

## Specific species list (LV)

### Data

The field research was done in the period from 1992–2016. In total, 472 sites in 91 rivers were surveyed. The rivers surveyed belong to all of the 6 defined river types in Latvia's river typology.

Table 1

Fish, lamprey and crayfish occurrence and abundance in the Venta RBD rivers

Species	N_rivers	N_rivers%	N_Sites	N_Sites%	SUM_N	SUM_N%
<i>Abramis brama</i>	6	6.6	25	5.3	66	0.1
<i>Alburnoides bipunctatus</i>	23	25.3	138	29.2	4248	4.3
<i>Alburnus alburnus</i>	33	36.3	175	37.1	5324	5.4
<i>Anguilla anguilla</i>	5	5.5	11	2.3	40	0.0
<i>Aspius aspius</i>	3	3.3	9	1.9	18	0.0
<i>Barbatulus barbatulus</i>	71	78.0	369	78.2	20247	20.6
<i>Blicca bjoerkna</i>	13	14.3	46	9.7	249	0.3
<i>Carassius carassius</i>	15	16.5	20	4.2	45	0.0
<i>Carassius gibelio</i>	11	12.1	18	3.8	193	0.2
<i>Cobitis taenia</i>	33	36.3	195	41.3	1254	1.3
<i>Cottus gobio</i>	47	51.6	216	45.8	4956	5.0
<i>Cyprinus carpio</i>	1	1.1	3	0.6	4	0.0
<i>Esox lucius</i>	71	78.0	263	55.7	925	0.9
<i>Gasterosteus aculeatus</i>	22	24.2	59	12.5	1043	1.1
<i>Gobio gobio</i>	58	63.7	297	62.9	6222	6.3
<i>Gymnocephalus cernua</i>	8	8.8	17	3.6	38	0.0
<i>Lampetra fluviatilis</i>	20	22.0	39	8.3	62	0.1
<i>Lampetra planeri</i>	45	49.5	82	17.4	207	0.2
<i>Leucaspis delineatus</i>	42	46.2	76	16.1	3733	3.8
<i>Leuciscus cephalus</i>	45	49.5	270	57.2	5292	5.4
<i>Leuciscus idus</i>	5	5.5	11	2.3	21	0.0
<i>Leuciscus leuciscus</i>	35	38.5	155	32.8	2030	2.1
<i>Lota lota</i>	38	41.8	94	19.9	310	0.3
<i>Misgurnus fossilis</i>	11	12.1	13	2.8	22	0.0
<i>Perca fluviatilis</i>	57	62.6	275	58.3	3496	3.6
<i>Phoxinus phoxinus</i>	57	62.6	219	46.4	14700	14.9
<i>Platichthys flesus</i>	1	1.1	3	0.6	8	0.0
<i>Pungitius pungitius</i>	39	42.9	51	10.8	733	0.7
<i>Rhodeus sericeus</i>	28	30.8	134	28.4	2299	2.3
<i>Rutilus rutilus</i>	61	67.0	348	73.7	16632	16.9

Species	N_rivers	N_rivers%	N_Sites	N_Sites%	SUM_N	SUM_N%
Sabanejewia baltica	3	3.3	5	1.1	6	0.0
Salmo salar	8	8.8	95	20.1	2108	2.1
Salmo fario	9	9.9	10	2.1	109	0.1
Salmo trutta	42	46.2	131	27.8	2098	2.1
Sander lucioperca		+	0	0.0	0	0.0
Scardinius erythrophthalmus	15	16.5	28	5.9	70	0.1
Silurus glanis		+	0	0.0	0	0.0
Thymallus thymallus	2	2.2	6	1.3	57	0.1
Tinca tinca	29	31.9	63	13.3	130	0.1
Vimba vimba	6	6.6	45	9.5	334	0.3
SUM					98383	100

Some species migrate into rivers during autumn (river lamprey) and winter-early spring seasons (river lamprey, smelt *Osmerus eperlanus*), when fish sampling is not carried. Their adults and fry stay in the rivers for only a short period (e.g. smelt, twite shad *Alosa fallax*). Rare species as *Coregonus* spp. and sabrefish *Pelecus cultratus*, also pikeperch and catfish *Silurus glanis* were reported as bycatch in commercial and recreational fisheries. However, part of these species are exploited by commercial and recreational fishery, their occurrence in the river Venta RBD are well known.

All together at least 46 fish and lamprey species were found in the river Venta RBD in last decade, from which 40 species regularly recognized in the monitoring.

The number of species and their diversity in the river is determined by numerous ecological and anthropogenic factors. To determine the RBD rivers specific species list following data sorting criteria was used:

- the river catchment area above sampling site not exceed 1000 km<sup>2</sup>;
- only the data with high and good ecological status used.

Latvian Fish index (LVFI) has been developed as a set of multimetric indices depending on the river type at sampling place. Index based on deviation from modelled and predicted reference conditions, that is based on the evaluation of observed and expected status of fish community.

Index values are then compared with the observed fish and combined to provide an overall status of site/river. Method focuses on two different habitat types: salmonid and cyprinid.

Most of the fish metrics corresponds with classification of fishes into ecological guilds. Fish metrics assessed relative abundance of fishes' gravel spawners, fishes intolerant to oxygen depletion, relative number of lithophilic species, number of species belonging to salmonid waters and number of species reproducing in running water.

LVFI values compared with LTFI (Lithuania fish index) values demonstrated good compatibility (Table 2).

Table 2

Pearson correlations between LTFI and LVFI

River type_Lit	LVFI_salmonidsites	LVFI_cyprinidsites
1	0.82 (n=81)	0.72 (n=81)
2	0.73 (n=61)	0.72 (n=59)
3	0.73 (n=89)	0.63 (n=89)

In total 49 sites (fishing occasions) in 27 rivers qualified as good and high ecological status sites with less undisturbed fish community were species intolerant to oxygen depletion, gravel spawners and species belonging to salmonid waters dominating (Table 3).

Table 3

Specific species list for good and high quality LVFI\_salmonidsites index (S<1000 km<sup>2</sup>)

Species	N_rivers	N_rivers%	N_Sites	N_Sites%	SUM_N	SUM_N%
Abramis brama	0	0	0	0.0	0	0.0
Alburnoides bipunctatus	12	44.4	23	46.9	1802	8.1
Alburnus alburnus	7	25.9	15	30.6	217	1.0
Anguilla anguilla	1	3.7	2	4.1	4	0.0
Aspius aspius	0	0.0	0	0.0	0	0.0
Barbatula barbatula	26	96.3	47	95.9	5273	23.6
Blicca bjoerkna	0	0.0	0	0.0	0	0
Carassius carassius	0	0.0	0	0.0	0	0
Carassius gibelio	2	7.4	2	4.1	3	0
Cobitis taenia	8	29.6	17	34.7	47	0.2
Cottus gobio	20	74.1	38	77.6	2559	11.5
Cyprinus carpio	0	0.0	0	0.0	0	0.0
Esox lucius	12	44.4	12	24.5	27	0.1
Gasterosteus aculeatus	5	18.5	8	16.3	23	0.1
Gobio gobio	23	85.2	37	75.5	1275	5.7
Gymnocephalus cernua	0	0.0	0	0.0	0	0.0
Lampetra fluviatilis	12	44.4	20	40.8	27	0.1
Lampetra planeri	15	55.6	24	49.0	97	0.4
Leucaspis delineatus	3	11.1	3	6.1	10	0.0
Leuciscus cephalus	17	63.0	27	55.1	352	1.6
Leuciscus idus	0	0.0	0	0.0	0	0.0
Leuciscus leuciscus	13	48.1	21	42.9	362	1.6
Lota lota	12	44.4	14	28.6	57	0.3
Misgurnus fossilis	0	0.0	0	0.0	0	0.0
Perca fluviatilis	12	44.4	15	30.6	81	0.4
Phoxinus phoxinus	26	96.3	48	98.0	7512	33.6
Platichthys flesus	1	3.7	1	2.0	1	0.0
Pungitius pungitius	5	18.5	5	10.2	20	0.1
Rhodeus sericeus	4	14.8	9	18.4	34	0.2

Species	N_rivers	N_rivers%	N_Sites	N_Sites%	SUM_N	SUM_N%
Rutilus rutilus	17	63.0	26	53.1	1013	4.5
Sabanejewia baltica	0	0.0	0	0.0	0	0.0
Salmo salar	5	18.5	15	30.6	242	1.1
Salmo fario	1	3.7	1	2.0	29	0.1
Salmo trutta	24	88.9	41	83.7	1270	5.7
Sander liucioperca	0	0.0	0	0	0	0.0
Scardinius erythrophthalmus	3	11.1	3	6.1	4	0.0
Silurus glanis	0	0.0	0	0	0	0.0
Thymallus thymallus	2	7.4	2	4.1	11	0.0
Tinca tinca	2	7.4	2	4.1	2	0.0
Vimba vimba	1	3.7	2	4.1	3	0.0
SUM	N=27		N=49		N=22537	

More than 70% from the rivers

More than 70% from the sites

More than 5% from the number of fish

Such species as riffle minnow, stone loach, bullhead, gudgeon, minnow and trout occurred in targets part of the rivers and sites were forms 95% from the number of individuals in community (Table 3).

31 one river 60 fishing occasions/sites qualified as good and high ecological status sites with less undisturbed fish community were species reopars dominating (Table 4).

Table 4

Specific species list for good and high quality LVFI\_cyprinidsites index (S<1000km2)

Species	N_rivers	N_rivers%	N_Sites	N_Sites%	SUM_N	SUM_N%
Abramis brama	11	44.0	19	51.4	0	0.0
Alburnoides bipunctatus	11	44.0	19	51.4	1435	8.2
Alburnus alburnus	11	44.0	0	0.0	233	1.3
Anguilla anguilla	0	0.0	0	0.0	0	0.0
Aspius aspius	0	0.0	16	43.2	0	0.0
Barbatulus barbatulus	25	100.0	36	97.3	3884	22.3
Blicca bjoerkna	0	0.0	0	0.0	0	0.0
Carassius carassius	0	0.0	0	0.0	0	0.0
Carassius gibelio	3	12.0	3	8.1	3	0.0
Cobitis taenia	11	44.0	16	43.2	72	0.4
Cottus gobio	20	80.0	27	73.0	576	3.3
Cyprinus carpio	0	0.0	0	0.0	0	0.0
Esox Lucius	13	52.0	18	48.6	62	0.4
Gasterosteus	3	12.0	4	10.8	16	0.1

Species	N_rivers	N_rivers%	N_Sites	N_Sites%	SUM_N	SUM_N%
aculeatus						
Gobio gobio	21	84.0	32	86.5	1276	7.3
Gymnocephalus cernua	0	0.0	0	0.0	0	0.0
Lampetra fluviatilis	7	28.0	9	24.3	9	0.1
Lampetra planeri	18	72.0	21	56.8	67	0.4
Leucaspis delineatus	7	28.0	9	24.3	821	4.7
Leuciscus cephalus	16	64.0	23	62.2	315	1.8
Leuciscus idus	0	0.0	0	0.0	0	0.0
Leuciscus leuciscus	14	56.0	17	45.9	178	1.0
Lota lota	9	36.0	10	27.0	41	0.2
Misgurnus fossilis	0	0.0	0	0.0	0	0.0
Perca fluviatilis	11	44.0	15	40.5	86	0.5
Phoxinus phoxinus	25	100.0	36	97.3	6310	36.3
Platichthys flesus	0	0.0	0	0.0	0	0.0
Pungitius pungitius	7	28.0	7	18.9	22	0.1
Rhodeus sericeus	8	32.0	11	29.7	284	1.6
Rutilus rutilus	19	76.0	28	75.7	1572	9.0
Sabanejewia baltica	0	0.0	0	0.0	0	0.0
Salmo salar	2	8.0	2	5.4	5	0.0
Salmo fario	1	4.0	1	2.7	29	0.2
Salmo trutta	17	68.0	20	54.1	80	0.5
Sander lucioperca	0	0.0	0	0.0	0	0.0
Scardinius erythrophthalmus	2	8.0	2	5.4	3	0.0
Silurus glanis	0	0.0	0	0.0	0	0.0
Thymallus thymallus	1	4.0	2	5.4	13	0.1
Tinca tinca	3	12.0	3	8.1	3	0.0
Vimba vimba	0	0.0	0	0.0	0	0.0
SUM	N=31		N=60		N=17403	

Table 5.

List of species (number of fish/100m2)

Species	Salmonid rivers/sites			Cyprinid rivers/sites		
	F%	N	Stdev	F%	N	Stdev
Abramis brama	0	#DIV/0!	#DIV/0!	0		

Species	Salmonid rivers/sites			Cyprinid rivers/sites		
	F%	N	Stdev	F%	N	Stdev
Alburnoides bipunctatus	47	25.6	27.0	51	30.9	33.3
Alburnus alburnus	31	3.9	4.0	43	5.3	5.5
Anguilla anguilla	4	0.8	0.6	0		
Aspius aspius	0	#DIV/0!	#DIV/0!	0		
Barbatulus barbatulus	96	40.6	46.8	97	37.8	41.6
Blicca bjoerkna	0	#DIV/0!	#DIV/0!	0		
Carassius carassius	0	#DIV/0!	#DIV/0!	8	0.6	0.3
Carassius gibelio	4	0.4	0.0	5	2.0	2.2
Cobitis taenia	35	0.9	0.6	43	1.6	2.0
Cottus gobio	78	27.7	37.8	73	10.2	13.1
Cyprinus carpio	0	#DIV/0!	#DIV/0!	0		
Esox Lucius	24	0.8	0.5	49	1.4	1.3
Gasterosteus aculeatus	16	1.2	1.6	11	1.7	2.2
Gobio gobio	76	12.3	13.3	87	16.2	14.9
Gymnocephalus cernua	0	#DIV/0!	#DIV/0!	0		
Lampetra fluviatilis	41	0.6	0.6	24	0.4	0.1
Lampetra planeri	49	1.6	2.9	57	1.4	2.8
Leucaspis delineatus	6	1.8	1.3	24	43.8	122.9
Leuciscus cephalus	55	5.0	6.6	62	4.8	6.3
Leuciscus idus	0	#DIV/0!	#DIV/0!	0		
Leuciscus leuciscus	43	5.5	6.0	46	3.8	3.9
Lota lota	29	1.6	1.2	27	1.6	1.5
Misgurnus fossilis	0	#DIV/0!	#DIV/0!	0		
Perca fluviatilis	31	2.4	2.6	41	2.7	3.6
Phoxinus phoxinus	98	66.2	58.7	97	80.0	63.0
Platichthys flesus	2	0.4	#DIV/0!			
Pungitius pungitius	10	2.2	2.4	19	1.7	2.1
Rhodeus sericeus	18	1.6	1.9	30	12.2	21.8
Rutilus rutilus	53	11.6	14.3	76	20.7	27.7
Sabanejewia baltica	0	#DIV/0!	#DIV/0!	0		
Salmo salar	31	6.0	6.6	5	0.9	0.9

Species	Salmonid rivers/sites			Cyprinid rivers/sites		
	F%	N	Stdev	F%	N	Stdev
Salmo fario	2	12.4	#DIV/0!	3		
Salmo trutta	84	13.0	21.8	54	1.7	1.0
Sander liuciperca	0	#DIV/0!	#DIV/0!	0		
Scardinius erythrophthalmus	6	0.4	0.4	5	0.5	0.4
Silurus glanis	0	#DIV/0!	#DIV/0!	0		
Thymallus <sup>1</sup> thymallus	4	2.2	1.4	5	3.5	0.5
Tinca tinca	4	0.4	0.2	8	0.4	0.2
Vimba vimba	4	0.3	0.4	0	0.0	0.0
Average		173.2	85.3		192.0	96.7

1- found only in the 2 rivers

Average number of fish per 1 ha in Venta RBD rivers are 173 – 192 ind./100 m<sup>2</sup>