1099 River lamprey
Lampetra fluviatilis (Linnaeus, 1758)

Photo 1. River lamprey (photo by T. Kuczyński)

I. INFORMATION ON SPECIES

1. Systematic affiliation

Order: Petromyzontiformes
Family: Petromyzontidae

2. Legal status and threat to the species

International law

Habitats Directive – Annex II and V
Berne Convention – Annex II

National law

Protection of the species – partial protection

Category of threat IUCN

IUCN Red List – LC (Least Concern ver 3.1), (Freyhof 2011)
Red list of fish and lamprey species (2009) – EN (Odra Basin – CR) (EN – endangered, CR – critically endangered), (Witkowski et al. 2009)
Polish red data book of animals. Vertebrata – EN (endangered), (Głowaciński 2002)

3. Species description

The river lamprey has an elongate and cylindrical body which is flattening laterally in the tail part. Its head is small. This species possess a circular horny teeth-filled, sucking discs instead of jaw and a toothed tongue. On the upper part of the head there is a residual, so-called “third eye”. River lamprey has two dorsal fins that are close to each other and the second is continuous with the tail fin. Colouration of the body is quite different from silvery along the sides, darkening to grey on the back in the individuals living in the sea (Photo 1) becoming dark olive and dark brown gradually lightening ventrally in the individuals returning to the river. The average adult length is around 30-45 cm. Sexual dimorphism is noticeable only during the spawning. The dorsal fin of female river lampreys is thickened and pseudoanal fin appears. Males develop a small tubular ovipositor in the genital pore (Photo 2, Photo 3).

Photo 2. Female of river lamprey during the spawning (photo by T. Kuczyński).

Photo 3. Male of river lamprey during the spawning (photo by T. Kuczyński)

4. Biology of the species

River lamprey is an anadromous fish that migrates from the sea into the river to spawn. Adults move into the sea to begin a parasitic life, attaching to a fish by their mouths and feeding on the blood and lymph. On reaching sexual maturity, river lampreys migrate back to their spawning rivers. There are two spawning runs: during autumn from October to December and between March and May in case of spring. River lampreys, unlike migratory salmonids, do not have *homing* instinct and migrate into the river attracted by a source of fresh water and pheromones of their larvae (Lucas et al. 1998). After reaching the brackish water, lampreys stop feeding and their digestive system undergoes atrophy. They are negatively phototactic, therefore migrations up the river to spawn take place at night, but spawning occurs during the day. Spawners of autumn run overwinter in the location of the spawning grounds where they spawn at the same time with the spawners of spring run. Spawning of river lampreys in the rivers of Pomerania starts when the water temperature reaches 10–11°C, usually from the end of March to the beginning of May. River lampreys spawn in the group on the gravel substrate, often at the same spawning grounds as salmonids. Eggs are laying in the small bottom ground depression (Photo 4, Photo 5). Most of fine, sticky eggs (about 1 mm in diameter) are washed out from the nest substrate and sticks to the bottom near the proper spawning. After an incubation period of a few days the larvae (*ammocoetes*) hatch. Their body is pale yellow-gray and eyes are hidden under the skin. Larval stage lasts about 4 years. At this time individuals spend their life buried in soft bottom sediments feed on detritus and small animal organisms. After this period of life cycle, larvae, which are 8–14 cm in length, start their matamorphosis into *macrophthalmia* phase characterized by developed eyes and the sucker. The sides of their body change to silvery. Then, river lampreys start their migration toward the sea and become parasites.

Photo 4. River lampreys during the spawning (photo by T. Kuczyński)

Photo 5. River lampreys during the spawning (photo by T. Kuczyński)

5. Habitat conditions

Habitat preferences of river lamprey depend on the development stage of the species. Spawning takes place in the part of river with fast-flowing water, where the water level is low and bottom is composed of gravel-stone sediments. On the other hand, larvae od river lamprey prefer soft bottom of less dynamic part of the river as well as meanders. Such a mosaic character is typical for streams of upland character. Therefore, the most important for river lamprey is the ecological patency, enable spawners successfully moving from the sea into the upper parts of the river or small tributaries where they find suitable conditions for spawning and for life of their larvae. In contrast to salmonids, river lampreys have low ability to overcome obstacles, in particular the fish passes designed for

salmonids. In such cases, spawning often takes place in the main channel of the downstream. These habitats are not optimal for the assembled eggs and larvae which are exposed to predatory fish.

6. Species distribution

In the 19th century river lampreys reached the upper and middle rivers of Odra and Vistula. However, mainly due to hydrotechnical development of the rivers, the geographical limit of the occurrence of this species has moved north (Witkowski 2010). Currently, the extent of river lamprey in the continental biogeographical region of Poland is limited to the rivers of the northern part of the country, in Szczecin Lagoon, Vistula Lagoon, Lower Vistula (below the dam in Włocławek) and in rivers flowing directly to the Baltic Sea.

II. METHODS

1. Concept of species monitoring

Monitoring of the river lamprey should take into account the complex biology of this species. River lamprey is an anadromous species for which the reproduction and larval period of life in the river is the most important. Therefore, the monitoring studies take into consideration not only the migration of adults to the spawning grounds, but also the occurrence of larvae which shows the effectiveness of reproduction. However, river lamprey larvae and brook lamprey occur together at the same monitoring stations (Potter 1980) and their taxonomy examination to the species level is often impossible. For that reason research to determine the location of the spawning grounds and habitats of river lamprey larvae have to be associated with the results of the previous analysis of migratory spawners. These both elements have to be treated as an integral part of the monitoring of this species and be carried out within one reproductive migration cycle, i.e. from autumn to the following summer.

Research assigned migrating reproductive population

The basic aim of the monitoring of the river lamprey spawners migration in the rivers is to determine the presence of both spawning runs - autumn and spring and the range of their migration on a dedicated site. The research include installation of fish traps in the river channel along the route of potential migration of adult river lampreys. Planning the catches should take into account the hydrotechnical development across the river due to the low ability to overcome this obstacle by river lampreys. Such guidelines will allow to obtain full information about the real range of migration of river lampreys to the spawning grounds. This research has a qualitative character, however quantitative results can be used as an element of analysis for assessing the conservation prospects of species on site.

Research assigned location of the spawning grounds and larvae habitats

Research dedicated to the location of breeding sites and the determination of habitats and the population status of river lampreys larvae are aimed at determining the relative abundance of larvae in microhabitats and their age structure. However, for individual river lamprey monitoring, it is important to choose the appropriate monitoring area as part of the surveyed site. Due to the impossibility of distinguish river lamprey larvae and brook lamprey larvae which have similar habitat requirements, the selection of the monitoring site should directly result from the research analysis of the reproductive migration. One monitoring area located in the identified spawning migration range should be designated for each site characterizing the most optimal conditions for spawning and microhabitats for larvae. As a consequence of such an approach sites for larvae monitoring in the

long-term perspective may change due to possible changes in the ecological patency of the river and the range of the reproductive migration of adult river lampreys as well.

2. Indicators and assessment of the conservation status of the species

Population status indicators

The table (Table 1) presents indicators for the assessment the status of 'Population' parameter for river lamprey, while the table (Table 2) presents the method of the valorization of these indicators.

Table 1. Indicators for assessing the status of the river lamprey 'Population' parameter

Indicator	Unit	Indicator description
Occurrence of individuals migrate for the spawning	-	indicator based on the observation of complete autumn and spring spawning migration of adults on the basis of catches by fyke nets which maintain caught fish alive in the patent site
Abundance of larvae	indv.·m^{-2}	number of electrofished larvae in the microhabitat on the determined surface of the bottom
Age structure of larvae	length class [cm]	age classes of larvae in microhabitat determined on the basis of their length; indicator determined based on electrofishing, where length of individuals mean: <60 mm – YOY - class 1., 61–90 mm - class 2., 91–120 mm - class 3., 121–150 mm - class 4.

Table 2. Valorization of indicators for assessing the status of the river lamprey 'Population' parameter

Indicator	Assessment		
	FV favourable status	**U1** unfavourable inadequate status	**U2** unfavourable bad status
Occurrence of individuals migrate for the spawning	if at least one individual was observed in autumn and spring migration	if no individuals were observed in autumn or spring migration	if no individuals were observed in autumn or spring migration
Abundance of larvae	if the value is >10	if the value is in the range of 6–10	if the value is <6
Age structure of larvae	if at least 3 age groups have been defined, including YOY	if at least 3 age groups have been defined, without YOY	if 2 or 1 age groups have been defined or no age groups

Habitat status indicators

The table (Table 3) presents the indicators and components of indicators to assess the status of 'Habitat' parameter for river lamprey, while the table (Table 4) presents the method of valorization of these indicators and their components.

Table 3. Indicators and components for the assessment of the status of the river lamprey 'Habitat' parameter

Indicator	Unit	Indicator description
EFI+_PL	-	assessment of ecological status according to New European Fish Index
Hydromorphological	-	assessment of 6 components of hydromorphological quality of the

Indicator	Unit	Indicator description
quality		river
Assessment of the spawning ground		
bottom substrate	-	characteristic bottom substrate in the river channel in the spawning ground
flow speed	$m \cdot s^{-1}$	determination of flow speed in the spawning ground
ecological patency of the river	-	determination of occurrence of obstacles for migration: unfunctional passes, bridges/anthropogenic development of banks causing intensive vibration, noise and light, fishing gear, poaching
Assessment of the larvae microhabitat		
bottom substrate	-	characteristic of bottom substrate in the river channel
flow disturbance	-	flow characteristic
nature of the river bank	-	nature of the deployment of the river bank and assessment of shading of the water surface
mobility of the river channel	-	assessment of the possibility of migration across the river channel in the flood area
flow speed	$m \cdot s^{-1}$	measure of flow speed
water temperature	°C	measure of water temperature

Table 4. Valorization of indicators for the assessment of the status of the river lamprey 'Habitat' parameter

Indicator	Assessment		
	FV favourable status	**U1** unfavourable inadequate status	**U2** unfavourable bad status
EFI+_PL	if I or II class appears	if III class appears	if IV or V class appears
Hydromorphological quality	if I or II class appears	if III class appears	if IV or V class appears
Assessment of the spawning ground			
bottom substrate	if only natural fraction (diameter of 1–3 cm) is found including	if natural and antropogenic substrate is found including fraction of 1–3 cm in diameter, or only antropogenic substrate (diameter of 1-3 cm)	if there are not fractions of substrate of 1–3 cm in diameter
flow speed	if flow speed is in the range of 2,0–1,5	if flow speed is in the range of 1,5–1,0	if flow speed is >2,0 and <1,0
ecological patency of the river	if no obstacles on river lamprey's migration route to spawning grounds	if obstacles on river lamprey's migration route to spawning grounds occur temporarily	if obstacles on river lamprey's migration route to spawning grounds are permanent

Indicator	Assessment		
	FV favourable status	**U1** unfavourable inadequate status	**U2** unfavourable bad status
Assessmnet of the larvae microhabitat			
bottom substrate	if sand >70% and river mud >10%	if sand is in the range of 60–70% and river mud in the range of 5–10%	if sand is <60% or other ranges not indicated for FV and U1
flow disturbance	if short-term changes in flow are taking place – no flow or minimum	if short-term changes in flow are taking place – medium	if short-term changes in flow are taking place – significant
nature of the river bank	if river bank is developed and hide-outs are vast and numerous	if river bank is developed and hide-outs are medium-sized and not numerous	if river bank is developed and hide-outs are small or there are not found
mobility of the river channel	if <15% length of the left and right river bank is built up by barriers for migrating lampreys	if 15–35% length of the left and right river bank is built up by barriers for migrating lampreys	if >35% length of the left and right river bank is built up by barriers for migrating lampreys
flow speed	if flow speed is <0,1	if flow speed is in the range of 0,1–0,5	if flow speed is >0,5
water temperature	if water temperature is in the range of 10–15	if water temperature is in the range of 15–20	if water temperature is >20

Conservation prospects

Assessment of the conservation prospects of the species on the site is a prediction of the population and habitat status in the perspective of the next 10-15 years. This is an expert method that takes into consideration the current population and habitat status of the species as well as previous trends of changes on the site in relation to these parameters. On this basis, it is necessary to analyze all current impacts and anticipated threats that may affect the future status of the population and the habitat on the surveyed site. Particular attention should be paid to the current and planned hydrotechnical development, possible regulation and maintenance works in the river channel as well as implemented or planned projects for ecological river clearing (so-called "blue corridors").

Conservation prospects can be assessed as favourable (FV) if in the perspective of 10–15 years the currently observed species status FV will persist or if the unfavourable inadequate status (U1) will improve. The unfavourable inadequate status (U1) of the species' behavior can be assessed when we predict that due to negative impacts or planned projects, the currently assessed favourable status may deteriorate or the unfavourable inadequate status will not change. Parameter can be assessed as U1 when the unfavourable bad status of the species (U2) as a result of the planned activities (e.g. in the case of projects concerning clearing of the river basins) can be improved, but the real results of such work are probably not reliable. Conservation prospects can be assessed as unfavourable bad (U2) if we predict that the currently observed status will not improve and the unfavourable inadequate status of the species (U1) will deteriorate or the current favourable status will significantly deteriorate.

Overall assessment

Overall assessment of conservation status of species is determined according to lowest assessment from among the three parameters: ‘Population’, ‘Habitat’ and ‘Conservation prospects’. Scheme of assessment aggregation of components of indicators, indicators and parameters of the conservation status for the river lamprey is presented in the figure (Fig. 1).

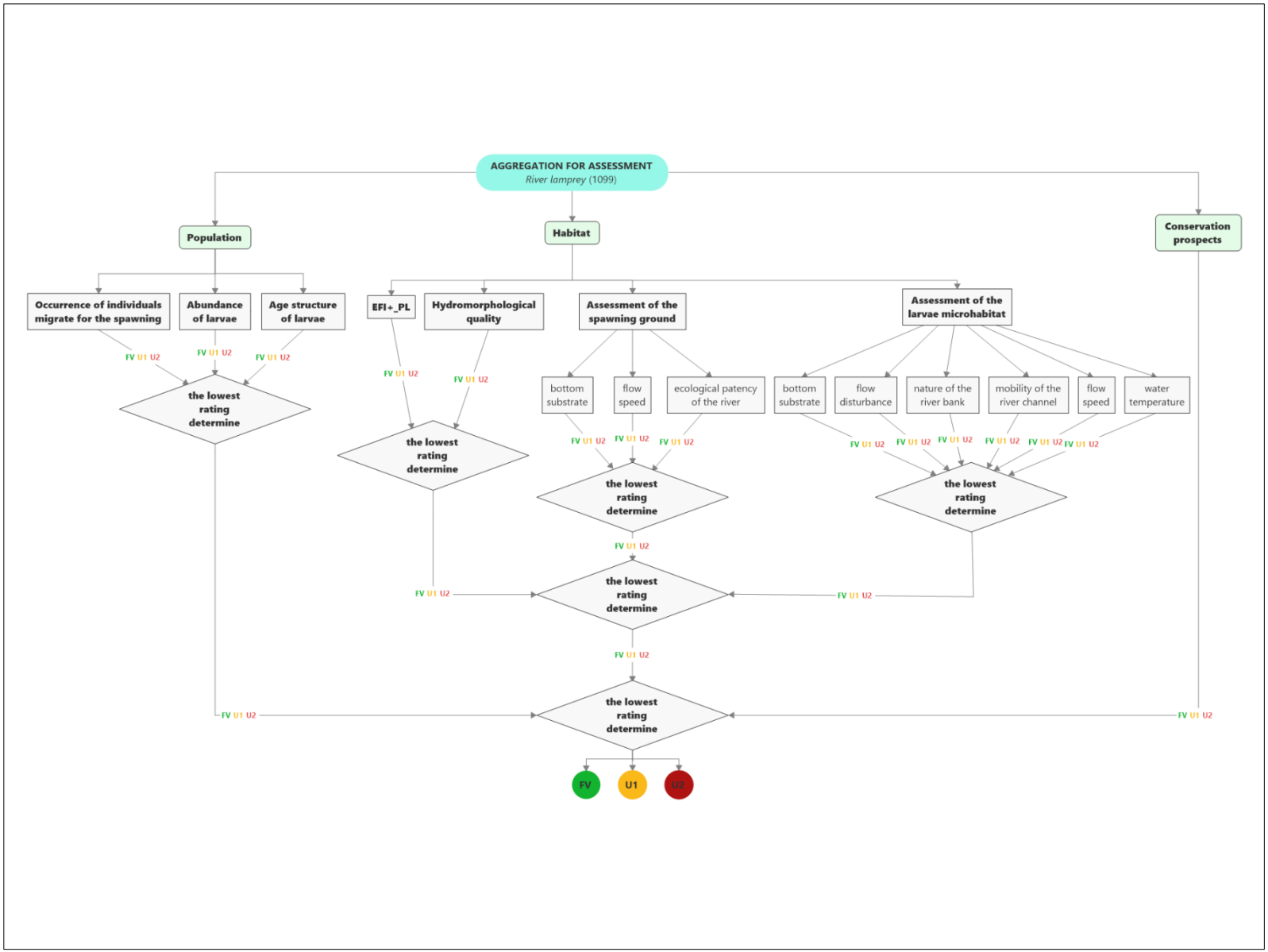

Fig. 1. Diagram of aggregation of components of indicators, indicators and parameters to assess the state of protection of the river lamprey

3. Description of monitoring

Selection of monitoring stations

Planning the distribution and the number of stations on selected site to study migrating spawners in accordance with the concept of river lamprey monitoring, require taking into consideration existing hydrotechnical development across the river in the basin and existing passes. The most convenient sites for catches are below the weirs, because river lampreys migrating up the river gather in these places trying to overcome this obstacle. There is a greater chance of catching them. However, fish traps should also be installed below the expected spawning grounds. In case of absence of significant obstacles for migration in a selected basin, research fishing should be conducted in at least three locations including the lower section of the river near its mouth, middle course of the river and the area of expected spawning grounds. Choosing the right places for the location of traps, one should take into account the considerations of the possibility of their safe setting on the bottom of the river and their removal. The results obtained in the monitoring of migrating spawners indicate the actual range of their migration. Besides, the field observation of potential spawning grounds should be the starting point in the determination the monitoring surface for the assessment of larvae habitats and their age structure. When the observed range of the spawning migration is stated, then only one site optimal for reproduction and nursing of river lampreys larvae should be choosed for electrofishing. If there are terminal barriers for migration which indicate the lack of accessibility to potential spawning grounds for migrating river lampreys and the lack of observation of spawning on the available section of the river, then sites for monitoring the larval habitats should be set directly below these barriers.

13 sites within present range of the river lamprey should be monitored on the following rivers: Pasłęka, Bauda, Drwęca, Wierzyca, Reda, Chełst, Łeba, Wieprz, Grabowa, Parsęta, Rega, Wołczenica and Ina (Fig. 2) in order to obtain the most complete assessment of the conservation status of river lamprey at the national level.

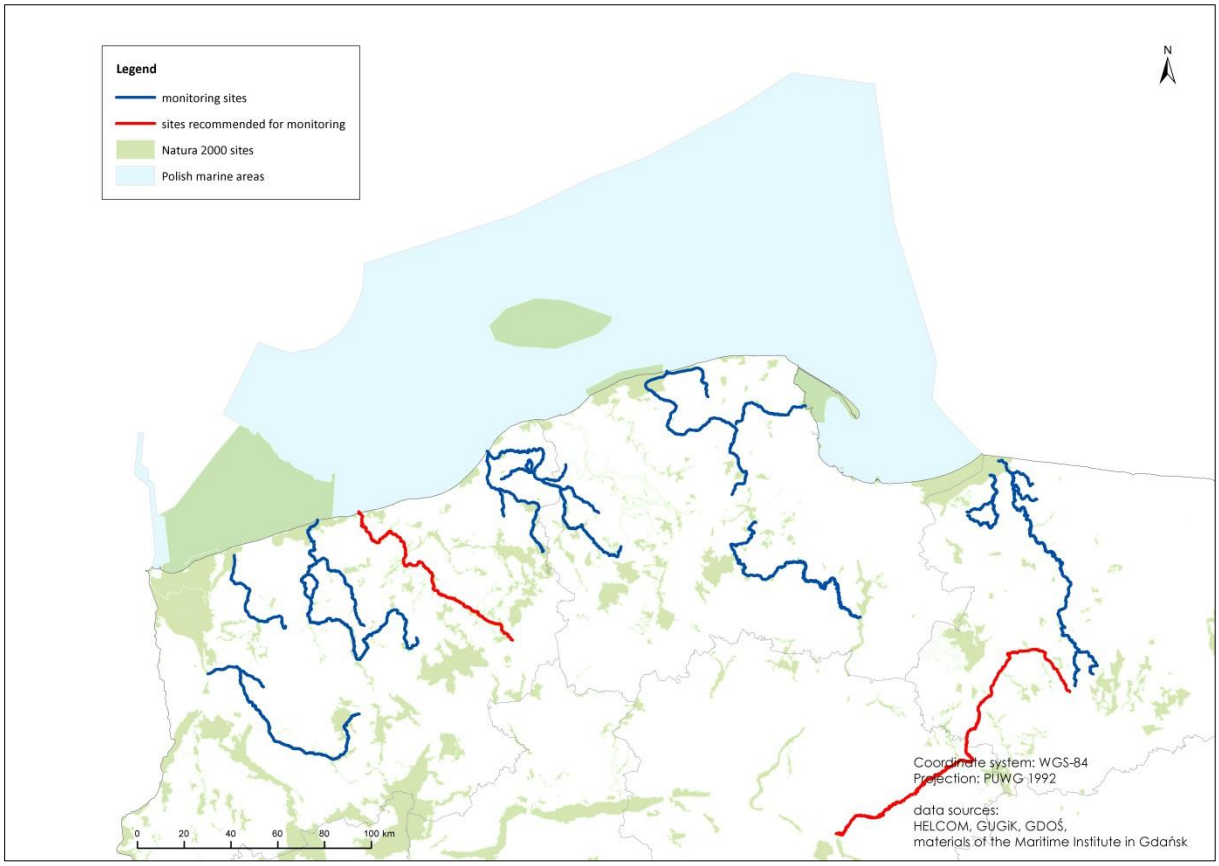

Fig. 2. Sites for river lamprey monitoring

4. The method of investigation

Determination of population status indicators

Occurrence of individuals migrate for the spawning

Catches dedicated to adult river lampreys migrating to the spawning grounds should be carried out with fish traps maintain caught fish alive. It is proposed to use small fyke nets without wings with a semi-circular opening which is 35 cm in height. This type of net consists of an external mesh sizes no more than 6 mm. At each station, three individual traps should be placed parallel to each other with the opening directed down the river. This way of installation of the traps takes into account the characteristic of the selected section of the river. However, it is possible to install fish traps in series especially in specific places where free wading is limited (Photo 6). Traps should be placed in the late afternoon or evening and removed the next day until noon due to the nocturnal character of migration of river lampreys. The catch at each station should be counted according to species and the caught river lampreys should be additionally measured with an ichthyological measure (or in a measuring tray) with an accuracy of 0.5 cm (to round down). In the case of a large number of individuals, the measurement of the fish length can be performed on a representative subsample.

Photo 6. Fish traps used to catch migrating river lampreys (photo by T. Kuczyński)

Abundance of larvae and age structure of larvae

Abundance and age structure studies of river lamprey larvae in their habitats are based on data from electric fishing gear (Photo 7). In selected microhabitats monitoring area of 1 m² should be designated using a frame placed on the bottom. Then electrical pulses should be emitted directly on the surface to be caught. The larvae reaction and their coming out the substrate to the bottom is often delayed, so electrofishing should be done for at least a few minutes with a few seconds breaks in the emission of the pulses. The larvae agitated by these pulses jump up from the selected surface of the bottom and are caught in the fine mesh landing net and are placed in a container with water. The catch should be completed at least 5 minutes after the last larvae emerged from the selected area of the bottom. Caught larvae should be measured on an ichthyological measure or in a measuring tray with an accuracy of 0.5 cm, rounded down.

Photo 7. Electrofishing of river lamprey larvae in the microhabitats (photo by M. Gorczyca)

Determination of the habitat status indicators

EFI+_PL and hydromorphological quality

For the assessment of the spawning grounds and microhabitats in the proper area of the surface water bodies the most up-to-date data from the State Environmental Monitoring should be used (last 5 years preceding the assessment of the conservation status of the river lamprey). If the current data is absent then field studies to obtain EFI+_PL and hydromorphological quality values should be performed in accordance with the methodology currently adopted under the State Environmental Monitoring.

Assessment of the spawning ground

Bottom substrate – coverage of the river bottom (in percent) determined by the expert method. Flow speed – value measured by means of a flowmeter or float and a measuring staff placed on the bottom of the river.

Ecological patency of the river

This indicator is determined by the expert method based on the inventory of the existing hydrotechnical development of the site and direct field observations.

Assessment of microhabitats

Bottom substrate – coverage of the river bottom with determined type of substrate (in percent) determined by the expert method.

Flow disturbance, nature of the river bank, mobility of the river channel – based on the direct field observation determined by the expert method.

Flow speed – value of flow speed is measured by flowmeter or float or measuring staff placed on the bottom of the river.
Water temperature – value measures by thermometer or multimetric meter immersed under the water surface.

5. The date and frequency of investigations

Time for catches of migrating river lampreys for spawning depends on the current hydrological situation. Catches for autumn migration should be determined between the beginning of October and the end of December, and for spring migration from mid-March to the end of May. In both migration seasons, 3 to 4 catches should be made for each site. Monitoring of spawners of spring run should also include observations to assess spawning grounds. However, research dedicated for larvae of river lampreys and their microhabitats should be carried out once during the summer (July-September).

6. Equipment and materials for investigations

- waders, gloves, safety equipment
- traps for catching migrating spawners of river lamprey
- rods or anchors for fixing traps in the bottom
- backpack kit for electrofishing
- fine mesh landing net on a long rod
- frame with dimension of 1x1 m
- multimetric meter for water parameters measure (temperature, oxygen, conductivity)
- ichtiological measure or ichtiological measuring tray
- measuring staff and float or flowmeter
- containers for keeping caught river lampreys

7. Examples of river lamprey research forms

Fishing form		
Name of a site: *Reda*		
Setting method (mark **X**):	□ from the boat	**X** wading
Type of gear:	*fyke nets*	

No.	Station	Depth [m][1]		Date of setting / starting	Time	Starting position		Final position[2]		Date of removal/ end	Time	Threats/Remarks
		P	K			Latitude	Longitude	Latitude	Longitude			
1.	*Reda 1*	*1,2*	-	*2017-03-23*	*17:45*	*54,5555*	*18,2222*	-	-	*2017-03-24*	*7:30*	-
2.	*Reda 2*	*1*	-	*2017-03-23*	*18:25*	*54,5569*	*18,2223*	-	-	*2017-03-24*	*9:05*	-

Prepared by:	**Verify by:**	**Approved by:**
Date:	Date:	Date:
Signature – full name:	Signature – full name:	Signature – full name:

[1] P – starting depth, K – final depth in case of the electrofishing, for other gears write only for P

[2] For fish traps – Do not fill out!

Analysis form

Research station	*Reda 1*	Date *2017-03-24*

Species				Species				Species			
Lt [cm]				**Lt [cm]**	.			**Lt [cm]**	*Minóg rzeczny*		
0,5				18,0				35,5			
1,0				18,5				36,0			
1,5				19,0				36,5	*II*		
2,0				19,5				37,0	*III*		
2,5				20,0				37,5			
3,0				20,5				38,0			
3,5				21,0				38,5	~~*III*~~ *II*		
4,0				21,5				39,0			
4,5				22,0				39,5			
5,0				22,5				40,0			
5,5				23,0				40,5			
6,0				23,5				41,0			
6,5				24,0				41,5			
7,0				24,5				42,0			
7,5				25,0				42,5			
8,0				25,5				43,0			
8,5				26,0				43,5			
9,0				26,5				44,0			
9,5				27,0				44,5			
10,0				27,5				45,0			
10,5				28,0				45,5			
11,0				28,5				46,0			
11,5				29,0				46,5			
12,0				29,5				47,0			
12,5				30,0				47,5			
13,0				30,5				48,0			
13,5				31,0				48,5			
14,0				31,5				49,0			
14,5				32,0				49,5			
15,0				32,5				50,0			
15,5				33,0				50,5			
16,0				33,5				51,0			
16,5				34,0				51,5			
17,0				34,5				52,0			
17,5				35,0	*III*			52,5			

Remarks:

Roach: 2

Prepared by:	**Verify by:**	**Approved by:**
Date:	Date:	Date:
Signature – full name:	Signature – full name:	Signature – full name:

Observation and measurement form for the river lampreys

[1] Name of a site	*REDA*	Date	*2017-08-08*	Time	*12:40*
[2] Station	*REDA 3*				

[3] Geographical coordinates P	*54,5544* *18,2333*	[3] Geographical coordinates K	*54,5549* *18,2334*

[4] Width P	*10 m*	[4] Width Ś	*15 m*	[4] Width K	*12 m*
[5] Maximal width	*16 m*	[6] Depth P	*1,1 m*	[6] Depth Ś	*1 m*
[6] Depth K	*0,8 m*	[7] Maximal width	*1,5 m*	[8] Flow speed 1	*0,01m/s*
				[8] Temperature 1	*15,3°C*
[8] Flow speed 2	*0,01m/s*	[8] Flow speed 3	*0,06m/s*	[8] Flow speed 4	-
[8] Temperature 2	*15,3°C*	[8] Temperature 3	*15,3°C*	[8] Temperature 4	-

[9] Shading	1	2	3	x	[10] Z right bank	1	2	3	4	[10] Z left bank	1	2	3	4
[11] Trees	1	2	x	4	[12] D right bank	1	2	3	4	[12] D left bank	1	2	3	4
[13] Submerged vegetation	1	x	3	4	[14] Rush and floating vegetation	1	2	3	4	[15] Filamentous algae	X	1	2	

[16] Submerged branches	1	x	3	4	[16] Pendulous branches	1	2	3	x	[16] Roots	1	x	3	4	[17] Fallen trees	1		
[18] Mud	1	x	3	4	[19] Sand	x	2	3	4	[20] Gravel	1	x	3	4	[21] Stones	1	x	3	4

[22] Threats	-
Remarks	-

Prepared by:	**Verify by:**	**Approved by:**
Date:	Date:	Date:
Signature – full name:	Signature – full name:	Signature – full name:

Necessary measuring instruments: GPS, measuring tape (50 m) or distance meter, measuring staff (4 m), weight with line, float or flowmeter, camera, thermometer;

Instruction for filling out the form:

[1] name of a site, example: *Rega*

[2] station, example: *Rega2*

[3] geographical coordinates in WGS 84 form at the beginning of the transect in the upper section of the river P and end in the lower section of the river K

[4] the value of 3 measurements of the water surface's width made at the beginning P, middle Ś and end K of the analyzed section of the river by means of a measuring tape or distance meter

[5] the value of the maximal water surface width on the transect measured by means of a measuring tape or distance meter

[6] the value of 3 measurements of the analyzed section 4 of the river made at the beginning P, middle Ś and end K measured by means of measuring staff or weight with line

[7] the value of the maximal depth on the analyzed section of the river measured by means of measuring staff or weight with line

[8] the value of the flow speed (measured by means of flowmeter or float) and water temperature (measured with the thermometer submerged under the water surface) in the center of the river lamprey larvae microhabitat for maximally 4 microhabitats

[9] estimated as a percentage [1] up to 25%, [2] 26%-50%, [3] 51%-75%, [4] 76%-100% for a whole section (circle the number)

[10] shading estimated as a percentage as in point [9] if there are differences between the river banks

[11] coverage the shoreline with trees estimated as a percentage as in point [9]

[12] coverage the shoreline with trees estimated as a percentage as in point [9] if there are differences between the river banks

[13] and [15] bottom coverage estimated as a percentage as in point [9]

[14] water surface coverage estimated as a percentage as in point [9]

[15] 0- none, 1 – up to 20% of coverage of a bottom substrate, 2 – more than 20% of coverage of a bottom substrate (circle the number)

[16] occurrence on the river banks estimated as a percentage as in point [9]

[17] number of fallen trees along the whole length of analyzed section

[18] [19] [20] [21] bottom coverage estimated as a percentage as in point [9] determined by the expert method

[22] write codes of the observed threats from the list of the threats

8. Other species for which the methodology can be applied

The methodology for river lamprey monitoring can be used also for monitoring the sea lamprey *Petromyzon marinus*. However, due to the differences in the biology of both species, indicator 'Age structure of larvae' for 'Population' parameter should be excluded from the assessment of the conservation status for the sea lamprey. In this case valorization of indicator 'Occurrence of individuals migrate for the spawning' should be applied (Table 5).

Table 5. Valorization of indicators of population state for sea lamprey

Indicator	**Assessment**		
	FV favourable conservation status	**U1** unfavourable inadequate status	**U2** unfavourable bad status
Occurrence of individuals migrate for the spawning	> 1 individual during the spring migration	1 individual during monitoring catches in the spring	none individuals
Abundance of larvae [ind.]	if the value is >10	if the value is in the range of 6–10	if the value is <6

9. References

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