First evaluation of abundance of the three river dolphin species (*Inia geoffrensis, I. boliviensis*, and *Sotalia fluviatilis*) in the Orinoco and Amazon River Basins, South America

Introduction

River dolphins are positioned at the apex of aquatic ecosystems given that they are present in all types of habitat (large rivers, smaller tributaries, lakes, confluences and flooded forests). They play an important role in regulating fish communities and can also be employed as indicators of ecosystem quality in terms of prey availability.

Additionally, they are of great cultural value for the majority of indigenous communities living along river banks, taking a fundamental place in their cosmogony. As a result of their biological and cultural importance, dolphins have become striking conservation objectives, through which efforts can be channeled to manage South American aquatic ecosystems.

An Environmental Diagnostic through the 'Veins' Of South America

River dolphins are seriously threatened, particularly through decrease in distribution due to fragmentation of their habitat. In the Amazon, for example, there are problems caused by pollution, deforestation and commercial fisheries.

Moreover, during recent years, dolphins have been killed for use as bait for catfish (*Calophysus macropterus*) and, according to data from the National Institute of Amazon Research (INPA, Brazil), around 1,500 are slaughtered every year in the Amazon region. Besides this, they are also killed by local fishermen who see them as competitors in catching fish.

But the problem is not only that dolphins are endangered. This situation carries serious implications for aquatic ecosystems, the survival of the species, and the economic and social wellbeing of river-dwelling communities.

An estimate of South American river dolphin abundance allows the number of dolphins that the Orinoco and Amazon basins can support to be determined, along with the most serious threats facing them, the state of their habitat, and potential measures for conservation of the three species within the two basins: the Pink Dolphin (*Inia geoffrensis*), Gray Dolphin (*Sotalia fluviatilis*), and Bolivian Dolphin (*Inia boliviensis*).

This is the first time an initiative of this magnitude concerning river dolphins, has been carried out in the Americas or the world, and the scientific information will help design a conservation strategy to implement competent actions to reduce threats to these species and guarantee their survival as well as that of their habitat: the Amazon and Orinoco river basins.

In a second phase, the results of these abundance estimates will allow a protection strategy to be designed for the species and its environment and also the implementation of activities that will diminish pressure on the ecosystems. These will provide productive and economic alternatives to local communities to utilise sustainable natural resources and minimize impact.

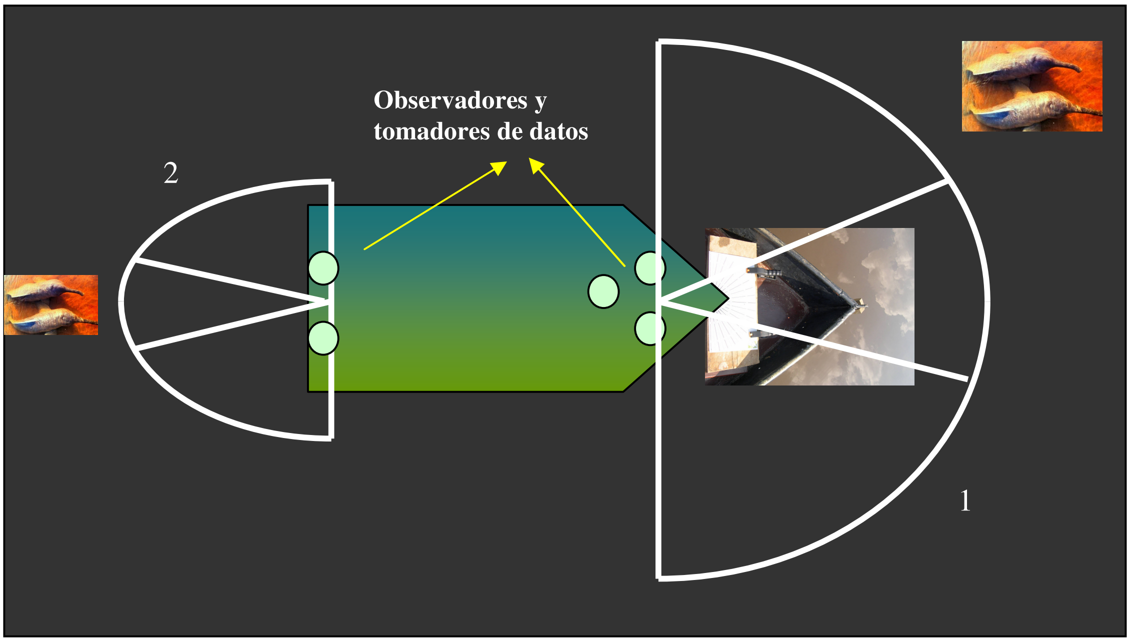
Work Methodology

The Andean waters of the two river basins researched, contain a high volume of sediment which discolours the water and complicates dolphin-sighting. In addition, pink dolphins only surface sporadically to breathe. For these reasons, Fernando Trujillo, scientific director of the Omacha Foundation and expeditions' leader, developed a model for counting river dolphins and extrapolating data without them having to be captured and marked. This was done with the support of St. Andrews University, in Scotland.

Fieldwork Phase and Procedures

Different boats were used for each of the rivers sampled. For example, on the Orinoco (Venezuela) an 18 meter boat was used with an observation platform 4,75 meters above water level. On the River Meta (Colombia) the boat was 30 meters long, with observation platforms 5,50 meters above water level in the bow, and 3,40 meters in the stern.

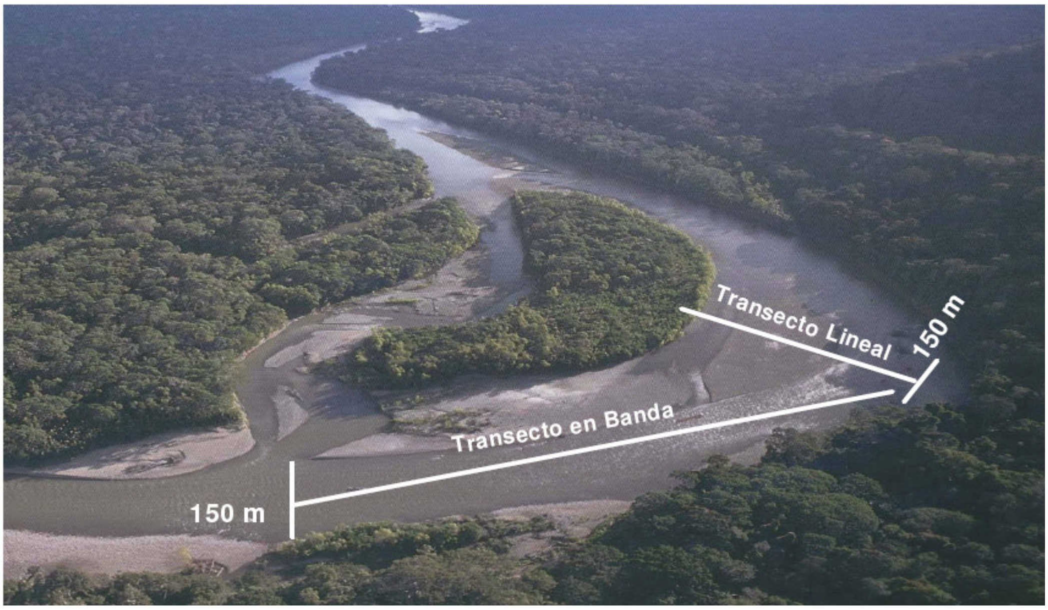
Observation Platforms



The platforms are occupied by five observers, three in the bow and two in the stern. Both platforms are in permanent communication to increase certitude in dophin detecting and counting. Platform height is crucial in allowing a wider field of vision, enhancing dolphin detection, and at the same time reducing possible interference with their behavior.

The boat travels at an average speed of 8 -15 km/h. A combination of linear and strip transects of the river were made (Leatherwood 1996, Vidal *et al*. 1997 and Martin *et al*, 2004) with some modifications to suit the study area. Linear transects were made when the river was crossed from one side to the other, that is to say at right-angles to the banks. Strip transects were made parallel to the banks of the main channels, islands or tributaries.

(Figure 1). Direct counting techniques were used at confluences to estimate average group size.



Observers had prior experience in sighting river dolphins, as their sighting ability was a key factor in maintaining constant detection of the populations, which can be affected by environmental conditions, dolphin behavior, the observation platforms or boat speed (Reeves *et al*. 2000). Observers were rotated each hour to avoid exhaustion and maximise concentration when sighting dolphins.

Three different recording formats were used; a Bow Register, a Stern Register and a Progress Log. This last was recorded every ten minutes, whether there were sightings or not, unlike the other two, where only observations were registered.

The use of *Garmin–etrex* GPS provided continuous information on geographical location, speed and direction for each trip. The use of range-finding binoculars (*Laser Range Finders*) helped estimate distances to riverbanks and detected dolphins.

Due to the need to estimate dolphin distance rapidly when sighting, binoculars were not used, and distance from boat to dolphins estimated visually instead. Prior to sighting, researchers were trained in distance measurement, using inanimate objects in the river. These distances were confirmed later with the binoculars. A member of the team worked permanently with the boat captain, giving him all necessary directions.

Sightings

Each observation platform (bow and stern) had a wooden protractor installed to determine the angle at which dolphins were sighted. At the moment of sighting, the distance to the detected animal was calculated and their geographical position recorded by GPS.

This information was recorded in the Bow or Stern Registers respectively, and also in a Progress Log. Only sightings which were taken during the transects were recorded as observations. Direct counts at river confluences, for example, were not recorded in the Progress Log.

For each bow or stern sighting, the time, sighting number, geographical position, side (port or starboard), dolphin detection angle, distance, species, observer's number, and whether the dolphin group was close-packed or dispersed, were all recorded. Finally, following Reeves *et al.* (2000), the size of the group was estimated by group size base protocol, to be high, low and (best) estimate.

A group was defined as the number of observable animals within a distance of 250 m. from the observers, as this area allows good eye contact with the dolphins (Trujillo 2000). The term *sighting* or *observation* used in this study refers to all animals detected within the transect. All dolphins were counted that were visible in the place where the first dolphin was observed.

If all the dolphins in the area could not be easily counted, the boat moved closer to them, or in some cases a smaller boat was launched, but this count was not counted as part of the transect. In this case, mainly at river confluences, a direct count technique was used and the data obtained was not incorporated within the Progress Log, because, when a group was found, the boat would reduce speed to confirm group size, take photographs and make videos to observe group composition and record behavior patterns. Then the transect would be continued and the Process Log resumed.

Types of Habitat used by Dolphins

Type of Habitat	Characteristic
Principal River	Rivers of Andean origin and from the Guyanese shield. Their waters are typically white, dark or a yellowish-brown color with little transparency, due to the large quantity of suspended sediment (Sioli 1975). More than 400 m. in width, and formed like a watershed or sub-watershed. Examples: Rivers Orinoco and Meta.
Confluence	Intersection areas of the main river channel with another river channel that stays connected in all water seasons. They generally showed a mixture of waters (white water with dark or clear) (Trujillo 2000). Examples: Meta-Orinoco, Meta-Casanare and Orinoco-Cinaruco.
Tributary	Small and medium rivers not more than 400 m wide. Generally show dark or clear water. The majority are of forest origin (Trujillo 2000). Examples: Manacacias, Guayabal and Arauca.
Channel	River course with a maximum width of 300 m., generally associated with island systems in the principal rivers, where both banks can be seen on each side. Strait of little navigability at some times of year.
Island	Land bodies present within the river course with evidence of vegetation, which appear or disappear depending on water dynamics.

Linear and Strip Transects

A systematic design of continuous transects was made, aiming for uniform coverage of the study area. This was difficult in some areas, since the state of the water and presence of sandbanks and rocks, etc, did not allow for uniform coverage.

Linear transects were used when the river was crossed from side to side, recording data 150 m. on either side of the line of transect. Strip transects were made parallel to the bank, recording data within a 300 m. strip, that is to say 150 m on either side of the boat, in relation to the bank. In the case of channels where the width was smaller than 300 m., the distance was measured between the banks. Different types of habitat were examined, principal rivers, confluences, tributaries, channels and islands.

Data was recorded every ten minutes during the strip transects including the distance from the bank, or from side to side (in the case of channels).

In the bow, one person was in charge of recording information in a Progress Log every ten minutes, another was responsible for permanent observation of the river and measuring angles at the moment of sighting and a third was responsible for the Bow Record where entries were made at the moment of each sighting. In the stern, one observer registered all observations in the Stern Record. Another was responsible for observations and measuring angles whenever dolphins were sighted.

It was important to bear in mind that both linear and strip transects were distributed as uniformly as possible. That is to say that areas were chosen where there were both high and low densities of dolphins, in order not to either overestimate or underestimate dolphin numbers throughout the study area, and avoid creating large variances in encounter rates.

Data Collection

The information was recorded in the following ways:

- Progress Log: Progress records were taken every ten minutes whether or not there were sightings. The date was recorded along with the time, event (corresponding to the start or end of a transect and to different events that occurred, such as observations), river type (principal river, confluence, tributary, channel or island), transect number, geographical location, distances, speed, type of riverbank, state of the river, type of water, sun conditions (measured in angles), and observation conditions including the general environment. To record all variables, Progress Log codes were created along with their abbreviations.
- Bow and Stern Registers:
  Entries were made whenever there were observations.
- Transect Distance Register:
  This was used to register the distance travelled in each transect. In this register the date was recorded, transect ID number, time at start and finish, type of transect (linear or strip) and length. The variables codes were used along with another format where observer positions were recorded (See Appendices 1, 2, 3, 4, 5 and 6). For direct counts at confluences, the time, date, geographical position and general group information (group size and composition) were all recorded (Trujillo 2000).

Subsequently, the information was organized in tables that were exported to a program called *Distance* to make the abundance estimates. The area of the rivers and other aquatic habitats in the study area were calculated through satellite imaging.

The fundamental idea behind applying a consistent methodology for dolphin abundance estimation and standardized information gathering is the ability to design an integrated conservation and monitoring strategy for South American dolphins, which is at present non-existent.

Inter-Institutional Synergy

Institutions such as WWF Switzerland, WWF Colombia, WWF Bolivia, WWF Peru, WWF LAC (Freshwater program), WWF Brazil, Wildlife Conservation Society (WCS), La Salle Foundation, Faunagua Foundation, Whale and Dolphin Conservation Society (WDCS), Alexander von Humboldt Institute, Conservation International (CI) and the Omacha Foundation, all contributed logistical, technical, scientific and financial resources, towards the estimation of South America's river dolphin abundance.

Abundance Estimation in the River Orinoco (Venezuela)

Institution	Name	Country
Omacha Foundation	Fernando Trujillo, Marcela Portocarrero	Colombia
Pontificia Javeriana University	Diana Pardo	Colombia
WCS	Félix Daza, Betzaida Carpio, Darwin Castillo	Venezuela
La Salle foundation	Nirson González	Venezuela

Abundance Estimations in the Rivers Napo, Aguarico, Lagartococha, Cuyabeno and Yasuní (Ecuador)

Institution	Name	Country
Omacha Foundation	Fernando Trujillo, Catalina Gómez, Marcela Portocarrero	Colombia
WCS	Víctor Utreras Salime Jalil	Ecuador

Abundance Estimation in the River Meta (Colombia)

Institution	Name	Country
Omacha Foundation	Fernando Trujillo, Catalina Gómez, Marcela Portocarrero, Isabel Gómez, Diana Pardo, Germán Garrote	Colombia
WWF Colombia	Saulo Usma, Julio Mario Fernández, Ximena Galeano	Colombia
WCS	Félix Daza	Venezuela

Abundance Estimations in the Rivers Samiria and Marañón – Amazon (Peru)

Institution	Name	Country
Omacha Foundation	Fernando Trujillo, Catalina Gómez, Marcela Portocarrero	Colombia
WCS	Fredy Arévalo, Lourdes Ruck	Perú

Abundance Estimations in the Rivers Amazon (Colombia andPeru) andJavarí (Brazil)

Institution	Name	Country
Omacha Foundation	Fernando Trujillo, María Claudia Diazgranados, Isabel Gómez, Diana Pardo, Marcela Portocarrero.	Colombia
WWF Colombia	Mary Lou Higgins, Julio Mario Fernández, Saulo Usma.	Colombia
WWF Switzerland	Alice Eymard	Suiza
WWF Sweden	Anna Forslund	Suecia
National Parks	José Sinisterra, Pedro Prado	Colombia
Sinchi Institute	Marisol Beltrán Gutiérrez	Colombia

Abundance Estimations in the River Ichilo - Mamoré (Bolivia)

Institution	Name	Country
Omacha Foundation	Fernando Trujillo, Marcela Portocarrero	Colombia
Faunagua	Gabriela Tavera, Paul van Dame, Verónica Zambrana, Adriana Salinas, Rob Pickeles	Bolivia
Cetaceous Specialists Group - IUCN	Enrique Crespo	Argentina
WWF Colombia	Saulo Usma, Julio Mario Fernández	Colombia

Abundance Estimations in the River Itenez (Bolivia)

Institution	Name	Country
Omacha Foundation	Marcela Portocarrero	Colombia
Faunagua	Gabriela Tavera, Adriana Salinas, César Navia, Josephine Hula	Bolivia
Natural Park Salvatierra	Fernando Endara Noel Kempf Mercado	Bolivia
Reserva Itenez	Ernesto Ramos	Bolivia

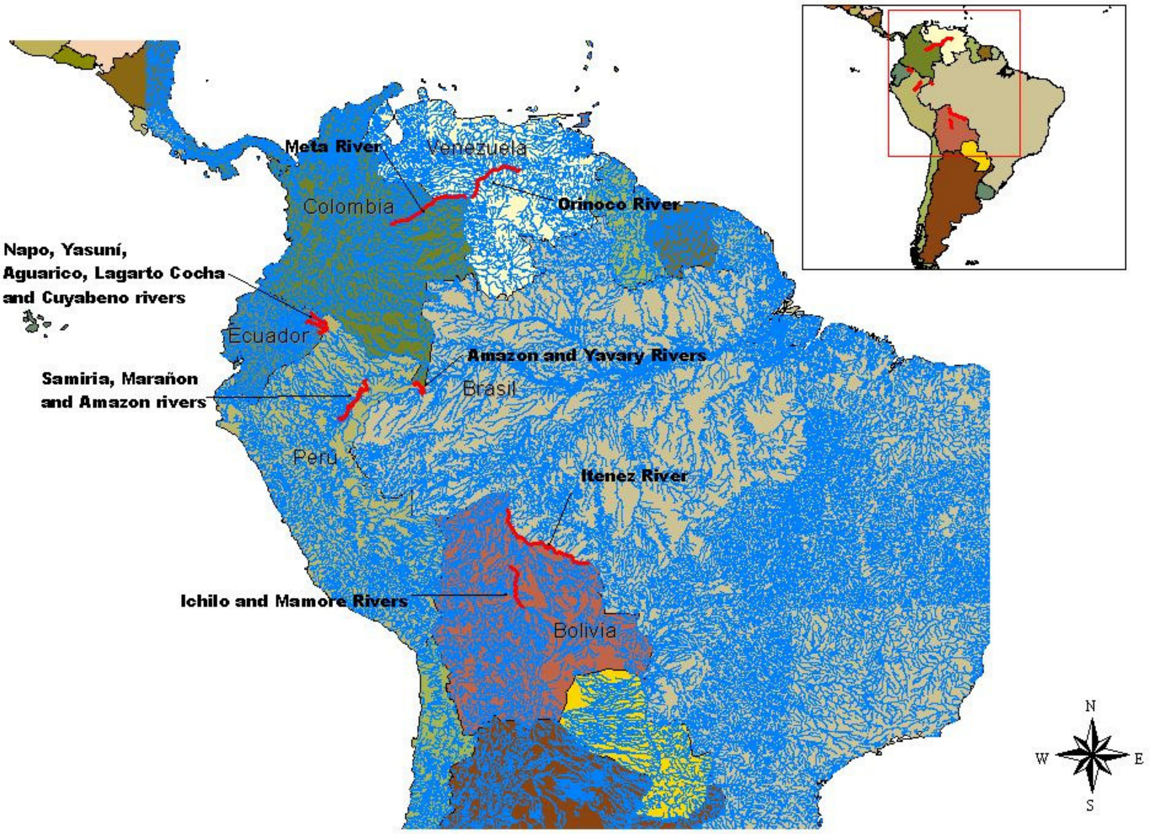
The Expeditions in Numbers

Country	Rivers	Number of Dolphins sighted					
		Total	***Inia boliviensis***	***Inia geoffrensis***	***Sotalia fluviatilis***	**Distance covered (Km.)**	**Threats**
Venezuela	Orinoco	263		143	120	380	Mercury pollution Intensive fishing Deforestation
Ecuador	Cuyabeno, Lagarto Cocha, Yasuní, Napo, Aguarico	40		28	12	505	Pollution through petroleum spillage
Colombia	Meta	121		121	0	860	Overfishing Deforestation
Peru	Samiria, Marañón-Amazon	818		441	377	400	Overfishing
Colombia, Peru and Brazil	Amazon, Javari	520		199	321	300	Dolphins killed to be used as bait Deforestation Overfishing.
Bolivia	Ichilo - Mamoré	485	485	0	0	550	Overfishing
Bolivia	Itenez	941	941	0	0	598	Mecury pollution Bycatch
Total		**3,188**	**1,426**	**932**	**830**	**3,593**	

Table of Dolphin Density in Researched Areas

Country	Species	Direct Count (Number of Dolphins)	Density (Individuals per Km^2)
Venezuela	***Inia***	**143**	**0.95**
	Sotalia	**120**	**0.93**
Colombia (Meta)	***Inia***	**121**	**0.36**
Colombia/Peru	***Inia***	**199**	**3.094**
	Sotalia	**321**	**5.23**
Ecuador	***Inia***	**28**	**0.55**
	Sotalia	**12**	**0.036**
Peru	***Inia***	**441**	**8.93**
	Sotalia	**377**	**6.80**
Bolivia (Ichilo/Mamore)	***Inia boliviensis***	**485**	**5.89**
Bolivia (Itenez)	***Inia boliviensis***	**941**	**5.11**

General Map of Research Areas



Training South American Professionals

One of the objectives of the initiative was to train researchers in the use of appropriate methodology to estimate dolphin abundance. There were seven expeditions in five different countries, with a total of 18 trained researchers. In the process, a South American network for river dolphin research and monitoring, was created.

During the first week of October, 2006, a training course in estimating animal abundance was held in Bogotá (Colombia). Fifteen Latin American researchers belonging to different organizations (Wildlife Conservation Society, Omacha Foundation and the University Jorge Tadeo Lozano, among others) were trained. The training was based on *Distance 5.0* software for analysis of biological data using distance techniques.

The course was led by Fernanda Marques (WCS Brazil) and researchers came from WCS Peru, Venezuela and Bolivia, and from the Omacha Foundation. On completion of the preliminary course, analyses of the South American river dolphin abundance project were discussed and development methodologies improved. This course offered preliminary bases for data analysis, and allowed researchers involved in the project to meet and discuss ideas and create action plans for the next few years.

Conservation Opportunities

At a global level, the greatest potential lies in the social and scientific network that was created around the South American river dolphin initiative. Today there is great interest on the part of governments and the mass media in understanding the importance of the Orinoco and Amazon ecosystems from the dolphins' point of view.

Communications played a key role over the 15 month study period, and WWF maintained a high profile for the South American initiative throughout its international network, in publications such as the International Secretariat's *News Bulletin*, *AKI News Letter*, and the web pages for WWF International, Switzerland, UK, Holland, Germany, Italy, Spain, Bolivia and Colombia. as well as in various institutional news bulletins, covering each of the census phases, with current results and achievements.

This interest was shared with media on the scale of *The Boston Globe*, *National Geographic TV*, *Christian Science Monitor*, *CNN in Spanish*, *Tele Mundo* (Swiss newspaper), *Vara Vroegels* (Dutch radio station), *Wild Nature* (*International Wildlife Photography* magazine), *El Deber* (Bolivian daily), *El Tiempo* (Colombian daily), *El Espectador* (Colombian weekly), *El Liberal* (Argentine Internet newspaper), *Cromos*, *Cambio*, *Gerente* and *Don Juan* (Colombian magazines), *Caracol TV*, *Culturama* (Colombian TV), and *National Radio of Colombia*, *RCN* and *Caracol* (Colombian radio stations).

People working in similar fields such as species, Amazonia and freshwater ecosystems both within the WWF Network and outside, especially those organizations who participated in the dolphin census, were also kept up-to-date with frequent reports.

This project has cleared the way for a South American river dolphin regional conservation strategy, and management plans for these species and the ecosystems they inhabit, in each of the countries involved.

With respect to each of the countries involved, key elements for conservation of river dolphins were noted, which should be taken into account in the design and implementation of their national action plans:

Peru

- A great number of dolphins were recorded here due to conservation efforts from the Pacaya-Samiria National Reserve. Similarly, the abundant presence of fish gives support to dolphin populations. Important conservation actions in the fields of fishing and turtle nesting and breeding, have been implemented to support aquatic resources. This helps biodiversity flourish in general, and, in the case of the turtles, there has been a return of the species, along with adequate management to guarantee their survival.

Bolivia

- Dolphins are not well-known in this country and the expedition led to a rediscovery of the species by the Bolivian general public, and not only its scientific community. From this, great interest has been shown in favor of their conservation and for their potential in ecotourism.
- Another key element has been the presence of a strong organization like Faunagua, with more than four years experience focused on aquatic ecosystems and economic alternatives for people. This can encourage the promotion of dolphins as symbols of aquatic ecosystem conservation.

Colombia

- The initiative started here, and there is a very strong alliance between organizations such as the Omacha Foundation, who have worked for twenty years with aquatic mammals, promoting river dolphin conservation and research, along with WWF Colombia. This synergy has helped what was originally only a regional and local focus, extend to South America in general, with even wider perspectives.
- There is potential here for dolphins being used to promote ecotourism as an economic option. Lonely Planet, the international guide, mentions tourist destinations such as Puerto Nariño, as important places to view them.
- There has been social work with local communities, producing income-generating crafts and other products that 'package' the image of dolphins. This work can also extend to other countries, as has been the case in Peru.
- The future design of an action plan for the river dolphins of Colombia already has the endorsement of the Environmental Ministry. They have asked WWF Colombia and its associates to coordinate the creation of a National Plan for the Conservation of Migratory Species for Biodiversity within Colombia. In this way, a link between the two plans will be sought.

Ecuador

- The presence of petroleum exploration sites inside the two National Parks, Yasuní and Cuyabeno, which, through poor management, occasionally discharge crude oil, has become a threat. However, there is confidence that the Wildlife Conservation Society (WCS), a key associate, will be able to invigorate aquatic ecosystem conservation processes by Víctor Utreras, who has been working on dolphin conservation.

Venezuela

- Exactly two months after the expedition was completed, and after threats to river conservation from mercury pollution had been identified, the Venezuelan government declared its gold mining industry to be illegal. Consequently, it is hoped that the use of mercury and this type of heavy metal in open-cast gold mining, will be diminished.
- The political situation and problems with law and order within Venezuela is slowing down tourism, to a certain extent. In the past, it has been very important to the Venezuelan economy and would have linked well with dolphin conservation.

Lessons Learned

From a Scientific Point of View

- To have a wider presence in large rivers. This would allow a more consolidated view of what is happening in South America. For example, a plan for the Amazon could be to sample alternate 200 Km. stretches of the river. The extrapolated results would be a lot more extensive than we are currently achieving.
- To initiate work jointly with Brazil and involve their people, because they have the largest segment of the Amazon, and it is important they are part of the process, with the same methodologies, in order to show consistent results. To this end, support from WCS Brazil will be crucial, under the direction of Dr. Fernanda Marques, who brought statistical support to the population estimates analysis.
- It is important to continue sampling the Orinoco river, particularly the delta, and establish the taxonomic status of *Sotalia*. There are *Sotalia* within the river Orinoco, who do not arrive in Colombia, but stop 10 km. short. They arrive in Venezuela, but it is not known if they are marine dolphins making extremely long incursions of 400 – 500 Km. within the Orinoco, or if it is a differentiated population like the *Sotalia fluviatilis* that exist in the Amazon.

From a Political Point of View

- It is important to create more alliances, not only at NGO level, but also with governments. We need ministries in each country to validate Management Plans for these dolphins, and link them to other initiatives, such as management of fisheries and other threatened species, as is being achieved in Colombia.

From an Organizational Point of View

- Some countries have greater weaknesses than others in continuing to monitor dolphin populations. Some organizations in those countries will need a capacity-building program to make this possible. We currently see Faunagua (Bolivia); the Department of Production and National Institute of Natural Resources (INRENA) in Peru as strong associates.
- There is some concern about the lack of strong partners identified with either Ecuador or Venezuela. Consequently, we would look to the La Salle Foundation, which has an excellent scientific reputation and good relations with the government, to provide a solution in Venezuela.
- There needs to be more training concerning aquatic mammals in those countries where there are weaknesses.

General Guidelines in the Creation and Implementation of a Regional Conservation Strategy for River Dolphins and Their Habitats

This would be worked out during a workshop in Bolivia during April, 2008. The success of the strategy lies in a commitment not only towards the conservation of river dolphins, but also their habitats. That is to say, to go beyond the direct threats towards dolphins in order to resolve the indirect threats that are concerned with the management of their habitat.

To this end, creative proposals should begin to be generated in areas such as fisheries management, management of fishing bans, deforestation, and in the creation of alternative productive systems to generate income for local communities, so they see dolphins as a potential resource which will improve their quality of life. For example, income generated through ecotourism, or other productive activities related to fishing and crafts, amongst others.

But in general, success will lie in going a long way beyond the direct needs of the species towards the management of their habitats. That it is the goal, to propose innovative and realistic, creative activities in managing hábitats within the two largest river basins in South America.

Fundación Omacha and WWF Colombia
February – March 2008

ANEXES

ANEXO 1. Códigos de esfuerzo

	Descripción
Evento	S = nuevo estrato T = nuevo transecto D = a 10 minutos del recorrido P = comienzo de esfuerzo del transecto en banda E = fin de esfuerzo del transecto en banda L = comienzo de esfuerzo del transecto lineal X = fin de esfuerzo del transecto lineal O = observación N = cambio en la navegación W = cambio de tipo de agua Z = cualquier otro cambio en las condiciones C = cambio en la posición del observador R = reducción de la velocidad para confirmar tamaño grupal B = regreso al transecto lineal para resumir esfuerzo
Estrato	C = confluencia (dentro de 150 m. de la unión de dos tipos de aguas) I = isla L = lago N = canal (sección angosta del río principal) R = río T = tributario
Réplica	Y = réplica N = no réplica
Velocidad	Velocidad del barco (en Km/h). Un valor de –99 indica que no hay valor
Tipo de orilla	F = Bosque inundado T = Bosque (tierra firme) L =pasto flotante G = pasto S = barranco R = río K = lago B = playa Rc = roca M = valor perdido
Estado del río	0 = valor perdido 1 = calmo 2 = ripiado 3 = oleaje/turbulencia

Tipo de agua	B = aguas negras W = aguas blancas M = mezcla de aguas U = valor perdido
Brillo solar	0 = ninguno 1 = algo (no impide la observación) 2 = moderado (es incómodo pero permite observación) 3 = fuerte (no permite observación) 4 = valor perdido
Brillo solar izquierda.	El ángulo de brillo solar que está más a la izquierda. Un valor negativo indica la posición a babor, mientras que el valor positivo indica la posición a estribor. Un valor de 999 indica que no hay valor o que no aplica.
Brillo solar derecha.	El ángulo de brillo solar que está más a la derecha. Un valor negativo indica la posición a babor, mientras que el valor positivo indica la posición a estribor. Un valor de 999 indica que no hay valor o que no aplica.
Capacidad de observación	Código para las condiciones de observación, que resume una algunas variables (cantidad de luz, condiciones del río, etc.) 0 = valor perdido 1 = pobre 2 = moderada 3 = buena 4 = excelente
Posición del observador	Ver formato para la descripción de los códigos de posición.

ANEXO 2. Posiciones del observador

FP = Observador adelante, a babor (izquierda)
FS = observador adelante, a estribor (derecha)
FC = Observador adelante, centro
DR = Apuntador
RP = Observador atrás, a babor (izquierda)
RS = Observador atrás, a estribor (derecha)
R = observador en descanso

Función	Código de posición						
	1	2	3	4	5	6	7
FP							
FS							
FC							
DR							
RP							
RS							
R							

ANEXO 3. Formato Distancias de transectos

No. Transecto	Fecha	H1	H2	Tipo	Longitud	Comentarios

ANEXO 4. Formato de Esfuerzo

Día	Mes	Año	Hora	Mi	Sec	Even	Strat	Transe	Latitud			Longitud			Dist Port	Dist Star	Speed	Tport	Tstar	Rstat	WaterT	GlareStrength	Sight	Obs Pos
									Deg	Min	Dec	Deg	Mi	Dec										

ANEXO 5. Formato de Proa

Day	Mon	Year	Platform	No	Tour	Min	Sec	Latitud			Longitud			AngSide	Angle	Rdist	Pdist	GrHigh	GrBest	GrLow	Sp	Obs	Coh
								Deg	Min	Dec	Deg	Min	Dec										