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An Evaluation of Potential Management Options for the Indo-Pacific Bottlenose Dolphin (*Tursiops aduncus*) Population in Kizimkazi, Zanzibar

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An Evaluation of Potential Management Options for the Indo-Pacific Bottlenose Dolphin (*Tursiops aduncus*) Population in Kizimkazi, Zanzibar

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December, 2013

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Table of Contents

Acknowledgements	3
Abstract	4
Introduction	5
Study Area	7
Methodology	8
Results	11
Discussion	22
Conclusion	33
Recommendations	34
References	35
Appendices	36

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Abstract

A short-term study was conducted between November 3rd and November 30th of 2013 in which dolphin area usage was assessed and interviews conducted in order to evaluate which actions should be considered in order to improve dolphin management in Kizimkazi, Zanzibar. GPS coordinates during dolphin sightings were recorded while on tourist and volunteer boat trips to assess dolphin movement and distribution. While on the tourist boats, observations were also made regarding boat operator, tour guide, and tourist knowledge and behavior in relation to tourism interaction guidelines. Interviews were conducted with locals involved in the dolphin tourism sector, tour company representatives, government employees, and experts to determine any changes in dolphin sightings, the issues in the industry, the roles of government departments and NGOs, and potential solutions to improve dolphin tourism in the area, with the goal of creating recommendations for future action. It was discovered that dolphin sightings in the study occurred in different areas than the most recent previous study and that there may also be a shift in group sizes and behavior, all as a result of pressures from fishing and tourist boats. From both observations and interview responses, it was noticed that the guidelines for interaction (Appendix 1) are almost always violated. This is due to the fact that, despite many seminars having been held in the area, all boat captains still lack complete knowledge of these guidelines. To date, government departments have had no direct involvement in managing dolphin populations in the area. It is recommended that there be a compromise reached with fishermen to lower dolphin bycatch, that the government set a standard payment to boat captains per boat trip, and that the current guidelines be altered to make them simpler and enforcement be carried out by the Department of Fisheries using funding from the Menai Bay Conservation Area. Throughout this process, there will need to be continued communication and cooperation with locals to ensure long-term success of this conservation plan.

Introduction

Of the 10 species of dolphins found in the Indian Ocean, two species, the Indo-Pacific bottlenose dolphin (*Tursiops aduncus*) and the humpback dolphin (*Sousa chinensis*), can be found in Zanzibar's Menai Bay, with estimated populations of 136 and 63 individuals, respectively (Stensland et al., 2006, p. 673). Since 1992, tourists visiting Zanzibar have traveled to Kizimkazi to partake in dolphin-watching and dolphin-swimming (Stensland et al., 2006, p. 668). This tourism usually involves the bottlenose dolphins, which approach boats more readily than the shy humpback. Dolphins were previously hunted in this area, with the last catch taking place in 1996 and consisting of 23 individuals, 12% of the combined estimated populations of both species in the area. Considering that the International Whaling Commission (IWC) states that an annual removal rate of just 2% for small cetacean species is unsustainable (Stensland et al. 2006, p. 679), this practice would have removed members of the population faster than they could reproduce, seriously damaging the chances of long-term survival for the cetacean populations in the area. Luckily, with the growth of the dolphin tourism industry, many fishermen became boat captains for tourists, ending the dolphin hunts. However, the dolphins are not without continued risks and pressures. A study on cetacean bycatch revealed 19 reported incidents between 1995 and 1999 in Menai Bay, with numbers steadily increasing each succeeding year. A more recent study of dolphin bycatch revealed an annual removal of more than 9% of the population of bottlenose dolphins alone (Berggren et al., 2007, p. viii). With populations already needing to recover from unsustainable hunting practices, such removal through bycatch, if continued, will keep the Menai Bay dolphin populations extremely unstable. Unfortunately, the dolphin tourism industry that seemed to save the dolphins from a possible local extinction may now also be adding new stress on the bottlenose dolphins. A study on the effects of tourist boats on dolphin behavior off the coast of Kizimkazi showed that the dolphins spent 44% more of their time traveling while in the presence of tourist boats, rather than partaking in other behaviors such as resting, foraging, and socializing. These behaviors are important for the animals to find food, nurse their young, successfully mate, stay physically fit, and ultimately maintain the health of the population. Similarly, Constantine et al. (2004) recorded that dolphins in the Bay of Islands, New Zealand, were observed resting during 69% of observation made with no tourist boats present, but during only 0.5% of observations while in the presence of tourist boats. With a tourism intensity of 10% of daytime hours being

sufficient to affect the cumulative energy budget of dolphins, the estimated intensity of 43% of daytime hours for the Menai Bay dolphins is expected to cause long-term population decline (Christiansen et al., 2010, p. 96-97). This intensity is partially due to the rapid increase in the number of tourist boats operating in Kizimkazi, of which there were 40 by 2003 (McCauley, 2003, p. 8). The area in which the dolphins encounter tourist boats represents about 44% of their total distribution range, the majority of which consists of important areas used for foraging and socializing (Stensland et al., 2006, p. 675). In 1997, the University of Dar Es Salaam University's Institute of Marine Science created guidelines for interaction (Appendix 1), describing a total of ten suggested rules to be followed by tour boats and swimmers in order to minimize negative impact on the dolphins, but studies have shown that these guidelines have not made a significant impact on the effects on the dolphins by tourism activities due to a lack of compliance. If pressures put on the dolphins become severe enough, it is possible they will use a long-term avoidance strategy in the areas in which they encounter tourist boats (Lusseau, 2003, p. 1791). This strategy has been observed in several other dolphin populations exposed to long-term boat disturbance. For example, dolphins in Sarasota Bay were observed to use deep-water channels more when higher boat traffic was present (Constantine et al, 2004, p. 305). When this shift occurs, dolphins can be forced to use habitat that is less suitable to their needs, such as an area with less food availability or increased risk of predation. If dolphins were to migrate away from their current area, the dolphin tourism industry itself would also be hurt due to less dolphins for tourists to readily view. In order to control current stresses on Menai's bottlenose dolphins and ensure that this already threatened population stays in its current location with healthy population numbers, there is a need for fishing and tourism practices to be altered to make them more sustainable. To understand the most realistic solutions by which to do this, the present study aims to provide information on the current status of dolphin tourism in Kizimkazi, including the current range of the dolphins, the logistics of dolphin tours, the extent of the impact caused by both fishing bycatch and tourism, effectiveness of training seminars, knowledge of and compliance with Menai Bay interaction guidelines (Appendix 1), government and NGO involvement and impact, as well as the opinions and wishes of the local people involved.

Study Area

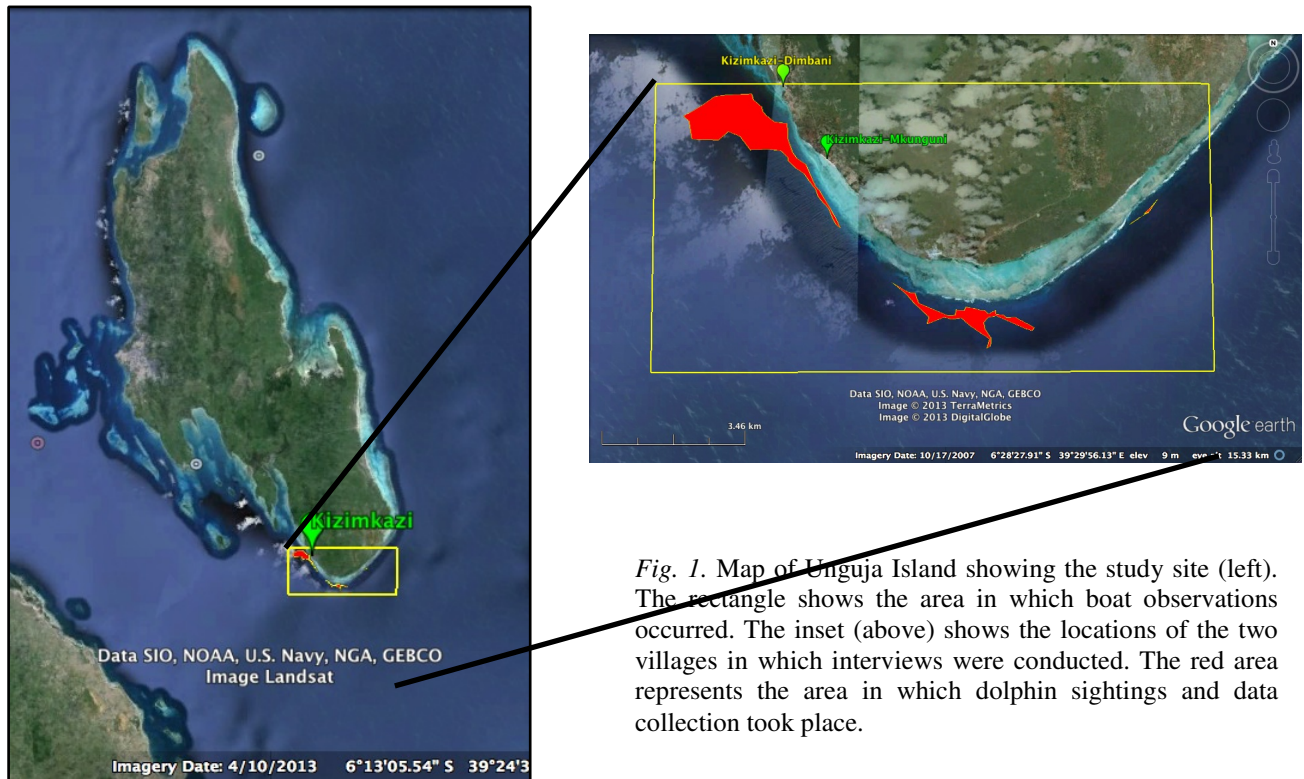


Fig. 1. Map of Unguja Island showing the study site (left). The rectangle shows the area in which boat observations occurred. The inset (above) shows the locations of the two villages in which interviews were conducted. The red area represents the area in which dolphin sightings and data collection took place.

This study was conducted in the town of Kizimkazi, on the Southwestern coast of Zanzibar's larger island of Unguja, 40 miles off the coast of mainland Tanzania. This area of coastline is part of the Menai Bay Conservation Area, a Marine Protected Area, and is the main destination in Zanzibar for dolphin tourism activities. Kizimkazi consists of two villages in which equal number of interviews with boat captains were conducted; Kizimkazi-Dimbani and Kizimkazi-Mkunguni. Additionally, interviews with tour companies were conducted in Stone Town, Zanzibar. Boat observations were made on tourist and volunteer boats that travelled within an area to the West of Dimbani and also along the Southern and Eastern sections of the southern tip of Unguja (*Fig. 1*)

Due to time and transportation constraints, boat observations were conducted solely on boats departing from Dimbani, although information collected during boat observations regarding the tourist boats and the dolphins during the dolphin-watching interactions is assumed to represent both villages since all tourists are taken to see the same dolphins in the same locations.

Methodology

Interviews with Tour Company Representatives

Interviews were conducted in English with representatives from nine randomly selected tour companies with offices in Stone Town for better understanding of the logistics of the dolphin tourism business and to assess the opinions of tour companies regarding present issues and potential solutions. The company representatives were asked questions (Appendix 2) about the popularity of their dolphin tour excursions, how tourists learn of the dolphin tours, other activities tourists complete while in Kizimkazi, how the company supplies a boat and tour guide, tourist comments after the dolphin tours, the presence of issues in the dolphin tourism industry, potential improvements to be made to dolphin tours, and whether government policy for more control would be a positive change.

Interviews with Government Representatives

A Chairman with the Commission of Tourism was interviewed in English about the role of the Commission in the dolphin tourism industry of Kizimkazi and the process of boat registration and tour guide certification (Appendix 3). An interview was also conducted in English with an official of the Department of Fisheries as well as a local employee of the Department office in Kizimkazi-Dimbani about the involvement of that department and the Menai Bay Conservation Area organization in the dolphin tourism of Kizimkazi and the potential for government action to manage threats to local dolphin populations (Appendix 4 and 5). The Sheha (local government leader) in each of the two Kizimkazi villages were interviewed in Swahili with the aid of a translator and were asked about the current number of boats registered in their respective villages, the number of those boats used for dolphin tourism, the number of residents directly reliant on dolphin tourism, their opinions on the presence of problems in the dolphin tourism industry, the effectiveness of workshops, and potential solutions such as national or local government intervention (Appendix 6).

Interviews with NGO Representatives

An interview was conducted in English with a representative of WIOMSA who has personally been involved in the area since 1997. Questions asked of this individual (Appendix 7) were used to gather more

information on the training seminars that have been offered in the area and also to ask their opinion, based on their extensive personal experience with the dolphin tourism activities, regarding what future action should take place. Two staff members with African Impact, an organization with a project currently running in Kizimkazi-Dimbani to monitor dolphin/tourist interaction, were interviewed about their observations regarding dolphin distribution and their opinions of what issues exist within dolphin tourism and what solutions would be most practical and successful for improving dolphin tourism given the realities of the situation in the area (Appendix 8).

Interviews with Locals Involved in the Dolphin Tourism Sector

Thirty randomly selected locals with direct involvement in the dolphin tourism sector, fifteen from Dimbani and fifteen from Mkunguni, were asked questions to discover changes over time of dolphin sightings, number of tour boats operating, opinions of training seminars, knowledge of tourist interaction guidelines, and opinions on the presence of problems and potential solutions (Appendix 9). These interviews were conducted in Swahili with the aid of a translator to ensure quality of information collected, with each interview lasting between fifteen and forty minutes. (Full List of Interviews Conducted can be found in Appendix 10).

Boat Observations - Tourist Boats

Observations were made during a total of seventeen boat trips, nine of which were onboard tourist boat trips. These observational trips started between 6:55am and 10:06am, ending between 8:40am and 12:10pm, with the observation time with dolphins ranging depending on the wishes of the tourists and boat operators. During dolphin sightings from tourist boats, data was collected regarding number of boats present, number of tourists per

Table 1. Descriptions of the four behavioral categories.

<u>Behavior</u>	<u>Definition</u>
Resting	Low level of activity and slow movement with three to four surfacings before a longer dive.
Traveling	Movement faster than resting speed and in a consistent direction.
Socializing	Body contact, mating, displays, and play.
Foraging	Fast movements, sudden direction change, surface rushes, and repeated leaping in synchronization.

boat, number of adult dolphins present, number of dolphin calves present, the number of interaction guidelines violated by either boat operators or tourists within 10m of surfacing dolphins, and total amount of time spent with the dolphins. Dolphin behavior was also noted when obvious signs matched one of the four behavior descriptions matching those used as

standard in other dolphin behavioral studies (Table 1). GPS data (using a Garmin Etrex Handheld GPS with an average accuracy of approximately 4m) was also taken to record dolphin location and movement in the presence of tourist boats. Latitude and Longitude were recorded every time the boat from which observations were being made came within 20m of a surfacing dolphin or within 20m of where a dolphin had been seen during the proceeding surface. All of the above data was collected in order to assess the current distribution and movement of the dolphins as well as level of boat compliance with guidelines, information that is necessary in analyzing the feasibility of different management strategies.

Boat Observations -African Impact Volunteer Boat

Additional observations were made during eight boat trips with the African Impact volunteer team. These boat observation trips started between 6:45am and 6:55am, ending between 7:30am and 8:40am, with observation time with dolphins lasting exactly thirty minutes per boat trip. During dolphin sightings from the African Impact observation boat, all of the same observations were made as when onboard tourist boats, with the addition of recording dolphin behavior during each surfacing sequence, which could be done with the help of the African Impact staff, who have substantial experience in determining more subtle dolphin behavior for their project data sets. All of the same GPS data was collected in the same manner as on tourist boats.

Data Processing

All interview data was condensed and tabulated in Excel and analyzed to find the percentage of interviewees who gave answers in common to determine popular opinions and draw other conclusions. Using the GPS data collected during boat trips, a map of observed dolphin distribution was created in Google Earth in order to assess the area coverage in which sightings took place. Also using this program, the distance travelled during each observation period was calculated and then used to give average speed when factoring in the time span over which that distance was travelled. This data was then compared with other factors that was recorded as observations, such as dolphin group size and behavior, in the hope of being able to draw conclusions about dolphin habitat usage.

Results

Interviews with Tour Companies

All tour companies interviewed mentioned that early morning, between 6am and 8am, is the preferable time for tourists to go on dolphin tours, although most make exception for tourists that request later times. 66.6% of tour companies said that most of their tourists find out about the dolphin tours online before coming to Zanzibar. These tour companies take an average of just under ten tourists per week (SD = 4.63) to Kizimkazi for dolphin tourism. Two-thirds said that they send a trained tour guide with tourists to Kizimkazi rather than supply a local guide. Of companies that mentioned negative comments made by tourists in post-trip evaluations, four different comments were cited as the most common.

Tourists complaining about not seeing dolphins was number one according to three companies, two companies said that tourists most often commented that they felt the dolphins were being stressed, and another two said the most common was that there were too many boats. Also, one company said most negative comments were that the tour boats lacked lifejackets (*Fig 2*). In making suggestions for improving dolphin tours, six out of the nine tour companies mentioned a need to limit the number of boats with a single dolphin group at any one time.

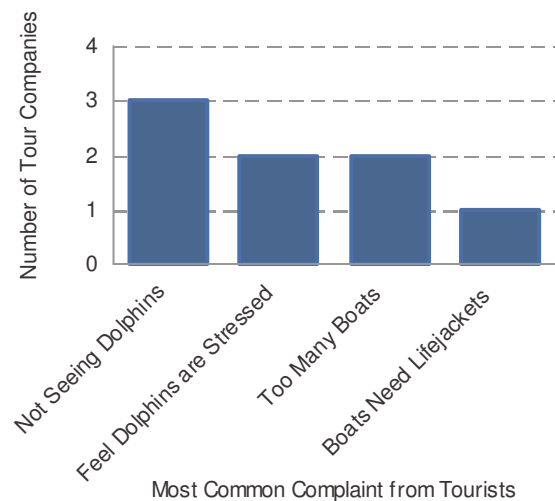


Fig. 2. The most common negative comment about dolphin tours made by tourists according to tour company representatives and the number of tour companies that cited the same comment.

Interviews with Government Representatives

Commission Of Tourism

According to the representative interviewed, the Commission issues licenses to all tour guides before they can legally start working in the tourism sector. To get this license, those wanting to work as a guide must attend a training course provided by the Institute of Tourism Training in Maruhubi, located close to Stone Town.

It is the responsibility of the Zanzibar Association of Tour Guides (ZATOGA) to inform those who want to become tour guides of how to complete this training course and obtain a license. The training courses include mostly general and some specific skills as well as information regarding regulations of tourism in order to ensure that all tourist experiences are of a standard quality. According to the respondent, the problem with the training is that only basic information is covered with no opportunity for further instruction concerning different sectors within tourism. In regards to Kizimkazi, the Commission does not currently require those operating tours to complete this course for the full license, but instead should attain a permit from the local Sheha. There are no limits to how many people can get a permit, although the Commission representative interviewed said that they are aware of the risks involved with over-exposing dolphins to tourist boats, which lowers the amount of time they have to eat, feed, rest, and mate. The reason permits are unlimited for boat captains in Kizimkazi is because the government wants to encourage citizens to become involved in the tourism industry in order to reduce national unemployment. Only with research and recommendations on the need to limit tourism activities regarding dolphins will there be a chance to limit the number of boats operating for tours in Kizimkazi. When asked what government department would be responsible for creating a law to control or improve dolphin tourism, the respondent replied that the Minister of Tourism would be willing to create a bill for this purpose.

Department of Fisheries

A representative of the Department of Fisheries said that there have been some minor previous attempts to address the dolphin tourism problems in Kizimkazi, but that none have been successful. Until recently, there was a debate between this Department and the Commission of Tourism in which each said the other was the government branch responsible for taking action, which blocked progress. Now, the Department of Fisheries would like to claim responsibility to take action because most boats involved with tourism activities are registered as fishing vessels so the Department of Fisheries has access to more information on current tourism activities. Also, enforcement would have to take place on the water, which the Department of fisheries has the resources and experience to conduct. A local representative of the Department of Fisheries office located in Kizimkazi-Dimbani said that Mkunguni, being a larger village with a higher population, also had a higher number of boats than Dimbani, and also a higher number of boats conducting dolphin tours (*Table 2*). Patrols are made with one of five

available vessels an average of three times a week in the area and an average of three people per month are sent to the court for illegal fishing as a result of these patrols. The representative communicated, however, that there are still problems with illegal fishing, which many people now conduct in cooperation with fishermen from mainland Tanzania so as to be able to move fishing gear out of the area when it is seen that a patrol is occurring. Despite ongoing illegal fishing, the Department claims to have significantly lowered the amount of destructive fishing in the area, increasing fish counts and also ending dolphin hunts. Regarding dolphin tourism, this employee cited several issues, including a lack of system to control tours, dolphins being accidentally caught in illegal fishing nets, and some tourists refusing to pay the \$3 entrance fee to the Menai Bay Conservation Area. This employee believes that if the guidelines for interaction for dolphin tourism were made law, the Department of Fisheries could effectively use patrols to catch those individuals violating the guidelines and take them to court for punishment, thereby improving the quality of dolphin tourism in Kizimkazi.

Local Government

The Masheha of Kizimkazi-Dimbani and Kizimkazi-Mkunguni estimated that approximately 45% and 20% of the working population of their respective villages had jobs directly replying on tourism, including work as boat captains, hotel staff, and restaurant staff. This equals approximately 790 individuals in Dimbani and 612 individuals in Mkunguni. In the opinions of these government representatives, the problems of dolphin tourism include low numbers of tourists in recent years and low salaries for local people involved in dolphin tourism. They also expressed that the \$3 paid by tourists to the Menai Bay Conservation Area should have a more direct positive effect in the local community and help those who conduct dolphin tourism. Each Sheha said that many seminars have been held in their communities, but the Sheha of Dimbani said they are very helpful while the Sheha of Mkunguni said that most boat captains to not change their behavior based on what is taught at the seminars and that it is possible that the seminars are too long and contain too much material, losing the interest of

Table 2. The number of boats registered with the Department of Fisheries, the number of those boats used for dolphin tourism, and the number of Fisheries/MBCA boats in both Kizimkazi-Dimbani and Kizimkazi-Mkunguni.

	Dimbani	Mkunguni
Total Number of Boats Registered	81	151
Number of Registered Boats Used for Tourism	14	32
Number of Patrol Boats	5*	0

* These boats are stationed at Dimbani but patrol the area used by residents of both Kizimkazi villages.

those attending. Both Masheha agreed that the local government should have a role in any improvements to dolphin tourism, but that the Department of Fisheries should make the guidelines for interaction enforceable. One of the Masheha also suggested a rotation system for the boats in the same style as the Dala Dalas, for which multiple vehicles run at alternating times to create a smoother system, as this would lower the number of boats with the dolphins at any one time. The Sheha of Dimbani additionally suggested that limiting fishing to areas away from known dolphin habitat could be beneficial for dolphin tourism because dolphin bycatch hurts the population. Personally, the Sheha says he knows of 12 dolphins having been caught and killed by accident within the last two years.

Interviews with NGO Representatives

Two NGOs are currently working together in Kizimkazi to attempt to monitor and improve dolphin tourism. The first is the Western Indian Ocean Marine Science Association (WIOMSA), which first started involvement in the area in 1997, when they created their first brochure of the Guidelines for Interaction to distribute to locals operating boats for dolphin tours. Since then, this organization has remained very involved in the area through running seminars and assisting in studies in cooperation with the Kizimkazi Dolphin Tour Operator Association (KIDOTOA), a locally-run NGO with the mission of improving dolphin tours. A total of over fifteen seminars have been held since 1997, with an average of one per year, with the most recent having been held within the last few months. These seminars usually allow for a total of forty boat captains from Dimbani and Mkunguni, half from each, as well as the local Masheha, a school teacher, and two women to attend two days of lectures. The number of people able to attend is primarily limited due to the fact that participants are paid, so funding restricts the scope of the seminar. Topics covered include dolphin biology and ecology, the history of dolphin tourism in Zanzibar, conservation, the interaction guidelines, how dolphin tourism is conducted in other countries, and more. The seminars also include a boat trip with a dolphin expert to directly observe the dolphins in order to learn more about their behavior. There are no tests at the end of the lectures, but group discussion is used to assess the impact of the seminars on the knowledge of attendees. Upon completing the seminars, participants are given a certification, but it is unofficial and the names of those individuals completing the course cannot be given to tour companies to encourage hiring trained boat captains over untrained boat

captains. According to the representative for these seminars, improvements in dolphin tourism can sometimes be seen for a couple months following a seminar, but there has been no overall change in boat captain conduct. This representative recommends that the next step should be government regulation or by-laws to control dolphin tourism, with a registration and rotation system to limit the number of boats with one group of dolphins at any one time. It is in the opinion of this representative that dolphin numbers have been decreasing in Menai Bay and will continue to do so if dolphin tourism is not successfully made more sustainable. Since August of this year, a volunteering organization called African Impact has been conducting morning boat surveys to collect information on the local dolphin population and tourist interactions that will hopefully help in the creation and implementation of regulation to improve dolphin tourism. The two staff members working for this organization in Kizimkazi both said that they normally see dolphins close to shore, in water no deeper than twenty meters, and usually close to fishing nets. They also noted that dolphins are usually seen traveling South in the morning while in the presence of tourist boats. Regarding guidelines, both staff members said that they have observed more violations when more boats are present at the same time with a group of dolphins and that driving habits of the boat captains are often very poor. They suggest that the guidelines be simplified to help boat operators better understand and follow them. A rotation system to limit the number of boats with dolphins at any one time was also suggested as an improvement, but these staff members believe that no solutions will work if there is not sufficient cooperation from the local community members. They said that this has been proven by the fact that all of the seminars held have made no noticeable changes because the local people do not have the will to follow the guidelines even though they have been educated about them. Despite the pressures of dolphin tourism they have witnessed, these staff members agree that fishing most likely presents a greater and more direct current threat to the dolphins in the area. The staff members stress that there needs to be more in-depth research on the current dolphin population in order to truly understand the effects of the dolphin tourism and fishing threats on the overall population growth.

Interviews with Locals Involved in the Dolphins Tourism Sector

Seminars

Of the thirty interviews conducted in this category, twenty-three were with locals currently working as dolphin tour boat captains. These boat captains had an average age of twenty-eight years ($SD = 6.60$), with twenty-one years being the average age that all current and former boat captains (twenty-eight total) started working in dolphin tourism ($SD = 5.89$). The number of years interviewees have worked as a boat captain ranged from two to twenty, with a mean of 7.7 ($SD = 5.08$). Of all of the current and former boat captains interviewed, only one answered that they had no knowledge of seminars for those working in dolphin tourism. Of those current boat captains who know of the seminars, approximately 36% have not attended. These interviewees mentioned that there was a limit on the number of people able to go to any given seminar, which meant that they had no opportunity to attend even if they wished to. Within the 64% who have attended seminars, 71% have participated in more than one, with five seminars being the maximum for the boat captains interviewed. When asked about the guidelines for interaction between tourists and dolphins, approximately 22% of respondents, all of which had never attended a seminar, said that there were no guidelines in existence or that they had no knowledge of them.

Of the individuals who knew of the guidelines, none could correctly list more than four of the ten, with the majority able to correctly describe two of the guidelines. In creating a comparison of the number of seminars a respondent had attended versus the number of guidelines correctly given in the interview, there was a positive correlation coefficient (r) of 0.29 and R^2 value of 0.0848, showing a weak positive relationship (Fig.3). Of those who knew of the guidelines, 84% said that only 'some', 'few', or 'none' of the current boat captains follow the guidelines. Approximately 43% said that not enough education of the guidelines to boat captains was the reason, while an additional 43% cited the fact that boat captains wish get their tourists closer to the

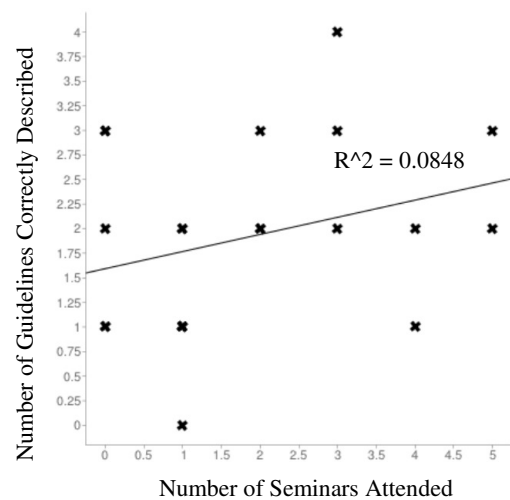


Fig. 3. The number of seminars attended by the respondent versus the number of guidelines correctly described out of ten, with linear-regression best-fit line and R^2 value.

dolphins first so that they can spend little time on each boat trip in order to return to the beach as soon as possible and then return to the dolphins with other groups of tourists in the same morning to increase their income. When asked questions in relation to future seminars, all respondents said they would like to learn more about dolphins, and of those who suggested new topics to be included in seminars, one-third said they would like to learn more about tourism in general and almost one-half said they would like there to be foreign language training included to facilitate communication between themselves and tourists. In

discussing probable participation in future seminars, 100% of respondents disagreed with the statement, "I do not want to attend a seminar". Additionally, 100% of respondents replied in agreement with the statement, "I would attend a seminar if I got paid", 95.5% agreed with the statement, "I would go to a seminar if I did not get paid and did not have to pay", and 90.9% agreed with the statement, "I would go to a seminar if I had to pay." (Fig. 4).

Dolphin Sightings

Although all interview respondents said that tourists are taken out early in the morning, usually starting at 6:30am, 23% mentioned that dolphins are available for dolphin-watching at any time of day and 33% said that evenings (between 3:30pm and sunset) were also a good time to see dolphins. 52% of boat captains said they conduct an average of ten or more trips per week during the high season, compared to the low season, in which two-thirds make an average of one trip per week. When asked about the locations for dolphin sightings, 43% of interviewees said that they now saw dolphins more often further from shore compared to when they started work as a boat captain. Thirteen of the boat captains interviewed talked about an area known to locals as 'Usine', located south of Mkunguni beach and close to shore. Ten of these thirteen captains said that in the past, there was a guarantee to see bottlenose dolphins in this area every day, but that the dolphins are less often viewed there and spread out to use a larger area now. While half of all boat captains interviewed said that dolphin group size had remained steady since they started working as a boat captain, half said that dolphin group sizes had decreased.

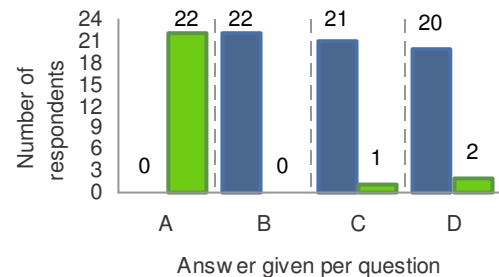


Fig. 4. The number of respondents who answered "True" and "False" to four statements; (A) I do not want to go to a seminar. (B) I would go to a seminar if I got paid. (C) I would go to a seminar if I did not get paid and did not have to pay. (D) I would go to a seminar if I had to pay.

Additionally, 20% of boat captains mentioned that they thought the number of dolphins in the bottlenose population has decreased whether groups size has changed or not. During dolphin sightings, boat captains said they currently see an average of approximately 19 tourist boats with one dolphin group. All boat captains were in agreement that the number of boats has increased in their time working in dolphin tourism (Fig. 5). When asked about current issues of dolphin tourism or areas that could be

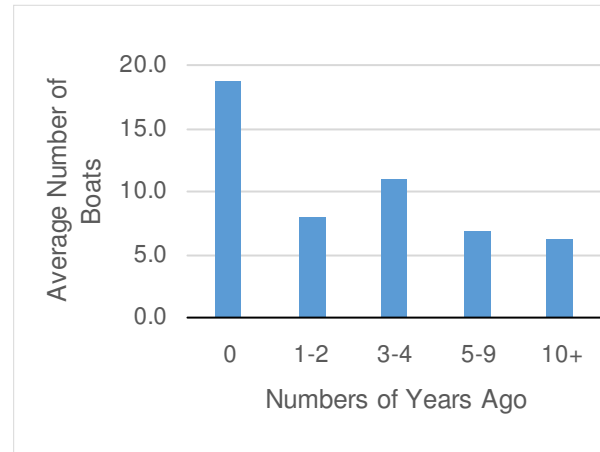


Fig. 5. Average number of boats seen with one group of dolphins now and when the boat captains interviewed started working in dolphin tourism.

improved, more than half of respondents said that not having a set price for dolphin tours was a major problem resulting in competition between boat captains and low salaries. In addition, 48% mentioned the fact that dolphins are sometimes accidentally caught and killed by fishing nets. Of those who mentioned dolphin bycatch, estimates on the number of dolphins killed ranged based on which incidents locals had personally witnessed or heard of. The highest estimation was an average of five dolphins per year, with one individual saying that four dolphins had been caught within the past two months alone, one occurring just two weeks before the start of this study and an additional bycatch witnessed by the researcher within the second week of the study. Besides bycatch, approximately 37% of interviewees mentioned that nets within areas of dolphin habitat are a problem because

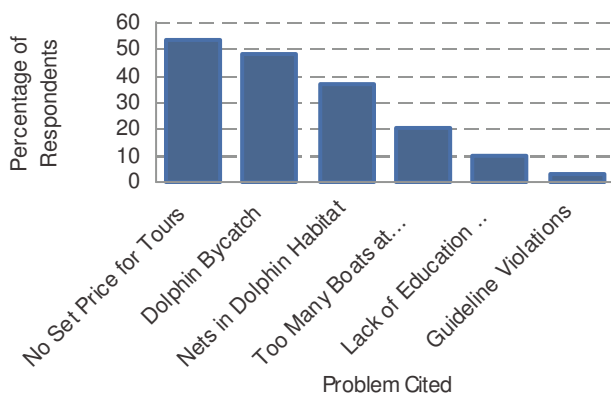


Fig. 6. The problems cited by locals interviewed about dolphin tourism and the percentage of respondents who mentioned the same problem.

dolphins will stop using an area in which they encounter many nets (Fig. 6). In addressing the current issues of dolphin tourism, 80% of respondents said they would like to see the interaction guidelines made enforceable with those who violate them and disturb the dolphins being punished by law. Half of all locals interviewed said there should be more control of fishing, either replacing the

type of nets that are dangerous to dolphins or not

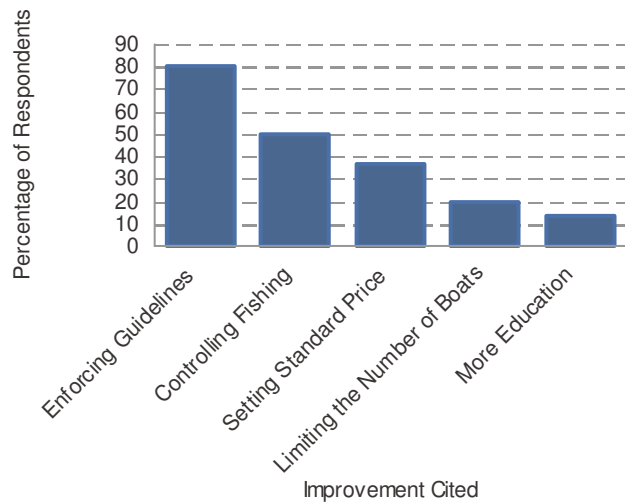


Fig. 7. The possible improvements cited by locals interviewed about dolphin tourism and the percentage of respondents who mentioned the same improvement.

Boat Observations

Observations

Indo-Pacific Bottlenose Dolphins were seen during fifteen boat trips, with sightings and data collection occurring for two separate sightings on three of those boat trips, accounting for a total of eighteen separate dolphin group sightings from boats. The average time spent taking observations with dolphin groups was thirty-four minutes ($SD = 17.45$), excluding two cases which occurred in passing rather than over a span of time. There was an weighted average of 5.64 boats with one group of dolphins at any one time ($SD = 2.03$), almost all of which were fiber boats, with an observed maximum of thirteen boats at one time. There was also an observed average of 3.34 tourists per boat ($SD = 1.75$). Dolphin group sizes ranged from one individual to approximately thirty-five individuals, not including calves. Data of group size shows a relationship between number of calves in a group with number of adults, which have a strong positive linear relationship ($R^2 = 0.74487$) (*Fig. 8*). Groups of dolphins for which the majority behavior in an

allowing nets to be placed in areas known to be used by dolphins. Other solutions included setting a standard price for tours, limiting the number of boats with one dolphin group, and continuing seminars for more education. (*Fig. 7*).

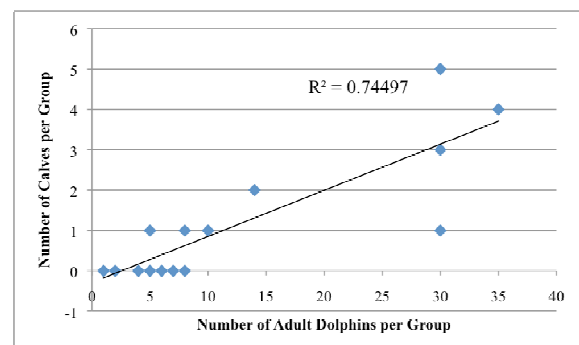


Fig. 8. The number of adult dolphins in one group and the number of calves present in that group, with a best-fit linear regression line and R^2 value.

observation period was resting were between ten and thirty individual adult dolphins while groups in which socializing occurred ranged between eight and thirty-five. Furthermore, traveling was observed as the dominant behavior in groups with numbers of individuals ranging between four and thirty-five. While interacting with tourist boats, dolphin behavior was observed to change based on the average number of guidelines violated, with groups with traveling as the dominant behavior associated with more guideline violations (*Fig. 9*). However, there was no significant direct relationship between the number of guidelines violated and the average speed of dolphin groups.

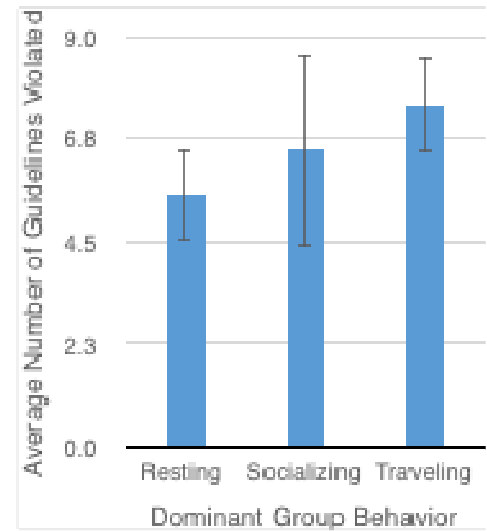


Fig. 9. The dominant group behavior of dolphin compared to the number of guideline violations by tourist boats.

GPS Data

Sightings took place in three distinct areas (known from here on as the Western, Southern, and Eastern Areas) (*Fig. 10*). These areas were of the following coverage sizes: 1.0448 Square Miles, 0.2682 Square Miles, and 0.0037 Square Miles, for a total area coverage of 1.3127 Square Miles (3.399893 km²). All but one of the sightings that occurred in the Western area were before 9am, while sightings made in the Southern area happened throughout the morning hours, although the majority of all sightings took place between 7am and 9am (*Fig. 11*). In comparing other variables between the three areas, there was a noticeable difference in average group size between the Western and Southern areas, which had averages of 5.67 (SD = 3.04) and 21.6 (SD = 13.1) adult



Fig. 10. Map of study site showing the three areas (Western, Southern, and Eastern) in which dolphin sightings occurred.

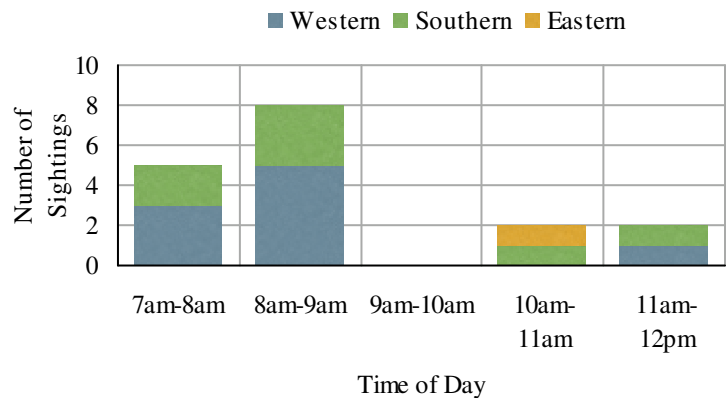


Fig. 11. Number of sightings per area per hour time-frame.

dolphins per group, respectively (*Fig. 12*). In comparing average speed of travel with area of sighting, however, there was no significant difference observed. The dominant behavior in the Western area was traveling, which was observed more than both

resting and socializing, while equal numbers of groups had resting and traveling as the dominant behavior in the Southern Area (*Fig. 13*). Although foraging was not observed as the dominant behavior for any groups, foraging was observed in a total of three group observations, all within the Southern area.

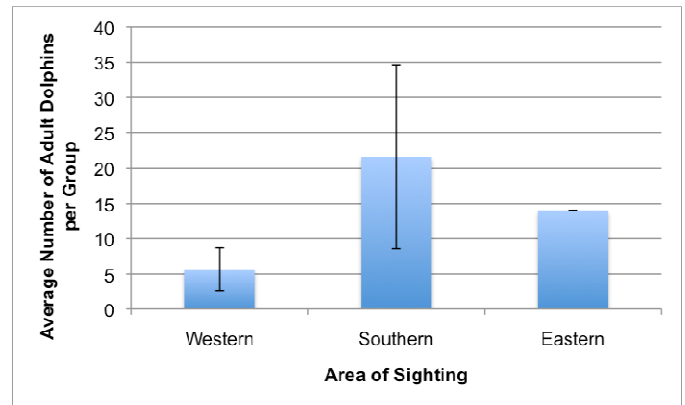


Fig. 12. The Average number of adult dolphins per group in each of the three areas of sightings.

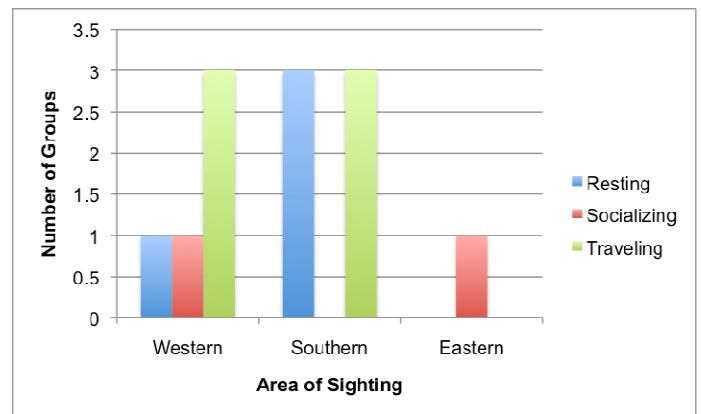


Fig. 13. The number of groups with each of the three dominant behaviors observed in each of the three areas of sightings.

Discussion

1.0 Distribution

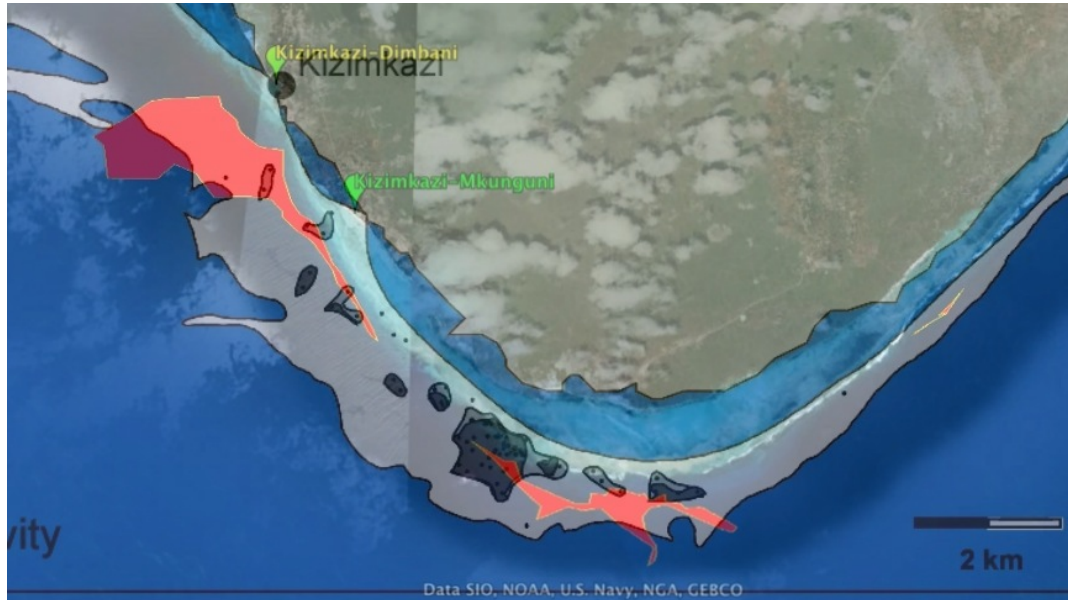


Fig. 14. Overlay of two maps. The first shows the total study area (white) of the Stensland et al. survey (2006) along with the density distribution of dolphin groups with tourist boats (light grey for low spatial density and dark grey for high spatial density) (Source: Berggren et al., 2007). The second shows the area in which dolphins were observed in the presence of tourist boats in the current study (red).

In a significant study of Indo-Pacific Bottlenose dolphin population and distribution carried out between 1999 and 2002, only 3.0 km² of the study area was found to be used by the dolphins when including areas of both high and low spatial density, and an even smaller area of 1.9 km² in which dolphin tourism activities were concentrated (Stensland et al., 2006, p. 675). In this study, however, dolphin tourism took place throughout a total an area of roughly 3.4 km² when adding together the coverage of the three areas. In comparing maps of distribution of dolphin/tourist interaction sightings between the previous and current data, the overlap appears very small and mostly only in the Southern area, although every individual sighting in the current study occurred at least in part within the study site boundaries used by Stensland et al. The largest spread of area in which dolphin sighting occurred in this study was the Western area, in which there were less than ten dolphin/tourist sightings during the study before. Likewise, Stensland et al. recorded most of their observations of dolphin/tourist interactions in the Southern area, in which sightings happened during the current data collection in a much smaller

area, generally more to the Southeast of the area in which sightings were previously recorded. Furthermore, Stensland et al. did not record any dolphin sightings, with or without tourist boats, in the Eastern area in which there was one dolphin group sighting in this study (*Fig. 14*). Due to the limited nature of this study, it is very likely that even more area than this is currently being used by the resident dolphin population. Whether this is true or not, there is a clear difference of area usage between the past and previous data, which could be a sign of area-avoidance in which dolphins move in order to escape population threats, most likely encounters with fishing nets, tourist boats, or both of these. This theory is supported by interview data, in which many locals said that they were seeing dolphins in different locations more often than when they started working, when sightings were mostly concentrated within the Usine area. However, there are some other factors that could have influenced this difference in data. Information gathered from locals interviewed for this study suggests that there is a daily pattern in which dolphin are closer to the beaches of Kizimkazi in the morning, in the Western area of sightings, and move to the South in the afternoon and evening. If the Stensland et al. survey was conducted at later times in the day than the current study, this could explain why there was such a difference in the number of sightings in the Western area. In addition, this study was conducted during the month of November, while the previous study was conducted for four years during the period of January through March each year. If there is a change in dolphin distribution as the seasons change, this could be the cause of such data variation between the two maps.

2.0 Habitat Use

In interviews, many boat captains agreed that dolphins were closer to shore earlier in the morning, which was a reason why they prefer to take tourists out as early as possible. This study confirmed that there were more dolphin sightings in the closer Western area before 9am, with sightings between 10am and noon taking place in the Southern and Eastern areas after boat captains could not find dolphins closer to Kizimkazi. This movement throughout the day should be factored into any legislation that may put restrictions on dolphin tours. For example, limiting the activities of certain boat captains to mornings only and others to afternoons only will put the latter at a disadvantage because those individuals will need to spend more money on gas and more time per tour to find dolphins.

3.0 Changes In Dolphin Sightings

With half of all locals interviewed agreeing that dolphin group size averages have decreased and all agreeing that the number of boats have increased, there is cause for concern that dolphin tourism, which may be harmfully impacting dolphin population numbers, will now be having a larger affect per individual. The data in this study, as well as previous studies on the effects of dolphin tourism, showed that when more guidelines were violated and boat captains more aggressive in their conduct, dolphins spent more time traveling rather than resting, socializing, or foraging. This not only means that the impacted dolphins have less time to find food, mate, nurse their young, and rest, but means that they are actively spending more energy to travel at greater speeds for longer periods throughout the day than they would in the absence of tourist boat pressure. Previous research has shown that dolphin group sizes vary with behaviors. Larger groups of dolphins will usually form for socializing and mating to take place, and groups are also larger when calves are present (Nystrom et al., p. 6). In this study, the same strong relationship between the number of calves and group size was observed, but group size varied greatly when socializing or traveling were observed as the dominant behavior. Groups that spent the majority of their time resting were generally much larger than groups of other behaviors and also larger compared to the average number of individuals per groups for which resting was the dominant behavior observed between 1999 and 2002 (Nystrom et al., p. 6). Because there was not a large range in the number of individuals of observed resting groups in this study, larger groups possibly change their behavior less when in the presence of tourist boats. This was a conclusion drawn by Constantine et al. (2004), who observed that dolphins were more likely to change from resting to traveling behavior in the presence of tourist boats when groups were smaller, possibly because individuals feel more threatened in lesser numbers. Because larger groups were observed in the Southern area and results show that dolphins are more likely to rest around boats when in larger groups, it may be possible that dolphins have adjusted their behavior and now gather in larger groups in response to boat pressures in this area so that they may still rest in this area while tourist activities are conducted.

4.0 Boat Registrations and Licensing

There is currently no requirement for which boats being used for dolphin tourism must be registered or licensed. This means that the number of boats able to operate at once is unlimited and there are no qualifications or trainings required of boat captains taking tourists on dolphin tours. While this has been important in allowing locals to easily get involved with dolphin tourism and generate income, it has also increased the difficulty of monitoring dolphin tourism and decreased the opportunities to implement a formal system. Furthermore, it was noted during observations that many of the boats used for dolphin tourism do not have names or other means of identification, which would make it much harder for any individual or agency to keep track of the different boats involved in dolphin tourism.

5.0 Training Seminars

While the seminars have obviously been effective in informing locals working in dolphin tourism about the basics of the guidelines since those who could not name any guidelines were those who had never attended one, these seminars are still not having the effect intended. The very weak link between the number of guidelines correctly described and the number of seminars attended suggests that attending more seminars does not increase the knowledge of individuals. Because boat captains could only explain a few of the guidelines, usually in simplified terms, it is possible that the list of guidelines is too long and language too complicated or vague so as to make long-term remembrance very unlikely. This is further supported by the fact that organizers of the seminars observe a change in boat captain behavior in the two or three months directly following a seminar, but that no sustainable change is observed beyond that time-frame.

6.0 Guideline Compliance

Despite the fact that some interviewees mentioned that the best time to see dolphins is in the evening and others commented that dolphins are available for viewing at any time of day, all tour companies interviewed encourage their tourists to go at the same time, around 6:00am to 8:00am. This causes a very large number of tourist boats to be out looking for dolphins at the same time. In this study, high numbers of guideline violations were recorded both with few boats present and with many boats present, but many interviewees commented that

more boats usually cause more guideline violations due to competition between boat captains, who want to work fast in order to return to the beach as fast as possible so as to take out multiple groups of tourists in one morning and increase their earnings. As previously mentioned, guideline violations were linked with dominant behavior in both this and past studies involving dolphin tourism. It is important that a solution be found so that more boat captains follow the guidelines to allow for less impact on the energy and behavioral budgets of the dolphins, and also so that boat captains can continue to conduct a sufficient amount of business.

7.0 Fishing

In such a small, resident population, bycatch removal poses a very large threat because even just a few animals can make a more significant impact on the growth of the total population. For example, with an estimated population number of 136 bottlenose individuals in the Menai Bay as of 2002, the sustainable annual bycatch rate would equal just 2.7 individuals. Interviewees in Kizimkazi for this study estimated that there has been a recent average of between one and five dolphins killed per year, with one respondent mentioning four incidents within just two months prior to the interview, and one incident in which a juvenile was caught in a net witnessed first-hand by the researcher during the second week of November, 2013. Additionally, during boat observations, it was seen that dolphins are often using the same areas in which nets can be found, sometimes observed coming within just 10m of nets during dolphin/tourist interactions. These frequent encounters with nets most likely occur because those areas contain the most fish abundance, which is targeted by both fishermen and foraging dolphins. According to a study on bycatch of cetaceans in Zanzibar conducted in 2002 by Amir et al., drift and bottom-set gillnets were found to be the types of gear that threaten the dolphins the most. It is possible that dolphins are able to detect and avoid other net types, which may be important to note for creating any future restrictions on fishing in this area.

8.0 Possible Solutions

8.1 Capping the number of boats

Due to the fact that more boats with one group of dolphins often lead to more violation of the guidelines and more disturbance of the dolphins, limiting the number of boats either leaving shore at one time or limiting the

number within a set distance of a dolphin group would most likely mean that guidelines would be followed more often and the impact on dolphins lessened. The logistics of this system, however, may not be suitable for the realities of the situations. First of all, a central office, organization, or individual would be needed to be responsible for either supplying tickets to boat captains or for registering the boats in a rotation system. Assuming such an arrangement could be made, a ticketing system by which the number of tickets per set time period allowing boats to leave shore could have other potential negative effects. Boat captains may compete with each other for the limited tickets, causing anger and conflict among locals. Boat captains who pick up tourists upon their arrival at the beach, rather than having an organized appointment, would possibly attain tickets without knowing whether they would be making a trip in that time or not. From this, there could develop a standard by which others would pay to buy these tickets from other boat captains, creating a system of financial exploitation. Alternatively, there could be a registration and rotation system by which certain boats would be given permanent permission to go out with tourists at a certain time, with different boats being given permission on different days. The difficulty in this system would be that the set schedule could conflict with the times when tour companies send their tourists or when certain boat captains get opportunities for dolphin tours. On days when there are not enough tourists to fill the boats on the rotation schedule, certain boat captains would lose out on their opportunity to make a trip until they had their next slot on the schedule. Additionally, because dolphins are often closer to shore in the early morning, boat drivers given slots later in the morning or afternoon would be at a distinct disadvantage compared to boat captains given permission to go out earlier, when there is not only a higher demand for tours, but less cost associated with gas to reach dolphins. Assuming logistical issues could be handled so as to implement a system of ticketing or registration and rotation, there is then an issue of enforcement. There would most likely need to be enforcement agents not only at both of the Kizimkazi beaches to ensure that the authorized boats were leaving at the correct times, but also on the water with the dolphins while tourist interactions take place in order to make sure that boats return when their permission period ends. Another concern arises from the impact such a system would have. While the number of boats at any one time would be reduced, there is a high likelihood that boats working on a staggered departure would stretch dolphin tours further throughout the day, thereby increasing the amount of time per day dolphins spend in the presence of tour boats. If a dolphin group were to be found during

the first shift in the morning, boat captains would most likely relay their location to boat drivers in the next shift, meaning that one group of dolphins would be under pressure from dolphin tourism for an extended period of time. This was found to happen in the Bay of Islands, when the departure of tours was switched from discrete to a staggered system, resulting in less time for dolphins to rest due to the increased time spent with boats (Constantine et al., 2004, p. 304).

8.2 Limiting the time of dolphin/tourist interaction

Limiting the time a single boat can spend with one group of dolphins per trip would seem to help mitigate the problem of too many boats at one time by decreasing the overlap of boat interaction. However, the data collected in this study suggests that boat captains already prefer to limit the time spent with dolphins per trip so as to return to the beach in order to take out multiple groups of tourists per day. In fact, interviewees cited this as one of the reasons boat captains violate the guidelines, since captains want to get the tourists on their boat as close to the dolphins first so as to satisfy their guests sufficiently in order to leave after as little time as possible. Therefore, officially limiting the time of a single interaction would either have no effect due to the fact that most boat drivers spend a modest amount of time with a group, or would even increase the guideline violations as more boat captains rush to make sure that their tourists get the experience they want within the time limit.

8.3 Setting a minimum number of tourists per boat

With boats observed in this study containing just an average of around three tourists, increasing the number of tourists per boat would certainly lower the number of boats with a dolphin group at any one time, especially during the busy hours of early morning. Some of the tour companies already conduct shared tours between companies, a practice that could be extended to ensure that more boats contain an appropriate minimum number of tourists considering most fiber boats can carry up to eight tourists and wooden boats up to twelve. Increasing the number of tourists on each boat would also increase earnings of boat captains, who are paid per tourist, which was the number one problem mentioned by locals interviewed. The downside to this plan, however, would be that less boat captains would be conducting tours every day, which would be damaging economically.

Also, making tourists share their dolphin experience with other tourists they do not know could decrease their overall enjoyment of their experience.

8.4 Making the current guidelines enforceable

The guidelines for interaction have only ever been suggestions, or a voluntary code of conduct, which both this and past studies have seen little adherence to by boat captains. Similarly, in a study by Allen et al. (2007), it was discovered that a voluntary code of conduct regarding dolphin interaction in Australia was ineffective in reducing stress on dolphins from tourist activities due to lack of compliance. However, the interview results from this study show that eighty percent of locals agreed that government enforcement of the current interaction guidelines would be a welcomed next step in improving dolphin tourism in Kizimkazi. This means that this course of action would likely have the most support for the local community, including local government leaders, making it the most successful next step forward. Additionally, this management plan would require an enforcement agency on the water to make sure that those who do not follow the guidelines are reprimanded. Otherwise, even if the guidelines are made law, level of compliance is likely to remain low without enforcement in the field. Because the Department of Fisheries and the Menai Bay Conservation Area have five patrol boats in the Kizimkazi area and already have experience conducting patrols to catch fishermen engaging in illegal fishing practices, this agency would be the most effective in enforcing the guidelines. Additionally, a three-dollar entrance fee paid to the Menai Bay Conservation Area by each tourist participating in dolphin tours generates a large income for that organization with the amount of tourism taking place in Kizimkazi. It seems only fair that the Menai Bay organization, which receives so much money due to dolphin tourism and has the "main goal...to conserve the natural resources of the area for sustainable use with active community participation" (Torell et al, 2006, p. 9), should fund the patrols to monitor compliance with guidelines. Before beginning patrols, however, the patrol staff should be thoroughly trained concerning dolphin tourism and the guidelines so that they may most effectively monitor and enforce them.

8.5 Continuing Seminars

While seminars have not had the desired effect of decreasing the overall impact of tourism activity on the bottlenose dolphins of Menai Bay, the seminars are important for having provided basic information to boat

captains regarding their area of work, especially the interaction guidelines. In order to reduce stress on the dolphins by enforcing guidelines, it is essential that all boat captains fully understand what behavior the government will expect of them. Some boat captains, however, do not know of the guidelines at all and those that do know about them lack sufficient understanding to follow all ten suggestions, many despite having attended multiple seminars. Therefore, if guidelines are to be made enforceable, simplifying them or shortening the list would be most effective, at least to begin with, to ensure understanding by local boat captains. Also, several of the guidelines seem unrealistic for the reality of dolphin tourism in Kizimkazi. For example, guideline number six says that tourist boats should never approach a group with a mother and calf. This suggestion makes sense since tourism activities can disturb calves needing to nurse. Most dolphin groups in Kizimkazi, however, were observed to contain calves, which means that boat captains would have to turn away from almost every group encountered and deny many tourists the ability to see and swim with the dolphins. Likewise, the guideline suggesting that tourists maintain physical contact with the tourist boats while in the water is also unrealistic. If tourists were forced to follow this guideline, many boat captains would move their vessels even closer to the dolphins, causing a greater disturbance, and tourists may be unhappy with their experience if they were not able to see the dolphins due to having to hold onto their boats. (See Appendix 11 for a suggested list of guideline adjustments). In addition to easily understood guidelines, future seminars should focus heavily on the current threats directly facing the dolphin population in Kizimkazi and the idea that the dolphins are an economic resource for the local people that is theirs to manage and protect for the future. Slowly instilling a sense of ownership and responsibility for the dolphins in the local people will ensure that locals are willing to make changes necessary to decrease threats to the dolphin population. Obtaining the willing cooperation of local people has proven to lead to more successful conservation plans because invested locals who understand the value of a natural resource and know how to protect it will likely hold each other accountable for responsible behavior (Gruby & Basurto, 2013, p. 3). An important step in helping to gain this trust and cooperation from local people will be to continue to use KIDOTOA as a link between outside forces wanting to impact dolphin tourism and the locals directly involved. Additionally, many interviewees mentioned that until every boat captain understands the guidelines, no captains can completely follow them. The interview results of this study suggest that boat captains are willing to go to

seminars without a payment, which could make the number of people able to attend unlimited, thereby finally allowing all boat captains to be educated about the guidelines. If this seminar was paired with the start of official enforcement of the guidelines, boat captains would likely be far more willing to attend without payment knowing that their understanding of the guidelines is key to not getting in trouble with the law. Additionally, if running seminars without payment to attendees does not attract many people to participate, any future seminar efforts should concentrate only on those individuals who are new to the business and have no knowledge of the guidelines since multiple seminars for the same individuals does not seem to produce better knowledge. After the guidelines are made enforceable and all boat captains are initially made aware of the actions they will be punished for, having seminars may not be as necessary because boat captains will be following the guidelines due to pressure of enforcement rather than knowledge given to them through lectures.

8.6 Fishing Restrictions

Since fishing bycatch seems to be occurring in numbers that are unsustainable for a small, resident dolphin population, it must be assumed that this factor currently presents the biggest challenge for dolphin populations in Menai Bay. Several tactics could be employed to lower the chances of bycatch of dolphins. First, it is known that dolphins are only caught in certain types of nets. Replacing these nets with ones that dolphins seem to be able to detect and avoid could lower or possibly even end dolphin bycatch. Unfortunately, many fishermen in the Menai Bay area do not have the resources to buy new fishing equipment, which is one reason illegal fishing methods still take place in the bay. If legislation were to demand that certain kinds of nets be removed from the area and replaced with more dolphin-friendly alternatives, it would be responsible of the government to exchange the nets of fishermen for an approved and more sustainable kind upon creating such a law. Funding for this could potentially come from the money saved through ending payments with seminars, which would be a more sustainable appropriation of this money because it can have a much more direct impact on dolphin survival. Alternatively, there could be a limitation on the areas in which fishermen are allowed to place nets, not allowing nets in areas known to be used most frequently by dolphins. This later plan would require an updated and in-depth knowledge of which areas are most crucial for dolphins currently and would also need buoy markers places in the water or some other clear form of communication with fishermen to let them know which areas are off-limits and

which areas are open to fishing. It should also be kept in mind that local fishermen rely on fish for their livelihood and any solutions should be a compromise created with their cooperation in which all parties are happy with the agreed compromise. It has been suggested that 'pingers', devices that emit sound underwater, can be attached to nets so as to warn dolphins of their presence. Whether the pingers are effective in keeping dolphins a safe distance from nets or not, interviewees who talked about them mentioned that they would not work in the long term because fishermen do not have the means or will to buy replacement batteries after the originals are exhausted. In order to make pingers effective, if they do actually work in preventing net entanglement, free replacement batteries should be placed in the devices for fishermen to ensure that they continue working past the life of the first set of batteries.

8.7 Setting a standard price

Since most locals interviewed mentioned low salaries for boat captains compared to tour companies and tour guides from Stone Town as a major problem with dolphin tourism, setting a standard amount a boat captain must be paid per tourist or per trip for dolphin tourism would be an agreeable action among the locals involved. In fact, taking such action to help locals benefit more per trip would not only decrease the likelihood that captains will break guidelines due to rushing tours, but may also make boat captains more likely to welcome and cooperate with any further government involvement once their situation has been improved by government intervention first. In order to set such a standard price, there should be an evaluation of whether setting the price per individual or per boat trip would be more agreeable and beneficial for all involved. Setting the price per boat would possibly encourage more shared boat trips among different tourist groups, especially if tourists are offered a discount from tour companies, who would be saving money by splitting the cost of the boat rather than paying for a separate boat per tourist group. With this management plan, there would need to be cooperation and agreement of the price among locals and tour companies, and there would most likely need to be an enforcement agent on the beach to ensure that boat captains do not continue to undercut each other and drive the price per trip lower than the set standard.

Conclusion

Currently in Kizimkazi, all evidence suggests that dolphin bycatch continues at an unsustainable rate and short-term and long-term negative effects of dolphin tourism have been well documented in this area and in many others throughout the world. If changes are not made to better manage and protect the Indo-Pacific Bottlenose dolphins of Menai Bay, population decline is a very possible and serious consequence. The government has made no attempts to intervene in order to alleviate this situation and NGOs that have been running seminars have not seen any significant changes in the bad practices of boat captains. Therefore, adopting a new plan is necessary to help protect this resource before time for the dolphins runs out. In evaluating various management options by analyzing the realities of the situation and factoring in the opinions of the locals involved, there appears to be no clear and easy solution to this problem and it is anticipated that change will be need to be slow but persistent. In weighing the various options in this context, it is recommended that the actions to pursue include reaching a mutual compromise with fishermen so as to lower bycatch rates, setting a standard price to boat captains per dolphin tour, and that the guidelines for interaction be simplified and introduced in future seminars along with instilling passion in locals to protect dolphins. Because the voluntary code of conduct currently does not work and the stress caused by tourism has been very well recorded as relating to guideline violation, it will be essential for the government to make the guidelines enforceable and patrols should be conducted in earnest by the Department of Fisheries and the Menai Bay Conservation Area.

Recommendations

Although bycatch in fishing nets and the signs of disturbance of the dolphins due to tourist activities in this area are both well documented, there is currently no proof that dolphin population or distribution has significantly changed as a result. The latest significant population and distribution study was over a decade ago and there is a severe need for an updated, extensive study in order to determine the real extent of impact of these two threats. Without hard evidence that population numbers are decreasing or that dolphins are using area-avoidance tactics, there is still a strong possibility that the government and local people will refuse to believe in making changes to protect the population. If, however, population decline or distribution change could be established as a fact, this might be the push needed to cause invested parties to take necessary action. Data collection conducted currently being collected by African Impact could provide the starting place for a study of this nature. Additionally, a study would need to be conducted using a methodology that resembles the previous study so that data may be directly compared, but it is also suggested that this study be conducted year-round to establish knowledge of any seasonal changes in dolphin distribution, as well as conduct surveys throughout different times of the day to see if there truly is a need to concentrate dolphin tours to the morning, or if dolphins remain within the same general area during the course of the day.

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Appendix 1 - Guideline for Dolphin Tourism in Zanzibar: Menai Bay Conservation Area

Rules for Boats:

Drive the boat slowly with a steady speed. Avoid sudden changes of speed or direction. Avoid reverse or going in and out of gear.

Approach the dolphin group from the rear or the side, never head on.

Do not chase the dolphins, let them come to the boat instead.

Do not encircle or intersect the dolphins.

Always make sure the dolphins have an escape route when there are more than two boats.

Never approach a mother and calf.

Dolphins slapping their tails at the surface, making coughing sounds, leaping or turning away from the boat, indicate that they are disturbed. Leave them alone and look for other animals instead.

Rules for Swimmers:

Enter the water as quietly as possible. Do not jump or dive in.

Stay close to the boat and hold onto the boat or line along the side of the boat.

Do not swim after or chase the dolphins. Let them come to you.

Appendix 2 - Interview Questions for Tour Companies

What is the name of your company?

What is your company's most popular service?

Do you offer trips to Kizimkazi? If so, what does the trip include? What time of day does the dolphin boat tour place?

How do most tourists learn about the dolphin trips?

How popular is your Kizimkazi trip service?

How many tourists (average) does your company take to Kizimkazi weekly?

How are boat operators and guides selected? Do you have any criteria regarding certification and/or training of guides?

Do you evaluate tourist satisfaction in anyway after the trip? If so, what are the most common comments from tourists?

Do you think the experience is educational for tourists?

What issues do you think there are regarding the dolphin tourism in Kizimkazi?

What do you think would be most effective in improving the dolphin tourism in Kizimkazi?

Do you think a government policy or local by-law could help? If yes, what would the most effective policy be?

Appendix 3 - Interview Questions for Commission of Tourism

What role does the commission of tourism play in the dolphin tourism industry in Kizimkazi?

Can you explain the process of certification?

What is the purpose of these the trainings?

How are people told about the need for certification?

What content is covered in training?

Is there a limit on the number of certifications given in a single area?

How many boat captains for dolphin tourism are currently certified?

What punishment is there for not getting a certification?

If the government was to take actions to improve control of dolphin tourism, which department would be responsible for such action?

Appendix 4 - Interview Questions for national representative of the Department of Fisheries

Have there ever been any official policies or laws made regarding dolphin tourism?

If there were to be a policy or law created, which government department would be responsible for such action?

Appendix 5 - Interview Questions for Local Offices of the Department of Fisheries/Menai Bay Conservation Area

How many registered boats are there in Dimbani and Mkunguni?

How many of these boats are used for tourism purposes?

How many patrol boats for the Department of Fisheries/Menai Bay Conservation Area are there in Dimbani and Mkunguni?

How often are Department of Fisheries/Menai Bay Conservation Area staff present in Dimbani and Mkunguni?

How often are patrols made by the Department of Fisheries/Menai Bay Conservation Area staff?

On average, how many people are taken to court per month due to practicing illegal fishing methods?

Does illegal fishing still continue in this area?

Overall, has the Department of Fisheries/Menai Bay Conservation Area been effective in protecting the marine environment in this area?

What problems exist with dolphin tourism in Kizimkazi and what improvements could be made?

Does the Department of Fisheries/Menai Bay Conservation Area have the ability to enforce the guidelines for interaction for dolphin tourism if they were to become an official law?

Appendix 6 - Interview Questions for Local Government Leaders (Shehas)

How many people reside in your village?

How many boats are registered in the village?

How many of those boats are used for tourist purposes?

What percentage of the people in this village have jobs directly linked to the tourism (boat operators, hotel staff, restaurant staff, etc.)?

What issues do you think there are with dolphin tourism in Kizimkazi?

What could local people or the government do to improve dolphin tourism in Kizimkazi?

How many seminars have been held for people working in dolphin tourism?

Have these seminars been effective?

What could be done to improve the seminars?

Could and should the local government have a role in improving dolphin tourism (for example, implement a bylaw to regulate dolphin tours)?

Appendix 7 - Interview Question for WIOMSA Representative

Can you explain the history/mission of IMS and WIOMSA in regards to the dolphin tourism in Kizimkazi?

What has your personal involvement in the area been?

Can you explain the training seminars offered?

(A) What are the objectives/goals of the seminars?

(B) How are people informed that there will be a seminar?

(C) What are the professions of the people attending the seminars?

(D) Where are seminars held and how often?

(E) How many people attend the seminars?

(F) What are the topics covered in a seminar?

(G) Is there a test taken at the end of the seminar? Is there any other form of assessment?

Are those who complete the seminars given a certification? If so, is this certification official?

Is there any communication with tour companies after a seminar is held to tell them that trained boat operators are available?

Do you think the workshops have been effective? Why/why not?

What do you think should be the next step in improving the dolphin tourism in Kizimkazi?

Do you think a government policy or local bylaw could help? If so, what would be the most effective policy?

Appendix 8 - Interview Questions for African Impact Staff/Volunteers

What is the role/mission of African Impact in Kizimkazi?
 How long have you been involved with dolphin tourism in Kizimkazi?
 What have you noticed regarding the distribution of the dolphins in this area?
 What have you noticed regarding violations of the Guidelines for Interaction?
 What current issues are there regarding dolphin tourism in Kizimkazi?
 What solutions do you think could work to improve dolphin tourism in Kizimkazi?
 What role should the national government have in finding a solution? What role should local government have in finding a solution?
 What role do you think African Impact could have in improving dolphin tourism in Kizimkazi?

Appendix 9 - Interview Questions for Dolphin Tour Boat Captains

What is your name and age?
 What is your profession?
 How many years have you worked or did you work as a dolphin boat captain?
 Have you heard Dr. Narriman Jiddawi and of the seminars held by IMS and KIDOTOA for people who work with dolphins? How many have you attended? What did you learn in the seminar?
 Do you know about the guidelines for interaction with dolphins? If so, can you explain what the guidelines are?
 Do you think most boat captains do or do not follow the guidelines? Why?
 Do you want to learn more about dolphins?
 Is there any other topics you think should be covered in a seminar for people working in dolphin tourism?
 Please answer 'True' or 'False' to each of the following statements as they apply to your personal views:

- (A) I wouldn't want to go to a seminar.
- (B) I would go to a seminar if I got paid.
- (C) I would go to a seminar if I didn't have to pay and didn't get paid.
- (D) I would go to a seminar if I had to pay.

Since you started working as a boat captain, have you noticed any change in the time of day you see dolphins?
 Since you started working as a boat captain, have you noticed any change in where you see dolphins?
 Since you started working as a boat captain, have you noticed any change in the average number of dolphins you see in one group?
 When you first started working as a boat captain, how many boats (average) did you see with one group of dolphins? How many boats (average) do you see with one group of dolphins now?
 What issues do you think there are with dolphin tourism?
 What can local people or the government do to improve dolphin tourism?
 Should the guidelines for interaction be enforced by the government by punishing people who violate them? (*for interviewees who did not know the guidelines, they were offered a brief explanation of the contents of the guidelines in order to effectively answer this question.)
 Should the government take any action regarding fishing that may be affecting dolphins?
 On average, how many boat trips do you make in one week with tourists during high season and during low season?

Appendix 10 - Complete List of Interviews Conducted

<u>Interview Number</u>	<u>Date</u>	<u>Profession or Position of Interviewee*</u>	<u>Location of Interview</u>
1	4/11/2013	Representative - Uhuru Travel	Stone Town
2	4/11/2013	Representative - Kobe Tours and Safari	Stone Town
3	4/11/2013	Representative - Indoma Tours	Stone Town
4	4/11/2013	Representative - Sayu Tours	Stone Town
5	4/11/2013	Representative - Serene Tours	Stone Town
6	4/11/2013	Representative - Asko Tours and Travel	Stone Town
7	4/11/2013	Representative - Lakupenda Isles Safari	Stone Town
8	5/11/2013	Senior Personnel and Representative of IMS/WIOMSA	Stone Town
9	6/11/2013	Representative - Sama Tours	Stone Town
10	6/11/2013	Chairman of the Commission of Tourism	The Commission of Tourism Offices
11	6/11/2013	Representative of the Department of Fisheries	Department of Fisheries office, Maruhubi
12	6/11/2013	Representative - Embrace Zanzibar	Stone Town
13	8/11/2013	Representative - Safari Blue Tour Company	(Email Communication)
14	9/11/2013	Sheha	Kizimkazi-Dimbani
15	10/11/2013	Boat Captain and Security Guard	Kizimkazi-Dimbani
16	10/11/2013	Boat Captain	Kizimkazi-Dimbani
17	10/11/2013	Fisherman/Former Boat Captain	Kizimkazi-Dimbani
18	10/11/2013	Tourism Taxi Driver	Kizimkazi-Dimbani
19	11/11/2013	Owner of Tourism Restaurant	Kizimkazi-Dimbani
20	11/11/2013	Boat Captain	Kizimkazi-Dimbani
21	11/11/2013	Fisherman/Former Boat Captain	Kizimkazi-Dimbani
22	12/11/2013	Fisherman and Boat Captain	Kizimkazi-Dimbani
23	12/11/2013	Fisherman and Boat Captain	Kizimkazi-Dimbani
24	12/11/2013	Boat Captain	Kizimkazi-Dimbani
25	12/11/2013	Boat Captain	Kizimkazi-Dimbani
26	12/11/2013	Boat Captain	Kizimkazi-Dimbani

27	13/11/2013	Hotel Staff and Boat Captain	Kizimkazi-Dimbani
28	13/11/2013	Boat Captain	Kizimkazi-Dimbani
29	13/11/2013	Boat Captain	Kizimkazi-Dimbani
30	14/11/2013	Fisherman and Boat Captain	Kizimkazi-Mkunguni
31	14/11/2013	Boat Captain	Kizimkazi-Mkunguni
32	14/11/2013	Fish Dealer and Boat Captain	Kizimkazi-Mkunguni
33	16/11/2013	Boat Captain	Kizimkazi-Mkunguni
34	16/11/2013	Boat Captain	Kizimkazi-Mkunguni
35	16/11/2013	Fisherman/Former Boat Captain	Kizimkazi-Mkunguni
36	16/11/2013	Boat Captain	Kizimkazi-Mkunguni
37	16/11/2013	Boat Captain	Kizimkazi-Mkunguni
38	16/11/2013	Boat Captain	Kizimkazi-Mkunguni
39	16/11/2013	Boat Captain	Kizimkazi-Mkunguni
40	17/11/2013	Fisherman/Former Boat Captain	Kizimkazi-Mkunguni
41	17/11/2013	Fisherman and Boat Captain	Kizimkazi-Mkunguni
42	17/11/2013	Fisherman/Former Boat Captain	Kizimkazi-Mkunguni
43	19/11/2013	Department of Fisheries Employee	Kizimkazi-Dimbani
44	19/11/2013	Boat Captain	Kizimkazi-Mkunguni
45	19/11/2013	Boat Captain	Kizimkazi-Mkunguni
46	20/11/2013	Sheha	Kizimkazi-Mkunguni
47	21/11/2013	African Impact Staff - Local	Kizimkazi-Dimbani
48	21/11/2013	African Impact Staff Volunteer	Kizimkazi-Dimbani

*Names of those individuals interviewed have been kept private for confidentiality purposes

Appendix 11 - Suggested Alterations for the Guideline for Dolphin Tourism in Zanzibar: Menai Bay Conservation Area

Rules for Boats:

Drive the boat slowly with a steady speed. Avoid sudden changes of speed or direction. Avoid reverse or going in and out of gear.

Approach the dolphin group from the rear or the side, never head on.

~~Do not chase the dolphins, let them come to the boat instead.~~

Do not encircle or intersect the dolphins. position the boat in front of a dolphin group, always stay a respectable distance to the side of the group as it travels.

~~— Always make sure the dolphins have an escape route when there are more than two boats.~~

~~— Never approach a mother and calf.~~

Dolphins slapping their tails at the surface, making coughing sounds, leaping or turning away from the boat, indicate that they are disturbed. ~~Leave them alone and look for other animals instead.~~ back away from the dolphins and travel slower, giving them time to calm down. If signs of disturbance continue, leave the group.

Rules for Swimmers:

Enter the water as quietly as possible, sitting on the edge of the boat with feet hanging over the edge as the position from which to enter the water. Do not jump or dive in. Also try making as little noise as possible while in the water so as not to disturb the dolphins.

~~— Stay close to the boat and hold onto the boat or line along the side of the boat.~~

~~— Do not swim after or chase the dolphins. Let them come to you. Do not attempt to touch the dolphin as this can disturb them.~~