ЎЗБЕКИСТОН РЕСПУБЛИКАСИ
ОЛИЙ ВА ЎРТА МАХСУС ТАЪЛИМ ВАЗИРЛИГИ

ФАРҒОНА ДАВЛАТ УНИВЕРСИТЕТИ

FarDU. ILMIY XABARLAR-

1995 йилдан нашр этилади
Йилда 6 марта чиқади

3-2018
ИЮНЬ

НАУЧНЫЙ ВЕСТНИК. ФерГУ

Издаётся с 1995 года
Выходит 6 раз в год

МУНДАРИЖА

Аниқ ва табиий фанлар

МАТЕМАТИКА

А.ЮСУПОВА, М.РАҲМОНҚУЛОВА
Вазифаларни баҳолаш учун функцияларнинг хусусиятларидан фойдаланиш 5
М.АБДУМАННОПОВ
Иккинчи тартибли оддий дифференциал тенглама учун Бицадзе-Самарский ва биринчи тур интеграл шартли масала 10

ФИЗИКА, ТЕХНИКА

Р.Х.МАКСУДОВ, Ш.ШУХРАТОВ, Ш. ХОЛДОРОВ
Чўзилувчан камарли узатувчи механизм таранглигини ҳисоблашнинг бир усули ҳақида 14

КИМЁ

Л.ИЛЬИНА, Г.ЛАПТЕВ, Е.ЙИЛДИРИМ, С.ЗАЙЦЕВ
Кортекснинг ишлов берилмаган микроорганизмларини молекуляр генетик таҳлил қилиш учун ДНКни изоляциялаш ва тозалаш усулларини оптималлаштириш 20
Х.ХАИТБАЕВ, Б.БАБАЕВ, И.ЮЛДАШЕВ, А.ХАИТБАЕВ
Трифенилфосфин бромидли комплекс туз синтези 24

БИОЛОГИЯ, ҚИШЛОҚ ХЎЖАЛИГИ

Б.ШЕРАЛИЕВ, З.ПЕНГ
Сирдарёдан тутилиб ўрганилган оддий қора балиқнинг Schizothoraxcurvifrons (Heckel, 1838) тана массаси ва тана узунлиги ўртасидаги боғлиқлик ҳамда нисбий тўйинганлик коэффициенти 27

ГЕОГРАФИЯ, ТУПРОҚШУНОСЛИК

Р.ПИРНАЗАРОВ
Ўрта Осиёдаги тўғонли кўллар ва уларнинг генезиси ҳақида 32

Ижтимоий-гуманитар фанлар

ИҚТИСОДИЁТ

М.АДҲАМОВ
Сифат – иқтисодий ўсиш омилларидан бири 36
А.ҒОФУРОВ, Г.ХАЛМАТЖАНОВА
Кимё саноатини модернизация қилиш ва уни самарали ишлатишнинг инновацион жараёнига оид халқаро тажриба 40

ТАРИХ

С.ХОШИМОВ
Шўро ҳокимиятининг Бухородаги куч ишлатиш органлари тарихидан 45
Б.УСМОНОВ
Чукалак жанги 49
Х.ЖЎРАЕВ
Россия империясининг Фарғона водийсига рус аҳолисини кўчириб келтириш сиёсати тарихидан. (“Туркистон тўплами” манбалари асосида) 53
С.ЙЎЛДОШЕВ
Халқ ўйинлари- маънавий тафаккур омили 56

ФАЛСАФА, СИЁСАТ

У.НАЗИРОВ
Этномаданият ривожида анъананинг ўрни 60

БИОЛОГИЯ, ҚИШЛОҚ ХЎЖАЛИГИ

UDK: 570+630

LENGTH-WEIGHT RELATIONSHIP AND RELATIVE CONDITION FACTOR OF SATTAR SNOWTROUT *SCHIZOTHORAX CURVIFRONS* (HECKEL, 1838) FROM SYR DARYA RIVER, UZBEKISTAN

B.SHERALIEV, Z.PENG

Annotation

This article presents the findings of the study on the length-weight relationship and relative condition factor of Schizothorax curvifrons (Heckel, 1838) from Syr Darya River which was studied for a period of six months (August-December, 2016 and January, 2017).

Аннотация

В статье представлены результаты исследования соотношения длины и веса и относительного коэффициента упитанности обыкновенной маринки из реки Сырдарья, которая изучалась в течение шести месяцев (август-декабрь 2016 - январь 2017)

Аннотация

Мақолада Сирдарьё дарёсидан олти ўй давомида овланган (август-декабрь 2016- январь 2017) оддий қора балиқнинг тана массаси ва узунлиги ўртасидаги боғлиқлик ҳамда нисбий тўйинганлик коэффициенти ҳақида ёзилган.

Keywords and expressions: *length-weight relationship, relative condition factor, Schizothorax curvifrons, Syr Darya River*

Ключевые слова и выражения: *соотношение длины и веса, относительный коэффициент упитанности, Schizothorax curvifrons, река Сырдарья*

Калит сўз ва иборалар: *тана массаси ва узунлик ўртасидаги боғлиқлик, нисбий тўйинганлик коэффициенти, Сирдарьё дарёси.*

Introduction. The sattar snowtrout, *Schizothorax curvifrons* (Heckel, 1838) is distributed at high altitudes in Afghanistan, Pakistan, India [19], China [32], Iran [7] and Central Asia [5], including invaded almost all the tributaries of the Syr Darya River, which is located in the mountainous areas of the Fergana Valley, Uzbekistan [15,27]. In the basin of the Syr Darya River there are three polymorphous forms of sattar snowtrout species and they differ from each other mainly in external coloration, the structure of the bodies and the times of reproduction [5]. The sattar snowtrout is regarded commercial important fish as a game fish in Uzbekistan. Despite the implication of the knowledge of the length-weight relationship in areas related to the management and conservation of fish species [10,11], the information available to the species invaded in Uzbekistan is almost limited.

The length-weight relations of fish are important in fisheries research, partly because they allow the conversion of growth-in-length to growth-in-weight equations, and are used in determining stock structure of fishes, determining whether somatic growth was isometric or allometric and estimating fish condition [1,10,11,18]. The relative condition factor (W_r) is broadly used in fisheries and ichthyology studies. This factor is calculated from the relationship between the weight of a fish and its length, with the intention of describing the "condition" of that individual fish [10]. Different values in W_r of a fish indicate the state of sexual maturity, availability of prey resources, abundance of predators, age and sex of some species [2,26] and the system of environment [12].

This work aimed to calculate the length-weight relationship and the relative condition factor of *S. curvifrons* collected from the Syr Darya River, Uzbekistan.

Material and Methods. The Syr Darya River (46°09′15″N 60°52′25″E) is formed at the confluence of Naryn River and Kara Darya River in the eastern part of the Fergana Valley and flows for some 2,212 kilometers west and north-west through Uzbekistan and southern Kazakhstan to the remains of the Aral Sea.

B.Sheraliev – *PhD Researcher of Southwest University, Chongqing 400715, China.*
Z.Peng – *Professor of Southwest University, Chongqing 400715, China.*

Total of 125 samples of *S. curvifrons* were collected monthly from August 2016 to January 2017 from the upper stream of the Syr darya River by nets with mesh sizes from 10 to 25 mm. Total length (TL), standard length (SL) to the nearest 0.01 mm and weight (W) to the nearest 0.01 g were recorded for each specimen. Identification of fishes was done following Sultanov (1974) and Veselov (1977). The sex was recognized by observation of gonads.

The length-weight relation was calculated based on equation

$$W = aL^b$$

where, *W* is the total weight of fish in grams, *L* is total length in cm, *a* is the intercept, and *b* is the regression coefficient (slope) [10, 18, 28]. The coefficients *a* and *b* were estimated by a lineal regression logarithms:

$$\log(W) = \log(a) + b * \log(L)$$

The 95% confidence limits of *a* and *b*, and the coefficient of determination (r^2) were also calculated by using the equations by Sparre and Venema (1998).

In order to estimate the relative condition factor between sex, the relative weight (Wr) was used according to Froese (2006) as:

$$W_r = 100\frac{W}{a_m L^{b_m}}$$

Where, W_r is the relative weight, *W* and *L* are the weight (g) and length (cm) of each fish. a_m and b_m are the mean values of *a* and *b* from the length-weight relationship. All the statistical analysis was done in MS Excel 2010.

Results. The total collection of 125 specimens consisted of 48 (38.4%) males, 16 (12.8%) females and 61 (48.8%) immature. Table 1 presents data related to descriptive statistics. Total length ranged from 8.3 to 23.1 cm for males, from 12.3 to 29.2 cm for females and from 6.16 to 13.14 cm for immature. Body weight ranged from 5.27 to 100.12 g for males, from 18.11 to 216.23 g for females and from 2.12 to 21.13 g for immature. Table 2 presents data related to estimate parameters of LWR. The overall allometric coefficient b for the LWR indicated positive allometric growth (>3.0) in males (y = 0.0075x^3.0724, r^2 = 0.988) and in immature (y = 0.0065x^3.1179, r^2 = 0.977) and negative growth (<3.0) in females (y = 0.02x-2.748, r^2 = 0.989). The coefficient b value of the overall combined gender indicated positive allometric growth (y = 0.0071x^3.087, r^2 = 0.994).

The relative condition factor (W_r) ranged from 77.45 to 116.36 (100.37±8.57) for males, from 87.92 to 109.79 (100.22±6.83) for females, from 83.78 to 118.32 (100.27±7.45) for immature and from 79.46 to 123.65 (100.37±8.53) for the total combined specimen (Table 1).

Table 1

Descriptive statistics and condition factor for *Schizothorax curvifrons* from Syr Darya River, Uzbekistan.

	Length (cm)		Weight (g)		Relative weight (W_r)
	min-max	Mean ± SD	min-max	Mean ± SD	Mean ± SD
Female	12.3-29.2	22.02±4.75	18.11-216.23	107.85±52.93	100.22±6.83
Male	8.3-23.1	12.29±3.55	5.27-100.12	21.44±20.80	100.37±8.57
Immature	6.16-13.14	8.76±1.43	2.12-21.13	6.23±3.82	100.27±7.45
All	6.16-29.2	11.81±5.16	2.12-216.23	25.08±39.67	100.37±8.53

Table 2

Estimated parameters of LWR for *Schizothorax curvifrons* from Syr Darya River, Uzbekistan.

	n	*a*	95% CL of a	*b*	95% CL of b	r^2
Female	16	0.019979	0.012128-0.032913	2.748567	2.586272-2.910862	0.990
Male	48	0.007509	0.005908-0.009543	3.072369	2.975922-3.168816	0.989
Immature	61	0.006519	0.004986-0.008525	3.117913	2.993941-3.241885	0.977
All	125	0.007080	0.006407-0.007824	3.087363	3.046130-3.128596	0.994

n = number of fish, *a* = intercept, *b* = slope, CL = confidence limit, r^2 = coefficient of determination.

Discussion. No information on length-weight relationships of the *S. curvifrons* was available in FishBase [9] from water basins of Central Asia. However, Mir et al. (2012) first reported values of b for *S. curvifrons* as 2.80 from Jhelum River in the Kashmir Valley. Since then, a number of researchers, including Khan and Sabah (2013) also reported value of b as 2.69 from the Jhelum River, Mir et al. (2014) reported a slightly higher value of b as 2.81 from Dal Lake and Bashir et al. (2016) reported the value of b parameter for *S. curvifrons* as 2.916 in Kashmir Valley, which are lower than observed in present study (Table 3).

Table 3

Estimated LWR parameters for *Schizothorax curvifrons* from different places.

Field of study	Study	*n*	Length range	*a*	95% CL of *a*	*b*	95% CL of *b*	r^2	Length type
Syr Darya River, 2016-2017	This study	125	6.16-29.2	0.0071	0.0064-0.0078	3.09	3.0461-3.1286	0.994	TL
Dal Lake, 2011	Mir et al. 2014	210	16.4-39.3	0.0122	0.0106-0.0141	2.81	2.7150-2.90.60	0.960	TL
Jhelum River, 2011	Khan and Sabah. 2013	136	14.5-37.0	0.0390	0.0280-0.0560	2.69	2.5820-2.7980	0.992	SL
Kashmir Valley, 2013-2015	Bashir et al. 2016	156	15.6-35.7	0.0150	0.0081-0.0258	2.92	2.7510-3.0810	0.985	TL
Jhelum River, 2011	Mir et al. 2012	296	8.0-32.8	0.0255	0.0194-0.0334	2.80	2.6910-2.9420	0.970	TL

n = number of fish, *a* = intercept, *b* = slope, CL = confidence limit, r^2 = coefficient of determination, TL = total length, SL = standard length.

The length-weight relationship of fish has important significance in studying the growth, gonadal development and general welfare of the fish population [16,18,30] and for comparing mode of life of fish from different species [24]. Consequently, fish species of b value in the same area can change at different year or period. The value of 'b' for an ideal fish is 3.0 which represents as isometric growth, as suggested by Le Cren (1951) and we used it in our study for the comparison purposes. Other workers [6,10] also suggested the range of the value of b should fall in between 2.5 and 3.5. In the present study the value of b ranged from 2.748567 to 3.117913.

The length-weight relationships of *S. curvifrons* from the Syr Darya River are described herewith for the first time. Our results differ from other previous research results. These differences may be due to environmental factors in a given geographic location, habitat type [8,33], but also to biotic factors such as differences in the native community, sex, gonadal maturity, degree of stomach fullness, food competition and trophic potential of rivers and ponds [13,14,22], in addition to human factors such as number of specimens examined, differences in the observed length ranges of the specimens caught and overfishing [10,34,35].

The relative condition factor for *S.curvifrons* from the Syr Darya River differed between sex (Table 1). Values of relative condition factor lower than 100 indicate that fish is under low availability of food resources and high abundance of predators, while higher values indicate high abundance of prey, low predation and indicates an isometric growth, which is the desirable in a fish farm [3,10,18,25]. There may be differences in the condition factor due to sex, environmental conditions such as pollution [23]. In this case, *S. curvifrons* from the Syr Darya River, by average is very close to 100. This index indicates that fish show an average or low rate of prey consumption in combination with an abundance of competitor fish.

In conclusion this study provides the first basic information on the length-weight relationships and relative condition factor of *S.*

curvifrons in Central Asian water that could be useful for fishery biologists/managers to impose adequate regulations for sustainable management of fisheries in the current flow and nearby areas, to prevent their complete disappearance.

Acknowledgements. I would like to acknowledge the fishermen of the Fergana Valley for their support in sample collection. In addition, I am also grateful to Jahongir Azimjonov for his help with mathematical calculations.

References:

1. Acarli, D., Kara A., Bayhan B. (2014). Length-weight relations for 29 fish species from Homa Lagoon, Aegean Sea, Turkey. Acta Ichthyologica et Piscatoria, 44, 249-257. DOI: 10.3750/AIP2014.44.3.09.
2. Anibeze, C.I.P. (2000). Length-weight relationship and relative condition of *Heterobranchus longifilis* (Valenciennes) from Idodo River, Nigeria. Naga, The World Fish Center, 23, 34-35.
3. Ayode, A.A. (2011). Length-weight relationship and diet of african carp *Labeo ogunensis* (Boulenger, 1910) in Asejire Lake Southwestern Nigeria. Journal of Fisheries and Aquatic Science, 6, 472-478. DOI: 10.3923/jfas.2011.472.478.
4. Bashir, A., Sharma, N.K., Bisht, B.S., Singh, R., Mir, J.I., Akhtar, M.S. (2016). Length-weight relationships of five commercially important freshwater fish species in the Kashmir Valley, India. Journal of Applied Ichthyology, 32, 740-741. DOI: 10.1111/jai.13065.
5. Berg, L.S. (1949). Freshwater fishes of the U.S.S.R. and adjacent countries. Volume 2. Academy of Sciences of the USSR, Moscow. (in Russian)
6. Carlander, K.D. (1969). Handbook of freshwater fishery biology, Volume 1. The Iowa State University Press, Ames.
7. Coad, B.W. (1995). Freshwater Fishes of Iran. Acta Scientiarum Naturalium Academiae Scientiarum Bohemicae, Brno 29, 1-64.
8. Díaz-Pérez, L., Rodríguez-Zaragoza, F.A., Ortiz, M., Cupul-Magaña, A.L., Carriquiry, J.D., Rios-Jara, E., Rodríguez-Troncoso, A.P., García-Rivas, M.C. (2016). Coral reef indices versus the biological, ecological and functional diversity of fish and coral assemblages in the Caribbean Sea. PLoS ONE, 11, e0161812. DOI: 10.1371/journal.pone.0161812.
9. Froese, R. & Pauly, D. Editors, (2018). FishBase. World Wide Web electronic publication. www.fishbase.org, version (02/2018).
10. Froose, R. (2006). Cube law, condition factor and weight-length relationship: history, meta-analysis and recommendations. Journal of Applied Ichthyology, 22, 241-253. DOI: 10.1111/j.1439-0426.2006.00805.x
11. Froose, R., Thorson, J.T., Reyes Jr, R.B. (2013). A Bayesian approach for estimating length-weight relationships in fishes. Journal of Applied Ichthyology, 30, 78-85. DOI: 10.1111/jai.12299.
12. Gomiero, L.M., Braga, F.M.S. (2005). The condition factor of fishes from two river basins in Sao Paulo State, Southeast of Brazil. Acta Scientiae Maringa, 27, 73-78.
13. González-Salas, C., Núñez-Lara, E., Ruiz-Zárate, M.A., Hernández-Landa, R.C., Arias-González, J.E. (2003). Condition of coral reef ecosystems in central-southern Quintana Roo (Part 3: Juvenile reef fishes). Atoll Research Bulletin, 496, 598–610.
14. Hossain, M.Y., Ahmed, Z.F., Leunda, P.M., Jasmine, S., Oscoz, J., Miranda, R., Ohtomi, J. (2006). Condition, length-weight and length-length relationships of the Asian striped catfish, *Mystus vittatus* (Bloch, 1794) (*Siluriformes: Bagridae*) in the Mathabhanga River, Southwestern Bangladesh. Journal of Applied Ichthyology, 22, 304–307. DOI: 10.1111/j.1439-0426.2006.00803.x.
15. Kamilov, G., Urchinov, Z.U. (1995). Fish and fisheries in Uzbekistan under the impact of irrigated agriculture. In T. Petr (ed.) Inland fisheries under the impact of irrigated agriculture: Central Asia. FAO Fisheries Circular No. 894, 10-41.
16. Kashyap, A., Awasthi, M., Arshad, M., Serajuddin, M. (2015). Length-weight, length-length relationship and condition factor of freshwater Murrel, *Channa punctatus* from Northern and Eastern Regions of India. World Journal of Fish and Marine Sciences, 7, 164-170. DOI: 10.5829/idosi.wjfms.2015.7.3.94100.
17. Khan, M.A. & Sabah. (2013). Length-weight and length-length relationships for five fish species from Kashmir Valley. Journal of Applied Ichthyology, 29, 283-284. DOI: 10.1111/j.1439-0426.2012.02061.x.
18. Le Cren, E.D. (1951). The length-weight relationship and seasonal cycle in gonad weight and condition in the perch (*Perca fluviatilis*). Journal of Animal Ecology, 20, 201-219. DOI: 10.2307/1540.
19. Menon, A.G.K. (1999). Check List-Fresh Water Fishes of India. Zoological Survey of India. The Survey. Occasional.
20. Mir, F.A., Mir, J.I., Singh Patiyal, R., Kumar, P. (2014). Length-weight relationships of four snowtrout spesies from the Kashmir Valley in India. Journal of Applied Ichthyology, 30, 1103-1104. DOI: 10.1111/jai.12482.
21. Mir, J.I., Shabir, R., Mir, F.A. (2012). Length-weight relationship and condition factor of *Schizopyge curvifrons* (Heckel, 1838) from River Jhelum, Kashmir, India. World Journal of Fish and Marine Sciences, 4, 325-329. DOI: 10.1111/j.1439-0426.2012.02061.x
22. Moutopoulos, D.K. & Stergiou, K.I. (2002). Length-weight and length-length relationships of fish species from the Aegean Sea (Greece). Journal of Applied Ichthyology, 18, 200-203. DOI: 10.1046/j.1439-0426.2002.00281.x.

23. Olurin, K.B., Aderibigbe, O.A. (2006). Length-weight relationship and condition factor of Pond Reared Juvenile *Oreochromis niloticus*. World Journal of Zoology, 1, 82-85.

24. Petrakis, G., Stergiou, K.I. (1995). Weight-length relationships for 33 fish species in Greek waters. Fisheries Research, 21, 465-469.

25. Rypel, A.L. & Richter, T.J. (2008). Empirical percentile standard weight equation for the blacktail redhorse. North American Journal of Fisheries Management, 28, 1843–1846. DOI: 10.1577/m07-193.-1.

26. Sabido-Itzá, M.M., Aguilar-Perera, A., Medina-Quej, A. (2016). Length-weight and length-length relations, and relative condition factor of red lionfish, *Pterois volitans* (Actinopterygii: Scorpaeniformes: Scorpaenidae), from two natural protected areas in the Mexican Caribbean. Acta Ichthyologica et Piscatoria, 46, 279–285. DOI: 10.3750/AIP2016.46.4.01.

27. Sheraliev, B.M. (2015). The systematic analysis of the fish fauna of the Fergana Valley. European Journal of Biomedical and Life Sciences, 2, 80-84. DOI: 10.20534/ELBLS-15-2-80-84f

28. Sparre, P. & Venema, C.S. (1998). Introduction to tropical fish stock assessment. Part I: Manual. FAO. Rome.

29. Sultanov, G.S. (1974). Vertebrate animals of the Fergana Valley. Publishing house "Fan" of the Uzbek SSR. Tashkent. (in Russian)

30. Verdiell-Cubedo, D., Oliva-Paterna, F.J., Torralva, M. (2006). Length-weight relationships for 22 fish species of the Mar Menor coastal lagoon (western Mediterranean Sea). Journal of Applied Ichthyology, 22, 293–294. DOI: 10.1111/j.1439-0426.2006.00738.x.

31. Veselov, E.A. (1977). Determinant of freshwater fish of fauna of the USSR. “Prosveshcheniye” Moscow. (in Russian)

32. Walker, K.F. & Yang, H.Z. (1999). Fish and fisheries in western China. FAO Fisheries and Aquaculture Technical Paper, 385, 237-278.

33. Weatherley, A.H. & Gill, H.S. (1987). The biology of fish growth. Academic Press, London.

34. Xue, Y., Ren, Y., Xu, B., Mei, C., Chen, X., Zan, X. (2011). Length-weight relationships of fish species caught by bottom trawl in Jiaozhou Bay, China. Journal of Applied Ichthyology, 27, 949-954. DOI: 10.1111/j.1439-0426.2010.01607.x.

35. Ye, S., Li, Z., Feng, G., Cao, W. (2007). Length-weight relationships for thirty fish species in Lake Niushan, a shallow macrophytic Yangtze Lake in China. Asian Fisheries Society, 20, 217-226.