

**Biological and ecological aspects of freshwater stingrays (Potamotrygonidae) in the area of influence of the municipality of Puerto Carreño (Vichada), Colombian Orinoco River Basin**

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- ✓ Colombia is the second country after Brazil in terms of richness of freshwater stingrays, with 11 species recorded so far.
- ✓ The National Action Plan for the Conservation and Management of Sharks, Rays and Chimeras of Colombia, identified *Potamotrygon magdalenae*, *Potamotrygon motoro*, *Potamotrygon schroederi*, *Potamotrygon orbignyi* and *Paratrygon aiereba*, as priority species for research, due to their importance in the ornamental fishery and to the biological characteristics that make them susceptible to human impacts such as overfishing.
- ✓ These priority species are threatened, with ornamental fishing being the major problem and four occur in the Amazon and Orinoco River Basins. Fishing for rays for the aquarium trade occurs mainly in the Orinoco River Basin.



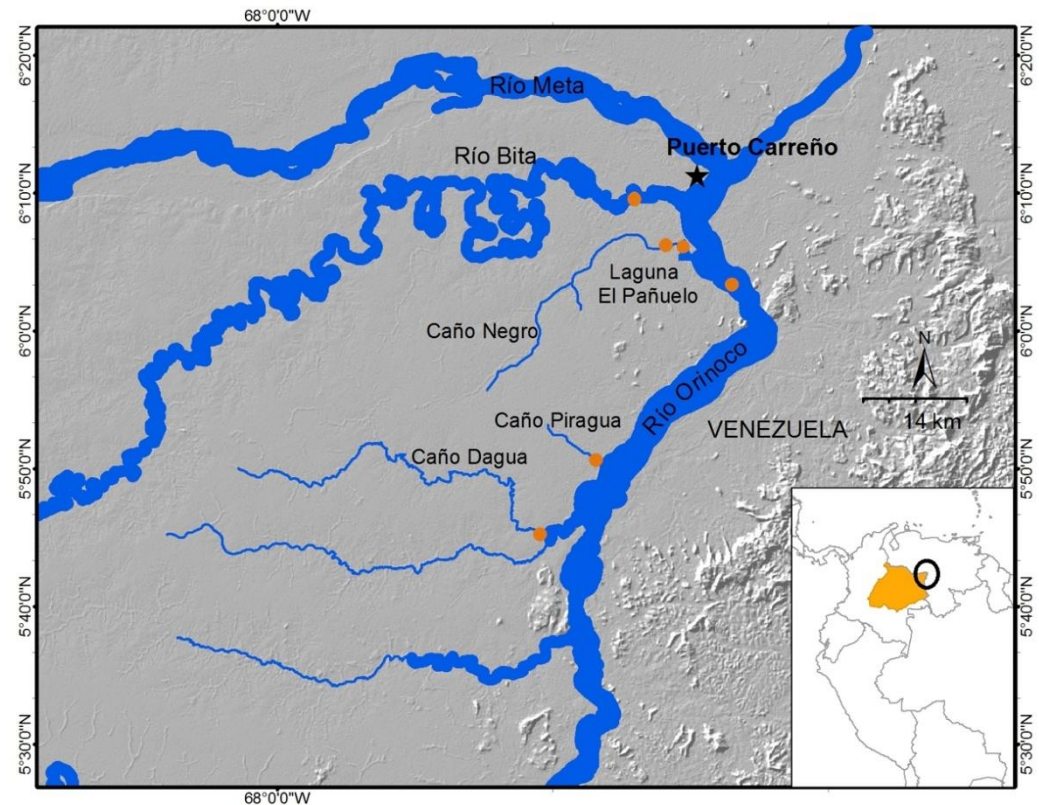
## Study Area

Surveys were done in the dry season from 2011 to 2016, to collect information on composition, distribution and bioecological aspects of the rays in the Colombian Orinoco River Basin near the municipality of Puerto Carreño.

Clear water



White water



# Sampling

Hook and Line



Gill net



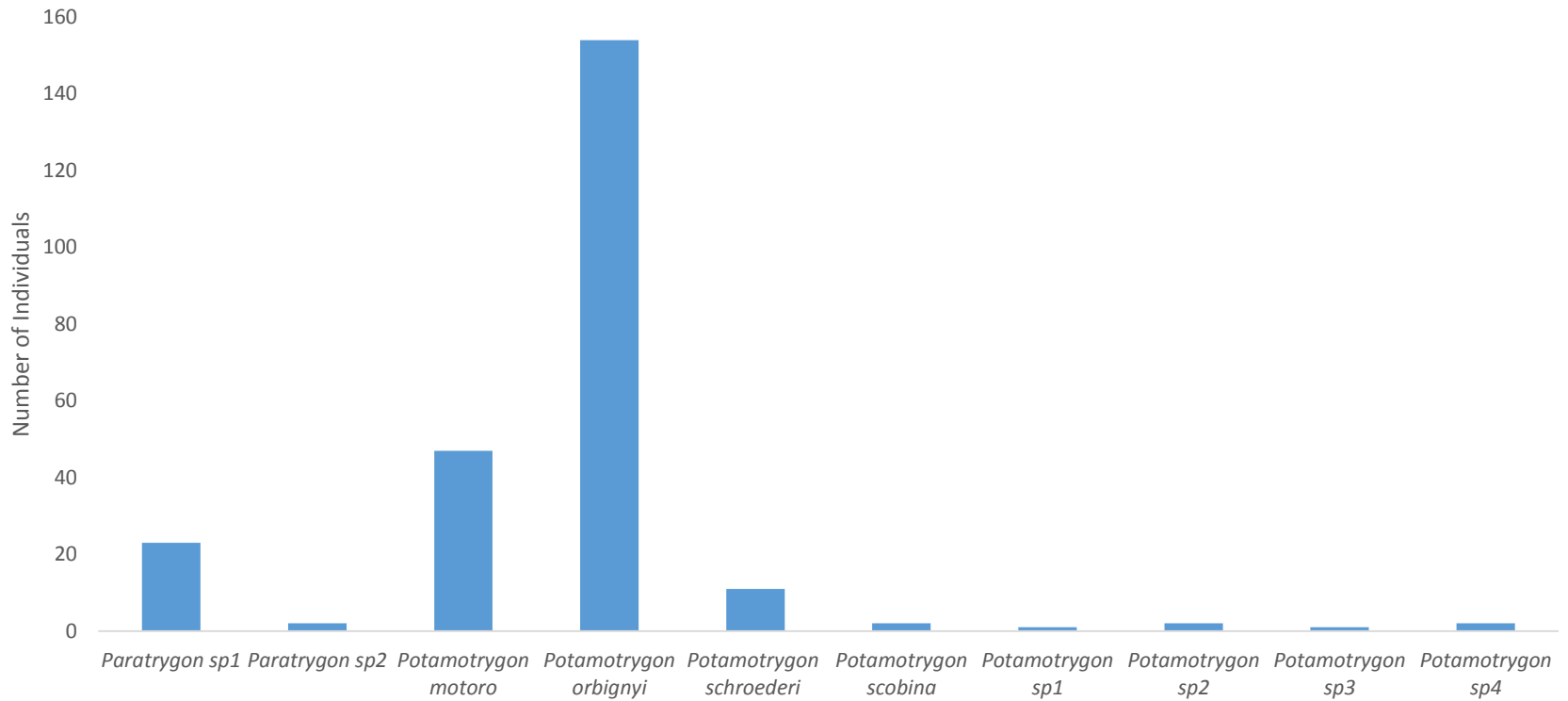
Hand nets



Harpoon



245 rays were collected

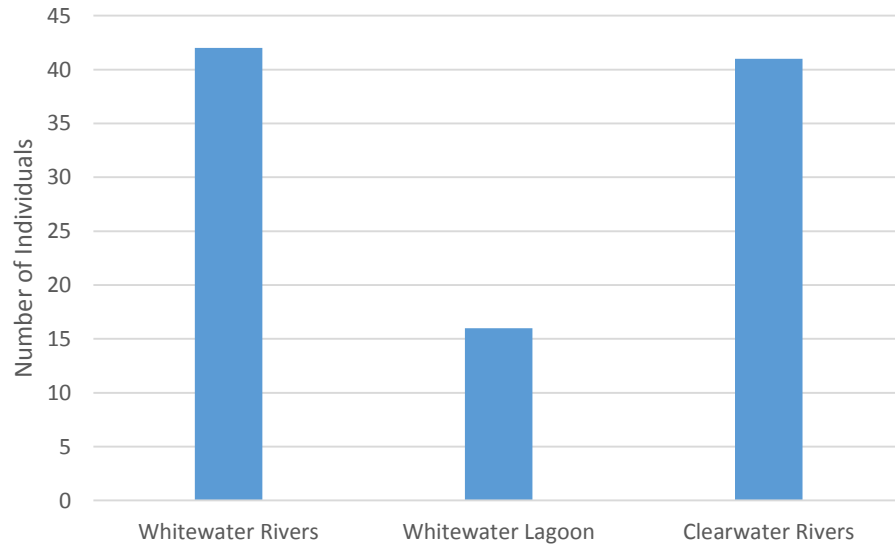


# *Potamotrygon orbignyi*

(raya tigrita, raya pintada, raya común)



## Habitat and Behavior



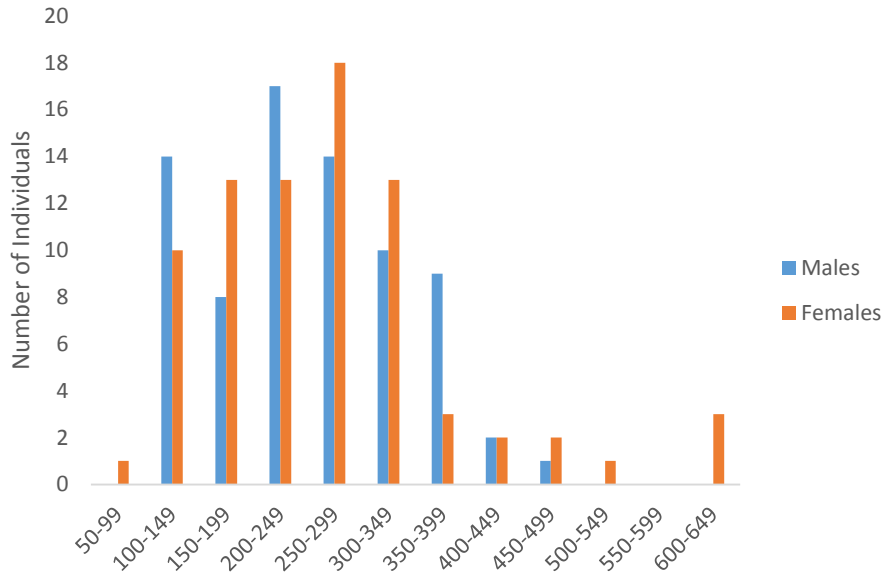
- ✓ Found in all water types.
- ✓ Usually diurnal but with some nocturnal activity.

# Species complexes

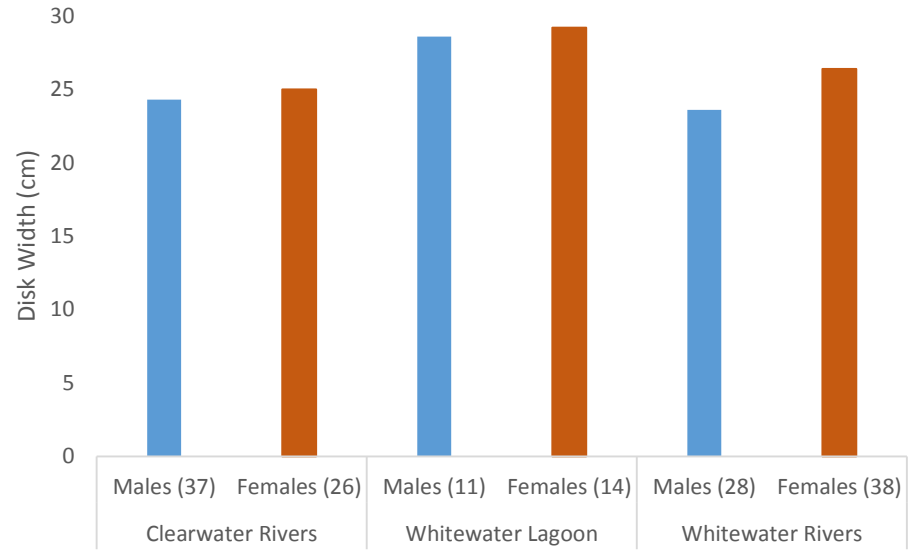
- ✓ The wide distribution of this species, associated with different types of waters and bottoms, is surely reflected in the different coloration patterns that can be found.
- ✓ According to preliminary results of molecular studies of this species, we can say that we are talking about a complex of cryptic species.



# Length-Weight



Sizes (disk width cm) for males and females of *Potamotrygon orbignyi*



Average disk width by sex, by water type



## Maximum size:

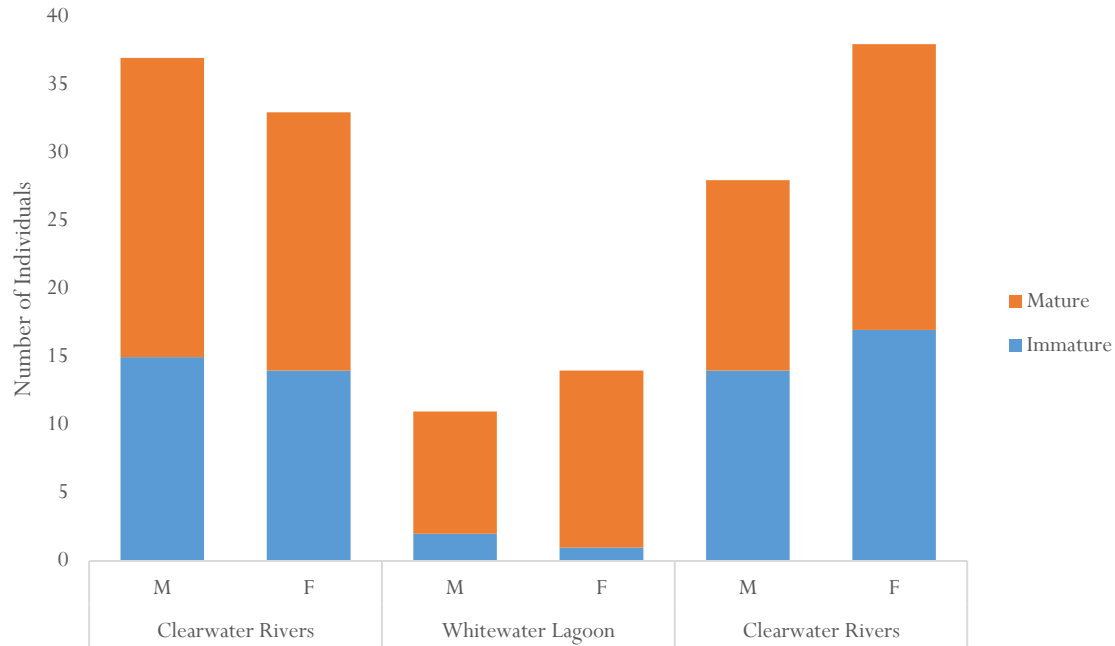
Female: 64 cm & 12.5 kg (Orinoco River)

Male: 49 cm DW & 5.4 kg (floodplain lagoon)

## Smallest size:

Female: 8 cm DW collected in 30 cm depth from a clear water stream with no flow.





Number of individuals by sex and maturity status of *Potamotrygon orbignyi* differentiated by systems.

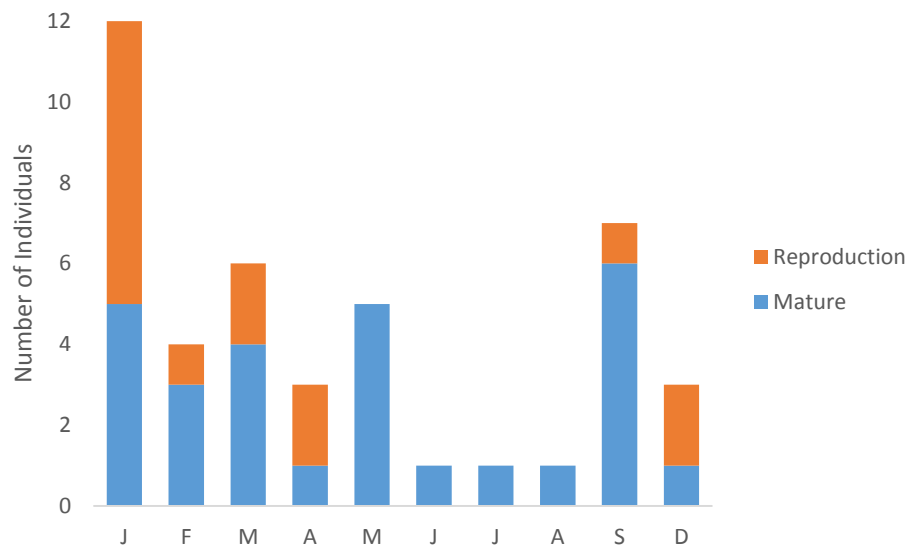
- ✓ The sex ration in all systems was 1:1
- ✓ Mature and immature animals in the same proportion



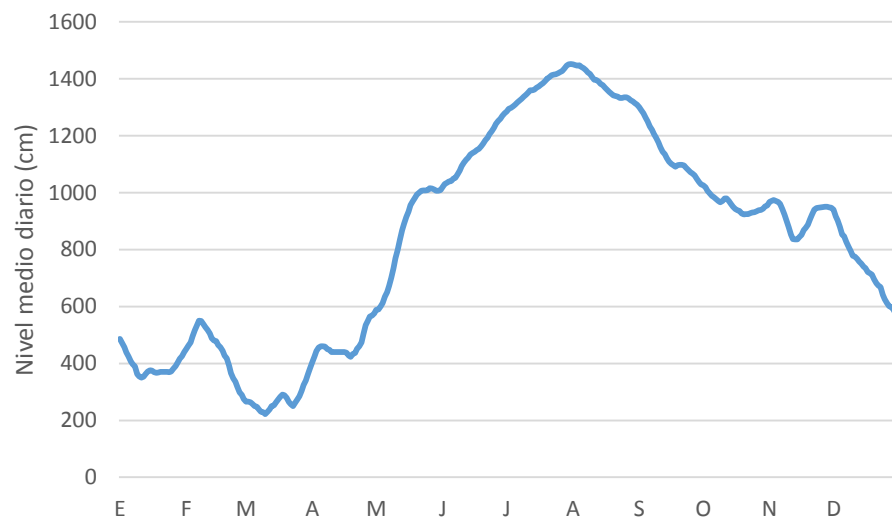
# Reproduction

54 sexually mature females were caught, of which 16 (30%) had evident signs of reproduction:

- 11 with just fetuses (1-5)
- 2 with fetuses and ovules
- 3 with just ovules (1-4 which were of different sizes in the same stingray)



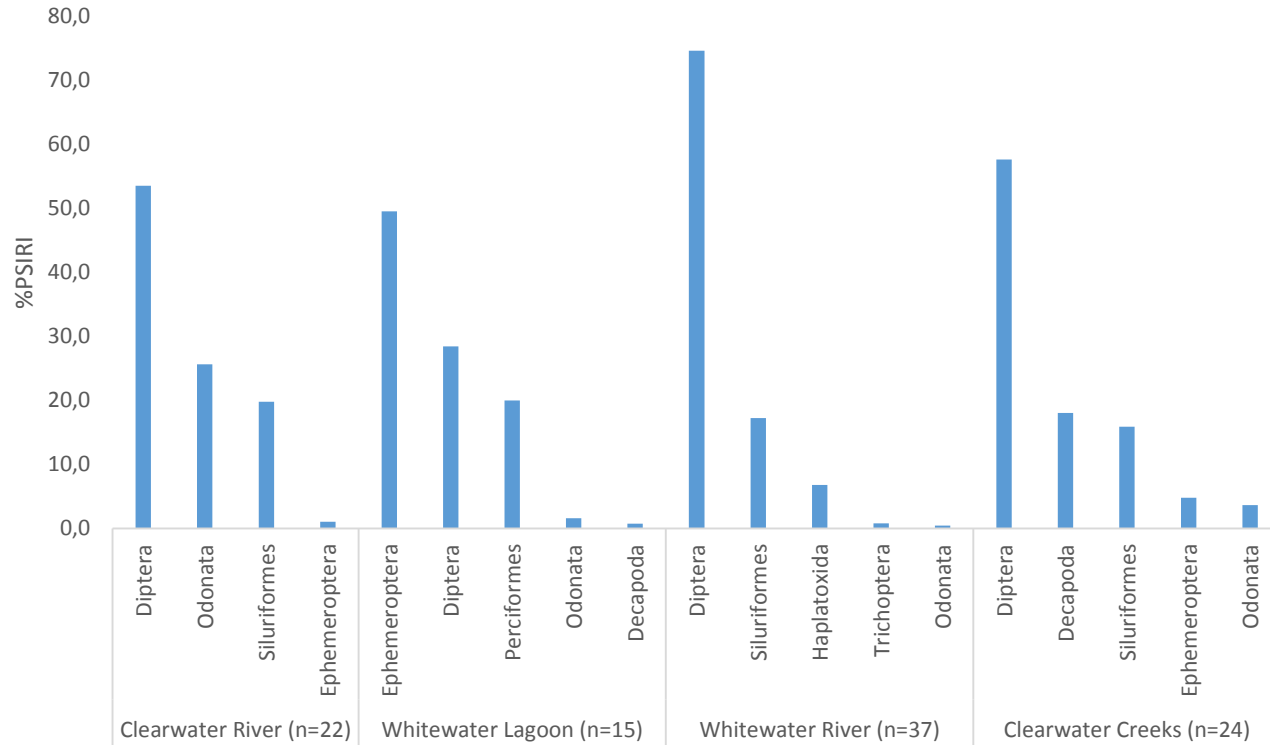
Seasonality and relationship of mature and reproducing females of *Potamotrygon orbignyi*.



Water level of the Orinoco river by month

During the rising water phase and high water phase of May through August, no animals were captured in breeding condition

# Feeding habits Carnivore-Insects

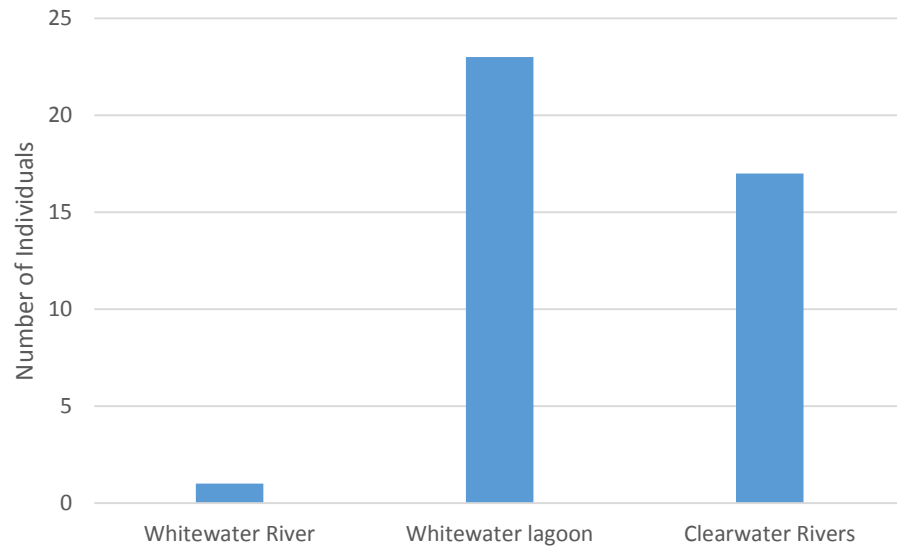


Specific prey index relative importance by habitat (%PSIIR)

The trophic categories were similar between the localities and we observed a preference for Dipteran larvae, except in the floodplain lagoon where the dominant trophic category was Ephemeroptera, followed by Diptera.

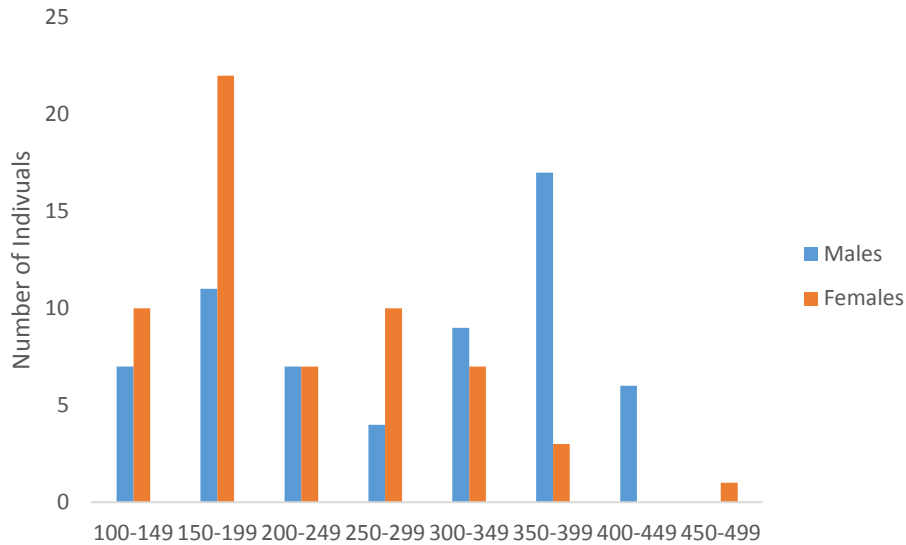
*Potamotrygon motoro*  
(raya motoro)

**Habitat and Behavior**

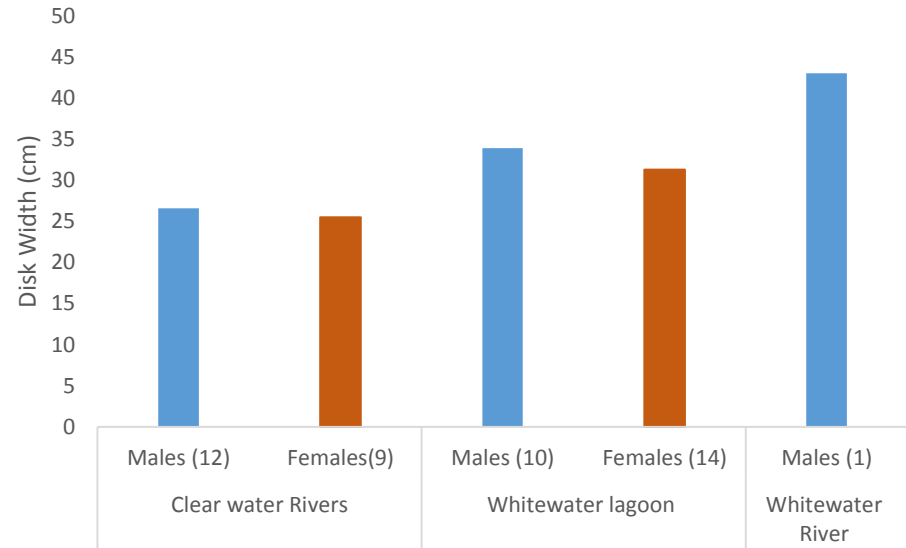


- ✓ Found in all habitats, more abundant in floodplain lagoon.
- ✓ This species is mostly nocturnal, during the day they rest in deep areas or shaded spots. During the night they move to shallow areas to feed.

# Length-Weight



Length distribution (disk width cm) for males & females of *Potamotrygon motoro*



Average size (disk width cm) by sex by system

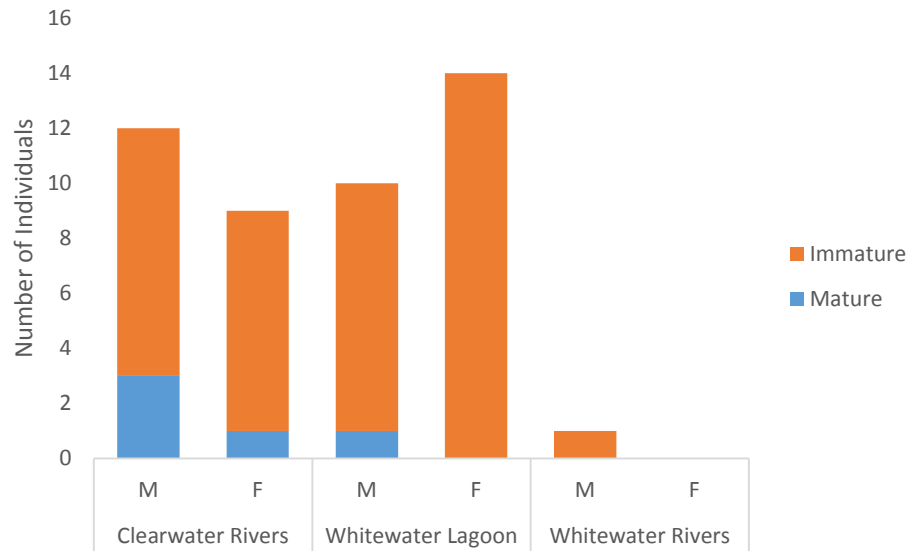


## Maximum size:

- Female 47 cm & 4.8 kg (whitewater floodwater lagoon)
- Male 43 cm & 4.2 kg (whitewater river)

## Smallest size:

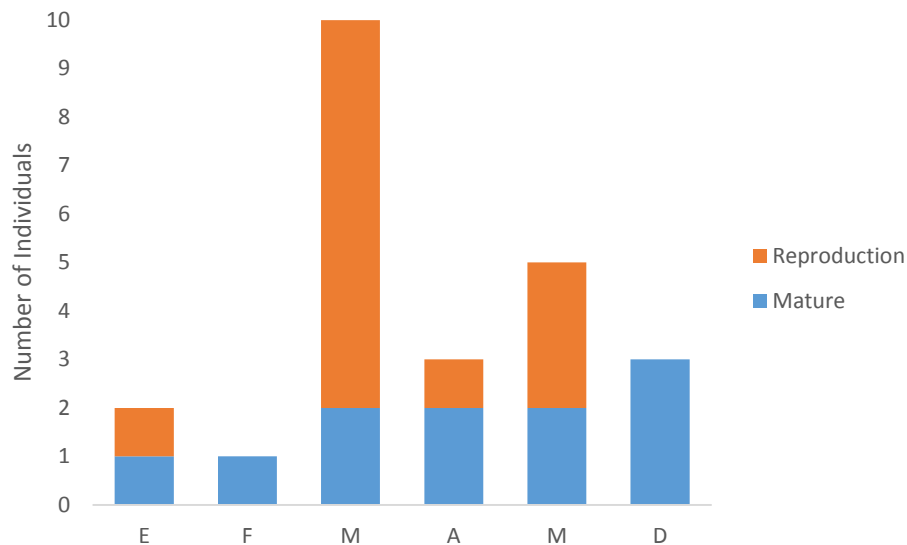
- Female 14 cm & 0.15 kg (clear water river)



Number of individuals by sex and maturity status for *Potamotrygon motoro* in different habitats.

- ✓ The sex ratio tended towards 1:1.
- ✓ Majority of captured individuals were juveniles.

# Reproduction



Seasonality and percent mature females for *Potamotrygon motoro*.



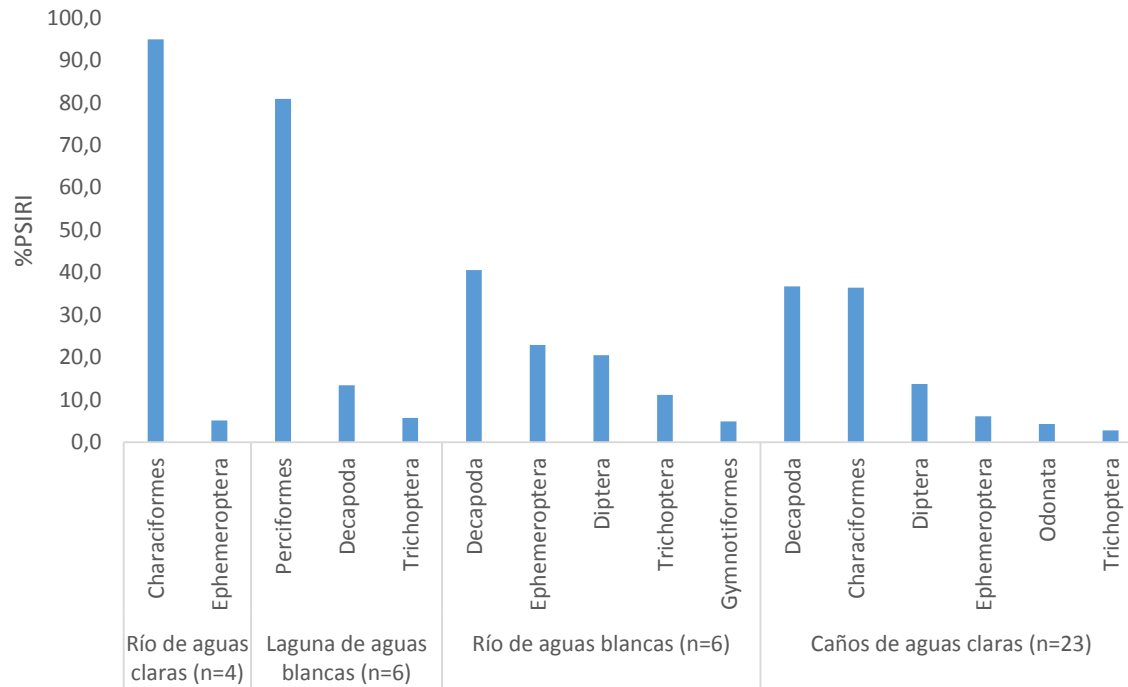
26 females were captured, of which 24 (92.3%) were mature, and of these 10 showed signs of reproduction:

- 6 had from 1-7 fetuses
- 2 had fetuses and ovules
- 2 had just ovules: 1-3 per female in different stages of development.

✓ This species reproduces during the entire dry season and the start of the rainy season.

# Feeding habits

Carnivore: fish, shrimp and insect



Relative importance specific prey index of by habitat (%PSIIR)

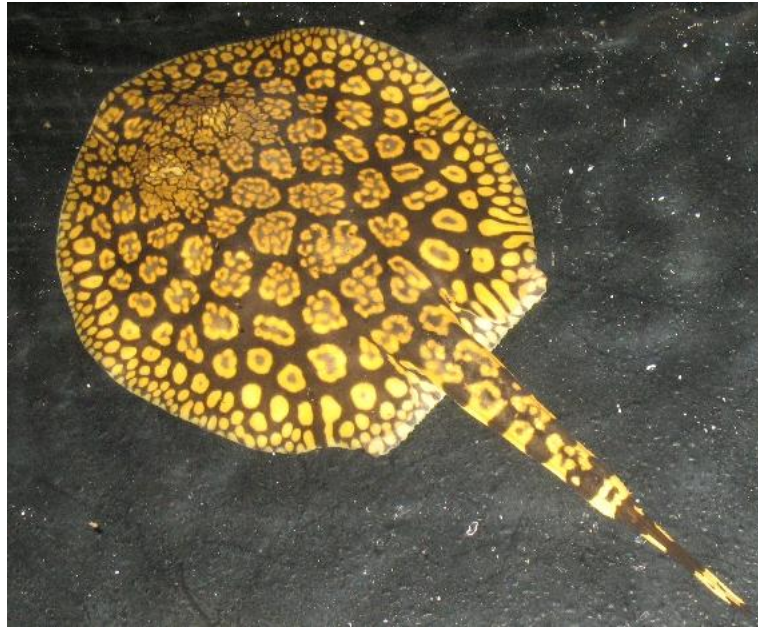
- ✓ The foods consumed varied in number and composition among the different sites samples, showing a wider variety of items consumed in the whitewater river and clear water creeks.





## *Potamotrygon schroederi*

(guacamaya, raya trébol)



### Habitat and Behavior

- ✓ Ninety percent of the captures were at night, when the rays were in places with more current, associated with beaches and the bottom of the principal river channel in the clear water rivers.
- ✓ None were captured in the floodplain lagoon.

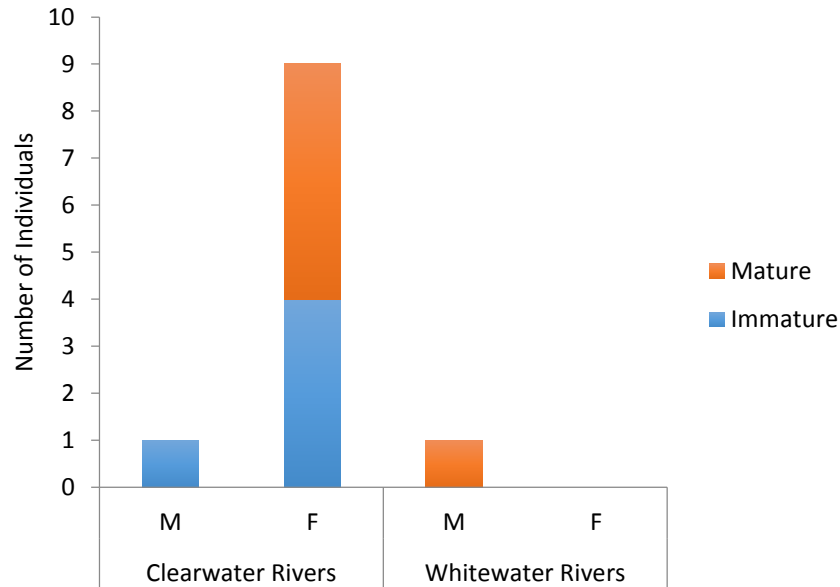
# Length-Weight

Maximum size:

- Female 58 cm DW & 10.5 kg
- Male 41cm DW& 2.8 kg

Smalles size:

- Male 21 cm & 0.45 kg



✓ Predominance of females (9F : 2M)

Number of individuals by sex and maturity status of *Potamotrygon schroederi* by habitat

# Reproduction

Sexually mature rays smaller than what has been reported in the literature:

## Sizes at Maturity

- Female 25 cm DW & 0.9 kg
- Mache 34 cm DW & 2 kg

## Reported:

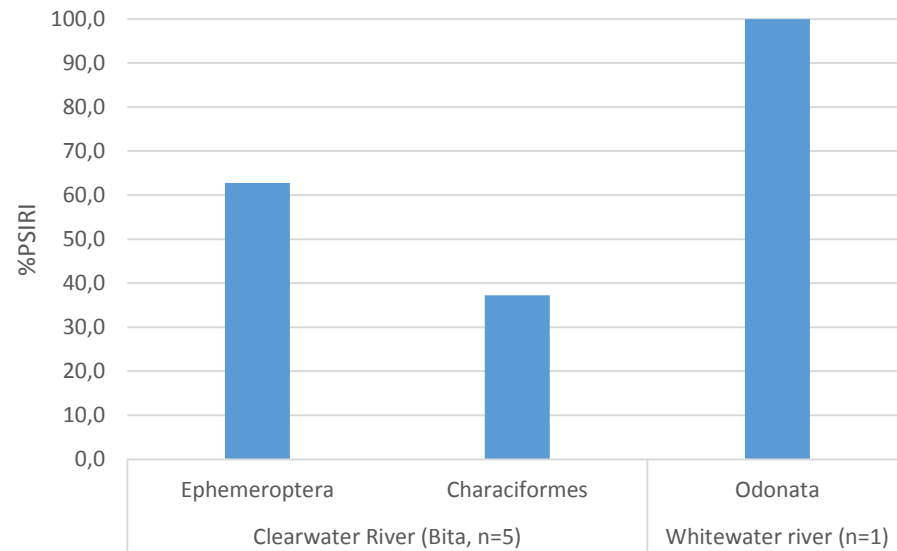
- Female 37 cm DW
- Male 39.5 cm DW

Of the nine females caught:

- 5 were mature
- 3 had evidence of reproduction, with ovules of different sizes (interval: 2-3)
- Captured in March and April (end of dry season, initiation of rains).



# Hábitos alimenticios Carnivore: Insect, fish



Specific prey index of relative importance (%PSIIR) by habitat.



# *Potamotrygon scobina*

(raya punta diamante)



## Habitat and Behavior

This ray seems not to be very common

Only four were caught

- 1 from the Bita River (clearwater)
- 3 from the Orinoco River (whitewater)

➤ 3M :1F

## Length-Weight

Females

- 1 adult, 43.5 cm DW & 4 kg

Males

- 1 juvenile: 26 cm DW & 3 kg
- 2 adults: 45 cm DW & 4 kg  
49 cm DW & 5.6 kg

## Feeding habits Carnivore



Whitewater: Characiformes 100% (n=1)



Clearwater: Ephemeroptera 100% (n=1)

## Unidentified Morphs



These may be new records for the country, as well as species new to science.

## *Paratrygon* spp

- ✓ For the Orinoco River Basin *Paratrygon aiereba* has been reported.
- ✓ But the true *P. aiereba* is not present in the Orinoco, instead there are two new species currently being described Loboda *et al.* (In preparation)

*Paratrygon* sp 1



- Fleshy button on the blowhole present
- Larger size
- Longer tail

*Paratrygon* sp 2



- No fleshy button on the blowhole
- Smaller size
- Shorter tail

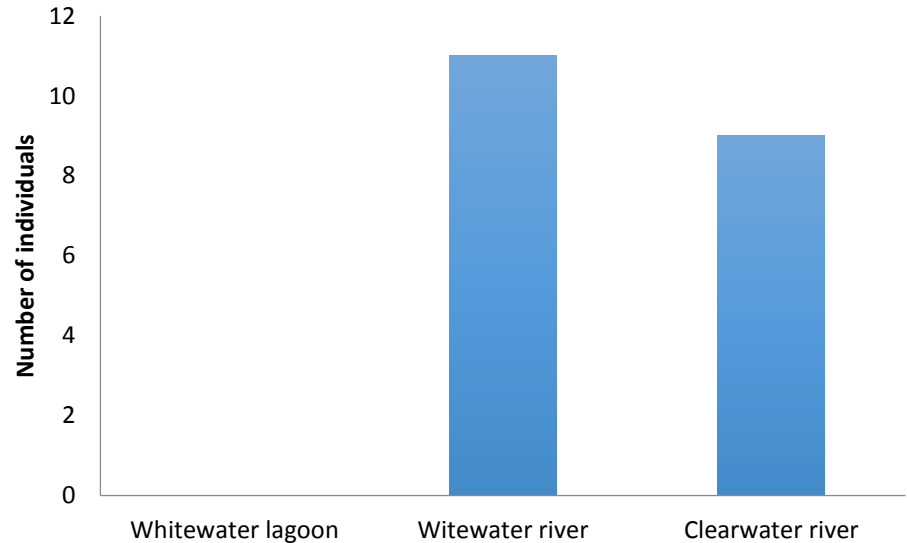




# *Paratrygon* sp 1

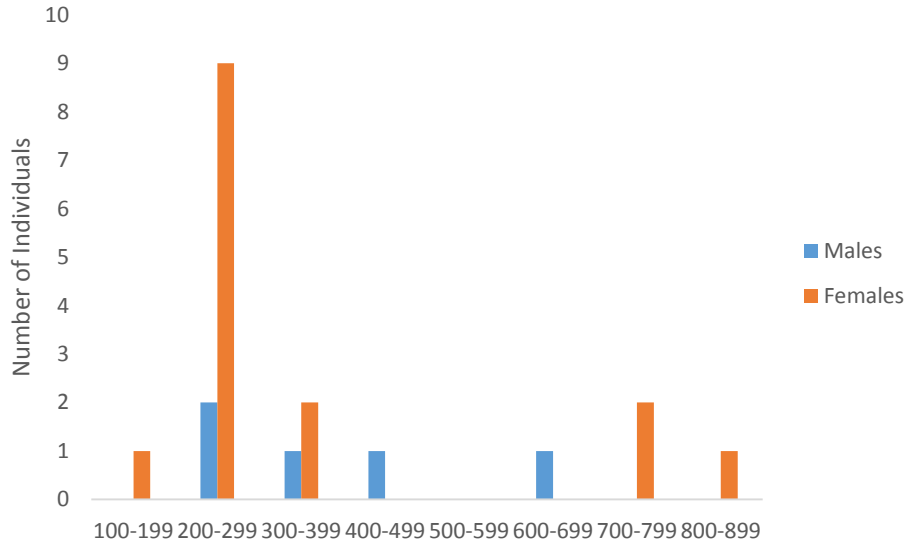
(*Raya manta*)

## Habitat and Behavior



- ✓ 58% of the records are from whitewaters, and 42% from clearwater. None were captured in the whitewater lagoon.
- ✓ A diurnal species with activity peak at dawn and dusk.
- ✓ At night they rest along shore and shallow areas of large rivers.

# Length-Weight



Sizes (disk width cm) for males and females of *Paratrygon* sp1

## Maximum size:

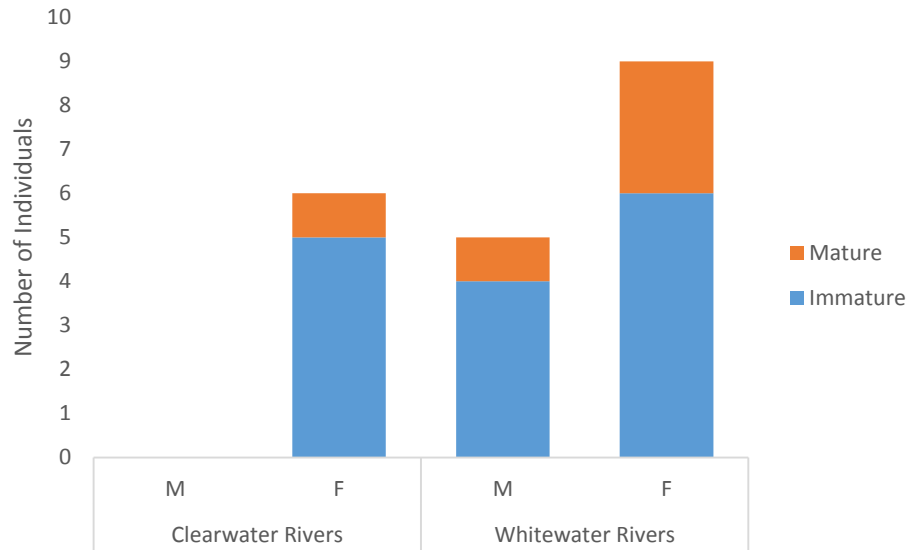
- Female 80 cm DW & 28 kg
- Male 65 cm DW & 10.6 kg

## Smalles size:

- Female 17.7 cm DW



✓ Two individuals (25 & 20 cm DW) still had umbilical scars visible



Number of individuals by sex and maturity of *Paratrygon* sp 1 by habitat

## Size at sexual maturity ??

Since this species is new to science, there are no records of its size at sexual maturity.

Female:

- Immature 36 cm DW
- Mature 39 cm DW



Maturity must be reached at some point between those values

Male:

- Immature 43 cm DW
- Mature 57 cm DW



# Reproduction

Of the 15 females captured, four were mature, and of those three showed signs of reproduction:

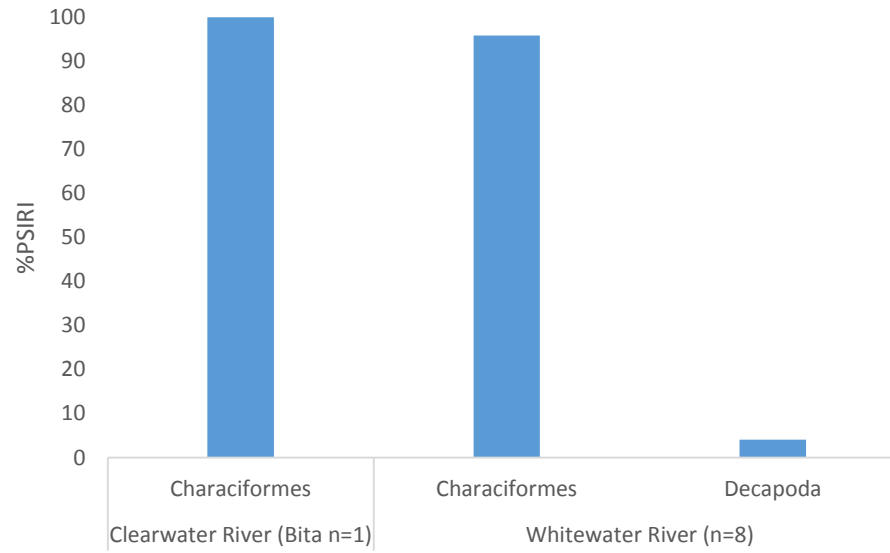
- 1 with 2 fetus
- 2 with ovules

The three females with signs of reproduction were captured in December, January and March (low water, dry season)



# Feeding Habits

Carnivore: fish, shrimp



Specific Prey Index Relative Importance (%PSIIR) by Habitat



*Paratrygon* sp 2  
(raya manzana)



### Habitat and Behavior

- ✓ This species was found to have a preference for habitats of larger size, and was most abundant in white water rivers. Not capture them in the floodplain lagoon, nor in the clear water creeks.
- ✓ At night they rest along shore and in shallow areas of larger rivers.

## Length-Weight

Maximum size:

- Female 76 cm DW & 40 kg
- Male 43.8 cm DW & 2.5 kg

Smallest size:

- Female 21 cm DWAD & 0.5 kg

## Size at sexual maturity???:

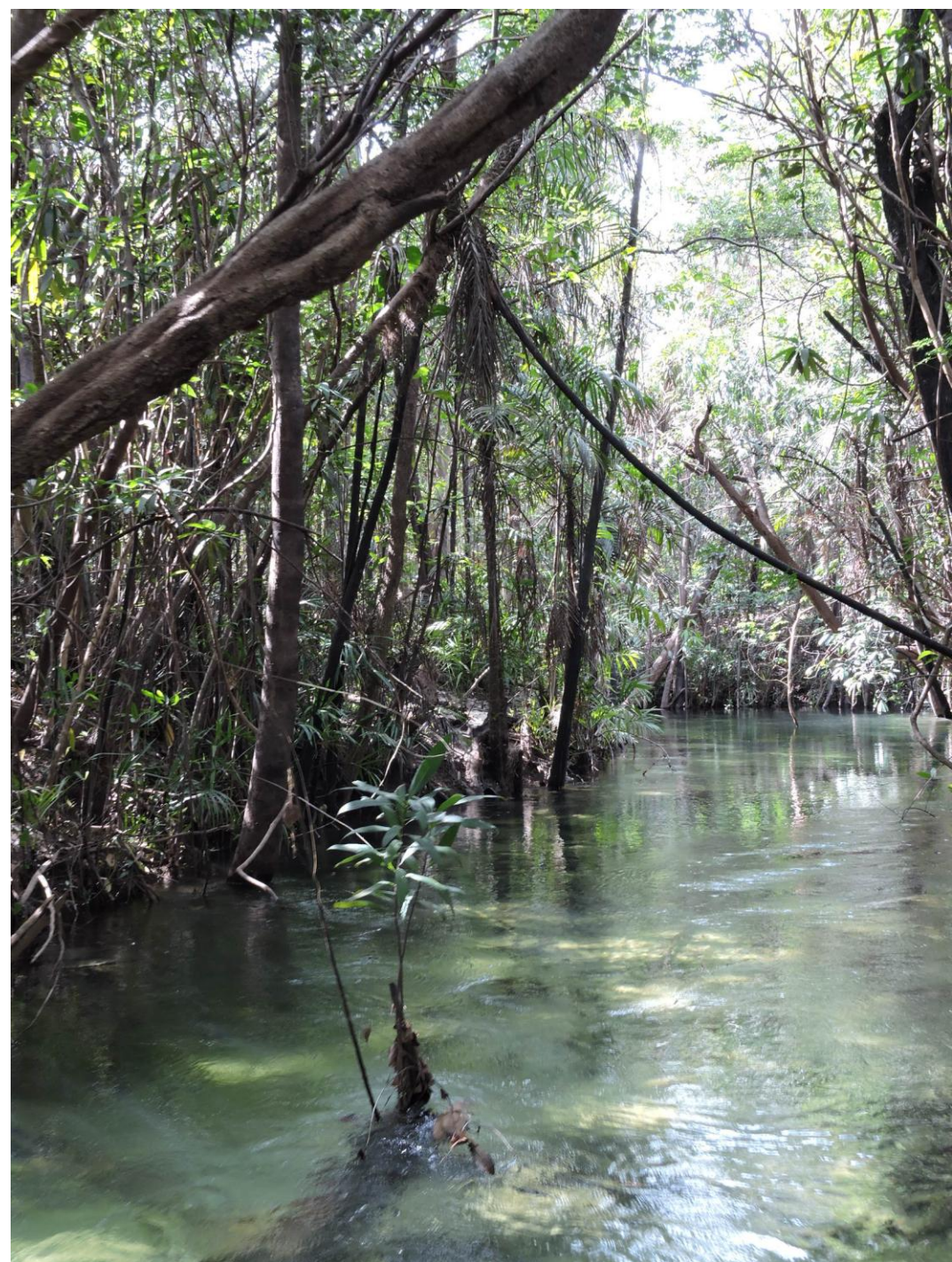
Female:

- Immature 36.5 cm DW
- Mature 50 cm DW

Maturity must occur between those values

Male:

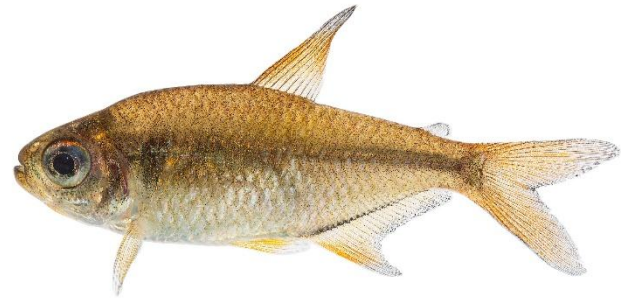
- Immature 38 cm DW
- Mature 40 cm DW



**Feeding habits**    Carnivore



Whitewater (n=1) 100% Decapoda



Clearwater (n=4) 100% Characiformes



- ✓ In conclusion, we can say that the Colombian Orinoco River Basin has elevated species richness of freshwater stingrays, and it is clear that many areas remain unexplored, with possibly more species waiting to be discovered.
- ✓ Our results describe details of their habitat, size at sexual maturity, fecundity and feeding habits that will serve as basic information for the management and sustainable use of these species subject to the ornamental fishery.



**Many thanks!!!**

