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**Hari Prasad**

Department of Fisheries  
Resource Management, College  
of Fisheries, Junagadh  
Agricultural University, Veraval,  
Gujarat, India

**AY Desai**

Principal and Dean, College of  
Fisheries, Junagadh Agricultural  
University, Veraval, Gujarat,  
India

**Ayushi Jogi**

College of Fisheries, Chhattisgarh  
Kamdhenu Vishavavidyalay,  
Kawardha, Chhattisgarh, India

**Corresponding Author:****Hari Prasad**

Department of Fisheries  
Resource Management, College  
of Fisheries, Junagadh  
Agricultural University, Veraval,  
Gujarat, India

## Morphometric and meristic characters of *Wallago attu* from bhadar reservoir of Gujarat, India

**Hari Prasad, AY Desai and Ayushi Jogi**

**Abstract**

The Morphometric measurements of *Wallago attu* presented in the Table 1 which depicts that total length  $63.83 \pm 1.08$  and total standard length  $59.35 \pm 1.28$  in cm. The correlation coefficient ( $r$ ) was minimum 0.256, 0.476 and 0.486 in caudal length, anal fin length, and dorsal fin length respectively. Whereas it was maximum 0.707, 0.666 and 0.602 in total length, standard length and head length for the *W. attu*. The regression coefficient ( $b$ ) was also observed and it was minimum 0.814 in eye dia and maximum 59.53 in total length of *W. attu*. The value of 'b' was shows negative allometric growth ( $b < 3.0$ ), positive allometric growth ( $b > 3.0$ ) and isometric growth ( $b = 3.0$ ) hence, current study shows that other morphometric parameters with total length shows positive allometric growth for *W. attu*. Meristic counts also show dorsal fin ray 6, pectoral fin ray 16, anal fin ray 93, pelvic fin ray 12, caudal fin ray 18 and two pairs of barbules.

**Keywords:** *Wallago attu*, morphometric and meristic characters, bhadar reservoir

**1. Introduction**

The Asian silurid catfish, *Wallago attu* also known as the 'Asian sheat catfish' or the 'freshwater shark' is one of the twenty mega fishes on Earth (Rufus *et al.*, 2015) <sup>[1]</sup>. *Wallago attu* belongs to family siluridae and live in fresh water such as India, Pakistan, Burma and East Indian Archipelago. The genus *Wallago* was first time described in 1851. There are three species of genus *Wallago* known to occur in Indian region viz. The abundance of benthic organisms as well as weed fishes in the beel might have favoured the dominance of *W. attu* among the catfishes (Goswami and Devaraj, 1992) <sup>[2]</sup>.

The species of *Wallago attu* was first described by Schneider as *Silurus attu*. Srivastava. *Wallago attu* is commonly called as Padhani or Barari.

**2. Conservation status****2.1 Lower Risk near Threatened**

In *Wallago attu* male and female sexual dimorphism in all stages and in all seasons can be easily marked from the structure of the pectoral spine, which is well developed, broad and strongly denticulated in male while weakly developed, narrow and feebly serrated in female. It breeds once in a year in monsoon during May-August with a peak in June-July in the eastern states, July in Punjab, June-September with a peak at July-August in Uttar Pradesh, June-August in north western states, July-August in the upper river part of the Tungabhadra reservoir in India (Hossain *et al.*, 2008) <sup>[3]</sup>.

The morphological studies, taxonomy, population structure, reproduction traits, growth and mortality and feeding habits (Vatandoust, *et al.*, 2014) <sup>[4]</sup>. For morphological study, morphometric (referring to measurable structures such as fin length, head length, eye diameter, or ratios between such measurements) and meristic (including almost any countable structure, such as fin rays, scales and gill rakers) characters are used (González, *et al.*, 2016) <sup>[5]</sup>.

In fish, identification may be determined based on two factors which are morphometric and meristic characters. Mostly the morphometric means of determining the growth rate of the fish is carried out by measuring some parts of the physiological structures of the fishes, while meristic is determined by performing some numerical counts on the fish in order to determine the species and class of the fish (Lekki and 2014) <sup>[6]</sup>.

The objective of the present study is to describe the morphometric and meristic characteristics and identify the main factors that threaten the species and making suggestions for its conservation strategies for the protection (Hossain, *et al.*, 2019) <sup>[7]</sup>.

There are numerous characters available for morphological study. These characters are most commonly divided in to two categories:

- **Morphometric:** characters refer to measurable structures such as fin length, head length, eye diameter, or ratios between such measurements.
- **Meristic** characters include almost any countable structure, including fin rays, scales, gill rakers, and so on (Safi, A., 2014) [8].

### 3. Materials and Methods

#### 3.1 Common name

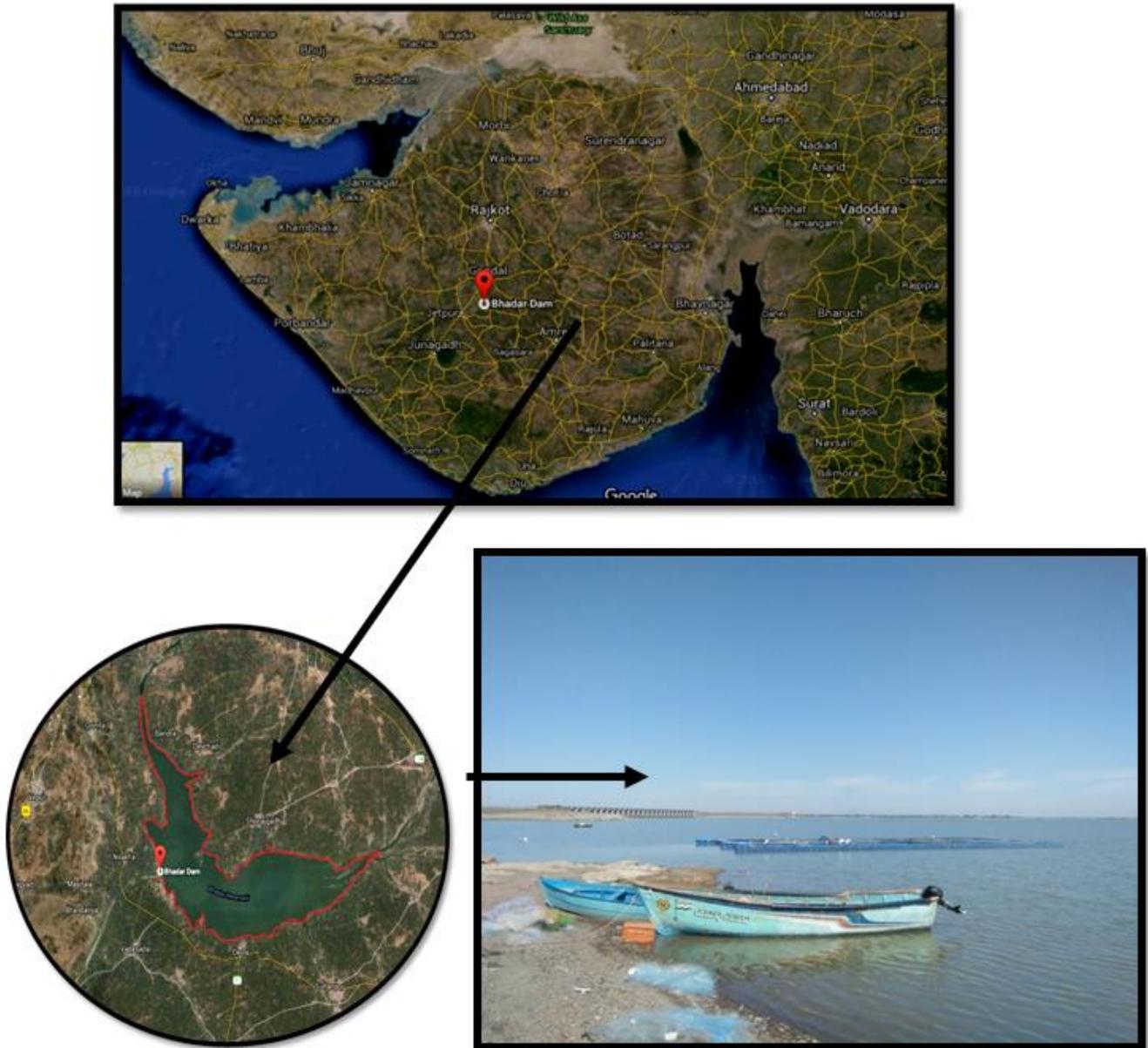
Boal, Boali, Boallee, Barhari, Poil and Baralie in India

#### 3.2 Fin Formula

D.5; P15 (11/4); V.10; A.91 (4/87); C.17; Barbles two pairs (Dahire, 2008) [9].

#### 3.3 Location

The present study is conducted at Bhadar reservoir landed of Rajkot district (Saurashtra region (22°30'N 70°78'33"E) in Gujarat, India. Bhadar reservoir (site) is located at 21°76'28"N 70°42'37" E near Bhukhi village Dhoraji Taluka of Rajkot district.



**Plate 1:** Satellite Images of Study Site and Inner View of Bhadar- Reservoir.

#### 3.4. Year and Season of Experiment

July 2018 to February 2019.

#### 3.5. Sampling Process

Data collected from the sites at every 1 month interval.

#### 3.6. Design and Method

Fish samples were collected from different selected localities

by random sampling method. Samples were brought to college of Fisheries, Veraval and clean thoroughly.

### 4. Methodology

*Wallago attu* fishes were collected from selected site of reservoir. The fishermen are mainly using gill net for fishing. Photography of fishes was done by using Sony Cyber-shot camera (18.2 Mega Pixels) at site. Fish samples were brought

to college of Fisheries, Veraval and used 5% formalin solution in specimen jar according to the size of species. The samples were identified with the help of literature.

## 5. Morphometric and other analysis of fish body

### 1. Total length

It is the distance between the anterior most extremity of the body (tip of snout or the upper lip and the posterior most boundary of the body) i.e. the tip of the caudal fin lobe. The angle of the longest lobe if the caudal fin is forked and has unequal lobes.

### 2. Head length

It is the space in a straight line between the anterior most part of the snout or the upper lip, whichever is extending farthest forward, and the posterior most edge of the opercula bone.

### 3. Snout length

It is the space in a straight line between the anterior most part of the snout or the upper lip whichever is extending farthest forward and the anterior margin of the orbit.

### 4. Post orbital length

It is the space in a straight line between the posterior margin of the orbit and the posterior most edge of the opercula bone.

### 5. Upper jaw length

It is the greatest span of the upper jaw.

### 6. Lower jaw length

It is the greatest length of lower jaw.

### 7. Eye length/ diameter

It is the distance between the front and rear margin of the eye.

### 8. Pre dorsal length

It is the space between the anterior most end of the body and the front end of the dorsal fin base.

### 9. Pre pectoral length

It is the distance between the anterior most end of the body and the front position of the pectoral fin base.

### 10. Pre anal length

It is the distance between the anterior most end of the body and the front point of the anal fin base.

### 11. Length of the caudal peduncle

It is the space between the rear point of the anal fin base and the base of the caudal fin.



Plate 2: External Measurements of fish body

Morphometric measurement (TL – Total Length; FL - Fork length ; SL - Standard length ; PPL – Pre pectoral length; PPLL - Pre pelvic length ; PDL - Pre dorsal length ; PAL - Pre anal length ; PL - Pectoral fin length ; LD - Dorsal fin length; LA – Anal fin length; LC - Caudal fin length; LAD - Adipose fin length; D – Depth; LWCP - Least width of caudal peduncle; PRO - Pre orbital (Snout length); POO - Post orbital length; LD - Dorsal fin length ; HL - Head length

## 6. Results and Discussions

### 6.1. Morphometric Measurements

The morphometric measurements of *W. attu* presented in the Table No 1 which depicts that total length  $63.83 \pm 1.08$  and total standard length  $59.35 \pm 1.28$  in cm. The total length (Independent variable) was kept on x-axis while other morphometric parameter (dependent variable) on y-axis and it was observed that significant correlations exist in standard length-total length (SL-TL), fork length-total length (FL-TL),

head length-total length (HL-TL), eye diameter-total length (ED-TL), dorsal fin length-total length (DL-TL), pectoral fin length-total length (PL-TL), pelvic fin length-total length (PvL-TL), anal fin length-total length (AL-TL) body depth-total length (BD-TL) and caudal fin length-total length (CL-TL). The correlation coefficient (r) was minimum 0.256, 0.476 and 0.486 in caudal length, anal fin length, and dorsal fin length respectively. Whereas it was maximum 0.707, 0.666 and 0.602 in total length, standard length and head length for the *W. attu* (Table No 2. Fig 1; 2; 3).

The regression coefficient (b) was also observed and it was minimum 0.814 in eye diameter and maximum 59.53 in total length of *W. attu*. The value of 'b' shows negative allometric growth ( $b < 3.0$ ), positive allometric growth ( $b > 3.0$ ) and isometric growth ( $b = 3.0$ ) hence, current study shows that other morphometric parameters with total length shows positive allometric growth for *W. attu*. (Table No 2 & Fig 5; 6; 7; 8; 9; 10; 11; 12; 13; 14; 15).

**Table 1:** Morphometric measurements (cm) of *W. attu*

Measurement	Mean	SD	SE	Max.	Min.	Range	COV
Total length	63.83	13.52	1.08	80.5	31.8	48.7	0.22
Standard length	59.35	19.28	1.28	103	26	77	0.30
Head length	14.85	5.12	0.34	26	6	20	0.34
Dorsal length	8.13	2.77	0.18	15	5	10	0.34
Pectoral length	7.03	2.64	0.17	16	4	12	0.37
Anal length	35.61	8.80	0.58	50	21	29	0.24
Pelvic length	4.18	1.73	0.11	10	2.3	7.7	0.41
Caudal length	6.51	1.53	0.10	12	4.8	7.2	0.23
Body depth	10.36	4.02	0.26	20	5	15	0.38
Eye dia	0.94	0.22	0.015	1.5	0.6	0.9	0.24
Barbel	16.35	2.65	0.17	23	11	12	0.16

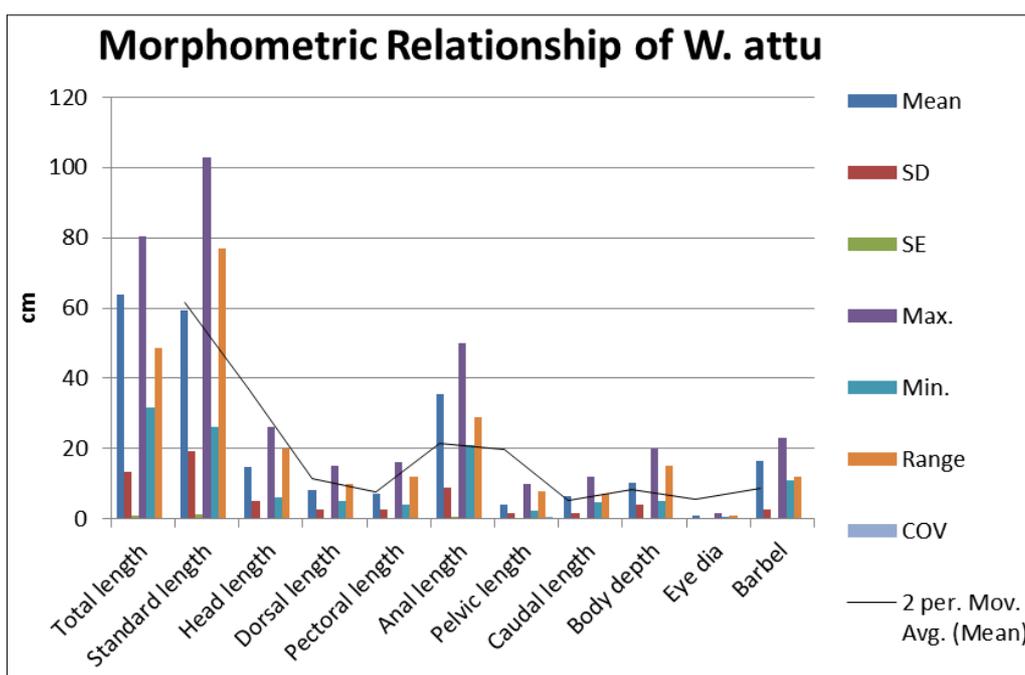
Significant correlation of the morphometric parameters with total length similarly reported by Hossain and Sultana, (2014)<sup>[10]</sup> in Bele, (*Glossogobius giuris*) from Mithamoin haor, Kissorgonj, Bangladesh. A linear relationship was found between total length and morphometric characters and these also showed significant positive correlations between dependent and independent variables.

The examination of morphological characters are especially desirable as two perspectives with which to test phylogenetic hypothesis. The analysis of morphological characters which include the multivariate analysis of external anatomical

characteristics. when attempted to evaluate some meristic and morphometric characters of taxonomic significance in differentiating and revealed fin length as characters of diagnostic significance between the species. Under present investigation subjecting morphologic and their relativity it has been found to have the level of significance in all the morphometric characters. Thus, a critical analysis of the morphometric characters by length-wise comparison was conducted and the level of significant difference between the species was observed in some characters.

**Table 2:** Descriptive statistics and regression parameters (Morphometric Parameters) for *W. attu*

Measurement	<i>W. attu</i>	
	$Y = \text{Log}(a) + b * X$	R
Total length	2.084+59.53	0.707
Standard length	1.977+53.88	0.666
Head length	0.544+12.55	0.602
Dorsal length	0.187+7.177	0.486
Pectoral length	0.252+5.746	0.498
Anal length	2.724+19.95	0.476
Pelvic length	0.386+2.016	0.558
Caudal length	0.659+10.59	0.256
Body depth	0.409+8.258	0.515
Eye dia	0.025+0.814	0.588
Barbel	0.191+15.37	0.607



**Fig 1:** Showing Morphometric Measurements of *W. attu*

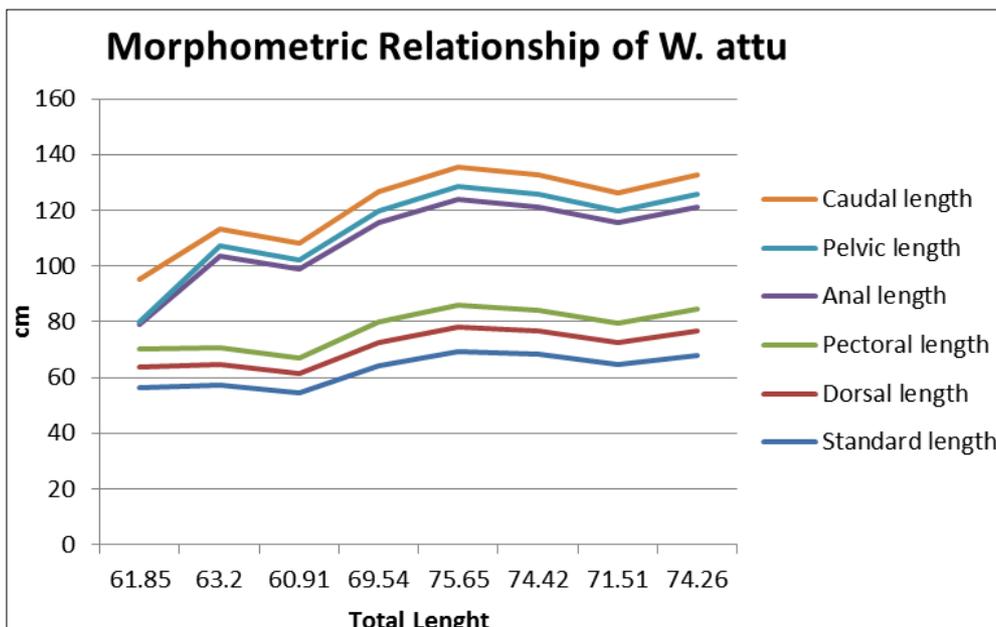


Fig 2: Showing Morphometric Monthly Variation of *W. attu*

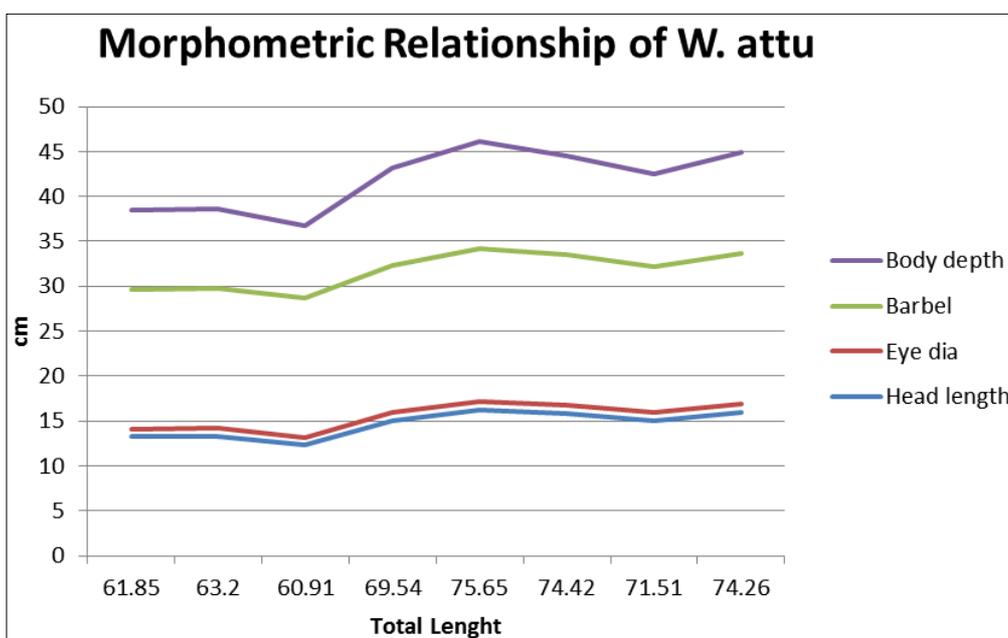


Fig 3: Showing Morphometric Monthly Variation of *W. attu*

Table 3: Meristic counts of *W. attu*

Meristic Counts of <i>W. attu</i>					
Dorsal Fin rays	Pectoral Fin rays	Pelvic fin rays	Anal Fin rays	Caudal Fin rays	Barbles pairs
6	16	12	93	18	2

**6.2. Fin Formula of *W. attu***

**D.6; P16 (11/5); PEL.12; A.91 (6/87); C.18; Barbles two pairs**

Meristic counts also show similarities with existing data provided by (Dahire, 2008) <sup>[11]</sup>. i.e. dorsal fin ray 6, pectoral

fin ray 16, anal fin ray 93, pelvic fin ray 12, caudal fin ray 18 and two pairs of barble (Table No 3). The meristic counts were independent of body size. The correlation between different morphometric measurements of *W. attu* are given in (Fig 4).

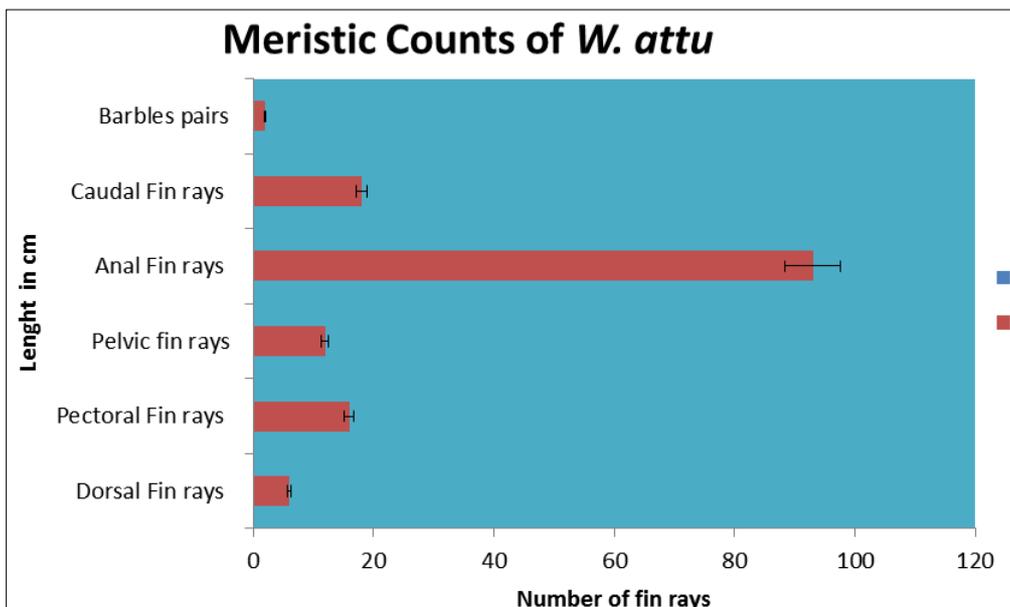


Fig 4: Meristic counts of *W. attu*

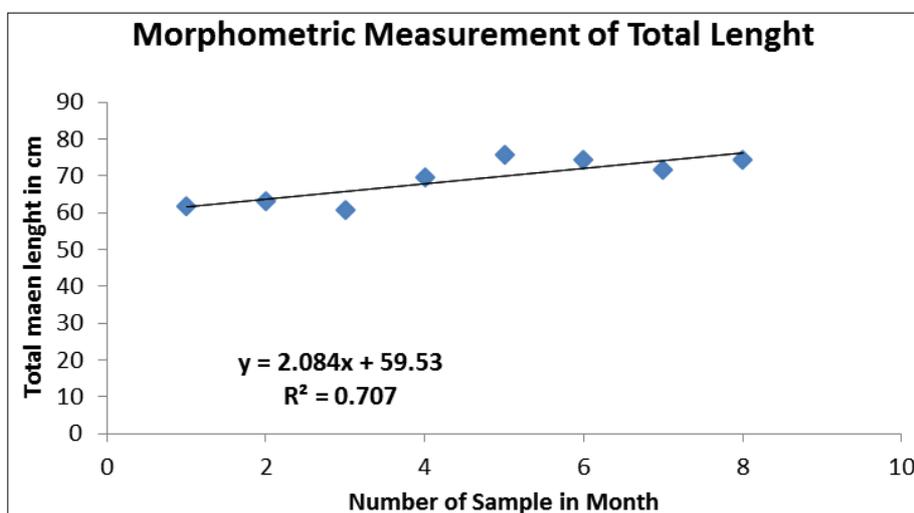


Fig 5: Correlation curve of total length of *W. attu*

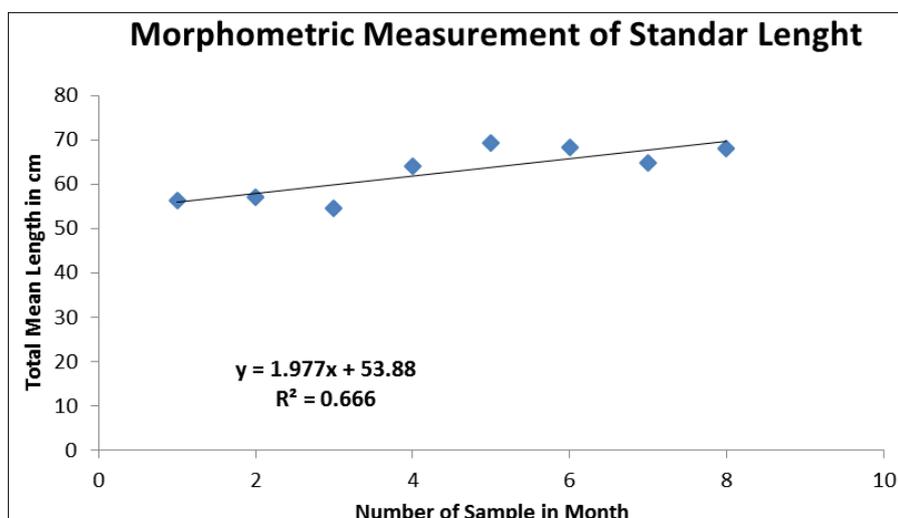


Fig 6: Correlation curve of total length of *W. attu*

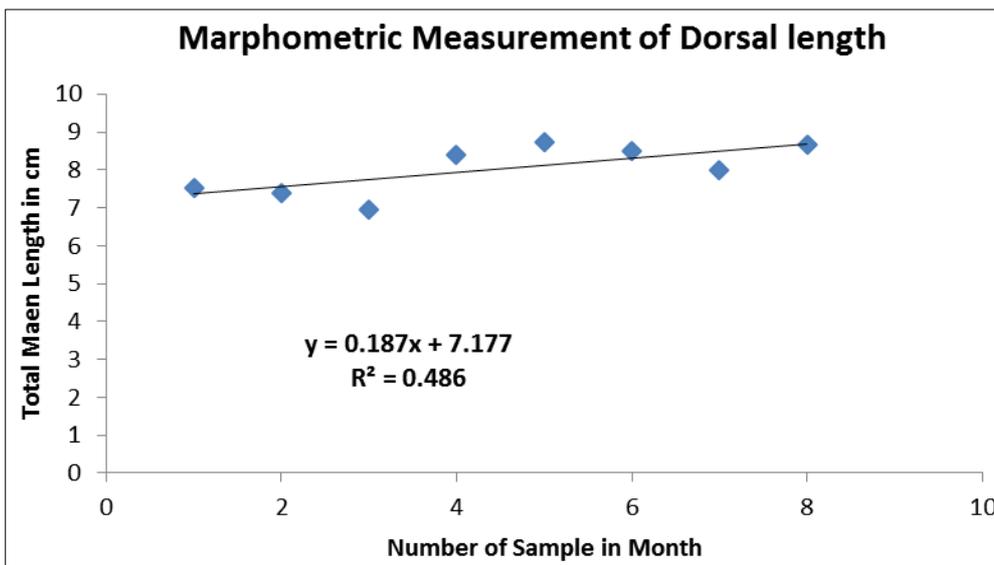


Fig 7: Correlation curve of total length of *W. attu*

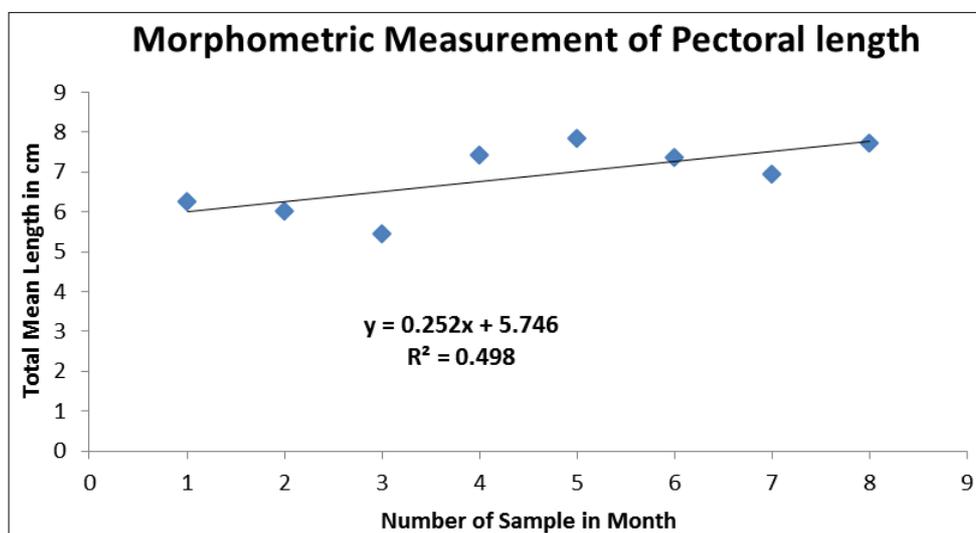


Fig 8: Correlation curve of total length of *W. attu*

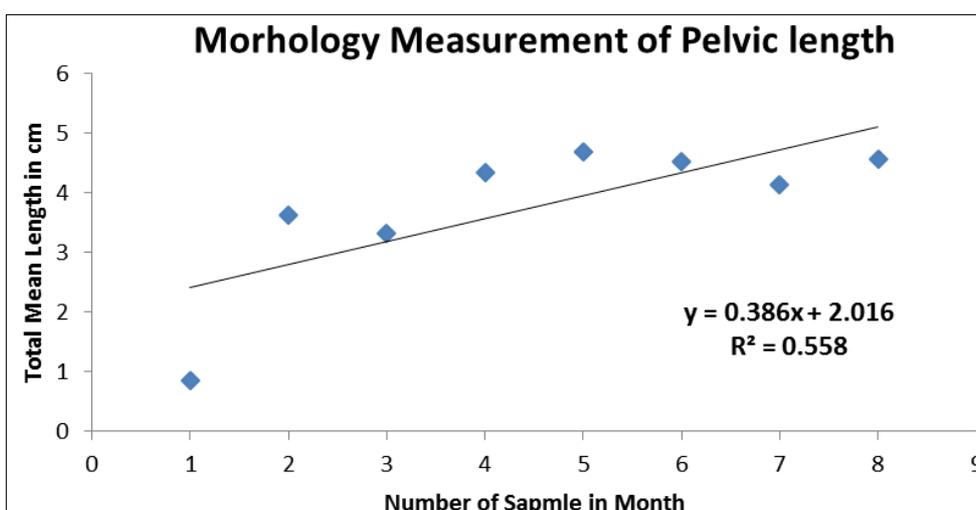


Fig 9: Correlation curve of total length of *W. attu*

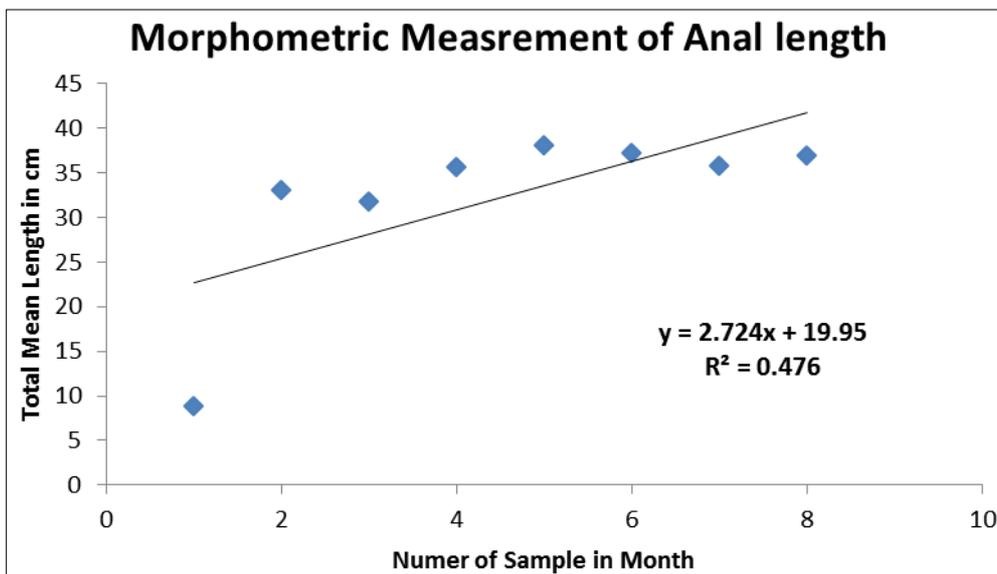


Fig 10: Correlation curve of total length of *W. attu*

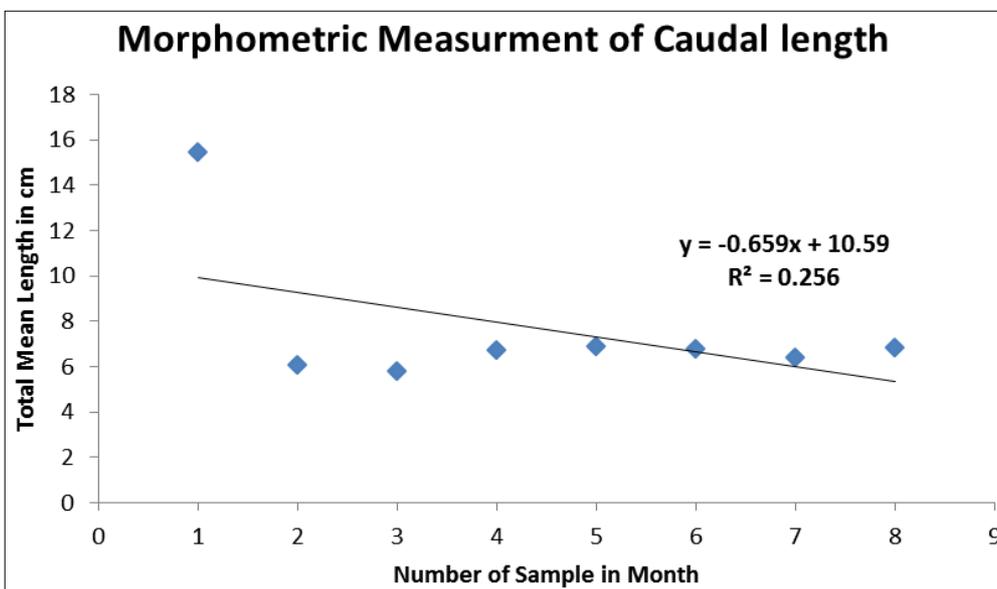


Fig 11: Correlation curve of total length of *W. attu*

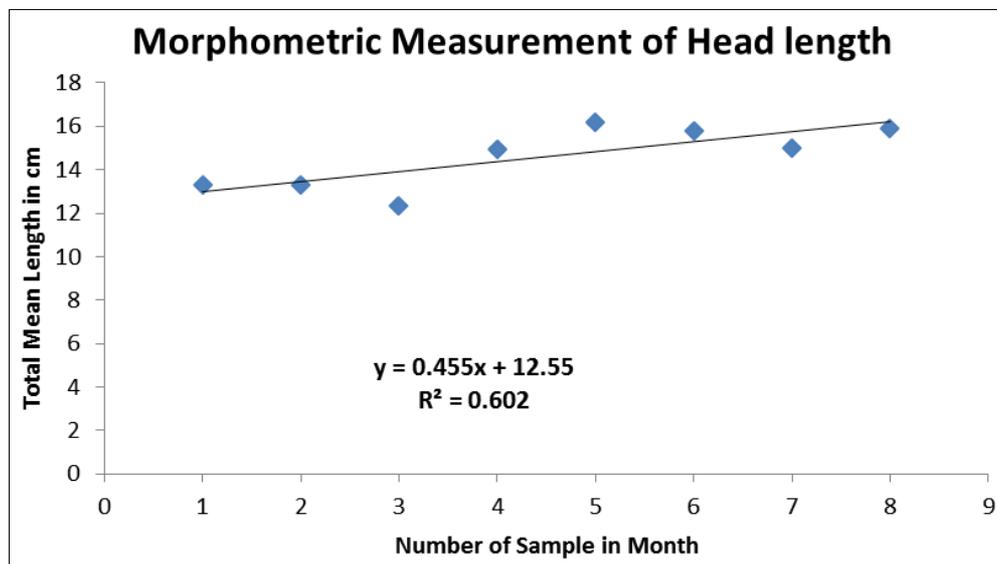
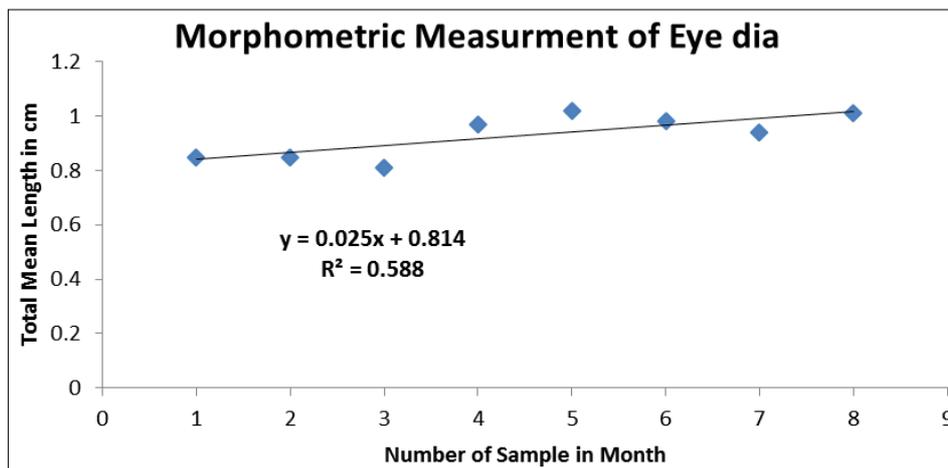
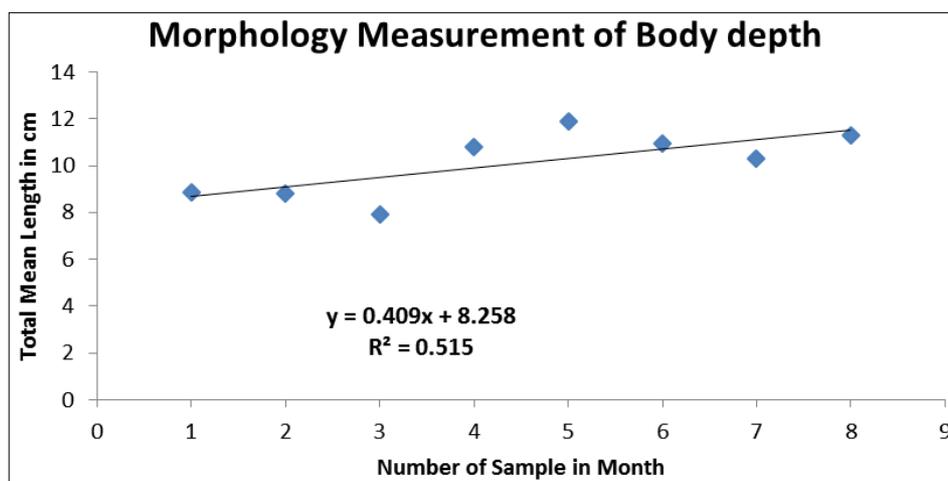
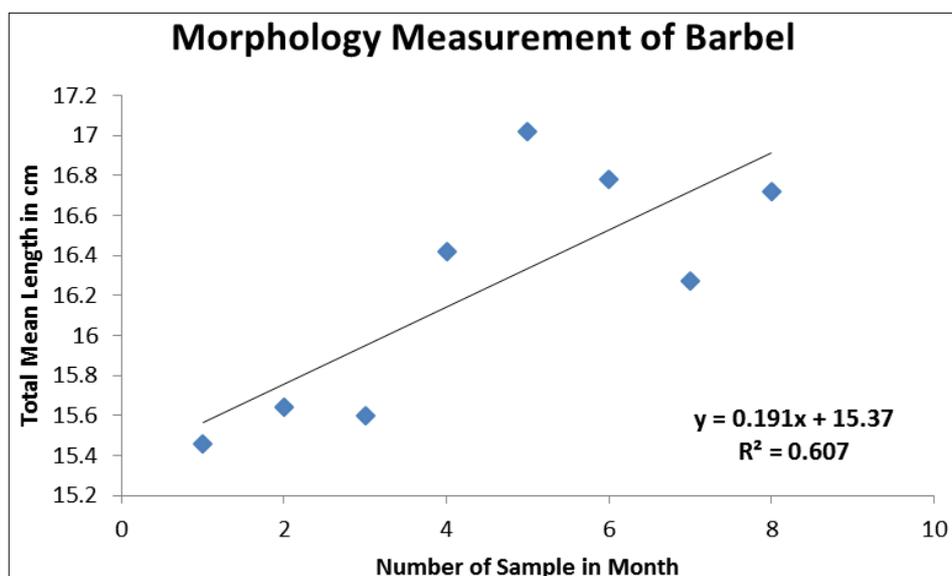


Fig 12: Correlation curve of total length of *W. attu*

Fig 13: Correlation curve of total length of *W. attu*Fig 14: Correlation curve of total length of *W. attu*Fig 15: Correlation curve of total length of *W. attu*

## 7. Conclusion

The Present study was near Bhukhi village Dhoraji Taluka of Rajkot district of Gujarat at Bhadar reservoir were suitable environment condition for *W. attu* fish. The current study shows that other morphometric parameters with total length shows positive allometric growth for *W. attu*. The morphometric measurements and meristic counts confirmed

that the test organism is *W. attu*. from the Bhadar reservoir, west coast of India.

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