

Research Article

Population Estimation of *Oncorhynchus mykiss*, *Salmo trutta* and *Schizothorax plagastimous* in Upper River Swat, Khyber Pakhtunkhwa, Pakistan

Khan T¹, Hayat S², Ullah F^{3*}, Hayat H⁴, Ali S², Khan S⁵ and Ahmad M¹

¹Department of Fisheries and Aquaculture, University of Veterinary & Animal Sciences, Pakistan

²Department of Livestock & Dairy Development, Khyber Pakhtunkhwa, Pakistan

³Lasbela University of Agriculture, Water and Marine Sciences, Pakistan

⁴Department of Pathology, University of Veterinary and Animal Sciences, Pakistan

⁵Department of Dairy Technology, University of Veterinary & Animal Sciences, Pakistan

*Corresponding author: Farman Ullah, Lasbela University of Agriculture, Water and Marine Sciences, Faculty of Veterinary and Animal Sciences, Uthal, Balochistan, Pakistan

Received: January 12, 2021; Accepted: February 03, 2021; Published: February 10, 2021

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 Sub-Areas (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.

Keywords: Population estimation; Trout fish; Upper river swat; Electro fishing

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) Madayn, 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 SA₁, SA₂, SA₃, SA₄, 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 and 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 SA₁, SA₂, SA₃ and SA₄, respectively. The details of captured fishes from each sub-area are given as under.

Subarea madyan (SA₁)

From SA₁, 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 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 (Table 1).

Subarea mankiyal (SA₂)

From SA₂, 106 fishes (84 *S. trutta*, 14 *S. plagastimous* and 8 *O. mykiss*) were captured. Mean wet weight of *Salmo 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

Table 1: Data of Fishes Captured At Madyan (SA₃).

Sub-area	Species	Captured fishes	Length (cm±SD)	Weight (gm±SD)	Abund-ance
Mad-yan (SA ₃)	<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 (SA₂).

Site	Species	Captured fishes	Length (cm±SD)	Weight (gm±SD)	Abund-ance
Mank-iyal (SA ₂)	<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 (SA₃).

Sub-area	Species	Captured fishes	Length (cm±SD)	Weight (gm±SD)	Abund-ance
Kalaml (SA ₃)	<i>O. mykiss</i>	112	22.85±5.44	141.80±76 0.44	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 (SA₄).

Sub-area	Species	Captured fishes	Length (cm±SD)	Weight (gm±SD)	Abund-ance
Mahoo Dhand (SA ₄)	<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

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 (Table 2).

Subarea kalam (SA₃)

From SA₃, 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±76.44 g and 110±39.88 g whereas mean body length of *S. trutta* and *O. mykiss* was recorded as 22.85±5.44 cm and 20.83±2.78 cm, respectively. The relative abundance of *S. trutta* and *O. mykiss* was 88.89% and 11.11% (Table 3).

Subarea mahoo dhand (SA₄)

From SA₄, 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±86.94 g whereas mean body length of *S. trutta* and *O. mykiss* was recorded as 24.23±5.278 cm and 26.64±2.78 cm, respectively. The relative abundance of *S. trutta* and *O. mykiss* was 87.37% and 12.62%, respectively (Table 4). The results of the present study are in line with the results of [7,8] regarding the fish diversity of river Swat. In the same way, results of [9] regarding length of the 96 trout fishes (13.0-88.4 cm) also support this study. The highest capture at SA₄ 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 *S. trutta* and *O. mykiss* species of trout.

Acknowledgment

The authors are indebted to Mr. Jaffar Yahya, Research Officer and all the team of Government Trout Culture and Training

Center (TCTC) Madyan, Swat, for their technical assistance and for supplying the facilities, equipment and time necessary to complete the field work.

References

- Hayat R. Saving of river swat from growing pollution. 2007.
- Petr T, Swar DB. Cold water fisheries in the trans-Himalayan countries, FAO Fisheries Technical Paper. Rome. 2002; 431: 364.
- Bohlin T, Hamrin S, Heggberget TG, Rasmussen G, Saltweit SJ. Electrofishing theory and practice with special emphasis on salmonids. Hydrobiologia. 1989; 173: 9-43.
- Thompson PD, Rahel FJ. Evaluation of depletion-removal electrofishing of brook trout in small Rocky Mountain streams. North American Journal of Fisheries Management. 1996; 16: 332-339.
- Zippin C. The removal method of population estimation J. Wild management. 1958; 22: 82-90.
- AOAC. Official methods of analysis of AOAC (Association of Official Analytical Chemists) 18th Edi. Horwitz W, editor. AOAC International: Publishing. Gaithersburg, Maryland. 2006.
- Mirza MR. Biologia Pakistan. 2007; 53: 109-112.
- Hasan Z, Ibrar A, Muhammad Y, Latif UR, Jahangir K. Fish biodiversity of river Swat. Pakistan J zool. 2013; 45: 283-289.
- Hatlevik SP. The lake trout of Tutshi lake life history and preliminary assessment of annual sustainable yield. British Columbia Ministry of Environment Fish and Wildlife Branch Smithers, B.C. Skeena Fisheries. 1987.
- Asian Development Bank. Pakistan Aquaculture Development Project Feasibility Study. Aquatic Farm Ltd. Honolulu Hawaii USA. 1984; 232.
- Bernhard M. Manual of methods in aquatic environment research, part 3: sampling and analyses of biological material. FAO Fish Tech. 1976.
- Blackburn J. Population abundance and stock assessment of westslope cutthroat trout in the upper Oldman River watershed. Data report, by the Alberta Conservation Association, Lethbridge, Alberta, Canada. 2008; 38: 50-61.

13. Hassan A, Ishaq M, Farooq A, Sadozai SH. Economics of trout fish farming in the northern areas of Pakistan, *Sarhad J Agric.* 2007; 23: 407-410.
14. SAS. Statistical Analysis Systems. Program 6; SAS institute incorporation. Cary. NC 27513. USA, 2000.
15. Wilson D. Report on the 2001 stock assessment of the river Darwen catchment Environment agency Lutra house, Dodd way Walton Summit Bamber Bridge Preston PR5 8X. 2002.
16. Yaqoob M. Cold Water Fisheries of Pakistan, Aquaculture & Fisheries Research Institute, National Agriculture Research Centre, Park Road, Islamabad, Pakistan. 2002.