

Design and Regulation of Dominica's Whale Watching Industry

Given Dominica's commitment to Convention for the Protection and Development of the Marine Environment of the Wider Caribbean, ratified October 5, 1990;

Given Dominica's commitment to the protection of certain species of wild fauna and flora against over-exploitation through international trade by signing the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) put into effect on February 11, 1995;

Where as, the Territorial Sea, Contiguous Zone, Exclusive Economic and Fishery Zones Act of Dominica of 1981 establishes the maritime zones controlled by Dominica;

Where as, the Fisheries Act of Dominica of 1987 establishes the management and development of fisheries, including marine mammals;

Considering, the whale watching industry and marine species are important to the economy of Dominica;

Considering, that the Discover Dominica Authority wants to ensure a thriving eco-tourism industry as a key part of the Nature Island;

Considering, the Chief Fisheries Officer, who governs the management of marine resources, wants to build a safer and more effective whale watching industry;

Considering, the Dominica Watersports Association, which oversees the operators involved with these activities, wants to ensure a sustainable future for their operators and the whales on which they depend;

Anxious to ensure a harmonious coexistence of marine mammals and humans, as part of sustainable development;

The following has been developed in order to enable the definition of new permit types for activities in the marine sector and the regulations pertaining to each permit type.

The Need for Regulations:

At its inception, the whale watching industry was seen as a zero-impact activity. However, after 20 years of research findings suggest otherwise. Studies have shown that whale watching activities can impact the targeted populations by changing behaviour, altering energy budgets, displacing animals from the habitat, and shifting their population parameters (Williams et al. 2002a; Williams et al. 2002b; Lusseau 2003; Constantine et al. 2004; Lusseau 2004; Scheidat et al. 2004; Bejder 2005; Lusseau 2005; Bejder et al. 2006a; Bejder et al. 2006b; Williams et al. 2006). The observation of whales and dolphins at sea is not a negative activity in and of itself; nevertheless, problems begin to arise when there is a large growth in the number of vessels involved in these activities (Bejder 2005; Lusseau 2005; Williams and Ashe 2007). The question is not the activity in itself, but rather in how it is undertaken. Without guidelines, there would be no means of control for the various activities that have an impact on the marine ecosystems and animals which live in it. The principal aim when creating a set of guidelines for cetacean watching should be to minimize the impacts of watching activity on the individual animals and the populations in which they live. In addition, they are intended to 1) ensure that the normal pattern of daily and seasonal behaviour of the cetaceans is maintained over the short and long term; 2) develop a supportive public with realistic expectations of cetacean encounters in order to prevent pressure from clientele for increasingly risky activities by operators; and 3) ensure that operators and their clients know how to act appropriately when enjoying cetaceans in their natural environment. Below we outline, the regulations for activities involving marine mammals in three parts: 1) Boat based whale watching regulations, 2) Structure for permit types for differing activities involving marine mammals, 3) Regulations for Boat and Swimmer Behaviour as Requirements of Media and Photography Permits

Part 1: Boat Based Whale Watch Regulations

Basic Principles:

Whale watch operators should consider it their “duty” to care for the animals that they exploit. Every effort should be made to minimise disturbance to cetaceans and avoid collisions between vessels. Ideally, the situation should be managed such that it allows cetaceans to control the nature and duration of the encounter.

The following basic principles should be respected:

- a) Vessels should be operated so as not to disrupt the normal behaviour of the cetaceans;
- b) Vessels will not negligently or intentionally bother, capture, chase, catch, collect, cutthrough, disperse, disturb, drive, encircle, entrap, follow, harass, harm, herd, hunt, hurt, kill, provoke, pursue or restrain cetaceans;
- c) Contact with cetaceans should be abandoned at any stage if they show avoidance behaviour or signs of becoming disturbed (see signs of disturbance above);
- d) Particular care should be taken when calves are present either alone or with escorts;
- e) A dedicated observer, who is trained in the cetaceans of the area, should be on duty in addition to the captain of the vessel; therefore a minimum of two crew are required onboard. Both should have both passed Fisheries Division training for whalewatching;
- f) Education about the marine ecosystem, the species being observed, and threats to our oceans will be offered to the clients. Education can be enhanced by a discussion about cetaceans, natural history, oceanography, and/or conservation movements;
- g) Staff and operators shall conduct the cetacean watching trips in a state of sobriety, and the consumption of alcohol is prohibited;
- h) There shall be no fishing from a vessel which is conducting a cetacean watching trip;
- i) There shall be no pets permitted onboard vessels conducting a cetacean watching trip;
- j) Vessels shall display these Guidelines on board; and
- k) If passengers have complaints about the behaviour of an operator, or perceive a failure in following these guidelines, they should contact Dominica Fisheries Division to report and discuss their complaints. Tel: 767-295- Email: fisheriesdivision@dominica.gov.dm

Defining Zones around Cetaceans:

Below are defined the zones surrounding the animals. These zones define areas in which vessels are permitted or not permitted to go, as well as limit vessel number, activity, and duration of stay while within them. Distances used to define the zones are measured from the closest animal to the closest part of the vessel. Figure 1 graphically represents the zones outlined below.

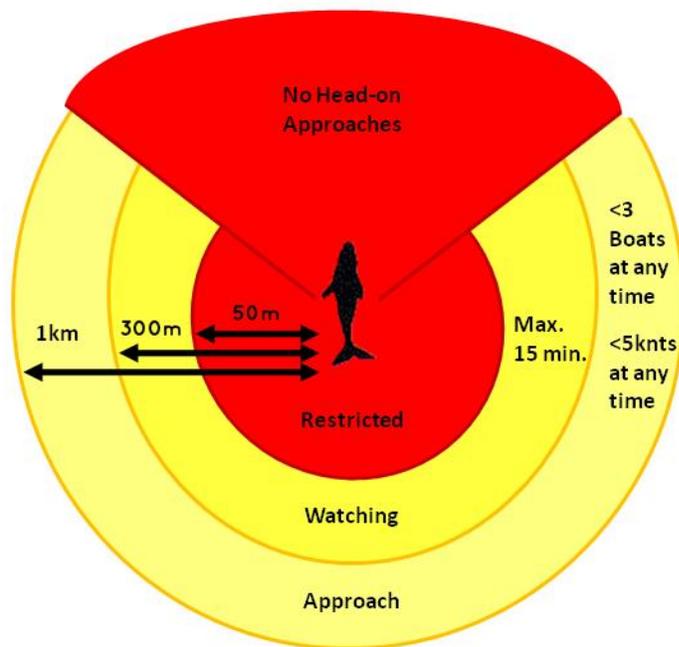


Figure 1 – Three nested zones around whales

Approach Zone:

The Approach Zone marks the area under which the guidelines for vessel activity come into effect. Starting at 1000m from the whales, vessels must limit their activity as described below. No more than 3 vessels should be within the Approach Zone with a given cetacean or cohesive group of cetaceans. This number also includes research vessels, ferries, private vessels and passing ships. Additional vessels must remain outside the Approach Zone and wait until one of the vessels has departed before entering, or search for another group of cetaceans. Vessels under sail should not approach cetaceans and should remain beyond the Approach Zone. The size of and number of vessel permitted in the Approach Zone is based on research which found that killer whale (*Orcinus orca*) avoidance behaviour changed when more than three boats were present within a 1000m from the animals (Williams and Ashe 2007).

Watching Zone:

The Watching Zone, between 50m and 300m from the nearest animal, is the area in which vessels are permitted to remain while observing cetaceans. Vessels are limited to 30 minutes within the Watching Zone.

Restricted Zone:

The closest zone to the animals, NO vessels shall get closer than 50m from the nearest cetacean except when in possession of a special permit. If your vessel is unexpectedly within 50 meters of a whale, disengage engines into neutral IMMEDIATELY and allow the whales to pass beyond 50m before moving again.

Boat Activity when Close to Whales:

Expect in circumstances of human safety and other emergencies:

- a) Upon entering the Approach Zone, vessels must maintain a no-wake speed (<5knts);
- b) Sudden or repeated changes in speed, gear, or direction of vessels should not be made;
- c) If more than one vessel is in the approach zone, they should be in radio communication to coordinate their movements around the whales;
- d) Whales should never be approached head-on, but from the rear or the side, nor should they be closely paralleled by boats;
- e) Where a vessel stops in the Watching Zone to enable the passengers to watch a cetacean, the engines should be placed in neutral or turned off after at least a minute in neutral;
- f) Vessels should not place themselves in a position in order to drift towards cetaceans. Drifting does not excuse getting too close;
- g) Boats should not cause whales or dolphins to become separated from a group or a mother from her calf or a group to become dispersed;
- h) Under no circumstances should cetaceans be driven or their movements diverted or blocked by vessels;
- i) If cetaceans approach the vessel to bow-ride, maintain a slow, steady speed without changing course. Vessels should not approach or run through groups to solicit bow-riding;
- j) No sonar shall be used to locate animals (if the vessel is equipped with a fish-finder or depth sounder, it should be off during all whale watching trips), nor should operators playback sounds to the animals;
- k) Avoid other noises above or underwater, including horns, whistles, and music;
- l) When leaving the whales, it is important to determine where the animals are relative to the vessel to avoid collisions or coming too close to the animals. If animals have all dove, wait 3 minutes before departing to ensure that they are down deep enough to have cleared the area;
- m) When leaving boats shall maintain a no-wake speed until beyond the Approach Zone.

Special Considerations for Sperm Whales:

As sperm whales are the focal species for many of the operators in Dominica, we address certain specific points about this kind of whale. When a vessel is interacting with sperm whales:

- a) The boat should leave the approach zone when a sperm whale abruptly changes its orientation or starts to make short dives of about 1 to 5 minute durations without showing its tail flukes;
- b) do not stay with a sperm whale or group of sperm whales for more than 3 of the whales' dive sequences; and
- c) do not stay within the Watching Zone with a social group of sperm whales for more than 15 minutes.

Swimming, Snorkelling, Scuba, Touching and Feeding Whales:

In some instances, such as for scientific research or photography and film work, it may be necessary for swimmers to be in the water with whales or dolphins. This may only be carried out under a special permit authorised by the relevant government agency. In these cases, swimmers must operate within the conditions of their particular authorization (see Part 2 - 3).

There is environmental, health, and safety concerns associated with deliberate feeding of whales and dolphins. In most cases feeding by humans has been shown to have adverse effects, sometimes severe, on the whales and dolphins concerned (Orams et al. 1996; Mann and Smuts 1999; Mann et al. 2000; Mann and Kemps 2003). As a result, no person should deliberately feed or attempt to feed wild cetaceans. This includes the throwing of food or any other material in the water in the vicinity of cetaceans, and feeding from boats. In addition, no commercial program shall involve feeding cetaceans or attempting to attract cetaceans by offering food to the animals.

Viewing Cetaceans from the Air:

Although the author was not aware of any commercial aerial operators in the Caribbean at the time this document was prepared, this section was included should this alternative be chosen in the future. Viewing cetaceans from aircraft may disturb whales and dolphins due to their speed, noise, shadow, or downdraft in the case of helicopters.

Aircraft operators must abide by the same guidelines outlined for vessels (when it applies), the basic principles, and the special considerations. In addition, the following guidelines must be followed:

Helicopters (including Gyrocopters):

- a. The restricted zone radius for helicopters increases to 500m;
- b. The minimum altitude above sea level should be 500m;
- c. Do not hover over restricted zone;
- d. Do not pass directly over animals, allow shadow to pass over the animals, or circle the animals;
- e. Duration of watching from helicopter is limited to 5 minutes;
- f. No more than one cetacean watching aircraft within 5km of animals;

Other Aircraft:

- a. The restricted zone radius for aircraft increases to 500m;
- b. The minimum altitude above sea level should be 350m;
- c. Water-planes or float-planes may not land on water near (<2km) animals;
- d. Do not pass directly over animals, allow shadow to pass over the animals, or circle the animals;
- e. Duration of watching from aircraft is limited to 5 minutes or two passes by a plane;
- f. No more than one cetacean watching aircraft within 5km of animals.

An outright ban of the use of helicopters is suggested in several areas including those in Tonga and the USA, among others, and should be considered.

Part 2: Defining Permit types for differing activities involving marine mammals

Proposed Permitting Regulations:

The proposed changes require the classification of each application in differing categories of permits. Media permits are intended for professional film and television work, Photography permits are for amateurs, tourists, or any professional with amateurs accompanying them, and research permits are restricted to scientific, academic or research institutions.

Implementation:

Overall, there is very little cost to the Government of Dominica to implement these proposed changes. Given that Dominica already has a reputation of an ecotourism destination, these proposed changes would extend that value system into the ocean. Dominica already stands as the leading place to see sperm whales, now there is an opportunity to lead the world in the way it is done. These proposed changes also allow for the regulation of how these funds are used to better marine management in Dominica. Justifying the increases in revenue from the permits by providing a percentage to the conservation of the current marine protected areas in Dominica and the whale species in focus will be seen as a positive move. Should nothing be done at this critical juncture, the outlook for the population of whales which use Dominica is limited. Recent research suggests that mortality in this local community is very high. In addition, not regulating the current practices will likely lead to the impending injuries at sea, the result of which will impact directly on tourism. The risks to human health from being in water with a wild animal without any regulations are great. On the whole, it will not take a large amount of resources to make these changes, but simply a will to see them done.

Permit Types:

1. Professional Media

Description: Any recognized media group, photojournalist, film crew or other media related party, which is collecting footage for a specific outlet, must apply for the Media permit. These are required in addition to any other permits required to film in Dominica from the Dominica Film Commission or the Discover Dominica Authority. The DDA and DFC will be consulted to determine if the applicant fits this category. Applicants for media permits may apply directly to government, but must have a local operator engaged in the operation and cannot bring in externally registered vessels.

Media Permits are of two types:

Type 1: **Boat based** filming in the marine sector

- a. Description: These are required for any media activity taking place at sea.
- b. Duration: The duration of the permit will be limited to 30 consecutive days.
- c. Cost: \$750 (**placeholder amount**) **per permit issued**. Permit fee can scale based on duration of filming. Funds from this source should be divided to support the Fisheries Division for whale management and conservation initiatives, marine

mammal observer training and operations cost, as well as marine science education programs.

- d. Separation: Boat based filming permits can overlap in timing with permits of other types.
- e. NO in-water footage of the animals can be collected: No cameras on poles, no handheld cameras from the side of the vessel.

Type 2: In-water filming or photography of whales and dolphins

- a. Description: These are required for all in-water media activity.
- b. Duration: The duration of the permit will be limited to 30 consecutive days. Professional permits should be limited in the duration of encounters¹ with whales (e.g. 8 hrs after detection) and by the number of in-water attempts² for each encounter (e.g. 20 attempts).
- c. Separation: No two in-water permits for media or photography shall overlap in time, but these may overlap with research permits.
- a. Enforcement: In order to enforce separation and activity, a copy of all permits will be forwarded to the coast guard.
- b. Regulations: All operations must follow the regulations of boat and swimmer behavior as provided by Fisheries Division. These regulations must be made clear and available to all clients.
- d. Cost: \$5,000 (**placeholder amount**) **per permit issued**. Funds from this source should be divided to support the Fisheries Division for whale management and conservation initiatives, marine mammal observer training and operations cost, as well as marine science education programs.
- e. Each individual listed on the application will be required to be named in a supporting letter of authorization from a credible source³ that the permit applicant is under contract and the particular assignment involves photographing or filming of a particular species of whale. Permits shall be limited to those species.
- f. Any photographs or video footage collected under Media permits must be accompanied by the permit number under which was collected when distributed. This will highlight the Government of Dominica's responsible management of this type of activity and allow for accountability and traceability of these products.
- g. Some of the footage/photographs taken will be made available to the Government of Dominica based on agreement prior to the issuing of the permits.

¹ An encounter begins after the first positive hydrophone detection. Limits should be set on the amount of time after detection at which in-water activities must stop. Encounter times should be shorter for tourist permits than for media permits. As the impact of amateurs in the water with whales are likely greater than professionals.

² An attempt is defined as any activity in which people enter the water during an encounter regardless of if the attempt is perceived as successful. Limiting attempts in number allows for a full understanding of the number of whales impacted by these activities.

³ Recognized broadcast, print, or online media organizations

- h. A fisheries officer shall be onboard as an observer for the duration of all Media Permits. The daily salary of this observer shall be in addition to the permit fees.
- i. In order to collect information about the extent of the occurrence of in-water activity, the observer from Fisheries will document each attempt on the In-water Activity Summary.

2. Photography

- a. Description: Local tour operators seeking to offer a swim-with-the-whale opportunity to non-professionals must apply directly to the Fisheries Division for a Photography Permit on behalf of their clients. International organizations may not apply directly for these permits.
- b. Duration: The duration of a tourist permit will not exceed 10 days for the group/individual. Swim-with-the-whale excursions should be limited more stringently in terms of duration of the encounters² (e.g. 4 hours after detection) and the number of attempts³ per encounter (e.g. 10 attempts per encounter) in order to limit negative interactions with traditional whale watch tours.
- c. Separation: Sequential permits shall be separated by at least 2 calendar days and no two photography permits shall overlap in time, but these may overlap with research permits.
- d. Enforcement: In order to enforce separation and activity a copy of all permits will be forwarded to the coast guard.
- e. Regulations: All tours must follow the regulations of boat and swimmer behavior as provided by Fisheries Division. These regulations must be made clear and available to all clients.
- f. Cost: \$1,000 (**placeholder amount**) **per person listed** on the permit. All clients intending on entering the water must be listed on the permit, along with contact information and passport numbers, at the time of application. Substitutions may only be made after the application process with a two-week advance notice in writing to the Fisheries Division.
- g. Whale Watch interaction: Priority shall be given to traditional boat base whale watch tours when they are present as conducting both activities at the same time on the same whales reduces satisfaction of clients from both operations.
- h. Any photos/video footage taken under this photography permit may not be sold, published, or publicly displayed in any public venue under penalty of fine; without prior written consent from the Government of Dominica.
- i. Permits are species specific. Photographers may not enter the water with any other species than those identified on the permit.
- j. Operators applying for Photography Permits should be required to submit the following materials:
 - i. Copy of Divemaster Certification by the in-water guide
 - ii. Watersports license
 - iii. Insurance and registration from Maritime Division for the vessel.
 - iv. Liability insurance covering clients for emergency rescue at sea.

- k. Each permit should not exceed a total of 6 persons total and should allow no more than 3 persons in the water at any time (including the guide – 2 + 1).
- l. Anyone entering the water must be over 18 years old.
- m. A fisheries officer shall be onboard as an observer for the duration of all Photography Permit who is responsible for ensuring compliance to the regulations. The daily salary of this observer shall be in addition to the permit fees.
- n. In order to collect information about the extent of the occurrence of in-water activity, the observer from Fisheries will document each attempt on the In-water Activity Summary.

3. Research

- a. Description: Research permits should only be granted to researchers from scientific or academic institutions whose objectives have been clearly defined through a written proposal and which produce novel understanding about the species under study or benefit the conservation and management of the animals. Access and restrictions can be determined based on the objectives outlined.
- b. Duration: The duration of a research permit shall be flexible based on the objectives of the study.
- c. Cost: \$3,000 (placeholder amount) per permit.
- d. Enforcement: In order to enforce separation and activity, a copy of all permits will be forwarded to the coast guard.
- e. Research permits require the collaboration of Fisheries Officers working with the research team.
- f. Copies of all raw data shall be made available to the Fisheries Division immediately after the end of the permit.
- g. Any photographs or video footage collected under Research permits must be accompanied by the permit number under which was collected when distributed. This will highlight the Government of Dominica's responsible management of this type of activity and allow for accountability and traceability of these products.
- h. Research applicants must submit directly to Fisheries Division:
 - i. A research proposal outlining their objectives and how they improve our understanding of the species, build capacity for management locally, or increase local conservation outcomes for the species under study.
 - ii. A letter from the head of the department from the scientific, academic, or research institution to which they belong in support of the merits of their work.

Part 3: Regulations for Boat and Swimmer Behaviour as Requirements of Media and Photography Permits

Any in-water activities should be managed such that it allows cetaceans to control the nature and duration of the encounter.

1. Prior to any in-water activity, all participants must participate in orientation by their local guide or a Fisheries Officer about whales, their typical behavior, their behavior when disturbed, what to do in an emergency, weather conditions, currents, and the limitations listed on their permits, a copy of which should be present on the vessel at all time.
2. In order to enforce these regulations, a copy of all permits will be forwarded to the coast guard.
3. All participants who will be in-water must **demonstrate swimming capacity** in front of the local guide or safety crew.
4. All in-water activity will be done in **sea state 3** (predominant whitecaps, winds less than 15kts) or less for the safety of all involved.
5. Over 15 miles offshore and the channels between islands (south of Scotts Head and north of the Cabrits) should be considered **exclusions zones where no in-water activity can take place**, in part due to the increased sea state in those areas. Furthermore, research has shown that animals need places to find refuge should they choose to avoid these types of activities.
6. **A common curtesy is given to the traditional whalewatch operations** such that swimmers are encouraged to not enter the water while whale watch are in the immediate area.
7. Where at all possible, there should be **no mixing in-water activity and boat based whale watching with the same cluster of whales**.
8. **No more than 3 swimmers including one local guide** shall be allowed in the water at any one time (2 clients and a local guide).
9. **At no time will a swimmer enter the water without a guide** and the decision about whether to enter is entirely up to the guide and not the clients.
10. **Local guides will be authorized by Minister of Agriculture and Fisheries** based on certification of CPR, lifesaving, and First Aid.
11. An **additional safety crew** (who is certified in CPR, First Aid, and life saving); who is not a client, the captain, local guide, excursion leader, or a Fisheries observer, and who has no other duties onboard; will act as an observer on the boat at all times maintaining lookout for each of the swimmers and serve as a secondary lifesaving support.
12. No chasing, touching, or feeding of the whales shall be tolerated.
13. In order to reduce the day to day impacts on the whales, **only one in-water media or photography permit shall be issued at a particular time**, but these may overlap with Research Permits.

14. It should be understood that **disturbance** is meant to be any activity that affects the normal behavior of the whales. This infers that the whale is being disturbed when any sudden change occurs in its behavior, such as, but not limited to:

Type 1:

- a. exhaling underwater (seen as blowing bubbles underwater)
- b. surface behavior such as lateral tail slashes, flipper or tail slaps, and excessive breaching
- c. interruptions in feeding, mating, or nursing activities
- d. Female or other escorts abandoning or attempting to shield a calf with her body or by her movements.

Type 2:

- e. Evasive swimming patterns such as changes in swimming direction or speed at the surface
- f. changes in breathing intervals
- g. chuffing (coughing sounds)
- h. abandonment of area where first observed
- i. prolonged dives or underwater course changes
- j. changes in vocalizations

If TYPE 1 disturbance behaviours by whales or dolphins is observed, in-water attempts will not take place for this group of whales the disturbance behavior is observed.

If TYPE 2 disturbance behavior is observed, continuation will be determined by the local guide or fisheries observer onboard.

15. The boat shall never make approaches from head-on and avoid a course that would cross the travel path of the animals.
16. The boat shall **only make one approach on any cluster** of whales. [with special case by case when animals are socializing]
17. Once swimmers are dropped, the boat shall move away from the animals and remain at a distance, in neutral, until recovery. This means that if the animal is still at the surface after swimmers have been dropped once, the boat may not approach that animal or animals again (i.e. no repeated attempts on the same individuals)
18. Both the vessel and the swimmers shall remain on the same side of the animals.
19. A “no entry” policy will be adopted in the presence of females while **nursing calves** who are peduncle diving.
20. Permit holders agree to collect photo identification photographs (flukes for whales and dorsal fins for dolphins) and submit this information and copies of the photographs to the Fisheries Division.
21. In order to collect information about the extent of the occurrence of in-water activity, the observer from Fisheries will document each attempt on the In-water Activity Summary.
22. Sub-surface apparatuses such as SCUBA and scooters are prohibited and only **natural light shall be used for filming/photography** (i.e. no flashes/strobes or video lights).

23. Under Photography permits, each in-water attempt must be **limited to 15 minutes** in the water [with a case by case basis when animals are socializing]
24. Boats with swimmers in the water **must fly the 'A' flag** to make clear to all other vessels that people are in the water.
25. Recovery of the swimmers must be done slowly (idle speed), after the animals have departed; either after they have fluked or swam away, so that the swimmers can approach the boat without crossing the whales travel path.
26. All injuries, minor or otherwise, which occur while at sea, in-water or aboard the vessel, must be filed as an injury report to Fisheries Division.

Should there be a doubt about the applicability of any of these, the final decision will be that of Dominica Fisheries Division of the Ministry of Agriculture and Fisheries and not to a member of the participants, operators, or the crew of the vessel. Permits can be revoked, without reimbursement, for failure to comply with these regulations. Until disputes are settled, no in-water activity shall resume.

References:

- Bejder L (2005) Linking short and long-term effects of nature-based tourism on cetaceans. Doctoral Thesis, Department of Biology, Dalhousie University. 174pp
- Bejder L, Samuels A, Whitehead H, Gales N (2006a) Interpreting short-term behavioural responses to disturbance within a longitudinal perspective. *Anim. Behav.* 72:1149-1158
- Bejder L, Samuels A, Whitehead H, Gales N, Mann J, Connor R, Heithaus MR, Watson-Capps J, Flaherty C, Krützen M (2006b) Decline in relative abundance of bottlenose dolphins (*Tursiops* sp.) exposed to long-term anthropogenic disturbance. *Cons. Biol.* 20:1791-1798
- Caldwell DK, Caldwell MC (1975) Dolphin and small whale fisheries of the Caribbean and West Indies: Occurrence, history, and catch statistics - with special reference to the Lesser Antillean island of St. Vincent. *J. Fish. Res. Board Can.* 32:1105-1110
- Caldwell DK, Caldwell MC, Rathjen WF, Sullivan JR (1971) Cetaceans from the Lesser Antillean island of St. Vincent. *Fish. Bull., U.S.* 69:303-312
- Caldwell DK, Caldwell MC, Walker RV (1976) First records for Fraser's dolphin (*Lagenodelphis hosei*) in the Atlantic and the melon-headed whale (*Peponocephala electra*) in the western Atlantic. *Cetology* 25:1-4
- Caldwell DK, Erdman DS (1963) The pilot whale in the West Indies. *J. Mammal.* 44:113-115
- Cardona-Maldonado MA, Mignucci-Giannoni AA (1999) Pygmy and dwarf sperm whales in Puerto Rico and the Virgin Islands with a review of *Kogia* in the Caribbean. *Carib. J. Sci.* 35:29-37
- Carlson C (2007) A review of whale watch guidelines and regulations around the world. UNPUBLISHED REPORT, pp 142 [Available from: http://www.iwcoffice.org/_documents/conservation/WWREGSApril0408.pdf]
- Constantine R, Brunton DH, Dennis T (2004) Dolphin-watching tour boats change bottlenose dolphin (*Tursiops truncatus*) behaviour. *Biol. Cons.* 117:299-307
- Debrot AO, Barros NB (1994) Additional cetacean records for the leeward Dutch Antilles. *Mar. Mamm. Sci.* 10:359-368
- Debrot AO, De Meyer JA, Desentje PJE (1998) Additional records and a review of the cetacean fauna for the leeward Dutch Antilles. *Carib. J. Sci.* 34:204-210
- Erdman DS (1970) Marine mammals from Puerto Rico to Antigua. *J. Mammal.* 51:636-639
- Erdman DS, Harms J, Flores MM (1973) Cetacean records from the north-eastern Caribbean Sea. *Cetology* 17:1-14
- Gero S, Gordon J, Carlson C, Evans P, Whitehead H (2007) Population estimate and inter-island movement of sperm whales, *Physeter macrocephalus*, in the eastern Caribbean. *J. Cetacean Res. Manage.* 9:143-150
- Gero S, Whitehead H (2016) Critical decline of the eastern Caribbean sperm whale population. *PLOS One.* 11 (10): e0162019.

- Gordon JCD, Moscrop A, Carlson C, Ingram S, Leaper R, Matthews J, Young K (1998) Distribution, movements, and residency of sperm whales off the commonwealth of Dominica, eastern Caribbean: Implications for the development and regulation of the local whalewatching industry. *Rep. Int. Whal. Commn.* 48:551-557
- Hoyt E (1999) The potential of whale watching in the Caribbean: 1999+. Whale and Dolphin Conservation Society, Bath, UK
- Hoyt E (2001) Whale watching 2001: Worldwide tourism numbers, expenditures, and expanding socioeconomic benefits. International Fund for Animal Welfare, Yarmouth Port, MA
- Hoyt E, Hvenegaard GT (2002) A review of whale-watching and whaling with applications for the Caribbean. *Coastal Management* 30:381-399
- IFAW (1997) Report of the workshop on the special aspects of watching sperm whales. International Fund for Animal Welfare, Crowborough, UK
- Jefferson TA, Lynn SK (1994) Marine mammal sightings in the Caribbean Sea and Gulf of Mexico, summer 1991. *Carib. J. Sci.* 30:83-89
- Lusseau D (2003) Male and female bottlenose dolphins, *Tursiops* sp., have different strategies to avoid interactions with tour boats in Doubtful Sound, New Zealand. *Mar. Ecol. Prog. Ser.* 257:267-274
- Lusseau D (2004) The hidden cost of tourism: Detecting long-term effects of tourism using behavioural information. *Ecology and Society* 9:2
- Lusseau D (2005) The residency pattern of bottlenose dolphins (*Tursiops* sp.) in Milford Sound, New Zealand, is related to boat traffic. *Mar. Ecol. Prog. Ser.* 295:265-272
- Mann J, Connor RC, Barre LM, Heithaus MR (2000) Female reproductive success in bottlenose dolphins (*Tursiops* sp.): Life history, habitat, provisioning, and group-size effects. *Behav. Ecol.* 11:210-219
- Mann J, Kems C (2003) The effects of provisioning on maternal care in bottlenose dolphins. In: Gales N, Hindell M, Kirkwood R (eds) *Marine mammals and humans: Towards a sustainable balance*. CSIRO Publishing, pp 480
- Mann J, Smuts B (1999) Behavioral development in wild bottlenose dolphin newborns (*Tursiops* sp.). *Behaviour* 136:529-566
- Mattlia D, Clapham PJ (1989) Humpback whales, *Megaptera noveangliae*, and other cetaceans in the northern Leeward Islands, 1985 and 1986. *Can. J. Zool.* 67:2201-2211
- Mignucci-Giannoni AA (1998) Zoogeography of cetaceans off Puerto Rico and the Virgin Islands. *Carib. J. Sci.* 34:173-190
- Mignucci-Giannoni AA, Swartz SL, Martinez A, Burks CM, Watkins WA (2003) First records of the pantropical spotted dolphin (*Stenella attenuata*) for the Puerto Rican bank, with a review of the species in the Caribbean. *Carib. J. Sci.* 39:381-392
- Orams M (2001) From whale hunting to whale watching in Tonga: A sustainable future? *Journal of Sustainable Tourism* 9:128-146

- Orams M, Hill GJE, Baglioni AJ (1996) 'Pushy' behavior in a wild dolphin feeding program at Tangalooma, Australia. *Mar. Mamm. Sci.* 12:107-117
- Orams MB (2000) Toursits getting close to whales, is it what whale-watching is all about? *Tourism Management* 21:561-569
- Reeves RR (1988) Exploitation of cetaceans in St. Lucia, Lesser Antilles, January 1987. *Rep. Int. Whal. Commn.* 38:445-447
- Reeves RR (2005) Distribution and status of marine mammals of the Wider Caribbean Region: An update of UNEP documents. pp 8. UNEP(DEC)/CAR WG.27/INF.3
- Roden CL, Mullin KD (2000) Sightings of cetaceans in the northern Caribbean Sea and adjacent waters, winter 1995. *Carib. J. Sci.* 36:280-288
- Rosario-delestre RJ, Rodriguez-Lopez MA, Mignucci-Giannoni AA, Mead JG (1999) New records of beaked whales (*Mesoplodon* spp.) for the Caribbean. *Carib. J. Sci.* 35:144-148
- Scheidat M, Castro C, Gonzales J, Williams R (2004) Behavioural responses of humpback whales (*Megaptera novaeangliae*) to whalewatching boats near Isla de la Plata, Machalilla National Park, Ecuador. *J. Cetacean Res. Manage.* 6:63-68
- Swartz SL, Cole T, McDonald MA, Hildebrand JA, Oleson EM, Martinez A, Clapham PJ, Barlow J, Jones ML (2003) Acoustic and visual survey of humpback whale (*Megaptera novaeangliae*) distribution in the eastern and southeastern Caribbean Sea. *Carib. J. Sci.* 39:195-208
- Taruski AG, Winn HE (1976) Winter sightings of odontocetes in the West Indies. 22:1-22 van Bree PJH (1975) Preliminary list of the cetaceans of the southern Caribbean. *Stud. Fauna Curacao Caribb. Isl.* 48:79-87
- UNEP (2005) Text of Protocol concerning specially protected areas and wildlife in the Wider Caribbean Area – Caribbean environment programme portal. [Available from <http://www.cep.unep.org/cartagena-convention/plonearticlemultipage.2005-1130.9771186485/plonearticle.2005-11-30.0334950413>].
- Ward N, Moscrop A (1999) Marine mammals of the Wider Caribbean Region: A review of their conservation status. pp 27. UNEP(WATER)/CAR WG.22/INF.3
- Ward N, Moscrop A, Carlson C (2001) Elements for the development of a marine mammal action plan for the Wider Caribbean: A review of marine mammal distribution. pp 83. UNEP(DEC)/CAR IG.20/INF.3
- Watkins WA, Daher MA, Samuels A, Gannon DP (1997) Observations of *Peponocephala electra*, the melon-headed whale, in the south-eastern Caribbean. *Carib. J. Sci.* 33:34-40
- Watkins WA, Moore KE (1982) An underwater acoustic survey of sperm whales (*Physeter macrocephalus*) and other cetaceans in the southeast Caribbean. *Cetology* 46:1-7
- Whalers WCo (2008) World whaling: Caribbean. In, vol 2008 Whitehead H, Moore MJ (1982) Distribution and movements of West-Indian humpback whales in winter. *Can. J. Zool.* 60:2203-2211

- Williams R, Ashe E (2007) Killer whale evasive tactics vary with boat number. *J. Zool.* 272:390-397
- Williams R, Bain DE, Ford JKB, Trites AW (2002a) Behavioural responses of male killer whales (*Orcinus orca*) to a 'leapfrogging' vessel. *J. Cetacean. Res. Manage.* 4:305-310
- Williams R, Lusseau D, Hammond PS (2006) Estimating relative energetic costs of human disturbance to killer whales (*Orcinus orca*). *Biol. Cons.* 133:301-311
- Williams R, Trites AW, Bain DE (2002b) Behavioural responses of killer whales (*Orcinus orca*) to whale-watching boats: Opportunistic observations and experimental approaches. *J. Zool.* 256:255-270

APPENDIX 1: List of Cetacean Species in the Wider Caribbean Region

Suborder Mysticeti: The Baleen Whales

IUCN Status

Family BALAENOPTERIDAE: The Rorqual Whales

<i>Balaenoptera musculus</i>	Blue Whale	Endangered
<i>Balaenoptera physalus</i>	Fin Whale	Vulnerable
<i>Balaenoptera borealis</i>	Sei Whale	Vulnerable
<i>Balaenoptera edeni</i>	Bryde's Whale	Insufficiently Known
<i>Balaenoptera acutorostrata</i>	Minke whale	Insufficiently Known
<i>Megaptera novaeangliae</i>	Humpback whale	Vulnerable

Suborder Odontoceti

Family PHYSETERIDAE

<i>Physeter macrocephalus</i>	Sperm whale	Insufficiently Known*
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Family KOGIIDAE

<i>Kogia breviceps</i>	Pygmy sperm whale	Insufficiently Known
<i>Kogia simus</i>	Dwarf sperm whale	Insufficiently Known

Family DELPHINIDAE: The Oceanic Dolphins

<i>Peponocephala electra</i>	Melon-headed whale	Insufficiently Known
<i>Feresa attenuata</i>	Pygmy killer whale	Insufficiently Known
<i>Pseudorca crassidens</i>	False killer whale	Insufficiently Known
<i>Orcinus orca</i>	Killler whale	Insufficiently Known
<i>Globicephala macrorhynchus</i>	Short-finned pilot whale	Insufficiently Known
<i>Steno bredanensis</i>	Rough-toothed dolphin	Insufficiently Known
<i>Sotalia guianensis</i>	Costero	Insufficiently Known
<i>Lagenodelphis hosei</i>	Fraser's dolphin	Insufficiently Known
<i>Delphinus delphis</i>	Short-beaked common dolphin	Insufficiently Known
<i>Delphinus capensis</i>	Long-beaked common dolphin	Insufficiently Known
<i>Tursiops truncatus</i>	Common bottlenose dolphin	Insufficiently Known
<i>Stenella attenuata</i>	Pantropical spotted dolphin	Insufficiently Known
<i>Stenella frontalis</i>	Atlantic spotted dolphin	Insufficiently Known
<i>Stenella coeruleoalba</i>	Striped dolphin	Insufficiently Known
<i>Stenella longirostris</i>	Spinner dolphin	Insufficiently Known
<i>Stenella clymene</i>	Clymene dolphin	Insufficiently Known
<i>Grampus griseus</i>	Risso's dolphin	Insufficiently Known

Family ZIPHIIDAE: The Beaked Whales

<i>Ziphius cavirostris</i>	Cuvier's beaked whale	Insufficiently Known
<i>Mesoplodon densirostris</i>	Blainville's beaked whale	Insufficiently Known
<i>Mesoplodon europaeus</i>	Gervais' beaked whale	Insufficiently Known
<i>Mesoplodon bidens</i>	Sowerby's beaked whale	Insufficiently Known
<i>Mesoplodon mirus</i>	True's beaked whale	Insufficiently Known

*Recent research by Gero et al (2016) suggests the small size, distinctiveness and current decline of the eastern Caribbean sperm whale community meets criteria to be listed as Endangered (Criteria C1) under regional assessment.