A&W ECOLOGISCH ONDERZOEK

Monitoring fish passage Wier and Oude Leije

Report commissioned by

WETTERSKIP FRYSLÂN

Cover photo

Above ground section of the siphon fish pass at Oude Leije, A&W

M. Koopmans 2011

Monitoring fish passage Wier and Oude Leije.
A&W rapport 1673 Altenburg & Wymenga reasurch, Feanwâlden

Required by

Wetterskip Fryslan
Postbus 36
8900 AA Leeuwarden
Telephone +31 (0) 58 292 22 22

Research carried out by

Altenburg & Wymenga ecological research ltd
Postbus 32
9269 ZR Feanwâlden
Telephone +31 (0) 511 47 47 64
Fax +31 (0) 511 47 27 40
info@altwym.nl
www.altwym.nl

Project number	Project leader	Status
1571vwl	M. Koopmans	Concept

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Figure 1.1 – Locations of the fish passages (Siphon fish ladders)

1.1 Introduction

In 2009 and 2010 two sluices were added to extend the navigable route, Northern Elfsteden navigation route. In connection with a possible freshwater/saltwater passage at Zwarte Haan extra attention for the environment within the Northern Elfsteden navigation route meant the sluices at Oude Leije and Wier (figure1.1) had to be made passable for migratory fish. A Siphon fish ladder has been placed around each of the sluices, these Siphon fish ladders allow fish to pass from the main drain to the polder and vice versa. The fish passages have been operational since spring 2011.

1.2 Aims

Wetterskip Fryslân (Friesian IDB) is interested in the operations of the installed Siphon fish passages in Oude Leije and Wier and instigated Altenburg & Wymenga ecological research ltd (A&W) to produce a report and statistics for these sites. To obtain an insight in the pass-ability of the Siphon fish ladder weekly monitoring was conducted at the main drain side of the pumping station. A&W have worked together with DHr. P. Visser, employee of Wetterskip Fryslân. The results included within the following report are from monitoring research conducted at both Wier and Oude Leije Siphon fish ladders.

2 Method

2.1 Equipment and setup

To discover the efficiency of the fish passage a fyke net was mounted to the main drain side of the fish pass. It was chosen to monitor the fish which were migrating from the polder to the main drain. This is part of a known migratory route for fish from the Waddenzee to the main drain. The fyke net caught any fish which used the siphon fish ladder, the caught fish are then measured and released behind the fyke net in the main drain waters. The large fyke net had a length of 10m with a hoop diameter of 150cm with 4 partitions, with a decreasing netting pitch from 13mm to 11mm to 9mm with the finest at 5mm. The siphon fish pass at Wier required a bespoke fyke net connecting it to the opening of the fish pass. The Siphon fish passage at Oude Leije had a fyke net and return nets attached to the opening of the fish pass on the main drain side, this ensured all fish which swam through the siphon fish pass ended up in the Fyke net. Every sample was taken in the same way at the same time (early morning).

2.2 Catch period and frequency

Sampling results from the Blikfaart and Sűdhoekster Faart clearly log that a large variety of fish species are present, mainly European perch, common roach, pike, tench, eel and also endangered species such as European bitterling and Spined Loach (reference OVB 2005). The spring migration for these fish species occurs from late March to late May (reference Kroes & Monden 2005). It is important that the monitoring/catch period is carried out within the migration period for the three-spined stickleback and the (glass) eel. The fyke net was first placed at the siphon fish pass in Wier 12th April 2011, the first sampling of the catch was carried out on the 14th April 2011. After every sample was measured the fyke nets were cleaned. Over a period of 9 weeks the effectiveness of the fish pass at Wier was determined by measuring the catch. The fyke at Oude Leije was placed on the 3rd May 2011 the first sampling was carried out on the 5th of May 2011. Monitoring at Oude Leije was carried out for 6 weeks. As of week 19 the frequency in which the fyke was emptied and sampled was adapted and reduced from twice per week to once per week (table 2.1). During the sampling every fish was recorded by specie and size. During each visit the water temperature was recorded by the Wetterskip (IDB) the flow rate within the siphon fish ladder was also registered several times.

Table 2.1 - Site visit data Oude Leije and Wier during spring 2011.

Visit No	Wier	Visit No	Wier	Visit No	Oude Leije
1	14/04/2011	8	13/05/2011	1	05/05/2011
2	18/04/2011	9	17/05/2011	2	09/05/2011
3	21/04/2011	10	24/05/2011	3	13/05/2011
4	26/04/2011	11	31/05/2011	4	17/05/2011
5	28/04/2011	12	07/06/2011	5	24/05/2011
6	03/05/2011			6	31/05/2011
7	09/05/2011			7	07/06/2011

Fyke net construction for fish pass monitoring at Wier.

3 Results

Species and Numbers

During the sampling period (spring 2011) the siphon fish passages at Wier and Oude Leije passed total of 887 fish, made up of 13 species (table 3.1). The most frequently recorded species were European perch, common roach and eel. Eurasian ruffe and common rudd were also often caught. Some examples were found of the following species; European bitterling, common bream, Prussian carp, pike, pike perch and tench. Chinese mitten crabs were also regularly found in the fyke nets.

The European bitterling is a highly protected species according to Flora- and faunawet, category 3 (Dutch legislation) and are now on the red/endangered list (www.minlnv.nederlandsesoorten.nl/). Noting: The channels in northwest Fryslân are an important habitat for this species.

Table 3.1 - Specie and number statistics found in catch at Oude Leije and Wier during spring 2011.

Species	Passage Oude Leije		Passage Wier		Total	
	No	%	No	%	No	%
European Perch	306	57	180	51	486	55
European Bitterling	~	~	1	~	1	0
Common Roach	155	29	61	17	216	24
Common Bream	5	1	3	1	8	1
Prussian Carp	~	~	4	1	4	0
Silver Bream	2	~	~	~	2	0
Common Carp	~	~	2	1	2	0
European Eel	29	5	69	20	98	11
Eurasian Ruffe	20	4	17	5	37	4
Common Rudd	10	2	11	3	21	2
Pike	2	~	~	~	2	0
Pike Perch	4	1	~	~	4	0
Tench	4	1	2	1	6	1
Total	537	100	350	100	887	100

The differences in the specie composition and numbers of the two fish passages are immediately noticeable. Pike, silver bream and pike perch were found in the fyke nets at Oude Leije but not in the nets at Wier. At Wier however European bitterling, Prussian carp and common carp were caught, whilst these species made no use of the fish pass at Oude Leije. The total numbers of fish caught at Oude Leije was far greater than at Wier. In reality the difference was far greater as the monitoring at Oude Leije started three weeks later from week 18 and was therefore monitored for a shorter period of time than Wier.

In both fish passes more than 50% of the catch was made up of European perch. Common roach made up around 25% of the fish caught. In the fish passage at Wier a large proportion of the catch

was made up of eel, 20%. At Oude Leije however eels made up only 5% of the total catch. Figure 3.1 displays the percentage of fish species caught

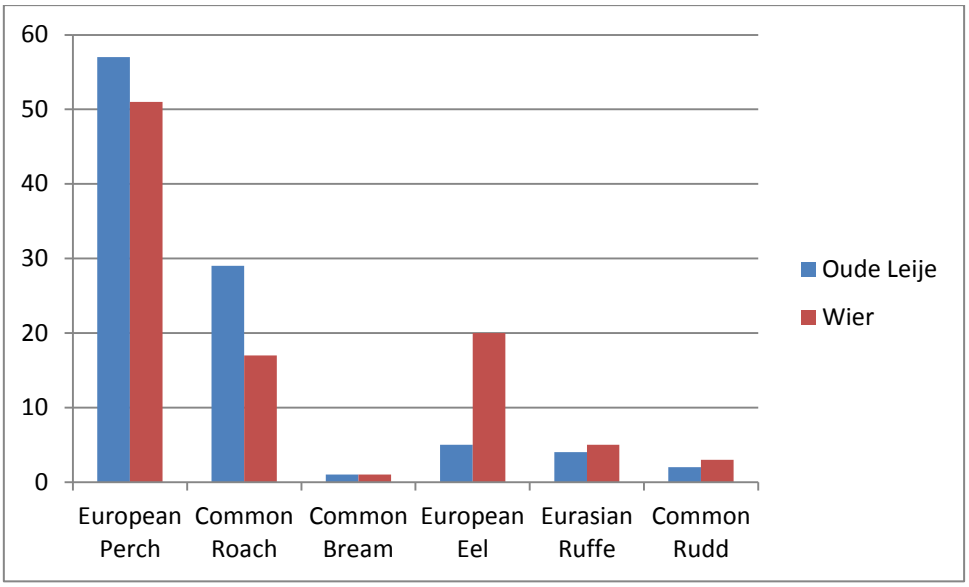


Figure 3.1 - Percentage distributions for fish species which passed through both fish passes at Oude Leije and Wier during spring 2011.

Numbers per sample

During the research period the catch composition varied, both in numbers caught and species found. The total number of fish caught each week regardless of species was recorded for each siphon to allow the data to give a direct comparison of both sites (Figure 3.2). The number of caught fish at the Wier fish pass during the sample period produces a rising line with the highest numbers around week 17 (end of April) this is the migration period for most of the common species in this area. However the fish passage at Oude Leije shows a clearly observable peak around week 19, middle of May. After the middle of May the numbers declined rapidly and started increasing again from week 22.

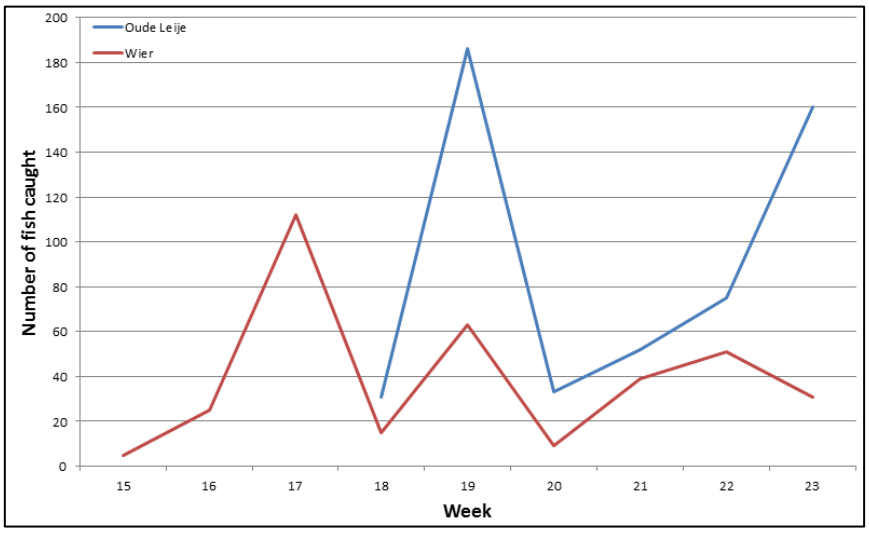


Figure 3.2 - Numbers caught weekly in the sampled fish passes

The number of fish caught per sample on the main drain side of the fish passage varied from 31 to 186 at Oude Leije (table3.2), with an average of 90 fish per sample. On average within each sample there were 7 species of fish, with a minimum of 5 species and a maximum of 10 species. The siphon fish pass at the Wier site recorded fewer fish on average in each sample than at Oude Leije. The Wier site showed an average of 39 fish in each catch with an average of 5 species. The catch size varied from a minimum of 7 to a maximum of 112 fish. Also within the samples from Wier there were on average less variations of species found with a minimum of 2 species to a maximum of 7 found in each sample. Common fish to the water course such as perch, common roach, eel and Eurasian Ruffe were found in almost every catch.

Table 3.2 - Species composition for each fish pass during spring 2011. The monitoring of the fish passage at Oude Leije is from week 18.

Fish Passage Oude Leije fish siphon									
Week	15	16	17	18	19	20	21	22	23
European perch	N/A	N/A	N/A	10	100	14	32	42	108
Common Roach	N/A	N/A	N/A	12	56	13	8	29	37
Common Bream	N/A	N/A	N/A	1	2	1	~	1	~
Silver Bream	N/A	N/A	N/A	~	1	1	~	~	~
European eel	N/A	N/A	N/A	3	9	2	6	1	8
Eurasian Ruffe	N/A	N/A	N/A	5	6	1	4	1	3
Common rudd	N/A	N/A	N/A	~	9	~	~	~	1
Pike	N/A	N/A	N/A	~	1	~	1	~	~
Pike-perch	N/A	N/A	N/A	~	1	~	~	~	3
Tench	N/A	N/A	N/A	~	1	1	1	1	~
Totaal	N/A	N/A	N/A	31	186	33	52	75	160
Number of species	N/A	N/A	N/A	5	10	7	6	6	6

Fish Passage Wier fish siphon									
Week	15	16	17	18	19	20	21	22	23
European perch	1	8	65	4	24	3	21	40	14
European Bitterling	~	~	~	~	~	~	~	~	1
Common Roach	1	6	4	~	12	1	15	9	13
Common Bream	1	2	~	~	~	~	~	~	~
Prussian Carp	~	~	2	~	2	~	~	~	~
Common carp	~	1	~	~	~	1	~	~	~
European eel	2	4	34	11	13	~	1	2	2
Eurasian Ruffe	~	2	3	~	7	3	2	~	~
Common rudd	~	2	3	~	5	1	~	~	~
Tench	~	~	1	~	~	~	~	~	1
Total	5	25	112	15	63	9	39	51	31
Number of species	4	7	7	2	6	5	4	3	5

Numbers by fish species

In line with the variation in numbers of fish caught each week, the numbers of each fish specie per catch changed from sample to sample. The numbers of three commonly caught species (common roach, eel and European perch) during sampling are recorded in figure 3.3. The numbers from these species are obtained from tables displayed figure 3.2. This clearly illustrates that European perch and common roach made up a large proportion of the fish caught.

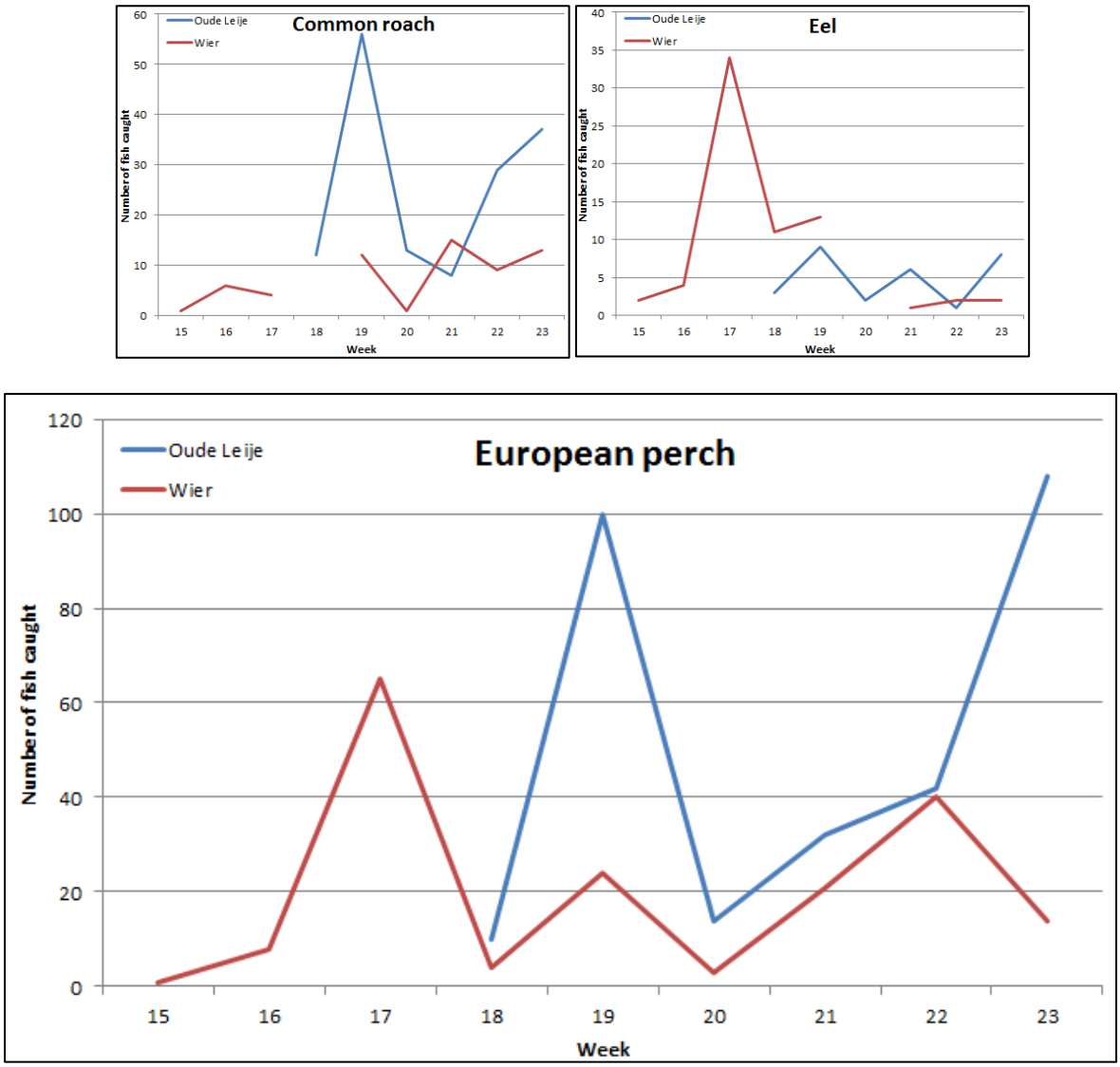


Figure 3.3 Numbers of a 3 species per fish passage in spring 2011

The majority of fish species show peak passage times between late April and mid-May. Noticeably the peak for European perch through Oude Leije is in mid-May. The migration period of European perch begins in March and runs to an end in late April. These are mostly

European perch up to 10cm, aged 1-2 years. The numbers of common roach showed a clear peak in Oude Leije, in Wier there is no clearly defined migration peak. The peak in week 19 fits in with the migration period for these species. Eel showed a clear peak in the number of examples which made use of the passage at Wier, the majority were sized at around 35cm (about 6 years old). The numbers of eel passing Oude Leije produced a stable line. The migration period for eel runs from April to May. Although the eels did make use of both fish passes they were not present in every sample.

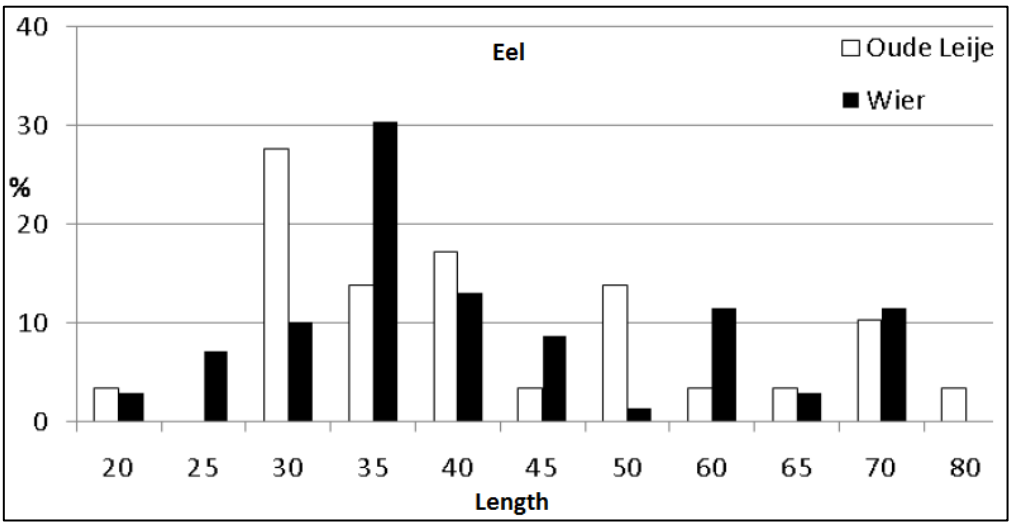
Table 3.3 Length per specie divided into length classes in both fish passes during Spring 2011

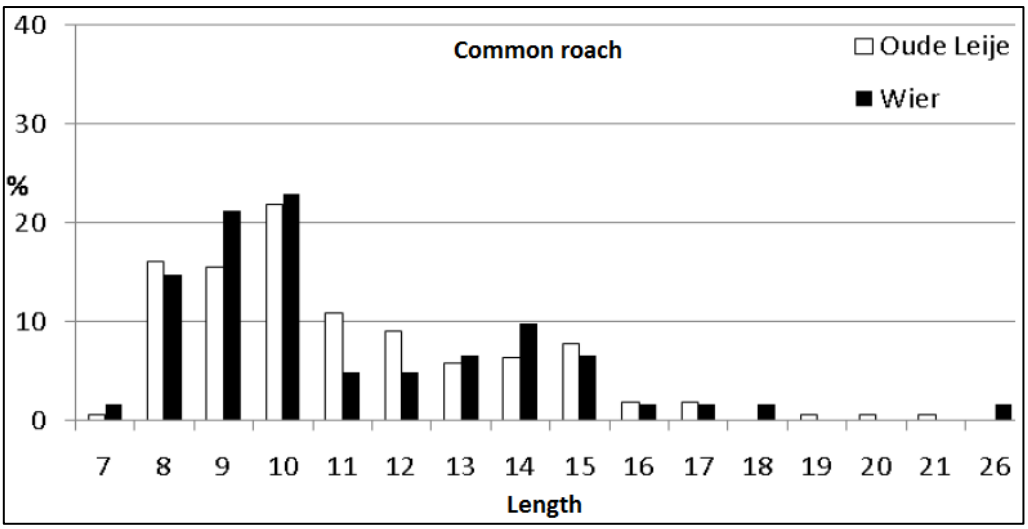
Fish passage Oude Leije Fish siphon	Length (cm)								
	0-15		15-25		25-40		>40		Total
	No	%	No	%	No	%	No	%	No
European perch	303	99	3	1	~	~	~	~	306
Common Roach	146	94	9	6	~	~	~	~	155
Common Bream	2	40	1	20	2	40	~	~	5
Silver Bream	1	50	1	50	~	~	~	~	2
European eel	~	~	1	3	17	59	11	38	29
Eurasian Ruffe	20	100	~	~	~	~	~	~	20
Common rudd	8	80	2	20	~	~	~	~	10
Pike	~	~	1	50	1	50	~	~	2
Pike-perch	3	75	1	25	~	~	~	~	4
Tench	~	~	~	~	2	50	2	50	4
Total	483	90	19	4	22	4	13	2	537

Fish passage Wier Fish siphon	Length (cm)								
	0-15		15-25		25-40		>40		Total
	No	%	No	%	No	%	No	%	No
European perch	176	98	4	2	~	~	~	~	180
European Bitterling	1	100	~	~	~	~	~	~	1
Common Roach	57	93	3	5	1	2	~	~	61
Common Bream	1	33	1	33	1	33	~	~	3
Prussian Carp	~	~	~	~	4	100	~	~	4
Common carp	~	~	~	~	1	50	1	50	2
European eel	~	~	7	10	37	54	25	36	69
Eurasian Ruffe	16	94	1	6	~	0	~	~	17
Common rudd	2	18	7	64	2	18	~	~	11
Tench	~	~	~	~	2	100	~	~	2
Total	253	72	23	7	48	14	26	7	350

Length Composition

Table 3.3 records the length composition of the fish species caught and divides them into respective length classes. This shows that the proportions of the European perch, common roach, eel and Eurasian ruffe are roughly the same in both passes. Further it can be concluded that the most commonly caught fish species which vary between length class and age are represented. A very large share of these species was smaller than 15cm. In figure 3.4 the percentages of eel, common roach and European perch are recorded. In general the figures agree with each other between the two sites.





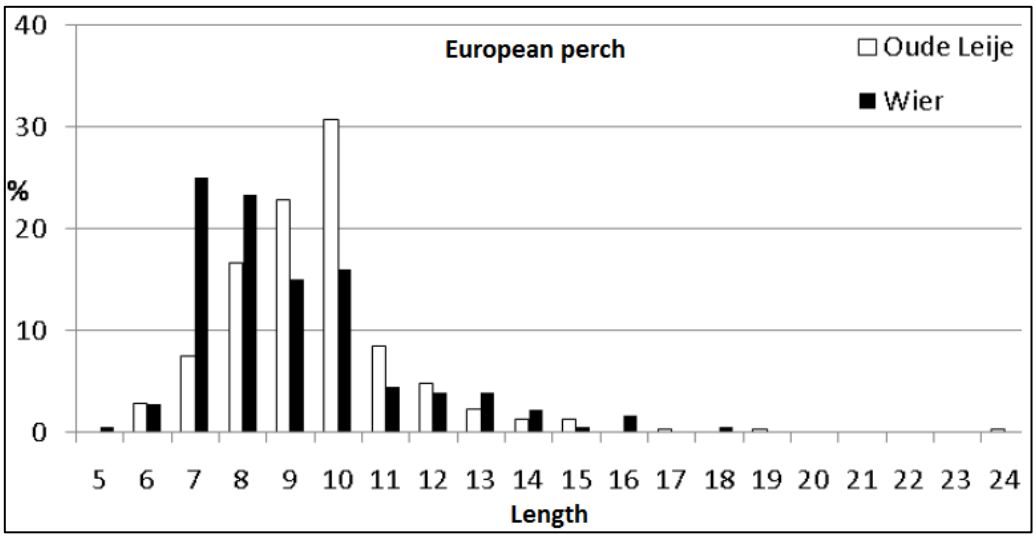


Figure 3.4 Numbers per length of 3 species during spring 2011

4 Conclusions

The monitoring results from both siphon fish passes at Oude Leije and Wier during spring 2011 we are able to draw the following conclusions:-

- During the sampling at both Wier and Oude leije siphon fish ladders throughout the spring of 2011 a total of 887 fish were caught made up of 13 species (table 3.1). The most common species caught were European perch, common roach and eel. There was one example of the highly protected European Bitterling using a pass.
- In both fish passes over half of the fish sampled were made up of European perch. The numbers of common roach make up approximately a quarter of the total fish caught.
- The number of fish caught at the Wier site fish pass during the research indicated a rising trend with the highest quantity peaking around week 17 (late April). At the Oude Leije site a clear peak in numbers of fish was around week 19, mid-May.
- The length ratio of European perch, eel and Eurasian ruffe were roughly the same in both fish passes. It can also be concluded that the most common species of different length class and age were represented. A very large proportion of the fish caught was smaller than 15cm.

5 Literature/references

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Website

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