Distribution and Conservation of the Torrent Duck *(Merganetta armata colombiana)* in Venezuela

Final Report Submitted to Akron Zoo, International Wild Waterfowl Association, Sylvan Heights Waterfowl Center & Fundación AndígenA

By

Denis Alexander Torres (*)
General Coordinator
Northern Torrent Duck Project

Mérida, Venezuela

April 2007

VENEZUELAN WATERFOWL FOUNDATION

FUNDACIÓN de las AVES ACUÁTICAS VENEZOLANAS

(*) Apdo. Postal 210, Mérida 5101-A, Estado Mérida, Venezuela.
e-mail: info@andigena.org
Website: www.andigena.org

AKRON ZOO

International Wild Waterfowl Association

SYLVAN HEIGHTS WATERFOWL CENTER

AndígenA

INTRODUCTION

The torrent duck *(Merganetta armata)* is an bird native only to South America. It is the only species of waterfowl adapted to live in the fast flowing rivers of the Andean mountains. They occur in a wide geographic range along both sides of the Andean Mountain Range, at elevations between 1,800 - 3,700 m., extending along some 8,000 km from "Cordillera de Mérida" in northwestern Venezuela to "Tierra del Fuego" at the southern limit of Argentina (Fjeldså & Krabbe 1990; Gómez-Dallmeier & Cringan 1989, Phelps & Meyer De Schauensee 1978). The species taxonomy is quite confusing, but three subspecies are currently recognized (Fig. 1): *Merganetta armata armata* which is found in Chile and Argentina; *Merganetta armata leucogenis*, distributed from southern Ecuador to northern Chile; and *Merganetta armata colombiana*, found in Venezuela, Colombia and northern Ecuador (Fjeldså & Krabgbe 1990).

Figure 1. Geographic variations of *Merganetta armata*. Illustration: Jesús de Orión Mora / © VWF.

Males of the southern nominate subspecies, *M. a. armata*, have a grey back and blackish underparts with a chestnut belly. Males of the slightly smaller northern subspecies, *M. a. colombiana*, are paler underneath, with steaked grey-brown underparts. Males of the third subspecies, *M. a. leucogenis*, are intermediate but can be variable in plumage; some having entirely black underparts. Only males of this subspecies have a black 'teardrop' mark beneath the eye. The Peruvian subspecies is sometimes split into not less than 4 subspecies (*leucogenis*, *turneri*, *garleppi* and *berlepschi*), but these are more likely simply color variations, as they are not limited to distinct areas.

In spite of the extensive distribution of the torrent duck, the available information about their natural history, distribution and population status it is still very scarce (Callaghan 1998; Ellis-Joseph *et al*., 1992; Dallmeier & Cringan 1989; Fjeldså & Krabbe 1990; Gómez-Johnsgard 1966, 1978; Jhonsgard 1966, 1978; Johnson 1963; Moffet 1970; Múnera 2004; Naranjo & Avila 2003; Scott 1954; Weller 1968; Wright 1965). The torrent duck's distribution has been severely fragmented due to habitat conversion since it shares with humans some of the most intensively-used and threatened landscapes of the continent (Dinerstein *et al*. 1995, Monasterios 1980). Consequently, the torrent duck populations are thought to be declining due to competition for food with the introduced trout (*Salmo* sp, *Oncorhynchus* sp), pollution, forest destruction, and damming of mountain rivers for hydroelectric developments. The Chilean population seems to be relatively stable. In Venezuela, the species has been listed as "Endangered" in the "Red Data Book" of the Venezuelan Fauna (Rodríguez & Rojas-Suárez 1999).

The torrent duck is an intriguing and threatened species in need of urgent conservation measures. For this reason, during 2000, a non-governmental organization was created to foster the development of action plans favorable to the torrent duck as well as other waterfowl species in Venezuela. This North American-Venezuelan initiative was named the "Venezuelan Waterfowl Foundation (VWF)". VWF has been carrying out "The Northern Torrent Duck Project" since 2001, with the valuable support of several organizations and individuals committed to the future of these majestic birds. The goal of The Northern Torrent Duck Project is to obtain basic information about the species' natural history, to bring the scientific knowledge to the general public, and to promote the effective protection of its habitat. A preliminary study of the torrent duck's breeding behavior and an educational campaign were completed between the period 2001-2004 (Mora & Torres 2003, Torres 2004). Environmental education has been one of the fundamental strategic actions of VWF. We have worked to foster public attention favorable to torrent duck conservation. In 2004 VWF entered a new project phase, with a goal to carry out a detailed study of the torrent duck distribution in Venezuela. This information will allow us to highlight the needs for expanded habitat protection and to promote further ecological research and education on this threatened species.

To reach our conservation goals, The Northern Torrent Duck Project has produced data to support our field observations. In this report we present the partial results of a survey of the torrent duck distribution and status in Venezuela, carried out during 2005 and 2006. With this information, we hope to design a pragmatic conservation action plan for this species in Venezuela.

Suggested Citation: Torres, D. 2007. Distribution and Conservation of the Torrent Duck *(Merganetta armata colombiana)* in Venezuela. Final Report. Venezuelan Waterfowl Foundation (VWF) / Fundación AndígenA. 34 pp.

QUESTIONS TO RESPOND THROUGH THIS PROJECT

a) what is the current distribution of the torrent duck in Venezuela.

b) what is the current conservation status of torrent ducks in Venezuela.

To answer these basic questions, we focused the study on four main project objectives:

1. Estimate the past and current distribution of *Merganetta armata colombiana* in Venezuela.
2. Determine the distribution of *M. armata colombiana* in Venezuela.
3. Compare the distribution of *M. armata colombiana* with the current distribution of the national parks and determine if modifications in the structure (extensions) of these areas are necessary to protect threatened populations.
4. Assess the status of *M. armata colombiana* in the Venezuela Andean Range.

MATERIALS AND METHODS

During the 20 months of our project, we gathered data regarding the torrent duck's distribution in Venezuela by means of: 1) Literature Review, 2) Review of the biological data available in the national museums of natural history, 3) Field work and 4) Interviews with wildlife experts. The data obtained became part of the data base used to generate location maps by means of a Geographical Information System.

Working team

A multidisciplinary team was formed in order to carry out the fieldwork, data accumulation, and processing (Erick Romero, César Barrio, Roger Manrique, Adrián Naveda, Jesús de Orión Mora, Pilar Antonio Bermúdez, Fabiola Quijada, Alan Highton and Tom Evenou). The cooperative effort also extended to local wildlife guides and park rangers who proved to be an invaluable source of information for this survey.

Data Collection, Storage and Construction of the Maps

Information was gathered through personal visits to the field and interviews with local landowners and wildlife experts. Direct observations of the torrent ducks were carried out in several localities. Where possible, photographs and video footage was recorded of the habitat and/or the animals. Coordinates of each locality were recorded. This data became part of the overall data base accumulated for mapping.

Two GPS units (Garmin) were utilized for logging the position of each torrent duck sighting or report of sighting. Data was collected utilizing the Geographic Coordinate System, but later was converted to the Universal Transverse Mercator (UTM) grid system by means of Transforven software. Once the coordinates were standardized in the UTM system, a

DBF IV file was created utilizing Excel software (Microsoft Office). This conversion is important for plotting the records on the map through a Geographic Information System (GIS). A final step was to georefence all the records, which in our case, was accomplished via Datum SIRGAS – REGVEN.

As a final step, we used ArcGIS 9.0 software to digitalize the baseline maps of the Mérida Mountain Range as well as to generate the different layers of the final map.

Digital Elevation Model

A Digital Elevation Model (DEM) for the torrent duck habitat was created using a georeferenced satellite image which displays actual altitudes of the referenced terrain. The image contains three standard bands, which allowed us to identify the altitudinal gradient (red tones are highest altitudes and green tones the lower altitudes). This DEM was constructed by means of the OrziExplorer 3D software (version 3.5). This display also allows visualization of the elevations in 3D and has the ability to rotate the images for varying views.

Integration of roads, rivers, towns and other such data into the model was accomplished by the use of MapSource software, which provided cartographic information to program the GPS units.

Figure 2. Observations of the torrent ducks allowed us to get information about species' natural history.

Figure 3. Binoculars allowed us to carry out observations at distance of the torrent ducks and other animals.

METHODOLOGICAL SYNTHESIS

DATA BASE (Fig. 4)

INPUTS:

- Literature Review
- Records of torrent duck specimens storage in Venezuelan Biological
- Interviews to local people in the torrent duck habitat and experts in wildlife knowledge

→ Data Classification per Origin

↓

Design of a Data Base

Data Base: Categories

Number of Identification, Name of the Collection (Biological Museum), Number of Catalogue, Locality, State, Latitude, Longitude, Altitude (m.a.s.l.) , Name of the Collector or Observer, Date of Collection or Observation, Age of the animal (Adult, Subadult, Chick), Sex (Female, Male), Source of Information (Bibliography, Personal Communication, Data Base, etc.).

Microsoft Excel - BD_PATO DE TORRENTES_VENEZUELA

	A	B	C	D	E	F	G	H	
1	Nº IDENTIFICACION	COLECCIÓN	Nº DE CATALOG	LOCALIDAD	ESTADO	LAT. N	LONG. E	ALT. (m.s.n.m	COLECT
2	1	Colección Phelps	74377	Copas, Las; La Revancha	TACHIRA	824907	130135	2200	Castro, I
3	2	Colección Phelps	24458	Boca de Monte; Pregonero	TACHIRA	890917	187675	1950-2000	Benedet
4	3	Colección Phelps	24459	Boca de Monte; Pregonero	TACHIRA	890917	187675	2400	Urbano,
5	4	Colección Phelps	24460	Boca de Monte; Pregonero	TACHIRA	890917	187675	1950-2000	Urbano,
6	5	Colección Phelps	14176	Culata, La	MERIDA	964170	270783	2750	Urbano,
7	6	Colección Phelps	10783	El Tamá, Páramo de; Villa Paéz	TACHIRA	828669	120953	2200	Barnés, '
8	7	Colección Phelps	10784	El Tamá, Páramo de; Villa Paéz	TACHIRA	828669	120953	2200	Benedet
9	8	Museo EBRG	5610	Páramo Mucuchíes	MERIDA	?	?		Bermude
10	9	Museo EBRG	12188	Buenos Aires, National Park Dinira	LARA	1061381	382946	1900	Bermúde
11	10	MHNLS	8935	Copas, Las; La Revancha	TACHIRA	824907	130135	2200	Naranjo,
12						LAT. N	LONG. W		
13				Río Mucujún, El Valle, Sector El Pajonal (cerca de Prado Verde)	MERIDA	8º 39' 45"	71º 06' 05"	2023	Roger Ma
14				Río Mucujún, (margen derecha vía La Culata), Sector Las Cuadras	MERIDA	8º 39' 56"	71º 06' 03"	2030	Denis To
15				Río Mucujún, cerca de la Finca San Antonio	MERIDA	8º 40' 09"	71º 06' 02"	2060	Roger Ma
16				Río Chama, sector Los Aleros	MERIDA			1990	
17				Río Chama, San Román (Monumento Perro Nevado)	MERIDA				
18				Río Chama, Cacute	MERIDA				
19				Río Chama, Truchicultura cerca de Escagüey	MERIDA				
20				Río La Leona (Mucuy Baja)	MERIDA				
21				Río Sinigüis, camino a San Juan Bautista, P.N. Sierra Nevada	BARINAS			1100	Jesús de
22				Río Capaz, Puente del Diablo	MERIDA				Jesús de
23				Río Nuestra Señora (llegando a El Morro)	MERIDA				
24				Río Albarregas, Santa Rosa	MERIDA				
25				Río Santo Domingo, Puente hacia Las Piedras-Pueblo Llano	MERIDA				
26				Río Santo Domingo, Puente cerca de El Baho	MERIDA				
27				Río Frío, puente	MERIDA	8º 51' 23"	71º 17' 27"	625	Alan High
28				Río Santo Domingo, Sector Las Tapias	MERIDA				
29				Río Santo Domingo, Hotel Los Frailes	MERIDA				
30				Río Chama, Capilla Juan Felix Sánchez	MERIDA				
31									

Figure 4. Example of the Data Base for storage the records about the torrent duck in Venezuela.

PRODUCTION OF THE MAP WITH THE USE OF ArcGIS 9.0

LAYERS OVERPOSISTION

LAYERS

BASELINE MAP OF THE VENEZUELAN ANDES

+

HIDROGRAPHY

+

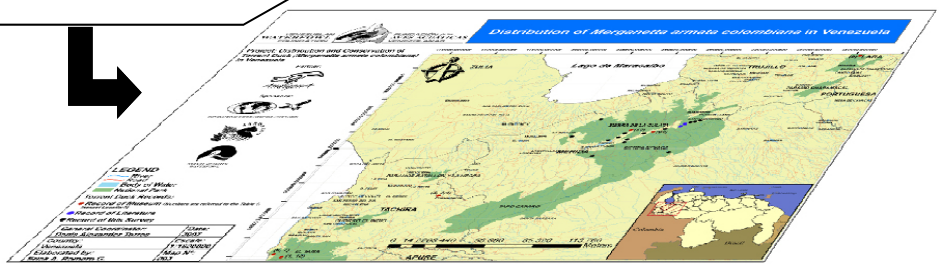
RECORDS OF TORRENT DUCK

+

NATIONAL PARKS

+

HUMAN SETTLEMENTS



MAP OF TORRENT DUCK DISTRIBUTION

RESULTS AND DISCUSION

We started this research on April 2005 and it was completed for December 2006.

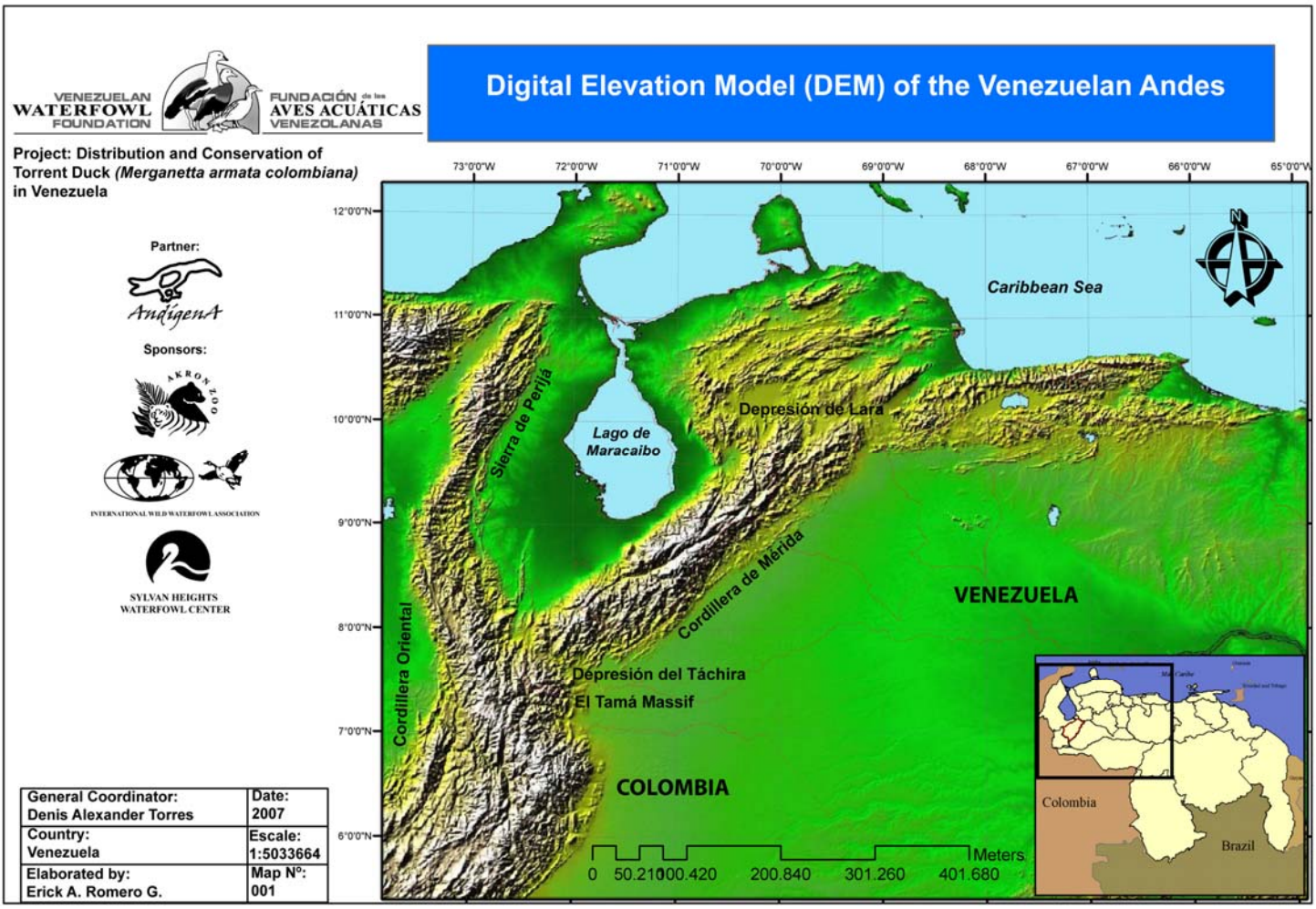
The Venezuelan Andes: A Geographic Overview

The Andes is the most extensive mountainous chain of the planet, with an approximate length of 8,500 Km (Vivas 1992). In Colombian territory, this mountain range is divided into three branches known as the "Oriental", "Central", and "Occidental" Mountain Ranges, respectively. The Oriental Mountain Range, to the 7º 30' of North latitude, is divided into two main branches: one that continues to the North and another that is directed toward NE. This point of division among both branches is known as the "Nudo de Pamplona". The northern branch constitutes the "Sierra de Perijá", whose watershed constitutes the international border between Venezuela and Colombia. In Venezuelan territory, this mountain range extends to 9º 0' and 11º 10' of North latitude and to 72º 10' to 72º 30' of Western longitude, reaching altitudes of 3,750 meters above sea level (m.a.s.l) (Manatará Peak) and covering an approximate surface area of 7,000 Km² (Lira 1992, Monasterio & Reyes 1980, Vivas 1992).

Mérida mountain Range represents an important geographic landmark for biogeographic studies since it forms the physical separation of two large sedimentary and hydrographic basins (Apure-Orinoco to the East and the Lake of Maracaibo to the West) (Vivas 1992). In this mountainous system we find the country's highest altitudes: Bolívar Peak (4,980 m.a.s.l, *sensu* Saler & Abad 1994), Humboldt Peak (4,942 m.a.s.l) and El Toro Peak (4,654 m.a.s.l), among others. The extensive altitudinal gradient of the mountain range results in rapid changes and variability regarding the climate and vegetation. Because of this, a complex gradient of Life Zones progresses from the Tropical Humid Forest (500 m.a.s.l.), Premontane Humid Forest (950 m.a.s.l.), Montane Humid Forest (2,900 m.a.s.l.) up to the Paramo (3,500 – 4,200 m.a.s.l.) (Veillon 1989). In some valleys it is even possible to find semiarid environments due to the topographical, geological, geomorphologic and climatic conditions of the area (Croizat 1954, 1958, cited in Péfaur & Pérez 1995). The complex hydrographic features of the Andes allow the presence of torrent ducks in a wide range of habitats, whose preliminary delimitation is presented in this report.

Review of Literature and Biological Data in National Museums of Natural History

The information regarding torrent duck's natural history, distribution and population status is very scarce (Fjeldså & Krabbe 1990; Gómez-Dallmeier & Cringan 1989; Johnsgard 1966, 1978; Johnson 1963; Moffet 1970; Múnera 2004; Naranjo & Avila 2003; Rodríguez & Rojas-Suárez 1999, Weller 1968; Wright 1965). The presence of this species in Venezuela is referred to only in two states of the Andean Region: Táchira and Mérida (Phelps & Meyer De Schauensee 1978; Hilty 2003, Gómez-Dallmeier & Cringan 1989) in a range between 1,700-3,000 m.a.s.l. In the State of Mérida, Hilty (2003) just mentions the presence of torrent duck in the localities of "La Mitisús" and "Hotel Los Frailes", and Gómez-Dallmeier & Cringan (1989) report an imprecise place between "Laguna Negra" and "Laguna Los Patos" inside the Sierra Nevada National Park. Mora & Torres (2003), recently reported the first presence of the torrent duck in the State of Barinas, in the southern slope of the Sierra Nevada National Park.



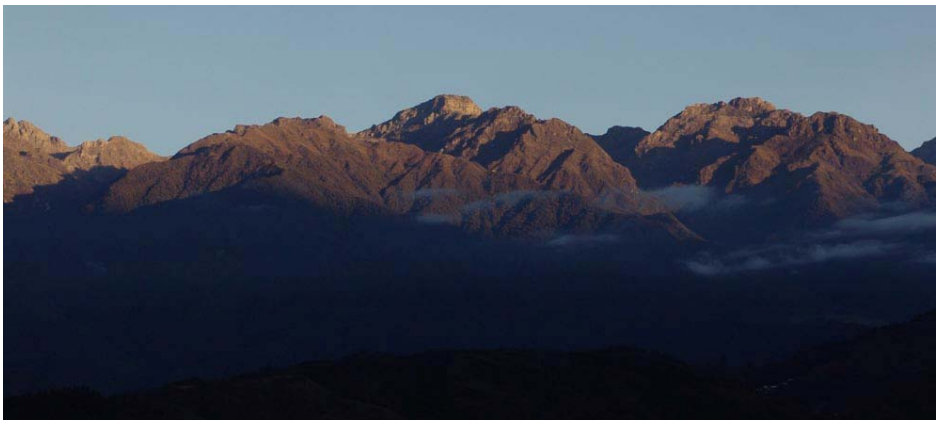
Map 001. A general view of the Andean Mountain Range in Venezuela.

An examination of the Biological Museums in Venezuela (Table 1); revealed only ten (10) specimens of *M. a colombiana* collected in the Venezuelan Andes: seven (7) from Táchira State, two (2) from Mérida State and one (1) from Lara State (Table 1; Fig. 5). The latter record implies a new locality for this species identified in the framework of this research (Naveda *et al*. in press).

Distribution of the Torrent Duck:

Since the sampling numbers found in Venezuela to detect the torrent duck presence were usually low (covering only a few sample plots with large gaps in between), a significant interpolation would be required, in order to generate a more accurate species distribution map. To compensate for these gaps, statistical modeling should be used to establish a link between survey data and habitat data obtained from satellite remote sensing (Grenier *et al*. 1994). The results of these models can be applied to all the portions of the study area that were not surveyed but where habitat information was obtained. The final result of this methodology is a map of potential distribution that reflects the results of exhaustive surveys. This criteria will be used in the future to generate a more accurate map of the torrent duck distribution in Venezuela.

Landscapes of the Venezuelan Andes. Photos: Denis Torres & César Barrio / © Fundación AndígenA.



Summits of Sierra Nevada National Park

***Coespeletia timotensis*, endemic plant of the Venezuela Andean Paramo**

Glacier-origin valley in Sierra de La Culata National Park

Glacier-origin lagoon in Sierra Nevada National Park

Montane Humid Forest

Collection	Specimen Code	Record Number	Prepared by	Date Prepared	Date Collected	Sex	Locality	State	Altitude (m. a. s. l.)	UTM Latitude (N)	UTM Longitude (E)
Colección Ornitológica Phelps	74377	1	Castro, M.	27-Ago-1980	19-Ago-1980	M	Las Copas; La Revancha	Táchira	2,200	824907	130135
	24458	2	Benedetti, F.	10-Dic-1943	30-Nov-1943	M	Boca de Monte; Pregonero	Táchira	1,950 – 2,000	890917	187675
	24459	3	Urbano, R.	07-Dic-1943	21-Nov-1943	F	Boca de Monte; Pregonero	Táchira	2,400	890917	187675
	24460	4	Urbano, R.	04-Dic-1943	30-Nov-1943	M	Boca de Monte; Pregonero	Táchira	1,950 – 2,000	890917	187675
	14176	5	Urbano, R.	11-Sep-1941	31-Ago-1941	M	La Culata	Mérida	2,750	964170	270783
	10783	6	Barnés, V.	12-Feb-1941	10-Feb-1941	M	Páramo de Tamá; Villa Páez	Táchira	2,200	828669	120953
	10784	7	Benedetti, F.	13-Feb-1941	10-Feb-1941	F	Páramo de Tamá; Villa Páez	Táchira	2,200	828669	120953
Museo de la Estación Biológica de Rancho Grande	5610	8	Bermúdez, P. A.	-	13-Mar-1967	F	Páramo Mucuchíes	Mérida	-	-	-
	12188	9	Bermúdez P. A. & Naveda-Rodríguez, A.	25-Apr-2005	25 -Apr- 2005	M	Buenos Aires, Dinira National Park	Lara	1,900	1061381	382946
Museo de Historia Natural La Salle	8935	10	Naranjo, C. & Musso, A.	-	31-Jan-1980	M	Las Copas; La Revancha	Táchira	2,200	824907	130135

Table 1. Specimens of *Merganetta armata colombiana* collected and deposited in Venezuelan Biological Collections.

Figure 5. Subadult Male of *M. a. colombiana* collected in Lara State, northern limit of the Mérida Mountain Range.

During our field work, we carried out a series of short expeditions in Mérida State along the rivers **Chama** (sites: Los Aleros, Cacúte, Escagüey, San Román, Páramo de Mifafí), **Mucujún** (sites: El Valle, La Culata, El Vallecito), **Capaz** (sites: La Carbonera, La Azulita, Puente de El Diablo), **Albarregas** (Santa Rosa, Monte Zerpa), **Sinigüis** (San Juan Bautista), **Santo Domingo** (sites: Los Frailes, El Baho, La Mitisús), **La Leona** (site: La Mucuy Baja), **Nuestra Señora** (sites: Los Nevados, El Morro) and **Río Frío**. The presence of torrent ducks was confirmed in all these localities (See pictures) as well as threat factors to the species' conservation.

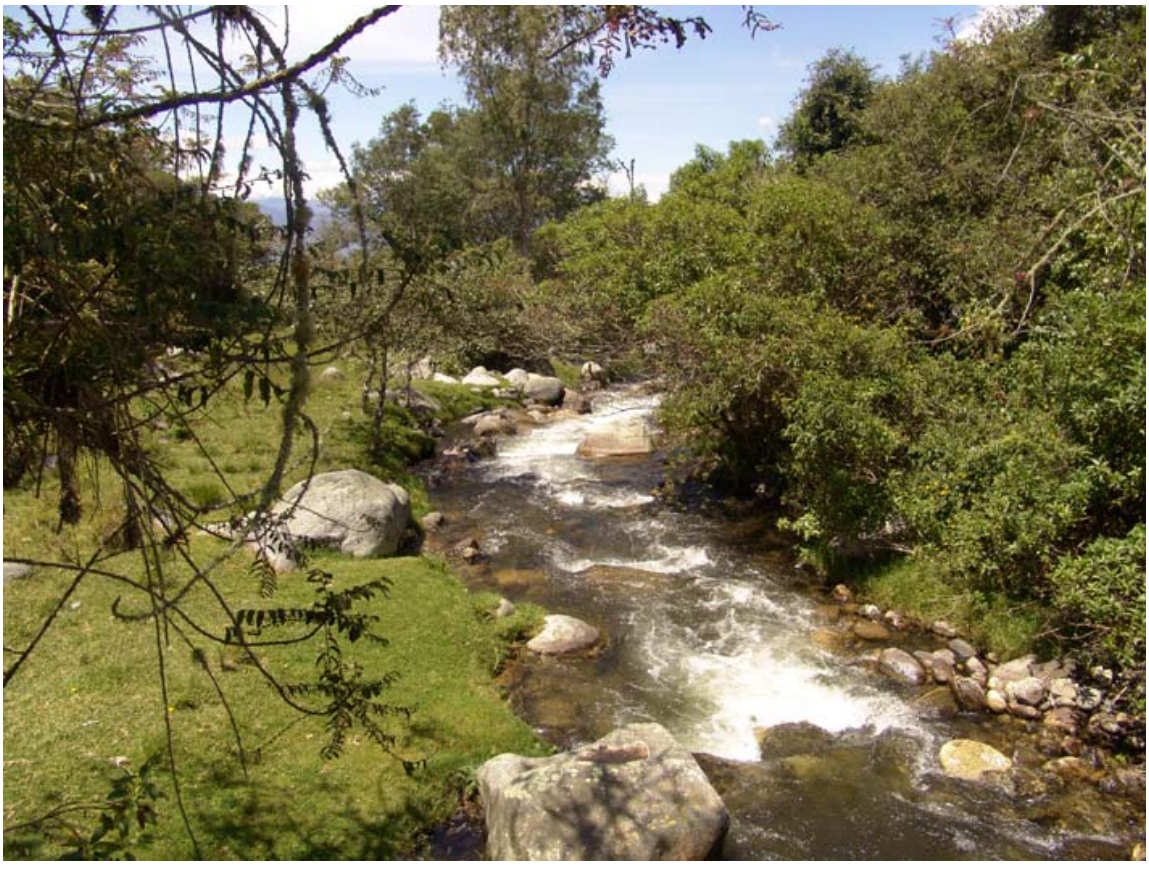
We also visited Táchira State in the southern border to Mérida State as well as the northern limit of the Mérida Mountain Range in Lara, where the presence of the torrent duck was only confirmed near to Dinira National Park (specimen 12188, Table 1). This new record represents the most northern limit in the distribution of *Merganetta armata colombiana* in Venezuela as well as a considerable amplification of the known range for this subspecies (Naveda *et al*. in press).

Sinigüis River watershed, on the way to San Juan Bautista, is the locality where torrent duck presence has been detected at lower altitude in the Andean slope of the Orinoco–Apure Basin.

Sunrise in the Sinigüis River Basin, Mérida State.

Santo Domingo River near to "Hotel Los Frailes", Mérida State.

Chama River near to Escagüey, Mérida State.



Different points across the Mucujún River Basin where several torrent ducks were seen. Mérida State.

Gavidia Canyon. Optimal torrent duck habitat, Mérida State.

River across the Páramo Los Granates, Sierra Nevada National Park. Presence of the torrent duck was reported by the local inhabitants in the surroundings, Mérida. Photo: César Barrio / © Fundación AndígenA.

Nesting site in Chama River, Mérida State.


Nesting site in Santo Domingo River, Mérida. A torrent duck nest was found below the bridge shown in the photo.

Chama River near to Escagüey, Mérida State.

Río Frío is the locality where we recorded the presence of torrent duck at lower altitude in the Andean slope of the Maracaibo Lake Basin. Photos: César Barrio / Fundación AndígenA.

Torrent ducks are not easy to see in the wild due the intricate habitat and their cryptic color that blends with the rocks at a distance (Fig. 6, 7). Generally torrent ducks are not often reported by the local people, even when the species can be near to the human settlements.

Figure 6. Adult male in the Chama River. Photo: Jesús de Orión Mora / © VWF.

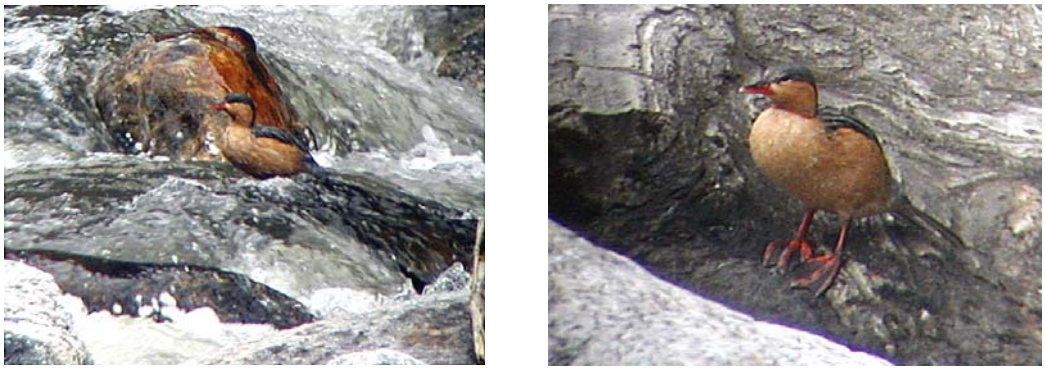
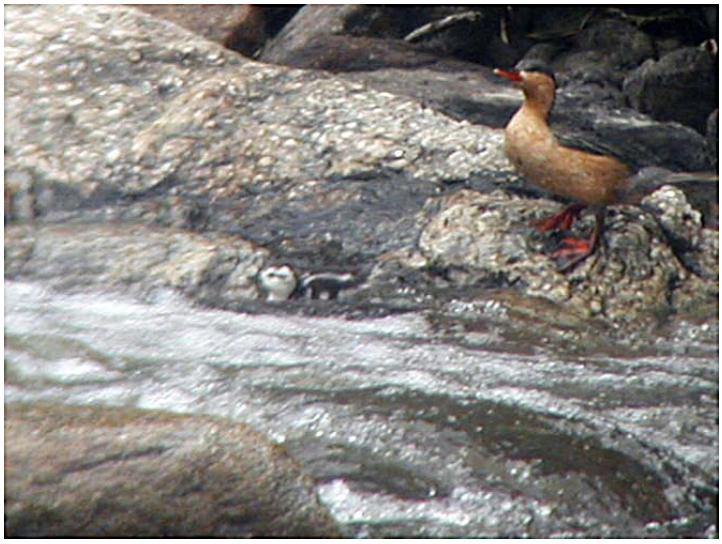


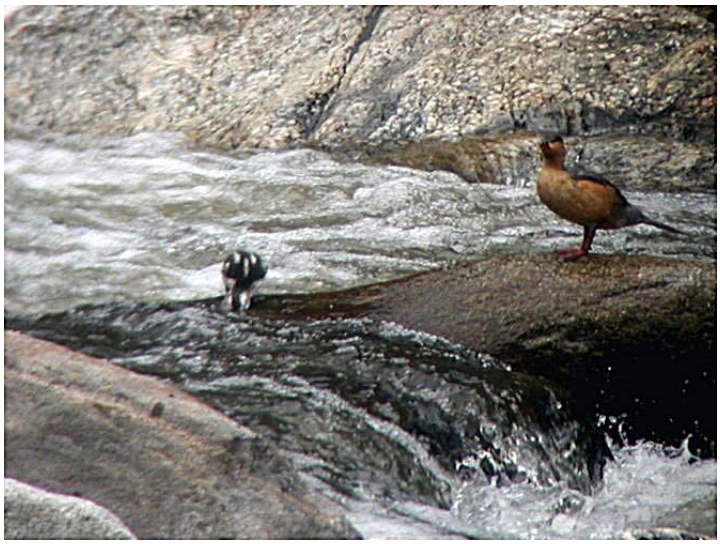
Figure 7. An adult female in the Chama River. In the picture to the left is possible to see the mimetic ability of this species. Photos: Jesús de Orión Mora / © VWF.

The altitudinal range for this species has been established in Venezuela between 2,000-3,000 m.a.s.l. (Hilty 2003), however we detected the presence of torrent ducks at lower altitudes as well. Two sightings are significant, Río Frío (650 m.a.s.l.) and Sinigüis River (1,100 m.a.s.l.), both in Mérida State. In these sites, the sightings of torrent ducks can be rare, but evidence of their presence and the favourable natural conditions that these environments offer require their consideration as part of torrent duck natural habitat and distribution.

The torrent duck distribution appears to be determined by several factors, the most important of which is the presence of rapids interspersed with stretches of more placid water. In addition, the rivers should have many slightly submerged and emergent rocks which produce falls, rapids and pools that appear to be crucially important for the stable presence of the torrent ducks. The surroundings vegetation is not apparently significant, since we have observed torrent ducks in several diverse vegetation zones. All the rivers used by torrent ducks are distinctly cold and thus the water is capable of retaining much of the oxygen accumulated when passing over falls and rapids. Such oxygen tensions would clearly be of importance in supporting the aquatic animal life upon which the torrent duck is dependent (Fig. 8).

Figure 8. These insect larvae (a non-identified species yet) were found on the rocks of a locality of the Chama River. We saw torrent ducks (adults, subadults and chicks) eating these larvae. The feeding strategy consist in scraping the stones to remove the larvae adhered to them. Photos: Jesús de Orión Mora / © VWF.





Torrent ducks may live in close proximity to human settlements if unmolested (e.g., at La Mitisús, Los Aleros, El Baho and near to Hotel Los Frailes, Mérida State). Chama River is one of the most important areas in the distribution of the torrent duck in the central block of the Mérida Mountain Range (Fig. 9). Unfortunately, it is also the most developed area in terms of human infrastructure. Consequently, this is the most endangered habitat for the species in Mérida State.

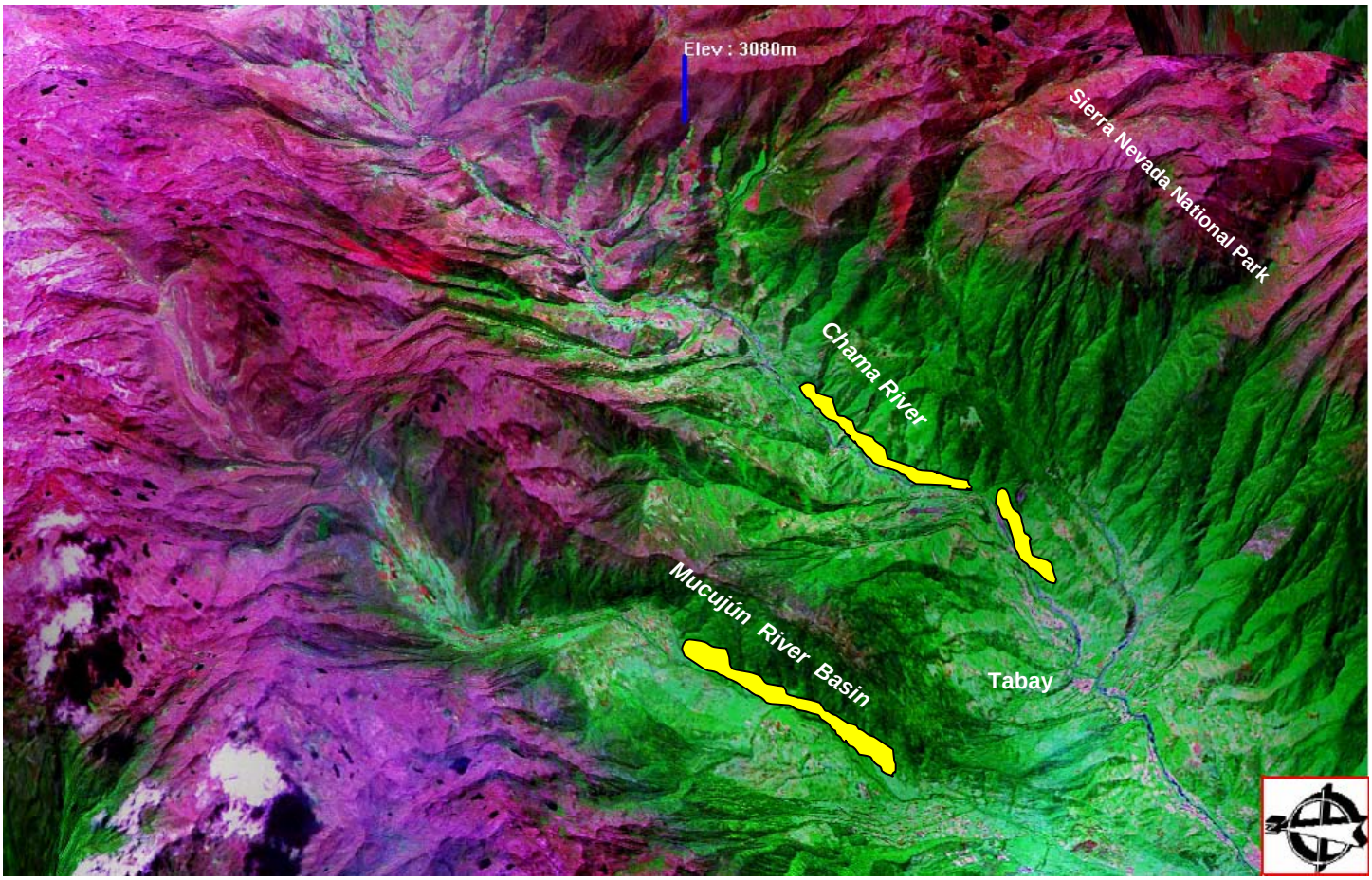


Figure 9. Digital Elevation Model (DEM) of the middle portion of Chama River basin (Mérida State), generated from a georeferenced satellite image by means of the OrziExplorer 3D software. The patches in yellow represents the areas of confirmed presence of torrent ducks.

The spatial distribution of the torrent duck is concentrated and fragmented to small areas (see Map 002). Even in a single river, the distribution of the individuals is not continuous spatially. For this reason, in our scale of work, the records were represented by points since the representation by areas does not reflect natural conditions.

Torrent ducks occur in small territories, frequently formed by breeding couples or family groups (parents and chicks). It has never reported as occurring in flocks, as have most other species of ducks. They appear to be highly sedentary and monogamous (Johnsgard 1966). Torrent duck densities in the Rivers Chama and Mucujún, rarely exceed one pair per km of stream, and usually are much less than this in other explored areas.

VENEZUELAN WATERFOWL FOUNDATION

FUNDACIÓN de las AVES ACUÁTICAS VENEZOLANAS

Distribution of *Merganetta armata colombiana* in Venezuela

Project: Distribution and Conservation of Torrent Duck *(Merganetta armata colombiana)* in Venezuela

Partner:

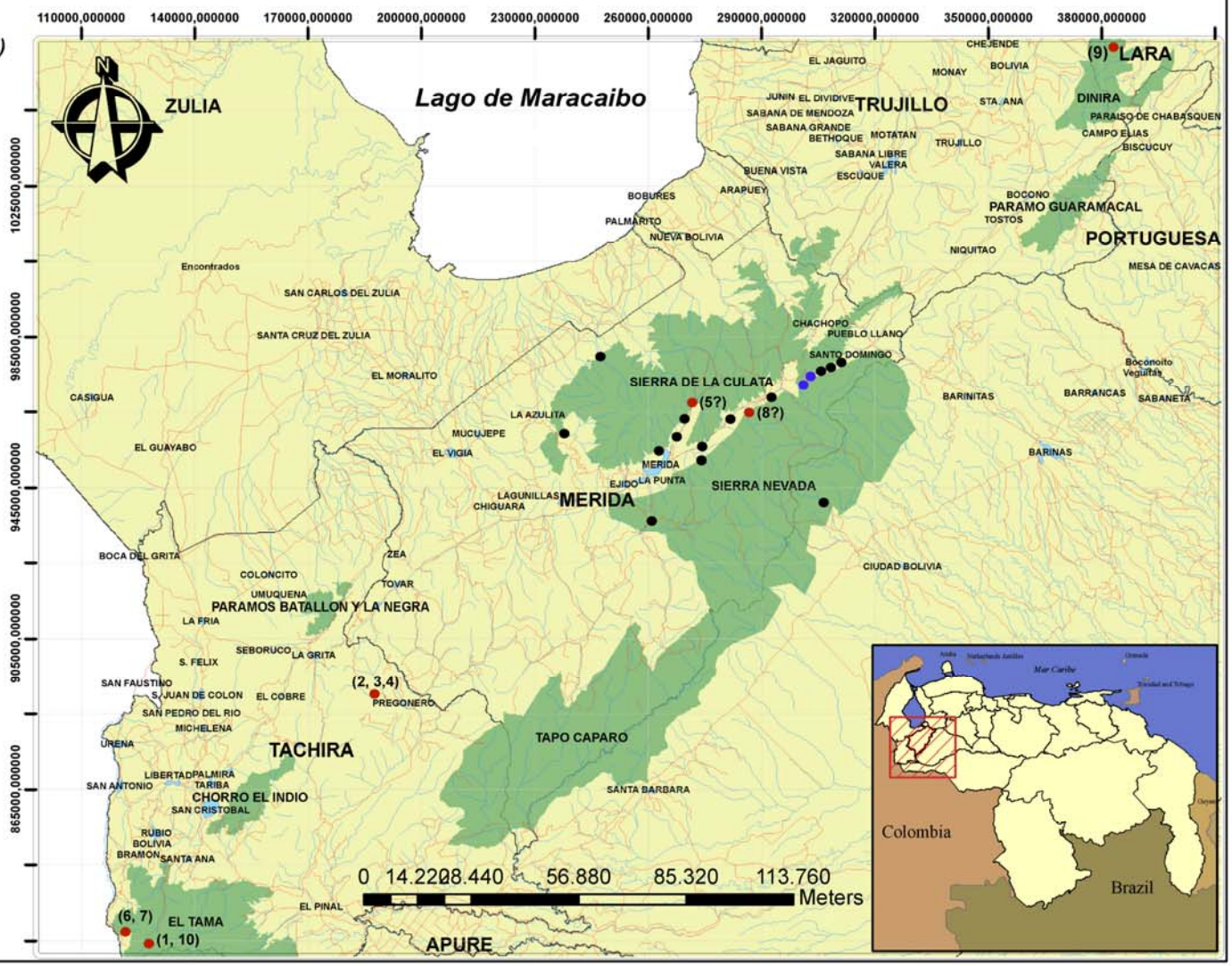
AndigenA

Sponsors:

AKRON ZOO

INTERNATIONAL WILD WATERFOWL ASSOCIATION

SYLVAN HEIGHTS WATERFOWL CENTER



LEGEND

- River
- Road
- Main Human Settlements (Cities)
- National Park

Torrent Duck Records:

- Record of Museum (Numbers are referred to the Table 1. Inexact Locality?)
- Record of Literature
- Record of this Survey

General Coordinator: Denis Alexander Torres	Date: 2007
Country: Venezuela	Escale: 1:1600000
Elaborated by: Erick A. Romero G.	Map Nº: 002

CONSERVATION

Indications suggest that torrent duck populations are diminishing. According to Ellis-Joseph *et al*. (1992), this species can be considered Endangered. These authors have suggested including *Merganetta armatta colombiana*, among priority species in need of special attention. By contrast, the World Conservation Union (IUCN) classifies it at the global level in the category of Low Risk / least concern (Birdlife International 2004). In Venezuela, torrent duck is classified as "ENDANGERED" (Rodríguez & Rojas-Suárez, 1999), but no specific study supports this classification.

Due to the fact that torrent duck is a species distributed in small numbers in restricted areas, its local populations will naturally consist of only a few individuals, putting the total population estimates of this species in Venezuela between a minimum of 100 and a maximum of 1,500 individuals (Rodríguez & Rojas-Suárez 1999). Furthermore, human interactions, such as settlements, further restrict potential habitat due to agricultural practices that contaminate water and reduce food sources. Deforestation is a particularly destructive practice which results in increased frequency and intensity of river flooding. The resultant floods destroy nests and increases individual mortality. Construction of dams and reservoirs further reduce the suitable habitat area, and introduction of exotic fishes such as rainbow trout have increased interspecific competition for food sources (Gomez-Dallmeier's & Cringan 1989, Fjeldså & Krabbe 1990);that potentially can decimate numbers and even extinguish local populations.

Direct human use or destruction of torrent ducks was not documented by our study. The species is not hunted or purposely destroyed in the areas of agricultural use. However, habitat destruction and fragmentation due to anthropogenic factors are a real threat for the survival of this species (expansion of the agricultural frontier, illegal occupations of land, deforestation, alteration of the rivers, water pollution by the use of agrochemicals products, introduction of trout, etc.). In some areas we observed the extraction of sand and rock of the riverbank to be used in the construction industry. This activity quickly destroys the torrent duck habitat in an irreversible manner (Fig. 10).

Torrent ducks are protected at the national level through two decrees (1,485 and 1,486) promulgated by the Environment Ministry which prohibit the traffic or hunting of the endangered species. By territorial extension, national parks constitute the main long-term guarantee for the torrent duck conservation and its habitat in Venezuela.

14.17% of the Venezuelan territory is currently protected in 43 National Parks (12,987,240 has). The presence of torrent ducks has been confirmed in 4 national parks (9.3%) of the Andean region (Dinira, Sierra Nevada, Sierra de La Culata and El Tamá) (see Map). Although we do not include records for the other national parks, we presume the potential presence of the species in many of the other Andean national parks (Table 2).

National Park	Surface (km²)	State	Altitudinal Range (m.a.s.l.)
Yacambú	296	Lara	1,400 - 2,160
Terepaima	187	Lara, Portuguesa	300 - 1,675
Dinira (*)	420	Lara, Trujillo, Portugue-	1,400 - 3,500
Guaramacal	215	Trujillo, Portuguesa	1,500 - 3,100
El Guache	122	Portuguesa	800 - 1,700
Sierra de La Culata (*)	2,004	Mérida, Trujillo	800 - 4,700
Sierra Nevada (*)	2,765	Mérida, Barinas	300 - 4,980
Tapo-Caparo	2,050	Barinas, Mérida.	400 - 2,800
Páramos El Batallón y La Negra	925	Mérida, Táchira	1,200 - 3,900
Chorro El Indio	698	Táchira	800 - 2,600
El Tamá (*)	1,390	Táchira, Apure	320 - 3,500
Perijá	2,953	Zulia	200 - 3,500
Total Surface of Protected Area	14,025		

Table 2. National Parks (NP) in the Andean Region of Venezuela. (*) NP with confirmed registers of torrent duck.

Figure 10. Extraction of sand and rocks in Chama River for the construction industry, Mérida State,

Forest destruction has a marked influence in the alteration of the local rainfall patterns. This human-induced change results in increased flooding causing habitat destruction and possible extermination of whole local populations of torrent duck. In fact, during one breeding season we noted the death of six chicks due to an exceptional flood of the Chama River (Mérida State).

The conservation of the torrent ducks and their habitat is crucial for the aquatic ecosystems of the High Andean mountains. Two birds species specialized to the aquatic ecosystem where the torrent duck lives were always seen during our field observations (Fig. 11, 12). In fact, the presence of these other species was a signal of potential presence of torrent duck in the site.

SUGGESTIONS FOR FUTURE RESEARCHES

- Studies focused on population dynamics, genetics, diet and geographic distribution in a more refined scale. It is a priority to explore all of the potential habitat areas to confirm the current presence of torrent ducks in Trujllo State and several areas among Mérida and Táchira States.

- To develop more environmental education activities that promote the conservation of torrent duck and its habitat.

- To promote captive breeding of torrent ducks in locations near to the natural habitat of the species. These captive breeding sites would allow research to better understand biological aspects about the species and to reinforce wild populations affected by human intervention, when the ecological and economic conditions permit it.

- To promote the development of a monitoring program for updating the geographic distribution map at different scales.

Figure 11. White-capped Dippers *(Cinclus leuncephallus leuncephallus)* are always frequent in the rivers occupied by torrent ducks. Photos: César Barrio and Alan Highton / © Fundación AndígenA.

Figure 12. Torrent Tyrannulet *(Serpophaga cinerea)* lives in the same habitat of the torrent ducks. Photo: César Barrio / © Fundación AndígenA.

TORRENT DUCKS OBSERVED DURING THE DEVELOPMENT OF THIS PROJECT. Photos: Jesús Mora / © VWF.

Photo: Alan Highton / © Fundación AndígenA.

AKNOWLEDGEMENTS

We are deeply grateful to Gary Riggs, Mike Lubbock, Stacy Dempsey, and Doug Piekarz for the valuable support during the development of this project. Erick Romero was the key person during the office work phase and the development of the cartographic outputs. Alcides Duran, Jesús de Orión Mora, Adrián Naveda, César Barrio and Roger Manrique collaborated during the fieldwork. Our sincere gratitude to the curators of “Museo de la Estación Biológica de Rancho Grande”, “Colección Ornitológica Phelps” and “Museo de Historia Natural La Salle” for the information regarding the specimens of M. a. colombiana in their collections. A special gratitude to Alan Highton and Jesús de Orión Mora for their extraordinary photos and knowledge regarding torrent ducks. Jesús de Orión Mora is also the author of the beautiful painting that illustrate the cover of this report.

This report is part of the project entitled “Distribution and Conservation of the Torrent Duck (*Merganetta armata colombiana)* in Venezuela”, led by the Venezuelan Waterfowl Foundation and Foundation AndígenA with the support from Akron Zoo, Sylvan Heights Waterfowls and the International Wild Waterfowl Association.

Photo: Alan Highton / © Fundación AndígenA.

LITERATURE CITED

BIRDLIFE INTERNATIONAL. 2004. *Merganetta armata*. In: IUCN 2006. *2006 IUCN Red List of Threatened Species.* <www.iucnredlist.org>. Downloaded on 01 January 2007.

CALLAGHAN, D. A. 1998. Conservation status of the Torrent Ducks *Merganetta*. *Wildfowl*, 48:166-173.

DINERSTEIN, E., D. M. OLSON, D. J. GRAHAM, A. L. WEBSTER, S. A. PRIMM, M. P. BOOKBINDER & G. LEDEC. 1995. *A Conservation Assessment of the Terrestrial Ecoregions of Latin America and the Caribbean*. The World Bank, World Wildlife Fund, Washington, D. C.

ELLIS-JOSEPH, S., N. HEWTON & A. GREEN. 1992. Global Waterfowl Conservation Assessment & Management Plan. First Review Draft. Captive Breeding Specialist Group (CBSG/SSC/IUCN), The Wildfowl & Wetlands Trust. 77 pp.

FJELDSÅ, J. & N. KRABBE. 1990. *Birds of the High Andes*. University of Copenhagen and Apollo Books, Svendborg, Denmark. 876 pp.

GÓMEZ-DALLMEIER, F. & A. T. CRINGAN. 1989. *Biology, Conservation and Management of Waterfowl in Venezuela.* ICBP, FUDENA, WWF *et al*. Editorial Ex Libris, Caracas. 351pp.

GRENIER, M., D. BORDAGE, & N. PLANTE. 1994. La télédétection, un complément avantageux aux inventaires pour évaluer la répartition de la sauvagine sur de vastes territoires. *J. Can. de télédétection*, 20(2): 162-170.

HILTY, S. 2003. *Birds of Venezuela*. 2nd Edition. Princeton University Press. 875 pp.

JOHNSGARD, P. A. 1966. The biology and relationship of the torrent duck. *Wildfowl*, 17: 66-74.

JOHNSGARD, P. A. 1978. Ducks, geese, and swans of the World. Univ. of Nebraska Press, Lincoln. 404 pp.

JOHNSON, A. W. 1963. Notes on the distribution, reproduction and display of the Andean torrent duck, *Merganetta armata*. *Ibis*, 105:114-116.

LIRA, J. 1992. La etnozoología de la Sierra de Perijá. *Carta Ecológica* (Lagoven), (63): 14-17. Caracas.

MOFFET, G. M., Jr. 1970. A study of nesting torrent ducks in the Andes. *Living Birds*, 9:5-28.

MONASTERIO, M. (ed.). 1980. *Estudios Ecológicos en los Páramos Andinos.* Ediciones de la Universidad de Los Andes. Mérida, Venezuela. 312 pp.

MONASTERIO, M. & S. REYES. 1980. Diversidad ambiental y variación de la vegetación en los páramos de los Andes venezolanos. Pp: 47-91 (Capítulo 3). In: MONASTERIO, M. (ed.). *Estudios Ecológicos en Los Páramos Andinos.* Ediciones de la Universidad de Los Andes. Mérida, Venezuela. 312 pp.

MORA, J. de O. & D. TORRES. 2003. [Abstract] Proyecto de conservación del pato de torrentes *(Merganetta armata colombiana)* en los Andes Venezolanos. I Jornadas de Ornitología y Conservación de Aves de Venezuela. Barquisimeto, Estado Lara. Grupo Guardaparques Universitarios, Grupo Ecológico y Excursionista Dinira – UCLA, Spiglass C. A. CD Interactivo.

MÚNERA-P, W. 2004. Nuevo registro del pato de torrentes *(Merganetta armata colombiana)* en Antioquia y comentarios sobre su distribución en el Norte de la Cordillera Central. Boletín Sociedad Antioqueña de Ornitología (XIV): 21-24.

NARANJO, L. G. & ÁVILA. 2003. Distribución habitacional y dieta del pato de torrentes *(Merganetta armata)* en el Parque Regional Natural Ucumari en la Cordillera Central de Colombia. *Ornitología Colombiana*, 1: 22 - 28.

NAVEDA-RODRÍGUEZ, A. TORRES, D. & BERMÚDEZ, P. A. *in press*. New record of torrent duck *(Merganetta armata colombiana)* (AVES: ANATIDAE) and comments on its distribution in Venezuela. *Memoria*, Soc. Cienc. Nat. La Salle. Caracas, Venezuela.

PÉFAUR, J. & R. PÉREZ. 1995. Zoogeografía y variación espacial y temporal de algunos vertebrados epígeos de la zona xerófila de la cuenca del Río Chama, Mérida, Venezuela. *Ecotrópicos*. 8(1-2): 15-3.

PHELPS, W. H. & R. MEYER DE SCHAUENSEE. 1978. *Una Guía de las Aves de Venezuela*. Talleres de Gráficas Armitano, C. A. Caracas.

RODRÍGUEZ, J. P. & F. ROJAS-SUÁREZ. 1999. *Libro Rojo de la Fauna Venezolana*. 2nd. edition. PROVITA, Fundación Polar. Caracas, Venezuela. 472 pp.

SALER, H. & C. ABAD. 1994 ("1992"). La altura del Pico Bolívar. *Rev*. *Geogr*. *Venez*. 33: 277-287.

SCOTT, P. 1954. Behaviour of the Bolivian Torrent Duck. Wildfowl Trust Ann. Rep. 6:69-72.

VEILLON J. P. 1989. *Los Bosques Naturales de Venezuela*. Oscar Todtmann Editores, C. A. Caracas, Venezuela. 118 pp.

VIVAS, L. 1992. *Los Andes Venezolanos*. Academia Nacional de la Historia. Caracas, Venezuela. 250 pp.

WELLER, M.W. 1968. Plumages and wing spurs of torrent ducks *Merganetta armata*. *Wildfowl*, 19:1-18

WRIGHT, J. K. 1965. Observations of behavior of the Andean torrent duck. *Condor*, 67(6): 535.