BIOLOGICAL AND REPRODUCTIVE FEATURES OF THE WHITEFISH (ABRAMIS BRAMA) POPULATION (ON THE EXAMPLE OF A GANG RESERVOIR)

Umaraliyeva Guzal Komiljonovna
Navoi State University, Navoi, Uzbekistan

ARTICLE INFO

Received: 06th June 2026
Accepted: 08th June 2026
Online: 10th June 2026

KEYWORDS

Abramis brama, Gang reservoir, linear growth, Fulton obesity coefficient, maturation index, absolute fertility, Li phenomenon

ABSTRACT

As a result of large-scale irrigation and melioration constructions of the Aral Sea basin, in the lower reaches of the Zarafshan River, there radically changed the hydrological regime and several large artificial reservoirs were formed, including the Tugakul reservoir. The artificial participation of ichthiofauna of industrial importance in this ecoticism was cultivated in the 1960s by the acclimatization of the whitefish (Abramis brama) from the Ural River . Currently, this species is able to fully adapt to the basin conditions (acclimatize), which has become one of the industrial objects of self-propagation.

Introduction. The study of the ichthyological indicators, biological plasticity, and population structure of fish species introduced in altered ecosystems influenced by anthropogenic and ecological security are among the factors of modern ichthyology and aquaculture. The whitefish (*Abramis brama* Linnaeus, 1758) belongs to the family Leuciscidae and is a bento-pelagic species that lives in freshwater and marshy ponds with high ecological stress.

The natural territory of the species includes basins of the Northern, Baltic, Axis, Azov, Kara, Caspian and Aral Seas. In the quasi-stationary state of the Holy Aral Sea, wit whale, although it had a high industrial value in the marine area, it was not found on the plains of the Zarafshan and Kashkadarya rivers in Uzbekistan. After large-scale hydrotechnical changes in the middle of the 20th century, swit catfish were transferred to new reservoirs erected in these river basins.

Tudakul Reservoir is located in the desert zone of Uzbekistan, in the lower reaches of the Zarafshan River, and is saturated mainly with waters of the Amu Darya (total area 22,000 hectares, average depth 5 m, maximum depth 22 m). Despite the fact that this reservoir is one of the most important fishing objects of the republic, modern biological and reproductive indicators of aquatic fish objects in it have not been systematically studied. The purpose of this study is to elucidate the fundamental development of modern technical characteristics and reproductive biology of the Tudakul reservoir whale.

Methodical material

Research material was collected in April 2025 and 2026 with the help of industrial nets from the Tudakul reservoir. A total of 130 specimens of fish were subjected to a full ichthological analysis. After specifying the species of fish, the material was delivered to the laboratory with a 4% formalin and surface fixation material.

The fish were anatomically splitted, the stages of maturation of the sex and gonads were determined, and the mass of the sex glands was measured. The gonadosomatic index (puberty ratio) was calculated as a percentage of gonadal mass to total body mass.

The degree of obesity of fish was determined by the Fulton formula. A retrospective study of the age of fish and growth rates in previous years was carried out using the Eynar Lea method using cheshuya (coins) preparations. Mathematical-Statistical Analysis and Correlation Coefficients MS Excel program was completed.

Results and their analysis

1. Biometric and allometric indicators

It was found that the body size of the studied whitefish varied from 13.2 to 32.5 cm, standard use (SL) from 9.4 to 24.0 cm, and total weight (W) from 25.2 to 1054.0 g. Fish body mass accounting indicators (TLvaSL) allowed for a high-grade linear positive correlation in the middle (r = 0.99):

SL = 0.867 \times TL - 1.4923

The degree function of fish body weight and specific allometric dependence was expressed by the regression equations:

- Standard length: W = 0.0259 \times SL^{2.9053}(r = 0.94)
- Relative to total length:W = 0.0065 \times TL^{3.1409}(r = 0.92)

The obtained confirms the nearness to the measured indices and the weight indicators increase proportionally with respect to the linear dimensions.

Sexual Content and Reproductive Biology

Among the samples collected in April (directly prior to the inference process), juveniles of maturity II and mature individuals of stage IV were sequenced. The fishes with a total body length (TL) of 15–18 cm formed the predominantly juvenile group. The fish are fully sexually mature = 18cm in size. Among sexually mature individuals, the sex ratio was 1 : 1.8 per females and males, with male fish dominating the population in numbers.

Gonada mass of female whitefish) is determined to increase directly with the specific increase of fish and is characterized by the following indicators:

- q = 2 \times 10^{-6} \times TL^{4.6148}(r = 0.67)
- q = 2 \times 10^{-5} \times SL^{4.2374}(r = 0.69)
- q = 0.0879 \times W - 4.369(r = 0.76)

The individual absolute fertility of the females in the study (TL18.0–32.5 cm) varied from 1,900 to 109,700 oocyte rows. Absolute pedigree will be in a positive correlation with the size and weight of the fish, which has an average strength. And the individual relative fertility rate ranged from 18.9 to 234.8 (mean 121.2) oocytes/g body weight. Relative pettiness was manifested regardless of the size of the fish (TLwith = 0.07, Wbilan = 0.03).

In the first half of April, high asynchronity (heterogeneity) was detected in the diameter of oocytes in the gonads. The minimum oocytes were in the range of 0.11–1.15 mm in diameter (mean 0.84 mm), maximum diameters were 1.73–2.21 mm (mean 1.95 mm), and the mean individual diameters were in the range of 1.13–1.68 mm (mean 1.48 mm). It was found that the diameter of the egg does not depend on the fish itself (r = 0.07). The gonadosomatic index ranged from 1.43% to 15.71% (mean 7.05%) in April, producing a weak correlation with fish weight (r = 0.26).

Discussion

A retrospective analysis of the growth rates of the whitefish population in the Gang Lake reservoir shows that the Li phenomenon is clearly manifested in the dynamics of growth. The linear growth of four and five-year-old fish in the first years of life (for example, 4-year-old uchunSL_1 = 15.3cm) can be seen to be higher in height than the growth indicators of the younger age (2-3 years) fish for the corresponding period (SL_1 = 9.0 - 9.5cm).

This situation is directly related to intensive fishing (promycel) in the reservoir. Industrialized, focused on large and fast-growing fish with a main weight of 1 kg and above, physically, the fastest growing and most environmentally active individuals in each generation grew rapidly from the population from the age of 3 years. In the pond, however, slow-growing phenotypes remained, which artificially reduced the average growth rates of the population.

Whitefish are breeding in this arid climate (when TL = 18cm). High fluctuations of absolute fertility (1.9 – 109.7 thousand eggs) testify to the high degree of adaptation of the species to anthropogenic and hydrological variability.

Conclusion. Wyoming catfish (*Abramis brama*), introduced into the Shudakul reservoir, today the reservoir has fully adapted to the ecological conditions and formed a restorative population. Fish, intensive fishing technologies have a significant impact on population structure, as evidenced by the Lee phenomenon in growth analysis. It will provide an opportunity to regulate fisheries, control the size of the net, as well as fish keeping in order to preserve reservoirs and restore cost-effectiveness.

References:

1.Atlas of Russian freshwater fishes: In 2 volumes. Volume 1 / Yu. Edited by S. Reshetnikov.– Moscow, Nauka, 2003. - 379 p.
2.Berg, L.S. Freshwater fish of the USSR and adjacent countries. 4th edition. Moscow – Leningrad, USSR Academy of Sciences Publishing House, 1949, part 2, 458 pages.
3.Komilov, G.K. Biological bases of fish farming and fish farming development in water bodies of Uzbekistan. Tashkent, Science, 1973. - 220 b.
4.Pravdin I.F. Guide to Studying Fish (Mainly Freshwater). Moscow, Food industry.– 376 pages.
5.Fish of Kazakhstan: in Volume 5. Volume 3: Cyprinidae (continued) / Mitrofanov V.P., Dukravets G.M., Melnikov V.A., Baimbetov A.A. et al.– Alma-Ata, Nauka, 1988. - 304 b.
6.Fishes of Uzbekistan (key). Tashkent: Chinar-ENK, 2001. - 152 b.
7.Yuldashov M.A., Komilov B.G. Results of introduction of alien fish species into water bodies of Uzbekistan. - Scientific Proceedings of Far Eastern State Fisheries Technical University, 2018, 44(1). - b.40 – 48.