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Fish biology

**BIOLOGICAL CHARACTERISTICS OF SEA TROUT SMOLTS
(*SALMO TRUTTA M. TRUTTA L.*) GROWN IN THE RIVER
GOWIENICA CATCHMENT AREA**

**BIOLOGICZNA CHARAKTERYSTYKA SMOLTÓW
TROCI WĘDROWNEJ (*SALMO TRUTTA M. TRUTTA L.*) WYROSŁYCH W
ZLEWNI RZĘKI GOWIENICA**

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This paper examines length, length in the period of descending, weight, length-weight relationship, factor condition as well as the period of descending during 24 hrs of the sea trout smolts grown in the Pomeranian catchment area of Gowienica river.

INTRODUCTION

The paper demonstrates length, length in the period of descending, weight, length-weight relationship, factor condition as well as the period of descending during 24 hrs of the sea trout smolts (*Salmo trutta m. trutta L.*) grown in the Pomeranian catchment area of Gowienica river, being included in the lower Odra system (Fig. 1). There is a lack of data in the literature on sea trout smolts of Gowienica river. Similar problems were dealt with by Chełkowski [1978, 1990, 1992, 1995], Chełkowski et. al. [1981, 1982] and Dębowski et al. [1992] concerning the Pomeranian rivers.

The present paper is second in the series of examination on sea trout smolts of the Gowienica river [Chełkowski et al. 1994].

MATERIALS AND METHODS

In the experiment carried out the sea trout smolts, migrating downstream the Gowienica river through Szczecin Lagoon to the Baltic Sea, were under study in the consecutive 5 years 1980-1984 (Fig. 1).

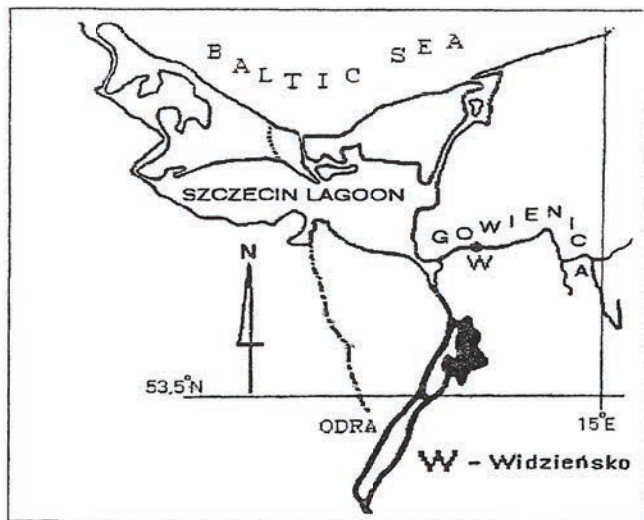


Fig. 1 Locations of the Gowienica catchment area in the lower Odra system

They were captured with the aid of winged trap [Świniarski 1975], dividing Gowienica river ca 50 m above the weir of non-working water factory in the village Widzieńsko, located in 12.6 km of river course from its mouth to Szczecin Lagoon. Traps were checked twice daily: at 7 a.m. and 7 p.m., from 1 March to 15 July, i.e. in the longer period when compared to the period of downstream migration in Pomeranian rivers [Chełkowski 1978, 1990; Chełkowska Z. B. Chełkowska 1981]. Fish from the morning and evening catch were counted then gathered in the water store built up of several rotatory ponds 2 m in diameter, made of plastic substance, supplied with water from the Gowienica river. Analysis was made periodically according to the amount of material collected. Fish were anesthetized in the water solution of MS-222 [Leitritz 1976]. After the species and stage of development (smolt, parr) [Mills 1971] have been determined, the number of smolts was recorded and furthermore for fish selected by random the length (l. caudalis) in 1 cm length classes or in mm as well as weight in g or with accuracy to 1/10 of non-gutted or gutted fish (without alimentary tract, heart, liver, milt and gonads) were recorded. For example, the 11-cm length class comprise those individuals measuring 100-119 mm, the 12-cm class grouped those measuring 110-119 mm and so forth. In the calculations the class mean was taken as the length. Additionally, relationship length-weight for sea trout smolts of the Gowienica river was described by means of power function:

$$W = k * L^n \quad (1)$$

where: W = weight of whole fish

L = length in mm

k and n = coefficients [Greń 1978; Opuszyński 1979; Szypuła 1982]

The material collected allowed to estimate the coefficient of condition (K) of sea trout smolts following the Fulton's formula in order to display the condition factor [Opuszyński 1979] both for gutted and non-gutted fish, what is recommended by Clark and Nikolski, after Suworow [1948].

In the catches of fish in Gowienica river the sea trout smolts occurred most abundantly in the period of 24 March - 18 June [Chełkowski et al. 1994].

For migration of sea trout grown in the Baltic Sea the lower part of Gowienica river up to the weir in Widzieńsko was available only, whereas upper and middle part of the drainage basin, above the weir mentioned was stocked with the alevin feeding of sea trout from the parental forms coming from the Pomeranian river Rega [Bartel et al. 1978-1983; reports of stocking of Polish Anglers Company]. Therefore sea trout smolts investigated grew under natural conditions in the Gowienica river catchment area.

Fish examined, except for individuals taken to the weight analysis of the gutted fish, were released back to Gowienica, below the weir mentioned.

RESULTS

Catches of fish throughout five years of study provided with 2064 specimens of juveniles of trout - 2010 smolts and 54 individuals in the parr stage. In the first year of study all smolts were measured whilst in four remaining years from 12.2 to 83.6% of fish collected. A total of 1430 smolts were measured (Tab. 1).

Table 1

Number of smolts studied of Gowienica river

Year	Number	For length Study	For weight study	
			whole fish	gutted fish
1980	917	917	56	56
1981	110	69	-	-
1982	219	183	120	26
1983	355	211	61	-
1984	409	50	50	-
Total	2010	1430	287	82

As can be seen from the data analyzed, the mean length of smolts for whole period of study amounted to 16.9 cm with the range in length classes from 11 to 29 cm. The largest mean length amounting to 18.9 cm was found in smolts migrating downstream in 1984, while the smallest one (16.3 cm) in smolts descending in 1981. In the remaining three years of study i.e. in 1983, 1980 and 1982 the mean length of smolts amounted to 16.6, 16.8 and 17.0 cm, respectively (Tab. 2).

Frequency of occurrence of smolts of the Gowienica river in 1 cm length class seems to be an interesting phenomenon. It is evident after examination that in the whole period of study smolts appear most abundantly in seven subsequent classes of length from 13 to 19 cm (81.8 % of whole sample studied). In the remaining 12 classes of length, i.e. 11 and 12 cm as well from 20 to 29 cm only 18.2 % of smolts was found. The 15 cm length class appeared to be most numerous, comprising 253 fishes (17.7 % - Tab. 3).

Table 2

Length (cm) of sea rout smolts of Gowienica river

Year	n	$\bar{x} \pm m$	δ	V	Range
1980	917	16.8 ± 0.11	3.288	19.54	11 - 28
1981	69	16.3 ± 0.24	2.005	12.33	11 - 21
1982	183	17.0 ± 0.18	2.414	15.15	11 - 28
1983	211	16.6 ± 0.14	1.951	11.73	12 - 23
1984	50	18.9 ± 0.46	3.263	17.26	15 - 29
Total	1430	16.9 ± 0.08	2.998	17.76	11 - 29

Table 3

Length class (cm)	n
11	2
12	18
13	68
14	207
15	253
16	237
17	200
18	133
19	71
20	40
21	49
22	53
23	43
24	28
25	13
26	6
27	5
28	3
29	1
Total	1430

Smolts captured in the Gowienica river, next being stored in the water, were periodically measured. Data obtained allowed to show the trend of smolts lengths in decades of study thus the length during the migration can be demonstrated. Estimation made in this field were based only on the material collected in 1980, when the most numerous group of smolts measured occurred during the five years of investigation. As seen from Table 4, the mean lengths of smolts in succeeding decades of migration decrease from the highest values in the second decade of April (19.3 cm) to the lowest one (15.4 cm) in the first decade of June. Ranges of smolts lengths in the period of migrations appeared to be peculiar, too. In the earlier period of migration (when the mean lengths of smolts are the largest), the widest range of smolts lengths is observed, and towards to the end of migration (i.e. when the mean length of smolt decrease), the range of smolts range become narrower. In the initial period of migrations, in April, smolt lengths cover the range from 11 to 28 cm, while in the third decade of May - 14-22 cm.

Table 4

Length (cm) of sea trout smolts of the Gowienica river collected in 1980 in the period of migration.

Month	Decade	n	\bar{x}	Range
April	II	140	19.3	11 - 28
	III	162	18.1	11 - 28
May	I	300	16.1	12 - 27
	II	245	15.9	12 - 22
	III	21	15.5	14 - 22
June	I	48	15.4	13 - 23
	III	1	17.0	
Total		917	16.8	11 - 28

Weights of non-gutted smolts (287) and gutted ones (82) from the Gowienica river were analyzed, too. As can be seen from the analysis performed, the mean weight of whole smolts amounted to 42.7 g ranging from 16.0 to 167 g, whilst the mean weight of gutted fish was 36.8 (range 15.0-111.3 g - Tab. 5).

Table 5

Weight (g) of sea trout smolts of the Gowienica river

Year	n	$\bar{x} \pm m$	δ	V	Range
Whole fish					
1980	56	40.9 ± 2.9	21.423	52.4	16.8 - 118.7
1982	120	40.3 ± 1.0	11.115	27.6	16.0 - 86.0
1983	61	36.1 ± 1.3	10.447	28.9	18.9 - 67.4
1984	50	28.7 ± 1.2	33.807	57.6	28.2 - 167.0
Total	287		20.499	48.0	16.0 - 167.0
Gutted fish					
1980	56	37.9 ± 2.7	20.473	54.0	15.0 - 111.3
1982	26	34.5 ± 1.8	9.413	27.3	15.5 - 51.3
Total	82	36.8 ± 2.0	17.800	48.3	15.0 - 111.3

Mean weights of ungutted smolts in the particular years of study covered the wide range from 36.1 to 58.7, while in gutted ones - 34.5-37.9 g.

Moreover, trend of weights in 1 cm length classes of the sea trout smolts from the Gowienica river was established, for the whole period of study (Tab. 6). It appeared that range of weights of fishes in the particular 18 length classes (from 12 to 29 cm) was pretty wide. For example, in the 16 cm length class, being the most numerous one, at the mean weight of 37.2 g for non-gutted fish, weight of individuals ranged from 28.0 to 49.7 g. On the other hand, however, at the mean weight of gutted smolts amounting to 34.1 g, weights of individuals covered the range 25.0-46.7 g.

Table 6

Smolt weight (g) of the Gowienica river over length classes

Length class (cm)	n	Whole fish		n	Gutted fish	
		\bar{x}	Range		\bar{x}	Range
12	2	17.2	16.0 - 19.0	-	-	-
13	10	21.3	18.9 - 27.0	8	18.6	15.5 - 21.8
14	26	23.8	16.8 - 32.4	10	21.6	15.0 - 30.0
15	42	31.4	24.9 - 38.1	12	28.9	24.0 - 35.5
16	74	37.2	28.0 - 49.7	18	34.1	25.0 - 43.7
17	47	42.1	32.0 - 51.0	11	39.7	28.0 - 50.0
18	44	48.2	32.0 - 67.4	11	43.0	31.0 - 60.2
19	20	55.7	44.0 - 76.8	6	48.5	38.0 - 71.9
20	6	63.5	54.0 - 78.0	2	53.5	46.0 - 61.0
21	2	77.0	68.0 - 86.0	-	-	-
22	6	89.9	78.0 - 118.7	3	93.8	85.0 - 111.3
23	1	102.2	-	-	-	-
24	2	107.5	104.0 - 111.0	1	105.0	-
25	1	130.8	-	-	-	-
26	2	136.5	136.0 - 137.0	-	-	-
27	1	159.0	-	-	-	-
28	-	-	-	-	-	-
29	1	167	-	-	-	-
Total	287	42.7	16.0 - 167.0	82	36.8	15.0 - 111.3

The influence of length on the weight of 287 non-gutted smolts from the Gowienica river was calculated by means of the equation 1 then presented in Fig. 2. As can be seen from the diagram the weight increments are directly proportional to the length increments. That dependence is statistically significant at α level = 0.001. Additionally it was found that weight of smolts is in 88 % length-dependent what is displayed by the coefficient of determination $R^2=88.05$.

The coefficient of condition was established for 287 non-gutted smolts of trout with the length and weight recorded as well as for 82 gutted fishes. The mean coefficient of condition for all sea trout smolts of the Gowienica river amounted to 0.96 ranging from 0.67 to 1.33 for whole fish and 0.88 (0.6-1.25) for gutted ones (Tab. 7). The mean values of coefficients of condition in lengths classes indicate for the decrease of condition of sea trout smolts of the Gowienica river as the length grows. In order to illustrate the phenomenon, discussed the decrease of value of the mean coefficient of condition in the group of non-gutted smolts between the smallest 12-cm length class amounting to 1.15 and the biggest one 29 cm amounting to 0.72 can be demonstrated; similarly, in the group of gutted smolts, between the smallest 13-cm length class amounting to 0.95 and biggest one 20 cm. amounting to 0.72 (Tab. 8).

Calculations performed additionally show the wide range of values of coefficients of condition of sea trout smolts in the particular 1cm length class. For example, in the 16-cm length class being the most numerous one with the mean coefficient of condition of fish non-gutted amounting to 1.0, the range found was 0.75-1.33, while in gutted smolts with the

mean coefficient of condition amounting to 0.92, individual values cover the range from 0.67 to 1.25.

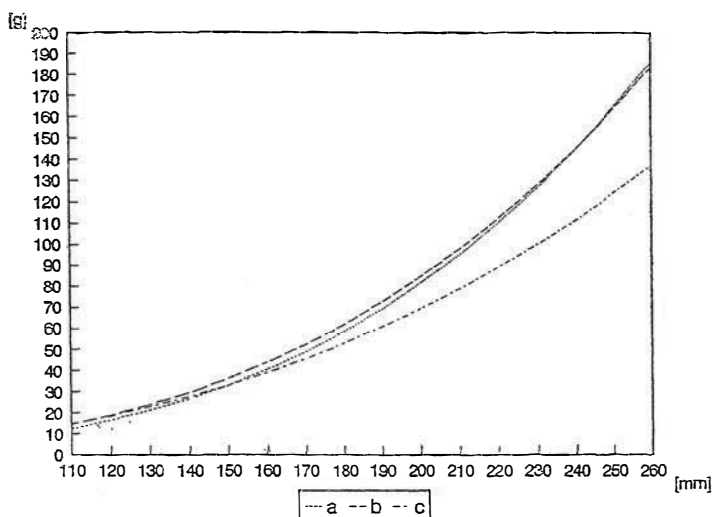


Fig. 2 Comparison of power curves of length-weight relationship of whole sea trout smolts of Pomeranian rivers

- a - from Osówka river grown from the alevin feeding;
 $W = 4.8676 \cdot L^{3.14195}$ (according to Chełkowski 1990)
- b - from Osówka grown from the fry;
 $W = 1.374 \cdot L^{2.95099}$ (according to Chełkowski 1995)
- c - from Gowienica grown from the alevin feeding;
 $W = 7.7582 \cdot L^{2.58671}$ (from the study).

Table 7

Coefficients of condition (K) of sea trout smolts of the Gowienica river

n	$\bar{x} \pm m$	δ	V	Range
Whole fish				
287	0.96 ± 0.01	0.136	14.13	0.67 - 1.33
Gutted fish				
82	0.88 ± 0.02	0.168	18.99	0.58 - 1.25

As it was mentioned, fish catches in the Gowienica river were checked at 7 a.m. and 7 p.m. Smolts captured at 7 a.m. were recorded as night-descending, while those ones collected at 7 p.m. - as day-descending. The catch register for the first four years of study (1980-1983) reveals the small number of day-descending fish ($n=36$; 2.2 %). Occurrence of the fish was stated only in 1980. The prevailing part of smolts in the region of Widzieńsko, however, were migrating downstream in the night ($n=1565$; 97.8 %).

In the Pomeranian rivers together with the sea trout smolts, juveniles of trout in parr stage migrate downstream, too [Chełkowski 1995]. Possibility of the descending exists also in the case of the river trout (*Salmo trutta m. trutta* L.) which turns from the resident form into migratory one, penetrating into the population of sea trout smolts, according to Skrochowska

[1953, 1969] and Żarnecki [1961]. The catch of fish provided with 53 individuals described. In the first year of study 39 fishes occurred, in the second one - 11, in the third - 1 and in the fifth - 2. No such fish were found in the fourth year. The contribution of fish in parr stage to the whole sample amounted to 2.64 %, in particular years ranging from 0 to 10 %. 19 fishes out of all specimens in parr stage studied, selected by random (comprising 13 non-gutted smolts) were analyzed in respect to length. Fishes in parr stage attained the mean length of 13.6 ± 0.36 cm and weight of 22.0 ± 2.44 g, with the range of length varying from 10.4 to 16.5 cm and weight from 10 to 38 g. As can be seen from the data obtained, lengths of fish in parr stage covered the lower range of lengths of sea trout smolts from the Gowienica river. Weights of 9 fishes, too, covered the lower range of weights of sea trout smolts examined, whereas 4 fishes in stage parr had slightly smaller weights than the smallest weights of sea trout smolts from the Gowienica river.

Table 8

Coefficients of condition (K) of sea trout smolts of the Gowienica river over length classes

Length class (cm)	n	Whole fish		n	Gutted fish	
		\bar{x}	Range		\bar{x}	Range
12	2	1.15	1.05 - 1.25	-	-	-
13	10	1.09	0.97 - 1.23	8	0.95	0.79 - 1.12
14	26	0.97	0.68 - 1.32	10	0.88	0.61 - 1.22
15	42	1.03	0.82 - 1.25	12	0.94	0.74 - 1.16
16	74	1.00	0.75 - 1.33	18	0.92	0.67 - 1.25
17	47	0.94	0.71 - 1.15	11	0.88	0.62 - 1.11
18	44	0.90	0.67 - 1.26	11	0.80	0.58 - 1.12
19	20	0.88	0.69 - 1.21	6	0.77	0.60 - 1.14
20	6	0.86	0.73 - 1.05	2	0.72	0.62 - 0.82
21	2	0.89	0.79 - 1.00	-	-	-
22	6	0.90	0.78 - 1.19	3	0.94	0.86 - 1.12
23	1	0.90	-	-	-	-
24	2	0.83	0.80 - 0.86	1	0.81	-
25	1	0.89	-	-	-	-
26	2	0.82	0.82 - 0.83	-	-	-
27	1	0.85	-	-	-	-
28	-	-	-	-	-	-
29	1	0.72	-	-	-	-
Total	287	0.96	0.67 - 1.33	82	0.88	0.58 - 1.25

DISCUSSION

The mean length of sea trout smolts of the Gowienica river, amounting to 16.9 cm is included in the range of mean lengths of sea trout smolts from the Pomeranian rivers: Rega [Chełkowski 1978], Mołstowa [Chełkowski et al. 1981], Osówka [Chełkowski 1990, 1993] and Parsęta [Dębowski et al. 1992], ranging from 15.3 to 19.6 cm. Similarly the lower range of length of sea trout smolts from the Gowienica river (11.0 cm) was included in the lower range

of length of sea trout smolts from the rivers discussed (9.3-12.6 cm). However the upper range of length of sea trout smolts from the Gowienica river (29.0) exceeds the upper range of length of sea trout smolts from Rega, Mołstowa, Osówka and Parsęta (23.9-26.1 - Tab.9).

Sea trout smolts from the Gowienica river (under study), from the Mołstowa river [Chełkowski et al. 1982] and from the Osówka [Chełkowski 1990, 1995] occur most abundantly in six 1 cm length classes ranging from 13 to 18 cm, only smolts from Rega [Chełkowski 1978] in seven length classes (17-23 cm - Tab. 10).

Mean weight of sea trout smolts of the Gowienica river amounting to 42.7 g is included in the mean weights of sea trout smolts from the Rega river [Chełkowski 1978], Mołstowa [Chełkowski et al. 1982] and Osówka [Chełkowski 1990; Chełkowski 1995], covering the range from 29.1 to 82.0 g. Similarly ranges of weights of smolts studied amounting to 16-167 g are included in the range of weights of sea trout smolts from the rivers compared, including the weights from 7.0 to 177.6 g (Tab. 11).

The comparison can be also made between the relationship length-weight of sea trout smolts of the Gowienica river and sea trout smolts of Osówka river [Chełkowski 1990; Chełkowski 1995], based on curves established by means of parameters of the power functions (Fig. 2). It appeared that in the range of length 110-160 mm weights of sea trout smolts of the Gowienica river are close to the weights of sea trout smolts of Osówka. However in the wider range of lengths, weights of sea trout smolts of the Gowienica river are lower where compared to the sea trout smolts of Osówka.

As can be seen from the calculations made, the mean lengths of sea trout smolts of the Gowienica river decrease in the periods (decades) of downstream migrations. The similar observations refer to the smolts of Mołstowa [Chełkowski et al. 1981], Osówka [Chełkowski 1990, 1993 a] and Parsęta rivers [Dębowski et al. 1992].

The mean coefficient of condition of non-gutted sea trout smolts of the Gowienica river amounting to 0.96, appeared to be slightly lower than mean coefficients of condition of non-gutted sea trout smolts of the Pomeranian rivers - Rega and Osówka, ranging from 1.04 to 1.09 [Chełkowski 1978; 1992; 1995] (Tab. 12). However the ranges of coefficients of condition of non-gutted sea trout smolts varying from 0.67 to 1.33 revealed to be similar to the ranges of coefficients of condition amounting to 0.71-1.37 of whole fish from Rega and Osówka. Similar trend was also found in coefficients of condition of sea trout smolts being compared, however, as could be expected, values of coefficient of condition are lower than those given above due to weights of the gutted fish taken for the calculations.

In the lower Gowienica river as well in Mołstowa [Chełkowski et al. 1992] and Osówka [Chełkowski 1991; 1993 a] smolts were migrating mostly in the night (7 p.m.-7 a.m.), less intensively during the day time (7 a.m.-7 p.m.). However in the upper Parsęta, according to Dębowski et al. [1992] smolts were migrating mainly during the day time, less intensively in the night. In the river Piddle (South England), according to Solomon [1978], smolts of the sea trout and salmon were migrating mainly in the night, less intensively during the day time.

It seems to be interesting that smolts of salmon (*Salmo salar* L.) in the Swedish river Ricklea flowing into the Gulf of Bothnia constituting the north part of Baltic Sea, according to Österdal [after Thorpe and Morgan, 1978] migrating in the early period (17 May - 15 June) mainly in the night, less intensively during the day time, while in the later period (from the latter part of June to 5 July) - intensively.

Table 9

Comparison of lengths (cm) of sea trout smolts of Pomeranian rivers

x	Range	River	Author	Comments
19.6	12.6 - 26.1	Rega	Chełkowski 1978	
15.2	9.3 - 23.9	Mołstowa	Chełkowski et al. 1981	
15.5	11.1 - 26.0	Osówka	Chełkowski 1990	
15.3	11.8 - 24.5	Osówka	Chełkowski 1993	
18.9	10.0 - 26.0	Paręta	Dębowski et al. 1992	x - from the calculation performed
16.9	11.0 - 29.0	Gowienica	from the study	

Table 10

Comparison of frequency of occurrence (in \bar{x}) of sea trout smolts of the Pomeranian rivers over length classes

Length class (cm)	Rega*	Mołstowa*	Osówka***	Osówka ****	Gowienica from the study	Total
11	-	0.3	-	-	0.1	0.2
12	-	3.2	1.6	0.7	1.3	2.4
13	0.5	11.0	2.4	4.6	4.7	8.3
14	-	25.5	10.5	15.7	14.5	20.6
15	3.7	25.2	32.3	25.2	17.7	22.5
16	2.1	16.7	27.4	24.9	16.6	16.8
17	7.3	7.3	8.1	14.9	14.0	9.6
18	6.8	4.9	6.5	9.6	9.3	6.5
19	10.5	2.5	2.4	1.4	5.0	3.4
20	18.9	1.4	2.4	1.1	2.8	2.5
21	15.2	1.4	3.2	-	3.4	2.4
22	17.8	0.4	0.8	0.7	3.7	2.0
23	7.3	0.2	0.8	0.8	3.0	1.3
24	4.2	-	0.8	-	2.0	0.7
25	4.7	-	0.8	0.4	0.9	0.5
26	0.5	-	-	-	0.4	0.1
27	0.5	-	-	-	0.3	0.1
28	-	-	-	-	0.2	0.1
29	-	-	-	-	0.1	-
%	100.0	100.0	100.0	100.0	100.0	100.0
n	191	3197	124	284	1430	5226

* Chełkowski 1978

**Chełkowski et al. 1982

***Chełkowski 1990

****Chełkowski (1995)

Table 11

Comparison of weights (g) of whole sea trout smolts of Pomeranian rivers

\bar{x}	Range	River	Author
82.0	19.5 - 177.6	Rega	Chełkowski 1978
29.1	7.0 - 117.5	Mołstowa	Chełkowski et al. 1982
4.07	13.4 - 206.5	Osówka	Chełkowski 1990
40.8	16.3 - 171.8	Osówka	Chełkowski 1993
42.7	16.0 - 167.0	Gowienica	from the study

Table 12

Comparison of coefficients of condition of sea trout smolts of Pomeranian rivers

\bar{x}	Range	River	Author
Whole fish			
1.04	0.81 - 1.30	Rega	Chełkowski 1978 (with supplement of range
1.09	0.77 - 1.25	Osówka	Chełkowski 1992
1.08	0.71 - 1.37	Osówka	Chełkowski (1995)
0.96	0.67 - 1.33	Gowienica	from the study
Gutted fish			
1.01	0.71 - 1.17	Osówka	Chełkowski 1992
0.99	0.68 - 1.22	Osówka	Chełkowski (1995)
0.88	0.58 - 1.25	Gowienica	from the study

CONCLUSIONS

Sea trout smolts grown in the Gowienica catchment area from the alevin feeding released, attain the mean length of 16.9 cm, ranging from 11 to 29 cm and the mean weight of 42.7 g, ranging from 16 to 176 g in whole fish and the mean weight of 36.8 g ranging from 15.0 to 11.3 g in gutted smolts.

Sea trout smolts of Gowienica river occurred most abundantly in seven consecutive length classes in the interval of 13-19 cm. 81.8 % of smolts examined occurred in this range of length.

During the migration the mean length of sea trout smolts of Gowienica river changes; at the beginning the length appeared to be the largest decreasing with the period of run. The relationship length-weight of whole sea trout smolts of Gowienica river can be described as follows:

$$W = 7.7582^{-5} * L^{2.58671}$$

Coefficients of condition of sea trout smolts of Gowienica river attain the mean value of 0.96 (range: 0.67-1.33) for whole fish and 0.88 (range: 0.58-1.25) for gutted ones.

Sea trout smolts grown in the Gowienica catchment area migrate downstream into the region of lower run of river mainly in the night (97.8 %), less intensively (2.2 %) during the day time.

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BIOLOGICZNA CHARAKTERYSTYKA SMOLTÓW
TROCI WĘDROWNEJ (*SALMO TRUTTA M. TRUTTA L.*)
WYROSŁYCH W ZLEWNI RZeki GOWIENICA

STRESZCZENIE

W pięciu kolejnych latach badań (1980-1984) pozyskano, żakiem skrzydłowym, w dolnej Gowienicy, uchodzącej do Zalewu szczecińskiego, 2010 smoltów troci wędrownej (*Salmo trutta m. trutta L.*), które wyrosły w zlewni z wsiedlonego wylęgu żerującego. Smolty troci osiągnęły średnią długość 16.9 cm, przy zakresie wahań od 11 do 29 cm i średnią masę 42,7 g całych ryb przy zakresie wahań - 16 do 167 g. Smolty najliczniej wystąpiły w siedmiu jednocentymetrowych klasach długości w przedziale 13-19 cm. W tym zakresie długości wystąpiło 81,8 % badanych smoltów. Średnia długość smoltów troci w kolejnych dekadach wędrówek maleje.

Zależność między długością a masą całych smoltów troci przyjmuje postać:

$$W = 7,7582^{-5} * L^{2,58671}$$

Współczynnik kondycji smoltów troci osiąga wartość 0,88, przy zakresie wahań od 0,58 do 1,25 ryb patroszonych. Smolty troci w rejonie dolnego biegu rzeki Gowienica spływają głównie nocą (97,8 %), a w znacznie mniejszej ilości w ciągu dnia (2,2 %).

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