Action funded by the EUROPEAN UNION

EUWI+ EU WATER INITIATIVE FOR EASTERN PARTNERSHIP

European Union Water Initiative Plus for
Eastern Partnership Countries (EUWI+): Results 2 and 3

ENI/2016/372-403

SURFACE WATER SURVEY REPORT 2018

23 sampling sites in Belarus, including field protocols, water sampling, chemical and biological analysis and the hydromorphological description of the sampling sites

BY-CRICUWR-1; July 2019

umweltbundesamt ENVIRONMENT AGENCY AUSTRIA

International Office for Water

Responsible EU member state consortium project leader

Michael Sutter, Umweltbundesamt GmbH (AT)

EUWI+ country representative in Belarus

Alexandr Stankevich (BY)

Responsible international thematic lead expert

Kristina Schaufler, Umweltbundesamt GmbH (AT)

Responsible Belarusian thematic lead expert

Prepared by: Central Research Institute for Complex Use of Water Resources (CRICUWR)

Authors

Prepared by: Central Research Institute for Complex Use of Water Resources (CRICUWR)
Georg Wolfram, DWS-Hydro-Ökologie for Umweltbundesamt GmbH (AT)
Kristina Schaufler, Umweltbundesamt GmbH (AT)

Imprint

Owner and Editor: EU Member State Consortium

Umweltbundesamt GmbH	Office International de’l Eau (IOW)
Spittelauer Lände 5	21/23 rue de Madrid
1090 Vienna, Austria	75008 Paris, FRANCE

Responsible IOW Communication officer:

Yunona Videnina
y.videnina@oieau.fr

July 2019

CONTENTS

List of Tables

List of Figures

List of Attachments

Shapefiles

Attachment 01: GPS waypoints and shapefiles of 23 sampling sites of ecological survey (15 files)

https://drive.google.com/open?id=1vy9ZupFUppf9BNxXL_f0xBaOzW9NEKz4

Maps and Photos

Attachment 02: Schemes, Satellite images and photos of 23 sampling sites of ecological survey (92 files)

https://drive.google.com/open?id=19fYx3kHyVN7X68xPgrb2-HZAZDV3BC4S

Data Sheets

Attachment 03: Summary of the field protocols (surface water sampling protocols) in the format of excel file for 23 sampling sites of ecological survey (1 file: 03 Summary sampling.xlsx)

https://drive.google.com/open?id=1v_7YBV43vIOr4ke_GzeXpuOroUpRlsTz

Attachment 04: Summary for chemical data in the format of excel file for 23 sampling sites of ecological survey (1 file: 04 Summary chemical data.xlsx)

https://drive.google.com/open?id=1L00bNKgGTDzoeTs9roqMEd9L0vmvxqG1

Attachment 07: Summary for biological data in the format of excel file 23 sampling sites of ecological survey - taxonomic diversity of benthic macroinvertebrates (1 file: 05 Summary for biological data.xlsx)

https://drive.google.com/open?id=1gUBzeAj6HtBz2Q8kIZ5Ye5ysBSvmkz3N

Documents in Russian

Attachment 05: Acts of sampling for 23 sampling sites of ecological survey in pdf format in accordance with national requirements in the Russian language (23 files)

https://drive.google.com/open?id=1ti5sKvzw_3i7MLmVgIKRjjxAN9OyLsil

Attachment 06: Protocols of measurements in environmental protection (surface waters) for 23 sampling sites of ecological survey in pdf format in accordance with national requirements in Russian language (23 files)

https://drive.google.com/open?id=18n2MLa5iWm1pEvvazH33lg1WD92ALSda

Metadata

All the presented GIS shapefiles (layers) are ESRI shapefiles with geometry types of point. The spatial reference system of the layers is +proj=utm +zone=35 +datum=WGS84 +units=m +no_defs; the extent of the layers in layers reference system units is xMin,yMin 319437.84,5694328.83 : xMax,yMax 716535.72,5974979.08. The accuracy of all the presented layers is corresponding the scale of 1:100000.Reference coordinate system - EPSG:32635, WGS84/UTM zone 35N; coding – UTF8.

Abbreviations

CRICUWR ..... Republican Unitary Enterprise «Central Research Institute for Complex Use of Water Resources»

EU ..... European Union

EUWI ..... European Union Water Initiative Plus for the Eastern Partnership

GIS ..... Geographical Informational System

IOW ..... International Office for Water, France

NSEM ..... National System of Environmental Monitoring

SWB..... Surface water body

UBA ..... Umweltbundesamt GmbH, Austria

WFD ..... Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community in the field of water policy

1 EXECUTIVE SUMMARY

This survey report provides the results of a surface water field survey conducted on 8-13 October 2018 in the Pripyat river basin. 23 surface water (SW) samples were taken from 23 monitoring sites. All SW samples were analyzed in the chemical laboratory of the Republican center for analytical control in the field of environmental protection as well as by biologists of the Central research institute for complex use of the water resources. Laboratory protocols with physical-chemical parameters and macroinvertebrates are presented. The protocols show a wide range of ecological status of the investigated water ecosystems, from potential reference conditions to water bodies at risk of failing the environmental objectives of the WFD. All results, including hydro-morphological protocols, will be used in the development of the RBMP of the Pripyat river basin.

2 INTRODUCTION AND SCOPE

This report has been prepared based on the Service Agreement AVH 10839-BY-CRICUWR-1 for the project “European Initiative Plus for Eastern Partnership” (EUWI+ 4 EaP). The subject of this report is a surface water monitoring in the Pripyat river basin. This report presents the results of this survey which included chemical, and biological sampling and analyses as well as a hydromorphological site description.

The main objective of the survey was to carry out a harmonized data collection which shall form a basis for the evaluation of existing national assessment methods for the biological quality element “benthic invertebrates” in selected river types of Pripyat river basin in Belarus. Based on this method, the ecological status of the rivers and water bodies of the Pripyat river basin included in this survey will be classified. These results will contribute to the status assessment and risk analysis within the national river basin management plan for the Pripyat river basin and form a sound methodological basis for future monitoring programs.

3 OVERVIEW OF THE ECOLOGICAL SURVEY: SAMPLING SITES AND DATES

The present chapter describes a general overview of the ecological survey in **Pripyat river basin** in Belarus performed 08-13 October 2018 by CRICUWR according the service agreement AHV 10839-BY-CRICUWR-1 for the project EUWI+ 4 EaP.

Pripyat river basin is one of the five main international river basins in Belarus which requires the development of a separate river basin management plan regarding the actual Water Code of the Republic of Belarus (**Figure 1**).The process of the development of Pripyat RBMP has already started in 2018 with the delineation of SWB in the basin in accordance with the EU WFD approach in the scope of EUWI+ project activities. 715 SWB were delineated under the following criteria: 1) Categorization of SWB, 2) Typology by "System A", 3) Significant human pressures and monitoring data (**Figure 2**). Unfortunately, only small numbers of SWB is covered by the existing monitoring network under the National System of Environmental Monitoring (NSEM). It is essential to fill these gaps at sites of intensive anthropogenic pressures like significant point sources of pollution. On the other hand clarifications of the reference conditions for all types of SWB are needed.

The present ecological survey includes the hydrochemical, hydrobiological and hydromorphological data collection and analyses at 23 sampling sites in the Pripyat river basin. They include 7 possible reference sites and 16 sites under the significant point sources of pollution (**Figure 3** and *Table 1.*

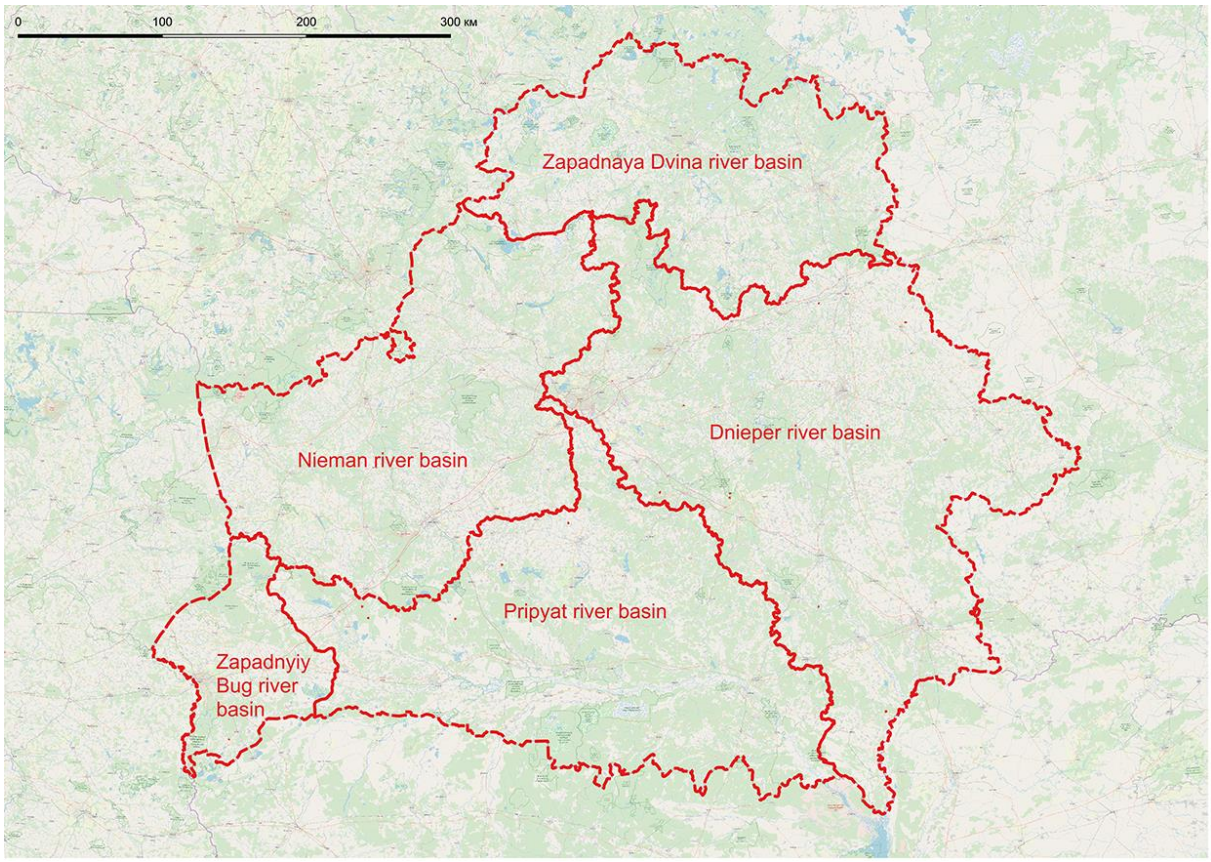

Figure 1. Pripyat river basin in Belarus

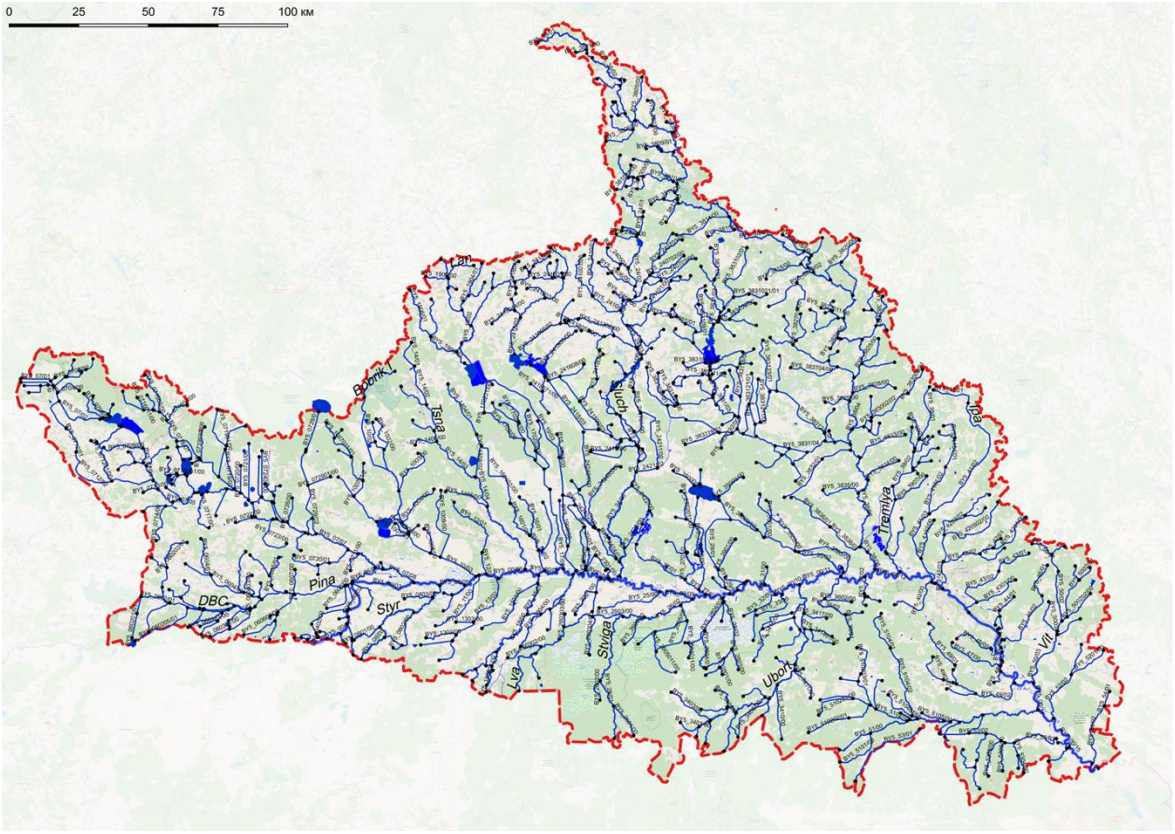

Figure 2. Surface waters in the Pripyat river basin in Belarus with 715 delineated SWB (636 river SWB, 79 lake SWB)

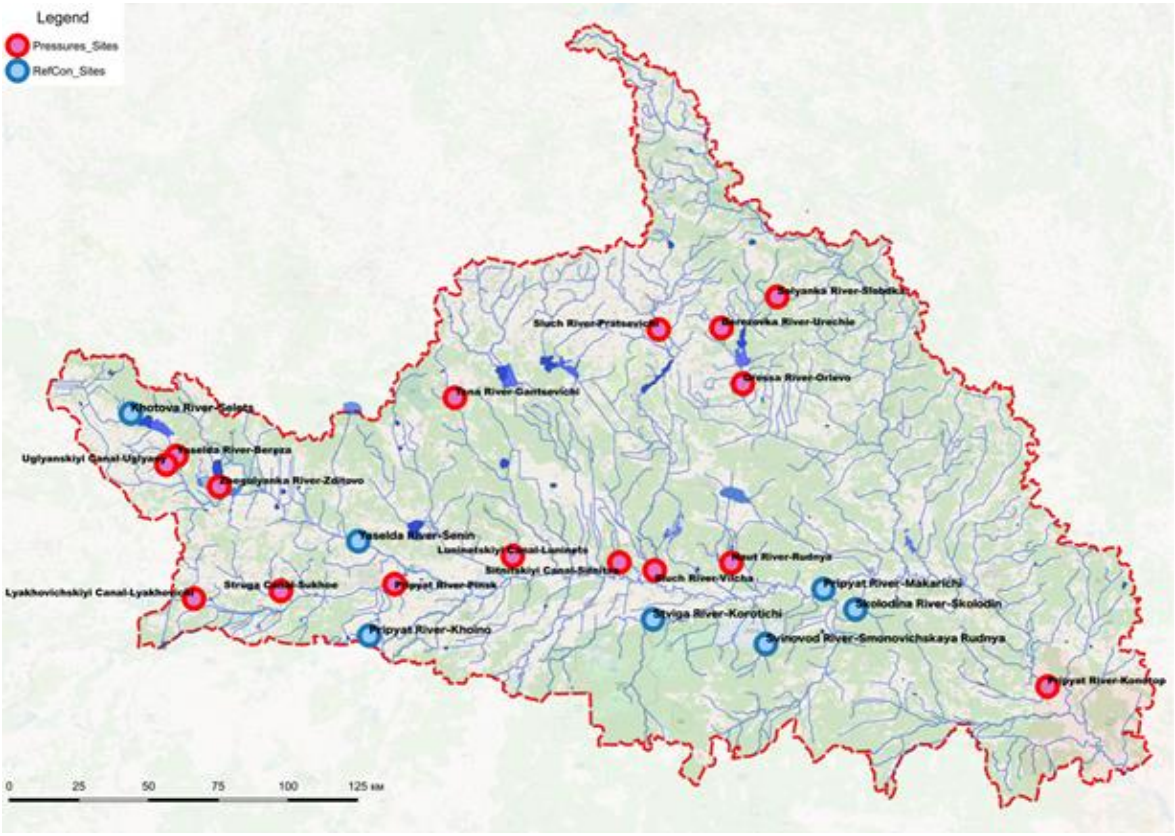

Figure 3. Map of 23 sampling sites in the Pripyat river basin

Table 1. List of 23 sampling sites in the Pripyat river basin

Basin	River name	Site name	Site #	Latitude	Longitude
Pripyat	Zhigulyanka River	Zditovo	01	52.421693	25.252881
Pripyat	Yaselda River	Bereza	02	52.510498	25.023442
Pripyat	Lyakhovichskiyi Canal	Lyakhovichi	03	52.059262	25.135041
Pripyat	Struga Canal	Sukhoe	04	52.090349	25.589734
Pripyat	Yaselda River	Senin	05	52.254943	25.989243
Pripyat	Pripyat River	Khoino	06	51.951777	26.053924
Pripyat	Pripyat River	Pinsk	07	52.117643	26.186847
Pripyat	Luninetskiyi Canal	Luninets	08	52.210628	26.801744
Pripyat	Sitnitskiyi Canal	Sitnitsa	09	52.189581	27.360689
Pripyat	Sluch River	Vilcha	10	52.164045	27.546387
Pripyat	Naut River	Rudnya	11	52.185036	27.949174
Pripyat	Pripyat River	Makarichi	12	52.098487	28.427937
Pripyat	Pripyat River	Konotop	13	51.761088	29.582606
Pripyat	Skolodina River	Skolodin	14	52.028242	28.593075
Pripyat	Svinovod River	Simonovichskaya Rud-nya	15	51.922048	28.123624
Pripyat	Stviga River	Korotichi	16	52.004752	27.536571
Pripyat	Sluch River	Pratsevichi	17	52.938976	27.577585
Pripyat	Oressa River	Orlevo	18	52.761288	28.022585
Pripyat	Berezovka River	Urechie	19	52.942057	27.912674
Pripyat	Solyanka River	Slobodka	20	53.039219	28.213646
Pripyat	Tsna River	Gantsevichi	21	52.71879	26.493306
Pripyat	Uglyanskiyi Canal	Uglyany	22	52.488504	24.971359
Pripyat	Khotova River	Selets	23	52.650034	24.775457

The following reasons were taken into account for the selection of the sampling sites in the Pripyat river basin for the present ecological survey:

1. Zhigulyanka River – Zditovo: wastewater discharges of a) Peskovskoe distillery, b) Bereza enterprise of housing and utilities, c) Bereza thermal power plant in annual amount about 1’185’000 m^3;
2. Yaselda River –Bereza: wastewater discharges of a) Bereza enterprise of housing and utilities, b) Bereza plant of silicate products, c) Fish farm Selets in annual amount about 40’528’000 m^3;
3. Lyakhovichskiyi Canal – Lyakhovichi: wastewater discharges of a) Drogichin enterprise of housing and utilities, b) Drogichin feed mill in annual amount about 615’000 m^3;
4. Struga Canal –Sukhoe: wastewater discharge of Ivanovo enterprise of housing and utilities in annual amount about 1’360’000 m^3;
5. Yaselda River – Senin:candidate to reference conditions for Type #7: Lowlands – Large – Organic;
6. Pripyat River – Khoino: candidate to reference conditions for Type #9: Lowlands – Very Large - Organic;
7. Pripyat River – Pinsk:wastewater discharge of Pinsk vodocanal in annual amount about 9’461’000 m^3;

8. Luninetskiyi Canal – Luninets: wastewater discharge of Luninetsvodo canal in annual amount about 1’341’000 m^3;
9. Sitnitskiyi Canal – Sitnitsa:mine water discharges of Enterprise Granit in annual amount about 23’922’000 m^3;
10. Sluch River – Vilcha: wastewater discharges of a) Fish farm Beloe, b) Luninetsvodo canal in annual amount about 5’945’000 m^3;
11. Naut River – Rudnya: wastewater discharge of Zhitkovichi enterprise of housing and utilities in annual amount about 540’000 m^3;
12. Pripyat River – Makarichi:candidate to reference conditions for Type #8: Lowlands – Very Large - Siliceous;
13. Pripyat River – Konotop: wastewater discharge of Mozyr oil refinery in annual amount about 16’463’000 m^3;
14. Skolodina River – Skolodin: candidate to reference conditions for Type #5: Lowlands – Middle – Siliceous;
15. Svinovod River – Simonovichskaya Rudnya: candidate to reference conditions for Type #4: Lowlands – Middle - Organic;
16. Stviga River – Korotichi:candidate to reference conditions for Type #6: Lowlands – Large – Siliceous;
17. Sluch River – Pratsevichi: wastewater discharge of Slutsk enterprise of housing and utilities in annual amount about 9’259’000 m^3;
18. Oressa River – Orlevo: wastewater discharges of a) Fish farm Luban, b) Luban enterprise of housing and utilities, c) Aleksandrov farm enterprise in annual amount about 31’546’000 m^3;
19. Berezovka River – Urechie: wastewater discharge of Urechie distillery in annual amount about 591’000 m^3;
20. Solyanka River – Slobodka: wastewater discharge of Starye Dorogi enterprise of housing and utilities in annual amount about 640’000 m^3;
21. Tsna River – Gantsevichi: wastewater discharges of a) Gantsevichi enterprise of housing and utilities, b) Military unit in annual amount about 1’481’000 m^3;
22. Uglyanskiyi Canal – Uglyany: wastewater discharges of a) Saria enterprise, b) Bereza building materials enterprise in annual amount about 141’000 m^3;
23. Khotova River – Selets: candidate to reference conditions for Type #2: Lowlands – Small – Organic.

The maps and photos of sampling sites are presented in Attachment 02 Photos. The GPS waypoints in kmz format and shape files of sampling sites are presented in Attachment 01 Shapefiles.

4 METHODS

4.1 General physical-chemical parameters

The hydrochemical parameters of the present 23 samples were analyzed and processed in four regional chemical laboratories of the Republican Center of Analytical Control, namely in accordance with Table 2:

1. Pinsk Interdistrict Laboratory of Analytical Control: 7 sites (sampling sites # 01-07);
2. Mozyr Interdistrict Laboratory of Analytical Control: 5 sites (sampling sites # 08-12)
3. Slutsk Interdistrict Laboratory of Analytical Control: 8 sites (sampling sites # 13-20);
4. Republican Center of Analytical Control, Minsk: 3 sites (sampling sites # 21-23).

The protocols for sample delivery and handover are presented in Annex 1. The acts of sampling needed by national requirements for 23 sampling sites in Russian are presented in Attachment 05 List of sampling acts [in RU]. The protocols of measurements in environmental protection (surface waters) needed by national requirements for 23 sampling sites in Russian are presented in Attachment 06 List of protocols [in RU]. All the chemical laboratories used the same methods and system of quality control in accordance with national legislation (Table 2).

Table 2. Hydrochemical parameters, methods and limits of detection (LOD)

#	Parameter	Unit	LOD	Method of detection
1	WT	°C	0–40	Procedure of measurement MH 5350-2015. Method of water temperature measurement
2	DO	mg/L	–	State standard ISO 5814-2007 Water quality. Determination of dissolved oxygen. Electrochemical probe method
3	O_2-Sat	%	0–100	State standard ISO 5814-2007 Water quality. Determination of dissolved oxygen. Electrochemical probe method
4	pH		2–12	State Standard ISO 10523-2009 Water quality. Determination of pH
5	EC	µS/cm	–	State Standard ISO 7888-2006 Water quality. Determination of Electrical conductivity
6	TSS	mg/L	>3.0	Procedure of measurement MH 4362-2012 Method of determination of concentration of total suspended solids in wastewaters, surface waters and groundwaters
7	BOD_5	mg/L	0.5–6.0	State Standard 17.13.05-23-2011 / ISO 5815-2:2003 Environmental Protection and nature use. Analytical control and monitoring. Water quality. Determination of biological oxygen demand concentration in n days (BOD_n). Part 2. Method without sample dilution

#	Parameter	Unit	LOD	Method of detection
8	COD	mg/L	5–16,000	Procedure of measurement 14.1:2:4.190-03 Determination of chemical oxygen demand in wastewaters and surface water samples by photometric method
9	NH_4-N	mg/L	>0.003	State Standard 17.13.05-09-2009 / ISO 7150-1:1984 Environmental Protection and nature use. Analytical control and monitoring. Water quality. Determination of Ammonia-N
10	NO_3-N	mg/L	>0.02	State Standard 17.13.05-43-2005 Environmental Protection and nature use. Analytical control and monitoring. Water quality. Determination of nitrate-N concentration by photometric method
11	PO_4-P	mg/L	>0.005	State Standard 18309-2014 Water. Methods of determination of phosphorus compound. Method G
12	DP	mg/L	>0.005	State Standard 18309-2014 Water. Methods of determination of phosphorus compound. Method G
13	Cl	mg/L	>10	State Standard 17.13.05-39-2005 Environmental Protection and nature use. Analytical control and monitoring. Water quality. Determination of chloride concentration by titrimetric method
14	SO_4	mg/L	>2	State Standard 17.13.05-42-2005 Environmental Protection and nature use. Analytical control and monitoring. Water quality. Determination of sulfate (ion) concentration by turbidimetric method
15	Ca	mg/L	>1	State Standard 17.13.05-46-2016 Environmental Protection and nature use. Analytical control and monitoring. Water quality. Determination of calcium and magnesium concentration by titrimetric method
16	Mg	mg/L	>1	State Standard 17.13.05-46-2016 Environmental Protection and nature use. Analytical control and monitoring. Water quality. Determination of calcium and magnesium concentration by titrimetric method
17	Na	mg/L	0.5–5000	State Standard 31869-2012 Water. Methods of determination of cations (ammonium, barium, potassium, calcium, lithium, magnesium, sodium, strontium) using capillary electrophoresis
18	K	mg/L	0.5–5000	State Standard 31869-2012 Water. Methods of determination of cations (ammonium, barium, potassium, calcium, lithium, magnesium, sodium, strontium) using capillary electrophoresis

4.2 Biological quality elements

The present survey concentrated on the biological quality element “benthic macroinvertebrates” (macrozoobenthos). The samples were analyzed and processed by the hydrobiological expert Mr Gennady Tishchikov. Sorting of sediments samples were conducted according AQEM/STAR protocol. The benthic invertebrates were separated to the following taxonomic groups and identified to the taxo-

nomic level indicated inTable 3. All specimens picked out of the sediment samples are kept and stored in vials with 70% ethanol. The results are presented in the Annex 5.

Table 3. Identification level of macroinvertebrates

Major group	Identification level	Major group	Identification level
Porifera	Major group	Ephemeroptera	Genus
Coelenterata	Major group	Odonata	Genus
Turbellaria	Major group	Plecoptera	Genus
Nematomorpha	Major group	Heteroptera	Genus
Nemertini	Major group	Megaloptera	Family
Gastropoda	Genus/Species	Planipennia	Family
Bivalvia	Genus/Species	Coleoptera	Family/Genus
Polychaeta	Major group	Hymenoptera	Major group
Oligochaeta	Family	Trichoptera	Family/Genus
Hirudinea	Family/Genus	Lepidoptera	Major group
Hydrachnidia	Major group	Diptera	Family/Genus
Crustacea	Genus/Species	Btyozoa	Major group

4.3 Field protocols and hydro-morphological site description

Field protocols (surface water sampling protocols) were filled for all 23 sampling sites of the ecological survey. The protocols followed the EUWI+ manual for the ecological survey and the following national guidance documents:

- State Standard 31861-2012 Water. General Requirements for sampling;
- State Standard 17.13.05-10-2009 / ISO 5667-6:2005 Water quality - Sampling - Part 6: Guidance of sampling of rivers and streams;
- State standard ISO 5814-2007 Water quality. Determination of dissolved oxygen. Electrochemical probe method;
- State Standard ISO 10523-2009 Water quality. Determination of pH;
- State Standard ISO 7888-2006 Water quality. Determination of Electrical conductivity;
- Procedure of measurement MH 5350-2015. Method of water temperature measurement.
- Hydromorphological parameters were described in the field at sampling sites and in cameral way by the hydro-morphological expert Mr. Kanstantsin Tsitou, namely: river use, channel and site parameters, riparian zone and floodplain. It followed the templates prepared and provided by EUWI+, which are based on previous experiences (EPIRB project).

5 RESULTS

5.1 Field protocols

The filled field protocols (surface water sampling protocols) in the format of signed document for 23 sampling sites are presented in Annex 1. The summary of the field protocols (surface water sampling protocols) in the format of excel file is presented in Attachment 03 Summary sampling.xlsx.

5.2 Chemical data

The summary of the chemical data in Excel format is presented in Attachment 04 Summary chemical data.xlsx.

The chemical data for each sampling site are presented in Annex 2. Data report in Russia are summarized in Attachment 06 List of protocols [in RU].

Some protocols included zero oxygen values. These data were checked and proved to be correct. They probably result from organic pollution in combination with low flow velocity (up to 0 m/s), which prevents input of atmospheric oxygen.

5.3 Biological data

The summary of the biological data (benthic macroinvertebrates) at 23 sampling sites is presented in Excel format in Attachment 07 Summary for biological data.xlsx.

5.4 Hydromorphological data

Hydromorphological description of 23 sampling sites of ecological survey is presented in Annex 4.

5.5 Conclusions and Lessons learned

The results of SW survey 2018 will play significant role in the development of RBMP of Pripyat. The field equipment used made it possible to obtain high-quality chemical and biological samples. The studied water bodies gave a wide range of ecological status of water bodies in the Pripyat basin. When designing the next survey, it will be necessary to partially adjust the list of monitoring sites to take into account all water bodies, which are potentially under the risk. On the other side, there is a need to complete the list of the monitoring sites with reference conditions. Their investigation will allow further refining the national system of environmental classification of water bodies in the Pripyat river basin.

umweltbundesamt
ENVIRONMENT AGENCY AUSTRIA

International Office for Water

www.euwipluseast.eu