Tiscia (Szeged) Vol. XVIII, pp. 113—117 (1983)

GROWTH OF SOME SPECIES OF FISHES IN THE TISA RIVER

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(Received 10 November, 1981)

Abstract

On the basis of the material collected in the period 1979–1982 on the locations of Padej and Titel (the total of 69 specimens of *Esox lucius* L. and 74 specimens of *Abramis ballerus* L. was studied) longitudinal growth and growth tempo were reconstructed and growth rate and growth constant calculated. The growth tempo of *E. lucius* and *A. ballerus* reaching peaks in the first and second year and than decreasing with age (greatest drop is after second year). According to the growth rate and growth constant two periods are observed: the first up to the third year and the second after this point.

Introduction

The Ichthyofauna of the Yugoslav section of the Tisa was the subject matter of studies by RISTIĆ, 1977; GRGINĆEVIĆ, 1977; BUDAKOV et al. 1979; MALETIN et al. 1980; GRGINĆEVIĆ et PUJIN, 1980. This study is a contribution to the research of ichthyofauna of the Tisa. This case study deals with a fish of prey *Esox lucius,* economically and ecologicaly important species and its prey *Abramis ballerus,* a less valuable species.

Materials in Methods

The material has been collected from 1979 through 1982 on the locations of Padej and Titel. The total of 69 specimens of *E. lucius* and 74 specimens of *A. ballerus* was studied. The body length without caudal fin was measured, longitudinal growth and growth tempo were reconstructed and growth rate and growth constant calculated.

Results and Discussion

The age of specimens of *E. lucius* is 2+ to 6+ (Table 1). The average body length increases with age. In addition, the absolute and relative gain are also shown.

Table 2 shows calculated longitudinal growth of *E. lucius* ranging between 12.75 cm for 1_1 to 43.94 cm for 1_6. In addition, the growth tempo reaching peaks in the first two years and than decreasing are also shown.

According to the growth rate and growth constant two period are observed: up to three years and over three years (Table 3).

Table 1. Length increase of *Esox lucius* L. in Tisa river (measured lengths in cm)

Age group	n	Length average (cm)			Absolute increase (cm)	Relative increase %
		min	max	M		
2+	1	—	—	27.10	—	—
3+	14	31.00	49.20	38.23	11.23	29.11
4+	30	28.60	50.00	39.67	1.44	3.62
5+	22	35.00	55.30	42.95	3.28	7.63
6+	2	46.10	59.70	52.90	9.95	18.80

Table 2. Length increase of *Esox lucius* L. in Tisa river (calculated lengths in cm)

Year	n	l_1	l_2	l_3	l_4	l_5	l_6
1980	1	13.13	20.98	—	—	—	—
1979	14	15.58	26.37	32.84	—	—	—
1978	30	12.91	22.96	30.76	36.50	—	—
1977	22	11.76	20.53	28.74	34.85	39.30	—
1976	2	10.39	19.21	28.04	36.47	40.58	43.94
M	69	12.75	22.01	30.09	35.94	39.94	43.94
Absolute increase (cm)		9.26	8.08	5.85	4.00	4.00	
Relative increase %		72.62	36.71	19.44	11.12	10.01	

Table 4 shows the longitudinal growth of *A. ballerus* as well as absolute and relative gain. The age of specimens is 2+ to 4+. The average value increases withage.

Table 5 shows calculated longitudinal growth of *A. ballerus* ranging from 9.68 cm for l_1 to 20.5 cm for l_4. .In addition, the growth tempo reaching peaks in the first and second year and than decreasing with age is also shown (greatest drop is after second year).

Table 6 shows the growth rate and growth constant. There are also two periods: the first up to the third year and the second after this point.

The average values of measured lengths of *E. lucius* from the Tisa are slightly lower than those from Obedska bara and Koviljski rit (flooded areas of the Sava and the Danube). Calculated values of body lengths range between those from Obedska bara and Koviljski rit. However, growth tempo is higher compared to these two areas. Growth rate and growth constant decrease after the third year, while in Obedska bara and Koviljki rit this drop occurs after the second year (BUDAKOV et MALETIN 1982).

Table 3. Rate of growth (C) and constant of growth (K) of *Esox lucius* L. in Tisa river

Age group	Length average (cm)	C	K
1	12.75	—	—
2	22.01	0.15	1.65
3	30.09	0.25	2.16
4	35.94	0.08	0.55
5	39.94	0.06	0.29
6	43.94	0.04	0.16

Table 4. Length increase of *Abramis ballerus* L. in Tisa river (measured lengths in cm)

Age group	n	Length average (cm)			Absolute increase (cm)	Relative increase %
		min	max	M		
2+	16	19.00	24.50	21.86	—	—
3+	44	12.10	28.20	22.67	0.81	3.57
4+	14	19.10	26.30	27.82	5.15	18.51

Table 5. Length increase of *Abramis ballerus* L. in Tisa river (calculated lengths in cm)

Year	n	l_1	l_2	l_3	l_4
1981	7	12.38	18.36		
1980	25	9.44	15.75	19.84	
1979	10	9.07	14.75	18.92	20.64
1978	9	10.86	18.96		
1977	19	8.67	14.02	18.53	
1976	4	7.67	13.49	17.48	20.37
M	74	9.68	15.28	18.69	20.50
Absolute increase (cm)			6.20	2.81	1.81
Relative increase %			64.04	17.69	9.68

Measured body length of *A. ballerus* is within the range given by GRGINEČVIČ (1977) according to her research in the Danube, Koviljski rit, canals Danube–Tisa–Danube, Jegrička and Mrtva Tisa. Calculated body lengths and growth tempo are lower in the tested area. Growth rate and growth constant of specimens from the Tisa decrease after the second year, while GRGINČEVIČ (1977) detected this decrease after the fourth year, even though she pointed to certain drop after the second year.

Table 6. Rate of growth (C) and constant of growth (K) of *Abramis ballerus* L. in Tisa river

Age group	Length average (cm)	C	K
1	9.68	—	—
2	15.88	0.14	1.11
3	18.69	0.04	0.18
4	20.50	0.09	0.20

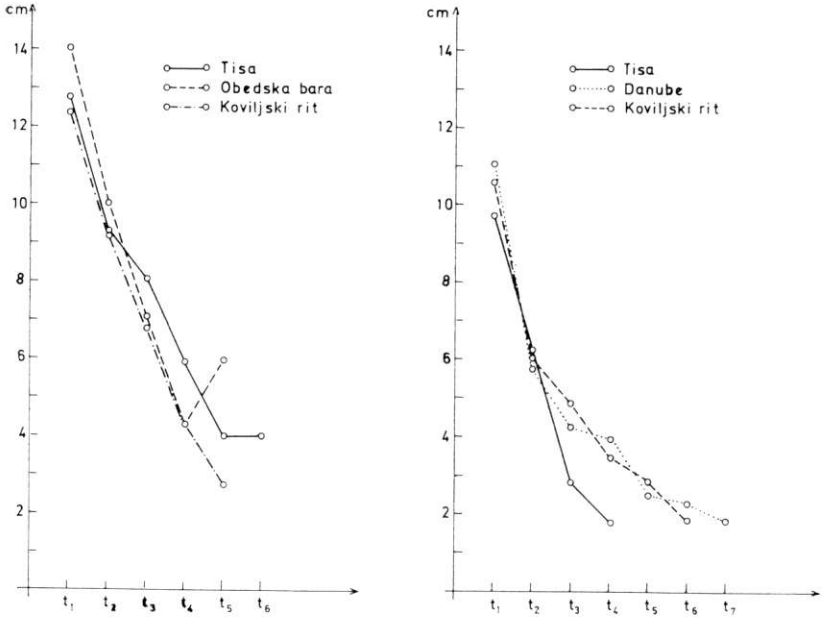

Fig. 1. The growth tempo of *Esox lucius* L. in Tisa, Obedska bara and Koviljski rit
Fig. 2. The growth tempo of *Abramis ballerus* L. in Tisa, Danube and Koviljski rit

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Egyes tiszai halfajok növekedése

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Kivonat

A szerzők 1979—1982 között, Padéj és Titel környékéről begyűjtött 69 *Esox lucius* L. és 74 *Abramis ballerus* L. példányon tanulmányozták a hosszanti növekedést, valamint számítás alapján a növekedés ütemét. A növekedés az első és a második évben a legerőteljesebb az említett fajoknál. A második év után észlelhető a legnagyobb hanyatlás. A növekedés ütemében és konstansában két időszak különíthető el: az első a harmadéves korig, a második a harmadik év után.

Rast nekih vrsta Riba u Tisi

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Abstrakt

Na osnovu materijala sakupljenog u periodu 1979—1982. g. na lokalitetima Padej i Titel (ukupno je obradeno 69 primeraka *Esox lucius* L. i 74 primerka *Abramis ballerus* L.) rekonstruisan je dužinski rast i tempo rasta i izračunate su brzina i konstanta rasta. Tempo rasta *E. lucius* i *A. ballerus* pokazuje najveće vrednosti u prvoj i drugoj godini života, a zatim sa starošću opada (najveći pad je posle druge godine). U odnosu na brzinu i konstantu rasta uočavaju se dva perioda: prvi do treće i drugi posle treće godine.

РОСТ НЕКОТОРЫХ ВИДОВ РИБ В р. ТИССА

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Резюме

На основании материала, собранного в периоде с 1979 по 1982 гг. на территории г. Падей и г. Тител всего обработано 69 экземпляров *Esox lucius* L. и 74 экземпляров *Abramis ballerus* L. сделана реконструкция роста по длине и темпа роста, также вычислены скорость и постоянная роста. Самые болышие значения темпа роста *E. lucius* и *A. ballerus* замечаются на одно- и двухлетнем возрасте, а потом понижается (самое значительное падение темпа роста — после двухлетнего возраста). Учитывая скорость и постоянную роста, замечаются два периода: Первый — до трехлетнего возраста и второй — после трехлетнего возраста.