summers 1994-97; pre-tourism data from 1980s	Touch rarely; once "a dolphin brushed me with a pectoral fin while swimming past" (Barr 1997)	2 tour operators do swim-with tours, 1 operator does dolphin-watch tours, 2 do aerial tours; 2-3 vessels with the same group; "humans are with the dolphin group during about 70% of daylight hours" (Würsig 1996); 2 operators may take 7 trips w/ up to 180 swimmers per day (Yin & Würsig 1999); recent voluntary guidelines instituted to safeguard dolphin rest periods	preliminary results show that "dolphin groups often react to vessels & do not appear to have greatly habituated despite nine years of tourism" (Würsig et al. 1997)
Bottlenose dolphin (<i>Tursiops truncatus</i>); Common dolphin (<i>Delphinus delphis</i>)	Bay of Islands, New Zealand	SW-r, MA-r (New Zealand regulations)	minimum population estimate of 265 identified individual bottlenose dolphins; >50% seen on 3+ days; "relatively closed [coastal] population"	1st whale watch operation in 1987; Constantine study: 1993-95, 1997-98	Touch rarely: 4% of swimmers reported that they were able to touch the animals although tour operators do not encourage	commercial tours had 86% success rate in finding dolphins; average time with dolphins per trip = 60 min; for bottlenose & common dolphins, respectively, 60% & 31% of swim attempts were successful (≥ 1 dolphin within 5m of swimmer); average of 2.5 swim attempts per encounter; mean of 2 boats within 400m of dolphin group; maximum of 800-1000 boats operating per day in high season; 38% of 255 bottlenose groups exposed to at least 1 swim-with attempt	not habituated
Killer whale (<i>Orcinus orca</i>); false killer whale (<i>Pseudorca crassidens</i>); pilot whale (<i>Globicephala melas</i>)	New Zealand	SW-r, MA-r (New Zealand regulations)	opportunistic encounters with most species?			killer, false killer & pilot whales are currently treated as dolphins by operators who sometimes attempt swim-with encounters	not habituated, opportunistic encounters

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Location	Impact Details	Research Details
Kaikoura, New Zealand	<p>Würsig et al. 1997 (Yin study): interrupted feeding & rest; dolphins changed their behavior in 77/93 boat approaches, including bow-ride (30 cases but only small proportion of group); group split into subgroups (n=7) or bunched together (7); dolphins changed direction of travel (13), scattered (8), or sped up (5); dolphins changed activity from travel to mill (7); but "the overall movement patterns & daily activities of these dolphins do not appear to have changed since tourism began and there is no evidence for a population decline"; Yin 1999: no differences in group speed or travel pattern when boats near; Yin & Würsig 1999: increased "reorientation rate" (group directional changes) when boats near; Barr 1997, Barr & Slooten 1998: dolphin groups more compact & more active when boats nearby, especially during afternoon when normal behavior is rest</p>	<p>Barr study: shore-based theodolite tracking & observed group behavior from tour vessel & in water; "observation sites on shore... are ideal, because they remove the possibility of observer disturbance and allow comparison of dolphin behaviour in the presence and absence of boats. The only disadvantage is that behaviour observations are less detailed at a distance"; "statistical power for detecting differences [in group behavior in presence of boats] was low in most cases, partly due to the large proportion of time dolphins were accompanied by boats"; "If dolphins take several hours to return to 'normal' behaviour after a boat visit, then almost all of the observations reported on here represent modified behaviour"; Yin study: shore-based theodolite tracking, focused on small groups not typically targeted by tourists; "selection of focal groups away from... other groups of dolphins [may have] introduced a bias towards tracking groups that had already segregated themselves away from vessel... activity"; see "Impacts" for findings</p>
Bay of Islands, New Zealand	<p>for bottlenose dolphins: feeding was least likely & socializing most likely to change during vessel approach; 32% of vessel approaches resulted in behavioral change (23% resulted in dolphin approach to vessel); increased avoidance of swim-with attempts over 6-yr period; for common dolphins: resting was least likely & socializing most likely to change during vessel approach; 52% of vessel approaches resulted in behavioral change (no observed avoidance responses); Constantine 1999: increased avoidance of swimmers by bnd over 6-yr period</p>	<p>Constantine & Baker 1996 compared group behavior at 400 & 100m; for bottlenose (bnd) & common dolphins (cd), respectively, 48% & 24% of swims resulted in sustained interaction (mean = 4.2 & 5.3 min; considered to be evidence of dolphin attraction to humans); 22% & 38% resulted in avoidance; operator strategy had significant effect on dolphin response to swimmers; Constantine 1999b conducted follow-up study; Amante-Helweg 1996 surveyed tourist attitudes</p>
New Zealand		descriptive

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Location	Recommendations	Comments	Related Sources
Kaikoura, New Zealand	<p>Barr & Slooten 1998: (1) do not approach resting or feeding pods, e.g., reduce boat activity during afternoon rest period; (2) do not increase dolphin tourism, reduce number of trips with larger boats carrying more tourists; (3) clarification & better adherence to regulations, e.g., rules re mothers & calves; (4) educate private boat operators; (5) more research to determine: a) whether dolphins are particularly disturbed during "sensitive period" of midday rest, b) extent of impact on individual dolphins; Yin 1999: (1) do not change (relax?) current standards; "observable trends were evident that are potentially important enough that a conservative approach is recommended."; (2) involve all concerned parties in management decisions; (3) "it may be possible to acoustically determine when dolphins are 'in the mood' for social interactions with humans", e.g., different levels of vocal activity may be associated with different behavioral states; Note: recent voluntary guidelines instituted to safeguard midday rest periods</p>	<p>"Fortunately, the main swim-with-dolphin tourism operators from Kaikoura are very astute naturalists who know how to approach the animals, and when not to push them. This is not the case everywhere"; "New Zealand has a short no-nonsense set of rules & guidelines and the enforcing Department of Conservation actually works closely with researchers for constant feedback on potential effects" (Würsig 1996); swim-with regulations specify: number of boat trips per day, number of boats near cetaceans, number of swimmers in water at any one time, do not swim with mother & juvenile cetaceans, operators must be licensed for specific activities</p>	<p>Würsig 1996; Barr 1997; Würsig et al. 1997; Barr & Slooten 1998; Constantine 1998, 1999a; Perrine 1998; Yin & Würsig 1999; Yin 1999</p>
Bay of Islands, New Zealand	<p>Constantine & Baker (1996) recommend: (1) "line abreast" approach strategy (swimmers enter water to one side of dolphins) resulted in lowest rate of avoidance, "in path" (swimmers enter water in dolphins' path) resulted in highest; operators should not use "in path"; (2) maintain regulations that recommend no approach while dolphins are resting; (3) maintain regulations that recommend no approach to groups with "juvenile" dolphins, but clarify definition of "juvenile" to mean calf; (4) need additional research to determine full ranging patterns of affected dolphins, individual responses of dolphins to boats & swimmers, effects of seasonal change in boat traffic, long-term effects on individuals & population</p>	<p>conditions permitted data collection only when vessel was within 400m of dolphins (= zone of "potential disturbance" by Baker & Herman 1989) therefore study may only include dolphins that are tolerant of approach; current research by Constantine will focus on effects of human activity on individual dolphins</p>	<p>Amante-Helweg 1996; Constantine & Baker 1996; Constantine 1998, 1999ab; Perrine 1998</p>
New Zealand	<p>Constantine 1998 recommends: because of documented attacks on other cetaceans (& one human in Hawaii), these whales should be considered whales, not dolphins, & swim-with should not be permitted</p>		<p>Constantine 1998, 1999a</p>

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Species	Location	Human Activity	Affected Animals	Duration	Distance	Extent of Human Activities	Origin of Habituation
Hector's dolphins (Cephalorhynchus hectori)	Porpoise Bay, New Zealand	SW-r, MA-r (New Zealand regulations)	50-65 dolphins, seasonally resident	Bejder study period: 1995-97		one commercial dolphin-watch operator; casual swimmers from shore; at least 1 boat present during 12% & at least 1 swimmer present during 11% of observations (taken during season of highest impact)	
Bottlenose dolphin (Tursiops truncatus)	Port Phillip Bay, Victoria, Australia	SW-g, MA-r (state whale watch regulations; voluntary swim-with code of conduct)	ca. 100 resident dolphins (60 identified); 4-8 calves born per year in summer months	swim with wild dolphins since 1989; voluntary code instituted in 1994; Weir et al study period: 1996	Touch? voluntary code specifies no touch, but divers make "attempts to grasp the dorsal fins"	9000 people swim with dolphins in Port Phillip Bay per year; 3 dedicated dolphin-swim operators + opportunistic swim-with charters; in January (high season) can have >20 private boats surrounding dolphins plus commercial vessels; in-water encounters rarely last >4min; "extended observations [by sequential boats] see pods being disturbed for hours at a time without respite"	not habituated, opportunistic encounters; tour operators may know some individual dolphins
Dwarf minke whale (Balaenoptera acutorostrata)	Great Barrier Reef, Australia	SW-r, uc, sc; MA-r, uc, sc (Great Barrier Reef Marine Park regulations)	>60 whales; varied age/sex; not known if seasonally resident, or if feeding/calving in this region	1st encounters in 1985; commercial dive trips focusing on whales began in 1996; Arnold & Birtles study: 1996-97	Touch rarely; "sometimes less than 5 metres"	mean encounter length = 1.2 hrs; 156 encounters in 1991-95; now 4 commercial operators provide whale-focused dive trips, 4 others have opportunistic whale encounters; 1 operator used spotter plane; one encounter with 8 whales was 11 hrs; whales approach dive boat when moored/stopped at sea; less often, whales follow moving boat; whales frequently remained near boat & swimmers	whales reported to initiate encounters; does not appear to be repeated encounters with same individual whales (F. O'Neill, personal communication)

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Location	Impact Details	Research Details
Porpoise Bay, New Zealand	long term impacts of repeated dolphin-watch tours of >70 min duration could result in disruption of critical energy budgets with possible consequences on rest, feeding, displacement from preferred zone or from bay & breeding success	Bejder & Dawson (1998; Bejder et al. 1999) conducted theodolite tracking of group behavior relative to boats & swimmers within 1 km of cliff vantage point: dolphins remained nearby for >5 min in 57% swim attempts = "non-disturbing", left within 5 min of attempt in 30% = "potentially disturbing", & left immediately after attempt in 12% = "disturbing" (based on 200-m radius); dolphins were attracted to boats during Min 10-50 of dolphin-boat encounters & tended to orient away from boats after Min 70; dolphins formed significantly tighter pods when boats were present, also tended to form tighter groups when swimmers present
Port Phillip Bay, Victoria, Australia	"active [feeding] behaviour attracted a number of boats... the dolphins rapidly discontinued feeding behaviour and 'sprinted' quickly [away]... The situation resulted in the dolphins being hemmed in"; dolphins more likely to avoid & less likely to interact with swimmers in proposed sanctuary zone thought to be nursery & foraging area; in response to boats, dolphins observed to enter "'freeze/silent' or 'rafting' behaviour... a behaviour that is normally seen with [panicked] dolphins [trapped] in nets of tuna boats" (Weir et al. 1996)	Weir et al. (1996) conducted shore-based theodolite observations of group behavior, also some observations from tour & research vessels: 40% of 440 swims were unsuccessful; in successful swims, dolphins altered behavior to interact with swimmers ("active") in 17%, avoided swimmers in 33%, were neutral but within 5m in 50%; most invasive swim types ("direct" approach by boat & free swim without mermaid lines) resulted in highest % successful swims AND highest % avoided swims; higher % avoidance & lower % "active" occurred inside proposed sanctuary
Great Barrier Reef, Australia	none reported	Arnold & Birtles 1998: observations made from commercial dive boat based on 30 encounters (25 hrs of contact); no aggression to humans recorded in 130 encounters; disturbance behaviors thought to be associated with direct approaches or touching by swimmers include "veer" (rapid change in direction away from human/vessel), "speed-up" (acceleration away), "change of level in the water" (deep dive away from swimmers); but also noted that whales often "slowed down... and maintained a position near swimmers"

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Location	Recommendations	Comments	Related Sources
Porpoise Bay, New Zealand	Bejder & Dawson (1998; Bejder et al. 1999) recommend: impacts of dolphin-watch tours are likely to be "cumulative rather than catastrophic" which emphasizes need for long term studies & for cautious interpretation when evaluating disturbance from short term studies; need "before & after" studies	"There is currently no evidence that the present level of disturbance is affecting Hector's dolphins in Porpoise Bay heavily. Considering the apparent importance of Porpoise Bay to the dolphins, the potential for increased disturbance through an increase in tourism in the area, is however, cause for concern." (Bejder et al. 1999)	Bejder & Dawson 1998; Constantine 1998, 1999a; Bejder et al. 1999
Port Phillip Bay, Victoria, Australia	Weir et al. (1996) recommend licensing tour operators with specific regulations: (1) prioritize minimizing disturbance to dolphin, especially during summer when calves are young via: (2) "parallel and rear" approaches to dolphins; (3) swimmers use mermaid lines, no free swimming; (4) establish coastal boat-free sanctuary in important dolphin habitat; (5) limit number of operators, passengers, trips per operator; (6) no swims near feeding dolphins or neonates; (7) avoid sequential & simultaneous interaction with dolphins by different operators; (8) occasional (non-licensed) operators must adhere to whale watch guidelines; (9) portion of licensing fee goes to enforcement & research	swim-with approved by state official but not permitted in more recent whale watch guidelines so "control of the swims [is] in a 'grey' area", therefore operators, researchers, managers developed a voluntary code for swim-with	Orams 1995; Weir et al. 1996; Perrine 1998
Great Barrier Reef, Australia	Marine Park regulations prohibit active approach to <30m (swimmer) or <100m (boat); but it is the whales that make the approach; however, recommend (1) rope tow-lines to ensure predictable location & safety of swimmers, (2) one boat per group of whales, (3) maintain "no-wake" speed especially when leaving whales, (4) constant monitoring for disturbance behaviors during encounter (5) special instructions to scuba divers for their safety & to minimize disturbance to whales, (6) no flash photography, (7) specific licensing for operators with focused swim-with-whale programs, must include educational component, (8) pre-encounter briefings to ensure that swimmers understand reasons for guidelines, (9) no new swim operations until more research is conducted, especially to document details of in-water interactions & basic biology of dwarf minke about which little is known	"The minke whale is a bit of an embarrassment to our lawmakers... Not only do they not mind boats & divers, but at times they actually seek them out"; "With their natural desire to approach divers and boats, this is one whale that is impossible for a snorkel diver to harass." (Aitken 1999); "To my knowledge, humpback whalewatching and minke whale swims in the Great Barrier Reef Marine Park are the only commercial whalewatching activities in [Australian] waters that are subject to limitation based on permit issue." (Corkeron 1998)	Arnold & Birtles 1998, 1999; Corkeron 1998; Aitken 1999

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Species	Location	Human Activity	Affected Animals	Duration	Distance	Extent of Human Activities	Origin of Habituation
Bottlenose dolphin (<i>Tursiops truncatus</i>); rough-toothed dolphin (<i>Steno bredanensis</i>); pilot whale (<i>Globicephala macrorhynchus</i>); Atlantic spotted dolphin (<i>Stenella frontalis</i>); striped dolphin (<i>Stenella coeruleoalba</i>), beaked whale (<i>Mesoplodon densirostris</i>), sperm whale (<i>Physeter macrocephalus</i>), sei whale (<i>Balaenoptera borealis</i>)	La Gomera, Canary Islands	SW-g, sc, r? MA-g, r? (local self-imposed code); in 1996, swim-with cetaceans was prohibited?	opportunistic encounters with most species, including all age/sex classes of dense beaked whales; dense beaked typically located @ mean distance of 4.4 km from shore	1st whale-watch operation in 1992; regulations initiated in 1996; Ritter & Brederlau study period: 1995-97	closest approach by swimmers: 1m for spotted dolphins; 5-10m for sei whale; 10-12m for sperm whale; close-up underwater photos for dense beaked whales	2 dolphin tour operators; average of 3.3 swim attempts per trip; average swim duration <4 min; in 27% of in-water encounters >=2 boats present; dense beaked whales: comprised 5% of all sightings; in 2/7 sightings there were 8 in-water encounters with 1-6 swimmers for 1-11 min (mean = 4.4 min); longest sighting (1 h 40 min) resulted in underwater photos of all beaked whales in group	not habituated, opportunistic encounters
short-finned pilot whale (<i>Globicephala macrorhynchus</i>)	Tenerife, Canary Islands	SW-uc, r?; MA-uc, r?; no permit needed until 1996 regulations?	resident coastal population of pilot whales, including many calves	in 1991 "local pilot whales were discovered by the tourist industry"; Heimlich-Boran et al study: 1992-93	boats within <40m	up to 25 medium-sized to large commercial boats, each carrying 20-150 passengers, some boats run multiple trips per day; "untold numbers of 'cowboy' operators in small boats"; "Swim-With-The-Whales" trips are becoming increasingly popular	not habituated, opportunistic encounters

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Location	Impact Details	Research Details
La Gomera, Canary Islands	<p>Ritter 1996: "Even in those situations w[h]ere the animals or individuals of a group behaved very sociably towards the boat, they possibly later avoided swimmers. Once when two persons went into the water to swim with Atlantic spotted dolphins, these disappeared at a very high speed which they maintained for several minutes"; Ritter & Brederlau 1999: 7 sightings of dense beaked whales: variable responses to boats/swimmers included: whales remained distant or were curious & approached; groups were compact; whales engaged in "interactive behaviours towards the boat" including approach & remain nearby; whales "scouted" (brief approach), oriented towards boat, changed swim speed or direction to accomodate boat movements; whales breached, tail-slapped, spy-hopped, frequently changed direction of travel, "sprinted several hundred meters with the animals repeatedly porpoising at high speed"; nursing was observed; researcher was able to take close-up underwater photos</p>	<p>Ritter 1996 observed cetacean-human interactions from commercial vessels + 35 in-water encounters; "descriptive" data on group behavior; 46 cetacean encounters resulted in 20% avoidance, 22% distant encounters, 20% "close" in-water encounters (dolphins curious about boat but avoid swimmers), 38% "intense" in-water encounters (dolphins interact with swimmers); 10% of in-water encounters resulted in an "interaction" with rough-toothed dolphins, pilot whales, spotted dolphins, or bottlenose dolphins; interactions more likely to occur if initial behavioral state is "milling"; dense beaked whales "repeatedly made the impression of curious animals which do not generally avoid the presence of man"; sei whales "seemed to tolerate the boat and were partially curious"</p>
Tenerife, Canary Islands	<p>Heimlich-Boran et al. 1994: effects of boats may alter feeding & social behavior; observed behavioral displays "which indicate irritation bordering on clear aggression [occurring] between whales & directed at our boat"</p>	<p>Heimlich-Boran et al. 1994: this is one of few studies to assess impact on individual whales; focal-animal sampling focused on response to boat presence, finding tighter group spacing & delayed rise to surface in presence of boats; no information on responses to swimmers</p>

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Location	Recommendations	Comments	Related Sources
La Gomera, Canary Islands	Ritter 1996 recommends (1) leave resting dolphins alone; (2) withdraw if there are many calves in a group of striped dolphins; (3) pilot whale behaviour should be assessed carefully before attempting a swim; (4) when encountering beaked whales, the motor should be put into neutral to assess the whales' behavior; Ritter & Brederlau 1999 recommend: (5) use of whale watch vessels as research platform to obtain data on regular basis; (6) mutually beneficial cooperative partnership between tour operators & researchers	Ritter 1996: "During behavioral observations there is always the tendency to discover eye-catching behaviours (e.g., leaps) rather than those which are less spectacular" -- i.e., this is a particular problem with studies of group behavior; "use of whale watching boats as observation platform gives an excellent possibility to collect data on a regular basis" but also presents problems, see e.g., Constantine & Baker 1996; Ritter & Brederlau 1999 imply that swim-with was prohibited in Canary Islands in 1996	Heimlich-Boran et al. 1994; Ritter 1996; Ritter & Brederlau 1999
Tenerife, Canary Islands	Heimlich-Boran et al. 1994 recommend (1) "we do not know sufficient about baseline parameters to measure subtle changes which indicate a departure from norm, or that different parameters must be measured, or vessel disturbance has a cumulative effect which can only be measured over the long-term"; (2) adequate legislation to protect resident population especially with so many young calves	Ritter & Brederlau 1999 report re La Gomera implies that swim-with was prohibited in Canary Islands in 1996	Heimlich-Boran et al. 1994; Ritter 1996

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Species	Location	Human Activity	Affected Animals	Duration	Distance	Extent of Human Activities	Origin of Habituation
Bottlenose dolphin (<i>Tursiops truncatus</i>); Atlantic spotted dolphin (<i>Stenella frontalis</i>); striped dolphin (<i>Stenella coeruleoalba</i>); common dolphin (<i>Delphinus delphis</i>); Risso's dolphin (<i>Grampus griseus</i>); sperm whale (<i>Physeter catodon</i>); killer whale (<i>Orcinus orca</i>); false killer whale (<i>Pseudorca crassidens</i>); pilot whale (<i>Globicephala macrorhynchus</i>)	The Azores	SW-r? (regulations exist but not strictly enforced; as of February 1999, swim-with whales no longer permitted)	near shore	since 1992		as of 1996, at least 4 commercial operators; details re sperm whales provided below	not habituated, opportunistic encounters
sperm whale (<i>Physeter catodon</i>)	Azores, Dominica, Grenada, Galapagos, Mediterranean	SW-uc, MA-uc	coastal whales, including mothers & calves	since 1992 in Azores; 1990 in Dominica; 1994 in Grenada; 1987 in Med	close-up underwater footage available from Dominica & Azores, including calves	as of 1996, at least 1-4 operators w/ sperm whale watch programs in each location; swim-with opportunistic (Azores, Med) and/or discouraged (Dominica); as of February 1999, swim with sperm whales prohibited in Azores	not habituated, opportunistic encounters

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Location	Impact Details	Research Details
The Azores	boat approaches & placement of swimmers may be "aggressive"	
Azores, Dominica, Grenada, Galapagos, Mediterranean	in Dominica (& elsewhere) near-shore waters where swim-with may occur are frequented by female groups (mothers & offspring), therefore tourist activity may disrupt mating & parental care; solitary calves remaining at surface while adults dive are especially vulnerable	

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Location	Recommendations	Comments	Related Sources
The Azores	regulations & voluntary guidelines include: (1) only 2 swimmers in water; (2) no scuba; (3) 1 boat per dolphin group; (4) as of February 1999: do not swim with whales (sperm, killer, false killer, pilot)		IFAW 1997; S. Heinrich (personal observation)
Azores, Dominica, Grenada, Galapagos, Mediterranean	IFAW (1997) provided explicit recommendations for watching sperm whales, including specifying boat behavior for different situations, e.g., at different distances from whales, for female groups vs males, for foraging vs resting/socializing whales, for solitary calves (do not approach); swimming with whales "should not be encouraged, either for single animals or for groups"	IFAW (1997): "The popularity of swimming with wild cetaceans is of particular concern in the case of sperm whales. Attempts to swim with whales are likely to be more disturbing than other types of encounters because such activity involves close approaches by boats and humans. Attempts at swimming with whales are usually made with socialising/resting groups. Solitary calves at the surface are also especially accessible, and therefore vulnerable"; "Although there are no reports of aggression towards humans by sperm whales... human swimmers are at risk of injury by whales... Sperm whales are, after all, the world's largest toothed animals."	IFAW 1997; S. Heinrich (personal observation)

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Species	Location	Human Activity	Affected Animals	Duration	Distance	Extent of Human Activities	Origin of Habituation
Spinner dolphin (<i>Stenella longirostris</i>)	Oahu & Kona coast of Big Island, Hawaii, USA	SW-uc, MA-uc	resting dolphins in sheltered bays	"many years"; beginning in 1980s in Kealakekua Bay; pre-tourism data from 1979-80		for many yrs, local people have swum with dolphins; now this is becoming popular tourist activity "with many people traveling thousands of miles just to interact with dolphins"; when dolphins are in Kealakekua Bay there are 10-30 swimmers, 30-40 kayakers, commercial tour boats, & zodiacs in bay; local bed & breakfasts, kayak vendors, vacation rentals advertise "swim-with-dolphin"	Unclear from reports whether dolphins are habituated (some people claim to have long-term relationships with individual dolphins) or not habituated (groups are disturbed by human activities)
short-finned pilot whale (<i>Globicephala macrorhynchus</i>)	Kona coast, Hawaii, USA	SW-uc	5 or more, including 1 adult male	single encounter	Touch: woman stroked whale's back; whale bit woman	opportunistic in-water encounter with non-habituated pilot whales	not habituated, opportunistic encounters
Killer whale (<i>Orcinus orca</i>)	Brazil	SW-uc	opportunistic encounters	report period: 1993-1997	within 5m	"killer whale proximity to the beach attracted the attention of bathers on several occasions"; photographs show swimmers & surfers in shallow water within 5m of orcas	not habituated, opportunistic encounters
Grey whale (<i>Eschrichtius robustus</i>)	Magdalena Bay, Baja California, Mexico	SW-uc, MA-uc	in one report: 1 adult (estimated 15 m long)	estimated 3 min in close proximity	Touch: "could not resist the urge to reach out and touch"	primarily whale-watch activities; extent of swim-with not reported	

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Location	Impact Details	Research Details
Oahu & Kona coast of Big Island, Hawaii, USA	bays where people swim with dolphins are daytime resting sites for dolphins; the high level of interaction by swimmers, boaters & kayakers may have detrimental impacts on dolphins' resting patterns; inexperienced humans cannot recognize crucial dolphin behaviors such as rest that they should not disrupt; decrease in dolphins' presence in Kealakekua Bay since 1979-80 may be related to tourist activity	all reports are brief/abstracts; Barber (in prep) reported in Würsig 1996: dolphins rest/socialize in shallow bays during day, forage offshore at night; swimmers/kayakers can easily reach resting dolphins from shore; Forest (aka Barber) 1999, Kealakekua Bay, 1 yr study in 1993-94: # swimmers/ kayakers/ motorboats higher on days when dolphins in bay; dolphins in bay 21% less often than in 1979-80, suggesting bay may have become "a less suitable resting area"; increased aerial activities associated with presence of boats, kayakers, swimmers, which may disrupt reproduction, feeding & rest; overall decrease in aerial activities compared with 1979-80, suggesting dolphins now have "reduced energy levels"; Green & Calvez 1999, Kealakekua Bay, 3 mos study in 1998-99: diurnal pattern for human swimmers: early AM, locals; midday, tourists & boats; afternoon, decreased human activity; corresponding diurnal pattern for dolphins: early AM, interact with humans; midday, avoidance; afternoon, rest; Psarakos & Marten 1999, Oahu, 1-2 mos per yr in 1995-98: data not yet analyzed
Kona coast, Hawaii, USA	A woman had a "near-death experience" swimming with wild pilot whales: the whale rammed into swimmer at high speed, opened mouth, grabbed her inner thigh & pulled her down to ~12m depth before letting go of her; difference of expert interpretation of whale behavior: the whale was aggressive because swimmer stopped interacting with him vs. whale was annoyed at human contact & had been chased by the boat prior to the in-water encounter	descriptive; based on underwater video
Brazil	none reported	descriptive
Magdalena Bay, Baja California, Mexico	danger to human swimmer: the whale was "repeatedly bringing its powerful flukes within centimetres of me but never making contact" (Snyderman 1988)	descriptive

Table 5: Cetaceans that are not habituated to in-water encounters with humans

Location	Recommendations	Comments	Related Sources
Oahu & Kona coast of Big Island, Hawaii, USA	Würsig 1996 recommends: "all human/dolphin interactions except for watching from a distance should be banned, and this ban should be enforced"	Würsig 1996: "a few dolphins usually turn... and briefly interact with the humans, giving the underwater viewers the false impression that 'all the dolphins' are coming to them"	Simonds 1991; Barber et al. 1995; Würsig 1996; Perrine 1998; Forest 1999; Green & Calvez 1999; McNarie 1999; Psarakos & Marten 1999
Kona coast, Hawaii, USA	Shane et al. 1993 recommend: swimming with wild cetaceans can be dangerous; swimmers should assess the animals' behavior before getting into the water with them	this in-water interaction was declared illegal in court case	Shane et al. 1993; Shane 1995
Brazil			Santos 1999; Siciliano et al. 1997
Magdalena Bay, Baja California, Mexico		found a lone whale "that appeared to be frolicking at the surface rolling over and over" & entered water to swim near & touch whale for several min	Snyderman 1988; Findlay 1997