Varamientos de toninas, Tursiops truncatus, en Laguna de Términos y zonas adyacentes, 2002-2013

Strandings of bottlenose dolphins, Tursiops truncatus, in terms Lagoon and adjacent areas, 2002-2013

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Resumen

En el área de Laguna de Términos se han registrado un total de 115 varamientos de toninas muertas de 2002 a 2013. El mayor número de varamientos ocurrió en 2006 (n= 19), mientras que el menor número se registró en 2007 y 2011 (n= 3); la mayor frecuencia fue en mayo (n= 23 registros) y en diciembre se registraron solamente dos animales varados. El mayor número de varamientos ocurrió en la temporada de secas (n=53, 46 %), seguido de la temporada de lluvias (n=42, 37%) y la de nortes (n=20, 17 %). Del total de 115 ejemplares de *Tursiops truncatus* varados, 72 fueron machos (62.6 %), 19 fueron hembras (16.52 %) y a 24 organismos no se les pudo determinar el sexo (20.88 %); ocho organismos fueron crías varadas (7 %), de las cuales tres fueron crías recién nacidas. Se registraron con mayor frecuencia organismos de tamaño de entre 191-200 cm y 231-240 (n=11, para cada intervalo). En este estudio se registraron toninas correspondientes a las formas costera y oceánica.

Palabras clave: varamientos, Tursiops truncatus, laguna de Términos.

Abstract

A total of 115 Commerson dead from 2002 to 2013 strandings have been recorded in the area of Términos Lagoon. The highest number of strandings occurred in 2006 (n = 19), while the lowest number was recorded in 2007 and 2011 (n = 3); the increased frequency was in May (n = 23 records) and in December there were only two stranded animals. The highest number of strandings occurred in the dry season (n = 53, 46%), followed by the rainy season (n = 42, 37%) and the "nortes" (n = 20, 17%). Of the total of 115 copies of Tursiops truncatus stranded, 72 were male (62.6%), 19 were female (16.52%) and 24 bodies could not be determined them sex (20.88%); eight bodies were stranded pups (7%), of which three were newborn calves. They were recorded more often organizations of size between 191-200 cm and 231-240 (n = 11, for each interval). Corresponding to the coastal and oceanic forms bottlenose dolphins were recorded in this study.

Key Word: strandings, Tursiops truncatus, Terminos Lagoon.

Reception Date: February 2014 **Acceptance Date:** March 2014

Introduction

The aquatic mammals strandings are a source of important information on the species richness, distribution, relative abundance, Morphometry, biological material, systematics, histology, genetics, pathology, natural history, parasitology, toxicology, biochemistry and impact by human activities in aquatic mammals. These events can be indicators of the status of populations and the ecosystems of which they are part (Heyning, 1991; Hofman, 1991).

The region of Términos Lagoon is a privileged area within the distribution of bottlenose dolphins, Tursiops truncatus, in the Gulf of Mexico since presents areas of favouring the establishment of a large population of these whales to feed and reproduce. The area has been frequently stranding of specimens of T. truncatus and other aquatic mammals dead unless it

have pointed out all the causes of such events or know the impact on the population of bottlenose dolphins.

Some of these mammals have tracks with human interaction, in addition to is has been able to detect the presence of contaminants in the adipose tissue of bottlenose dolphins.
The study of the stranding of bottlenose dolphins and other aquatic mammals is therefore of utmost importance. Since the dolphins are top predators, are useful indicators of general trends in the deterioration of the marine environment (Wells et al., 2004). His wealth is directly correlated with the abundance of food, and the changes in its distribution can predict the health of the ecosystem and natural cyclical changes in marine habitat (Ward and Moscrop, 1999).

The study of stranded animals has an important scientific potential, and that through them you may know biology of many species that are difficult to study in the wild. Therefore, in this paper the annual variations of strandings, spatio-temporal strandings, life history parameters such as sex ratio and age classes, and the extent to which man causes are analyzed strandings (human interactions).

DEVELOPMENT OF CONTENTS

Distribution. The dolphin is distributed in all oceans of the world, both in tropical and temperate waters. Although T. truncatus is considered a resident species in the country inhabiting coastal lagoons, river mouths, littoral, neritic and oceanic Gulf of Mexico, very few studies have been conducted on dolphins in this area (Heckel, 1992; Delgado-Estrella and Pérez-Cortés, 1993; Delgado, 2002).

Most information has been generated through the work done by Delgado (1991, 2002) over ten years with populations of T. truncatus Southern Gulf of Mexico, specifically the coast of Tabasco, Campeche, Yucatan and Quintana Roo. In this work different population parameters of dolphins, as the abundance, distribution, residence patterns, breeding seasons, composition of groups, among others were determined.

The area with the highest relative abundance in the southern Gulf of Mexico was the lagoon of Terms in Campeche, offering the most favorable conditions for a population of dolphins that can fluctuate between 300 and 800 individuals is established. In decreasing order of abundance are the states of Tabasco, Quintana Roo northern part and, finally, the west coast of Yucatan. Terms Lagoon is a natural shelter that provides benefits for all individuals but especially for females who tend to use these areas to give birth and raise their young, gives them protection from predators and has permanent abundance of food. The season of birth is during the dry season, with peaks during the month of May (Delgado, 2002)

Strandings. A stranding is one event in which an aquatic mammal reaches a beach in disrepair, weak or simply lost. Strandings can be classified according to the number of agencies involved: i) Individual involving a single individual and ii) mass involves two or more individuals of the same species (excluding mother-calf pairs), stranded in one place and simultaneously.

Moreover, the term refers to mass death mortality in large scale; this term does not describe the cause of death, the number of species involved, nor whether the animals were stranded alive or dead, but simply died. The massive death can be the result of the rapid spread of a virus such as influenza or distemper in seals, a parasitic infection or a large consumption of toxic algae.

The scientific potential of the stranded animals is such that currently has a wealth of information on stranding events that have been assisted in which skulls and skeletons, photographs, measurements, stomach contents, reproductive organs, teeth are obtained for age determination, samples for genetic analysis and toxicological studies, various parasites and tissue samples from sick animals.

Strandings of marine mammals can be triggered by various causes, whether natural or anthropogenic; the first is due to changes in the environment or climate, disease or

environmental factors populations. The others are caused by direct or indirect human interaction, such as pollution, maritime traffic and fishing (Walsh et al., 1990; Geraci and Lounsbury, 1993; Morales and Olivera, 1993; Delgado et al., 1994).

Although there are many theories, the factors involved in stranding are still to be determined. The most accepted as potential causes of stranding hypotheses are:

Due to natural causes:

- Accident topographic and oceanographic and geomagnetic disturbances can cause malfunction of its echolocation.
- Beaches with small slope.
- Adverse weather conditions, as they may cause animals to become trapped in shelters or choking because the waves and strong currents.
- Pursuit predators.
- Chasing prey to very shallow areas.
- Orphan, weak or malnourished pups.
- Natural toxins.
- Illness, injury, exhaustion and aging.
- Social cohesion, due to the strong bond between individuals of a herd, when the leader of the other staff members as well.

Because human interaction:

- Chemical pollution (toxic waste spills, wastewater discharge, among others.).
- Trash (ingestion of plastics or other solid waste).
- Accidents gear.
- Beats with boats.
- Noise pollution: sonar, drilling, explosions, seismic surveys and acoustic oceanographic studies.
- Human predation and direct aggression (hunting, harpooning).

The condition of the body can not be determined solely on appearance or based on the time you have dead copy. For large animals, the rate of decay is related mainly with the retaining body temperature and greater heat due to the amount of adipose tissue and lean animals have decomposition is influenced by environmental temperature

An organism that takes several days he was "inflated" or "swollen" due to the gases produced by the decomposition of internal tissues; a sign of this condition they would be exposed tongue and penis. In animals recent death, adipose tissue is firm, white and colored slightly greasy; muscles feel consistent to the touch and are bright red. As the decomposition proceeds, both tissues become soft and gelatinous, besides the adipose tissue becomes oily.

The decomposition rate can also be increased due to the terminal condition of the animal, for example, a generalized infection with increased body temperature (fever) or wounds that allow rapid bacterial invasion; ii) temperature; iii) the number and arrangement of connective tissue and iv) for the content of proteolytic enzymes. Own aquatic mammals, hemoglobin and myoglobin accelerate the decomposition in contact with the tissues. The skin, fat and muscles may remain intact and even present serious injury for seven or nine days after death; the heart and lungs can be kept perhaps for two or three days; the adrenal glands, liver, spleen, brain and kidney break down fairly quickly.

Condition. Then a classification system for codes of 1 to 5, based on Geraci and Lounsbury (1993) is presented; the time interval in which an animal can pass from one code to another depends on factors such as temperature, sun exposure, presence of scavengers, among others.

Code 1. Live animals.

Code 2. Recent death (fresh Animals). The appearance of the animal is normal, cool (or minimum) odor, dry skin and minimal lacerations to her clear eyes, tongue and penis retracted,

firm and white subcutaneous fat, firm muscles, dark blood cells, distinct and intact consistent and distinct organs, gas content in minimal or absent bowel (0-24 hours).

3. Code moderate decomposition. Body intact, gas accumulation in the abdominal cavity (inflated animals), tongue and penis protraídos, dry and cracked skin, foul odor, clear or deep damage scavengers agencies, mucous membranes dry, sunken eyes, subcutaneous fat inclusions blood and exudate oily, smooth muscles and toneless, hemolyzed blood (thick), soft innards but still intact, dilated bowel gases (24-72 hours).

Code 4. Significant decomposition. The body may be intact, but collapsed, the skin comes off easily, the epidermis can be completely absent, usually severe damage by scavenging organisms, strong, pungent odor, soft subcutaneous fat bags filled with gas or oil, muscles are presented ill-defined and easily removable bones, thin and black blood, guts distinguishable but macerated, full of gas (72 hours or more) intestine.

Code 5. Mummified or bones. Pieces of skin normally found in skeletal remains and any remaining tissue is dry (dehydrated).

After determining the condition of the organism proceeds to the collection of biological material, as applicable (Table 1).

Tabla 1. Relación entre la condición del organismo y el material biológico a colectar

	Código 1	**Código 2**	**Código 3**	**Código 4**	**Código 5**
Fotografías	✓	✓	✓	✓	✓
Morfometría	✓	✓	✓		
Histopatología		✓			
Toxicología	✓	✓			
Historia de vida	✓	✓	✓		
Microbiología	✓	✓			
Parasitología	✓	✓			
Craneometría		✓	✓	✓	✓

Because of the importance of these events, in 2006 the Care Team Stranding Carmen, composed of staff UNACAR, the EIO Carmen and APFFLT, with the support of the Directorate of Civil Protection of the Municipality of Carmen was created (Carmen PC).

STUDY AREA

Scientific collection permits have authorized the attention of strandings and collection of biological material in coastal localities along the coast and along inland waters (rivers, streams and lakes) in the states of Campeche and Tabasco. However, every effort was carried out in the region of Laguna de Terms, Campeche and adjacent areas.

Terms Lagoon is located in the Gulf of Mexico, west of the Yucatan Peninsula and in front of the Campeche, between 18 ° 20 'and 19 ° 00' north latitude and 91 ° 10 'and 92 ° 00 'west longitude; north delimits the Isla del Carmen, 37.5 km long and three miles wide at the ends of two mouths to constantly communicate with the Gulf of Mexico: Puerto Real and del Carmen (Fig. 1).

Figure 1. Study area.

Towards the east end of the lagoon estuarine system-Sabancuy Terms extending from 18 ° 32 'and 19 ° 02' N and 91 ° 06 is located 'and 91 ° 54' W, with an average depth of four meters; in this area the villages of Isla Aguada and Sabancuy are located. The Pom-Atasta system is located in the western portion of Laguna terms, between 18 ° 30 'and 18 ° 35' N and 91 ° 50 'and 92 ° 20'W, has an average depth of 2.7 m and consists of lagoons of varying dimensions; Atasta Peninsula is comprised of seven communities: Atasta, San Antonio Cárdenas, Nuevo Progreso, Emiliano Zapata, Puerto Rico, New Campechito Rivera and San Francisco.

Dry, rain and nortes: During three climatic seasons are presented. The first prevailing during the months of February to May, the rainy season between June and September. The time nortes call is presented from October to January and is characterized by the strong influence of polar winds accompanied by low atmospheric pressure, low temperatures and rainfall. The tropical cyclone season starts in May and ends in November.

METHODS

Data strandings occurred from 2002 to date, registered and staffed by the Faculty of Natural Sciences of the Universidad del Carmen (UNACAR), Technical Reports strandings Carmen developed by the Oceanographic Research Station were analyzed 3rd Naval Military Region of the Secretariat of the Navy (EIO Carmen) and the Directorate of the Department of Wildlife Protection Terms Laguna (APFFLT).

Besides addressing strandings reported, beach tours were conducted to locate stranded copies or biological remains. Tours are conducted on foot along the northern portion and east coast of Isla Carmen, reviewing about 38 km; for the Pom-Atasta system around eight kilometers from the eastern portion Isla Aguada and walked about five kilometers from the western part were reviewed. Walking tours were made in 2011, 2012 and 2013.

A record format in which basic data of each specimen as the time, date, location, species, sex and depending on the state of decomposition of the body morphometry

was performed and material collected included was used to collect information in the field biological. When animal conditions permitted, were taken up to 20 body measurements standardized (Perrin, 1975; Geraci and Lounsbury, 1993), Figure 2.

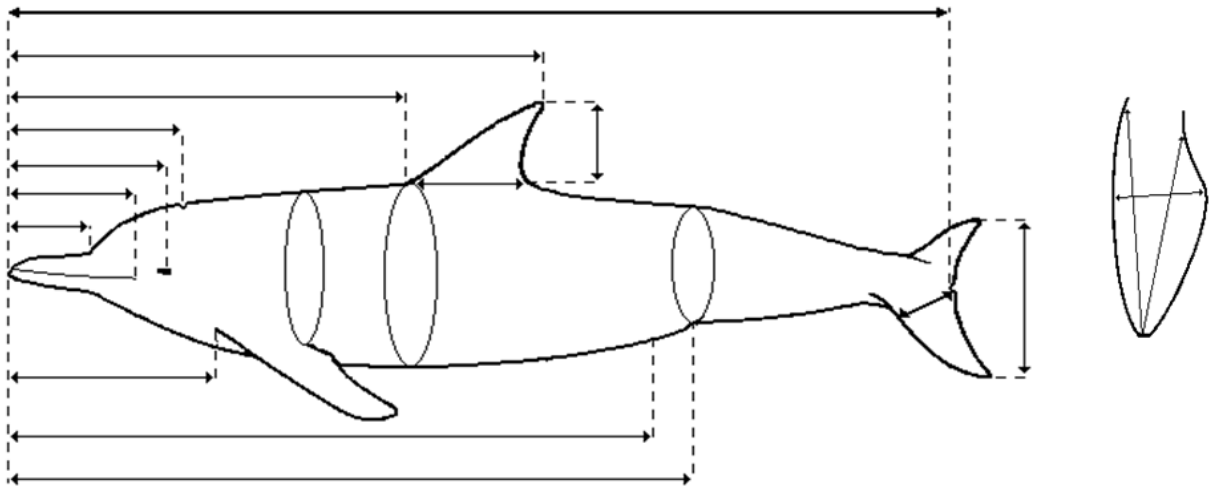

Figure 2. Body measurements of Tursiops truncatus (Modificado de Leatherwood et al., 1988)

Attention strandings of marine mammals was performed following the protocols routinely used in these studies (Geraci and Lounsbury, 1993). An external evaluation of each specimen was made to assign conservation code, determine the type of biological sample to be collected; and whether there was an anthropogenic cause of stranding (net marks, wounds, injuries, etc.). In general, only external evaluation of stranded dolphins and no autopsy was performed. The collected material was sent to analysis or deposited in the Collection of Marine Mammals of the Faculty of Natural Sciences (DACNAT) of the Universidad Autónoma del Carmen, with registration No. CAMP-MAM-173-04-05.

The variation of strandings per year, month, season, sex were analyzed using the test for goodness of fit chi-square ($\chi 2$) test and analysis of variance.

RESULTS

Most strandings were reported to the direction of PC Carmen, who in turn notified the Carmen EIO or APFFLT; the UNACAR was responsible for morphometry and collection of biological samples. All registered strandings corresponded to fish dead or dying alive and none was found.

Variation per year. In the study area comprises 115 strandings of dolphins were recorded during the period 2002 to 2013 (= 9.583); the largest number of strandings occurred in 2006 (n = 19) while the lowest number was recorded in 2007 and 2011 (n = 3) Figure 3. The $\chi 2$ test showed significant differences between years ($p < 0.001$).

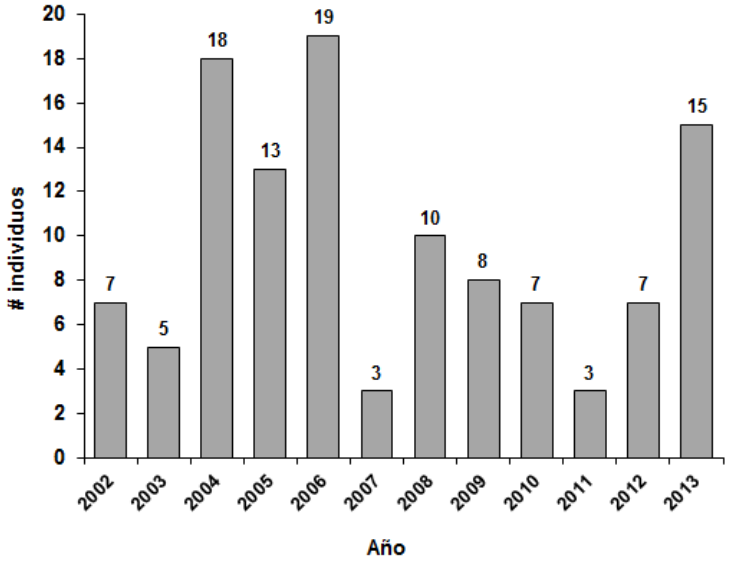

Figure 3. Stranding Tursiops truncatus per year for the period 2002-2013

Variation per month. From 2002-2013, a higher incidence of strandings was presented in May (n = 23 records) while in December only two stranded animals (Figure 4) were recorded. ANOVA showed no statistically significant difference in the annual total number of animals per month stranded.

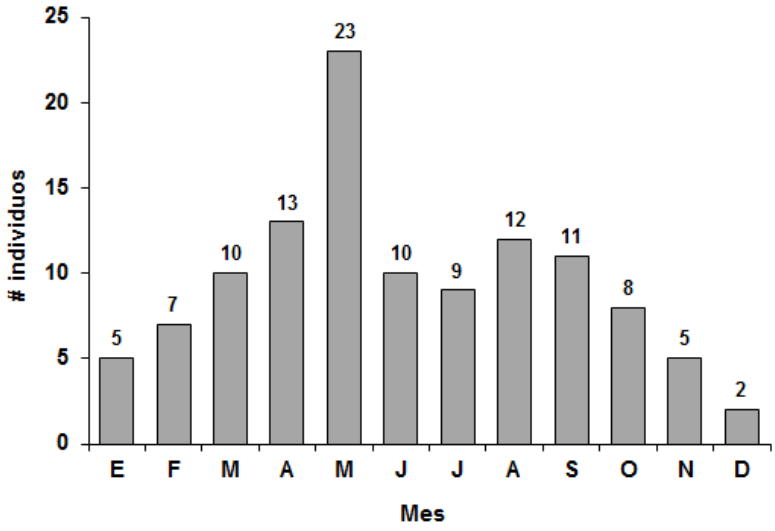

Figure 4. Number of Tursiops truncatus stranded by month during the period 2002-2013.

Seasonal variation. Considering the seasons shows that the largest number of strandings occurred during the dry season (n = 53, 46%), followed by the rainy season (n = 42, 37%) and nortes (n = 20, 17 %). The χ2 test indicated that there were significant differences in the total number of animals stranded by season ($p < 0.001$). The ANOVA analysis indicated that the average number of strandings still differs significantly higher during the dry season.

Variation by area. With regard to areas, 88 stranded dolphins were recorded in the Isla del Carmen, while 21 bodies were recorded in the area of Pom-Atasta and only six strandings have occurred in the lagoon system-Sabancuy Terms.

Distribution of sexes. Of the total of 115 copies of Tursiops truncatus stranded in the area, it was determined that 72 were males (62.6%), 19 were females (16.52%) and 24 agencies were you able to determine the sex (20.88%) due to the degree of decomposition in which (Figure 5) were. The χ2 test indicates that there are significant differences in the genre of stranded animals.

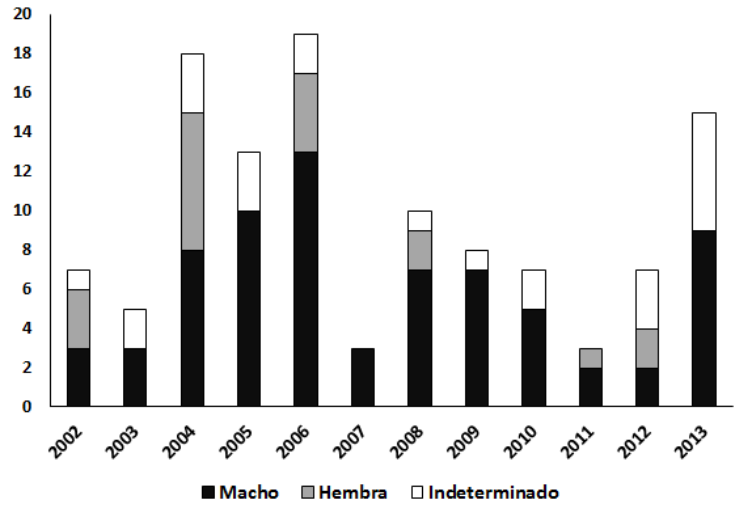

Figure 5. Relationship stranding sex of Tursiops truncatus during the period 2002-2013.

Stranded pups. Eight stranded pups (7%), of which three hatchlings were identified by the presence of fetal folds and remains cord were recorded. Although you can not claim to have months incidence in pup strandings in the months of May and August the largest number of offspring (n = 2 for each month) are stranded; nor in the case of hatchlings a time trend was observed, since the three pups were stranded in different seasons.

Size. Due to the condition of stranded bodies could only measure the total length of 95 Tursiops whose size ranged from 102 to 283 cm. Grouping the organisms are stranded in length intervals, were recorded more frequently size between 191-200 and 231-240 cm (n = 11 in each interval), followed by organisms whose size ranged from 211 to 220 cm, 221 230, 251 to 260 and from 261 to 270 cm (n = 9 for each interval).

Life story. According to the physical features six stranded copies (size, color), the presence of form or neritic or oceanic ecotype be confirmed. In a stranded Tursiops on July 6, 2004, it was observed that had a round shaped wound crater, achieving identify this scar like a punch shark bite.

Human interaction. Only 14 strandings could establish a direct relationship with the man, since the animals had mutilation of the caudal fin; Tursiops stranded these 14, nine were males, three females and two indeterminate. As for the variation years records of organisms found in this condition were mainly in 2006 (n = 4), 2004 and 2009 (n = 3); considering the months of the sampling years, it was observed that during May, June and July had the highest number of records finless porpoises flow (n = 3).

Additionally, eight copies had marks entanglement network; of these six were males and two females. In terms of variation for years, were found more network Tursiops with marks in 2012 (n = 3) and 2009 (n = 2); over the years month sampling, was observed during March and April as many toninas mark recorded with network (n = 3).

Discussion

Although T. truncatus is a species that is widely distributed, it is abundant along the Gulf of Mexico and the Mexican coast, that their strandings occur and that there are groups of attention to strandings of marine mammals in the Gulf of Mexico, there are few published worked with basic information about strandings of this species, in addition to most of the information comes from very specific sites. It was not until August 2012 that the National Stranding Network reported strandings of marine mammals at national level; however, the information is specific to each author and can not do an analysis like the one presented in this work.

Therefore, the results of this study provide the opportunity to be a reference to the species in relation to strandings; Unfortunately, there are no jobs to the area with which to compare the results obtained here.

The marine mammal stranding events represent special interest to both the general public and the scientific community; They can even be considered a risk to public health. Hence the interest of recording, broadcast and try to establish the possible causes of strandings occurred in the area of Laguna de Terms and avoid speculation and misinterpretation of such events.

Stranding patterns may reflect the abundance and density of the species in the area (Morales and Olivera 1993; McFee and Hopkins-Murphy, 2002). Should consider that Laguna Terms is an area that houses a large permanent and temporary resident population, so it is natural that the organisms die from natural causes or human interaction.

No study that compares strandings occurred each year; however, it was noted that in 2006 the largest number of strandings (n = 19) followed by 2004 (n = 18), 2013 (n = 15) and 2005 (n = 13) was recorded. The results of this work show that weather events such as hurricanes or tropical storms were not associated with strandings of dolphins, since neither in 2004 nor in 2006 these phenomena were recorded off the coast of Campeche so that has impacted the population of dolphins in the area. Although Hurricane Stan crossed the Yucatan Peninsula and was reduced to a tropical depression, emerging and returning strength in the Bay of Campeche on October 4, apparently it was not because of strandings recorded on those dates as these occurred 10 and 26 October, several days apart. The same happened with Tropical Storm Barry, which emerged and resumed force west of Ciudad del Carmen on June 19, 2013, while strandings were recorded 6 and June 29, 2013.

The work done by McFee and Hopkins-Murphy (2002) notes that in South Carolina, United States, 49% of strandings recorded from 1992 to 1996 occurred between April and July. In July the largest number of these events (n = 22) was recorded, while in January and October as few strandings (n = 2 and n = 3, respectively) was recorded. However, McFee et al (2006) found that in the same area after a seven-year study (1997-2003), the greatest number of strandings occurred in November Tursiops (n = 44, 14.6%) and the lower in February and September (n = 13, 4.3%).

For the area of Laguna de Terms, after 12 years of effort, we found that the largest number of strandings occurred in March T. truncatus (n = 23, 20%) and April (n = 13, 11%), while in December the lowest number (n = 2, 2%) was recorded. Be expected that the higher density a

higher probability exists that a stranding occurs; However, Delgado (2002) notes that in Laguna Terms the highest density was recorded during the rainy season while the lowest during the dry season. Therefore, it could not establish any relationship between the number of strandings and density recorded in the area.

Some studies indicate that mortality is higher in males and in the first year of the offspring (Fernandez and Hohn, 1998; Mann et al., 2000; Stolen and Barlow, 2003; Krzyszczyk, 2013). In this study, a greater number of males stranded in the lagoon area terms was recorded, with the ratio 1.00: 0.26 male (n = 72) for females (n = 19). However, this should not be interpreted as Laguna's Terms males in the population died.

High mortality of males have been demonstrated in other locations of Tursiops (Scott et al. 1990, Fernandez and Hohn 1998). There are probably several factors contributing to this statement. The social structure may be involved. It has been shown that both males and young females form groups after separation from their mothers, but females are reunited in possibly more protective larger groups, while males often travel in pairs (Wells et al. 1987). The differences in movement patterns can also increase susceptibility of males to predation; if males traveling alone or in open water, they may be more vulnerable to predatory sharks (Stolen and Barlow, 2003), as well as competition among males for access to females could result in direct and indirect (Möller et al mortality., 2001; Parsons et al., 2003; Aloise et al, 2013).. All these factors may be involved, including the physiological and metabolic in higher mortality of males.

Although it could be taken as evidence of predation, four agencies with shark bites were recorded; was possible to identify the lesion corresponded to a shark attack because the circular mark property of their bite. Delgado (2002) also documented the shark attack to a copy of Tursiops. What could not be determined in both studies is whether the attack killed issues or if the attack came after the death of the dolphin.

According to Delgado (2002), during the dry season the greatest number of offspring in Laguna Terms occurred. It was during the dry season when the greatest number of strandings of offspring (n = 5) was recorded, while in the rainy season and recorded two strandings in nortes there were none. It naturally, the most common situation in these animals is that increased mortality is concentrated in the early stages of life (Pérez 2006). During its first year, the offspring of Tursiops have a significantly lower rate of older offspring survival; however, the survival rate of young adults and juveniles, despite being relatively greater, are less than the survival rates of adult (Mann et al., 2000; Krzyszczyk, 2013) Therefore, in this study the dry season with as many pups stranded on Laguna Terms coincides with the busiest season record of pups established by Delgado (2002).

According to Delgado (2002), females sexually toninas mature coming from the southern Gulf of Mexico measured at least 240 cm, so that in this study the total number of females stranded with registered total length (n = 17), 24 % (n = 4) were sexually mature females. McFee and Hopkins-Murphy (2002) found 50% of sexually mature female while McFee and colleagues (2006) showed 47.3% mature females (both work with female larger than 220 cm).

Two forms or ecotypes of Tursiops are recognized:. A coastal or neritic form (coastal or nearshore) and other ocean or sea (offshore), which differ in morphology, genetics, hematology, parasitology and eating habits (Duffield et al, 1983 ; Mead and Potter, 1990). In general, coastal dolphin way described small size and tends to inhabit shallow warm waters, while the oceanic form is larger and is in deep, cold waters (Hersh and Duffield, 1990). However, these differences are not consistent in all locations, in some regions the coastal dolphins are smaller than pelagic but in other regions the opposite is true (Delgado, 2002).

In this work six individuals stranded by whose morphology is considered belong to ocean recorded form, while the remaining animals stranded form correspond to the coastal. They were recorded more frequently toninas size between 191-200 and 231-240 cm (n = 11 in each range) that corresponded to the coastal way; however, oceanic forms had greater size to 270

cm; Moreover, in one bite characteristic was observed circular punch Cookiecutter shark shark (Dalatiidae), widely distributed in tropical seas, epipelagic habits Bathypelagic (Compagno, 1984).

Regulation watching dolphins is also necessary because such activity is taking place in the community of Isla Aguada without any guidelines and / or specifications that regulate, ie not having any consideration of the limits of change in the population of dolphins, as groups with calves spawning and feeding should be avoided, as well. This activity can be done provided is governed by the relevant authorities and the service providers are trained in dolphin watching. You must also set the number of vessels that develop this activity with its duration and frequency.

Conclusions

In the study area have registered a total of 115 strandings of dead dolphins from 2002-2013.

The largest number of strandings occurred in 2006 (n = 19) while the lowest number was recorded in 2007 and 2011 (n = 3).

A higher incidence of strandings was presented in May (n = 23 records), while in December only two strandings were reported.

The largest number of strandings occurred during the dry season (n = 53, 46%), followed by the rainy season (n = 42, 37%) and nortes (n = 20, 17%).

In the Isla del Carmen area 88 stranded dolphins were recorded, 21 bodies were recorded in the area of Pom-Atasta and only six strandings occurred in the lagoon system-Sabancuy Terms.

Of the total of 115 copies of Tursiops truncatus stranded in the area, it was determined that 72 were males (62.6%), 19 were females (16.52%) and 24 agencies were not able to determine the sex (20.88%)

Eight stranded pups (7%), of which three were hatchlings were recorded.

Were reported more frequently organisms size between 191-200 and 231-240 cm (n = 11 for each interval).

We confirmed the presence in the area of the two forms or ecotypes: coastal and ocean.

Acknowledgements

This work is the result of hard work field by student volunteers Care Team Stranding of UNACAR. We thank the staff of the Directorate of Protection Area Wildlife Laguna Terms and Carmen Oceanographic Research Station of the 3rd Naval Military Region of the Navy for the information provided and, above all, for the hard work collaborative care in strandings of dolphins. We thank the direction of Civil Protection of the Municipality of Carmen by reports of strandings. DGVS and SEMARNAT thank for giving to M. in. C. Gerardo Hernández Rivas scientific collection permits OFFICE NO. SGPA / DGVS / 14339, SGPA / DGVS / 01032/06, SGPA / DGVS / 01682/07, SGPA / DGVS / 03542/08, SGPA / DGVS / 09924/10, SGPA / DGVS / 08287/12.

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