



# Population Estimation of *Oncorhynchus Mykiss*, *Salmo Trutta* and *Schizothorax Plagastimous* in Upper River Swat, Khyber Pakhtunkhwa, Pakistan

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## Abstract

This study was designed to assess the population status of *Oncorhynchus mykiss* (Rainbow trout), *Salmo trutta* (brown trout) and *Schizothorax plagastimous* (swati fish) in river Swat. Data were collected from four subareas (SAs) namely Madyan (SA1), Mankiyal (SA2), Kalam (SA3) and Mahoo Dhand (SA4). Fishes captured with electrofisher were identified morphologically and the wet weight and body length were determined. A total of 502 fishes were captured and identified. The highest capture (206) was recorded at SA4 whereas the lowest (64) at SA1. Similarly the highest captured specie (276) was *Salmo trutta* while the lowest (22) was *Schizothorax plagastimous*. The body length ranged from 15-36 centimeters whereas the wet weight varied from 47-304 grams. Out of 502 fishes, 64, 104, 124 and 206 were from SA1, SA2, SA3 and SA4, respectively. The mean wet weight of *Oncorhynchus mykiss*, *Salmo trutta* and *Schizothorax plagastimous* 137.15g, 124.57g and 138.85g, respectively. The aim of the study was to determine species-wise, size-wise and sex-wise relative abundance of fishes in river Swat.

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## Introduction

RIVER Swat starts from Mahoo Dhand at an elevation of about 3,000 meters, passes through the valley of Swat and flows for about 160 kilometer across the valley up to Chakdara. Total length of the river is 250 kilometers from Kalam to river Kabul near Charsadda. River Swat provides habitat for various fish species especially the trout in the upper part. The valley is mainly known for its abundant fish resources [1]. Trout belong to the group of fishes known as Salmonids. The typical coloration of rainbow trout is blue to olive green above the lateral line, a pink band along the lateral line and silver below the lateral line. Brown trout have generally some shade of brown on the back and side, fading to yellow on the belly, spots are large and black [2].

## Materials and methods

### Permission from fishery department

Before starting the field work, permission was obtained from the Fishery Department, Khyber Pakhtunkhwa and a research officer of the Trout Culture & Training Center (TCTC) Madayan, Swat was deputed by the department for technical assistance & facilitating the work.

### Site Selection

The subareas selected for fish capturing were: Madyan, Mankiyal, Kalam, and Mahoo Dhand indicated as SA<sub>1</sub>, SA<sub>2</sub>, (SA<sub>3</sub>, SA<sub>4</sub>, respectively.

### Fish capturing

Fishes were captured through electrofisher, a common scientific survey method used to sample fish populations to determine abundance, density, and species composition [3-5]. Electrofishing caused no permanent harm to fish and fish usually returned to their natural state in as little as two minutes after being stunned. The captured fishes were identified on the basis of morphological characteristics.

### Statistical analysis

The data were analysed by Analysis of Variance (ANOVA) through SAS 9.1 statistical software and Duncan's Multiple Range Test (DMRT) was applied to compare means [6].

## Results & discussion

The studies were conducted at four sub-areas (SAs) of the upper river Swat viz: Madyan, Mankiyal, Kalam and Mahoo Dhand denoted by short words of SA<sub>1</sub>, SA<sub>2</sub>, SA<sub>3</sub> and SA<sub>4</sub>, respectively. The details of captured fishes from each sub-area are given as under.

### Subarea Madyan (SA<sub>1</sub>)

From SA<sub>1</sub>, 64 fishes (56 *S. plagastimous* and 8 *O. mykiss*) were captured. Mean wet weight of *S. plagastimous* and *O. mykiss* was as recorded as 121.85 ± 46.24 g and 130.25 ± 45.02 g whereas mean body length of *S. plagastimous* and *O. mykiss* was as recorded as was recorded as 20.73 ± 3.80 cm and 21.75 ± 2.5 cm, respectively. The relative abundance of *S. plagastimous* and *O. mykiss* was 87.5 % and 12.65 %, respectively.

### Subarea mankiyal (SA<sub>2</sub>)

From SA<sub>2</sub>, 106 fishes (84 *S. trutta*, 14 *S.plagastimous* and 8 *O.mykiss*) were captured. Mean wet weight of *S. trutta*, *S.plagastimous* and *O.mykiss* was as recorded as 117.69 ± 64.79 g, 155.85 ± 59.18 and 113.5 ± 81.17 g whereas mean body length of *S. trutta*, *S.plagastimous* and *O.mykiss* was as recorded as was recorded as 20.84 ± 4.60 cm, 23.42 ± 3.50 cm and 20 ± 5.7 cm, respectively. The relative abundance for *S. trutta*, *S. plagastimous* and *O. mykiss* was 79.24 %, 13.20 % and 7.54 %, respectively.

### Subarea kalam (SA<sub>3</sub>)

From SA<sub>3</sub>, 126 fishes (112 *s. trutta* and 14 *O. mykiss*) were captured. Mean wet weight of *S. trutta* and *O. mykiss* was as recorded as 141.80±76.44g and 110 ± 39.88g whereas mean body length of *S. trutta* and *O. mykiss* was recorded as 22.85 ± 5.44cm and 20.83 ± 2.78cm, respectively. The relative abundance of *S. trutta* and *O. mykiss* was 88.89 % and 11.11 %.

### Subarea mahoo dhand (SA<sub>4</sub>)

From SA<sub>4</sub>, 206 fishes (180 *s. trutta* and 26 *O. mykiss*) were captured. Mean wet weight of *S. trutta* and *O. mykiss* was as recorded as 162.37 ± 75.04 and 94.85 ± 86.94g whereas mean body length of *S. trutta* and *O. mykiss* was recorded as 24.23 ± 5.278cm and 26.64 ± 2.78cm, respectively. The relative abundance of *S. trutta* and *O. mykiss* was 87.37% and 12.62%, respectively.

**Table 1:** Data of Fishes Captured At Madyan (SA<sub>1</sub>).

Sub-area	Species	Captured fishes	Length (cm ± SD)	Weight (gm ± SD)	Abund-ance
Mad-yan (SA <sub>1</sub> )	<i>O. mykiss</i>	8	21.75 ± 2.5	130.25 ± 45.02	12.65%
	<i>S. plagastimous</i>	56	20.73 ± 3.80	121.85 ± 46.24	87.35%

**Table 2:** Data of fishes Captured At Mankiyal (SA<sub>2</sub>).

Site	Species	Captured fishes	Length (cm ± SD)	Weight (gm ± SD)	Abund-ance
Mank-iyal (SA <sub>2</sub> )	<i>S.trutta</i>	84	20.84 ± 4.60	117.69 ± 64.79	79%
	<i>O.mykiss</i>	8	20 ± 5.71	113.5 ± 81.17	7.54%
	<i>S. plagastimous</i>	14	23.42 ± 3.50	155.85 ± 59.18	13.20%

**Table 3:** Data of fishes Captured At Kalam (SA<sub>2</sub>)

Sub-area	Species	Captured fishes	Length (cm ± SD)	Weight (gm ± SD)	Abundance
Kalam (SA <sub>2</sub> )	<i>O. mykiss</i>	112	22.85 ± 5.44	141.80 ± 76.44	88.88%
	<i>S. plagastimous</i>	14	20.83 ± 2.78	110 ± 39.88	11.11%

**Table 4:** Data of fishes captured at Mahoo Dhand (SA<sub>4</sub>)

Sub-area	Species	Captured fishes	Length (cm ± SD)	Weight (gm ± SD)	Abundance
Mahoo Dhand (SA <sub>4</sub> )	<i>O. mykiss</i>	180	24.23 ± 5.278	162.37 ± 75.04	87%
	<i>S. plagastimous</i>	26	26.64 ± 6.046	194.85 ± 86.94	12.62

Fish were collected from four subareas (SAs) in Swat river to find out the abundance of trout fish species. These subareas include Madayan (SA<sub>1</sub>), Mankiyal (SA<sub>2</sub>), Kalam (SA<sub>3</sub>) and Mahoo Dhand (SA<sub>4</sub>). From these sampling sites three fish species namely *Oncorhynchus mykiss*, *Schizothorax plagastimous* and *Salmo trutta* were captured. The reason of variations in the number of fish species during present survey and studies by Hassan et al. [7] might be the sampling area, which in our study was comprised of 50 km while that of Hassan et al. [7] was 250 km. Other reason might be the study period, which was 3 months during present study and 6 years by Hassan et al. [7] with a data of different seasons, localities and years. Two hundred and fifty one individuals ranging from 15cm to 36cm in length and 47 to 304 g in weight were captured throughout the study period. Similar study was conducted in Tutshi lake and a total of 96 trout having ranging in length from 13.0 to 88.4 cm and age from 5 to 40 years were harvested using gill net [8]. Two hundred and fifty one individuals ranging from 15cm to 36cm in length and 47 to 304 g in weight were captured throughout the study period. Similar study was conducted in Tutshi lake and a total of 96 trout having ranging in length from 13.0 to 88.4 cm and age from 5 to 40 years were harvested using gill net [8].

The results of the present study are in line with the results of Mirza et al [9] and Hasan et al. [10] regarding the fish diversity of river Swat. In the same way, results of Hatlevik [8] regarding length of the 96 trout fishes (13.0-88.4cm) also support this study. The highest capture at SA<sub>4</sub> is probably due to least water temperature and highest dissolved oxygen [essential for trout survival] as compared to other areas.

### Conclusion

From the present study it is concluded that upper parts of river Swat (especially river part from Mankiyal to Mahoo Dhand) provide a rich habitat *Salmo trutta* and *Oncorhynchus mykiss* species of trout.

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