# HEAD-STARTING THE GIANT SIDENECK RIVER TURTLE (PODOCNEMIS EXPANSA): TURTLES AND PEOPLE IN THE MIDDLE ORINOCO, VENEZUELA

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Abstract.—To evaluate the effect of the Giant Sideneck River Turtle or Arrau (Podocnemis expansa) head-starting program, we compared the size distribution between head-started turtles caught in 1998-2001 and 2008, and wild and head-started turtles caught in 2008 during in-water surveys, and interviewed members of local communities (riberños) along the Middle Orinoco, Venezuela. Currently, P. expansa are larger and older and there are proportionately more head-started turtles in the wild than in 1998-2001. There are more small and large juvenile head-started turtles than wild ones. Ribereños are divided in their perception of head-starting and this perception is affected by their livelihood, distance from the Arrau Wildlife Refuge, support for current conservation actions, relationship with the Ministry of the Environment, and desired role in future conservation actions. Despite a tendency to discount head-starting on behalf of ribereños that have a negative relationship with the Ministry of the Environment, those ribereños with a positive relationship believe head-starting is successful and want to participate actively in future conservation programs. The perceived success of this program may boost participation by ribereños despite their having been overlooked in its design.

Key Words.—captive rearing; local views; participatory conservation; reinforcement; repatriation

# INTRODUCTION

Head-starting, captive rearing of eggs or hatchling turtles to a predetermined age or size to avoid high first-year mortality with subsequent release into the wild, has been a controversial conservation practice for decades (e.g., Huff 1989; Burke 1991; Dodd Jr and Seigel 1991; Woody 1991; Allen 1992; Frazer 1992; Seigel and Dodd Jr 2000; Bell et al. 2005; Fontaine and Shaver 2005; Mitrus 2005). Criticism among opponents includes symptomatic treatment of conservation problems (a.k.a.: halfway technology, Frazer 1992), altered behavior of head-started individuals, and disruption of ecological function 2003; Flores 2005; Hernández and Espín 2006).

of head-started species (Frazer 1992; Bowen et al. 1994). Supporters emphasize bolstering depleted populations and the public education and conservation support achieved through outreach in many head-starting programs (Allen 1990; Cadi 2003; Das 2003; Hernández 2003; Fontaine and Shaver 2005).

In the Middle Orinoco, Venezuela, the Giant Sideneck River Turtle or Arrau (Podocnemis expansa), once commercially overexploited to less than 1% of its historical abundance (Humboldt 1820; MINAMB 2008), has had its own headstarting program to boost population recovery since 1992 (Hernández et al. 1998; Hernández The main cause for the *P. expansa* population crash, legal commercial harvest, was banned in 1952 (Ojasti 1967, 1971). The Arrau Turtle Wildlife Refuge ("wildlife refuge" or "refuge", hereafter) was created in 1989 to protect the main nesting beaches in the Middle Orinoco (Licata and Elguezabal 1997) and the nesting female population has since stabilized at about 1000 nesting females (Mogollones et al. 2010; Peñaloza 2010). pansa head-starting program in the Middle To date, over 350,000 head-started turtles have been released in the Middle Orinoco on the beach they hatched from a year earlier in the wildlife refuge (Hernández and Espín 2006; MINAMB 2008). By 2008, the Foundation for the Development of Mathematical, Physical, and Natural Sciences (FUDECI), a non-governmental organization that reared over 74% of these head-started hatchlings, had recaptured 581 head-started turtles between the ages of 1-14 (turtles were not tagged the first two years of the program) in the wild (Peñaloza 2010). Head-started turtles have not been seen nesting, though they are not expected yet because of delayed sexual maturity (estimated at 17 years, Hernández and Espín 2006; or between 11-28 years, Mogollones et al. 2010).

For the first 10 years of the head-starting program, the eggs were incubated on the nesting beach, protected by the Ministry of the Environment and the National Guard, and the hatchlings were transported to captive rearing facilities in nearby cities; a year later the head-started turtles were released into the wild. In general, ribereños did not participate in the program (Peñaloza 2010), in fact, most of the people who came to the release ceremony were from the cities where hatchlings where raised (Flores 2005; MINAMB 2008). In the past few years, about 10% of the hatchlings have been head-started at the Ministry of the Environment's Biological Station in Santa María del Orinoco, inside the wildlife refuge. Some ribereño fishers have been deputized by the Ministry of the Environment to collect and hand in turtles incidentally caught while fishing; ribereños appreciate being included in the conservation program (Peñaloza 2010). Although the P. had head-started over 74% of all reintroduced

expansa head-starting program does not include a participatory aspect for local communities, garnering local support for conservation programs is essential; the attitude of local communities could be the difference between failure and success (Newmark et al. 1993; Fiallo and Jacobson 1995; Townsend et al. 2005).

We monitored the effectiveness of the P. ex-Orinoco by studying the change in size distribution between turtles captured during in-water surveys in 1998-2001 and 2008, and between wild and head-started turtles in 2008. We also determined the perception of local communities toward this program by carrying out semistructured interviews of members of communities located along the Middle Orinoco.

#### MATERIALS AND METHODS

Study area.—The study area comprised a 120 km stretch of the Middle Orinoco River, Venezuela between the city of Puerto Páez, Apure (across from the Colombian border) to the town of La Urbana, Bolivar (Fig. 1). This stretch includes the wildlife refuge and 29 riverine communities located both up- (south) and down-river (north) from the refuge. The wildlife refuge spans 25 km of the Orinoco River, from La Cazuela to the southern tip of Santa Isabel Island, and a 50 m buffer zone on either bank (17,431 ha). Eleven families, from two communities (Boca de Parguaza and Santa María), are inside refuge boundaries. There is a National Guard post and a Ministry of the Environment Research Station (N 06°36' 04", W 67°07' 38.9") in Santa María. Officers from these two governmental agencies form joint commissions to patrol the wildlife refuge, protect nesting turtles and nests, and manage egg transplant on the turtle-nesting beach. About 10% of hatchling P. expansa turtles are head-started at the research station, the rest are reared in off-site facilities. Until 2008, FUDECI

*P. expansa* yearlings. From 19 April to 12 June 2008, we conducted in-water turtle surveys within and just north of the wildlife refuge and visited each community by river to conduct interviews.

*In-water turtle surveys.*—We conducted inwater turtle surveys inside and outside of the wildlife refuge along a 50 km stretch of the Orinoco River from the Parguaza River mouth to Fraile Arriba Island (Fig. 1), with 5 cm mesh-size trawl nets. We surveyed turtles by beach-seining; the net is pulled between two boats or one boat and a person on land. Once landed, we identified turtles by species, measured curved carapace length (CCL, over the curve) and plastron length (PL, intergular to anal notch), sexed male turtles by secondary sexual characteristics, and individually marked turtles by shell notching before release.

We compared the size distribution of turtles captured in the present study with those captured by Herández and Espín (2006) in the same sampling area, and between wild and head-started turtles from the present study. For these comparisons, we used normal (Gaussian) kernel density plots in R (Bowman and Azzalini 2007; R Core Team 2012). The test statistic is the integrated squared difference between the two density estimates. Under the null hypothesis, the distribution of this test statistic is calculated from datasets created by random permutation of group labels on the entire dataset. A reference band is used to illustrate the comparison between density curves; it is centered at the average of the two curves and is equal to the width of two standard errors at any given point (Bowman and Azzalini 1997).

*Interviews.*—We contracted two boat captains, one from Puerto Páez and another from Capachal, to take us to each community and introduce us to community leaders and members. We carried out semi-structured interviews with leaders and all willing heads of family from each community;

up to 100% of community members were interviewed and no less than 10% were interviewed in large communities (>50 families).

The entire interview questionnaire had 35 openended questions focusing on community size and political structure, local livelihoods and needs, and turtle consumption and conservation (Appendix A). The following analysis centers on responses about the conservation program and its perceived effectiveness. During each interview, we took written notes and made an audio recording. We fully transcribed to text ten randomly chosen interviews from different communities spanning the entire sampling area. These interviews were thoroughly examined and coded (using Nvivo 2.0) according to questions asked and themes that emerged in the ribereños' responses. The resulting coding scheme was then used to classify ribereño responses while listening to the remaining interviews. Additional answers and new themes were added to the classification scheme if they arose in the remaining interviews. A selection of the resulting classified responses, pertaining to head-starting and conservation actions, were used for further analysis to describe how ribereños live and how they perceive turtle conservation.

We used classification trees (from classification and regression tree models, CART) to study the relationship between the perception of the head-starting program, conservation actions, and the characteristics of ribereños in the Middle Orinoco. CART models are widely used for exploratory data analysis and model building; they are particularly well suited for data mining tasks where there is little a priori knowledge or no theories or predictions as to how variables are interrelated (De'ath and Fabricius 2000; Moisen 2008; StatSoft 2010). CART recursively partitions data to yield models known as tree-models (Breiman et al. 1984), which are easier to interpret than linear models, are non-parametric, non-linear, and capture non-additive behavior (De'ath and Fabricius 2000). We used the package "rpart" (Therneau and Atkinson 1997, 2002) in R (R Core



**FIGURE 1.** Map of study area displaying name and location of riverine communities, the Arrau Turtle Wildlife Refuge, and the in-water turtle survey area in the Middle Orinoco, Venezuela.



FIGURE 2. Size of *Podocnemis expansa* turtles caught during in-water turtle surveys. Each box contains the lower data extreme, first quartile, median, third quartile and upper data extreme (outliers are included in whiskers). The width of the box equals percent capture for each site corrected by sampling effort. Sites listed in south to north, up-river to down-river, order. Sites inside the wildlife refuge in grey.

Team 2012) to build our CART models, deter- provement over the root misclassification error. mine optimal tree size through cross-validation and assess model performance by misclassification rate. Trees are allowed to grow to a size beyond which additional splits would not improve the model. Cross-validation errors are obtained for each tree in "rpart" and we selected the tree size for which cross-validation error is minimized. The misclassification error, which is the proportion of responses misclassified by the fitted model, is reported by R using the percentage improvement over the "root misclassification error". Said error is based on a null model where every case has the same probability of a certain outcome. The model "improvement" is the im- turtles has increased since 1998-2001 (Fig. 3),

#### **Results**

In-water turtle surveys.—We caught 174 P. expansa turtles in 2008; 4 males, 23 females, and 100 juveniles (not all turtles could be sexed). There were 75 (43%) wild turtles and 99 (57%), 1- to 14-year-old turtles from the head-starting program. Turtle size ranged from 101 to 617 mm CCL. Turtle size and distribution along the river area sampled were not related; we found the broadest size range just down-river of the wildlife refuge (Fig. 2). The size distribution of



Curved Carapace Length (mm)

**FIGURE 3.** Size comparison using kernel density plots of *Podocnemis expansa* turtles caught by Hernández and Espín (2006) from 1998 to 2001 and during the present study in 2008.

i.e., head-started turtles have survived, grown and aged beyond that reported by Hernández and Espín (2006)  $\leq 14$  years vs.  $\leq 7$  years of age, respectively, P = 0.03). The percentage of head-started turtles in the wild has also increased, though not significantly ( $\chi^2 = 3.31$ , df = 1, P = 0.07), from 41% in 1998-2001 (Hernández and Espín 2006) to 57% in 2008 (present study). In 2008, head-started turtles were smaller than wild turtles if newly released head-started turtles are considered (Fig. 4A, P = 0), otherwise, head-started and wild turtles have the same size distribution with slightly more large juvenile head-started than wild turtles (Fig. 4B, P =0.13). Head-started turtles have not reached sizes comparable to mature wild turtles.

Interviews.—Table 1 summarizes the interview questions and ribereño characteristics used in the classification tree analyses. We assume an increased proportion of juvenile turtles in the recent past (five years in our analyses) indicate head-starting success. Ribereños are divided on their perceived success of the head-starting program; fishers living close to the wildlife refuge and farmers, grazers and ribereños with other livelihoods, believe juvenile turtle abundance has increased in the past five years (model improvement = 0.52, Fig. 5, top panel). Most ribereños who believe the seasonal fishing ban is positive, believe there are fewer juvenile turtles, whereas ribereños who do not mention or think the fishing ban is negative and have a good relationship or want more interaction with the Ministry of the En-



**FIGURE 4.** Size comparison using kernel density plots of wild and head-started *Podocnemis expansa* turtles captured in the present study. All head-started and wild turtles (A). Head-started turtles without newly released cohort and all wild turtles (B).



**FIGURE 5.** (Top panel) Ribereño's perception of current juvenile abundance, an indirect measure of headstarting success, in relation to ribereño characteristics (see Table 1). Nodes and leaves (ovals and rectangles, respectively), state the most common response (i.e., fitted class) and the probability of each response (Dnt\_knw, Fewer, More) out of all observations. Branches indicate the variable being split. Branch length represents proportion of variance explained in each split (model improvement = 0.52). (Bottom panel) Ribereño's perception of head-starting in relation to other conservation actions currently in place (Cnsv.prg, Csmp.illg, Fshn.ban, Laws, Relatn.gv, see Table 1). Numbers indicate probability of each response relative to all observations. Peñaloza et al.—2010 Head-starting Symposium: Turtles and people in Venezuela.

**TABLE 1.** Description of interview questions (variables) used in classification tree analyses to determine local perception toward head-starting program. Questions grouped by characteristics of ribereños and their communities and ribereño opinions. Source refers to whether we asked questions directly (Q), they were a theme introduced by ribereños (Th), or information was obtained from a map (M). Variables and values listed in alphabetical order and abbreviated to eight characters for analysis. All variables are categorical except "Age", "Distance" and "Smp\_dist".

Characteristic/Question (Variable)	Source	Values
Ribereño age (Age)	Q	30 - 86  yr (average = 53  yr)
What do you think about the turtle conserva-	Q	Bad, God
tion program? (Cnsv.prg)		
Direction on river from wildlife refuge (Di-	М	Dwn_rivr, Up_rivr
rection)		
What do you think should be done to con-	Q	Active, Passive, Restrict
serve turties? (Cnsv.sol)	м	0 (21-
Distance from wildlife refuge (Distance)	M	0 - 63  km
(Csmp.illg)	In	Both (eat/sell), sell, no_ref
Do you receive government assistance?	Q	No, Yes
(Gv.asst)		
Do you think your community could get	Q	Dnt_knw, No, Yes
organized to help with turtle conservation?		
(Cty.cnsv)		
Are you familiar with Venezuelan Environ-	Q	No, Some
mental Laws? (Laws)		
Livelihood (Livelihd)	Q	Graze, Farm, Fish, Other (Order if multiple
		livelihoods)
Rights of future generations (Futr.gen)	Th	Future, No_ref
Location with respect to in-water sampling	Μ	Inside, Outside
area (Smp_area)		
How would you like to help conservation	Q	active, passive
efforts? (Hlp.cnsv)		
Distance from edge of sampling area	Μ	11 - 38 km
(Smp_dist)		
Current juvenile abundance compared to five	Q	Dnt_knw, fewer, more
years ago (juvs)		
State in which Ribereño lives (State)	Q	Bolívar, Apure
How is your relationship with the Govern-	Th	Bad, Good, More
ment/Ministry of the Environment?		

vironment, believe there are more juveniles now than five years ago (model improvement = 0.52, Fig. 5, bottom panel). Ribereños who believe the head-starting program is successful would like to participate actively in future conservation programs (model improvement = 0.52, Fig. 6, top panel). In general, ribereños living close (<38.5 km) to the wildlife refuge have a bad relationship with the Ministry of the Environment, whereas those living farther away would like more interaction with the Ministry of the Environment (model improvement = 0.61, Fig. 6, bottom panel).

#### DISCUSSION

Head-started turtles have survived, continued to grow and age since last reported by Hernández and Espín (2006). We caught a higher percentage of head-started turtles in our samples. There is a higher proportion of small juvenile (<200 mm CCL) and slightly more large juvenile (300 - 500 mm CCL) head-started turtles than found in the wild. These results indicate that there are more juvenile turtles in the wild due to the headstarting program. However, ribereños are divided in their perception of the effect of this program.

Contrary to warnings from head-starting opponents (Frazer 1992), head-starting does not seem to affect behavior of *P. expansa* in the Middle Orinoco. Head-started and wild turtles share the same habitat and disperse equally along the river from the release site (nesting-beach). Whether or not head-started turtles will reproduce will have to wait for head-started *P. expansa* to mature (estimated sexual maturity of 17 years, Hernández and Espín 2006; or between 11-28 years Mogollones et al. 2010); not enough time has gone by since the first release of marked turtles in 1995.

About half of the ribereños believe there are fewer juvenile turtles now than there were 5 years ago, whereas the other half believes there are more. Ribereño fishers close to the wildlife refuge tend to believe there are more juveniles; however, proximity to the refuge also increases negative interaction with the Ministry of the Environment, which is related to believing there are fewer juveniles. Ribereños who believe headstarting is successful are interested in participating actively in conservation.

The direct relationship between distance from the refuge and perceived head-starting success may support the wildlife refuge as a safe-haven for turtles and the existence of source-sink dynamics (e.g.; McCullough 1996) between the refuge and adjacent unprotected stretches of the Middle Orinoco. The broader size range of turtles found inside and adjacent to the wildlife refuge also supports a source-sink dynamic. The different study areas used for in-water sampling and conducting interviews did not affect how ribereños perceived head-starting outcome.

Ribereños who support the fishing ban perceive fewer juvenile turtles, they support conservation actions but they do not think head-starting is successful, however, the fact that they perceive scarcity may explain why they support a ban on fishing during spawning months.

There is a complex relationship between ribereños, conservation actors (Ministry of the Environment personnel), and conservation actions (head-starting program, seasonal fishing ban, etc.) in the Middle Orinoco. Ribereños living inside or close to the wildlife refuge may have frequent negative interactions with the Ministry simply because they are closer or because their livelihoods still depend on extracting river resources despite the location of the refuge. Previous studies (Peñaloza 2010; Peñaloza et al. 2013) found that ribereños living further from the refuge did not hide evidence of turtle consumption, whereas nearby communities outside the refuge stated "discarding all turtle shells in the river so the Ministry won't bother us"; these studies did not find evidence of turtle consumption within the wildlife refuge.

Given the increase we found in the proportion of juveniles, why is it that ribereños do not say the head-starting program is a success? A bad relationship with the Ministry of the Environment may affect how ribereños express themselves



**FIGURE 6.** (Top panel) Ribereño's perception of head-starting in relation to declared support for future conservation actions (Cnsv.prg, Cnsv.sol, Cty.cnsv, Futr.gen, Hlp.cnsv, see Table 1). (Bottom panel) Relationship between ribereño characteristics and their interaction with the Ministry of the Environment (government) (explicit references only, see Table 1). For both panels, numbers indicate probability of each response relative to all observations.

with respect to Ministry-run conservation programs. The interaction between distance from the refuge, relationship with the Ministry and perception of head-starting are difficult to understand; there may be a direct relationship between perception of head-starting and relationship with the Ministry, which would explain why some ribereños living close to the refuge state that head-starting has failed despite indications of its success.

Regardless of the possible negative effect between the Ministry and some ribereños, those with good Ministry relations believe headstarting is a success. These ribereños would also like to interact more with the Ministry of the Environment personnel and actively help future conservation efforts. Considering that community involvement was not a goal of the head-starting program, head-starting seems to have had a positive, conservation-conscience-creating effect on the ribereños in the Middle Orinoco.

Our results suggest a positive effect of the headstarting program on the P. expansa population in the Middle Orinoco. However, although this population is no longer under the legal commercial exploitation that caused its initial demise, it is subject to ongoing illegal subsistence and commercial harvest (Hernández and Espín 2003; Peñaloza 2010; Peñaloza et al. 2013). The commercial harvest is of particular concern to the conservation of this population because it is targeting large juvenile turtles (Peñaloza 2010; Peñaloza et al. 2013), one of the life stages with most influence on population growth in a long lived species like P. expansa (Heppell 1998). Because of this, we recommend increasing government surveillance beyond the nesting beach to include migratory and feeding habitats. Unfortunately, the public appeal of the head-starting program has weakened the surveillance program by channeling funds toward head-starting and away from surveillance (Gerardo Dávila, pers. comm.). To expand surveillance in the face of decreased funding and wide distribution of P. expansa turtles along the Middle Orinoco will require going be-

yond government agencies, i.e., we must include ribereños. However, the socio-economic impact of the wildlife refuge on local communities was overlooked and many ribereños have been forced away from their dependence on river resources without being offered alternatives. To eliminate commercial harvest and decrease subsistence harvest to sustainable levels, the ribereños of the Middle Orinoco require social programs that offer livelihood and food alternatives to turtle exploitation. Despite their marginalization, ribereños are interested in turtle conservation. We have common goals; let us find joint paths to achieve them.

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#### Appendix A

# **GUIÓN DE ENTREVISTAS**

Nobre del entrevistado:

Fecha: Edad: Sexo: Lugar: Foto número: Digital: Película: Código I: Código II:

# CONSENTIMIENTO

Mi nombre es Claudia Peñaloza, soy estudiante y estoy haciendo mi pasantía. Quiero investigar que piensa la gente del Orinoco sobre las tortugas y la finalidad de mi trabajo es saber que se tiene que hacer para que la gente de por aquí siempre tenga tortugas. Le preguntaré sobre su comunidad, su familia, como se gana la vida, cuanta tortuga come, cuanta tortuga hay ahorita y que piensa sobre su conservación. La entrevista dura más o menos media hora y no está bajo ninguna obligación de hacerla. Además, no tiene que contestar todas las preguntas y puede parar la entrevista cuando quiera. Si me da

Atkin-Package. pasar en limpio sus respuestas y que no se me olvide nada. Solo yo escucharé las grabaciones y las borraré en cuanto las pase en limpio. Al terminar la entrevista puede cambiar cualquier respuesta que quiera y puede decidir si quiere o no darme permiso de utilizar su entrevista en mi investigación. Quiero aclararle que sus respuestas son confidenciales y su nombre no se guardará junto con sus respuestas.

> ¿Quiere hacerme preguntas sobre mi investigación? Si tiene alguna otra pregunta, puede llamar a mi tutor en Caracas, Guillermo Barreto. El podrá ayudarle con cualquier otra inquietud que usted tenga sobre mi investigación. Además, si me quiere hacer mas preguntas, me puede encontrar en Las Viviendas en Puerto Páez (al lado de Don Luis Tovar), hasta mediados de Junio. Tome mi tarjeta que tiene mi número de teléfono y el de mi tutor.

¿Tiene alguna pregunta sobre la entrevista?

¿Quiere participar en mi investigación?

¿Puedo grabar la entrevista?

Voy a empezar a grabar. Le volveré a preguntar algunas cosas para que queden grabadas y luego comenzaré la entrevista. Mientras estemos grabando, por favor no diga su nombre. Recuerde que puede dejar de contestar cualquier pregunta y puede parar la entrevista cuando quiera. ¿Está listo?

# Comienzo a grabar

¿Tiene alguna pregunta sobre la investigación que estoy haciendo? ¿Quiere participar? ¿Puedo utilizar sus respuestas en mi trabajo?

Comienza la entrevista

I. Estructura comunitaria:

1. ¿A cuál comunidad pertenece usted? 2. ¿Quién mas pertenece a esta comunidad? (¿Cuánta gente? ¿Dónde están?) 3. ¿Existen Cooperativas o Consejos en esta comunidad? ¿Usted es parte de ellos? 4. ¿Hay un líder comunitario? 5. Cuando hay conflictos dentro de la comunidad, ¿cómo los resuelven? (ejemplos: ganado robado, le perro del vecino se comió sus gallinas, se soltaron los cochinos del vecino en su vega).

# II. Modo de Vida:

1. ¿Dónde nació? ¿Hace cuanto tiempo vive aquí? 2. ¿Porqué vino a vivir aquí? ¿Tiene más familia aquí? 3. ¿Está casado? ¿Tiene hijos? ¿Cuántos? 4. ¿Quién vive en su casa? 5. ¿Cómo se gana la vida? 6. ¿Donde pesca/caza/cosecha? ¿Qué? ¿Cuándo? ¿Lo vende? 7. ¿Su familia gana suficiente dinero? 8. ¿Le gusta como vive? 9. ¿Qué le hace falta para mejorar su vida? ¿Para vivir más cómodo?

# III. Costumbres alimentarias y consumo de tortugas:

1. ¿Cuál presa le gusta más? 2. ¿De donde la saca? 3. ¿Con que frecuencia come presa? ¿Es suficiente? Si no, ¿porqué no? 4. ¿Su familia come tortuga? ¿Qué tanto? ¿La ha vendido alguna vez? ¿La ha comprado? 5. ¿Por qué no come más tortuga? 6. ¿Cuánta tortuga comería usted si hubiese mucho? ¿Y el resto de la gente? 7. ¿Cómo le gusta cocinada la tortuga? 8. ¿Sabe si en esta comunidad hay gente que vende tortuga? ¿A quien se la vende? 9. ¿Por aquí se encuentra Terecay?

# IV. Abundancia de Tortugas:

1. ¿Cómo ha cambiado la cantidad de tortugas... hace 5, 10, 25, 50, >50 años? 2. ¿Por qué ha cambiado?

#### V. Programa de Conservación:

1. ¿Qué significa la conservación para usted? 2. ¿Quién cree usted que debe cuidar la fauna? 3. ¿Usted conoce las Leyes Ambientales de Venezuela? ¿Cómo las afectan a usted? 4. ¿Usted conoce el programa de conservación de Ambiente aquí en Sta. María? 5. ¿Qué opina sobre este programa de conservación? 6. ¿Usted recomendaría algún cambio? ¿Cuál? 7. ¿Se siente involucrado en este programa? 8. ¿Le gustaría ayudar con la conservación de la tortuga? ¿Cómo? 9. ¿Cree que puede haber un programa de conservación de tortugas en su comunidad? ¿Cómo sería? ¿Quién participaría?

Después de finalizar la entrevista, pero antes de apagar la grabadora

¿Quiere cambiar alguna respuesta que me dio?

¿Aún puedo utilizar sus respuestas en mi trabajo?

Si me da permiso, quisiera tomarle una foto para guardar junto a su nombre en mis archivos. La foto no será ligada de ninguna manera a las respuestas que me dio durante la entrevista. Si me da permiso, utilizaré la foto para hacer presentaciones en la Universidad sobre mi investigación y quizá para buscar mas fondos para seguir mi pasantía. Si quiere, cuando regrese a (nombre del pueblo) le daré una copia de la foto para que usted se la quede.

¿Puedo tomarle una foto para mis archivos? ¿Puedo utilizar su foto en mis presentaciones? ¿Quiere que le dé una copia de su foto?

Apago la grabadora ¿Hay alguna respuesta de su entrevista que no quiere que utilice? Muchísimas gracias por ayudarme en mi investigación



CLAUDIA L. PEÑALOZA received her Licentiate in Biology from Simón Bolívar University in Caracas, Venezuela, with a thesis on Aves Island Green Turtle (Chelonia mydas) demography and population viability. Soon afterward, she became a Research Associate for the Foundation for the Development of Physical, Mathematical and Natural Sciences, FUDECI, mostly doing research on the Giant Sideneck River Turtle (Podocnemis expansa). She then went on to obtain her Ph.D. from Duke University (Durham, North Carolina, U.S.A.), expanding on the P. expansa research she did at FUDECI. During this time, she branched-out toward sustainable harvest and participatory conservation, while also deepening her knowledge of population biology and mark-recapture data analysis. After obtaining her Ph.D., Dr. Peñaloza took on a Postdoctoral Fellowship with the Colorado Cooperative Research Unit at Colorado State University (Fort Collins, Colorado, U.S.A.) and the U.S. Geological Survey (Gainesville, Florida, U.S.A.), with a research focus on improving demographic parameter estimation for the Florida Manatee (Trichechus manatus latirostris) by developing novel mark-recapture models. Dr. Peñaloza then became a Postdoctoral Fellow with the School of Forestry and Wildlife Sciences at Auburn State University (Auburn, Alabama, U.S.A.) working with mark recapture data analysis on the American Black Duck (Anas rubripes) to describe the density dependent effect of habitat availability and severe weather on seasonal duck survival. Currently, Dr. Peñaloza is in her home country of Venezuela; she is continuing her research with A. rubripes and C. mydas, has started new collaborations studying Leptonycteris curasoae and Atelopus cruciger, and is also a Scientific Manuscript Editor for American Journal Experts.



**OMAR HERNÁNDEZ** received his Licentiate in Biology from the Central University of Venezuela in Caracas, Venezuela in 1988. Since then he has been actively involved in various conservation efforts in Venezuela through his position as a Researcher, and currently General Director, for the Foundation for the Development of Physical, Mathematical and Natural Sciences, FUDECI. During his time at FUDECI, he directed the Giant Sideneck River Turtle (Podocnemis expansa) conservation program from 1994 - 2009, the ongoing Orinoco Crocodile (Crocodylus intermedius) conservation program since 2000, and is now involved in Yellow-headed Sideneck Turtle (Podocnemis unifilis) and Orinoco Crocodile conservation in the Santos Luzardo National Park in Venezuela. Lic. Hernández is a member of the Tortoise and Freshwater Turtle and Crocodile Specialist Groups of the IUCN Species Survival Commission. He is also a member of the Venezuelan Herpetological Society, Crocodile Specialist Group (GECV), and Continental Turtle Work Group (GTTC), in which he has served as Member of the Board, President, General Secretary and Spokesperson at different times over the past two decades. Lic. Hernández has