

The American Crocodile

2009 Surveys

Osaaventura Research Based Tours
Golfo Dulce Region, Costa Rica

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Dear Crocodile fanatic:

It's here! Your opportunity to participate in ongoing research of the legendary American Crocodile! Join us in our explorations of the far-flung corner of southwestern Costa Rica with the objective of conserving this magnificent beast.



The American crocodile (*Crocodylus acutus*) has been mercilessly hunted for the last seventy years or more for its particularly good skin. Throughout its Central and northern South American range the American crocodile has diminished hugely in number, prompting CITES to place it on Appendix 1 (Endangered), and the IUCN on its Red List: VU (Vulnerable). The survival of the species lies in a few secure, scattered populations in its range; in Cuba, the Dominican Republic, Belize and Florida. Costa Rica's excellent institutional infrastructure and conservation record since the early 1970's has allowed the American crocodile to recover in number. The Osa area has some of the most extensive wetland habitats in the country suitable for the American crocodile.

The region within which our research takes place encompasses the mangrove laden estuaries of the Rio Sierpe, the rivers draining into the Golfo Dulce from both the eastern versant of the Osa Peninsula and the mainland and the Pacific coastal lagoons and rivers of the Osa Peninsula north to the Rio Terraba.

Michael Boston (Principal Investigator) began surveys of the American Crocodile in the ACOSA (Área de Conservación Osa) region of southwestern Costa Rica in September of 2004 and has completed a number of surveys since. The possibility of a robust and healthy population of this crocodylian inhabiting the wetlands of the Osa area has been noted. However, very little data is available on the American in the region. This is where you come in!

We are seeking field-research adept individuals to partake in this crucial monitoring program. While here, you will play two roles **essential** to the project:

1. Being actively involved in surveys gathering data vital to conservation and;
2. Acting as the core source of funding while participating.

Due to the very inconsistent nature of research grants this project, vital in assessing the top predator of the region, cannot be consistently fueled without your help!

We have room for 2-4 dutiful individuals to work on our day and night croc surveys for 10 day periods at a time. You will fill important roles associated with croc monitoring; assistant spotter, data logger, measurements of captured etc. With your aid, the continued

monitoring of sites and the inclusion of others will provide us with a baseline density count for future assessment. Sheer necessity will direct us into little explored reaches of the region, through winding coastal estuaries, open lowland swamps and expansive flooded forests dominated by the raffia palm (*Raphia taedigera*) among others.

During the 10 days you are here we will strike a balance between comfort and roughing-it, exploration and relaxation, repetitive scientific protocol and the unexpected. So seize this chance to partake in a worthy cause and some serious exploration!

Sincerely,

Michael Boston
Principal Investigator

Gareth Blakemore
Investigator



Crocodiles of the Golfo Dulce

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Research Proposal

Investigators

*Mike R. Boston
Gareth D. Blakemore*

Collaborators

*Joseph Wasilewski
Steven Conners
Jorge Largaespada
Jim Tamarack*

Support

*This census is being conducted under the auspices of Friends of the Osa
(www.osaconservation.org)*

Project Title

*A survey to assess population status and trends of the American Crocodile (*Crocodylus acutus*) in the Osa Peninsula region (ACOSA) of Costa Rica*

Research Site

Golfo Dulce Region of southwestern Costa Rica

Team Size

Minimum: 2 Maximum: 4

Introduction

The American crocodile (*Crocodylus acutus*) is a wide ranging species, native to extreme southern Florida, most of the Greater Antilles and both the Atlantic and Pacific coasts of southern Mexico, Central America and northern South America. In spite of this extensive range there are few areas where it is considered common and there is a need for accurate population data from many countries. The species suffered major population declines in the mid 20th century from hunting, and continues to suffer from habitat loss (Ross 1998). It is currently listed on CITES Appendix I, classified as “Vulnerable” by the IUCN Red List (1999) and “Endangered” by the U.S. Fish and Wildlife Service. The

species receives full legal protection in Costa Rica; it is included as “Endangered” in the Law of Wildlife Conservation (1998).

In Costa Rica, studies have focused on determining the size and the structure of populations of crocodiles in several rivers including some in the ACOSA. For example, in Corcovado National Park densities of 4 individuals/km have been recorded in the Sirena river, 1.3 individuals/km in the Corcovado river (Bolaños *et al.* in preparation) and 7.44 individuals/km in the Sirena Lagoon (Porrás 2002). Most surveys have been made on the Pacific coast outside the ACOSA, e.g. Tarcoles River (Sasa & Chaves 1992; Torrealba, *et al.* 1992; Motte 1993; Piedra 2000; Porrás 2004); Gulf of Nicoya, Sierpe-Terraba and La Rambla (Caribbean coast) (Bolanos *et al.* 1996); Tempisque-Bebedero River (Sanchez *et al.* 1996), Jesus Maria River (Piedra 2000, Porrás 2004) and Tusubres River (Piedra 2000, Porrás 2004). In some habitats, e.g. the Jesus Maria River (Porrás 2004) the size and the structure (age and sex) of the population puts its future at risk.

In the extensive wetlands of the ACOSA area the American crocodile was intensively hunted for its skin and oil from the 1930’s to the 1980’s. During this same period ACOSA lost considerable areas of wetland on the upper drainages of its major rivers to rice fields and banana and oil palm plantations. Though hunting pressure and habitat loss are much reduced now, agricultural effluent may still be a problem today (M. Boston personal communication).

Due to the conservation status of this species it is necessary to determine the demographics of the populations in Costa Rica. Census information will provide baseline data needed for future management. The present study hopes to determine the status of American crocodiles in the Osa peninsula region of Costa Rica. This would help fulfill one of the high priority projects in the IUCN Crocodile Specialist Group recommendations for this species (Ross 1998).

Research Objectives

Overview

Observations over the past decade (Mike Boston) and interviews with local residents indicate that American crocodiles are present in all of the major watersheds of the ACOSA. Additionally there are extensive mangrove habitats (> 50% of the mangroves in the country are in this region) swamps and lagoons which provide potential habitat for crocodiles. This remote, sparsely populated region of the country has never been systematically surveyed for crocodiles. It could prove to be one of the most important strongholds for this species in Costa Rica and perhaps in its entire range. Therefore the primary goal of this project is to survey these habitats in order to satisfy the following objectives.

Objective #1

To determine the presence/absence of *Crocodylus acutus* at survey sites.

- **Where is the American crocodile present?**

- a. The principal goal of this project is to verify the presence (or absence) of crocodiles within the various aquatic ecosystems of the ACOSA area via systematic surveys.
- b. A distribution map will then be produced to more effectively monitor known populations.

Objective #2

To estimate crocodile densities, population sizes and age structure.

- **What are the densities of known populations within the ACOSA region and the age structure of those populations?**
 - a. The number of individuals encountered/km will be used as an index of population density.
 - b. Obtaining density counts will provide a useful baseline count to which future fluctuations in the species' numbers can be monitored. Furthermore, comparing ACOSA crocodile densities to those elsewhere within the Mesoamerican region could prove useful as conservation fodder.
 - c. When possible, the size of each individual will be recorded to allow for an assessment of age structure.

Objective #3

To identify nesting areas where possible.

- **Where is *C. acutus* nesting within the ACOSA area?**
 - a. Surveys during the principal nesting period (January) will focus on finding and mapping nest sites.
 - b. Nest sites can then be monitored year to year to determine use.
 - c. Returning to active nests during the hatching period (late April/early May) allows us to assess reproductive success.

Objective #4

To determine the movement and migration patterns of *C. acutus* through mark and recapture.

- **How are individuals moving within the population? Are migration/recruitment events occurring?**
 - a. By marking each captured individual (via caudal clippings) and recording exact location with a GPS unit, any subsequent recapture would yield valuable data on that individual's movements.

We plan for numerous surveys throughout the year so as to cover much of the extensive habitat. Most surveys will, however, coincide with three major events in the biology of this species as follows:

1. **January:** nesting period;
2. **April/May:** hatching period;
3. **August/September:** a neutral period where all individuals are present.

Education

Education of the local citizenry is equally as important to species conservation as is identifying suitable habitat (Wemmer 2001). Residents need to know why the animals in question deserve protection. Crocodiles have been responsible for recent fatalities in the country. Human/crocodile conflicts can cause prejudice towards the species and lead to persecution. There is also evidence of recent crocodile poaching in the ACOSA (M. Boston, pers. com.). It will be important to explain or reemphasize the protected status of the species in Costa Rica to those who are unaware. A summary of the educational goals follows:

1. Emphasize the importance of crocodiles to the ecosystem and their value to the local economy through ecotourism. (Abadia Klinge 2004).
2. Identify human behaviors that can be changed or modified to reduce the likelihood of human/crocodile conflicts while noting that they are protected by law.

Methods

The survey will take place in the Osa Conservation Area that is located in southern Costa Rica (see Figure 1 below). The majority of surveys will be conducted via boat at night. Spotlights will be used to locate animals via eyeshine. This is a standard crocodylian survey technique that is the most efficient method of locating these animals (Messel et. al. 1981, Verdade et. al.2004). When an animal is located, an attempt will be made to approach as closely as possible to determine size and confirm species (*Caiman crocodilus* is also found in the area). Locations of individuals will be recorded via GPS. This information will be combined with distance surveyed to create a crocodile density ratio for each survey location. Daytime surveys will also be conducted to verify habitat types, locate nesting sites, tracks, droppings or other indications of crocodylian activity. Water temperature and salinity will be recorded. Salinity levels in coastal waters can affect the survival of hatchling crocodiles (Dunson 1982), so this measure provides an indication of the suitability of nursery habitat

Specimens will also be captured opportunistically, examined visually, sexed, weighed and morphometric measurements taken. Taking individuals no larger than one meter in length would minimize effects on population dynamics as these individuals are juveniles and do not have established territories. Capturing of large individuals is not necessary and would undoubtedly over stress those captured, possibly resulting in fatalities. Animals will be marked by clipping caudal scutes; this is a safe and proven

technique. The resulting mark(s) allows individual identification from a distance and will permit investigators to obtain information on growth (estimated) and movements without the need for recapture. Recaptures, when possible, will be undertaken to obtain more precise measurements on growth, body condition and general health.

The educational effort will be both formal (e.g. talks to school groups) and informal (interviews and discussions with local residents). The high literacy rate and mandatory education system in Costa Rica will make presentations at schools an effective way to reach a large segment of the local population. Targeting a young audience should be effective in maintaining a long term conservation ethic with respect to crocodiles.

Informal discussions with people who live and work in crocodile habitats will be an opportunity to dispel myths, provide natural history information, offer safety advice and remind them of the protected status of the species. This will also be an opportunity for the investigators to gain information about crocodiles from the people who spend the most time in these habitats. These discussions should be mutually beneficial. Empowering local citizens with the tools needed for wildlife conservation work builds in-country capacity for these activities in the future.

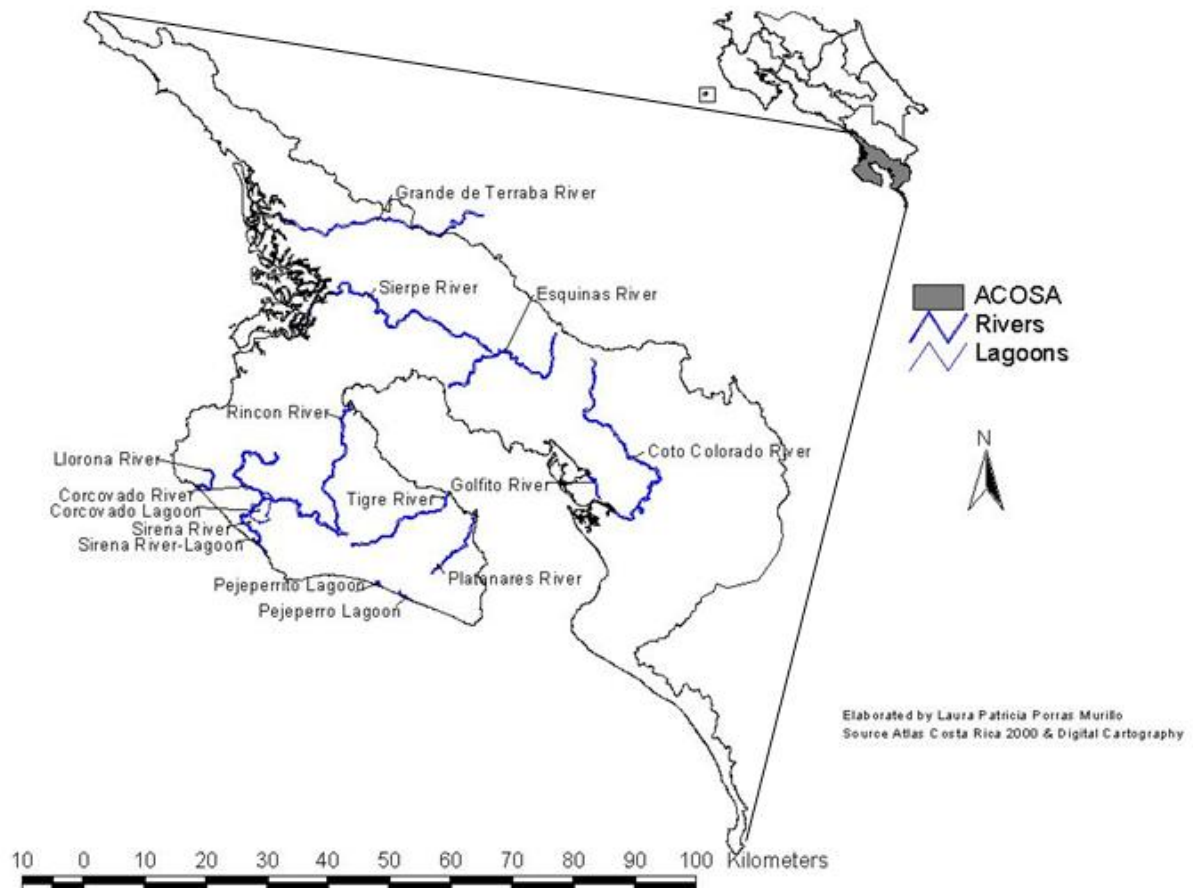


Fig1: Location of Área de Conservación Osa in Costa Rica

Projected Outcomes

This project will provide baseline data on American crocodile populations in the ACOSA region of Costa Rica. Upon completion, information on occupied habitats/watersheds, nesting areas, demographics and movements will be published and disseminated to those responsible for managing this species and the region. Additionally, information about crocodiles and their conservation will be disseminated to local residents.

Surveys to Date

1. September 2004: Survey of the Rios Coto, Esquinas, Rincon, Tigre and Platanares of the Golfo Dulce drainage (Evergreen Fellowship).
2. April 2005: Survey of the Rios Coto and Esquinas (Evergreen Fellowship).
3. August 2005: Survey of Rio Sirena and Laguna Sirena of Corcovado N. P. (self-funded).
4. April 2006: Survey of Lagunas Pejeperro and Pejeperrito on the southern Pacific coast of the Osa Peninsula (self-funded).
5. May 2006: Survey of Laguna Pejeperrito (self-funded).

Volunteer Training

No prior knowledge of research techniques is needed, lucky you! All training will be given on-site; an introductory presentation will be given the first day followed by in field training. One of the main concerns in ecological monitoring are biased results, which may result for many reasons. When using VES (visual encounter survey) methods we must make several assumptions which may or may not hold true; i.e. that every individual is equally conspicuous, each individual is equally likely to be observed during each sampling session and that each individual is recorded only once. The latter two may be minimized through sampling at similar times of the year and under similar weather conditions and keeping track of individuals so as not to record multiple recounts. Another concern is that observers will most likely have different search images for target species. Therefore, the quality and consistency of information gathered by volunteers is also a source of potential bias. To reduce this source of bias, all volunteers will be trained in field techniques and spotlighting methods before actual surveys begin.

Volunteer Assignments

The gathering of scientific data is an often monotonous and boring process. We will spend hours on end in the field under hot and humid conditions adhering to rigid protocol. What, you thought this was going to be a relaxing holiday? Each volunteer will be assigned a duty during surveys. Tasks are as follows:

1. Data logger: This individual's task is in recording all environmental variables, specimen data and keeping note of time.

2. Instrument Reader: This individual's task is in gathering all environmental variables, specimen data and location and reporting them to the data logger.
3. Assistant Spotter: This individual has the task of assisting the primary spotter in systematically scanning the survey site for eyeshine and in directing the boat captain through the habitat to each spotted individual.
4. Miscellaneous: many other small tasks will be assigned as needed.

Project Staff

Michael R. Boston

I was born in Rawalpindi, Pakistan of Irish parents. Soon after my birth, we moved to Trinidad & Tobago in the West Indies, where I spent the next 14 years of my life. It was there that my father, known throughout the islands as "Snake Man," bequeathed to me his passion for snakes and crocodiles and, indeed, the natural world. I completed my secondary level schooling in Northern Ireland, and for the next five years worked as a research assistant for the Department of Industrial & Forensic Science as a water pollution analyst. However, biology was my passion, and I moved to England to become an undergraduate. In 1979, I graduated with honors in Biology from the University of Portsmouth. After graduating, I worked for many years in the Ulster Museum, Belfast, as an Entomologist, studying the taxonomy and faunistics of parasitic wasps (the Ichneumonidae!). I was elected Fellow of the Royal Entomological Society of London for my published contributions to entomological research. Subsequent to this I took another position in the Ulster Museum working on the conservation of bats in Ireland. Indeed, I was one of the founding members of the Northern Ireland Bat Group, and Ireland's first professional batman! Accepting an offer to establish the first Tropical Butterfly and Reptile House in Northern Ireland, I went on to develop and manage this project into one of the province's leading tourist attractions. I then moved to Scotland and began a project with The Highlands & Islands Development Board to create a rainforest exhibit entitled "The Living Rainforest." This was to be an expansion of the ideas I gained from my experiences in Northern Ireland. However, a 29% fall in tourism in 1994 spelled the end to the project. During this period I wielded a pickaxe and shovel to make ends meet – I was a laborer, and loved it! However, I yearned to return to the tropics, and to rainforests that I so love. Bewitched by the wild beauty of the Osa Peninsula during a visit in 1995, I returned to there to live and work the following year. In 1998, I established OsaAventura. Since then, I have been imbuing in others that passion for tropical rainforests that my father imbued in me in my formative years.

Mike has been named a Research Associate of Friends of the Osa (www.osaconservation.org). Under the auspices of this foundation he is carrying this long-term survey of the American crocodile (*Crocodylus acutus*) populations in the Osa Peninsula region of Costa Rica. For the past three years he has been monitoring whale sharks in the Golfo Dulce as part of a collaborative project with PRETOMA (www.tortugamarina.org) and Vida Marina (www.vidamarina.org).

Gareth D. Blakemore

I am a California native with a B.s. in Zoology from Humboldt State University. During university I worked summers for the U.S. Forest Service conducting TES

(Threatened/Endangered Species) wildlife surveys in Arizona. Our main focus was the critically endangered Chiricahua leopard frog (*Rana chiricahuensis*). The task of the project was in assessing the presence/absence of this species throughout the Pleasant Valley Ranger District of the Tonto National Forest through systematic surveys, the determination of suitable release sites for captive reared individuals, the modification and restoration of these sites and then the eventual reintroduction of tadpoles and metamorphs into sites. A very exciting and radical project indeed, especially when we discovered that individuals had begun colonizing new sites! We monitored the five known populations from year to year. Other species we monitored included the infamous Mexican spotted owl (*Strix occidentalis lucida*) and the goshawk. We also undertook some rather unorthodox work in the form of non-native removal as we slaughtered bullfrogs, crayfish and tiger salamanders by the tons. I am currently conducting similar work in the rugged backcountry of Sequoia and Kings Canyon National Parks of California.

It was my first trip to the Osa Peninsula, in 2000, that triggered a profound change in me. In tropical ecology I had a new found passion but have since focused more intently on researching the diverse herpetofauna of the region.

Research Area

Flying over the Golfo Dulce you gain an appreciation for the intense beauty of the region. Packed into an incredibly small area are an absurd number of habitats that lend to the areas unique biological richness, indeed a naturalists paradise. Within the region is the largest intact mangrove ecosystem in Pacific Mesoamerica (the Terraba-Sierpe system), the most significant remaining areas of lowland Pacific tropical rainforest, and one of only four tropical fjords on the planet, the Golfo Dulce. These ecosystems, and numerous others, provide habitat that is essential for the Osa's plentiful wildlife. The Talamanca Mountains, east of the Golfo Dulce, act as a shield against the winter trade winds so that precipitation arrives from the pacific lending to the areas wetter climate than the rest of Pacific Central America. The area thus supports the richest tropical lowland forest on Central America's west coast and possesses strong floristic affinities to the Colombian Chocó-region. Many South American tree species reach their northern limits here. On the Osa Peninsula temperatures seldom drop below 27°C (80°F), in the rainy season, and may exceed 35°C (95°F), in the dry season. Combined with the high humidity (60 - 100%), conditions here can become uncomfortable, even oppressive. Rainfall ranges from 4 to 7 meters (160 to 280 inches) annually, and falls mainly between the months of April and November, heaviest in October.

Itinerary
January 20th-29th, 2009
(1st survey)

Day 1

Day of arrival: arrive to *Puerto Jimenez* for an afternoon 'Project Briefing' and training followed by an evening survey of the *Rio Platanares*. Accommodation for the night will be in *Cabina Jimenez* on the waterfront.

Day 2

Across the Golfo Dulce by boat to *Zancudo*. Day time nest-survey of the *Rio Coto*, followed by a night survey. Accommodation in *Zancudo*.

Day 3

Day time nest-survey of the *Rio Coto*, followed by a night survey. Accommodation in *Zancudo*.

Day 4

By boat to *Cana Blanca Wildlife Sanctuary*. Day time nest-survey of the *Rio Esquinas* followed by a night survey.

Day 5

Across the Golfo Dulce to *Puerto Jimenez*. Transport boat by vehicle to the *Rio Rincon* for day and night surveys of the areas extensive mangrove habitat.

Day 6-9

Transport boat by vehicle to *Sierpe* for diurnal nest surveys and night surveys of the extensive deltas of the *Rios Sierpe and Terraba*.

Day 10

Depart from *Palmar Sur* to destination of your choice, for much needed R&R!

Total cost/person: \$2,285

Price includes all food and lodging, transportation and guide fees during stay and is subject to change. Please notify us beforehand if you have any special food preferences or allergies. Itinerary is subject to change and will not be fixed for all surveys as the research area encompasses much area. Contact us if a slight change in dates would suit your schedule better.

Other surveys planned in 2009

February 3rd-12th
March 24th-April 2nd
April 14th-23rd
April 28th-May 7th
August 4th-13th
September 8th-17th

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