

## Evaluation of Sea Turtle Nesting in Playa Grande and Surrounding Area

Submitted by:

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I visited Playa Grande from November 24 through November 27, 2007 at the request of Asociacion para la Proteccion de la Tortuga Baula y el desarrollo de la Bahia de Tamarindo. I was chosen because I have 12 years experience managing sea turtles in an urbanized environment, Boca Raton, Florida, USA. During those years I have gained experience in controlling beachfront lighting and assessing its impact on Loggerhead (*Caretta caretta*), Green (*Chelonia mydas*), and Leatherback (*Dermochelys coriacea*). I also have extensive experience with predator control in an urban environment as well as managing *in situ* and relocated nests.

This report is my assessment of the present and future impact of development in Playa Grande on leatherback nesting. The opinions in this report are based on 12 years of field experience with sea turtles in Boca Raton, FL as the holder of Florida State Marine Sea Turtle Permit #041.

### Playa Grande

I was very impressed to see little evidence of beachfront development either from the beach itself (Figure 1) or from a boat. The majority of the existing houses and hotels appear to be outside of the 50 meter zone (from the mean high tide line). From a boat, only a handful of roofs are apparent with the most prominent structure being the Villa Baulas at the east end of Playa Grande (Figure 2) and some houses to the north end of the beach (Figure 3). In both of these areas, the natural dune vegetation is altered and should be restored. Photographs of Playa Grande from south to north taken from a boat show little visible development (Figures 4A-F) Although streetlights are beginning to be erected in the Playa Grande area, none are visible from the beach at night. The streetlight fixtures are high pressure sodium (HPS) light source in a standard NEMA fixture which is a significant contributor to sky glow and glare. I recommend using low pressure sodium (LPS) light sources for this application in a full cutoff type fixture (a fixture which allows no light above a 180 degree plane from the fixture). An inexpensive shield is available for the standard NEMA fixtures that will make this fixture full cutoff (see- <http://www.hubbell-ltg.com/download/brochures/Outdoor/Dark%20Skys.pdf> ) should the LPS option not be a viable alternative.

While participating in a guided tour to see nesting leatherback sea turtles (baulas), I was able to walk nearly 4 km on Playa Grande late on the evening of November 24. Minor sources of lighting on some of the houses were seen but none of these sources would be sufficient to deter a nesting female leatherback or their hatchlings. As these sources of light were behind a screen of dune vegetation, they were only seen through small patches through the dune vegetation. The only exception to this was the Villa Baulas, which had several unshielded compact fluorescent

bulbs visible from the beach. All of the fixtures at this site are a poor example of beachfront lighting. A simple educational program for the residents could easily correct these lights as I found the residents I met to be very interested in how they can reduce or eliminate any negative impacts they may have on sea turtles. All 5 of the female leatherbacks that emerged that night were located at the extreme northern end of Playa Grande near the houses that are visible from the beach. Very little signs of leatherback nesting activity was seen by me on the southern end of Playa Grande (closer to Tamarindo) during my visit. If this is a common nesting pattern, this would implicate the lights of Tamarindo as a deterrent to nesting females. I can state with confidence that the few existing lights I saw on Playa Grande are not responsible for the drastic decline in leatherback nesting on this beach. A little education of the residents can totally eliminate these few light sources almost immediately and in the future.

I noticed that garbage collection was from elevated baskets in Playa Grande and most of Costa Rica. These containers do not protect the garbage from wildlife such as raccoons, a may be responsible for a higher population of raccoons and other predators of sea turtle nests in the area. All trash in the Playa Grande area should be kept in varmint-proof containers to keep the populations of potential predators as close to "wild" levels as possible. A trapping program in an area such as this would most likely be detrimental to other wildlife.

### **Tamarindo**

The only significant and destructive source of lighting in the area was the Town of Tamarindo, east of the estuary (Figure 5). This Town has very bright metal halide (the most environmentally destructive light source) and high pressure sodium lights on the beach (Figure 6). Development is well within the 50 meter prohibited zone and all of the original dune vegetation in this area is either gone or drastically reduced (Figure 7). This area appears to be the victim of uncontrolled development and is the only Town to lose its International Blue Flag designation (of some 3300 beachfront towns worldwide) due to its lack of sewage treatment facilities. Because of this the coliform bacteria levels are often dangerously high in the area. This certainly can have a very negative impact on the leatherbacks that nest in Playa Grande and Playa Langosta and may cause these turtles to avoid these areas altogether. I understand from residents that Playa Tamarindo used to be a leatherback nesting site nearly a decade ago, now there are no recorded nests in the area that I have heard of from any available sources. In some documents in the United States, Playa Tamarindo is included in the Las Baulas National Park (The State of the World's Sea Turtles Report, Volume 1, page 22; [www.seaturtlestatus.org](http://www.seaturtlestatus.org)) which causes me to wonder if Playa Tamarindo should have been protected as well as Playa Grande and Playa Langosta. Development such as this will only destroy the natural beauty of Costa Rica that so many visitors come to see. It is imperative that Playa Grande not be developed in the manner of Tamarindo. In my opinion, unless development and lighting is better controlled in Tamarindo, there will be an increasing negative impact on leatherback nesting in Playa Grande.

### **Guided Tours of Nesting Leatherbacks in Playa Grande**

While attending a guided tour on the evening of November 24, I was initially shocked at the enormity of the program. Seven days a week during nesting season up to 130 people a night wander up and down the beach in groups of 30 to view nesting leatherbacks. They enter the

beach from one of two sites operated by the MINAE and may walk nearly the entire length of the beach (as I did) to reach a nesting sea turtle. I did not see a turtle abandon a nesting attempt as a result of this activity but the presence of such a large number of people roaming the beach at night most likely impacts some emerging females in a negative manner. Strangely, there are more people on the beach at night than there are in the daytime. In Boca Raton, areas of the beach with a large human presence at night have few, if any nests. Leatherbacks are the hardest species of sea turtle to scare by human presence, in my experience, but I have seen many instances of them leaving the beach without nesting in areas with high human traffic.

Additionally, the groups are broken down into 15 individuals to view the turtle at very close range (less than 1 meter), and then are rotated with 15 more after 5 to 10 minutes. This process apparently continues until all have seen the turtle or the turtle returns to the water. As some of the turtles are only viewed by biologists at some distance, it would be interesting to see what the average nesting time of a guided tour turtle versus a turtle observed by biologists. This would help indicate whether or not the people present were having a negative impact on the nesting turtles. The guide with our group was very well trained and up-to-date with information and he also used his small red flashlight sparingly.

### **Hatchery at Northern end of Playa Grande**

In Florida, sea turtle conservation is based largely on educating/directing people while letting the turtles do their thing as naturally as possible. Because the temperature of the sand determines the sex of sea turtle hatchlings (Mrosovsky, N. "Sex Ratios of Sea Turtles", *J. Exp. Zool.*, 270, 16-27, 1994, Christopher A. Binckley; James R. Spotila; Kathryn S. Wilson; Frank V. Paladino, "Sex Determination and Sex Ratios of Pacific Leatherback Turtles, *Dermochelys coriacea*", *Copeia*, 1998:2, 291-300, 1998), the potential of changing the sex ratio of the hatchlings is enhanced as all the nests are located at one site. If the site is not shaded at any time during the day, it is possible to have all the nests produce females in the resulting higher incubation temperatures. Such a situation would certainly have a negative effect on the population as is seen in Malaysia (Chan, E.H. and H.C. Liew. "Decline of the Leatherback Population in Terengganu, Malaysia 1956-1995. *Chelonia Conservation and Biology*, 2:196-203). The main disadvantage of a hatchery is that all the eggs are in one basket. Much has been written about the serious negative impacts hatcheries can have on the future populations of sea turtles (Mortimer, J.A., "Reducing Threats to eggs and Hatchlings: Hatcheries", In- K.L. Eckert, K.A. Bjorndal, F.A. Abreu-Grobois, M. Donnelly, (Eds) *Research and Management Techniques for the Conservation of Sea Turtles*. IUBN/MTSG Publication No. 4, pp. 175-178, 1999; Morreale, S.J., G.J. Ruiz, J.R. Spotila, E.A. Standora, "Temperature-Dependent Sex Determination: Current Practices Threaten Conservation of Sea Turtles", *Science* 216:1245-1247, 1982).

### **Decline of Nesting Leatherbacks in Las Baulas National Park**

The number of leatherback nesting females has declined more than 90% since 1989 (<http://www.earthsbirthday.org/EDSS/documents/EDSSstdataset.pdf> and <http://www.baulas.org/87-07.html>). Although some of this loss of nesting may be due to the situation at Tamarindo, the real problem is the loss of leatherbacks to the fishing industry at sea (<http://playagrandeinfo.org/docs/leatherbacknature.pdf>).

I am surprised that nesting data on the beach is lacking GPS (global positioning satellites) coordinates for all crawls and nests as this type of data can show unequivocally areas where nesting females are experiencing problems (see [http://www.scgis.org/docs/Newsletters/SCGIS\\_Newsletter\\_June2006.pdf](http://www.scgis.org/docs/Newsletters/SCGIS_Newsletter_June2006.pdf), pages 5-7). The cost of GPS handheld units is very small (approximately \$100.00) and should be included in all nesting surveys. Using such data, untrained members of the public can see clearly where a problem in nesting occurs. In my experience, such data is more readily accepted than data that is interpreted by biologists.

The present state of development in Playa Grande has not had a significant negative impact on leatherback nesting in the area, in my opinion. There were no significant light sources on the beach at Playa Grande that could negatively impact a nesting female or her emerging hatchlings. The lighting and water pollution at Tamarindo most likely does have a negative impact on leatherback nesting and hatchling health in the area. This beach has already been destroyed for any future turtle nesting. Future uncontrolled development can destroy the nesting beach at Playa Grande if it is not controlled.

### **Monitoring Local Sea Turtle Populations Through Stranding Data**

While driving along the coast north of Playa Grande, I saw a dead sea turtle wash in while having lunch. The turtle was an Olive Ridley that had apparently been hit by a boat. I was surprised to learn that there was no network or governmental agency to report this death to as several curious people came over to check the body out, then walk off nonchalantly. Collecting information about dead or injured sea turtles found along the coast can yield valuable information on what threats exist to the populations in coastal waters and can even pinpoint areas where the fisheries have a negative impact. A description of the Stranding and Salvage Network, its benefits, and practices in the United States is found in Shaver and Teas, 1999 (Shaver, D.J. and W. G. Teas, "Stranding and Salvage Networks", In- K.L. Eckert, K.A. Bjorndal, F.A. Abreu-Grobois, M. Donnelly, (Eds) Research and Management Techniques for the Conservation of Sea Turtles. IUBN/MTSG Publication No. 4, pp. 152-155, 1999). In Florida, there are only about 5 people paid by the State to collect stranding data. As this is obviously too few to cover Florida's expansive coastline, the State relies on trained volunteers, such as myself, to record and report strandings in our local area of responsibility. Because of this, the stranding program can be carried out very inexpensively.

### **Development in the Guanacaste Area**

I visited San Jose in 2004 for the International Sea Turtle Symposium, I was shocked at how different the airport was and how much had changed in these few years. What disturbed me was the multitude of signs in English offering beachfront properties (Figure 8A, B, C). Visiting the area north of Playa Grande on the area of Flamingo showed many signs of rapid development such as cranes (Figure 9) and foreign Real Estate Offices (Figure 10A, B). Such heavy development without even rudimentary urban planning will strain basic resources, such as drinking water, and may be a center of disease if towns are constructed without sewage treatment facilities. Oceanfront development in this manner will certainly be detrimental to not only Costa Rican sea turtles, but to the whole of Costa Rica's beautiful environment. The development

pressure in Guanacaste appears very high which indicates that whatever buffer exists from the mean high tide line to some point inland, development will still occur. I encourage you to not let the heart and beauty of Costa Rica disappear under the ugliness of uncontrolled development.

### **Development in Playa Grande**

The residents of Playa Grande have seen the destructive side of development in the area such as Tamarindo and Flamingo and many seem keen to write up a code to control development in Playa Grande. Such a code would be very important, as it is evident that the Playa Grande area will be developed regardless the width of the National Park's beach buffer zone. A code that addresses lighting, sewage, and garbage control, and other human-related impacts on the environment from the outset will insure that Playa Grande remains a beach that is attractive to the rapidly decreasing leatherback population in the Pacific Ocean. The draft of the code I saw restricted building heights, lot sizes, and the maximum footprint for building on each lot. My impression is that if such a code were adopted, Playa Grande would look very much as it does today, twenty years from now. I have attached a copy of the code with suggested changes to enhance the conservation of all the species in Playa Grande (Zoning Plan Playa Grande\_EDIT.doc). As a United States biologist, I have no appropriate input to the legality of the existence of such a local code, I am commenting on sections of the code that could benefit the environment of Costa Rica on a local as well as National level. I am also attaching a copy of the lighting ordinance of Boca Raton, Florida that I hope can be used as a model for a similar lighting code in Playa Grande and Costa Rica (LIGHT\_ORDINANCE\_BOCA.pdf). As stray light in populated areas increasingly contributes to sky glow, its effects are being seen on nesting sea turtles in Florida ([http://www.scgis.org/docs/Newsletters/SCGIS\\_Newsletter\\_June2006.pdf](http://www.scgis.org/docs/Newsletters/SCGIS_Newsletter_June2006.pdf), pages 5-7). Because of this, I encourage you to investigate including provisions in a lighting ordinance that addresses and restricts sky glow sources. Attached are two ordinances that address sky glow and are intended to only serve as models as Costa Rica is very different from Florida (JUPITER\_CODE.doc and VOLT%20Model%20Ordinance%20v4.pdf). A simpler description of codes addressing sky glow can be found in the following attachment (FRAMEWORK FOR OUTDOOR LIGHTING IMPROVEMENT ORDINANCES.doc). Additional information about sky glow issues and fixes can be found on the International Dark Sky Society's website ([www.darksky.org](http://www.darksky.org)). It is always my preference to see no development, a view that is, unfortunately, unrealistic in today's world. If an area is going to develop, I strongly support rational, planned development such as this.

**Figures**



Figure 1. Playa Grande looking north, November 24, 2007.



Figure 2. Villa Baulas from the water, November 25, 2007.



Figure 3. Houses at north end of Playa Grande, November 25, 2007



A.



B.



C.



D.



E.



F.

Figure 4, A-F. Photographs of Playa Grande from south (A) to north (F) showing beachfront development as it exists November 25, 2007. These photographs are from north of Villa Baulas (Figure 2) to the south of the houses in Figure 3. North is to the left in each photograph.



Figure 5. Tamarindo at dusk taken from Playa Grande, November 25, 2007.



Figure 6. High pressure sodium lights taken from the Tamarindo beach, November 25, 2007.



Figure 7. Tamarindo beach structures and dune, November 25, 2007.



A.



B.



C.

Figure 8 A-C. Advertisements for coastal development at the San Jose International Airport, November 29, 2007.



Figure 9. Development north of Playa Grade near Flamingo, November 26, 2007.



A.



B.

Figure 10 A-B. Signs for development north of Playa Grande.