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Short Term Secondary Production and Population Dynamics of Crustacea Rotifera in Three Different Biotops of Neusiedler See (Austria)

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Abstract: This paper describes the population dynamic parameters of the two crustaceans *Diaphanosoma mongolianum, Arctodiaptomus spinosus* and four rotifer species which are *Filinia longiseta, Hexartra mira, Brachionus angularis* and *Polyarthra vulgaris.*

Key Words: Biomass, Secondary production, Cladocera, Copepoda, Rotifera

Neusiedlersee (Avusturya)'nın Üç Farklı Biyotobundaki Crustacea ve Rotifera Türlerinin Kısa Dönem Populasyon Dinamikleri ve Sekonder Prodüksiyonları

Özet: Bu çalışmada, Neusiedlersee'nin üç farklı biyotopunda bulunan, iki crustacea *Diaphanosoma monqolianum, Arctodiaptomus spinosus* ve dört rotifera *Filinia longiseta, Hexarthra mina, Brachionus anqularis* ve *polyarthra vulgaris*'in populasyon dinamiği parametreleri ve kısa dönem sekonder prodüksiyonları hesaplanmıştır.

Anahtar Sözcükler: Biyomas, Sekonder prodüksiyon, Cladocera, Copepoda, Rotifera

Introduction

This article presents part of a study on the production and population dynamics of copepods, cladocerans and rotifers in three water bodies of Neusiedler See.

Earlier studies have dealt with some of the ecological aspects of the zooplanktonic organisms and lake water as well (1, 5a, 5b, 8, 9, 10, 19). But comparision of the production and zooplankton composition have been firstly done in the three different water bodies.

In Neusiedler See main zooplankton taxa were cladocera, copepoda and rotifera.

Population growth of rotifers is rapid because of their parthenogenetic reproduction, they show short development times in favourable conditions (1). Although recent work reveals that rotifer production is mainly controlled by predation of fish larvae and big zooplanakton, limited food concentrations and other parameters also play an important role.

The aim of this study is to determine secondary production and population dynamics of the zooplanktonic organisms and to compare in the three water bodies according to zooplankton composition and production.

Also this study is a model for the secondary production estimation and it can easily applicable for the natural and productive lakes.

Study Area

This study was carried out in three biotops of Neusiedler See:

1. The open lake
2. The water site within the reed belt called "Ruster Poschn"
3. The "Zug", another wated body within the reed called little lake, not as isolated from the open lake as Ruster Poschn (fig. 1).

Neusiedler See is an eutrophic, shallow (depth 110 cm), well mixed lake which were characterized by its high pH (7.5-9) and conductivity 1150-2800 µS. The open water zone (143 km^2) was characterized by the high concentration of suspended solids which are stirred up from the bottom by wind actions (10). It is surrounded reed belt (*Phragmites communis*) which covers 178 km^2 (10).

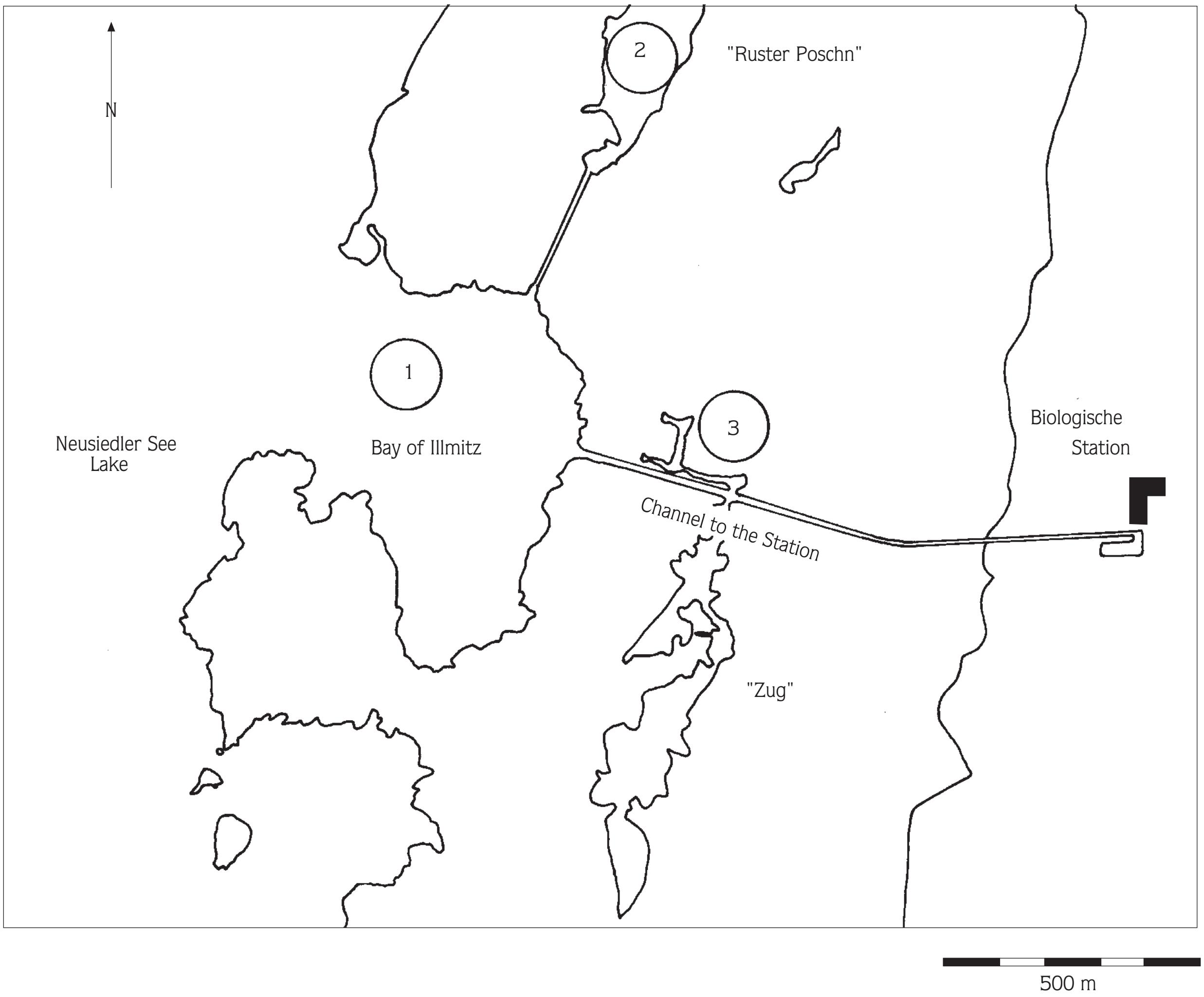

Figure 1. Sampling area of Neusiedler See

Wthin the reed belt several water bodies can be found such as “Ruster Poschn” and “Zug”. Their water colour was quite clear but coloured by humic substances (10), pH and conductivity were similar to that of the open water. The “Zug” is very shallow (mean depth 60 cm) and connected with the open lake by a channel. High H_2S concentrations were found in all three biotops. The chemical and physical parameters were given in Table 1-3.

Dates	Depth (cm)	Conductivity (µS)	pH	Secchi D. (cm)	Temperature (˚C)	Chl-a (µg/l)
30.07.1991	100	2450	8.5	25	21	2.79
02.08.1991	120	2500	8.6	10	18.8	9.715
06.08.1991	110	2400	8.6	15	20.6	3.71
09.08.1991	108	2400	8.7	25	24.7	2.45
15.08.1991	105	2400	8.6	25	23.7	1.79
20.08.1991	105	2500	8.6	27	19.8	4.41

Table 1. Chemical and physical parameters in Neusiedler See

Table 2. Chemical and physical parameters in Ruster Boschn

Dates	Depth (cm)	Conductivity (µS)	pH	Secchi D. (cm)	Temperature (°C)	Chl-a (µg/l)
06.08.1991	100	2600	8.3	60	23	4.8
09.08.1991	90	2700	8.3	50	25.9	3.9
13.08.1991	100	2600	8.2	65	24	6.07
16.08.1991	105	2600	8.2	70	23.2	5.89
21.08.1991	100	2600	8.6	80	21.1	6

Table 3. Chemical and physical parameters in Little Lake

Dates	Depth (cm)	Conductivity (mS)	pH	Secchi D. (cm)	Temperature (°C)	Chl-a (mg/l)
31.07.1991	70	2500	8.4	20	21.2	19.38
02.08.1991	50	2300	8.7	20	18.9	8.075
05.08.1991	55	2300	8.3	18	19.4	4.745
08.09.1991	45	2650	7.8	14	24	3.34
11.08.1991	40	2500	8.7	25	27	3.705
14.08.1991	50	2500	8.4	20	23.7	5.51

Method

Sampling

Samples were taken every three days from the sampling stations of the each water site between 30.07.-30.08.1991. Zooplankton samples were collected randomly with a plankton net (40 µm mesh) and towed vertically through the water column, preserved using 4% formalin, and examined in the laboratory. During the sampling period, depth, conductivity, pH and temperature were determined, Secchi depth was measured with a white and black 20 cm diameter disc. Chlorophyll a concentration of the composite samples was determined according to the method of Youngman (11).

The samples were diluted one or twice and 10 cc of from the each bottle were counted under inverted microscope. Rotifer species were identified using the key to Edmondson, 1959; Pejler, 1962; Kuttikova, 1970; Koste 1978; Kolisko, 1974 (12-17). The data transformed to logarithm.

The length-weight regressions of Ruttner-Kolisko (18) were used to determine dry weight. The length frequency analysis of the zooplankton were determined using an ocular micrometer. From the each samples 20-30 individuals were measured. Carapace length of copepods, total length of cladocerans, body length of rotifers were measured and for some species the spine length was also measured according to Herzig (9).

Population dynamics of the dominant zooplankton taxa determined according to the methods of described by (2-8). The estimation of production determined from the populations turnover method are used by Herzig (9).

Population dynamics were analyzed using the method of Paloheimo, 1974 Edmondson, 1971 (3, 19). Instantaneous birth rates b' and finite birth rate B, population growing rate r', ínstantaneous death rate d'and finite death rate D, were calculated from collected samples.

Production was calculated from turnover time (T) and biomass.

The development time of *Arctodiaptomus spinosus* and *Filinia longiseta* was determined according to Herzig (1, 5a, b).

Results and Discussion

The values of conductivity, pH, secchi, depth and temperature, at all the three water sites for the each sampling day were given in table (Tab. 1-3). According to the, these biotops had almost nearly the same characters. Mean depth of Neusiedler See was 110 cm, Ruster Poschen was 100 cm and Zug was 50 cm. All the biotops generalized high alkalinity and high conductivity. Chlorophll-a concentrations was given in table 1-3.

According to the biomass of zooplankton of Neusiedler See, Ruster Poschen and Zug, *Arctodiaptomus spinosus* and *Diaphanosoma mongolianum* were the most abundant species.

The population dynamics of the main taxa were shown in Table 4-13. From the minimum, maximum and the mean of instantaneous birth rate, the intrinsic increase rate (population growing rate), the instantaneous and finite death rate, the turnover time and the finally production were calculated for *Arctodiaptomus spinosus, Diaphanosoma mongolianum, Polyarthra vulgaris, Brachionus angularis, Filinia longiseta* and *Hexarthra mira.*

Rotifer species in the three biotops

Brachionus angularis Gosse

Brachionus urceolaris O.F.M.

Brachionus quadridentatus Hermann

Euchlanis dilatata Ehrenberg

Keratella quadrata O. F. M.

Lecane luna O. F. M.

Lophocharis salpina Ehrenberg

Polyarthra vulgaris Carlin

Filinia longiseta Ehrenberg

Hexarthra mira Hudson

occur in three biotops

Lecane grandis Murray

occur only in Neusiedler See

Asplanchna sieboldi Leydig

Cephalodella gibba Ehrenberg

Lecane ohionensis Herrick

Mytilina ventralis Ehrenberg

Squatinella mutica Ehrenberg

Trichocerca rouselletti Voigt

occur in Ruster Poschen and Zug

Asplanchnaa girodi De querne

Keatella cochlearis Gosse

Keratella tropica Apstein

Testudinella patina Hermann

occur only in Ruster Poschen.

In Rotifers, the dominant taxa were *Polyarthra vulgaris, Brachionus angularis, Filinia longiseta* and *Hexarthra mira* in Ruster Poschen, Zug and Neusiedler See subsequently. Due to the highest density of these species in Ruster Poschen production was determined only in this biotop.

Table 4. *Arctodiaptomus spinosus* population dynamics in Neusiedler See

					MEAN					
Dates	Length (μm)	Weight (μg)	b'	B	r'	d'	D	T	P μg/m^3/day	chl.a μg/l
212	932	7.518	0.26	0.273	0.1	0.16	0.147	3.657	18155	2.79
215	913	7	0.322	0.307	-0.09	0.412	0.337	3.247	21937.9	9.715
219	864	5.78	0.2	0.205	0.051	0.149	0.138	4.873	9884	3.71
222	880	6.16	0.438	0.415	-0.108	0.546	0.42	0.408	14657.7	2.45
225	916	7.08	0.389	0.415	0.129	0.26	0.228	2.408	30399.6	1.79
230	940	7.7	0.193	0.187	-0.055	0.248	0.219	5.325	11340.9	4.41
233	900	6.6	0.233		-	-	-	-	-	3.325

					MAXIMUM					
Dates	Length (μm)	Weight (μg)	b'	B	r'	d'	D	T	P μg/m^3/day	chl.a μg/l
212	932	7.518	0.53	0.55	0.1	0.43	0.349	1.794	37018.6	2.79
215	913	7	0.402	0.384	-0.09	0.492	0.388	2.601	2734.3	9.715
219	864	5.78	0.32	0.328	0.051	0.269	0.235	3.045	15.817.9	3.71
222	880	6.16	0.7	0.663	-0.108	0.808	0.554	1.507	39725.6	2.45
225	916	7.08	0.582	0.621	0.129	0.453	0.364	1.609	45496	1.79
230	940	7.7	0.281	0.273	-0.055	0.336	0.285	3.657	16509.5	4.41
233	900	6.6	0.278	-	-	-	-	-	-	3.325

					MINUMUM					
Dates	Length (μm)	Weight (μg)	b'	B	r'	d'	D	T	P μg/m^3/day	chl.a μg/l
212	932	7.518	0.052	0.054	0.1	-0.048	0.049	18.28	3636.18	2.79
215	913	7	0.226	0.024	-0.09	0.316	0.27	40.21	1771.32	9.715
219	864	5.78	0.091	0.093	0.051	0.04	0.039	10.71	4492.02	3.71
222	880	6.16	0.156	0.147	-0.108	0.256	0.232	6.672	8845.2	2.45
225	916	7.08	0.273	0.291	0.129	0.144	0.134	3.431	21331.4	1.79
230	940	7.7	0.193	0.187	-0.055	0.248	0.219	5.325	11340.9	4.41
233	900	6.6	0.151	-	-	-	-	-	-	3.325

Table 5. *Diaphanosoma mongolianum* population dynamics in Neusiedler See

MEAN

Dates	Length (µm)	Weight (µg)	b’	B	r’	d’	D	T	P µg/m^3/day	chl.a µg/l
212	626	1.217	0.699	0.849	0.379	0.32	0.273	1.176	10629.5	2.79
215	815	2.72	4.85	4.953	0.042	4.808	0.991	0	43390.7	9.715
219	765	2.243	0.176	0.317	0.211	0.074	0.071	3151	19189.5	3.71
222	785	2.426	0.613	0.154	-0.269	0.445	0.359	6.48	396.88886	2.45
225	904	3.731	0.181	0.743	0.374	0.239	0.212	1.345	27158.7	1.79
230	633	1.259	0.262	0.174	-0.075	0.256	0.225	5.734	302.31	4.41
233	759	0.783	-	-	-	-	-	-	-	3.325

MAXIMUM

Dates	Length (µm)	Weight (µg)	b’	B	r’	d’	D	T	P µg/m^3/day	chl.a µg/l
212	626	1.217	0.453	0.55	0.379	0.074	0.071	1.815	5919.4	2.79
215	815	2.72	3.952	4.036	0.042	3.91	0.979	0.247	11198	9.715
219	765	2.243	0.213	0.237	0.211	0.002	0.001	4.216	4433.68	3.71
222	785	2.426	0.118	0.103	-0.269	0.387	0.32	9.665	659.879	2.45
225	904	3.731	0.438	0.531	0.374	0.064	0.061	1.882	18412.7	1.79
230	633	1.259	0.099	0.095	-0.075	0.024	0.023	10.48	1240	4.41
233	759	0.783	0.138	-	-	-	-	-	-	3.325

MINUMUM

Dates	Length (µm)	Weight (µg)	b’	B	r’	d’	D	T	P µg/m^3/day	chl.a µg/l
212	626	1.217	0.383	0.465	0.379	0.04	0.003	2.147	5000	2.79
215	815	2.72	0.46	0.469	0.042	0.418	0.341	2.128	1301	9.715
219	765	2.243	0.226	0.251	0.211	0.015	0.01	3.974	4700	3.71
222	785	2.426	0.092	0.08	-0.269	0.361	0.303	12.39	512.65	2.45
225	904	3.731	0.074	0.089	0.374	-0.3	0.34	11.14	3102.8	1.79
230	633	1.259	0.058	0.005	-0.075	0.133	0.124	17.89	723.8	4.41
233	759	0.783	0.027	-	-	-	-	-	-	3.325

Table 6. *Diaphanosoma mongolianum* population dynamics in Little Lake

MAXIMUM

Dates	Weight (µg)	b’	B	r’	d’	D	T	P µg/m^3/day	chl.a µg/l
212	1.602	0.317	0.388	0.422	-0.11	0.116	2.576	843.02	19.38
215	1.802	0.969	0.852	-0.261	1.23	0.707	1.172	7947.82	8.75
217	1.719	0.511	0.588	0.276	0.235	0.209	1.699	2386.97	4.745
220	1.802	0.613	0.532	-0.287	0.9	0.593	1.876	5039.04	3.34
223	3.962	0.613	0.684	0.217	0.342	0.289	1.46	6006.58	3.705
226	2.67	1.494	1.397	-0.135	1.629	0.803	0.715	15862	5.51
230	13.21	0.84	-	-	-	-	-	-	3.325

MEAN

Dates	Weight (µg)	b’	B	r’	d’	D	T	P µg/m^3/day	chl.a µg/l
212	1.602	0.252	0.313	0.422	-1.7	0.185	3.189	704.306	19.38
215	1.802	0.423	0.213	-0.261	0.684	0.495	4.675	1990.83	8.75
217	1.719	0.213	0.245	0.276	-0.063	0.065	4.076	993.098	4.745
220	1.802	0.255	0.221	-0.287	0.542	0.418	4.511	2094.35	3.34
223	3.962	0.309	0.345	0.217	0.092	0.087	2.897	3026.53	3.705
226	2.67	0.204	0.19	-0.135	0.339	0.287	5.24	2162.23	5.51
230	13.21	0.518	-	-	-	-	-	-	3.325

MINUMUM

Dates	Weight (µg)	b’	B	r’	d’	D	T	P µg/m^3/day	chl.a µg/l
212	1.602	0.124	0.154	0.422	0.-298	0.347	6.482	346.054	19.38
215	1.802	0.14	0.123	-0.261	0.401	0.33	8.115	1147.96	8.75
217	1.719	0.072	0.082	0.276	-0.204	0.226	12.06	335.26	4.745
220	1.802	0.047	0.04	-0.287	0.323	0.276	24.47	2473.3	3.34
223	3.962	0.266	0.297	0.217	0.049	0.047	3.366	420.55	3.705
226	2.67	0.04	0.037	-0.135	0.175	0.16	26.72	-	5.51
230	13.21	0.624	-	-	-	-	-	-	3.325

Table 7. *Arctodiaptomus spinosus* population dynamics in Little Like

MAXIMUM

Dates	Weight (µg)	b'	B	r'	d'	D	T	P $\mu g/m^3$/day	chl.a µg/l
212	6.2	0.96	1.547	0.889	0.071	0.068	0.646	24088.47	19.38
215	4.46	0.227	0.218	-0.073	0.3	0.259	4.56	14550.26	8.075
217	5.19	0.402	0.264	-0.903	1.3	0.728	3.777	1640.55	4.745
220	5.15	0.178	0.151	1.026	0.512	0.4	6.6	632.4	3.34
226	3.07	0.365	0.321	-0.334	0.624	0.464	3.109	7892.59	3.705
230	4.92	0.589	-	-0.259	-	-	-	-	5.51

MEAN

Dates	Weight (µg)	b'	B	r'	d'	D	T	P $\mu g/m^3$/day	chl.a µg/l
212	6.2	0.548	0.883	0.889	-0.341	0.406	1.132	13747.27	19.38
215	4.46	0.34	0.289	-0.073	0.413	0.338	3.46	1918.32	8.075
217	5.19	0.232	0.147	-0.903	1.21	0.703	6.77	914.604	4.745
220	5.15	0.08	0.068	1.026	0.414	0.338	14.7	158.496	3.34
226	3.07	0.164	0.144	-0.334	0.423	0.334	6.92	3542.19	3.705
230	4.92	-	-	-0.259	-	-	-	-	5.51

MINUMUM

Dates	Weight (µg)	b'	B	r'	d'	D	T	P $\mu g/m^3$/day	chl.a µg/l
212	6.2	0.096	0.154	0.889	-0.793	1.21	6.46	2407.09	19.38
215	4.46	0.131	7.91	-0.073	0.204	0.184	7.91	837.74	8.075
217	5.19	0.081	1.57	-0.903	1.06	0.654	1.57	394.6	4.745
220	5.15	-	-	1.026	-	-	-	-	3.34
226	3.07	-	-	-0.334	-	-	-	-	3.705
230	4.92	0.253	4.48	-0.259	0.512	0.4	4.48	547.792	5.51

Table 8. *Diaphanosoma mongolianum* population dynamics in Ruster Boschen

MAXIMUM

Dates	Length (µm)	Weight (µg)	b'	B	r'	D	T	P $\mu g/m^3$/day	chl.a µg/l
218	686	1.614	0.348	0.251	-0.685	0.644	3.969	6498.03	4.87
221	561	0.871	0.603	0.758	0.442	0.148	1.318	1352.34	3.9
225	591	1.021	0.7	0.78	0.215	0.384	1.28	9579.86	6.07
228	663	1.45	0.187	0.18	-0.072	0.228	5.542	5997.78	5.89
233	650	1.365	0.421	-	-	-	-	-	6

MEAN

Dates	Length (µm)	Weight (µg)	b'	B	r'	D	T	P $\mu g/m^3$/day	chl.a µg/l
218	686	1.614	0.187	0.135	-0.685	0.581	7.386	3489.09	4.87
221	561	0.871	0.488	0.607	0.442	0.063	1.647	1016.63	3.9
225	591	1.021	0.117	0.13	0.215	-0.102	7.661	2128.8	6.07
228	663	1.45	0.088	0.084	-0.072	0.147	11.77	1700.52	5.89
233	650	1.365	0.199	-	-	-	-	-	6

MINUMUM

Dates	Length (µm)	Weight (µg)	b'	B	r'	D	T	P $\mu g/m^3$/day	chl.a µg/l
218	686	1.614	0.097	0.07	-0.685	0.542	14.24	1808.56	4.87
221	561	0.871	0.321	0.403	0.442	-0.106	2.477	719.799	3.9
225	591	1.021	0.091	0.101	0.215	-	9.849	1239.6	6.07
228	663	1.45	0.017	0.016	-0.072	0.0855	60.96	528.6	5.89
233	650	1.365	0.108	-	-	-	-	0	6

Table 9. *Arctodiaptomus spinosus* population dynamics in Ruster Boschen

					MEAN					
Dates	Length (µm)	Weight (µg)	b'	B	r'	d'	D	T	P µg/m^3/day	chl.a µg/l
218	941	7.77	0.175	0.153	0.189	0.022	0.021	5.288	7240.7	4.8
221	808	4.58	0.238	-0.02	0.235	0.258	0.227	4.243	9496.27	3.9
225	844	5.329	0.548	-0.348	0.896	0.896	0.591	1.116	41618.9	6.07
228	1094	13.111	0.402	-0.084	0.486	0.486	0.348	2.057	19514.12	5.89
233	644	2.084	0.878	-	-	-	-	-	-	6

					MAXIMUM					
Dates	Length (µm)	Weight (µg)	b'	B	r'	d'	D	T	P µg/m^3/day	chl.a µg/l
218	941	7.77	0.165	0.153	0.178	0.012	0.011	5.608	6826.6	4.8
221	808	4.58	0.065	-0.02	0.064	0.085	0.081	15.53	2587.9	3.9
225	844	5.329	0.036	-0.348	0.03	0.384	0.318	32.89	1411.99	6.07
228	1094	13.111	0.146	-0.084	0.14	0.23	0.205	4.141	5621.83	5.89
233	644	2.084	0.455	-	-	-	-	-	-	6

					MINUMUM					
Dates	Length (µm)	Weight (µg)	b'	B	r'	d'	D	T	P µg/m^3/day	chl.a µg/l
218	941	7.77	0.04	0.153	0.043	-0.113	0.119	23.13	1651.21	4.8
221	808	4.58	0.063	-0.02	0.062	0.083	0.079	16.03	2208.2	3.9
225	844	5.329	0	-0.348	-	-	-	-	-	6.07
228	1094	13.111	0.073	-0.084	0.07	0.157	0.145	14.28	2810.9	5.89
233	644	2.084	0.148	-	-	-	-	-	-	6

Development time of Arctodiaptomus spinosus was 1.78 and the development time of Filinia longiseta was found 0.58.

Population Dynamics

According to the results of zooplankton production and the population dynamic of three biotops *Arctodiaptomus spinosus* and *Diaphanosoma mongolianum* biomasses, the productions were the highest than the other taxa, in Neusiedler See, Ruster Poschen and Zug subsequently. The data showed that *Arctodiaptomus spinosus* and *Diaphanosoma mongolianum* were the most abundant species in the three biotops. *A. spinosus* was a dominant species throughout the year in Neusiedler See (10). But in July or August shows the highest densities such high numbers are mainly due to the shorter time needed by the animals for their predominantly temperature dependent development. In Neusiedler See second abundant species was *Diaphanosoma mongolianum,* this production was high in Neusiedler See, Ruster Poschn and Zug subsequently. This species is a common limnetic form, inhabiting the epilimnion of deep stratified lakes as well as shallow water bodies. In the temperature zone, as a rule *Diaphanosoma mongolianum* one of the few species which an increased the productivity (5a).

To compare these two abundant species, it was found that *Arctodiaptomus spinosus* mean, minimum and maximum production has reached double of *Diaphanosoma mongolianum* production in Neusiedler See (Table 4, 5). To compare this values with Zug, (Table 6, 7) *Arctodiaptomus spinosus* mean, minimum and maximum production were higher than *Diaphanosoma mongolianum* production. All three biotops were characterized with high alkalinity and high conductivity. According to Herzig (5a, b) this two dominant species tolerate high alkalinities. *Arctodiaptomus spinosus* is a typical crustacean of sodium lakes Löfler and Herzig (5a, 20). The second important species *Diaphanosoma mongolianum* also can tolerate alkaline waters. Also the abundance of *Diaphanosoma mongolianum* is influenced predominantly by temperature and food, the mechanical effect of the turbit material also plays a very important role in mortality, especially shallow lakes like Neusiedler See. Fish predation in early summer by all the newly hatched fry, should not be ignored as an important elimination factor for this population. Autumn is characterized by the rapid decrease of the whole population due to the appereance of the males and the production of resting egs (5a, 20).

Neusiedler See is an shallow lake. The wind affects on the horizontal distribution of zooplankton highly in this lake. But physical, chemical and biological factors also affect the distribution of animals (10). Major plankton gradient can be recorded along the wind axis, but local concentration due to circular movements can also arise.

Table 10. *Brachionus angularis* population dynamics in Ruster Boschen

MEAN

Dates	Length (µm)	Weight (µg)	b'	B	r'	d'	D	T	P µg/m^3/day	chl.a µg/l
218	140	0.36	0.66	-0.388	0.547	1.048	0.649	1.828	3076.14	4.8
221	125	0.25	1.816	-0.16	1.678	1.977	0.861	0.595	1384.8	9
225	124	0.25	1.939	0.777	2.932	0.362	0.303	0.341	1494.13	6.07
228	128	0.27	0.963	-0.084	0.923	0.047	0.649	1.082	11411.6	5.89
233	104	0.14	0.855	-	-	-	-	-	-	-

MAXIMUM

Dates	Length (µm)	Weight (µg)	b'	B	r'	d'	D	T	P µg/m^3/day	chl.a µg/l
218	140	0.36	0.543	-0.388	0.45	0.931	0.605	2.221	2531.8	4.8
221	125	0.25	0.458	-0.16	0.423	0.298	0.257	2.362	348.8	3.9
225	124	0.25	0.542	0.777	0.819	-	-	1.22	417.6	6.07
228	128	0.27	0.702	-0.084	0.673	0.786	0.544	1.485	8318	5.89
233	104	0.14	0.776	-	-	-	-	-	-	-

MINUMUM

Dates	Length (µm)	Weight (µg)	b'	B	r'	d'	D	T	P µg/m^3/day	chl.a µg/l
218	140	0.36	0.102	-0.388	0.084	0.49	0.387	11.82	475.73	4.8
221	125	0.25	0.394	-0.16	0.364	0.554	0.425	2.746	300	3.9
225	124	0.25	0.499	0.777	0.754	-0.278	-0.32	1.325	384.5	6.07
228	128	0.27	0.55	-0.084	0.479	0.634	0.469	2.085	5924.4	5.89
233	104	0.14	0.676	-	-	-	-	-	-	-

Table 11. *Polyarthra vulgaris* population dynamics in Ruster Boschen

MEAN

Dates	Length (µm)	Weight (µg)	b'	B	r'	d'	D	T	P µg/m^3/day	chl.a µg/l
218	89	0.21	0.66	-0.214	0.594	0.847	0.582	1.683	800.6	4.8
221	96	0.27	1.329	-0.085	1.274	1.414	0.756	0.748	1159.8	3.9
225	79	0.15	0.536	0.994	0.917	-0.458	0.58	1.089	329.4	6.07
228	83	0.17	0.913	0.061	0.941	0.852	0.573	1.062	7560	5.89
233	86	0.19	1.054	-	-	-	-	-	-	6

MAXIMUM

Dates	Length (µm)	Weight (µg)	b'	B	r'	d'	D	T	P µg/m^3/day	chl.a µg/l
218	89	0.21	1.049	-0.214	0.944	1.263	0.717	1.058	1273.6	4.8
221	96	0.27	3.329	-0.085	3.191	3.414	0.967	0.313	2905.3	3.9
225	79	0.15	0.978	0.994	1.674	-0.016	1.161	0.597	601	6.07
228	83	0.17	1.187	0.061	1.223	1.126	0.675	0.817	9827.5	5.89
233	86	0.19	1.234	-	-	-	-	-	-	6

MINUMUM

Dates	Length (µm)	Weight (µg)	b'	B	r'	d'	D	T	P µg/m^3/day	chl.a µg/l
218	89	0.21	0.274	-0.214	0.246	0.488	0.386	4.054	332.4	4.8
221	96	0.27	0.847	-0.085	0.812	0.932	0.606	1.231	738.7	3.9
225	79	0.15	0.173	0.994	0.296	-0.821	1.272	3.378	106.2	6.07
228	83	0.17	0.58	0.061	0.598	0.519	0.404	1.672	4802	5.89
233	86	0.19	-	-	-	-	-	-	-	-

Table 12. *Filinia longiseta* population dynamics in Ruster Boschen

Dates	Length (µm)	Weight (µg)	b'	B	r'	d'	D	T	P µg/m^3/day	chl.a µg/l
218	150-602	0.43	1.682	-0.381	1.466	1.963	1.963	0.681	4071.4	4.8
221	160-526	0.53	0.929	0.659	1.315	0.27	0.27	0.76	978.4	3.9
225	137-458	0.33	0.626	-0.182	0.572	0.808	0.808	1.747	1917	6.07
228	140-512	0.35	2.525	-0.445	2.309	2.97	2.97	0.433	3955	5.89
233	134-512	0.31	1.901	-	-	-	-	-	-	-

Table 13. *Hexarthra mira* population dynamics in Ruster Boschen

					MEAN					
Dates	Length (μm)	Weight (μg)	b'	B	r'	d'	D	T	P μg/m³/day	chl.a μg/l
218	147	0.54	0.607	-0.567	0.463	1.174	0.69	2.158	1808.6	4.8
221	160	0.7	1.846	0.378	2.243	1.468	0.769	0.445	2073.2	3.9
225	144	0.57	0.491	-0.042	0.48	0.533	0.413	2.079	1469.9	6.07
228	149	0.51	0.518	-0.4	0.426	0.918	0.6	2.342	1281.8	5.89
233	144	-	-	-	-	-	-	-	-	-

					MAXIMUM					
Dates	Length (μm)	Weight (μg)	b'	B	r'	d'	D	T	P μg/m³/day	chl.a μg/l
218	147	0.54	0.393	-0.567	0.299	0.96	0.617	3.333	1171	4.8
221	160	0.7	0.174	0.378	0.209	-	-	4.784	275.5	3.9
225	144	0.57	0.174	-0.042	0.17	0.216	0.194	5.868	520.7	6.07
228	149	0.51	0.393	-0.4	0.323	0.793	0.547	3.087	972	5.89
233	144	-	-	-	-	-	-	-	5	6

					MINUMUM					
Dates	Length (μm)	Weight (μg)	b'	B	r'	d'	D	T	P μg/m³/day	chl.a μg/l
218	147	0.54	0	-	-	-	-	-	-	4.8
221	160	0.7	0	0.378	-	-	-	-	-	3.9
225	144	0.57	0	-0.042	-	-	-	-	-	6.07
228	149	0.51	20.206	-0.4	0.169	0.606	0.454	5.889	6612.7	5.89
233	144	-	-	-	-	-	-	-	-	6

Refer to Löffler (10) *Arctodiaptomus spinosus* and *Diaphonosoma mongolianum* is found upwind and distribution pattern of both is very similar, but the naupli show a clear downwind concentration.

To comparison of Rotifer species in Ruster Poschn, *Brachionus angularis,* was the highest, *Polyarthra vulgaris* was the second, *Filinia longiseta* was the third, *Hexarthra mira* was the lowest density. In Neusiedler See, predation presure of rotifers was quite high. During counting *Leptodora kindtii* was occured which is one of the most important predator o rotifers.

In shallow lakes, an additional input to the open water community is provided by the material stirred up from the bottom. The material from the bottom may be rich in organic substances possibly nitrogenous compound with high calorific content and is inhabited by large number of bacteria. In shallow and polymictic lakes this material is regularly brought into the pelagic zone and represents an additional food supply for the zooplankton. In addition, such shallow lakes offer better temperature conditions to the zooplankton than deep stratfied lakes (10).

Phytoplankton seems to be an important producer for the filter feeding zooplankton. In shallow lakes direct grazing food chain seems to be increasingly replaced by the indirect detritus food chain. The role of phytoplankton as a main food source is taken over by bacteria and detritus, originating from the bottom.

In “Zug” Rotifera never appeared in the same density as in “Ruster Poschn”. The reason was in this water body high concentrations of H_2S were determined, which could affect the distribution of zooplankton. Moreover this watre body is more eutrophic than the others (tab. 2,3).

Population dynamics parameters and production of main taxa is given in (Table 4-13).

As noticed above minimum, maximum and mean of instantaneous birth rate, finite birth rate, population growing rate, instantaneous and finite death rate, turnover time and finally production were calculated for *Arctodiaptomus spinosus, Diaphanosoma mongolianum, Polyarthra vulgaris, Filinia longiseta, Brachionus angularis* and *Hexarthra mira.*

Mean production of *Arctodiaptomus spinosus* and numbers of egg bearing specimens, copepodit and naupliar stages were higher in Neusiedler See than in the two water bodies within the reed belt (Table 4).

Herzig (5a) showed that *Diaphanosoma mongolianum* has a high production in this lake too. Similar results found during this study. Generally cladocera and copepoda secondary production are higher in Neusiedler

See than in the other habitats see table 4, 5. Because of the predation pressure and other environmental factors on rotifer density was rather low in Neusiedler See. The production was not calculated for this lake. As rotifer density was high in "Ruster Poschn", production calculations for four rotifer species were aplied only in this water bodies (Tab. 10-13). The mean productions is increasing subsequently from *Brachionus angularis* over *Polyarthra vulgaris* and *Hexarthra mira* to *Filinia longiseta.*

Comparing cladocera and copepoda population dynamics between "Ruster Poschn" and "Zug" a higher mean production of *Arctodiaptomus spinosus* was found in "Zug" (Table 7). Also *Diaphanosoma mongolianum* mean production was higher at this water site (Table 6). Summering up the results, it can be said that the production of *Arctodiaptomus spinosus* and *Diaphanosoma mongolianum* is subsequently higher in Neusiedler See, "Zug" and "Ruster Poschn". On the other hand rotifers showed higher abundances in "Ruster Poschn".

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