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FOOD SELECTION BY POND-REARED SIBERIAN STURGEON *Acipenser baeri* (Brandt) FRY

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ABSTRACT. Selection of zooplankton, benthic and plant-dwelling prey by Siberian sturgeon fry was studied. The fish showed distinct selectivity towards large insect larvae, especially plant-dwelling *Cloëon dipterum*. Small planktonic crustaceans – *Eucyclops serrulatus*, and very abundant in the pond *Bosmina longirostris* were avoided.

Key words: STURGEON, FRY, FOOD SELECTIVITY, POND.

INTRODUCTION

Fish survival, growth rate, and further development at early developmental stages is strongly affected by food availability, quantity, and quality.

Availability of suitable food for fish juveniles is particularly important in case of predatory species, poorly tolerating starvation, such as pike (Szczerbowski 1969, Załachowski 1970), or showing little feeding activity, such as Siberian sturgeon (Pyka, Kolman 1997).

Assessment of food preferences of Siberian sturgeon juveniles is important for successful pond-rearing of this species based on natural food. Taking into consideration sturgeon food selectivity, it is possible to promote development of suitable food organisms in the ponds, and increase their productivity. Till now, little attention has been paid to feeding of Siberian sturgeon on natural food. Maljutin (1971) described general preferences of this species in European water bodies, and Ruban (1991) gave a brief information on Siberian sturgeon feeding in rivers. Relationships between pond food supply and sturgeon foraging were characterised in a more detailed way by Mołodcowa (1992).

An assessment of food selectivity of pond-reared Siberian sturgeon fry for zooplankton, benthos, and plant-dwelling animals was the aim of the present study.

MATERIAL AND METHODS

The present study contributes to a complex research project concerning sturgeon rearing, carried out since 1993 in the Fish Hatchery Montowo (Polish Anglers Union, Toruń). The results of studies on feeding of Siberian sturgeon fry in ponds were analysed (Pyka, Kolman 1997).

The study was based on 52 130-day-old fry of average individual body weight from 0.72 g (0.59-0.94 g) to 50.45 g (45.36-65.70 g), and average body length from 50.2 mm (45.5-57.0 mm) to 215.4 mm (200-240.5 mm). The sturgeons were reared in an earthen pond of 0.03 ha, average depth 0.8 m., and maximum depth 1.7 m.

The fish were harvested in the rearing season 1994, from June 5, to August 28, at 9:00 a.m., every 3 days in the initial growth phase (until the age of 67 days), and then every 7 days, until the end of the experiment (August 28, 1994). The fish were preserved in 4% formaldehyde solution. Zooplankton, benthos, and plant-dwelling animals were sampled on the same days.

Contents of fish alimentary tracts were analysed using a binocular. Food organisms were counted and measured with 0.01 mm accuracy. Zooplankton biomass was calculated using weight standards (Starmach 1955) and our own unpublished data – in the case of Ostracoda and Insecta larvae. Total number of 185 guts were analysed (mean number of 12 fish in each sample).

Food selectivity of Siberian sturgeon fry was evaluated according to Ivlev's (1955) formula: $E = (r_1-p_1)/(r_1-p_1)$, where: r_1 – percentage of the prey item in the gut content, and p_1 – percentage of the same item in the environment.

RESULTS

COMPOSITION AND DYNAMICS OF FOOD OF SIBERIAN STURGEON FRY.

Food of Siberian sturgeon fry included Cladocera – *Ceriodaphnia sp.*, *Moina sp.*, *Daphnia longispina*, and *Simocephalus sp.*, Insecta larvae – Chironomidae (mainly *Chironomus plumosus*), and Ephemeroptera - *Cloëon dipterum*, Ostracoda – *Cyclocypris laevis*, *Condonata candida*, *Cypris pubera*. Contribution of these animals to total number of food organisms is shown in Fig. 1C. The results indicate that in the initial period of growth the sturgeons fed mainly on Chironomidae, comprising 20-90% of all food items. The fish readily fed also on planktonic Cladocerans - 10.1-75%. In later phase of sturgeon growth, in summer, sturgeon food consisted mainly of Ostracoda, very

abundant in the pond, and Ephemeroptera larvae (*Cloëon dipterum*). The highest percentage of Ostracoda was observed in July (98.1-99.0%), and in August *Cloëon dipterum* dominated (63.6-86.4% of sturgeon food). Ostracoda, Chironomidae, and Cladocera were less numerous, comprising 4.0-7.3%, 6.4-30%, and 0-3.2% of sturgeon prey respectively.

COMPARISON OF FOOD COMPOSITION OF SIBERIAN STURGEON FRY, AND CONTRIBUTION OF PREY ORGANISMS IN THE ENVIRONMENT – FOOD SELECTIVITY

Contribution of plankton, benthos, and plant-dwelling animals to food of Siberian sturgeon fry differed considerably from the percentage of these organisms in the environment (Fig. 1). During the entire experimental period, the fish avoided *Bosmina longirostris*, which was dominating in the pond. The sturgeons ignored also *Eucyclops serrulatus*, rarely encountered in the environment. Among Ephemeroptera larvae, plant-dwelling *Cloëon dipterum* were preferred. Over the entire experimental season, the sturgeons did not show selectivity either towards small crustaceans – *Ceriodaphnia sp.*, and *Moina sp.*, or towards larger ones – *Daphnia longispina*. Low values (usually negative) of selectivity index were observed for Chironomidae – *Chironomus plumosus* predominating among benthic and plant-dwelling animals (Fig. 2). They were present in the alimentary tracts of most of the fish in the entire season (except July 11), but their share in the pond was very high (14.0-98.3%). After mass development in the pond, Ostracoda became the only food of Siberian sturgeon fry (Fig. 2).

DISCUSSION

Siberian sturgeon food composition and its seasonal changes are determined mainly by: qualitative and quantitative composition of prey organisms in the environment and their availability. Locomotory speed of prey is also an important factor affecting fish feeding (Szlauer 1965), modifying food availability, and thus food selectivity of fish. This factor is particularly important in case of fish showing low feeding activity, such as Siberian sturgeon fry (Pyka, Kolman 1997).

Dynamics of food selectivity index (Fig. 2) calculated for various prey organisms showed that small, slowly swimming planktonic animals were not selected by the sturgeons, and some of them were even completely avoided. The fish preferred Insecta larvae, mainly Ephemeroptera – large, plant-dwelling *Cloëon dipterum* (usually pos-

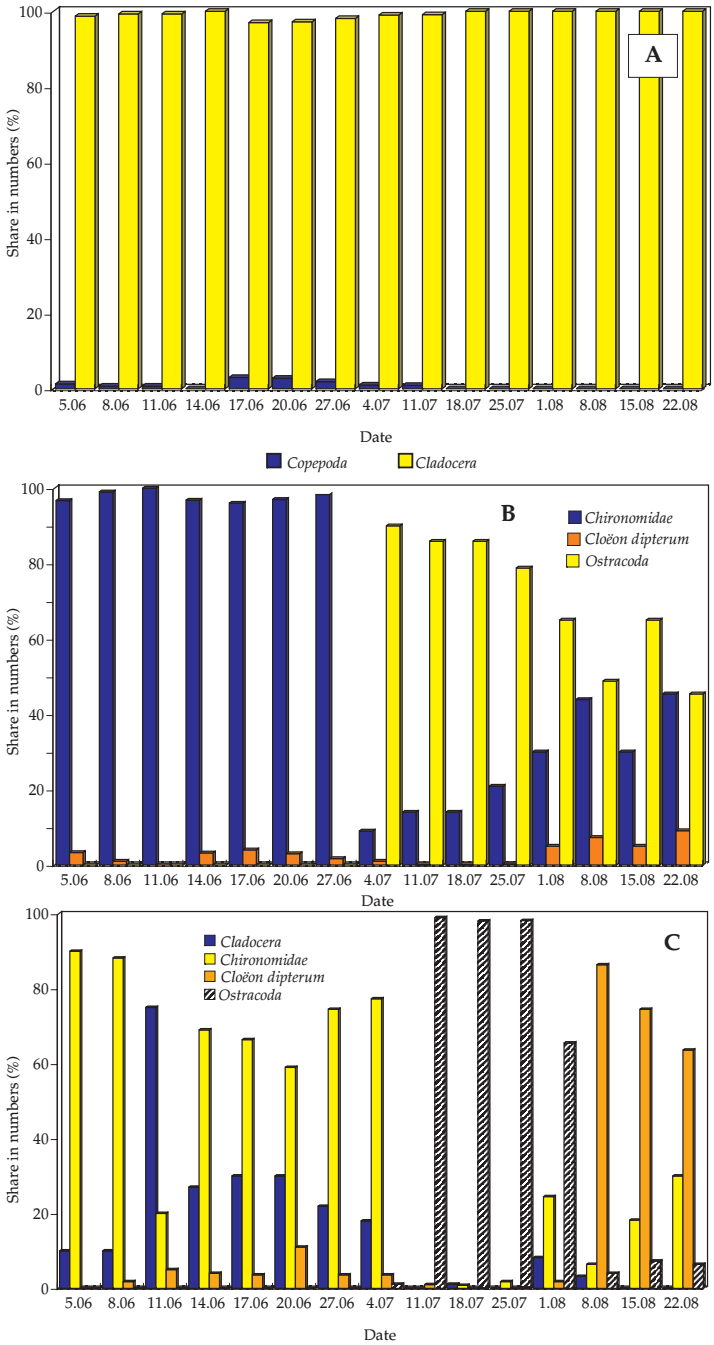

Fig. 1. Comparison of the composition of prey organisms in the ponds (A, B), and food composition of Siberian sturgeon fry (C), as percentage of total number of organisms.

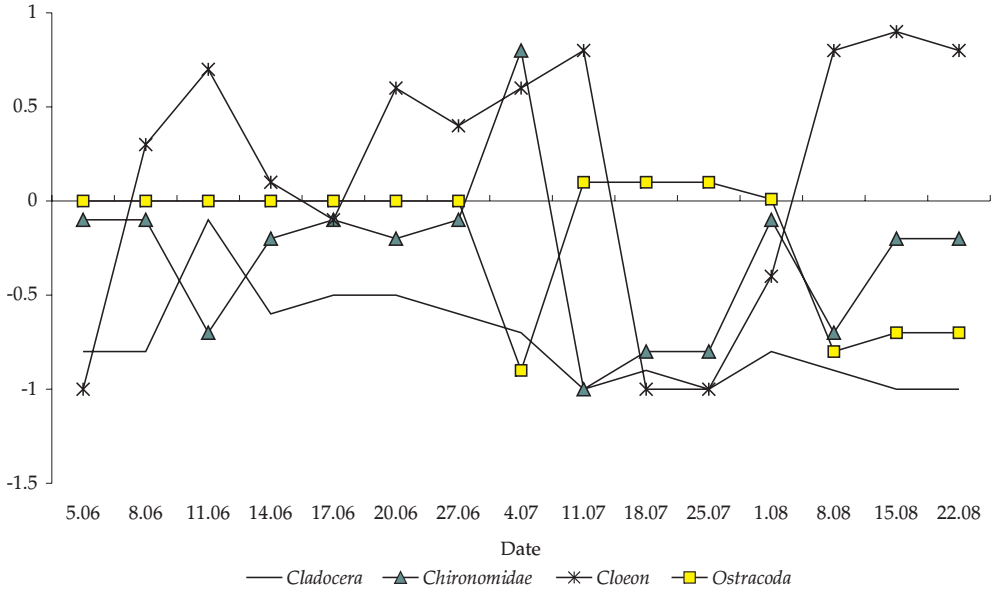

Fig. 2. Dynamics of food selectivity index in Siberian sturgeon fry.

itive values of selectivity index). It seems that this food item was selected by the sturgeons due to large size. Selectivity towards large prey was observed in other predatory fish such as pike-perch (Nagięć 1966), pike (Pyka 1995), and in non-predatory species – common carp (Kouril et al. 1981). Sturgeon preference for *Cloëon dipterum* might have resulted from bottom life and low feeding activity of this fish. *Cloëon dipterum* inhabit the same (bottom) zone of the reservoir and are easily accessible to the fish due to their poor escape ability.

CONCLUSIONS

Pond-reared Siberian sturgeon fry showed selectivity towards large Insecta larvae, mainly *Cloëon dipterum*.

Small zooplankters, such as *Bosmina longirostris*, and *Eucyclops serrulatus*, which dominated among the prey organisms, were completely avoided by the sturgeons.

Sturgeon food selectivity was determined by prey size, locomotory activity, and habitat.

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STRESZCZENIE

WYBIÓRCZOŚĆ POKARMOWA NARYBKU JESIOTRA SYBERYJSKIEGO *Acipenser baeri (Brandt)* W WARUNKACH CHOWU STAWOWEGO

W pracy omówiono wybiórczość pokarmową narybku jesiotra syberyjskiego, w wieku od 50 do 130 dni i średniej masie jednostkowej od 0,72 do 50,45 g oraz średniej długości ciała od 50,2 mm do 215,4 mm, podchowywanego w stawie ziemnym. Narybek jesiotra syberyjskiego wykazywał wybiórczość pokarmową w stosunku larw *Insecta*, głównie *Cloeon dipterum* oraz okresowo pojawiających się stawie – *Ostracoda*. Nie przejawiał natomiast wybiórczości pokarmowej w stosunku do skorupiaków z grupy *Cladocera* (*Ceriodaphnia sp.*, *Moina sp.* i *Daphnia longispina*). Niskie wskaźniki wybiórczości pokarmowej osiągały *Chironomidae*, ze względu na ich masowe występowanie w stawie. Do składników całkowicie pomijanych należały skorupiaki planktonowe – *Eucyclops serrulatus* i *Bosmina longirostris*.

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