J O I N T   A N N U A L   R E P O R T
on environment monitoring
in 2014

according to the "Agreement between the Government of the Slovak Republic and the Government of the Republic of Hungary concerning Certain Temporary Technical Measures and Discharges in the Danube and Mosoni branch of the Danube", signed on April 19, 1995

Submitted by:

Ladislav Lazár
Monitoring Agent of the Government
of the Slovak Republic

András Rácz
Monitoring Agent of the Government
of Hungary

October 2015

C O N T E N T S

List of Appendices

A.1. Agreement between the Government of the Slovak Republic and Government of the Republic of Hungary concerning Certain Temporary Technical Measures and Discharges in the Danube and the Mosoni Branch of the Danube, signed on April 19, 1995

A.2. Statute on the Activities of the Nominated Monitoring Agents Envisaged in the "Agreement between the Government of the Slovak Republic and Government of the Republic of Hungary concerning Certain Temporary Technical Measures and Discharges in the Danube and the Mosoni Branch of the Danube", signed on May 29, 1995

A.3. Minutes from meeting of Monitoring Agents held on April 25, 2007 in Győr, on which the Statute on the Activities of Nominated Monitoring Agents was modified.
- in Slovak language
- in Hungarian language

A.4. Minutes from the negotiation and signature of the Joint Annual Report in 2012 on the joint Slovak-Hungarian monitoring established by the intergovernmental Agreement from April 19, 1995.
- in Slovak language
- in Hungarian language

A.5. Minutes from the negotiation of experts on surface water and groundwater monitoring performed according to the intergovernmental Agreement from April 19, 1995.
- in Slovak language
- in Hungarian language

A.6. Minutes from the negotiation and signature of the Joint Annual Report in 2013 on the joint Slovak-Hungarian monitoring established by the intergovernmental Agreement from April 19, 1995.
- in Slovak language
- in Hungarian language

PREFACE

Antecedents

This Joint Report is the twentieth joint report on environment monitoring since signing the intergovernmental Agreement concerning certain temporary technical measures and discharges in the Danube and Mosoni branch of the Danube. The Agreement was signed by the Governments of the Slovak Republic and the Republic of Hungary on April 19, 1995[1] in Budapest (**Appendix A.1**) - hereinafter the Agreement. The Agreement prescribes the monitoring of environmental impact of the increased discharges into the Danube and Mosoni branch of the Danube, and the water supply into the right-side river branch system. The environmental monitoring is coordinated by Nominated Monitoring Agents of both Parties, whose activities are described in the Statute signed on May 29, 1995 in Gabčíkovo[2] (**Appendix A.2**) - hereinafter the Statute.

The Agreement had to originally expire just after the declaration of the judgement of the International Court of Justice in the Haag in the case concerning the Gabčíkovo - Nagymaros Project. However, the Slovak Republic on October 23, 1997, through the Ministry for Foreign Affairs, informed the Republic of Hungary about its readiness to prolong the validity of the Agreement from April 19, 1995 until an agreement on implementation of the Judgement of International Court of Justice, declared on September 25, 1997, is reached. The Republic of Hungary has accepted the proposed prolongation by the Resolution of Hungarian Government from December 17, 1997.

On April 25, 2007 the Nominated Monitoring Agents have agreed on the Statute modification (**Appendix A.3**). The modification reflected changes in the water quality monitoring according to the Water Framework Directive (2000/60/EC) and defined changes in the time schedule for elaboration of the National and Joint Reports. Certain modifications were also in monitoring sites, observed parameters and the frequency of measurements. Currently new modification of the Statute is being prepared, reflecting the results and experiences so far.

In the Agreement the Slovak Party has undertaken to release an annual average discharge of 400 $m^3.s^{-1}$ into the Danube downstream of Čunovo dam and another 43 m^3s^{-1} into the Mosoni branch of the Danube and the right-side seepage canal. Both discharges are subject to hydrological and technical conditions described in Appendices No. 1 and 2 of the Agreement. The Hungarian Party, according to the Agreement, built up the submerged weir in the common section of the Danube at rkm 1843, and put it into operation in June 1995. This weir enables the water supply into the right-side river branches in the inundation area on the Hungarian territory. The

---

1 Agreement between the Government of the Slovak Republic and Government of the Republic of Hungary concerning Certain Temporary Technical Measures and Discharges in the Danube and Mosoni branch of the Danube, signed on April 19, 1995.

2 Statute on the Activities of the Nominated Monitoring Agents envisaged in the "Agreement between the Government of the Slovak Republic and Government of the Republic of Hungary concerning Certain Temporary Technical Measures and Discharges in the Danube and Mosoni branch of the Danube", signed on May 29, 1995, modified on April 25, 2007.

water discharged into the Mosoni branch of the Danube ensures the water supply of the Mosoni Danube and river branches in the Hungarian flood-protected area.

According to the Article 4 of the Agreement the Parties are obliged to mutually exchange and evaluate data obtained by the environmental monitoring on both, Slovak and Hungarian sides of the Danube. These data are necessary to assess the impacts of increased flow rate in the Danube and the water supply on the Hungarian territory. Technical details of environmental monitoring – the determination of influenced area, the specification of sampling and measuring points, the frequency of measurements, the list of exchanged parameters, the frequency of data exchange, etc. – are described in the Statute (Appendices A.2 and A.3) and other relevant documents.

According to the Article 3 of the Agreement the observation results and the measured data in tabular and graphical form, together with their evaluation, constitute the National Annual Reports prepared by the Parties themselves. The Joint Annual Report is elaborated jointly and is based on approved and mutually exchanged National Annual Reports.

This Joint Annual Report on environmental monitoring gives an evaluation concerning the year 2014. In the present report the transformation of the period of evaluation from hydrological year to calendar year had been finalized. The evaluation of the Slovak side is based on data collected by the Slovak Hydrometeorological Institute (SHMÚ), Faculty of Natural Sciences of the Comenius University (PriF UK), Slovak Academy of Sciences, National Forest Centre (NLC-LVÚ), Soil Science and Conservation Research Institute (VÚPOP), Western Slovakia Water Company (ZsVS), Bratislava Water Company (BVS), Slovak Water Management State Enterprise (SVP-BA), Water Research Institute (VÚVH) and Ground Water Consulting Ltd. (GWC). The data exchange and the evaluation of monitoring under the frame of joint monitoring were co-ordinated by the Plenipotentiary of the Government of the Slovak Republic for Construction and Operation of Gabčíkovo - Nagymaros Project at the Ministry of Transport, Construction and Regional Development of the Slovak Republic.

The evaluation of the Hungarian side is based on data collected by the Győr-Moson-Sopron County Government Office (GYMSMKH), Department of Environment Protection and Nature Conservation (former North-Transdanubian Inspectorate of Environment and Water (ÉDUKTVF)), North-Transdanubian Water Directorate (ÉDUVIZIG), Regional Water Companies, Forest Research Institute (ERTI), West Hungarian University, Museum of Natural Sciences, Hungarian Academy of Sciences (MTA) and Eötvös Lóránd University (ELTE). The data exchange and the evaluation of monitoring were co-ordinated by the Deputy State Secretary for Environmental Affairs at the Ministry of Agriculture of the Hungary.

Goals of the Joint Monitoring

Main goal of the joint Slovak-Hungarian monitoring, in accordance to the intergovernmental Agreement, is to observe, record and jointly evaluate the quantitative and qualitative changes of surface and groundwater bodies and water dependent natural environment in connection to the realised measures and water supply. The water supply into the right-side river branches on the Hungarian territory is assured by the submerged weir at rkm 1843 in the Danube old riverbed, which increases the water level upstream of the weir.

The evaluation includes changes in hydrological regimes of surface and ground water, changes in surface and ground water quality, changes in soil moisture and changes in forest stands and biota.

The goal of mutual data exchange is to provide information on monitoring results (measurements, analyses, observations), about development of parameters included in the data exchange, and about environmental changes in the influenced area of both Parties. The basic condition of exchanged data evaluation is the usage of equal or similar methods of measurements and analyses and application of agreed methods of interpretation.

The final goal of the Joint Annual Report is to submit joint evaluation of monitoring results and joint recommendations for monitoring improvement and environment protection activities to the respective governments.

Joint monitoring activities in the year 2014

In the year 2014 the monitoring activities continued mostly in accordance with the intergovernmental Agreement and the modified Statute. As usual, the monitoring consisted of surface and ground water regime observations, surface- and ground- water quality monitoring, measurements of soil moisture content, monitoring of forest stands and biological observations. However, in case of soil moisture content measurements and biological observations no data for the year 2014 were provided by the Hungarian Party.

On January 23, 2014 approval and signing of the Joint Annual Report on environment monitoring in 2012 was realized in Budapest (**Appendix A.4**). On April 15, 2014, in accordance with the Statute on monitoring, both Parties, Slovak and Hungarian, mutually handed over the monitoring data for the year 2013 in Győr. In the period from March 24, 2014 to April 15, 2014 several negotiations were held alternately in Győr and Bratislava. Negotiations were focused on issues regarding the evaluation of surface water flow rates. The minutes from negotiations was finalized on April 15, 2014 (**Appendix A.5**). The electronic versions of National Annual Reports on the joint Slovak-Hungarian monitoring in the year 2013 were mutually handed over on August 13, 2014 in Győr. The printed version of the National reports were mutually exchanged at the occasion of negotiations on the joint report. The approval and signing of the Joint Annual Report on environment monitoring in 2013 was done on December 11, 2014 in Bratislava (**Appendix A.6**).

The artificial flooding of the right-side river branch system in the year 2014 was planned in the period from April 23 to June 6, 2014. However, due to low actual flow rates on the Danube the period with higher water amount discharged into the Danube old riverbed was postponed and the discharge of 800 $m^3.s^{-1}$ was in the period performed from May 30 to June 12, 2014.

The present Joint Annual Report in 2014was elaborated on the basis of the Slovak and Hungarian data, that were mutually exchanged on May 12, 2015 in Győr. The mutual exchange of the electronic versions of National Annual Reports on environmental monitoring in 2014 was realized on July 7, 2015 in Győr.

Fulfilment of recommendations in the Joint Annual Report 2013

1. In the winter period during low flow rates on the Danube often occurs deficit of discharge higher than acceptable deviation of ±7% (daily average discharges lower than 250 $m^3.s^{-1}$). For this reason, the Hungarian experts propose to undertake negotiations with stakeholders to remove this deficiency.

   No negotiation with stakeholders, aiming the removing deficiencies in flow rates discharged into the Danube old riverbed during the winter period, that are higher than acceptable deviation of ±7%, has been initiated yet.

2. Experts on monitoring of surface and groundwater of the Slovak and Hungarian Parties on the basis of the evaluation of the year 2013 propose to modify the evaluation period from the hydrological year to calendar year. Modification of the evaluation period is proposed to be applied for the year 2015, with the recommendation that the evaluation in 2014 will be carried out as in 2013, i.e. the evaluation shall cover as the hydrological as well as the calendar year. Experts propose the modification of the evaluation period in order to harmonize the evaluation of surface and groundwater with the evaluation of other components of the natural environment (water quality, soil moisture, forest and biota)..

   In accordance with the recommendation, the present Joint Report contains the evaluation of surface and groundwater for both, the hydrological year and the calendar year. That means the transformation of the period of evaluation from hydrological year to calendar year had been finalized. Starting from the Joint Report on environment monitoring in the year 2015 the evaluation of all observed parameters will cover the calendar year only.

PART 1

Surface water levels and flow rates

Observation of surface water levels and measurement of flow rates in the year 2014 continued to the extent prescribed in the Agreement. The list of gauging stations observed on the Slovak and the Hungarian territories are given in the **Table 1-1**. The data from these stations were mutually exchanged by the Parties for the purpose of evaluation of the surface water level and flow regimes. At selected gauging stations (10 gauging stations on each side) common flow rate measurements were performed and time series data were compiled. Mutually agreed data form the basis for the joint evaluation of measures and water supply taken under Articles 1-3 of the Agreement. The observation network is presented in **Fig. 1-1a, b**.

Taking into account the proposals approved in the Joint Annual Report on environment monitoring in 2013, the assessment of surface water in this joint report concerns both, the hydrological (period from November 1 of the previous year to 31 October of the reported year), and the calendar year (period from January 1 to December 31 of the reported year).

Table 1-1: List of gauging stations

No.	Country	Station No.	Location and station name
Slovak side			
1	**Slovakia**	**1250**	Danube, Bratislava-Devín
2	**Slovakia**	**2545**	Danube, Hamuliakovo
3	**Slovakia**	**2558**	Danube, Dobrohošť
4	**Slovakia**	**1251**	Danube, Gabčíkovo
5	**Slovakia**	**1252**	Danube, Medveďov
6	**Slovakia**	**1600**	Danube, Komárno
7	**Slovakia**	**2848**	reservoir, Čunovo - dam
8	**Slovakia**	**2552**	Danube, Čunovo - downstream from the Čunovo dam
9	**Slovakia**	**2851**	Mosoni branch of the Danube, intake at Čunovo
10	**Slovakia**	**3126**	left-side river arm system, intake at Dobrohošť
11	**Slovakia**	**2849**	power canal, Gabčíkovo Power Plant
12	**Slovakia**	**2850**	tail-race canal, Gabčíkovo Power Plant
13	**Slovakia**	**3124**	seepage canal - upper water level, Čunovo
14	**Slovakia**	**3125**	seepage canal - lower water level, Čunovo
15	**Slovakia**	**1653**	Little Danube, Malé Pálenisko
16	**Slovakia**	**4045**	left-side river arm system, A-1
17	**Slovakia**	**4046**	left-side river arm system, B-1
18	**Slovakia**	**4047**	left-side river arm system, B-2
19	**Slovakia**	**4048**	left-side river arm system, C-1
20	**Slovakia**	**4049**	left-side river arm system, D-1
21	**Slovakia**	**4050**	left-side river arm system, E-2
22	**Slovakia**	**4051**	left-side river arm system, F-1
23	**Slovakia**	**4052**	left-side river arm system, F-3
24	**Slovakia**	**4053**	left-side river arm system, G-1
25	**Slovakia**	**4054**	left-side river arm system, H-1
26	**Slovakia**	**4055**	left-side river arm system, H-3
27	**Slovakia**	**4056**	left-side river arm system, J-1
28	**Slovakia**	**4057**	left-side river arm system, lake B (former gravel dredging pit)

No.	Country	Station No.	Location and station name
Hungarian side			
1	**Hungary**	**000001**	Danube, Rajka
2	**Hungary**	**004515**	Danube, Doborgaz
3	**Hungary**	**000002**	Danube, Dunaremete
4	**Hungary**	**000005**	Danube, Komárom
5	**Hungary**	**000017**	Mosoni Danube, Mecsér
6	**Hungary**	**000018**	Mosoni Danube, Bácsa
7	**Hungary**	**003939**	Danube, submerged weir
8	**Hungary**	**004516**	right-side river arm system, Helena
9	**Hungary**	**003873**	seepage canal, lock No. I.
10	**Hungary**	**003875**	seepage canal, lock No. II.
11	**Hungary**	**003940**	seepage canal, lock No. V.
12	**Hungary**	**003871**	seepage canal, lock No. VI.
13	**Hungary**	**110106**	Zátonyi Danube, Dunakiliti, Gyümölcsös út
14	**Hungary**	**110113**	right-side river arm system, Z-1
15	**Hungary**	**110127**	right-side river arm system, Doborgaz-15
16	**Hungary**	**110115**	right-side river arm system, B-2
17	**Hungary**	**110117**	right-side river arm system, B-3
18	**Hungary**	**110170**	right-side river arm system, Z-6
19	**Hungary**	**110152**	right-side river arm system, Z-8
20	**Hungary**	**110119**	right-side river arm system, B-4
21	**Hungary**	**110129**	right-side river arm system, B-5
22	**Hungary**	**110162**	right-side river arm system, B-6
23	**Hungary**	**110138**	right-side river arm system, B-7
24	**Hungary**	**110198**	right-side river arm system, B-8
25	**Hungary**	**110131**	right-side river arm system, B-9
26	**Hungary**	**110133**	right-side river arm system, B-11
27	**Hungary**	**110142**	right-side river arm system, Z-12
28	**Hungary**	**110155**	right-side river arm system, Z-10
29	**Hungary**	**110157**	right-side river arm system, Gatya enclosure

The intergovernmental Agreement, signed on 19th April 1995, set up a temporary water management regime. The Parties has agreed that in case of an average annual flow rate of 2025 $m^3.s^{-1}$ in the Danube at gauging station Bratislava-Devín an annual average of 400 $m^3.s^{-1}$ of water should be discharged into the Danube old riverbed downstream of the Čunovo dam. Actual daily amount of water is governed by the flow rate coming into the Bratislava-Devín cross-section, taking into consideration the rules of operation set out in Annex 2 of the Agreement (**Appendix A.1**). The average daily flow rate in the vegetation period (between April 1 and August 31), depending on the hydrological conditions, should fluctuate between 400 and 600 $m^3.s^{-1}$; in non-vegetation period (between September 1 and March 31) the average daily flow rate should not be less than 250 $m^3.s^{-1}$. According to the methodology agreed in the Joint Annual Report in 2004, in case of flow rates over 5400 $m^3.s^{-1}$ the water amount over 600 $m^3.s^{-1}$ discharged through the Čunovo dam is not taken into consideration when the annual average is calculated for the purpose of this evaluation. In the Joint Annual Report in 2011 the methodology for calculating the annual average was adjusted further. Modification relates to flow rates over 600 $m^3.s^{-1}$ discharged through the Čunovo dam during maintenance works. In such cases, for the purpose of calculation an annual average, the higher flow rates will be reduced to an amount corresponding to flow rates as defined in the Annex 2 of the Agreement. Besides this, another 43 $m^3.s^{-1}$ of water was agreed in the Agreement to be discharged into the Mosoni branch of the

Danube and into the right-side seepage canal. Discharges are dependent on hydrological and technical conditions.

The gauging station Bratislava-Devín plays a key role in determining the current amount of water to be released into the Danube old riverbed downstream of Čunovo dam. The basic monthly characteristics of flow rate in the Danube for the hydrological year 2014 are given in the **Table 1-2a**, for the calendar year 2014 in the **Table 1-2b**. The *Minimum* and the *Maximum* values represent the lowest and the highest recorded data. The *Avg. min* and the *Avg. max* represent the lowest and the highest average daily values. The *Average* is calculated from average daily values.

Table 1-2a: Monthly characteristics of flow rate in the Danube at Bratislava-Devín gauging station in the hydrological year 2014

Year	2013		2014										
Month	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Year**
Minimum	1405	1081	1069	1100	943	1187	1559	1193	1399	1664	1699	1180	**943**
Avg. min	1427	1121	1094	1130	978	1206	1632	1220	1460	1728	1731	1235	**978**
Average	1896	1360	1243	1258	1173	1379	2591	1782	1916	2506	2530	2037	**1809**
Maximum	2902	1720	1464	1425	1545	1833	5695	3144	3771	5289	4320	5931	**5931**
Avg. max	2587	1688	1426	1366	1496	1719	5414	2855	2806	4875	4122	5414	**5414**

Table 1-2b: Monthly characteristics of flow rate in the Danube at Bratislava-Devín gauging station in the calendar year 2014

Year	2014												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Minimum	1069	1100	943	1187	1559	1193	1399	1664	1699	1180	1237	1131	**943**
Avg. min	1094	1130	978	1206	1632	1220	1460	1728	1731	1235	1289	1157	**978**
Average	1243	1258	1173	1379	2591	1782	1916	2506	2530	2037	1668	1329	**1788**
Maximum	1464	1425	1545	1833	5695	3144	3771	5289	4320	5931	2109	1785	**5931**
Avg. max	1426	1366	1496	1719	5414	2855	2806	4875	4122	5414	2074	1764	**5414**

In the case of hydrological year 2014 (**Table 1-2a**) the minimal annual flow rate of 943 $m^3.s^{-1}$ occurred on March 12, 2014, the lowest average daily flow rate of 978 $m^3.s^{-1}$ was recorded on the following day March 13, 2014. The highest annual flow rate occurred on October 24, 2014, when it reached 5931 $m^3.s^{-1}$ at culmination, and the highest average daily flow rate was 5414 $m^3.s^{-1}$. The average annual flow rate at this station in hydrological year 2014 reached 1809 $m^3.s^{-1}$, what represents the fifth lowest average annual flow rate (**Table 1-3**). Lower average annual flow rates were recorded in years 1998 (1723 $m^3.s^{-1}$), 2004 (1807 $m^3.s^{-1}$), 2007 (1768 $m^3.s^{-1}$) and 2011 (1782 $m^3.s^{-1}$).

In the case of calendar year 2014 (**Table 1-2b**) the annual minimum and the lowest average daily flow rate were the same as for the hydrological year. This was also in the case of the annual maximum and the highest average daily flow rate. The average annual flow rate in calendar year 2014 reached 1788 $m^3.s^{-1}$, which is the third lowest average annual flow rate (**Table 1-3**) Lower average annual flow rates were recorded only in years 2003 (1646 $m^3.s^{-1}$) and 2011 (1700 $m^3.s^{-1}$).

Table 1-3: Average annual flow rates

Station No.	Period	Average annual flow rate in the hydrological year[3] ($m^3.s^{-1}$)	% of average flow rate	Average annual flow rate in the calendar year ($m^3.s^{-1}$)	% of average flow rate
1249[4]	**1901-2001**	**2051**	**-**	**2052**	**-**
1250	**1990-2013**	**2087**	**-**	**2083**	**-**
1250	1990	1711	84.5	1721	85.0
1250	1991	1752	86.5	1737	85.8
1250	1992	1775	87.7	1934	95.5
1250	1993	2030	100.2	1909	94.3
1250	1994	1908	94.2	1866	92.1
	Agreement	**2025**	**100.0**	**2025**	**100.0**
1250	1995	2278	112.5	2329	115.0
1250	1996	1993	98.4	2015	99.5
1250	1997	2094	103.4	2031	100.3
1250	1998	1723	85.1	1921	94.9
1250	1999	2582	127.5	2387	117.9
1250	2000	2393	118.2	2379	117.5
1250	2001	2170	107.2	2232	110.2
1250	2002	2458	121.4	2683	132.5
1250	2003	2001	98.8	1646	81.3
1250	2004	1807	89.2	1852	91.5
1250	2005	2128	105.1	2097	103.6
1250	2006	2152	106.3	2186	108.0
1250	2007	1768	87.3	1916	94.6
1250	2008	2014	99.5	1876	92.6
1250	2009	2163	106.8	2186	108.0
1250	2010	2098	103.6	2130	105.2
1250	2011	1782	88.0	1700	84.0
1250	2012	2018	99.7	2121	104.7
1250	2013	2444	120.7	2417	119.4
1250	**2014**	**1809**	**89.3**	**1788**	**88.3**

The flow regime of the Danube in the hydrological year 2014 had a typical course. During the winter months (December 2013, January and February 2014) and early spring (March, April 2014) the flow rate in the Danube ranged almost exclusively below 1500 $m^3.s^{-1}$. The lowest flow rates occurred at the beginning of the second decade of March, the annual minimum was recorded on March 12, 2014 at 943 $m^3.s^{-1}$. Subsequently, after a gradual increase of flow rates in the second half of March, April and in the first half of May, short, but significant discharge wave occurred at the beginning of the second half of the month, which culminated on May 17, 2014 at 5695 $m^3.s^{-1}$. After it subsided, another discharge wave occurred at the end of May, which culminated on May 29, 2014 at 4896 $m^3.s^{-1}$. After passing the second discharge wave the flow rates gradually decreased until the middle of the third decade of June almost to 1200 $m^3.s^{-1}$. Flow rates from late June until almost to the end of July fluctuated between 1300 and 2400 $m^3.s^{-1}$. At the end of July another discharge wave occurred, which culminated on August 1, 2014 at 5286 $m^3.s^{-1}$. After its subsidence one

3 The hydrological year runs from 1st November of the previous year to 31st October of the current year.

4 Data from gauging stations No. 1249 - Bratislava (until 23.10.1992) and 1250 - Bratislava-Devín were used in the average annual flow rate calculation for the period 1901-2001.

more, smaller discharge wave occurred in the middle of August, culminating around 3300 $m^3.s^{-1}$. After the subsequent decrease of flow rates below 1800 $m^3.s^{-1}$ a new discharge wave occurred at the beginning of September, culminating on September 2, 2014 at 4320 $m^3.s^{-1}$. By mid-September another discharge wave occurred, which peaked on September 15, 2014 at 3710 $m^3.s^{-1}$. After passing this discharge wave, flow rates quite rapidly declined and in mid-October they dropped below 1300 $m^3.s^{-1}$. In the third decade of October another significant discharge wave occurred, which culminated on October 24, 2014 at 5931 $m^3.s^{-1}$, what was also the annual maximum. Subsequently the flow rates in the Danube quickly dropped below 2000 $m^3.s^{-1}$ and by the end of the year declined below 1200 $m^3.s^{-1}$. A common feature of all discharge waves was that they had a relatively short duration, and flow rates over 3000 $m^3.s^{-1}$ occurred only for 3-6 days.

After the decline of flow rates at the end of the hydrological year 2013 to around 1500 $m^3.s^{-1}$, flow rates on the Danube temporarily increased after richer precipitation (culmination on November 7, 2013 at 2902 $m^3.s^{-1}$). A short increase of flow rates as a result of more rich precipitation occurred also in the middle of the third decade of November, when the flow rate on November 25,2013 culminated at 2545 $m^3.s^{-1}$. Then the flow rate until the half of the first decade of January 2014 gradually declined below 1100 $m^3.s^{-1}$. In January and February 2014 it was relatively balanced and it fluctuated between 1100 and 1500 $m^3.s^{-1}$. The flow rate on the Danube from the beginning of the third decade of February almost to the middle of March continuously decreased and on March 12, 2014 fell to 943 $m^3.s^{-1}$, what represented the annual minimum. Relatively stable and rather low flow rate was due to the lack of precipitation in the winter months. Slight increase of flow rates from mid-March was caused by weaker rainfall in the Austrian Danube catchment area. Slight increase of flow rates continued also in April, mainly due to gradual warming. At the end of April 2014 flow rates due to slight precipitation in the German and Austrian Danube catchment area have risen to over 1800 $m^3.s^{-1}$. The slight increase of flow rates continued also in the first half of May, but at the beginning of the second half of May flow rates have risen sharply due to heavy rains in the German and mainly in the Austrian Danube catchment area and the discharge wave culminated on May 17, 2014 at 5695 $m^3.s^{-1}$, which was the second highest flow rate in the year 2014. After a decline to values around 2100 $m^3.s^{-1}$ the flow rate began to rise again due to additional rich precipitations. This second rise however, was not as significant as the first one and the flow rate culminated on May 29, 2014 at 4896 $m^3.s^{-1}$.Subsequently, the flow rate to the beginning of the third decade of June gradually declined to 1193 $m^3.s^{-1}$. Flow rates in late June and during July 2014 due to some rainfall periods fluctuated between 1300 and 2400 $m^3.s^{-1}$. At the end of July due to abundant rainfall in the Danube basin another discharge wave occurred, which culminated on August 1, 2014 at 5286 $m^3.s^{-1}$. After its subsidence below 2100 $m^3.s^{-1}$ in mid-August one more, smaller discharge wave occurred due to precipitations in the German Danube catchment area, culminating around 3300 $m^3.s^{-1}$. Then flow rates until the end of the month continuously declined to below 2000 $m^3.s^{-1}$. In September 2014, due to heavy rainfall in the whole Danube catchment area two significant discharge waves occurred. The first one culminated on September 2, 2014 at 4320 $m^3.s^{-1}$. After a temporary decrease of flow rates another discharge wave occurred in the middle of the month due to further precipitations, which culminated on September 15, 2014 at 3710 $m^3.s^{-1}$. After passing this discharge wave the flow rates until the end of the month rather quickly declined. Flow rates continued to decline until mid-October 2014, when the flow rate has fallen below 1300 $m^3.s^{-1}$. Due to abundant rainfall at the beginning of the third decade of October in the German and Austrian Danube catchment area, the highest discharge wave in 2014 occurred in the middle of the third decade, which culminated on October 24, 2014 at 5931 $m^3.s^{-1}$, what represented the annual maximum. After this significant discharge wave the flow rate in the Danube until the end of the year decreased, initially sharply and then gradually. During November there occurred two and in December 2014 one insignificant increase of flow rates and to the end of the year the flow rate decreased below 1200 $m^3.s^{-1}$.

Based on the above assessment it can be concluded that the flow regime of the Danube was fairly typical, with low and balanced flow rates in the winter period and more significant discharge waves in May, during August and in the first half of September. The exception was the strong discharge wave in late October, when usually the lowest flow rates occur in the Danube. Overall it can be stated, that the flow rates from mid-December 2013 to late July 2014, excluding discharge waves, moved below the long term average daily flow rates. From early August until the end of the year the flow rates were around the long-term daily average values, while at discharge waves they were considerably exceeded.

When comparing the average daily flow rates measured at gauging stations No. 1250 – Bratislava-Devín, 1252 – Medveďov and 1600 – Komárno it can be stated that even in the hydrological/calendar year 2014, these flow rates were without any significant changes. (**Fig. 1-2**). Larger differences between those stations occurred during the discharge waves in May, August, September and October, when at the station Bratislava-Devín they were higher daily average flow rates recorded than at the other two stations in Medveďov and Komárno (of the order of several 100 $m^3.s^{-1}$). Some difference was observed also in Komárno station where the flow rate, mainly in February and also at the beginning of December 2014, was higher than in the other two stations due to increased inflow from the catchment area of Rába river through the Mosoni Danube. The flow rate at the station Komárno can be also influenced by the water flow of the river Váh.

1.1. Discharge into the Danube downstream of the Čunovo dam

The average daily amount of water released into the Danube downstream of Čunovo dam is based on average daily flow rates determined at gauging stations Doborgaz and Helena (**Fig. 1-3**). At these stations joint flow rate measurements are performed to determine the flow rate supplied into the Danube old riverbed. The basic monthly characteristics of flow rate in the Danube downstream of the Čunovo dam (consisting of the sum of flow rates at gauging stations at Doborgaz and Helena) for the hydrological year 2014 are given in **Table 1-4a** and for the calendar year 2014 in **Table 1-4b**. The *Minimum* and the *Maximum* values represent the lowest and the highest recorded data. The *Avg. min* and the *Avg. max* represent the lowest and the highest average daily values. The *Average* is calculated from average daily values.

Table 1-4a: Monthly characteristics of flow rate in the Danube downstream of the Čunovo weir in the hydrological year 2014

Year	**2013**		**2014**										
Month	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Year**
Minimum	211	208	219	222	211	243	376	457	398	387	309	223	**208**
Avg. min	217	214	229	229	242	337	433	475	433	412	325	235	**214**
Average	271	228	239	237	249	386	563	652	521	567	814	335	**422**
Maximum	460	251	262	254	273	440	1130	828	634	1520	2490	1390	**2490**
Avg. max	400	239	247	250	257	396	805	803	606	1122	2318	950	**2318**

In the case of hydrological year 2014 (**Table 1-4a**) the total average annual flow rate released into the Danube downstream of the Čunovo dam was 422 $m^3.s^{-1}$. The minimal annual flow rate of 208 $m^3.s^{-1}$ occurred on December 1, 2013, while the lowest average daily flow rate of 214 $m^3.s^{-1}$ was recorded on December 10, 2013. The highest annual flow rate occurred on September 14, 2014, when it reached 2490 $m^3.s^{-1}$ at culmination, and the highest average daily flow rate of 2318 $m^3.s^{-1}$ was recorded on September 15, 2014. Taking into consideration the obligations envisaged in the intergovernmental Agreement, the Slovak Party, in the case of average annual flow rate of 1809 $m^3.s^{-1}$ at Bratislava-Devín, was obliged to release an average annual discharge of 357 $m^3.s^{-1}$ into the Danube riverbed downstream of Čunovo dam.

Table 1-4b: Monthly characteristics of flow rate in the Danube downstream of the Čunovo weir in the calendar year 2014

Year	**2014**												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Minimum	219	222	211	243	376	457	398	387	309	223	173	85	**85**
Avg. min	229	229	242	337	433	475	433	412	325	235	184	219	**184**
Average	239	237	249	386	563	652	521	567	814	335	230	225	**418**
Maximum	262	254	273	440	1130	828	634	1520	2490	1390	292	295	**2490**
Avg. max	247	250	257	396	805	803	606	1122	2318	950	262	230	**2318**

In the case of calendar year 2014 (**Table 1-4b**) the total average annual flow rate released into the Danube downstream of the Čunovo weir was 418 $m^3.s^{-1}$. The minimal annual flow rate of 85 $m^3.s^{-1}$ occurred on December 12, 2014 and the lowest average daily flow rate of 184 $m^3.s^{-1}$ was recorded on November 20, 2014. Values for the highest annual flow rate and the highest average daily flow rate were the same as in the case of hydrological year. Taking into consideration the obligations envisaged in the intergovernmental Agreement, the Slovak Party, in the case of annual average flow rate of 1788 $m^3.s^{-1}$ at Bratislava-Devín, was obliged to release an average annual discharge of 353 $m^3.s^{-1}$ into the Danube riverbed downstream of Čunovo dam.

During the assessed year 2014 discharges over 600 $m^3.s^{-1}$ due to higher flow rates in the Danube (over 5400 $m^3.s^{-1}$) were released twice: during the discharge wave in May 2014 (one day) and during the discharge wave in October 2014 (one day). Higher discharges were released also during the technical maintenance of Gabčíkovo Power Plant (period from 8. to 21. September 2014, 14 days). According to the methodology for average annual discharge calculation, accepted in the Joint Annual Report on the environment monitoring in 2011, reduction of discharge released to the Danube old riverbed for the above-mentioned periods (altogether 16 days) was done (**Table 1-5**).

Table 1-5: Reduced flow rates for the modified average annual discharge calculation

Date	**Q Bratislava-Devín**	**Original Q ($m^3.s^{-1}$)**	**Reduced Q ($m^3.s^{-1}$)**
17.05.2014	5414	766	600
08.09.2014	2131	836	458
09.09.2014	2004	827	436
10.09.2014	2001	831	436
11.09.2014	2067	828	436
12.09.2014	2292	1050	480
13.09.2014	2735	1378	589
14.09.2014	3535	2101	600
15.09.2014	3634	2318	600
16.09.2014	3051	1790	600
17.09.2014	2659	1531	567
18.09.2014	2397	1210	501
19.09.2014	2181	1022	458
20.09.2014	2007	929	436
21.09.2014	1964	681	414
24.10.2014	5414	950	600

When the reduced discharges (**Table 1-5**) are applied for the calculation of average annual discharge, the Slovak Party in 2014 released an total average annual discharge of 392 $m^3.s^{-1}$ (109.9% of the agreed water amount) in the case of hydrological year and 388 $m^3.s^{-1}$ in the case of calendar year (109.8% of the agreed water amount). Some deficiencies were encountered as regards the compliance with the minimal discharges during the non-vegetation period, when the deficit of discharge exceeded the acceptable deviation of ± 7 %. Based on the jointly accepted flow rate data the deficit was higher than the acceptable deviation in November 2013 for nine days, during December 2013 for nineteen days, in January 2014 for one day, in February 2014 for five days, during November 2014 for thirteen days and in December 2014 for the whole month, so thirty-one days. In the case of minimal values in the vegetation period it can be stated that in the year 2014 flow rate less than 400 $m^3.s^{-1}$ occurred only at the day of change from the winter to the summer mode. Based on the above it can be concluded that the flow regime in the summer has been followed. The deficiencies in the winter period have no significant impact on the biota of the area affected. Negotiations with stakeholders, aiming the correction of deficiencies during the winter period have not been initiated yet.

Based on the above evaluation it can be stated that the Slovak Party has fulfilled the average annual discharge jointly agreed in the intergovernmental Agreement. Taking into consideration the minimal values prescribed in the Agreement (in the winter period not less than 250 $m^3.s^{-1}$, in the vegetation period at least 400 $m^3.s^{-1}$) and the acceptable deviation (±7 %) it can be stated that flow rates below 250 $m^3.s^{-1}$ occurred 34 times in the case of hydrological year, or 50 times in the case of calendar year (difference max to 18.7 $m^3.s^{-1}$ and 48,8 $m^3.s^{-1}$ respectively). Flow rate below 400 $m^3.s^{-1}$ in the summer period occurred only once at the day of change from the winter to the summer mode. In the period from May 23 to June 12, 2014 during the artificial flooding, flow rates above 600 $m^3.s^{-1}$ were released at the request of the Hungarian Party.

1.2. Discharge into the Mosoni branch of the Danube

According to the intergovernmental Agreement from April 1995 the flow rate into the Mosoni Danube, which consist of flow rate released into the Mosoni branch of the Danube through the intake structure at Čunovo and flow rate through the seepage canal, should be 43 $m^3.s^{-1}$.

Discharge measurements in the Mosoni branch of the Danube are carried out downstream of intake structure on the Slovak territory at 0.160 rkm and also upstream of lock No. I on the Hungarian territory. Average daily flow rates were agreed upon joint evaluation of common discharge measurements performed at both profiles.

Regarding the discharge released into the Mosoni branch of the Danube data measured downstream of intake structure were considered in this evaluation (**Fig. 1-4, Table 1-6a, 1-6b**).

Table 1-6a: Monthly characteristics of water amount released into the Mosoni branch of the Danube through the intake at Čunovo in the hydrological year 2014

Year	2013		2014										
Month	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Year**
Minimum	24.0	28.1	16.0	17.0	15.3	9.8	12.1	17.3	23.3	14.1	7.3	11.7	**7.3**
Avg. min	24.0	41.5	25.4	25.8	31.6	24.3	12.2	31.3	31.5	30.0	11.5	11.7	**11.5**
Average	41.2	42.9	35.5	36.1	32.8	31.5	28.0	33.0	32.9	32.6	20.3	28.4	**32.9**
Maximum	44.0	44.6	44.7	45.0	50.0	35.0	35.5	36.2	34.9	35.1	45.0	45.0	**50.0**
Avg. max	44.0	44.3	44.4	44.6	34.3	34.2	35.0	35.6	34.4	34.1	33.5	44.7	**44.7**

In the case of hydrological year 2014 (**Table 1-6a**) the average annual discharge released into the Mosoni branch of the Danube through the intake at Čunovo was 32.9 $m^3.s^{-1}$. The minimal annual discharge of 7.34 $m^3.s^{-1}$ occurred on September 30, 2014, while the lowest average daily discharge of 11.5 $m^3.s^{-1}$ was recorded on October 23, 2014. The highest annual discharge of 50.0 $m^3.s^{-1}$ occurred on March 28, 2014, while the highest average daily discharge of 44.7 $m^3.s^{-1}$ was recorded on October 1, 2014 and on October 3, 2014.

Table 1-6b: Monthly characteristics of water amount released into the Mosoni branch of the Danube through the intake at Čunovo in the calendar year 2014

Year	2014												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Minimum	16.0	17.0	15.3	9.8	12.1	17.3	23.3	14.1	7.3	11.7	11.7	25.0	**7.3**
Avg. min	25.4	25.8	31.6	24.3	12.2	31.3	31.5	30.0	11.5	11.7	25.5	39.9	**11.5**
Average	35.5	36.1	32.8	31.5	28.0	33.0	32.9	32.6	20.3	28.4	41.3	42.0	**32.9**
Maximum	44.7	45.0	50.0	35.0	35.5	36.2	34.9	35.1	45.0	45.0	43.9	44.3	**50.0**
Avg. max	44.4	44.6	34.3	34.2	35.0	35.6	34.4	34.1	33.5	44.7	43.5	43.4	**44.7**

In the case of calendar year 2014 (**Table 1-6b**) the minimal annual discharge, the lowest average daily discharge, the highest annual discharge and the highest average daily discharge were the same as in the case of hydrological year. The average annual discharge released into the Mosoni branch of the Danube was 32.9 $m^3.s^{-1}$.

The flow rate in the right-side seepage canal was also measured at two sites. The first is on the Slovak territory at Čunovo; the second is on the Hungarian territory upstream of the Lock No. II. In this evaluation the data observed at the Lock No. II were considered (**Table 1-7a, 1-7b**).

Table 1-7a: Monthly characteristics of flow rates determined at the Lock No. II in the hydrological year 2014

Year	**2013**		**2014**										
Month	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Year**
Minimum	2.11	1.82	1.63	1.46	1.29	0.904	1.05	1.20	2.65	2.01	2.11	1.82	**0.904**
Avg. min	2.25	1.98	1.67	1.46	1.33	1.37	1.15	1.26	2.68	2.14	2.25	1.92	**1.15**
Average	2.64	2.17	1.92	1.62	1.58	1.63	1.83	2.71	2.88	2.83	2.64	2.48	**2.25**
Maximum	3.56	2.54	2.11	1.82	1.92	2.22	5.90	4.69	3.27	7.40	3.15	2.90	**7.40**
Avg. max	3.55	2.49	2.11	1.81	1.77	1.82	3.83	3.49	3.24	4.71	3.05	2.90	**4.71**

In the case of hydrological year 2014 (**Table 1-7a**) the average annual flow rate in the right-side seepage canal at Lock. No. II was 2.25 $m^3.s^{-1}$. The minimal annual flow rate of 0.904 $m^3.s^{-1}$ occurred on April 9, 2014. The lowest average daily flow rate of 1,15 $m^3.s^{-1}$ was determined on May 30 and 31, 2014. The highest annual flow rate of 7.40 $m^3.s^{-1}$ occurred on August 8, 2014, and the highest average daily flow rate of 4.71 $m^3.s^{-1}$ was recorded on August 9, 2014.

Table 1-7b: Monthly characteristics of flow rate determined at the Lock No. II in the calendar year 2014

Year	**2014**												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Minimum	1.63	1.46	1.29	0.904	1.05	1.20	2.65	2.01	2.11	1.82	1.92	1.92	**0.904**
Avg. min	1.67	1.46	1.33	1.37	1.15	1.26	2.68	2.14	2.25	1.92	1.92	2.43	**1.15**
Average	1.92	1.62	1.58	1.63	1.83	2.71	2.88	2.83	2.64	2.48	2.75	2.74	**2.31**
Maximum	2.11	1.82	1.92	2.22	5.90	4.69	3.27	7.40	3.15	2.90	4.51	3.15	**7.40**
Avg. max	2.11	1.81	1.77	1.82	3.83	3.49	3.24	4.71	3.05	2.90	4.04	3.01	**4.71**

In the case of calendar year 2014 (**Table 1-7b**) the average annual flow rate in the right-side seepage canal at Lock. No. II was 2.31 $m^3.s^{-1}$. The minimal annual discharge, the lowest average daily discharge, the highest annual discharge and the highest average daily discharge were the same as in the case of hydrological year.

The total flow rate into the Mosoni Danube consist of flow rate released into the Mosoni branch of the Danube through the intake structure at Čunovo and flow rate through the right-side seepage canal, determined at Lock. No. II.

Table 1-8a: Monthly characteristics of flow rate released into the Mosoni Danube in the hydrological year 2014 (average daily values)

Year	**2013**		**2014**										
Month	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Year**
Avg. min	27.6	43.5	27.4	27.4	33.0	25.9	13.4	32.7	34.3	32.3	14.2	13.6	**13.4**
Average	43.8	45.0	37.4	37.7	34.4	33.1	29.8	35.7	35.8	35.4	23.0	30.9	**35.2**
Avg. max	46.9	46.4	46.2	46.4	35.9	36.0	37.9	38.7	37.3	38.8	36.3	47.4	**47.4**

In the case of hydrological year 2014 (**Table 1-8a**) the average annual discharge released into the Mosoni Danube was 35.2 $m^3.s^{-1}$. The lowest average daily flow rate of 13.4 $m^3.s^{-1}$ was recorded on May 19, 2014. The highest average daily flow rate of 47.4 $m^3.s^{-1}$ occurred on October 1, 2014.

Table 1-8b: Monthly characteristics of flow rate released into the Mosoni Danube in the calendar year 2014 (average daily values)

Year	**2014**												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Avg. min	27.4	27.4	33.0	25.9	13.4	32.7	34.3	32.3	14.2	13.6	27.4	42.6	**13.4**
Average	37.4	37.7	34.4	33.1	29.8	35.7	35.8	35.4	23.0	30.9	44.1	44.8	**35.2**
Avg. max	46.2	46.4	35.9	36.0	37.9	38.7	37.3	38.8	36.3	47.4	47.5	46.2	**47.5**

In the case of calendar year 2014 (**Table 1-8b**) the average annual discharge released into the Mosoni Danube was 35.2 $m^3.s^{-1}$. Value for the lowest average daily flow rate was the same as in the case of hydrological year. The highest average daily flow rate of 47.5 $m^3.s^{-1}$ was determined on November 6, 2014.

In the year 2014, technical maintenance of turbines was carried out during January (21 days) and in the period from February 9, 2014 to November 2, 2014 (264 days) reduced amount of water was released almost continuously during the planned preparatory and constructing works. The discharged water amount during those days ranged from 11 to 36 $m^3.s^{-1}$. The average annual discharge into the Mosoni Danube in the year 2014, both the hydrological and calendar, was 35.2 $m^3.s^{-1}$, which is 81.9 % of the agreed amount. With respect to the above mentioned limitations, the total amount of water discharged into the Mosoni Danube was lower than the water amount set out in the intergovernmental Agreement. The Hungarian Party have been informed about the exceptional water discharge into the Mosoni Danube due to the planned construction works by Slovak party at the negotiations of the Nominated Monitoring Agents on December 11, 2014.

1.3. Water distribution on the Hungarian territory

The water discharged to the Hungarian side is distributed between the Danube old riverbed, the river branches in the inundation area, the river branches on the flood-protected area and the Mosoni Danube. The distribution of water on the Hungarian territory is regulated by the Operation rules, depending on the incoming flow rate in the Bratislava-Devín cross-section and the season.

1.3.1. Water supply into the inundation area

River branches in the inundation area on the Hungarian territory is supplied with water from two sources:

a) from the Danube old riverbed through three openings in the riverbank by manipulating the water level impounded by the submerged weir and the Dunakiliti dam;

b) from the right-side seepage canal through the lock No. V.

These two sources are summed to determine the total amount.

The water distribution was set up according to the criteria of the reference status, to be achieved. The reference status was determined at the end of the nineties with participation of stakeholders. Taking various needs into consideration the water distribution reflects the hydrological regime of the fifties. In the river branches in the inundation area, water levels characteristic for this period are targeted. The daily flow rate is determined as a function of flow rate entering the Bratislava - Devín cross-section. Environmental status of Szigetköz in the reference period was determined as the most similar to a state that can be sustainable on a long run, and provides sufficient information on riverbed morphology and hydro-geological regime for determining the reference status.

The total water amount inflowing through the three openings in the Danube riverbank upstream of the submerged weir is determined at the Helena gauging station. Joint flow rate measurements at this gauging station were performed by both Parties. Measurements were jointly evaluated and average daily flow rate data were adopted (**Table 1-9a, 1-9b**).

Table 1-9a: Monthly characteristics of flow rate determined at the Helena gauging station in the hydrological year 2014

Year	2013		2014										
Month	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Year**
Minimum	19.5	16.5	7.60	6.00	9.00	20.7	47.0	61.0	70.0	18.0	15.9	12.0	**6.00**
Avg. min	20.5	17.3	9.46	9.83	10.9	24.0	71.4	66.9	83.7	21.8	21.0	15.7	**9.46**
Average	36.4	21.2	15.5	14.0	18.2	40.6	115	139	105	91.2	73.3	29.5	**58.5**
Maximum	60.5	29.5	23.5	24.6	29.6	75.0	200	216	138	211	283	149	**283**
Avg. max	53.5	26.7	22.2	21.7	25.6	66.2	151	210	125	160	268	82.3	**268**

In the case of hydrological year 2014 (**Table 1-9a**) the average annual discharge into the right-side river branches at Helena gauging station was 58.5 $m^3.s^{-1}$. The minimal annual flow rate of 6.00 $m^3.s^{-1}$ was recorded on February 9, 2014, while the lowest average daily flow rate of 9.46 $m^3.s^{-1}$ was determined on January 14, 2014. The highest annual flow rate of 283 $m^3.s^{-1}$ occurred on September 14, 2014, and the highest average daily flow rate of 268 $m^3.s^{-1}$ was recorded on September 15, 2014.

Table 1-9b: Monthly characteristics of flow rate determined at the Helena gauging station in the calendar year 2014

Year	2014												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Minimum	7.60	6.00	9.00	20.7	47.0	61.0	70.0	18.0	15.9	12.0	6.50	7.00	**6.00**
Avg. min	9.46	9.83	10.9	24.0	71.4	66.9	83.7	21.8	21.0	15.7	8.62	13.8	**8.62**
Average	15.5	14.0	18.2	40.6	115	139	105	91.2	73.3	29.5	19.0	15.5	**56.6**
Maximum	23.5	24.6	29.6	75.0	200	216	138	211	283	149	49.7	18.9	**283**
Avg. max	22.2	21.7	25.6	66.2	151	210	125	160	268	82.3	40.0	18.2	**268**

In the case of calendar year 2014 (**Table 1-9b**) the average annual flow rate at Helena gauging station was 56.6 $m^3.s^{-1}$. Values for the minimal annual flow rate, the highest annual flow rate and the highest average daily flow rate were the same as in the case of hydrological year. The lowest average daily flow rate was determined on November 20, 2014 with a value of 8.62 $m^3.s^{-1}$.

The water amount inflowing from the right-side seepage canal is determined at the Lock No. V. The residual amount of water from the Mosoni Danube supply is released through this object.

Table 1-10a: Monthly characteristics of flow rate determined at the Lock No. v in the hydrological year 2014

Year	2013		2014										
Month	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Year
Minimum	8.30	28.1	15.5	12.1	25.0	13.4	0.00	0.00	0.00	0.00	0.00	1.00	**0.00**
Avg. min	11.4	28.2	16.2	15.1	25.9	14.5	0.00	0.00	0.00	0.00	0.00	1.07	**0.00**
Average	22.1	28.9	25.1	25.0	26.7	22.6	7.21	0.19	0.28	8.85	9.07	20.2	**16.3**
Maximum	28.4	29.6	30.2	30.0	27.8	27.4	22.6	1.60	0.70	23.6	27.2	29.3	**30.2**
Avg. max	28.4	29.6	29.7	29.8	27.4	27.1	19.2	1.42	0.57	22.1	22.4	28.7	**29.8**

In the case of hydrological year 2014 (**Table 1-10a**) the average annual flow rate through the Lock. No. V was 16.3 $m^3.s^{-1}$. The minimal annual flow rate and also the lowest average daily flow rate was 0.00 $m^3.s^{-1}$ and it occurred several times in May, June, July, August and September 2014. The highest annual flow rate of 30.2 $m^3.s^{-1}$ was recorded on January 28, 2014 and the highest average daily flow rate of 29.8 $m^3.s^{-1}$ occurred on February 7 and 9, 2014.

Table 1-10b: Monthly characteristics of flow rate determined at the Lock No. V in the calendar year 2014

Year	2014												
Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Minimum	15.5	12.1	25.0	13.4	0.00	0.00	0.00	0.00	0.00	1.00	0.90	26.9	**0.00**
Avg. min	16.2	15.1	25.9	14.5	0.00	0.00	0.00	0.00	0.00	1.07	16.5	28.7	**0.00**
Average	25.1	25.0	26.7	22.6	7.21	0.19	0.28	8.85	9.07	20.2	28.4	29.0	**16.8**
Maximum	30.2	30.0	27.8	27.4	22.6	1.60	0.70	23.6	27.2	29.3	29.7	29.5	**30.2**
Avg. max	29.7	29.8	27.4	27.1	19.2	1.42	0.57	22.1	22.4	28.7	29.3	29.3	**29.8**

In the case of calendar year 2014 (**Table 1-10b**) the average annual flow rate through the Lock. No. V was 16.8 $m^3.s^{-1}$. Values of the minimal annual flow rate, the lowest average daily flow rate, the highest annual flow rate and the highest average daily flow rate were the same as in the case of hydrological year 2014.

The total flow rate inflowing to the inundation area consist of water amount flowing through the Helena cross-section and water amount flowing through the Lock No. V in the right-side seepage canal (**Fig. 1-5, Table 1-10a, 1-10b**).

Table 1-11a: Monthly characteristics of total water amount released into the inundation area in the hydrological year 2014 (average daily values)

Year	2013		2014										
Month	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Year
Avg. min	48.9	46.8	35.5	34.4	38.2	49.1	90.6	66.9	84.1	43.9	38.7	38.4	**34.4**
Average	58.5	50.2	40.6	39.0	44.8	63.2	122	140	106	100	82.4	49.7	**74.8**
Avg. max	73.4	54.9	49.4	44.0	51.8	88.2	153	210	125	160	268	97.1	**268**

Concerning the total flow rate in the right-side river branch system in the hydrological year 2014 (**Table 1-11a**) the average annual value was 74.8 $m^3.s^{-1}$. The lowest average daily flow rate of 34.4 $m^3.s^{-1}$ was recorded on February 9, 2014. The highest average daily flow rate of 268 $m^3.s^{-1}$ occurred on September 15, 2014, during the culmination of the second discharge wave in September.

Table 1-11b: Monthly characteristics of total water amount released into the inundation area in the calendar year 2014 (average daily values)

Year	2014												
Month	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec	Year
Avg. min	35.5	34.4	38.2	49.1	90.6	66.9	84.1	43.9	38.7	38.4	37.6	43.0	**34.4**
Average	40.6	39.0	44.8	63.2	122	140	106	100	82.4	49.7	47.4	44.5	**73.4**
Avg. max	49.4	44.0	51.8	88.2	153	210	125	160	268	97.1	56.5	46.9	**268**

In the case of calendar year 2014 (**Table 1-8b**) the average annual of the total flow rate in the right-side river branch system was 73.4 $m^3.s^{-1}$. The lowest average daily flow rate and the highest average daily flow rate were the same as in the case of hydrological year 2014.

The artificial flooding in the year 2014 was planned from May 23, 2014. However, due to decline of flow rates in the Danube it was postponed and realized from May 30, 2014 to June 12, 2014.

Concerning the water stages in the Hungarian river branch system it can be stated that water levels in the upper part of the inundation area (Tejfaluszigeti river branch system) were slightly behind the reference status during the mid water periods. In the middle part of the inundation area (Cikolai and Bodaki river branch systems) the water levels for the mid water periods were slightly above it. The corresponding water stages in the lower part of inundation area (Ásványi river branch system) were prevailingly above the desired status. However, after completion of the still ongoing construction works, aimed at rehabilitation of the river branches, the opportunity to achieve the reference status opens.

Based on the above mentioned it can be concluded that the reference water levels in the right side inundation area were quite well achieved for the low and mid water periods The reference water levels, desired in the lower part of the river branch system, becomes fully achievable after completion the ongoing construction works.

1.3.2. Water supply into the Mosoni Danube

The water supply into the Mosoni Danube is realized from the right-side seepage canal through the Lock No. VI (**Fig. 1-6**). The flow rate is measured at the cross-section downstream of the lock (**Table 1-12a, 1-12b**).

Table 1-12a: Monthly characteristics of flow rate discharged into the Mosoni Danube through the Lock No. VI in the hydrological year 2014

Year	2013		2014										
Month	Nov	Dec	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Year
Minimum	11.3	10.5	8.32	10.7	6.52	6.52	5.23	28.5	27.4	9.75	7.64	5.66	**5.23**
Avg. min	16.1	13.2	9.85	10.9	6.60	6.69	5.46	30.5	31.2	9.91	9.23	5.88	**5.46**
Average	21.4	14.1	12.0	12.1	7.23	9.13	20.5	33.2	32.5	24.4	10.8	8.39	**17.2**
Maximum	26.9	16.5	14.2	13.4	10.9	20.7	35.1	37.2	34.5	36.0	18.3	21.2	**37.2**
Avg. max	26.1	15.7	13.9	13.4	9.94	11.9	32.3	36.2	33.2	34.9	12.8	13.7	**36.2**

In the case of hydrological year 2014 (**Table 1-12a**) the average annual discharge released through the Lock No. VI into the Mosoni Danube was 17.2 $m^3.s^{-1}$. The minimal annual flow rate of 5.23 $m^3.s^{-1}$ occurred on May 12, 2014 and the lowest average daily flow rate of 5.46 $m^3.s^{-1}$ was recorded on May 19, 2014. The highest annual flow rate of 37.2 $m^3.s^{-1}$ occurred on June 10, 2014 and the highest average daily flow rate of 36.2 $m^3.s^{-1}$ was recorded on June 15, 2014.

Table 1-12b: Monthly characteristics of flow rate discharged into the Mosoni Danube through the Lock No. VI in the calendar year 2014

Year	2014												
Month	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**June**	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**	**Year**
Minimum	8.32	10.7	6.52	6.52	5.23	28.5	27.4	9.75	7.64	5.66	7.32	7.80	**5.23**
Avg. min	9.85	10.9	6.60	6.69	5.46	30.5	31.2	9.91	9.23	5.88	8.99	9.44	**5.46**
Average	12.0	12.1	7.23	9.13	20.5	33.2	32.5	24.4	10.8	8.39	10.8	10.0	**15.9**
Maximum	14.2	13.4	10.9	20.7	35.1	37.2	34.5	36.0	18.3	21.2	12.3	10.7	**37.2**
Avg. max	13.9	13.4	9.94	11.9	32.3	36.2	33.2	34.9	12.8	13.7	12.2	10.6	**36.2**

In the case of calendar year 2014 (**Table 1-12b**) the average annual discharge released into the Mosoni Danube was 15.9 $m^3.s^{-1}$. Values for the minimal and maximal annual flow rate and the lowest and highest average daily flow rates were the same as in the case of hydrological year 2014.

The water supply regime is controlled by the rules of operation and follows the Danube's water regime, similarly to the river branch water supply. In the non-vegetation period a low water period was simulated in the Mosoni Danube. This was realised by redirecting of a greater part of water into the inundation area.

1.4. The Danube water level characteristics on Čunovo-Vámosszabadi stretch

Concerning water levels in the Danube old riverbed the stretch between Čunovo and Vámosszabadi may be divided into four different sections according to the prevailing influence. These sections can be characterised by data obtained from following gauging stations: Rajka and Hamuliakovo, Dunakiliti, Doborgaz and Dobrohošť, Dunaremete and Gabčíkovo, Vámosszabadi and Medveďov.

Characteristics of the four sections on Čunovo - Vámosszabadi stretch in the year 2014 are as follows:

a) Section Čunovo - Dunakiliti. The water level in this section is impounded since construction the submerged weir. From this impounded section the water flows into the right-side river branch system. The amount of water flowing into the river branch system is determined by water level regulation at the Dunakiliti dam. Since introducing the submerged weir into operation the water level is maintained in the mid-water riverbed. Flow velocities measured in the Rajka profile in 2014 fluctuated in the range between 0.32-0.60 $m.s^{-1}$ (240-517 $m^3.s^{-1}$), but flow velocities during discharge wave in September 2014 reached values from 1.14 to 1.57 $m.s^{-1}$ (985-1714 $m^3.s^{-1}$). In the year 2014 flow rates exceeding 600 $m^3.s^{-1}$ were released into the Danube old riverbed on five occasions: during discharge waves in May, August, September and October and during the artificial flooding of the right-side river branch system in late May and June.

In the hydrological year 2014 the average daily water level at the Hamuliakovo gauging station (rkm 1850) fluctuated from 122.60 to 124.80 m a. s. l. (122.47-124.80 m a. s. l. in the calendar year 2014) and the average annual water level was 122.96 m a. s. l (122.93 m a. s. l. in the calendar year 2014). The average daily water level in the Rajka profile (rkm 1848.4) fluctuated from 122.60 to 124.75 m a. s. l. (122.46-124.75 m a. s. l. in the calendar year 2014) and the average annual water level was 122.94 m a. s. l. (122.92 m a. s. l. in the calendar year 2014) (**Fig. 1-7**). Compared with the previous year the minimal water levels in the hydrological year 2014 were lower by 0.12 m and lower by 0.09 m respectively, and the maximal water levels were lower by 4.72 m and 4.16 m respectively. The average annual water levels were lower by 0.25 m and 0.21 m respectively.

b) <u>Section between Dunakiliti and Dunaremete.</u> This section of the Danube is not influenced by any measures and the water level is determined only by flow rate in this stretch of the river. In the upper part of this section the water level in the river branches is about 3 m higher than the water level in the main riverbed. In the hydrological year 2014 the average daily water level at the Dobrohošť gauging station (rkm 1838.6) fluctuated in the range from 117.20 to 121.82 m a. s. l. (117.09-121.82 m a. s. l. in the calendar year 2014) and the average annual water level was 117.76 m a. s. l. (the same in the calendar year 2014). The average daily water level at the Dunaremete profile (1825.5) fluctuated from 113.47 to 117.95 m a. s. l. (113.48-117.95 m a. s. l. in the calendar year 2015) and the average annual water level was 114.06 m a. s. l. (the same in the calendar year 2014) (**Fig. 1-8**). Flow velocities measured in the Dunaremete profile, except measurements during discharge wave in September, fluctuated in the range between 0.74-1.08 $m.s^{-1}$ (248-430 $m^3.s^{-1}$), but flow velocities during the discharge wave reached the values of 1.57 $m.s^{-1}$ (802 $m^3.s^{-1}$). Compared with the previous year the minimal water level at Dobrohošť was higher by 0.38 m, at Dunaremete lower by 0.18 m. The maximal water levels were lower by 2.67 m and 2.45 m respectively. The average annual water levels were lower by 0,09 m and 0,08 m respectively.

c) <u>Section between Dunaremete and Sap.</u> The water level in this section is influenced by backwater effect from the confluence of the tailrace canal and the Danube old riverbed (rkm 1811). The water level changes, especially in the lower part of this section, are influenced by the flow rates in the tailrace canal. Length of the upstream section influenced by backwater effect depends on the actual flow rate distribution between the hydropower plant and the Danube old riverbed. In normal operation it can be stated that the backwater effect reaches the Dunaremete profile (rkm 1825.5) at flow rates exceeding 2500 $m^3.s^{-1}$ at Medveďov. In the hydrological year 2014 the average daily water level at Gabčíkovo gauging station (rkm 1819) fluctuated in the range from 111.67 to 113.81 m a. s. l. (the same range for the calendar year 2014) and the average annual water level was 112.24 m a. s. l. (112.25 m a. s. l. in the calendar year 2014) (**Fig. 1-9**). Daily water level fluctuation at Gabčíkovo gauging station in the Danube old riverbed can reach about 0.20 m as a consequence of hydropower plant operation. Compared with the previous year the minimal water level was higher by 0.06 m and the maximal water level was lower by 3.34 m. The average annual water level was lower by 0.26 m.

d) Section Sap - Vámosszabadi. Daily water level fluctuation at this stretch (up to 0.30 m) depends on the hydropower plant operation. Major changes occur at low flow rates in the Danube due to the ratio of total flow rate and the capacity of one turbine, which may be put into operation or stopped. The average annual flow rate at Vámosszabadi - Medveďov profile in hydrological year 2014 was 1725 $m^3.s^{-1}$. In the hydrological year 2014 the average daily water level at Medveďov profile (rkm 1806.3) fluctuated in the range from 108.50 to 113.56 m a. s. l. (the same range for the calendar year 2014) and the average annual water level was 109.70 m a. s. l. (109.68 m a. s. l. in the calendar year 2014) (**Fig. 1-10**). Flow velocities measured during flow rate measurements, except periods with discharge waves, fluctuated in the range between 1.01-1.30 $m.s^{-1}$ (1164-1867 $m^3.s^{-1}$). Compared with the previous year the minimal water level was lower by 0.32 m and the maximal water level was lower by 3.50 m. The average annual water level was lower by 0.82 m.

Fig. 1-1a

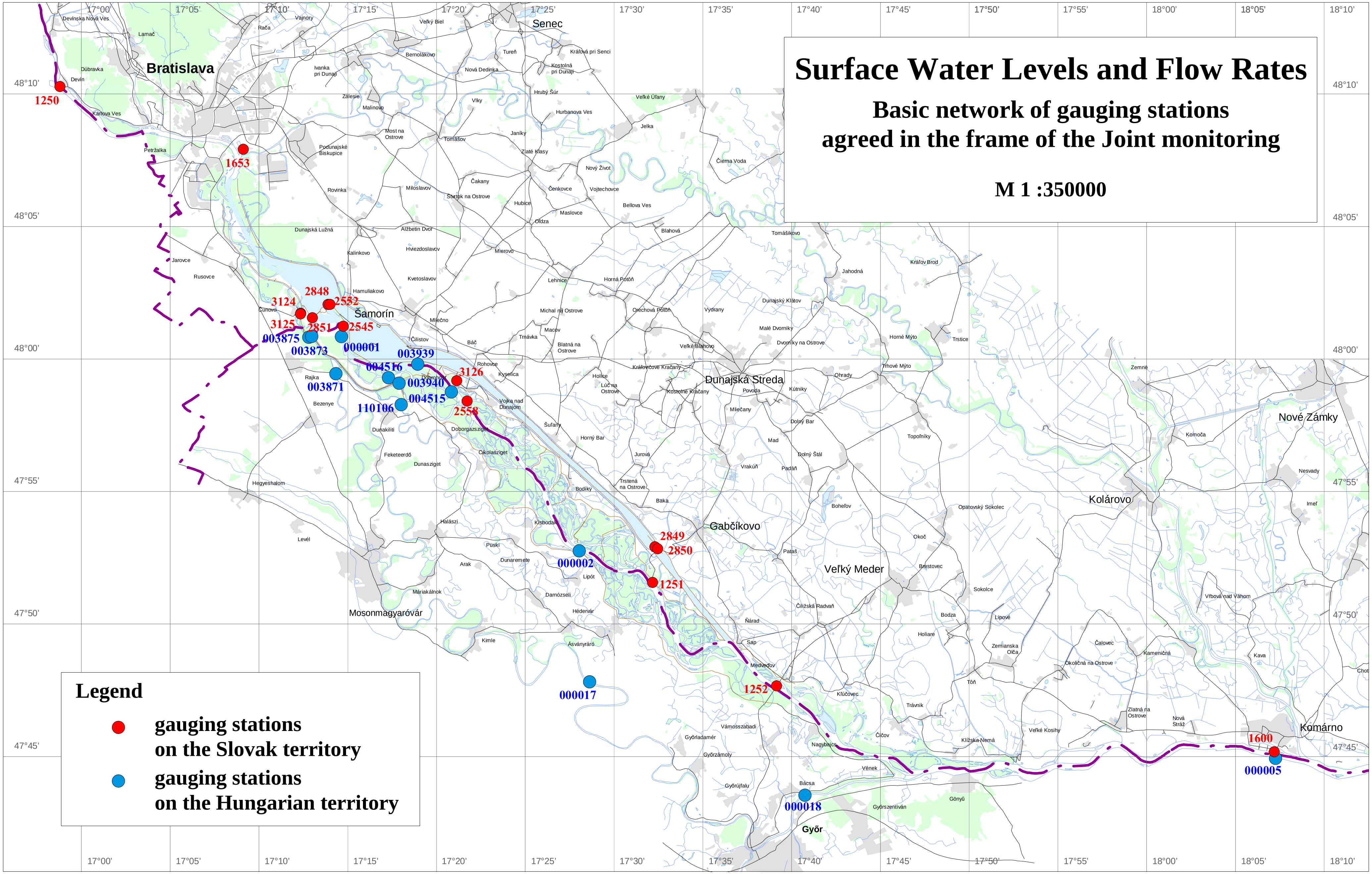
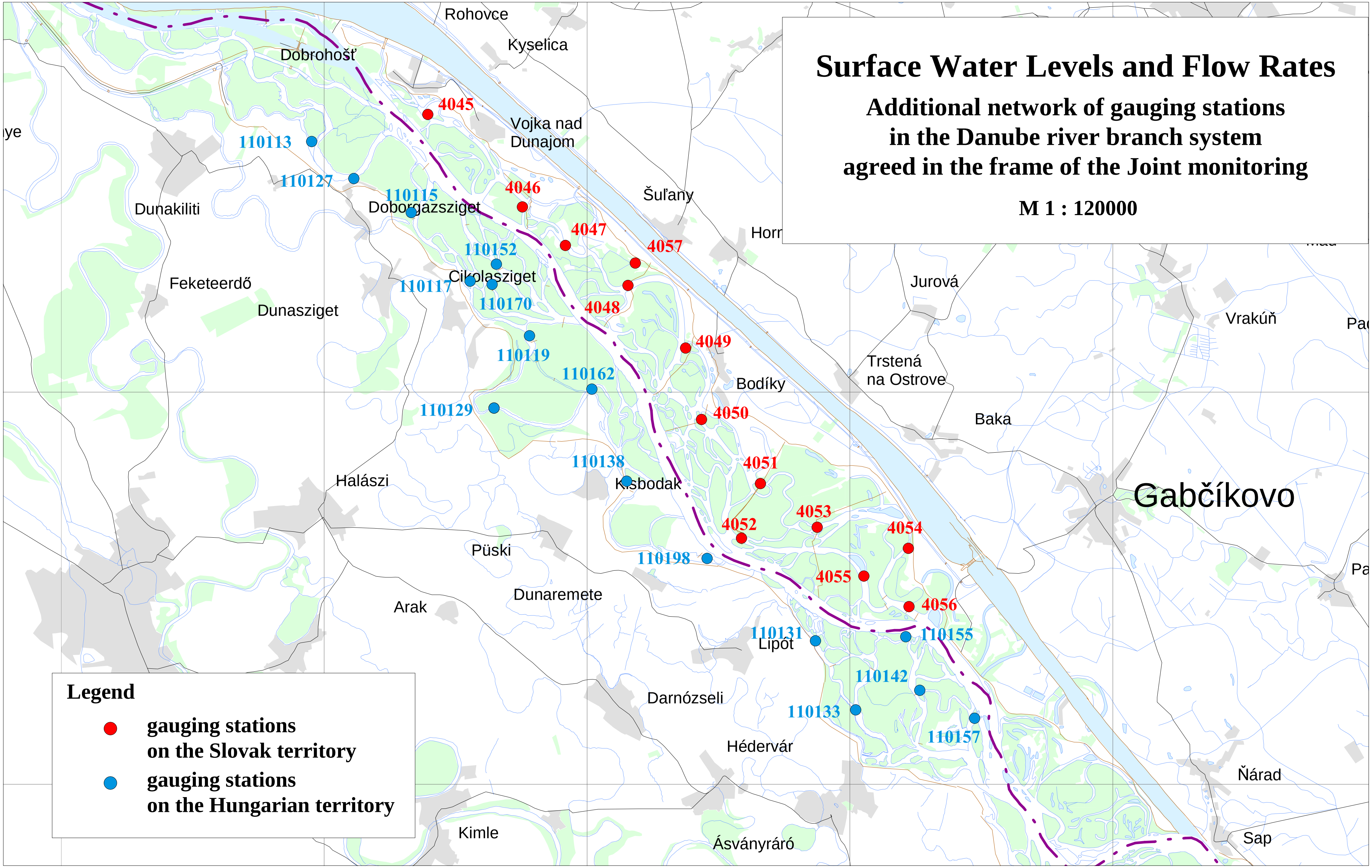

Surface Water Levels and Flow Rates
Basic network of gauging stations
agreed in the frame of the Joint monitoring
M 1 :350000
Legend
gauging stations
on the Slovak territory
gauging stations
on the Hungarian territory
Bratislava
Senec
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr
1250
1653
3124
3125
2848
2552
2851
2545
3126
2558
2849
2850
1251
1252
1600
003875
003873
000001
003939
004516
003940
003871
004515
110106
000002
000017
000018
000005

Fig. 1-1b



Surface Water Levels and Flow Rates
Additional network of gauging stations
in the Danube river branch system
agreed in the frame of the Joint monitoring
M 1 : 120000
Legend
gauging stations
on the Slovak territory
gauging stations
on the Hungarian territory
Rohovce
Kyselica
Dobrohošť
Vojka nad
Dunajom
Šuľany
Jurová
Vrakúň
Trstená
na Ostrove
Bodíky
Baka
Gabčíkovo
Ňárad
Sap
Dunakiliti
Doborgazsziget
Feketeerdő
Dunasziget
Cikolasziget
Halászi
Kisbodak
Püski
Dunaremete
Arak
Lipót
Darnózseli
Hédervár
Kimle
Ásványráró
4045
4046
4047
4057
4048
4049
4050
4051
4052
4053
4054
4055
4056
110113
110127
110115
110152
110117
110170
110119
110162
110129
110138
110198
110131
110155
110142
110133
110157

Fig. 1-2

Surface Water - Flow Rate

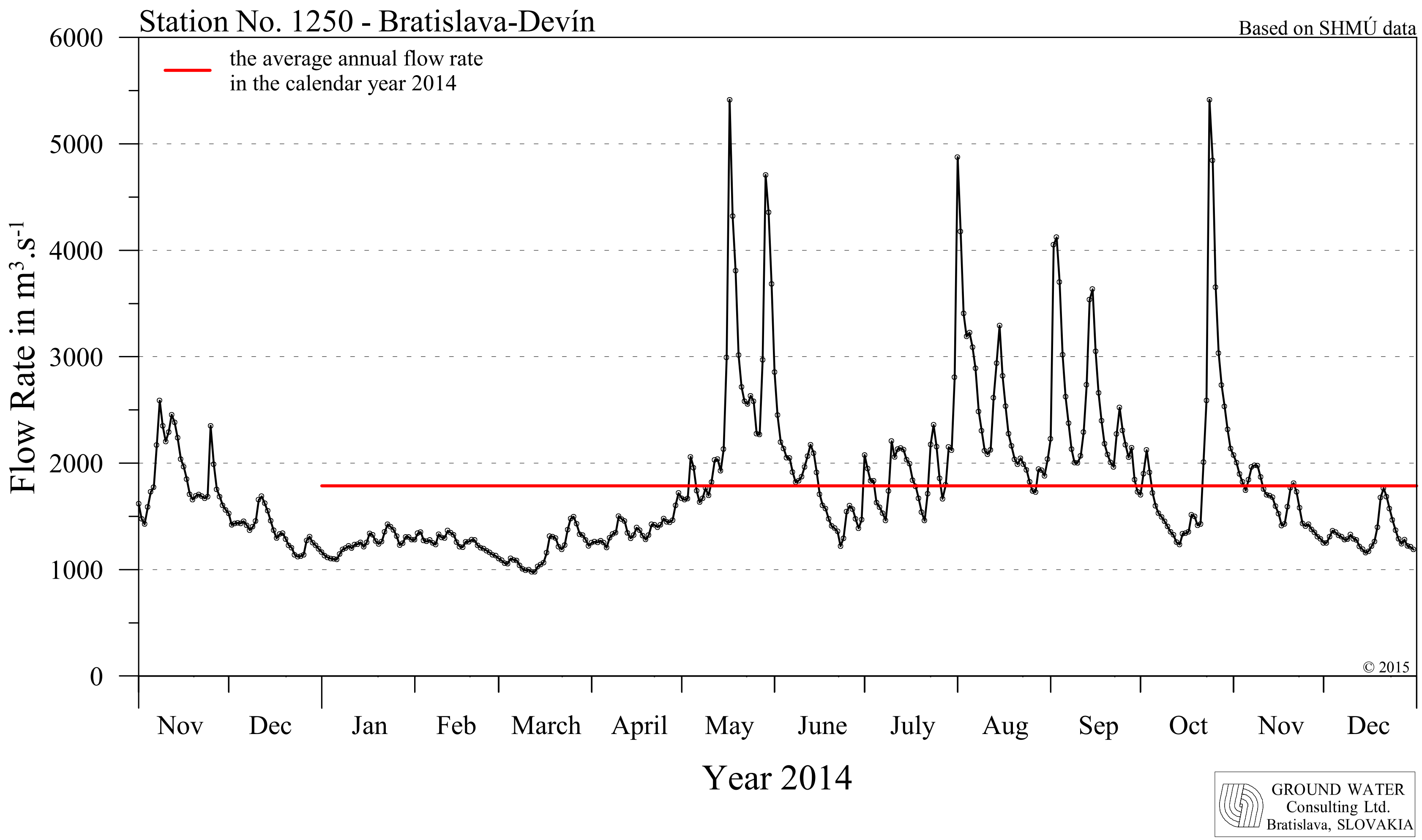


Fig. 1-3

Surface Water - Flow Rate

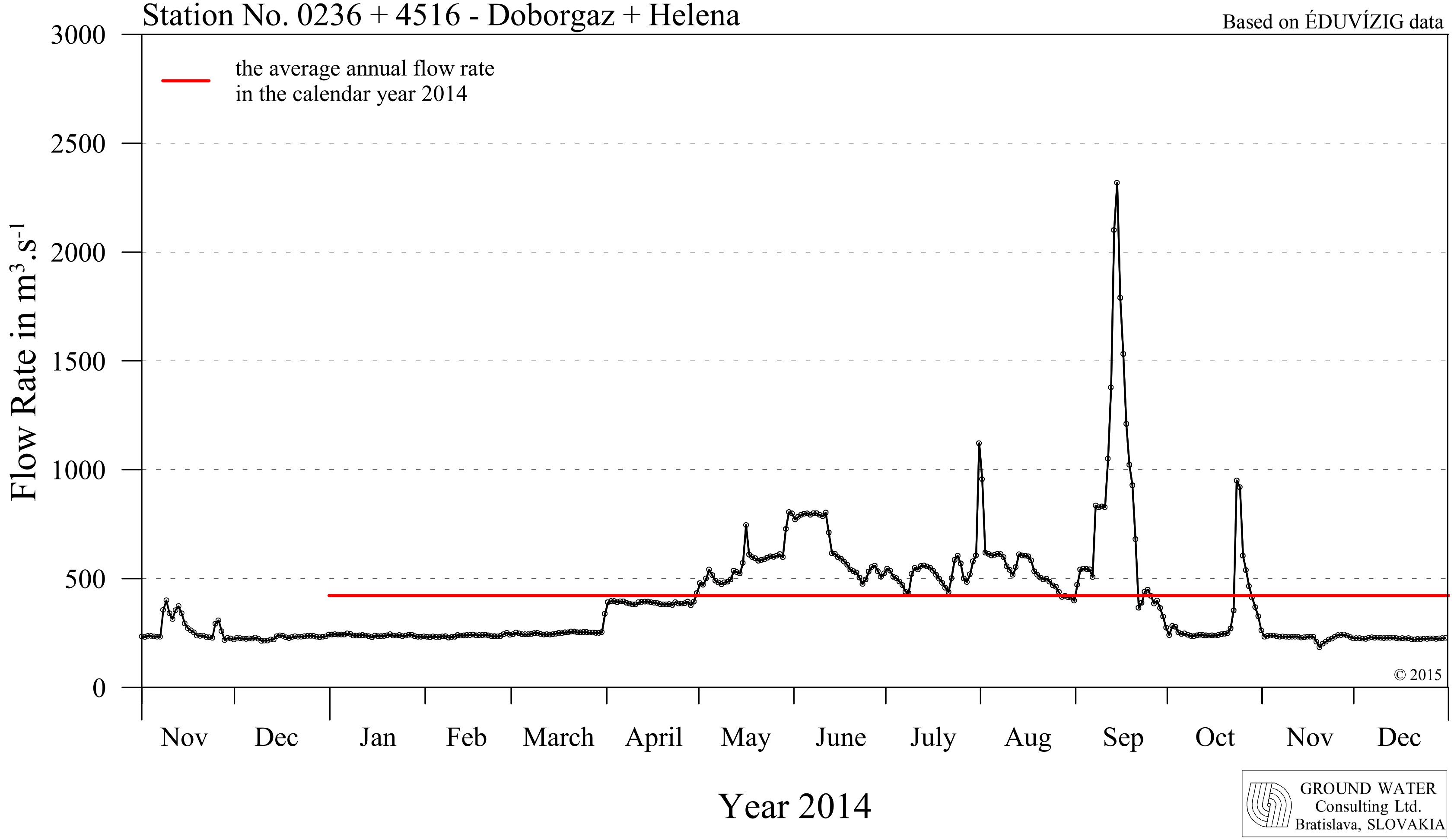
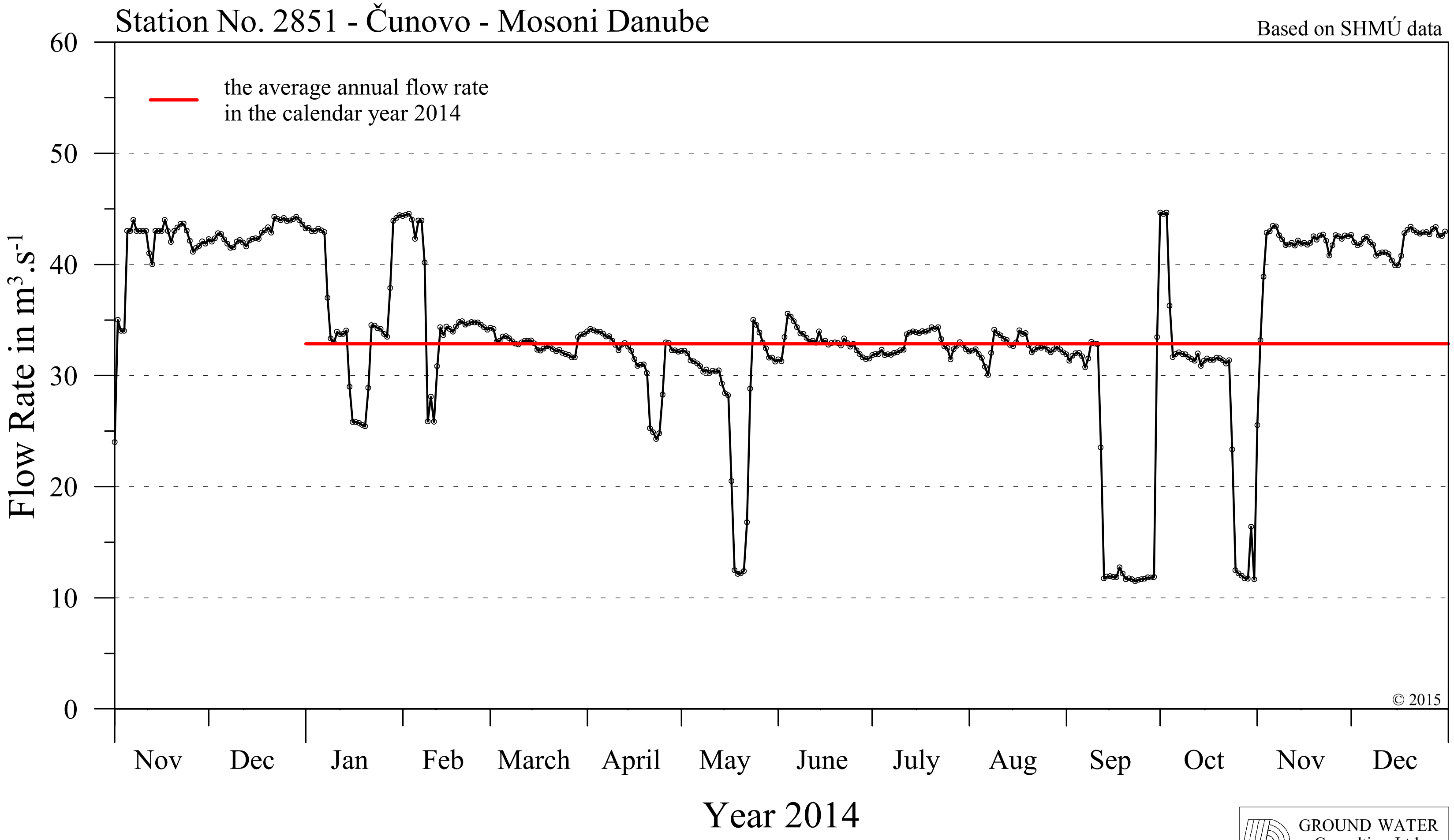


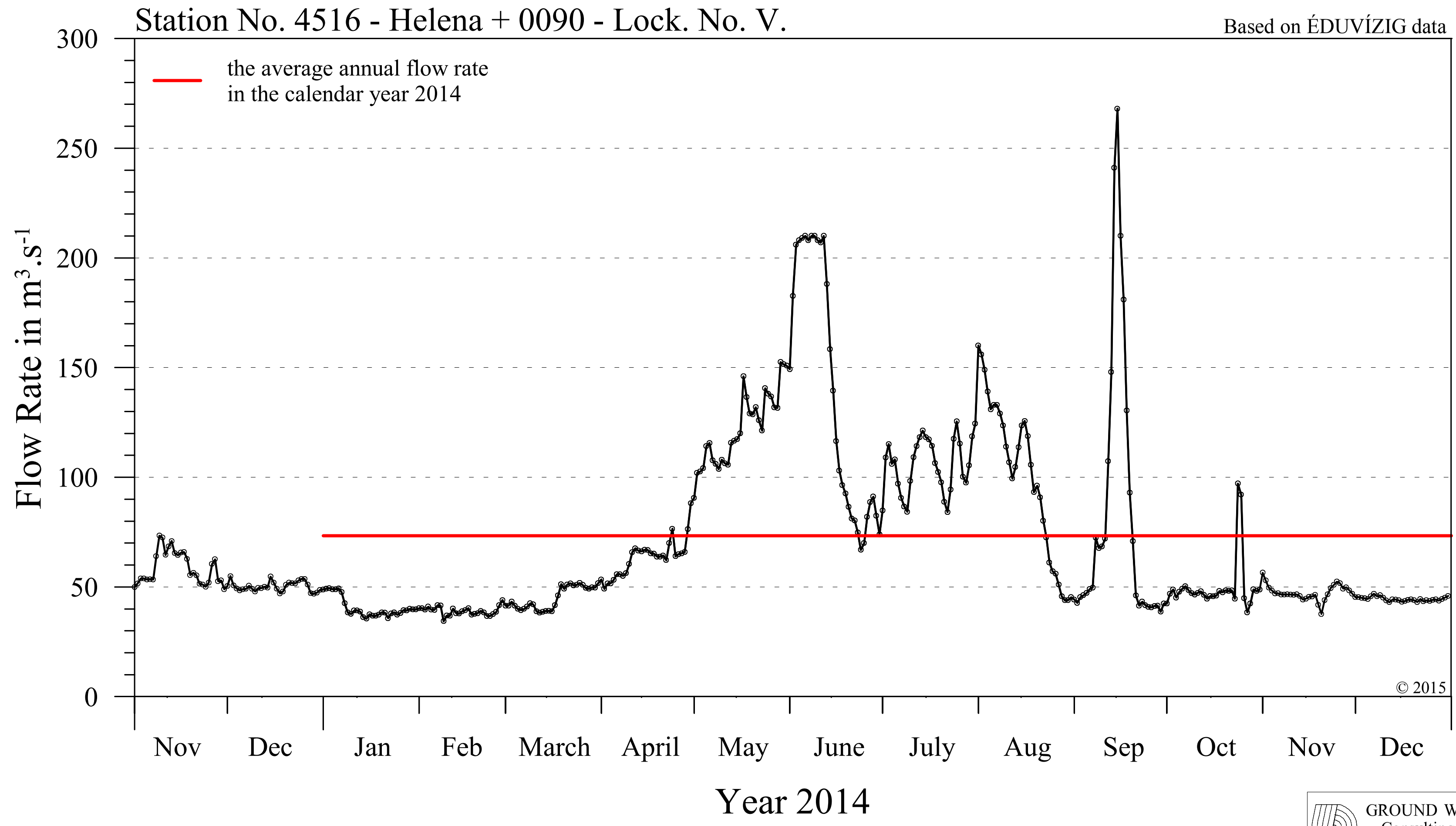
Fig. 1-4

Surface Water - Flow Rate



GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA

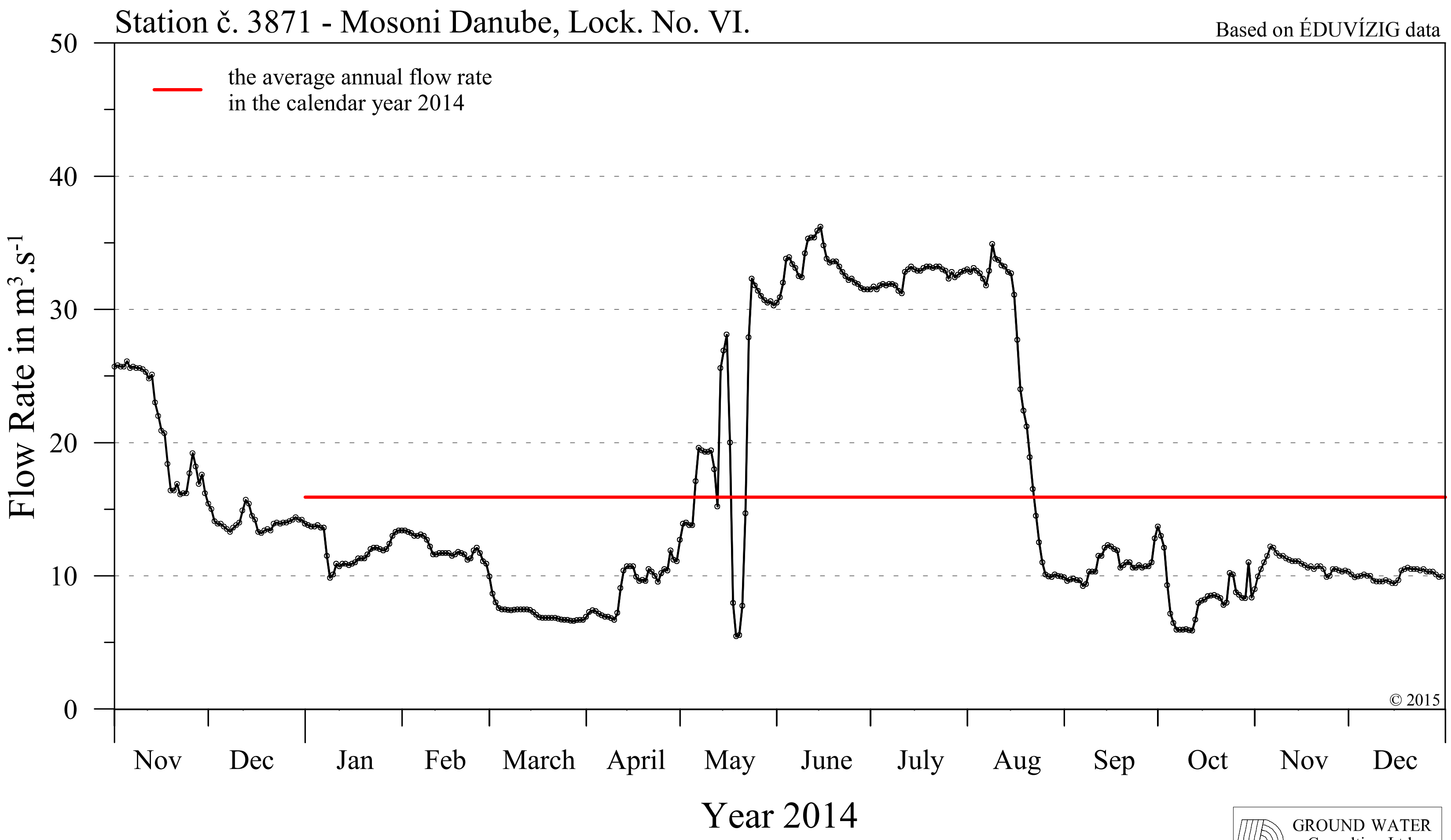
Fig. 1-5 **Surface Water - Flow Rate**



GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA

Fig. 1-6

Surface Water - Flow Rate



GROUND WATER Consulting Ltd. Bratislava, SLOVAKIA

Fig. 1-7

Surface Water Level

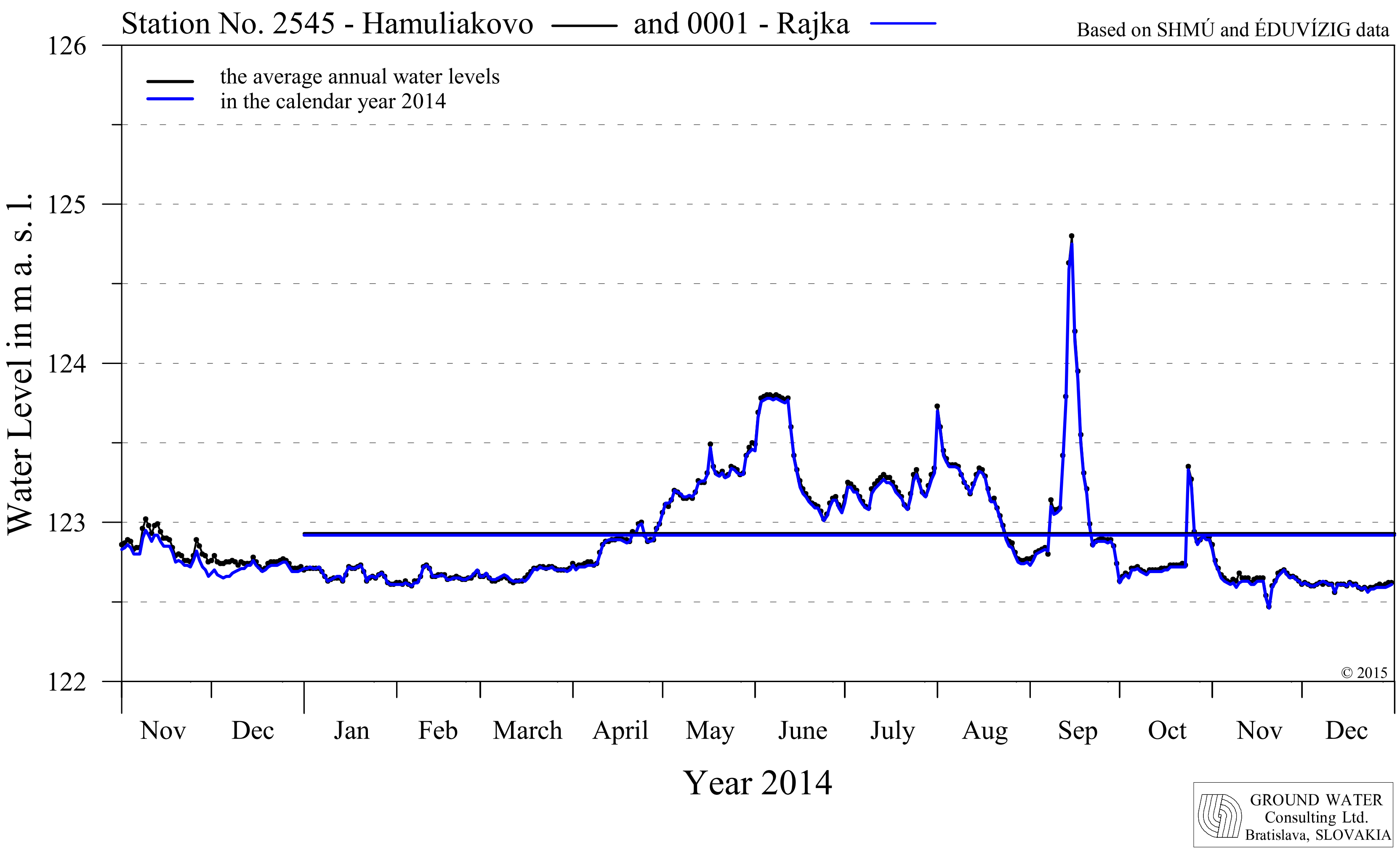
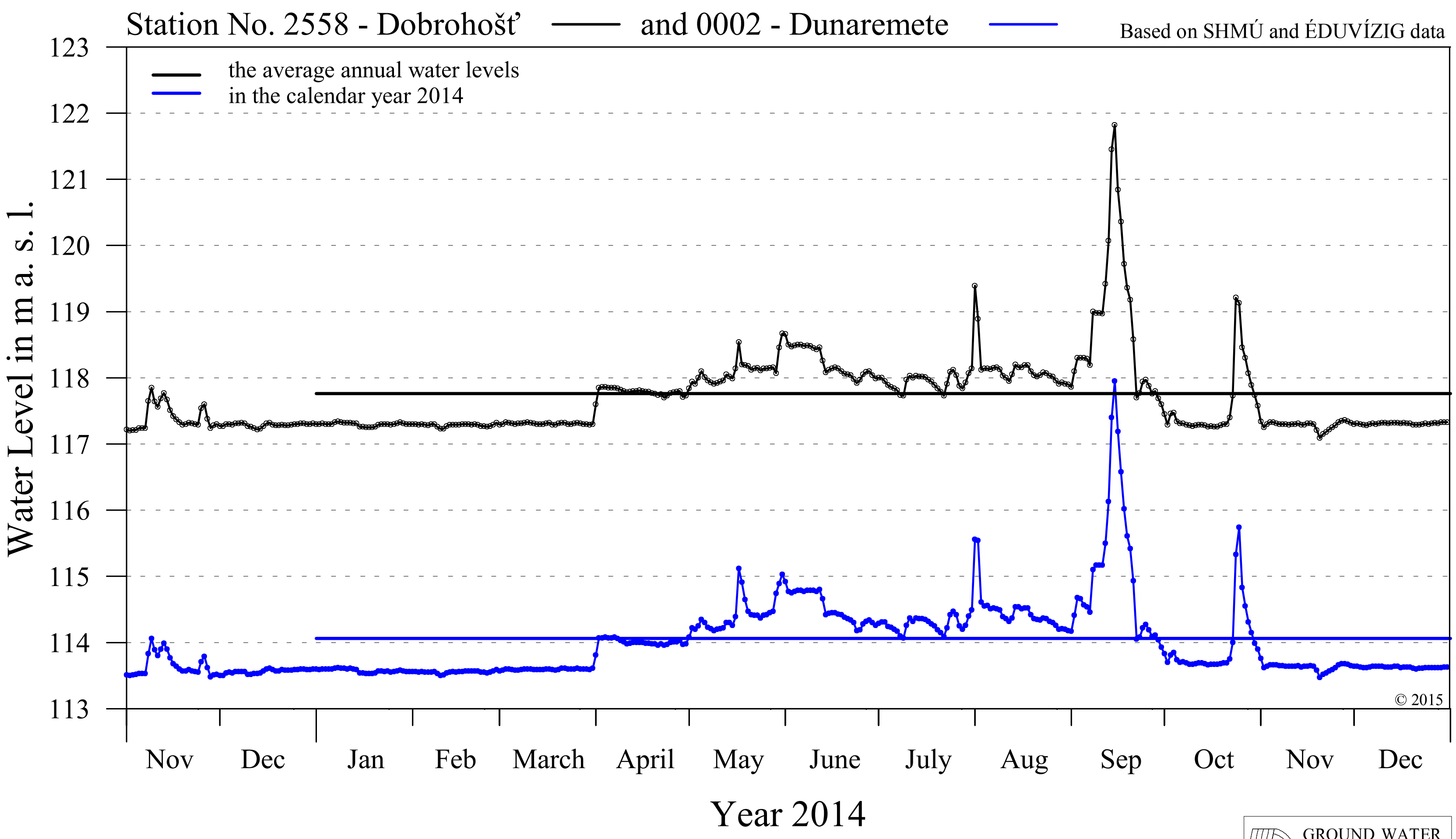


Fig. 1-8

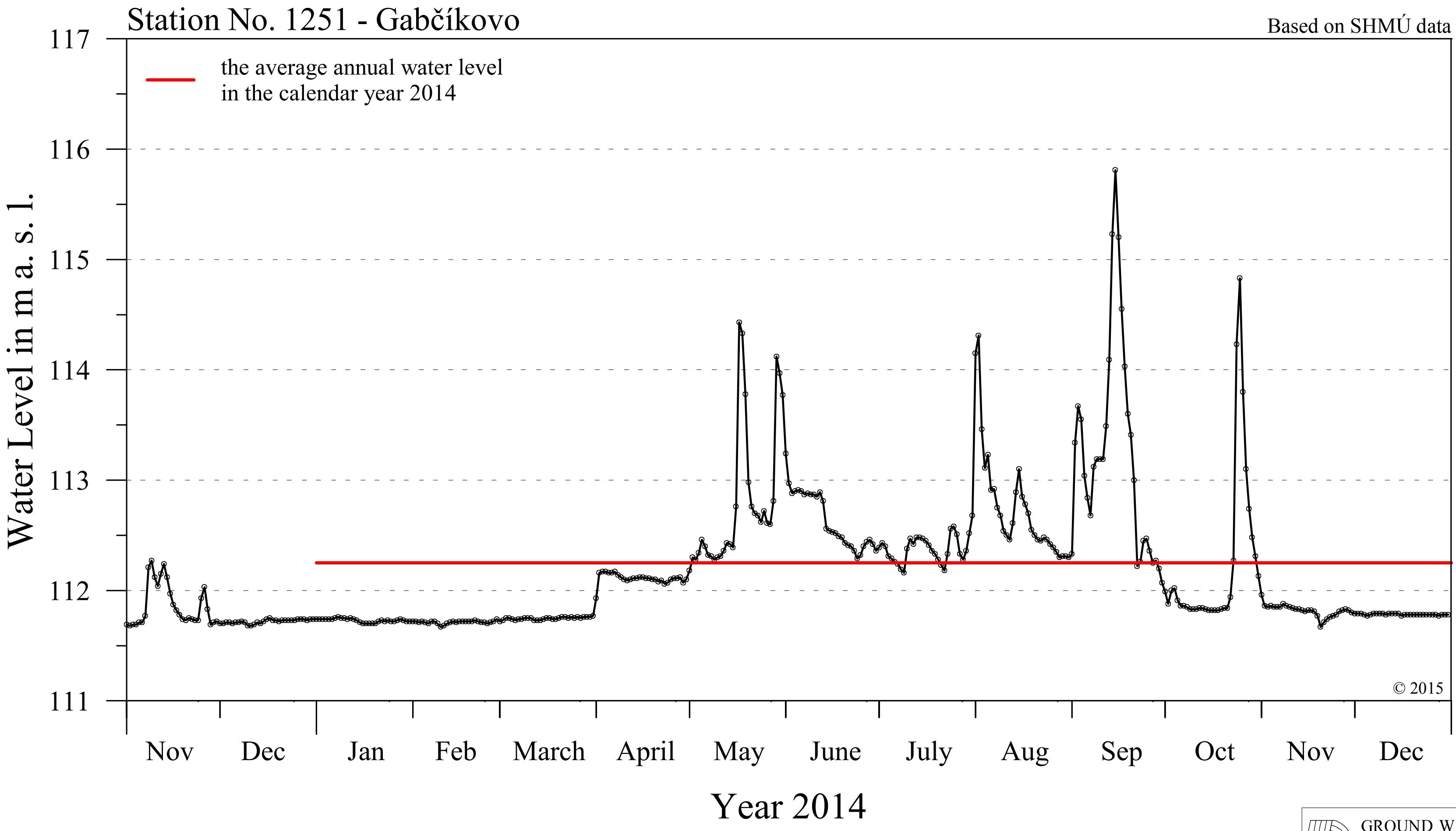
Surface Water Level



GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA

Fig. 1-9

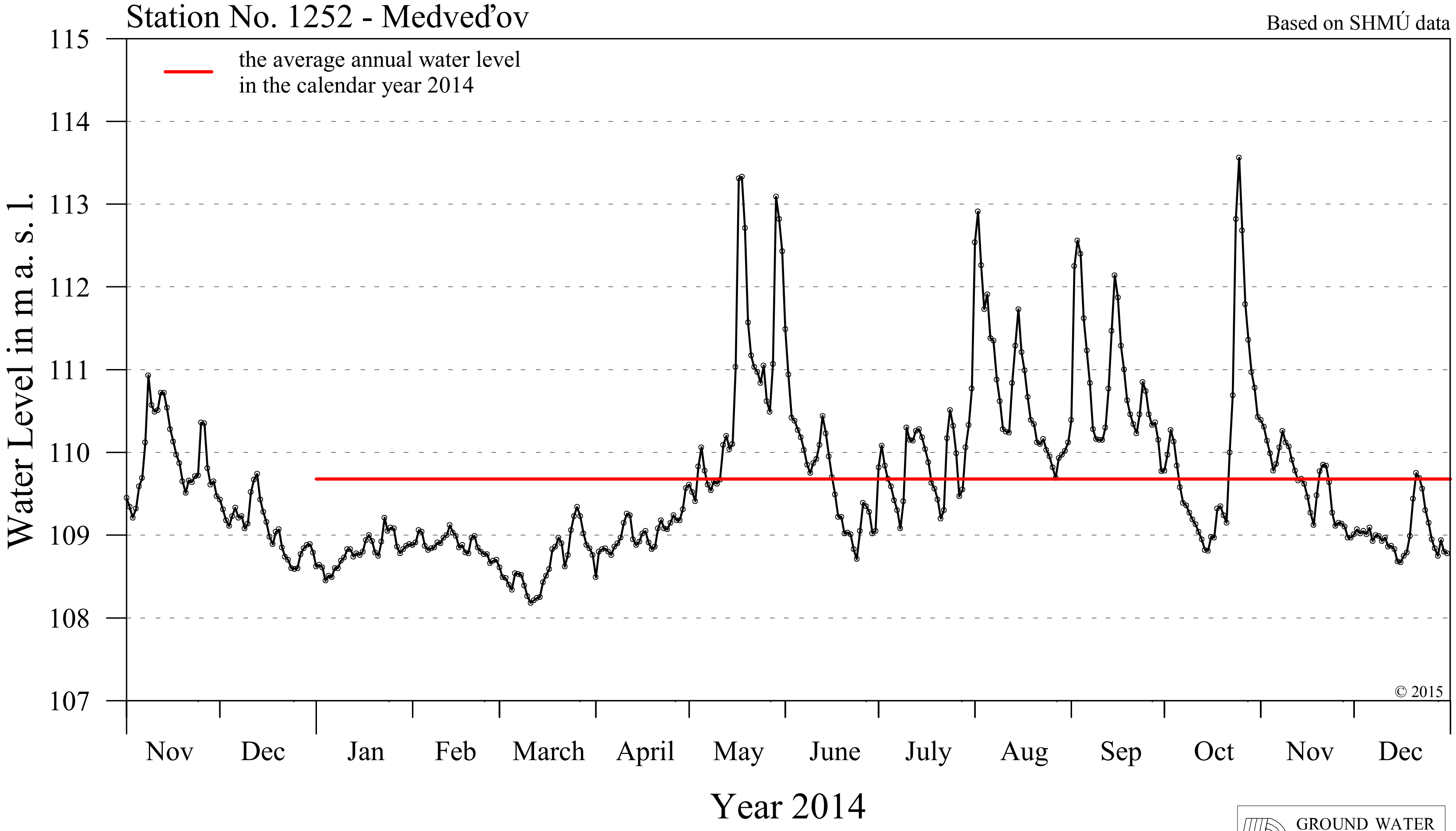
Surface Water Level



GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA

Fig. 1-10

Surface Water Level



GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA

PART 2

Surface Water Quality

The surface water quality in 2014 was monitored at 15 sampling sites on the Slovak territory and at 11 sampling sites on the Hungarian territory. The list of sampling sites is presented in **Table 2-1**, and their location is shown in **Fig. 2-1**.

At all monitoring sites the influence of measures, described in the Agreement, on surface water quality was observed. The main factors that could affect the water quality, are: the backwater effect upstream of the submerged weir, increased discharges into the Danube downstream of the Čunovo dam and into the Mosoni branch of the Danube, the water supply into the right-side river branch system, and morphological changes in the riverbed.

Table 2-1: List of monitoring sites

	Country	Sampling site No.	Location and sampling site name
Slovak side			
1	**Slovakia**	**109**	Danube, Bratislava - middle
2	**Slovakia**	**4016**	Danube old riverbed, upstream of the submerged weir
3	**Slovakia**	**4025**	Danube old riverbed, Dobrohošť - left side
4	**Slovakia**	**3739**	Danube old riverbed, Sap – upstream of the confluence
5	**Slovakia**	**112***	Danube, Medveďov - middle
6	**Slovakia**	**1205**	Danube, Komárno - middle
7	**Slovakia**	**307**	reservoir, Kalinkovo - navigation line
8	**Slovakia**	**308**	reservoir, Kalinkovo - left side
9	**Slovakia**	**309**	reservoir, Šamorín - right side
10	**Slovakia**	**311**	reservoir, Šamorín - left side
11	**Slovakia**	**3530**	tail race canal, Sap - left side
12	**Slovakia**	**3529***	Mosoni Danube, Čunovo - middle
13	**Slovakia**	**3531***	right-side seepage canal, Čunovo - middle
14	**Slovakia**	**317**	left-side seepage canal, Hamuliakovo - middle
15	**Slovakia**	**3376**	left-side river arm system - Dobrohošť
Hungarian side			
1	**Hungary**	**0001***	Danube old riverbed, Rajka
2	**Hungary**	**0043**	Danube old riverbed, Dunakiliti, submerged weir, upstream
3	**Hungary**	**0042**	Danube old riverbed, Dunakiliti, submerged weir, downstream
4	**Hungary**	**0002**	Danube old riverbed, Dunaremete
5	**Hungary**	**2306***	Danube, Medve
6	**Hungary**	**1141**	Mosoni Danube, Vének
7	**Hungary**	**0082***	Mosoni Danube, Lock No. I
8	**Hungary**	**0084***	right-side seepage canal, Lock No. II
9	**Hungary**	**1112**	right-side river arm system, Helena
10	**Hungary**	**1114**	right-side river arm system, Szigeti arm, 42.2 km
11	**Hungary**	**1126**	right-side river arm system, Ásványráró, 23.9 km

* - jointly observed monitoring sites

Surface water quality and sediment quality data for agreed monitoring sites, and time series diagrams of individual surface water quality parameters, are presented in the Slovak and Hungarian National Annual Reports on the Environment Monitoring in

2014 or in their Annexes. Figures in the Joint Report represent the data of selected parameters at selected monitoring sites.

Table 2-2: Agreed limits for surface water quality classification

Parameter / Class	Unit	I.	II.	III.	IV.	V.
Temperature	°C	<20	25	27	30	>30
Electric conductivity	$mS.m^{-1}$	<40	70	110	130	>130
Suspended solids	$mg.l^{-1}$	<20	30	50	100	>100
pH	-	6.5-<8	8-<8.5	6-<6.5 8.5-<9.0	5.5-<6.0 9.0<9.5	<5.5 >=9.5
Fe	$mg.l^{-1}$	<0.5	1	2	5	>5
Mn	$mg.l^{-1}$	<0.05	0.1	0.3	0.8	>0.8
O_2	$mg.l^{-1}$	>7	6	5	4	<4
BOD_5	$mg.l^{-1}$	<3	5	10	25	>25
COD_{Mn}	$mg.l^{-1}$	<5	10	20	50	>50
TOC	$mg.l^{-1}$	<3	7	10	12	>12
NH_4^+	$mg.l^{-1}$	<0.26	0.39	0.77	1.93	>1.93
NO_3^-	$mg.l^{-1}$	<4.4	13.3	26.6	66.4	>66.4
NO_2^-	$mg.l^{-1}$	<0.03	0.20	0.39	0.99	>0.99
PO_4^{3-}	$mg.l^{-1}$	<0.15	0.31	0.61	1.53	>1.53
total N	$mg.l^{-1}$	<1.5	4	8	20	>20
total P	$mg.l^{-1}$	<0.1	0.2	0.4	1	>1
Cl^-	$mg.l^{-1}$	<100	150	200	300	>300
SO_4^{2-}	$mg.l^{-1}$	<150	250	350	450	>450
Dissolved solids	$mg.l^{-1}$	<300	500	800	1000	>1000
UV oil	$mg.l^{-1}$	<0.01	<0.05	0.1	0.3	>0.3
Zn	$\mu g.l^{-1}$	<2	5	10	50	>50
Cu	$\mu g.l^{-1}$	<1	2	4	10	>10
Cr	$\mu g.l^{-1}$	<1	2	4	10	>10
Cd	$\mu g.l^{-1}$	<0.05	0.1	0.2	0.5	>0.5
Hg	$\mu g.l^{-1}$	<0.05	0.1	0.2	0.5	>0.5
Ni	$\mu g.l^{-1}$	<0.5	1	2	5	>5
Pb	$\mu g.l^{-1}$	<0.5	1	2	5	>5
As	$\mu g.l^{-1}$	<0.5	1	2	5	>5
Saprobe index of biosestone	-	<1.8	2.3	2.7	3.2	>3.2
Saprobe index of macrozoobenthos	-	<1.8	2.3	2.7	3.2	>3.2
Saprobe index of phytobenthos	-	<1.5	2.0	2.5	3.0	>3.0
Chlorophyll-a	$mg.m^{-3}$	<10	35	75	180	>180

The results of monitoring of surface water quality at selected sampling sites, as assessed by limits in **Table 2-2**, are shown at the end of this chapter**.**

2.1. General evaluation of the actual year

In the year 2014 a lot of rainfall, often very intensive, occurred in the German and Austrian Danube catchment area, which affected the flow rate regime on the Danube. Contrary to the previous year, the water levels and flow rates of the Danube in the first four month of 2014 were relatively stable. The flow rate for the first time exceeded 1800 $m^3.s^{-1}$ only at the end of April. From May to October 2014 several discharge waves were recorded, only some of which were more significant: in the second half of May, at the beginning of August, in September and the highest occurred atypically in late October. A common feature of discharge waves was their relatively short duration. In May two significant increases of flow rate occurred on the Danube. The first discharge wave peaked on May 17, 2014 at 5695 $m^3.s^{-1}$, the second culminated on May 29, 2014 at 4896 $m^3.s^{-1}$. In July, precipitations in the Danube catchment area occurred almost every day, but they were not particularly significant, thus flow rates were not so high. From among four increases of flow rates the most significant occurred at the end of the month, and it peaked at the beginning of August (culmination on August 1, 2014 at 5286 $m^3.s^{-1}$). In mid-August there was even one more moderate increase of flow rate (peaking about 3300 $m^3.s^{-1}$). Subsequently, the flow rate on the Danube had declining, and later balanced tendency till end of the month. In September, two more significant increases of flow rate were recorded again, at the beginning and in the middle of the month (peaking on September 2, 2014 at 4320 $m^3.s^{-1}$, and on September 15, 2014 at 3710 $m^3.s^{-1}$). Heavy precipitations throughout the Danube basin area in the second half of October evoked a sharp increase of flow rates and caused the highest discharge wave in the evaluated year (culmination on October 24, 2014 at 5931 $m^3.s^{-1}$). In the last two months the flow rate on the Danube has been decreasing slowly, during November there occurred two and in December one insignificant increase of flow rate. The average daily flow rate during the year ranged mostly below the long-term average daily flow rates (averages for the period 1990-2013). Flow rates above the long-term average values occurred only at a time of major discharge waves. (Flow rates refer to the gauging station Bratislava-Devín.)

The average daily air temperatures were most of the year above the long-term daily averages (averages for the period 1961-2013 at station Bratislava-airport). Values significantly above the long-term average occurred in January, from February to April, early June, in July and October. More significant cooling down, when the air temperature has dropped below the long-term normal, occurred in late January, in the first half of May and in the second half of August. Moderate cooling down, when the average daily temperature dropped to long-term averages, was recorded in the second half of June and at the end of September.

The lowest monthly amount of precipitation was recorded in January and March, when it does not exceed either 15 mm (12.3 mm in January and 13.1 mm in March). The highest monthly amounts occurred in the period from July to September, when they ranged above 118 mm with a maximum of 154.8 mm in September. In the other months of the year the monthly amounts of precipitation ranged between 34.3 mm (February) and 67.7 mm (May). (Rainfall data refer to the station Bratislava-airport).

2.2. Basic physical and chemical parameters

Water temperature

The course of measured water temperature values shows a seasonal character and the fluctuation of its values is similar, except sampling sites in seepage canals. The water temperature in the winter period is low and maximal values occur in the summer period. In 2014, the lowest values occurred in late January or early February. The lowest water temperature of 1.7 ° C was recorded in January at the common sampling site No. 3531/0084 in the right side seepage canal at Čunovo/Rajka by the Slovak Party. However, this relatively low temperature for seeping water was not confirmed by the measurements of the Hungarian Party, which at the same time measured 8.2°°C.

Development of water temperature during the year is closely related to climatic and hydrological conditions. Maximal temperatures were recorded during the hottest period of the year - in July, especially in its second half. An exception was the sampling site No. 309 in the lower part of the reservoir, where the highest annual temperature (24.3 °C) was recorded in the first half of June (**Fig. 2-3**). In connection with the warming in the first half of June, the water temperatures increased also on other sites in the reservoir, but not as significantly as at the site No. 309. The value of 24.3 °C represents the maximum temperature in the evaluated year. The water temperature in the main flow of the Danube and in the reservoir (except the maximum at site No. 309) fluctuated from 2.4 to 22.6 °C. In the Danube old riverbed and in the river branch system it ranged up to the value of 22.0 °C. The water temperature in the Mosoni Danube at the sampling site No. 1141 at Vének reached higher values as at the common sampling site No. 3529/0082 at Čunovo/Rajka (2.2-23.8 °C versus 1.9-20.6 °C). The most balanced water temperature was characteristic for water in the left-side seepage canal at Hamuliakovo (sampling site No. 317), where it fluctuated from 10,2 to 16.4 °C. The water temperature in the right-side seepage canal ranged in wider range, from 1,7 to 17.2 °C. Compared with the previous year, the water temperatures values at individual sampling points were lower or similar. Exceptions were the sampling points in the reservoir (No. 308 and 309), in the main flow at Komárno (No. 1205) and in the seepage canals (No. 3531/0084 at Čunovo/Rajka and No. 317 at Hamuliakovo), where higher maximal values of water temperature were registered in comparison with the previous year.

pH

The water quality indicator pH is closely related to the development of phytoplankton. Higher values occur in seasons corresponding to periods of increased assimilation activity of phytoplankton. The first increase of pH values was recorded already in March at several sampling sites, but the highest values were achieved in April in connection with the main wave of phytoplankton development. As a result of cooling down and decline in phytoplankton abundance, the pH values in late May significantly decreased and at most sampling sites fluctuated in a narrow range until the end of the year. Only at sampling sites in the reservoir another increase of pH values was registered in the first half of June and at sampling site No. 309 also in the second half of July (**Fig. 2-4**), which was associated with milder wave of phytoplankton development in these months. Overall, the pH values in 2014 varied in the range from 7.68 to 8.90. Highest values were recorded in the Danube old riverbed upstream and downstream of the submerged weir at Dunakiliti (sampling sites No. 0043 and 0042). The pH values in the main flow of the Danube ranged from 7.75 to 8.66 and in the reservoir from 7.80 to 8.61. High values were also observed in the right-side river branch system, where the pH value varied from in the range 7.71-8.79. The narrowest range was characteristic for the seepage canals. In the left-side seepage canal the pH fluctuated from 7.81 to 8.20 (sampling site No. 317 at Hamuliakovo), in the right-side seepage canal from 7.68 to 8.07 (sampling site No. 3531/0084 at Čunovo/Rajka). The differences in pH values measured at jointly monitored sampling sites were similar to the previous year. The highest pH value on the Slovak territory was 8.65 measured in April at the sampling site No. 4025 in the Danube old riverbed at Dobrohošť. Except the right-side side seepage canal, the pH varied in wider ranges than in 2013 and reached higher values. The development of pH values at selected sampling sites is shown in **Fig. 2-4**.

Specific electric conductivity

The specific electric conductivity of surface water refers to the content of dissolved salts of mineral origin. It has a seasonal character, which is in seepage canals less pronounced. Values are higher in winter months, lower values occurs during summer. The development of values at individual localities in the year 2014 was very similar, with a declining trend from March to May and at some sampling sites until August. Maximal values were recorded during January and February, minimums from May to August, depending on the sampling site. Since August the conductivity started to increase again The development of conductivity at sampling site No. 1141 in the Mosoni Danube at Vének differed from the other observed sampling sites. The highest values were recorded from October to December with the maximum in November. The conductivity values here varied from 31.4 to 72.5 $mS.m^{-1}$, and they were higher than in 2013 (39.0 to 53.5 $mS.m^{-1}$). On the other sampling sites it varied in the range from 27.7 to 52.8 $mS.m^{-1}$. The dissolved salts content in seepage canals is rather stable over the year. The electric conductivity values fluctuates in narrow ranges and in the evaluated year the lowest spread of values (41.8-48.6 $mS.m^{-1}$) was typical for water in the left-side seepage canal (sampling site No. 317 at Hamuliakovo). Except the sampling site in the Mosoni Danube at Vének, the specific electric conductivity compared to 2013 has slightly decreased or was similar. The Slovak Party again measured higher values of conductivity than the Hungarian Party. This fact is most visible at jointly monitored sampling sites (**Fig. 2-5**).

Suspended solids

The suspended solids content is closely related to the flow rate. It increases at flood/discharge waves and higher values are characteristic mainly for the summer period. In the evaluated year increased contents of suspended solids associated with higher flow rates on the Danube occurred in May, at the beginning of August and also in early September The highest discharge wave, which peaked in October, was not caught by sampling. The highest contents of suspended solids are the most frequently recorded in the Danube at sampling site No. 109 at Bratislava. In the year 2014 the maximal content at this sampling site was recorded in early September (483 $mg.l^{-1}$) and slightly lower in early August (394 $mg.l^{-1}$). At Medveďov there were registered much lower values, just in August higher value was recorded, when the Slovak Party measured 140 $mg.l^{-1}$ and the Hungarian Party 121 $mg.l^{-1}$. The highest content in the Danube old riverbed was recorded at common sampling site No 1203/0001 at Rajka. The Slovak Party measured 278 $mg.l^{-1}$ and the Hungarian Party 254 $mg.l^{-1}$. On the other sampling sites in the Danube old riverbed the suspended solids content on the right bank varied from 4 to-130 $mg.l^{-1}$ (higher concentrations were detected in May and September) and on the left bank only in a narrow range from 2.1 to 26.7 $mg.l^{-1}$, because samplings were done outside the occurrence of more significant discharge waves. The situation was similar also in the reservoir, where values ranged from <2 to 31.8 $mg.l^{-1}$. Higher contents of suspended solids were measured also in the Mosoni Danube: in May at Vének (sampling site No. 1141) 193 $mg.l^{-1}$ and in August on the common sampling site No. 3529/0082 at Čunovo/Rajka 210 $mg.l^{-1}$, or 175 $mg.l^{-1}$ according to Hungarian data. Higher concentrations in the right-side-river branch system occurred in May and early September, with the maximum of 144 $mg.l^{-1}$ in May at the sampling site No. 1112 - Helena river arm. The lowest contents are typical for the water-in seepage canals. The content in the evaluated year fluctuated in a similar range as in 2013, in the right-side seepage canal (sampling site No. 3531/0084) ranged from <2 to-15 mg.l^{-1}, in the left-side seepage canal (sampling site No. 317) all values were below 2.0 mg.l^{-1}. Compared with the previous year, the content of suspended solids in 2014 was mostly similar, but with higher highs. Exceptions were the sampling sites in reservoir, on the left side of the Danube old riverbed and in the tail-race canal, where contents were lower throughout the year. Samplings on these sampling sites were performed outside the occurrence of more significant discharge waves. The content of suspended solids measured downstream of reservoir (sampling site No. 112/2306 at Medveďov) during discharge waves was lower than in the Danube at Bratislava, what reflects the settling effect of the reservoir. Suspended solids content at selected sampling sites is shown in **Fig. 2-6**.

Iron

The amount of suspended solids influences the iron content in the surface water, therefore higher iron content occurs in samples taken during higher flow rates. On the sampling site No. 109 at Bratislava the iron was determined only in the first three months of the year, when flow rates were low and relatively balanced. The highest iron concentrations in the year 2014 1.46 mg.l^{-1} was recorded on the sampling site No. 2306 at Medveďov in early September. Higher concentration of 1.28 mg.l^{-1} was recorded also in May in the Mosoni Danube at Vének (sampling site No. 1141). On the other sampling sites the iron fluctuated up to 0.76 mg.l^{-1}. The iron content on the Slovak sampling sites in the Danube old riverbed, in the tail-race canal and on sampling sites in the reservoir was low in the evaluated year, maximally up to 0.40 mg.l^{-1} (samples were taken outside the occurrence of more significant discharge waves). The lowest iron concentrations are characteristic for the seepage water. In the evaluated year the iron content in the seepage canals varied in the range from <0.01 to 0.17 mg.l^{-1}. Overall, the iron contents on monitored sampling sites, compared with the previous year, were similar or lower.

Manganese

As in the case of iron also the manganese contents in the evaluated year were similar or lower than in 2013. During the year 2014 only five significantly higher manganese concentrations occurred at five sampling sites: on the sampling site No. 0002 in the Danube old riverbed at Dunaremete (0.33 mg.l^{-1}) in the second half of May, on the sampling site No. 0043 upstream of the submerged weir at Dunakiliti (0.20 mg.l^{-1}) in December and high concentrations occurred on all three sampling sites in the right*side river branch system in the second half of May, with the maximum of 0.33 mg.l^{-1} in the Ásványi river branch (sampling site No. 1126). Except the mentioned higher concentrations the manganese contents in the evaluated year varied up to 0.12 mg.l^{-1}. Similarly to the previous year the manganese content in the left-side seepage canal on sampling site No. 317 at Hamuliakovo fluctuated in a wider range (0.03-0.10 mg.l^{-1}) than in the right-side seepage canal on sampling site No. 0084 at Rajka (<0.02-0.06 mg.l^{-1}).

Basic physical and chemical parameters - summary

Basic physical and chemical parameters in the Danube and in the river branch system connected to the Danube main riverbed show seasonal variations and some of them predominantly depend on the flow rate. The fluctuation of basic physical and chemical parameters in the Mosoni Danube and in the seepage canals reflects the different characteristics of these water bodies. The water quality in the Mosoni Danube is influenced by the Danube water and on sampling site at Vének by its tributaries and wastewater from Győr. The water in the seepage canals is influenced mainly by the leaking groundwater. Typical for this water are fairly balanced time series data of quality indicators, which fluctuate only in narrow ranges.

The water temperature on monitored sampling sites during the evaluated was mostly similar or lower than in 2013. Only on five sampling sites (in the main flow at Komárno, in the reservoir and in the seepage canals) it reached higher maximums than in the previous year. Also the specific electric conductivity in the evaluated year was similar or lower. An exception was the sampling site in the Mosoni Danube at Vének, where the conductivity significantly increased, especially in the last three months of the year. The pH values fluctuated in wider ranges and except the right-side seepage canal were higher than in the previous year. The content of suspended solids, iron and manganese was affected by the actual hydrological regime. The suspended solids concentrations during the year were similar as in 2013, but the highs at some sites were higher. Decline of content has been documented at sampling sites observed by the Slovak Party (on the left bank of the Danube old riverbed, in the reservoir and in the tail-race canal), where samples were taken outside the occurrence of more significant discharge waves. Iron and manganese concentrations were similar or lower than in the previous year. Over the year, in the case of manganese significantly higher concentrations occurred during the discharge waves , on several sites, like in the year 2013.

2.3. Cations and Anions

The quantitative ratio ionic composition of the surface water in the evaluated year 2014 showed high stability, just as in previous years. The seasonal fluctuation of individual ions content followed the changes of conductivity. Changes of dissolved solids content are related to the flow rate fluctuation in the Danube. Compared to the long-term measurements the values of basic cations and anions have not changed. The development of cations and anions concentrations at particular sampling sites was similar. Higher content of salts is characteristic for the sampling site in the Mosoni Danube at Vének, because of its tributaries and cleaned wastewater from Győr. The average values of sodium, potassium, chlorides and sulphates at Vének exceeded the average values registered at the other sampling sites. The most stable ionic composition is characteristic for seepage water. Compared to 2013 the cations content in the evaluated year declined. An exception was the magnesium, which at most sampling sites reached higher concentrations. From among anions only the chloride content decreased. Sulphates and bicarbonates in the evaluated year fluctuated in wider ranges and achieved higher highs and only at sampling sites in the right-side river branch system their contents were lower than in 2013. Special developments of cations and anions was observed at the sampling site in the Mosoni Danube at Vének. Contents were higher than in the previous year and specific were mainly the last three months of the year, when significantly higher contents were recorded, what correlates with high values of conductivity in this period.

2.4. Nutrients

Ammonium ion

At sampling sites on the right bank of the Danube old riverbed, in the right-side river branch system and at sampling site in the Mosoni Danube at Vének (sampling sites observed by the Hungarian Party) higher contents of ammonium ion, in comparison with the previous year, were documented in the year 2014. The highest values were recorded at sampling site No. 0002 at Dunaremete (0.33 $mg.l^{-1}$) and at sampling site No. 1141 in the Mosoni Danube at Vének (0.31 $mg.l^{-1}$). Other concentrations varied in the range from 0,02 $mg.l^{-1}$ to 0,21 $mg.l^{-1}$. The maximal values at individual sampling sites occurred in May or July. At sampling sites in the main flow, on the left bank of the Danube old riverbed, in the left-side river branch system, in the reservoir , in the seepage canals and in the tail-race canal the ammonium ion concentrations were relatively balanced, without major fluctuations. Compared with the previous year they were similar or lower and fluctuated in the range from <0.02 to 0.11 $mg.l^{-1}$.

Nitrates

In the case of nitrates seasonal fluctuation of measured values is characteristic, which is less remarkable in seepage canals. Seasonal fluctuation is related to the growing season and the consumption of nutrients in the water. In the growing period the nutrient content usually falls to a half of the winter amount. The highest concentrations of nitrates in the evaluated year were recorded in January or in February. Subsequently the concentrations until May gradually declined. In May it rapidly cooled down and due to rich precipitations in the German and Austrian catchment area two more significant discharge waves occurred in the second half of the month. This resulted in an increase of nitrates content in samples taken in early June (**Fig. 2-7**). Other discharge waves on the Danube had not significant impact on development of nitrates. In late June, in July and August the lowest contents were recorded, from September the nitrates content began to rise again and in December it fluctuated between 8-10 $mg.l^{-1}$. Except sampling sites in the seepage canals and the sampling site in the Mosoni Danube at Vének the course of nitrates at individual sampling sites was similar and their concentrations varied from 3.5 mg.l-1 to 11.8 $mg.l^{-1}$. The nitrates content at Vének (sampling site No. 1141) was the highest, as in the previous year. Concentrations ranged mostly from 6.5 $mg.l^{-1}$ to 13.1 $mg.l^{-1}$ with one high value of 20.0 $mg.l^{-1}$ recorded in April (**Fig. 2-7**). The lowest nitrates content was characteristic for the seepage water, where the seasonality is not as pronounced. The content of nitrates in seepage canals varied from 2.8 to 7.4 $mg.l^{-1}$. Compared to the previous year, it can be concluded that nitrates concentrations in the evaluated year achieved lower minimal and maximal values. Only at the sampling site in the Mosoni Danube at Vének was the minimum and maximum higher (6.5 and 20.0 $mg.l^{-1}$) than in the previous year (5.6 and 18.9 $mg.l^{-1}$).

Nitrites

The nitrites content in the evaluated year was mostly lower than in the year 2013. An exception was the sampling site in the Mosoni Danube at Vének and the sampling site in the right-side seepage canal at Čunovo/Rajka. The nitrites content at Vének (sampling site No. 1141) varied from 0.034 to 0.109 $mg.l^{-1}$, with one high value of

0.272 mg.l^{-1} in May, which represented the highest concentration of nitrites measured in 2014. In the right-side seepage canal at Čunovo/Rajka (sampling site No. 3531/0084) the content ranged from 0.020 to 0.057 mg.l^{-1}, but in early September an increased value has been found: the Slovak Party recorded 0.115 mg.l^{-1} and the Hungarian Party measured slightly higher value of 0,127 mg.l^{-1}. The nitrites content at other sampling sites ranged from 0.013 to 0.081 mg.l^{-1}. In general, higher contents of nitrites occurred in colder months (January, February and December) and during the discharge of waves or after cooling down (in early June and early August) and in the right-side river branch system also in September.

Total nitrogen

The total nitrogen belongs to water quality parameters with significant seasonal fluctuation. Changes of total nitrogen in the water follow the seasonal changes of nitrates. In the year 2014 it was clear for sampling site in the main flow, on the left bank of the Danube old riverbed, in the reservoir and in the tail-race canal. The highest contents were reached in colder months (in early February and at some sampling sites also in early June, after cooling down in May), the lowest contents were recorded in summer months. Since August the contents of total nitrogen gradually increased and in December they varied between 2-3 mg.l^{-1}. The course of the total nitrogen concentrations at sampling sites on the right bank of the Danube old riverbed, in the right-side river branch system, and in the Mosoni Danube was volatile throughout the year. Higher concentrations here occurred in different months and seasonality was not so obvious. Like in the previous year, the highest concentration of 5.53 mg.l^{-1} was measured on the sampling site No. 1141 in the Mosoni Danube at Vének. However, the other concentrations at this sampling site fluctuated from 2.52 to 3.51 mg.l^{-1}. Except the seepage canals and the sampling site at Vének the content of the total nitrogen varied from <1 to 3.48 mg.l^{-1}. The highest concentrations measured by the Slovak Party were not as high as the concentrations measured by the Hungarian Party, what is most visible at jointly monitored sampling sites (**Fig. 2-8**). The highest value in 2014 recorded by the Slovak Party was 3.15 mg.l^{-1}, measured on the sampling site No. 308 in the upper part of the reservoir. The seasonal fluctuation in the seepage canals is less remarkable and regarding the origin of water the total nitrogen content is lower. In the left-side seepage canal (sampling site No. 317 at Hamuliakovo) the total nitrogen in the evaluated year fluctuated in a narrow range from <1.0 to 1.78 mg.l^{-1}. In the right-side seepage canal at Čunovo/Rajka (common sampling site No. 3531/0084) the differences in values determined by the Slovak and Hungarian Parties were higher than in the year 2013 (**Fig. 2-8**). The total nitrogen content fluctuated here from 0.88 to 2.80 mg.l^{-1}. Compared to the previous year, the total nitrogen contents decreased and lower minimal and maximal values were recorded, similarly to nitrates. An exception was again the sampling site in the Mosoni Danube at Vének, where higher concentrations were recorded than in 2013.

Phosphates

Higher concentrations of phosphates are characteristic for colder months and during high flow rates. Low values are typical for the vegetation period, when intensive growth of algae going on. There is an inversely proportional relationship between the phosphates content and the phytoplankton abundance. Low contents of phosphates in the evaluated year were recorded from late February to May. In these months the main wave of phytoplankton development was documented. Low values (mostly below the detection limit) in the Danube old riverbed and in the reservoir occurred also in June and on the sampling site No. 309 in the lower part of the reservoir even from March to the end of July (**Fig. 2-9**). At this sampling site the highest annual average of phytoplankton abundance on the Slovak territory was documented and the maximum was recorded at the end of July. The highest contents of phosphates occurred mostly in December samples, on the right bank of the Danube old riverbed and in the main flow at Bratislava at the end of October, and in the Mosoni Danube at Vének in May. At this sampling site the development of phosphates concentration in the evaluated year differed from other places of sampling. The maximal value of 4.50 $mg.l^{-1}$ in May was also the highest concentration in the evaluated year (**Fig. 2-9**). High concentrations were recorded also on the sampling site No. 109 at Bratislava, where the content of phosphates varied from 0.031 to 0.430 $mg.l^{-1}$. In December at jointly monitored sampling sites the Slovak Party measured higher concentrations of phosphates, but these were not confirmed by measurement of the Hungarian Party (in the Danube at Medveďov 0.337 $mg.l^{-1}$ – the Hungarian Party measured only 0.200 $mg.l^{-1}$, in the Mosoni Danube at Čunovo 0,307 $mg.l^{-1}$ – the Hungarian Party measured 0.200 $mg.l^{-1}$, in the right-side seepage canal at Čunovo 0.245 $mg.l^{-1}$ – the Hungarian Party measured 0.100 $mg.l^{-1}$). After excluding these concentrations the content of phosphates fluctuated from 0.031 to 0.210 $mg.l^{-1}$, and in the seepage canals up to 0.123 $mg.l^{-1}$. Compared with the previous year the contents of phosphates were similar, at some sampling sites with higher highs. Exceptions were two sampling sites (sampling site No. 109 in the Danube at Bratislava and sampling site No. 1141 in the Mosoni Danube at Vének), where the concentrations were higher than in 2013

Total phosphorus

Changes of the total phosphorus content in time only partially follow the quantitative changes of phosphates. The increase of its concentration in surface water is often caused by phosphorus bound to suspended solids. Therefore higher concentrations can occur in connection with discharge waves. Such concentrations in the evaluated year occurred at some sampling sites in May, at the beginning of August or in September. High concentration of 0.40 $mg.l^{-1}$ in the Danube main flow was recorded at sampling site No. 109 at Bratislava at the beginning of August. In the Danube old riverbed higher values occurred in May, August and September at the common sampling site No. 1203/0001 at Rajka, with a maximum of 0.27 $mg.l^{-1}$ (determined by the Slovak Party) or 0.24 $mg.l^{-1}$ (determined by the Hungarian Party) and in the right-side river branch system in May and September, with the maximum of 0.25 $mg.l^{-1}$ in May recorded on the sampling site No. 1112 (Helena river arm). The highest value in 2014 was recorded in the Mosoni Danube on sampling site No. 1141 at Vének, where 0.65 $mg.l^{-1}$ was measured in May. It was an unique value, because the other concentrations at this sampling site fluctuated from 0.10 $mg.l^{-1}$ to 0.20 $mg.l^{-1}$. Besides higher values associated with discharge waves the total phosphorus concentrations at other sampling sites ranged from 0.02 to 0.15 $mg.l^{-1}$. The lowest contents are typical for seepage canals (sampling sites No. 3531/0084 and 317), where the total phosphorus in the evaluated year fluctuated from 0.01 to 0.10 $mg.l^{-1}$. Compared with the year 2013 the total phosphorus contents were similar, but with higher peaks at individual sampling sites. The time course of total phosphorus concentrations in the year 2014 at selected sampling sites is shown in **Fig. 2-10**.

Nutrients - summary

Some nutrients show seasonal fluctuation. Higher concentrations are characteristic for colder months; decrease of values is recorded in the spring after warming. Seasonal fluctuation is related to the biochemical processes in the water, which are temperature dependent. Contents of phosphates and total phosphorus can increase at higher flow rates. Low values of phosphates are typical for the growing period, when intensive growth of algae going on and contents frequently decrease below the detection limit.

In the evaluated year the ammonium ion content has increased on the right bank of the Danube old riverbed, in the right-side river branch system and in the Mosoni Danube at Vének. On the other observed sampling sites concentrations declined. Contents of the other observed nutrients were lower or similar as in the previous year. Exception was the sampling site in the Mosoni Danube at Vének and in the case of phosphates the sampling site in the Danube at Bratislava, where higher concentrations were recorded than in 2013. In the case of phosphates and total phosphorus isolated higher values, associated with discharge waves, occurred at some sampling sites. Although several discharge waves occurred in the evaluated year, they were of short duration and mostly were not caught directly by sampling, therefore only a small number of high concentrations was recorded. Seasonality in the evaluated period was seen in the case of nitrates and total nitrogen. Their contents were lower, with lower lows and lower highs on the individual sampling sites.

The most polluted water in terms of concentration of nutrients appears to be the surface water in the Mosoni Danube at Vének, where higher concentrations of nutrients occur more frequently during the year and disrupt the seasonal fluctuation. Compared to the year 2013, concentrations of observed nutrients were higher at this sampling site. The lowest and the most balanced nutrient values can be found in the seepage water, what results from its groundwater origin. The seasonality here is not as strong as elsewhere.

The nutrient content in the Danube water is potentially sufficient for development of eutrophic processes under other suitable conditions.

2.5. Oxygen regime parameters

Dissolved oxygen

The dissolved oxygen content in the surface water is, besides the decay processes of organic pollution, affected by hydro-meteorological conditions and by assimilation activity of phytoplankton. The dissolved oxygen content proportionally decreases with increasing water temperature. Low values in the year 2014 were recorded from May to September, depending on the sampling site location and the lowest oxygen concentrations occurred mainly in July and August. The highest concentrations were recorded mostly in February or early March. Exceptions were the sampling sites on the right side of the Danube old riverbed and in the right-side river branch system (observed by the Hungarian Party), where the highest dissolved oxygen concentrations were recorded mainly in April. These maximums were probably related to the assimilation activity of phytoplankton, similarly as the increased values in April at sampling sites in the reservoir, on the left bank of the Danube old riverbed and in the left-side river branch system. The highest concentration of dissolved oxygen of 16.6 $mg.l^{-1}$ in the evaluated year was recorded in the Danube old riverbed at two sampling sites: in January on No. 0042 downstream of the weir at Dunakiliti and in April on No. 0002 at Dunaremete. In the Danube old riverbed on the right side and in the right-side river branch system the dissolved oxygen contents were more volatile during the year. Except April and January, higher values also occurred in late October and were probably related to the October discharge wave. At these sampling sites the oxygen content fluctuated from 8.6 to 16.6 mg.l^{-1}. Time series data of dissolved oxygen on sampling sites in the Danube main flow and on sampling sites observed by the Slovak Party in the Danube old riverbed, in the left-side river branch system, in the tail-race canal and in the reservoir were fairly balanced. The dissolved oxygen concentrations here did not decreased below 7 mg.l^{-1}, which is the limit for the I. quality class according to the **Table 2-2**, and the content fluctuated in the range from 7.8 to 14.5 mg.l^{-1}. In connection with the decrease of water temperature during the discharge waves in August and September, increased values were recorded at some sampling sites. In the Mosoni Danube on the common sampling site No. 3529/0082 at Čunovo/Rajka dissolved oxygen contents were higher (from 8.8 to 13.8 mg.l^{-1}) than on the sampling site No. 1141 at Vének (from 6.4 to 12.7 mg.l^{-1}). The narrowest range was characteristic for the left-side seepage canal, where the dissolved oxygen content fluctuated from 9.4 to 11.1 mg.l^{-1}. Except the sampling site at Vének, lower values than 7 mg.l^{-1} were found also in the right-side seepage canal at the common sampling site No. 3531/0084. The Slovak Party measured lower values in three occasions (in September, October and November), but only the value of 6.7 mg.l^{-1} in November was confirmed also by the Hungarian Party.

Generally it can be stated, that the oxygen conditions in the year 2014 were mostly good and similar as in the year 2013. Compared to the previous year, when low contents of oxygen were recorded in the right-side seepage canal in the period from June to October, also here improvement of oxygen conditions was observed.

COD_{Mn} and BOD_5

COD_{Mn} and BOD_5 parameters are used for expression of organic contamination of water, they indicate the chemically and biologically degradable organic matter content. Higher values of COD_{Mn} and BOD_5 usually occur in periods with higher flow rates in the Danube, when the water contains higher amount of natural organic matter. In the Mosoni Danube and in the right-side seepage canal the Slovak Party in 2014 did not observed the COD_{Mn} parameter.

In the evaluated year 2014 the values of COD_{Mn} were more volatile than in the previous year 2013, and there have been many higher values (e.g. in May 7.0 mg.l^{-1} in the Danube old riverbed on the sampling site No. 0042 downstream of the bottom weir at Dunakiliti, 7.4 mg.l^{-1} in the branch system on the sampling site No. 1112 at Helena, in August 8.1 mg.l^{-1} in the Danube on the sampling site No. 109 at Bratislava, in early November 7.2 mg.l^{-1} on the sampling site No. 1141 in the Mosoni Danube at Vének) - **Fig. 2-11**. The highest concentration of 13.0 mg.l^{-1} was recorded in May on the sampling site in the Mosoni Danube at Vének. Except the above values the COD_{Mn} varied from <0.8 to 6.5 mg.l^{-1}. Overall, the increased values occurred in connection with discharge waves in May, at the beginning of August, in September or at the end of October. The sampling in October was carried out after the culmination of the highest discharge wave in the evaluated year, therefore the recorded the COD_{Mn} values were not so high (**Fig. 2-11**). At sampling sites, that are observed only by the Slovak Party, the highest measured value was 3.8 mg.l^{-1}. Samples, however, were taken mostly at lower flow rates. The poorest water in terms of organic contamination was the water in seepage canals, where the COD_{Mn} values fluctuated in a narrow range, from <0.8 to 2.3 $mg.l^{-1}$ (sampling sites No. 317 and 0084). Compared to the previous year, several higher values were recorded, but at sampling sites in the Danube at Medveďov (No. 2306), in the Danube old riverbed at Rajka (No. 0001) and in the Mosoni Danube at Rajka (No. 0082) the maximal values were lower than the maxima in January 2013. In general it can be concluded that the contamination by organic matter expressed by COD_{Mn} was similar as in the previous year or slightly higher at sampling sites on the right bank of the Danube old riverbed and in the right-side river branch system.

In the case of BOD_5 water quality parameter, the biggest differences in values measured by the Hungarian and the Slovak Parties are characteristic in long-term, what is most visible at joint sampling sites (**Fig. 2-12**). Higher values are determined by the Hungarian Party. In 2014 the BOD_5 values determined by the Hungarian Party fluctuated from 0.2 to 9.3 $mg.l^{-1}$ (maximum on the sampling site No. 0002 in the Danube old riverbed at Dunaremete), while Slovak values ranged from <0.5 to 3.9 $mg.l^{-1}$ (maximum on the sampling site No. 112 in the Danube at Medveďov). The lowest values, similarly as in the case of COD_{Mn}, were characteristic for the left-side seepage canal at Hamuliakovo (sampling site No. 317), where they fluctuated in the range from <0.85 to 1.3 $mg.l^{-1}$. Increased values in the time course ware registered in March, April, July, August, October or December. High values occurred mainly on the left bank of the Danube old riverbed with the maximum of 9.3 $mg.l^{-1}$ and in the right-side river branch system with the maximum of 8.6 $mg.l^{-1}$. In the Mosoni Danube at Vének the BOD_5 fluctuated in similar range (from 1.3 to 6.7 $mg.l^{-1}$) as in the year 2013 (from 2.1 to 6.6 $mg.l^{-1}$). High values occurred also in the right-side seepage canal at the joint sampling site No. 3531/0084 (up to 8.6 $mg.l^{-1}$), but the maximum recorded by the Slovak Party was only 3.3 $mg.l^{-1}$ (**Fig. 3-12**). In comparison with the year 2013 the contamination by organic substances expressed by BOD_5 indicator slightly increased, with the exception of four sites where the contamination has decreased (the sampling site No. 109 in the Danube at Bratislava, sampling site No. 3529/0082 in the Mosoni Danube at Čunovo/Rajka and in the Danube old riverbed on the sampling site No. 0001 at Rajka and the sampling site No. 0042 downstream of the bottom weir at Dunakiliti).

<u>Oxygen regime and organic carbon parameters - summary</u>

Oxygen conditions in the year 2014 can be classified as very good. The dissolved oxygen content remained preserved at the level of previous years and, except the right-side seepage canal, only two concentrations lower than 7 $mg.l^{-1}$ (which is the limit value for I. quality class according to the **Table 2-2**) occurred in the Mosoni Danube at Vének.. Also in the right-side seepage canal the oxygen conditions has improved in comparison with the previous year (only one low value of the three was confirmed also by the Hungarian Party).

Contamination by organic matter expressed by COD_{Mn} was similar as in the year 2013, only at sampling sites on the right bank of the Danube old riverbed and in the right-side river branch system it has slightly increased. The COD_{Mn} values determined on sampling sites observed only by the Slovak Party were low, because samples were taken during periods with low flow rates. Contamination by organic substances expressed by BOD_5 indicator slightly increased on most of sampling sites, decline was registered only at four sampling sites. Also in the year 2014, there were significant differences in BOD_5 values registered at joint sampling sites between the Slovak and the Hungarian Party. Values obtained by the Hungarian side were higher.

The water in the left-side seepage canal remained the cleanest. The organic pollution in the right-side seepage canal expressed by COD_{Mn} was low, however in case of BOD_5 several high values, recorded by the Hungarian Party, occurred and in the summer period deterioration of oxygen conditions was registered. The oxygen conditions on sampling site in the Mosoni Danube at Vének were good and the organic pollution expressed by BOD_5 was lower than in the Danube old riverbed or in the right-side river branch system, but the COD_{Mn} values belonged to the highest in the evaluated year and were similar as in the previous year.

In general it can be stated that the organic pollution in long-term (1992-2014) indicates a slight downward tendency in the organic load expressed by the COD_{Mn} in the Bratislava section of the Danube. The organic load expressed by BOD_5 in the past five years has increased, what may be related to measures in the riverbed taken on the Austrian stretch of the Danube.

2.6. Heavy metals

From among heavy metals the joint monitoring includes observation of zinc, mercury, arsenic, copper, chromium, cadmium, nickel and lead contents. In 2014 the Slovak Party did not observed heavy metals on sampling site: No. 3376 in the left-side river branch system at Dobrohošť, on sampling site No. 3529 in the Mosoni Danube at Čunovo and on sampling site No. 3531 in the right-side seepage canal at Čunovo. Generally, the contents of heavy metals in the evaluated year were low. In the case of mercury, chromium, cadmium, lead, arsenic and zinc most of values ranged below the detection limits.

The highest <u>zinc</u> content of 52 $\mu g.l^{-1}$ in the evaluated year was recorded on the sampling site No. 109 in the Danube at Bratislava. Except this one value all other were lower than 20 $\mu g.l^{-1}$, what is the detection limit in case of analyses carried out by VÚVH. At sampling sites observed by two other organizations the measured values ranged from 1.1 to 14.2 $\mu g.l^{-1}$, similarly to the year 2013 (1.7-17.9 $\mu g.l^{-1}$). Many concentrations were lower than the detection limit values, so lower than 10 $\mu g.l^{-1}$ in case of Hungarian data and less than 1 $\mu g.l^{-1}$ in case of analyses carried out by SVP-BA.

In case of <u>mercury</u>, similarly to the year 2013, only one higher value of 0.28 $\mu g.l^{-1}$ was recorded by the Slovak Party on the common sampling site No. 112/2306 in the Danube at Medveďov. The Hungarian Party, however, at the same time determined a concentration below the detection limit <0.02 $\mu g.l^{-1}$. All other values were below the detection limit values, so lower than 0.05 $\mu g.l^{-1}$ in case of Slovak data or less than 0.02 $\mu g.l^{-1}$ in case of Hungarian data.

<u>Arsenic</u> concentrations ranged below 5.0 $\mu g.l^{-1}$, what is the detection limit value in case of analyses carried out by SVP-BA. At sampling sites observed by VÚVH or Hungarian Party the arsenic concentrations fluctuated in the range from <0.9 to 4.1 $\mu g.l^{-1}$. Measured values occurred only at some of sampling sites, with a frequency 1-2 times, only on the sampling site No. 1141 in the Mosoni Danube at Vének it was 5 times.

Similarly as in the case of mercury also in the case of chromium only one concentration (5 µg.l-1), higher than the detection limit, occurred on the sampling site No. 109 in the Danube at Bratislava. All other concentrations fluctuated below 2 µg.l-1 for analyses carried out by VÚVH, below 0.5 µg.l-1 for analyses carried out by SVP-BA, or below 1.7 µg.l-1 in case of Hungarian data.

Cadmium concentrations, except three values, were lower than 0.08 µg.l-1 on sampling sites observed by SVP-BA, and lower than 0.1 µg.l-1 in the case of other sampling sites. Three slightly higher concentrations (0.1 µg.l-1, 0.13 µg.l-1 and 0.15 µg.l-1) were measured by the Hungarian Party on three sampling sites (on the sampling site No. 1141 in the Mosoni Danube at Vének and on two sampling sites in the Danube old riverbed No. 0002 at Dunaremete and No. 0042 downstream of the weir at Dunakiliti).

Low concentrations in the evaluated year were characteristic also for lead. Also in this case only three concentrations exceeded the detection limits (1.0 µg.l-1 in the case of Slovak data, and 0.7 µg.l-1 in the case of Hungarian data). In the Mosoni Danube at Vének only slightly higher value of 0.9 µg.l-1, has been recorded. The two other were measured in the Danube, 13.0 µg.l-1 at Bratislava and 7.0 µg.l-1 on the common sampling site at Medveďov by the Slovak Party. The Hungarian Party at Medveďov, at the same time, determined a concentration below the detection limit <0.7 µg.l-1.

The highest frequency of concentrations above the detection limit is characteristic for copper. In the year 2014 the copper concentrations on the Hungarian territory varied from <0.5 to 8.7 µg.l-1. The highest value was recorded in April on sampling site No. 1126 in the Ásványi river arm. Copper concentrations recorded by the Slovak Party were mostly below the detection limit (2 µg.l-1 for analysis carried out by VÚVH, or 1 µg.l-1 for analysis carried out SVP-BA). Although there have been only five values higher than the detection limits, two of them were very high. On the sampling site No. 109 in the Danube at Bratislava in May and October concentrations of 151 µg.l-1 and 142.5 µg.l-1 were recorded, what represent the highest contents since the start of monitoring. Similarly to previous years there were significant differences in concentrations measured by the Hungarian and the Slovak Party on jointly observed sampling sites at the same dates.

The content of nickel in the surface water in the year 2014 was similar as in the previous year. It varied in the range from <0.7 to 8.1 µg.l-1 (in 2013 up to 7.1 µg.l-1). Maximum was measured in March on the sampling site No. 0002 in the Danube old riverbed at Dunaremete. Most values were below the detection limit and the Slovak Party recorded only two concentrations (1.2 and 2.9 µg.l-1) above the detection limit value on the sampling site No. 109 in the Danube in Bratislava.

In summary it can be concluded that heavy metal concentrations, which were determined from filtered samples, were low during the evaluated year, except two high concentrations of copper recorded on the sampling site in the Danube at Bratislava. Sporadic higher concentrations occurred also in the case of zinc, mercury, chromium. lead and nickel. A large part of the measured values was below the detection limits of applied analytical methods. Low concentrations were characteristic mainly for arsenic and cadmium. The highest frequency of concentrations above the detection limit was characteristic for nickel and especially for copper. Compared to the previous year, the concentrations of observed heavy metals were similar. A slight difference was in the occurrence of higher concentration of zinc, lead and high concentrations of copper.

Conversely, compared to 2013, higher concentrations in the case of arsenic and chromium have not been recorded.

The detection limits of particular heavy metals often correspond to the II., III. or IV. class of surface water quality according to the **Table 2-2**. The detection limits differ depending on the laboratory. The evaluation of heavy metals according to the agreed limits (**Table 2-2**) at selected sampling sites is given in **Table 2-8**.

Based on the comparison of heavy metal concentrations with the limits pursuant to the Directive of the European Parliament and of the Council No. 2008/105/EC on environmental quality standards, and limits according to the national standards (Hungarian standard MSZ No. 12749 „The quality of surface water, quality characteristics and evaluation" and „Regulation of the Government of the Slovak Republic No. 269/2010 Z.z., laying down the requirements for achieving good water status") it can be stated, that in the year 2014 concentrations of heavy metals were in compliance with environmental quality standards, except copper on the sampling site in the Danube at Bratislava, where the characteristic value calculated from data for 2014 did not meet the requirements for the quality of surface water.

2.7. Chlorophyll-a

Chlorophyll-a content refers to the amount of phytoplankton and provides information about the eutrophic status of water. The amount of chlorophyll-a is affected by the flow rate and temperature conditions of the evaluated year and by the fluctuation of nutrients content. In connection with different hydrological and climatic conditions, the development of chlorophyll-a in the evaluated year differed in comparison with the previous year. Chlorophyll-a contents in the year 2014 fluctuated in the range from 0.5 to 63.4 $mg.m^{-3}$. Higher contents of chlorophyll-a at some sampling sites have been recorded already in February, but maximal values were registered in April, when the main wave of phytoplankton development was documented. Contents of chlorophyll-a declined sharply in late May or early June, due to the cooling down and flow waves in May. A slight increase in chlorophyll-a content at some sampling sites was recorded in June and early July. The highest value in July was measured at the sampling site No. 309 in the lower part of the reservoir. At this single sampling site maximal abundance of phytoplankton was found in July. Since August, the chlorophyll-a contents were low until the end of the growing season. The highest value of 63.4 $mg.m^{-3}$ in 2014 was measured by the Slovak Party on the common sampling site No. 112/2306 at Medveďov, but this has not been confirmed by the Hungarian Party, which on this sampling site at the same time recorded only 14.2 $mg.m^{-3}$. The situation was similar also on the common sampling site No. 3529/0082 in the Mosoni Danube at Čunovo/Rajka, where the Slovak Party recorded the content of chlorophyll-a of 50.6 $mg.m^{-3}$ and the Hungarian Party only 20.1 $mg.m^{-3}$. The content of chlorophyll-a in the right-side river branch system (from <2 to 24.9 $mg.m^{-3}$) was lower than in the left-side river branch system (from <2 to 38.4 $mg.m^{-3}$). Values in the reservoir fluctuated from <2 to 55.2 $mg.m^{-3}$ and were higher than in the previous year. Similarly to the year 2013, the chlorophyll-a content on the sampling site No. 1141 in the Mosoni Danube at Vének belonged to the lowest, values varied from <2 to 5.9 $mg.m^{-3}$ (in the previous year from <2 to 13.0 $mg.m^{-3}$). Low contents are characteristic for seepage water. In the right-side seepage canal at

Čunovo/Rajka (common sampling site No. 3531/0084) they ranged from <2 to 10.7 mg.m^{-3} and in the left-side seepage canal at Hamuliakovo (No. 317) from <2 to 3.1 mg.m^{-3}. In general, the content of chlorophyll-a determined by the Slovak party was higher in the evaluated year than in 2013, while values recorded by the Hungarian Party were lower compared to the values of the previous year. An exception was the sampling site No. 0001 in the Danube old riverbed at Rajka, where increase of chlorophyll-a content was registered (it varied from <2 to 54.5 mg.m^{-3}). The development of chlorophyll-a at the selected sampling sites is shown in **Fig. 2-13**.

2.8. Other biological indicators

Evaluation of biological quality indicators in 2014 at jointly monitored sampling sites and on sampling sites monitored only by the Hungarian Party was carried out in accordance with the methodology agreed in the frame of the Transboundary Water Commission. On sampling sites monitored only by the Slovak Party evaluation used in the previous period was applied.

2.8.1. Biological indicators and evaluation of ecological status of surface water at jointly monitored sampling sites

Biological indicators in the year 2014 at jointly monitored sampling sites were evaluated within the ecological status of surface water and in accordance with the methodology agreed in the frame of the Transboundary Water Commission (in ”Assessment of water quality status of Slovak-Hungarian boundary flows in the year 2014”, May 2015 and the Hungarian National Annual Report in 2014). The overall ecological status of surface water is determined by biological quality elements, together with supporting hydromorphological, physico-chemical and chemical elements. The evaluation of ecological status in the year 2014 was focused on sampling sites, not water bodies. Hydromorphology was not a part of the joint monitoring, therefore it was not included in the evaluation. The ecological status was assessed at all sampling sites on the Slovak territory, despite the fact that some sampling sites are situated in water bodies designated as heavily modified. The basic principle of evaluation is the type specificity and the comparison of changes in environment quality with reference values, which reflect the environment status without or with minimal anthropogenic influence. From among the biological quality elements the benthic invertebrates (macrozoobenthos), phytobenthos, phytoplankton and macrophytes were evaluated.

The evaluation of monitoring results for particular biological elements was carried out according to the classification schemes, which include limit values for classification into the respective quality classes in the range I.-V. quality class, together with corresponding ecological status: I. class - high, II. - good, III. - moderate, IV. - poor, V. - bad. Limit values are determined by metrics (indexes), which reflect the response of aquatic organisms to disturbances (stressors) and also express the species diversity, abundance or the biomass and sensitive species. Metrics (indexes) were developed by the Slovak and Hungarian Party separately at national level. The Slovak Party assesses the macrozoobenthos according to the multimetric index that adequately responds to the degree of degradation of the environment and is type specific. The phytoplankton is evaluated according to the proportional representation of the four groups (*Cyanophyta*, *Chromophyta*, *Chlorophyta*, *Euglenophyta*) and according to the abundance and biomass. The assessment of phytobenthos is based on three indexes (CEE - the response of diatoms to overall pollution, EPI-D - detects the eutrophication processes in streams, IBD - biological diatoms index) and macrophytes on IBMR index - biological index (more details in Government Regulation No. 269/2010 Z.z. as amended by later regulations). The basis of the Hungarian evaluation of phytoplankton is the multimetric index HRPI (Hungarian River Phytoplankton Index) that characterizes the quantitative and qualitative conditions of phytoplankton. Macrozoobenthos is assessed on the basis of the national evaluation system HMMI (Hungarian Multimetric Macroinvertebrate Index) developed over the years 2010-2012. Evaluation of phytobenthos in the case of the Danube is carried out under the IPS index, or in the case of other flows under the IPSITI index (combination of three diatomaceous indexes: IPS - Integrated Pollution Index, SID - Saprobe Index, TID - Trophic Index). Macrophytes are evaluated on the basis of reference index (RI), which except the relative estimation of biomass of species takes into account the characteristics of the indicator (more details in the Hungarian National Annual Report in 2014).

Table 2-3: Evaluation of ecological status for biological quality elements at jointly monitored sampling sites

Sampling site	macro-zoobenthos		phyto-benthos		macro-phytes		phyto-plankton	
	SK	HU	SK	HU	SK	HU	SK	HU
Danube, Bratislava	III		II		x		II	I
Danube old riverbed, Rajka	II	II	II	II	x	x	II	II
Danube, Medveďov	III	II	III	II	x	x	II	I
seepage canal, Čunovo/Rajka	II	II	I	II	II	I	I	II
Mosoni Danube, Čunovo/Rajka	III	II	II	II		I	II	I

SK - Slovak results, HU - Hungarian results

In **Table 2-3** the evaluation of ecological status according to particular biological quality elements is given separately for each country. The final quality class of the water body is determined by the worst value of biological element (the rule of "worst case approach").

Surface water quality

- according to macrozoobenthos is classified into II. or III. quality class, what corresponds to good or moderate ecological status;
- according to phytobenthos it was set into the range from I. to III. quality class, what corresponds to high, good and moderate ecological status;
- according to macrophytes and phytoplankton it belongs to the I. quality class (high ecological status) or II. quality class (good ecological status).

Ecological status of individual sampling sites was determined as follows:

Danube at Bratislava - this sampling site according to the Slovak results was classified into moderate status (III. class).

Danube at Medveďov - according to the Slovak results it was classified into moderate status (III. class), but the Hungarian Party determined good ecological status (II. class).

Danube old riverbed at Rajka - results of both Parties classified this sampling site into good ecological status (II. class).

Right-side seepage canal at Čunovo/Rajka - according to the results of the Slovak and Hungarian Party it was classified into good status (II. class).

Mosoni Danube at Čunovo/Rajka - based on the Slovak results it was classified into moderate status (III. class), but the Hungarian Party determined good status (II. class).

To determine the overall ecological status also the supporting elements were included in the evaluation. The Slovak Party, except the biological quality elements, considered the physico-chemical quality elements and synthetic and non-synthetic substances relevant for Slovakia. The overall ecological status according to the obtained results corresponds to ecological status referred above. Good overall ecological status was achieved in the right-side seepage canal at Čunovo/Rajka and in the Danube old riverbed at Rajka. In the Danube at Bratislava and Medveďov and also in the Mosoni Danube at Čunovo/Rajka moderate overall ecological status was determined. The level of reliability of the ecological status assessment was high or medium.

The Hungarian Party, taking into account the physico-chemical quality elements and other specific substances (heavy metals), on all sampling sites determined good overall ecological status.

2.8.2. Biological indicators and evaluation of ecological status of surface water at sampling sites monitored only by the Hungarian Party

From among the biological quality elements the Hungarian Party in 2014, except the jointly monitored sampling sites, observed the macroinvertebrates, phytobenthos and phytoplankton on another seven sampling sites in the Danube old riverbed, in the right-side river branch system and in the Mosoni Danube. An overview of evaluation results of biological quality elements is presented in **Table 2-4**. For the classification of biological quality elements, limit values corresponding to the typological classification No. 23 (Danube, upper Hungarian section) have been used for the Danube and the river branch system. In the case of the Mosoni Danube, limit values corresponding to the typological classification No. 14 (SV-Me-D-nn) should be used. However, the evaluation of samples taken in the Mosoni Danube at Vének was carried out according to the type No. 23, since evaluation by the type No. 14 can not be considered relevant.

Table 2-4: Evaluation of ecological status for biological quality elements at sampling sites on the Hungarian territory

Sampling site	macro-zoobenthos	phyto-benthos	phyto-plankton
Danube old riverbed, Dunakiliti, upstream of the submerged weir - 0043	II	II	I
Danube old riverbed, Dunakiliti, downstream of the submerged weir - 0042	II	II	I
Danube old riverbed, Dunaremete - 0002	II	III	I
river branch system, Helena - 1112	II	II	I
river branch system, Szigeti river arm - 1114	II	III	I
river branch system, Ásványi river arm - 1126	II	II	I
Mosoni Danube, Vének - 1141	III	II	I

Based on the results obtained from the monitoring of biological quality elements it can be stated that according to the phytoplankton high ecological status (I. class) was determined on all seven sampling sites. On the dates of sampling, when the amount of chlorophyll-a was lower than the limit value for the I. quality class (<15 μg.l^{-1}), a detailed analysis of phytoplankton was not carried out, therefore chlorophyll-a EQR values were took into account at the phytoplankton assessment (more details in the Hungarian National Annual Report in 2014).

According to phytobenthos, moderate ecological status (III. quality class) was achieved on two sampling sites (in the Danube old riverbed and in the river branch system - Szigeti river arm). On other sampling sites good ecological status was achieved (II. quality class).

Based on macrozoobenthos good ecological status (II. quality class) was determined in the Danube old riverbed and in the right-side river branch system. Only in the Mosoni Danube at Vének moderate ecological status (III. quality class) was achieved.

Concerning the overall ecological status, when except the biological quality elements also the supporting elements (physico-chemical quality elements and other specific substances) were included in the evaluation, following results were achieved (Hungarian National Annual Report in 2014). On four sampling sites (in the Danube old riverbed upstream and downstream of the weir at Dunakiliti and in the right-side river branch system - Helena and Ásványi river arms) good overall ecological status was determined. On three sampling sites (in the Danube old riverbed at Dunaremete, in the right-side river branch system - Szigeti river arm and in the Mosoni Danube at Vének) moderate overall ecological status was achieved.

2.8.3. Biological indicators at sampling sites monitored only by the Slovak Party

The monitoring and evaluation of biological quality elements was carried out according to the methodology applied in previous years.

Phytoplankton

In the period between March and October 2014 six phytoplankton samples were taken in seepage canals and twelve samples on other sampling sites (**Table 2-5**). Suitable conditions for phytoplankton development occurred already in March and the main wave of development in the evaluated year was registered in the spring months. The highest values of phytoplankton abundance were achieved mainly in April, on two sampling points in March (No. 112, 317), and on two in June (No. 109, 307). The summer, less significant wave of phytoplankton development was recorded in the warmest time of the year - in the second half of July, when significant increase of abundance occurred on three sampling sites (No. 307, 3741 and 309). On the sampling site No. 309 in the lower part of the reservoir the abundance of 13112 individuals.ml^{-1} in July represented the maximum for this sampling site in the evaluated year. Annual minima on most sampling sites were recorded at the end of August. In September and October a slight phytoplankton development was observed, when the abundance only slightly exceeded the value of 1000 individuals.ml^{-1} on two sampling sites in the reservoir.

The phytoplankton abundance in the evaluated year ranged from 32 to 18900 individuals.ml^{-1}, while the lowest value was determined on the sampling site No. 3530 in the tail-race canal at Sap and the highest occurred on the sampling site No. 3739 in the Danube old riverbed at Sap. Compared to the previous year 2013, the phytoplankton abundance achieved higher maxima on seven sampling sites. The limit for mass development of phytoplankton was exceeded on six sampling sites (No. 109, 308, 309, 3529, 3739 and 3531), while in the year 2013 it was on four sites (No. 109, 308, 309 and 3529).

The annual average of phytoplankton abundance was on seven sampling sites higher than in the previous year, while a significant increase was documented on three sampling sites. The highest value of annual average of phytoplankton abundance (4596 individuals.ml^{-1}) was determined on the sampling site No. 309 in the lower part of the reservoir at Šamorín, like in the year 2013.

Similarly to the previous period, the largest portion in the phytoplankton composition in the evaluated year, except the left-side seepage canal, had the centric diatoms (*Bacillariophyceae - Centrales*). In the left-side seepage canal, on the sampling site No. 317 at Hamuliakovo, the pennate diatoms (*Bacillariophyceae - Pennales*) had the largest portion in the phytoplankton composition. Unlike the previous years, significantly increased the share of cyclical diatoms and significant representation on this site in the evaluated year had a filamentous green algae (*Ulotrichales*).

The phytoplankton composition significantly determines the saprobe index of biosestone. The saprobe index in 2014 varied from 1.46 to 2.53 (**Table 2-5**). It fluctuated mostly in the range, which corresponds to β-mesosaprobity. Such an environment provides suitable living conditions for a wide scale of organisms with high species diversity. At five sampling sites in April, values slightly exceeding the lower limit for α-mesosaprobity were recorded. The average values of saprobe indexes on most of observed sampling sites increased, at two sampling sites they did not changed significantly. Improvement was recorded in the seepage canals, where the value of average saprobe index of biosestone slightly declined. The level of saprobity has not changed.

Table 2-5: Values of saprobe index of biosestone in 2014

Sampling site	Min	Max	Yearly average		Saprobity level
			2014	2013	
Danube, Bratislava - 109	1.71	2.35	**2.16**	***2.07***	β -mesosaprobity
Danube, Medveďov - 112	1.97	2.38	**2.15**	***2.12***	β -mesosaprobity
Danube, Komárno - 1205	2.00	2.39	**2.21**	***2.04***	β -mesosaprobity
Danube, bottom weir - 4016	1.81	2.50	**2.20**	***2.14***	β -mesosaprobity
Danube, Dobrohošť - 4025	1.74	2.53	**2.15**	***2.13***	β -mesosaprobity
Danube, Sap - 3739	1.88	2.51	**2.15**	***1.98***	β -mesosaprobity
Mosoni Danube, Čunovo - 3529	1.84	2.52	**2.15**	***2.16***	β -mesosaprobity
reservoir - Kalinkovo - 307	1.92	2.27	**2.13**	***2.10***	β -mesosaprobity
reservoir - Kalinkovo - 308	2.04	2.48	**2.17**	***2.12***	β -mesosaprobity
reservoir - Šamorín - 309	1.71	2.37	**2.17**	***2.10***	β -mesosaprobity
reservoir - Šamorín - 311	1.82	2.35	**2.20**	***2.09***	β -mesosaprobity
tailrace canal, Sap - 3530	1.84	2.53	**2,17**	***2.14***	β -mesosaprobity
river branch system - 3376	1.92	2.51	**2.18**	***2.09***	β -mesosaprobity
right-side seepage canal - 3531	1.87	2.46	**2.17**	***2.20***	β -mesosaprobity
left-side seepage canal - 317	1.46	2.18	**1.86**	***1.91***	β -mesosaprobity

Concerning the abundance of phytoplankton, as a key determinant of saprobe index, it can be stated that the hydropower system even in 2014 have not had negative impact on saprobity level.

Macrozoobenthos

From an ecological point of view, the monitoring of macroinvertebrates in flowing water bodies appears to be the most appropriate method for bioindication. Samples are relatively easy to access and quickly processable. In the year 2014, the macroinvertebrate samples were collected in May, July and September on monitoring sites listed in **Table 2-6**. Samples were not taken on sampling sites in the Danube at Medveďov and in the Danube old riverbed at Sap in May, and in the Danube at Bratislava in July due to longer lasting unfavourable conditions for sampling. In sections with fast flowing water with gravely or stony bottom (sampling sites No. 109 at Bratislava, No. 112 at Medveďov in the Danube and No. 4025 in the Danube old riverbed at Dobrohošť) rheophillic and oxybiontic macroinvertebrate species prevail, indicating β-mesosaprobity. At these sampling sites the following species dominated in 2014: *Dikerogammarus villosus*, *Dikerogammarus bispinosus*, *Echinogammarus ischnus*, *Limnomysis benedeni*, *Jaera istri*, *Theodoxus danubialis*, *Hydroptila sp.* and some representatives of the family *Chironomidae*. In sections with slow flowing water stagnophillic and oligooxybiontic species appear, which bear slight pollution. On these sections sandy or muddy bottom occurs – sampling sites in the Danube old riverbed No. 4016 upstream of the submerged weir and No. 3739 at Sap, where *Lumbriculidae g. sp. div.*, *Lumbricidae g. sp. div.*, *Naididae g. sp. div.* and *Chironomidae g. sp. div.* dominated in the evaluated year, furthermore species such as *Lithoglyphus naticoides*, *Potamopyrgus antipodarum*, *Limnomysis benedeni*, *Corbicula fluminea* and *Valvata piscinalis* occurred.

In the reservoir there are places with different flow velocities. Depending on the flow velocity there are different types of bottom substrates. Sandy and gravely substrate (sampling sites No. 307 and 308) at places with slow flow velocity gradually changes into muddy substrate (sampling sites No. 309 and 311). Dominant macrozoobenthos species in the reservoir in 2014 on muddy substrate were *Chironomidus sk. plumosus*, *Lumbriculidae g. sp. div.*, *Plumatella repens*, *Corophium curvispinum*, *Hypania invalida.* and *Corbicula fluminea*. On mostly gravely and sandy substrate (sampling sites No. 307 and 308) *Lumbriculidae g. sp. div.*, *Corophium curvispinum*, *Corbicula fluminea* dominated, and on the sampling site No. 307 also *Hypania invalida*, *Potamopyrgus antipodarum* and *Chironomidus sk. plumosus*. On the sampling site No. 308 the greatest diversity of dominant species was observed. In addition to the above, dominant presence had here also *Obesogammarus obesus*, *Valvata piscinalis*, *Limnomysis benedeni*, *Katamysis warpachowskyi*, *Theodoxus fluviatilis*, *Radix peregra*, *Radix ovata* and representatives of *Chironomidae g. sp. div.*. In the river branch system representatives of *Lumbriculidae g. sp. div.*, *Lumbricidae g. sp. div.*, *Chironomidae g. sp. div.* dominated in the evaluated year, together with species *Dikerogammarus villosus*, *Theodoxus danubialis*, *Theodoxus fluviatilis*, *Valvata piscinalis*, *Radix peregra* and *Limnomysis benedeni*.

Based on the determined species the saprobe indexes of macrozoobenthos were calculated, which varied in the range from 2.00 to 2.68. On most sampling sites values corresponded to β-mesosaprobity (**Table 2-6**). Exceptions were two sampling sites in the lower part of the reservoir, where values exceeding the limit value of 2.50 were found and corresponded to α-mesosaprobity. Also the average value of saprobe index of macrozoobenthos in the lower part of the reservoir on the sampling site No. 311 (2.55) corresponded to α-mesosaprobity (**Table 2-6**), in contrast to 2013, when the highest value of saprobe index of macrozoobenthos was 2.46, and the highest average value was 2.37 (on the sampling site No. 3739).

Table 2-6: Values of saprobe index of macrozoobenthos in 2014

Sampling site	Saprobe index				Saprobity
	V.	*VII.*	*IX.*	*Average*	
Danube, Bratislava - 109-left	2.25	-	2.05	**2.15**	β -mesosaprobity
Danube, Bratislava - 109-right	2.18	-	2.15	**2.17**	β -mesosaprobity
Danube, Medveďov - 112-left	-	2.21	2.20	**2.21**	β -mesosaprobity
Danube, bottom weir - 4016	2.17	2.07	2.08	**2.11**	β -mesosaprobity
Danube, Dobrohošť - 4025	2.32	2.27	2.09	**2.23**	β -mesosaprobity
Danube, Sap - 3739	-	2.39	2.35	**2.37**	β -mesosaprobity
Mosoni Danube, Čunovo - 3528	2.00	2.09	2.07	**2.05**	β -mesosaprobity
river branch system - 3376	2.07	2.01	2.03	**2.04**	β -mesosaprobity
reservoir, Kalinkovo - 307	2.39	2.42	2.41	**2.41**	β -mesosaprobity
reservoir, Kalinkovo - 308	2.09	2.18	2.00	**2.09**	β -mesosaprobity
reservoir, Šamorín - 309	2.33	2.33	2.56	**2.41**	β -mesosaprobity
reservoir, Šamorín - 311	2.68	2.50	2.46	**2.55**	α-mesosaprobity

Note: left - left bank; right - right bank

Other aspects of the development of macrozoobenthos communities are evaluated in Part 7 – Biological monitoring, where more detailed evaluation for cladocerans (*Cladocera*), copepods (*Copepoda*), molluscs (*Mollusca*), dragonflies (*Odonata*), mayflies (*Ephemeroptera*) and caddisflies (*Trichoptera*) can be found.

Phytobenthos

Phytobenthos represents communities of algae and heterotrophic microorganisms attached on submerged substrates in all aquatic ecosystems. Indicates short-term changes in water quality. Saprobe index of phytobenthos correlates with the through-flowing water quality, especially with organic pollution. Saprobe index of phytobenthos in the evaluated year was monitored in the Danube (sampling sites No. 109 at Bratislava, left and right bank, No. 112 at Medveďov), in the Mosoni Danube at Čunovo (No. 3529) and in the river branch system at Dobrohošť (No. 3376). At Bratislava and Medveďov only two samplings were carried out due to longer lasting unfavourable conditions for sampling. At monitoring sites mainly algal phytobenthos component, especially benthic diatoms have been studied.

The value of saprobe index of phytobenthos at monitored sampling sites ranged from 1.62 to 2.09. The average values varied from 1.74 to 1.99. Compared to 2013, there was slight worsening of the annual average can be stated at all sampling sites. The most significant deterioration was documented in Bratislava on the right bank, whereas the annual average increased from 1.82 to 1.97 (**Table 2-7**). The average values of saprobe indexes varied within the β-mesosaprobity on all monitored sampling sites.

In terms of species diversity, the dominant part of phytobenthos in the evaluated year was formed by pennate and centric diatoms (*Bacillariophyceae - Pennales, Centrales*) - 37 taxa. Other groups were represented by fewer number of taxa. The dominant species at monitored sites were *Melosira varians*, *Diatoma vulgaris*, *Navicula avenacea*, *Navicula sp.*, *Roicosphenia abbreviata*, *Cymbella tumida* and *Nitzschia sp.* from the group of diatoms, *Phormidium autumnale* from cyanophyta, and *Cladophora glomerata* from filamentous green algae group (*Chlorophyta*).

Table 2-7: Values of saprobe index of phytobenthos in 2013

Sampling site	May	July	September	Yearly average	
				2014	2013
Danube, Bratislava - 109-left	2.09	-	1.85	**1.97**	***1.82***
Danube, Bratislava - 109-right	2.07	-	1.90	**1.99**	***1.90***
Danube, Medveďov - 112-left	-	1.62	1.86	**1.74**	***1.65***
Mosoni Danube, Čunovo - 3528	1.75	1.65	1.96	**1.79**	***1.74***
river branch system - 3376	1.76	1.69	2.04	**1.83**	***1.76***

Note: left - left bank; right - right bank

2.9. Quality of sediments

In the evaluated year 2014, similarly to previous years, the Slovak and Hungarian Parties have realized unified evaluation of sediment quality according to the „Canadian Sediment Quality Guideline for Protection of Aquatic Life" (CSQG) published in 1999, revised in 2002.

The sediment sampling in the frame of the Joint Monitoring by the Slovak Party was performed in October 2014 at six sampling sites. The Hungarian Party sampled the sediments in April and the autumn sampling has been performed in September or October 2014 at seven sampling sites. The situation of sampling sites is shown in **Fig. 2-2**. The list of analysed parameters was the same as in the year 2013. In addition to inorganic and organic microelements the Hungarian Party has analysed also the contents total phosphorus and total nitrogen.

Overall, the inorganic pollution of sediments on the Slovak territory slightly increased in comparison with the previous year. Concentrations lower than the threshold effect level (TEL, or ISQG) occurred only in the case of lead on all six monitored sampling sites. At such concentrations the adverse effect on biological life occurs rarely, and they correspond to uncontaminated natural environment. The threshold effect level was slightly exceeded in the case of mercury on two sampling sites in the reservoir and in the case of zinc on five sampling sites. Contents of chromium, copper, arsenic and cadmium were higher than the limit values for threshold effect level on all six monitored sampling sites. Concentrations of heavy metals in the range >TEL and <PEL (Probable Effect Level) were closer to the lower TEL limit, thus exceeding of the threshold effect level was only slight. The only one higher concentration of arsenic, exceeding the middle of the given range (TEL = 5.9 $mg.kg^{-1}$, PEL = 17.0 $mg.kg^{-1}$), was recorded on the sampling site No. 4016 in the Danube old riverbed and reached 12.8 $mg.kg^{-1}$. Concentrations from the range >TEL and <PEL represent the level, when the adverse effects on biological life can be observed occasionally, in more than 25 % of cases, and represent a potential eco-toxicological effect.

In sediment samples collected on the Hungarian territory smaller number of concentrations above the threshold values for heavy metals occurred. The lowest contents (lower than TEL) in the spring and autumn were documented in the case of copper, cadmium and lead. Unlike the previous year, the highest number of TEL exceedances and the highest concentrations were recorded in the case of mercury (in 2013 it was in the case of zinc). The mercury content exceeded the level of the threshold concentration (TEL) on all sampling sites both, in the spring and also in autumn. The mercury content in April on the sampling site No. 1141 in the Mosoni Danube at Vének just exceeded also the probable effect level (PEL ´486 $\mu g.kg^{-1}$). Concentrations exceeding the probable effect level (PEL), represent the level, when the adverse effect on biological life occurs frequently, in more than 50 % of cases.

Organic pollution of sediments was low in 2014. Only on one sampling site in the river branch system (No. 1141 - Szigeti river arm) exceeding of the threshold effect level was recorded in the spring sampling in the case of five organic compounds (pyrene, fluoranthene, benzo(a)anthracene, dibenzo(a,h)anthracene and benzo(a)pyrene). On the Slovak territory slight exceedances of TEL limit value occurred in the case of heptachlorine and fluoranthene on one sampling site, in the case of chrysene on four, and in the case of benzo(a)pyrene on all six sampling sites. Other concentrations of monitored organic micropollutants were lower than the threshold effect level and corresponded to an uncontaminated environment, when the adverse effect on biological life is not expected.

The highest concentrations of organic micro-pollution were registered by the Slovak Party on the sampling site No. 307 in the upper part of the reservoir, and the highest concentrations of heavy metals on the sampling site No. 309 in the lower part of the reservoir at Šamorín. On the Hungarian territory the highest inorganic pollution of sediments was on the sampling site No. 1141 in the Mosoni Danube at Vének and the highest concentrations of organic substances were detected on the sampling site No. 1114 in the Szigeti river arm in the spring and on the sampling site No. 1112 in the Helena river arm in the autumn. The lowest sediment contamination in 2014 was documented on the sampling site No. 3739 in the Danube old riverbed at Sap on Slovak territory and on the sampling site No. 0084 in the right-side seepage canal at Rajka on Hungarian territory.

The Hungarian Party also analysed the total phosphorus and total nitrogen content in sediments. Total phosphorus content in 2014 varied in the range from 315 to 1321 $mg.kg^{-1}$ and the concentrations of total nitrogen varied in the range from 198 to 1636 $mg.kg^{-1}$. The lowest content of total phosphorus and total nitrogen as well was recorded on the sampling site No. 0042 in the Danube old riverbed downstream of the submerged weir at Dunakiliti in the spring sample. Maxima were detected in the autumn, in the case of total phosphorus on the sampling site No. 1141 in the Mosoni Danube at Vének and the highest content of total nitrogen was in the river branch system on the sampling site No. 1126 in the Ásványi river arm. Compared to the year 2013, the contents of total phosphorus were higher on most sampling sites. Decline was documented in the spring on three sampling sites (in the Danube old riverbed upstream and downstream of the submerged weir at Dunakiliti - No. 0043 and 0042 and in the Mosoni Danube at Vének - No. 1141), and in the autumn on two sampling sites (in the river branch system No. 1112 in the Helena river arm and No. 1126 in the Ásványi river arm). Total nitrogen contents were mostly lower, slightly increased only in the autumn on two sampling sites (No. 0043 and 0042 - upstream and downstream of the submerged weir at Dunakiliti).

Overall, the sediment pollution in the evaluated year on the Slovak territory was similar or slightly higher than in 2013. More significantly increased the contents of lead, the contents of copper increased slightly, while in the case of copper on three sampling sites maximum was achieved since the start of sediment monitoring. On the Hungarian territory decrease of zinc contents was registered, and in either case did not exceeded the PEL level (in the year 2013 it was four times). Contents of mercury on several locations increased, but only in one case the measured value just exceeded the probable effect level according to the Canadian standard. The organic pollution slightly increased mainly in the river branch system.

2.10. Indicative assessment of surface water quality parameters according to agreed surface water quality classification limit values

In **Table 2-8** an indicative classification of selected sampling sites and selected surface water quality parameters was done.

Table 2-8: Indicative assessment of surface water quality parameters according to agreed surface water quality classification limit values

Parameter	Sites situated on the Danube			Mosoni Danube		Seepage canal	Right-side river branch system
	Bratislava	Rajka	Medveďov	Čunovo/ Rajka	Vének	Čunovo/ Rajka	Helena, Szigeti, and Ásványi river arm
temperature	I	I (II)		I (II)	I (II)	I	I (II)
pH	II-I (III)			II-I (III)	II-I	I (II)	II (I, III)
conductivity	II-I	I-II		I-II	I-III	II-I	I-II
suspended solids	I-V	I-II (III,IV,V)	I (II,III,IV,V)	I-II (III, IV, V)	I-III (IV, V)	I (II)	I-II (III, IV, V)
Cl^-	I			I		I	I
SO_4^{2-}	I			I		I	I
NO_3^-	II (I)			II (I)	II (III)	I-II	II (I)
NH_4^+	I			I	I (II)	I	I
NO_2^-	I-II	II-I		II-I	II (III)	II-I	II-I
total nitrogen	II-I	II (I)		II (I)	II (III)	II-I	II-I
PO_4^{3-}	I-II (III)	I-II	I-II (III)	I-II	I-III (I)	I (II)	I-II
total phosphorus	I-II (III)	I-II	I-II (III)	I-II (III)	II (III, IV)	I	I-II (III)
O_2	I			I	I (II)	I-II	I
COD_{Mn}	I (II)		I	I (II)	I-II (III)	I	I (II)
BOD_5	I (II)	I-III		I-III	I-III	I-II (III)	I-III
chlorophyll-a	I (III)	I (II, III)		I (II, III)	I)	I (II)	I (II)
Fe	-	I (II	I (III)	I (II)	I (II, III)	I	I-II
Mn	-	I (II	I	I	I-II (III)	I (II)	I (III, IV)
Zn	IV** (V)	III*-IV*		III* (IV)	III*	III*	III* (IV)
Hg	I*		I* (IV)	I*		I*	I*
As	II* (III)	II* (III,IV)	II* (III)	II* (III)	II** (III,IV)	II* (III)	II* (III)
Cu	II*, V	I-III (IV)	I-III	II-III	II-III (IV)	I-II (III,IV)	I-III (IV)
Cr	II* (IV)	II*		II*	II*	II*	II*
Cd	II*			II*	II**	II**	II*
Ni	II* (IV)	II**		II* (III)	II** (III)	II**	II** (IV)
Pb	II* (V)	II*	II* (V)	II*	II**	II*	II*

* all the data below the detection limit

** most of the data below the detection limit

The indicative classification was performed using the limit values for five-classes system, according to the trans-boundary water quality classification adopted by the Slovak-Hungarian Trans-boundary Water Commission at its LXV. session, and mentioned in the „Directive for surface water quality monitoring of the Slovak-Hungarian boundary waters and for extended water quality monitoring on the Danube".

Certain part of the observed parameters shows seasonal fluctuation, which subsequently affects the classification into the quality classes. In the case that a range is given (e.g. I-II), this means natural seasonal fluctuation of particular parameters or their dependence on climatic conditions. The quality class in brackets means that measured value occurred only once or two times in the evaluated period (mostly during higher discharges or flood waves). The range with asterisks (e.g. I*-II*) represents a situation, when every recorded value was below the detection limit of applied analytical method, but the two Parties have different detection limits.

Based on a comparison of water quality entering the influenced area (sampling site at Bratislava) and water quality, which leaves the influenced area (sampling site at Medveďov) it is evident, that the water quality that leaves the system is very similar.

Fig. 2-1

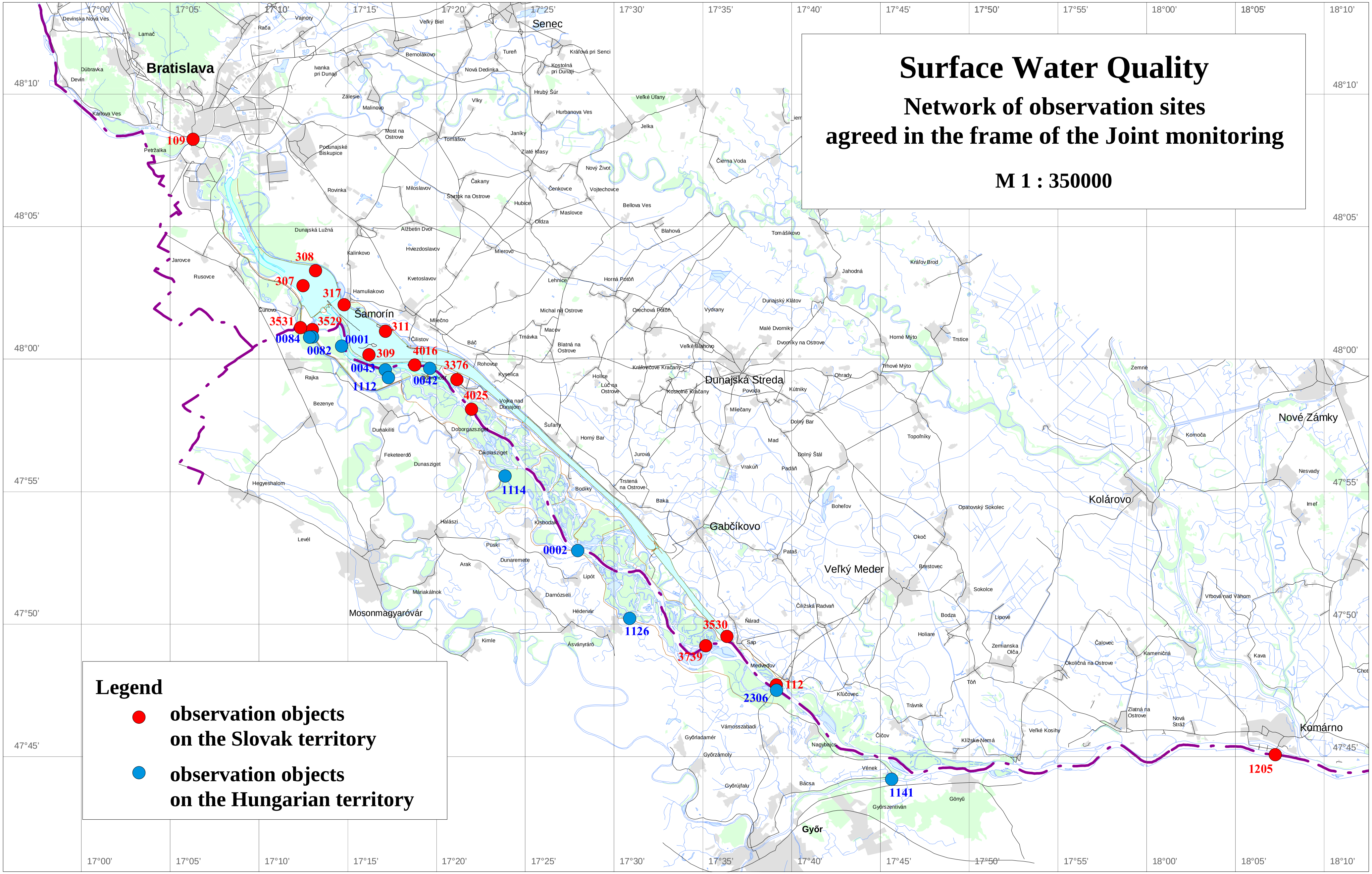
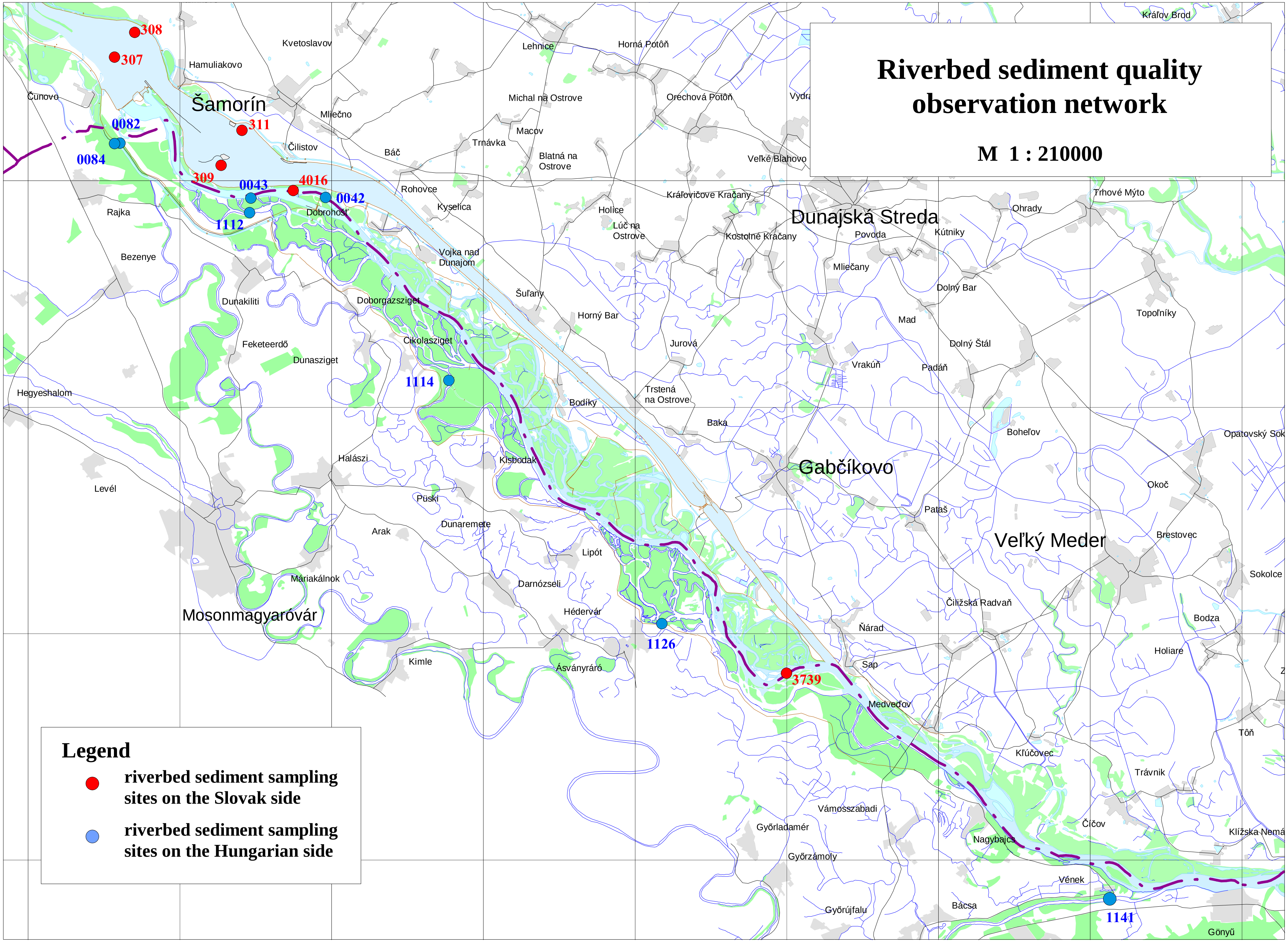

Surface Water Quality
Network of observation sites
agreed in the frame of the Joint monitoring
M 1 : 350000
Legend
observation objects on the Slovak territory
observation objects on the Hungarian territory
109
308
307
317
3531
3529
0084
0082
0001
311
309
4016
0043
1112
0042
3376
4025
1114
0002
1126
3530
3739
112
2306
1141
1205
Bratislava
Šamorín
Senec
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr
17°00'
17°05'
17°10'
17°15'
17°20'
17°25'
17°30'
17°35'
17°40'
17°45'
17°50'
17°55'
18°00'
18°05'
18°10'
48°10'
48°05'
48°00'
47°55'
47°50'
47°45'

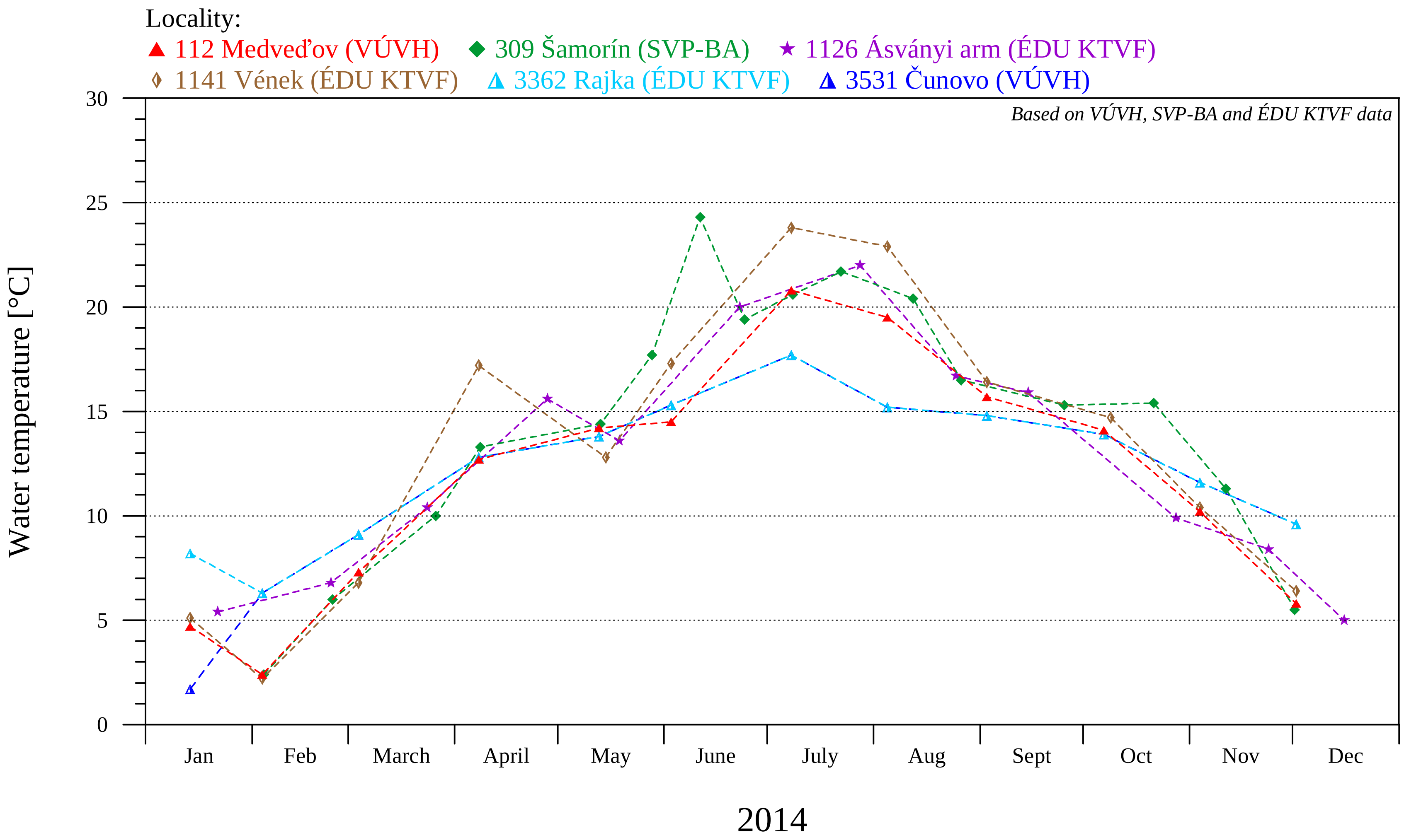
Fig. 2-2



Riverbed sediment quality observation network
M 1 : 210000
Legend
riverbed sediment sampling sites on the Slovak side
riverbed sediment sampling sites on the Hungarian side
308
307
311
309
4016
3739
0082
0084
0043
0042
1112
1114
1126
1141
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Mosonmagyaróvár
Čunovo
Hamuliakovo
Kvetoslavov
Mliečno
Čilistov
Báč
Rohovce
Kyselica
Dobrohošť
Vojka nad Dunajom
Rajka
Bezenye
Dunakiliti
Feketeerdő
Dunasziget
Doborgazsziget
Cikolasziget
Hegyeshalom
Levél
Halászi
Püski
Arak
Dunaremete
Máriakálnok
Kisbodak
Lipót
Darnózseli
Hédervár
Ásványráró
Kimle
Lehnice
Michal na Ostrove
Macov
Trnávka
Blatná na Ostrove
Horná Potôň
Orechová Potôň
Veľké Blahovo
Kráľovičove Kračany
Holice
Lúč na Ostrove
Kostolné Kračany
Šuľany
Horný Bar
Jurová
Trstená na Ostrove
Bodíky
Baka
Povoda
Mliečany
Kútniky
Ohrady
Dolný Bar
Mad
Dolný Štál
Vrakúň
Padáň
Pataš
Boheľov
Topoľníky
Trhové Mýto
Kráľov Brod
Opatovský Sok
Okoč
Brestovec
Sokolce
Bodza
Holiare
Čiližská Radvaň
Ňárad
Sap
Medveďov
Kľúčovec
Trávnik
Tôň
Čičov
Klížska Nemá
Vámosszabadi
Győrladamér
Győrzámoly
Győrújfalu
Nagybajcs
Vének
Bácsa
Gönyű

Fig. 2-3

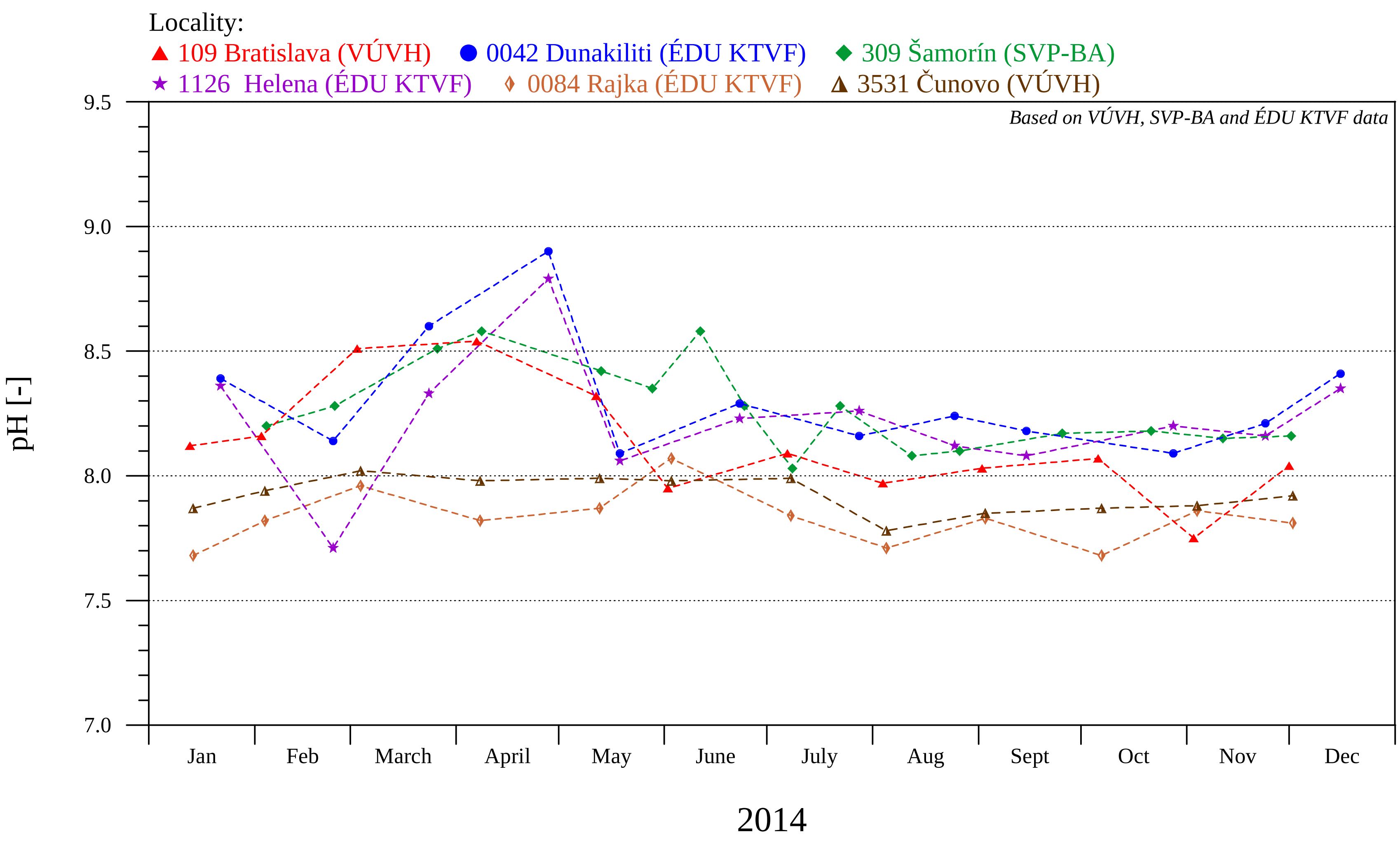
Surface water quality



GROUND WATER Consulting Ltd. Bratislava, SLOVAKIA

Fig. 2-4

Surface water quality



GROUND WATER Consulting Ltd. Bratislava, SLOVAKIA

Fig. 2-5

Surface water quality

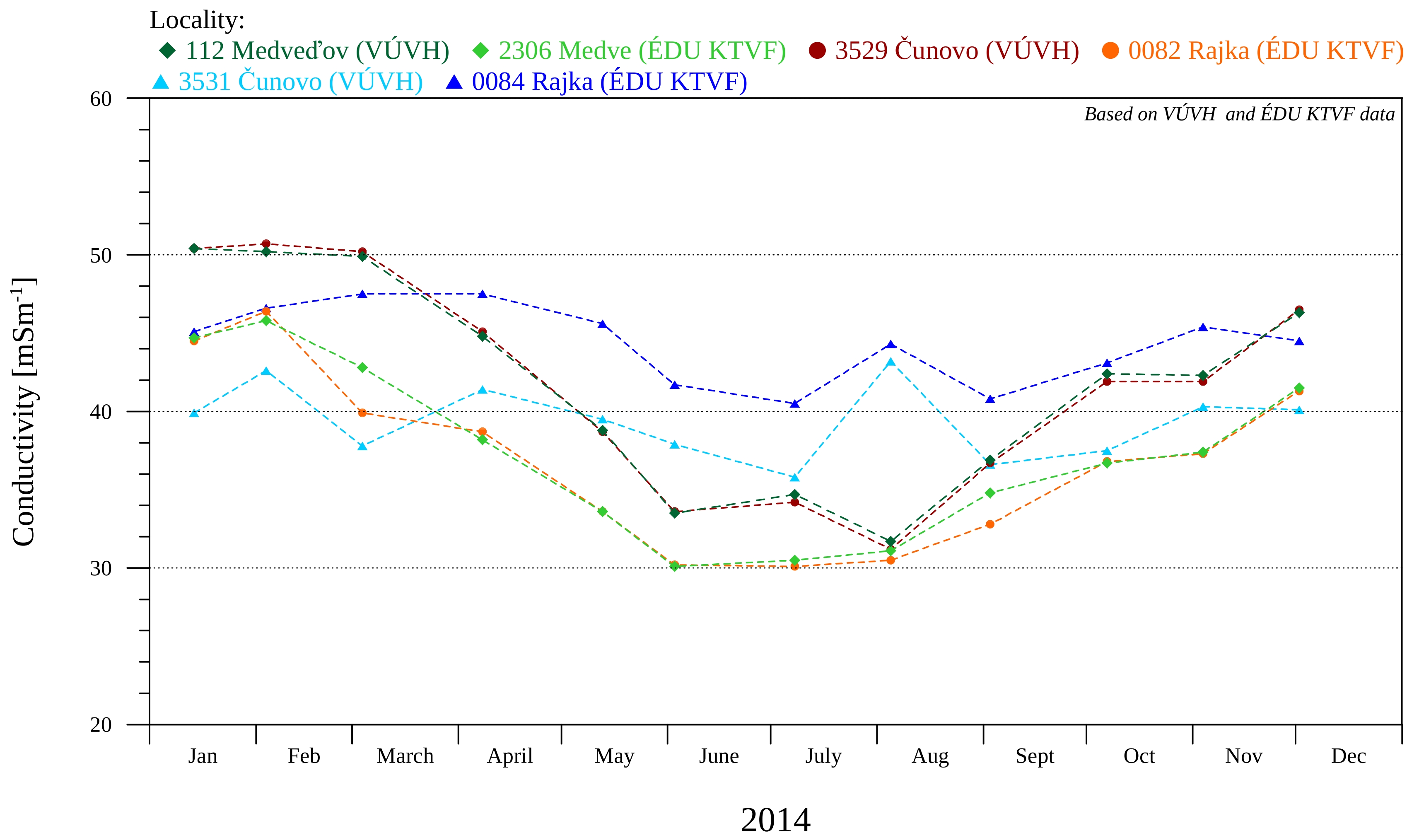


Fig. 2-6

Surface water quality

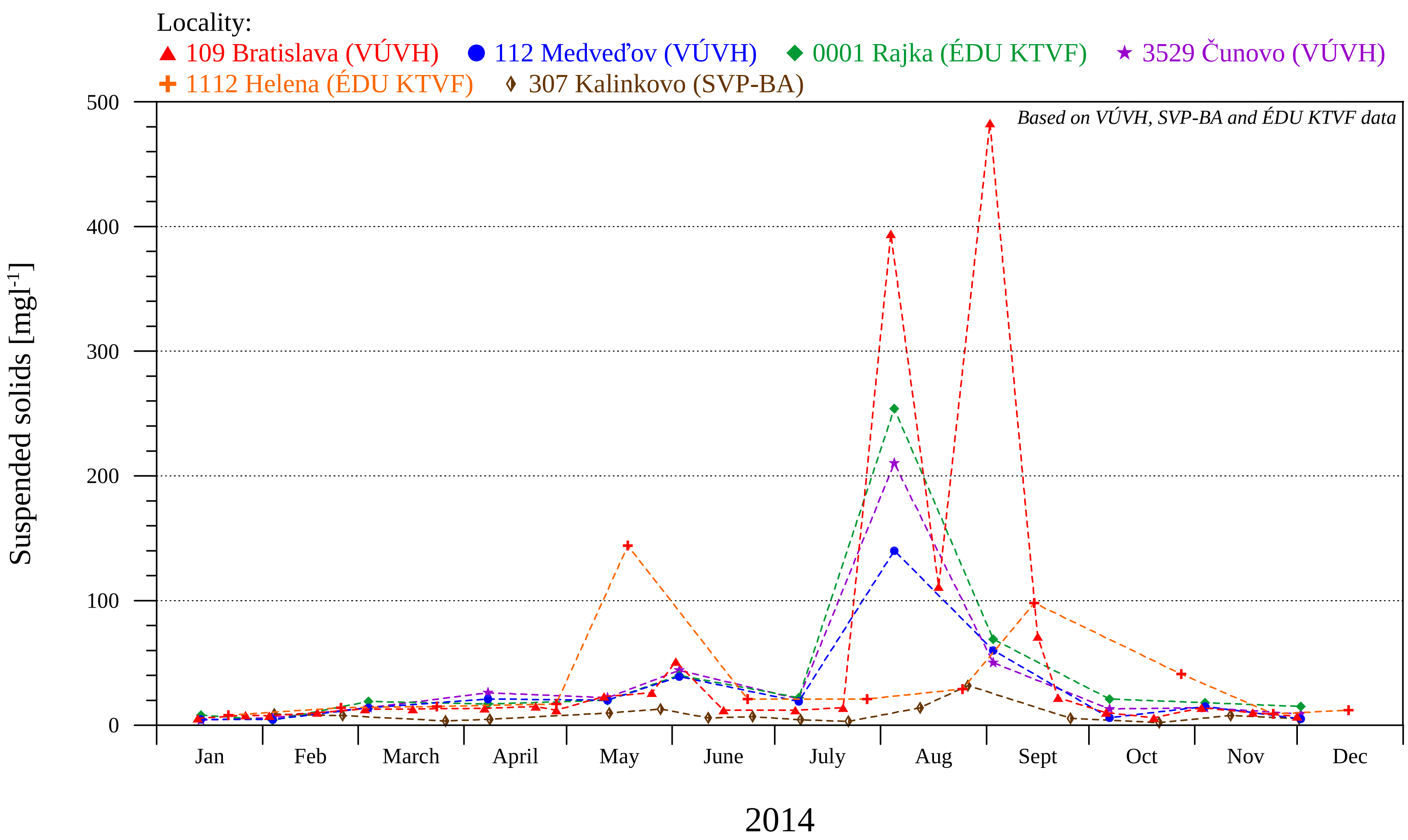


Fig. 2-7

Surface water quality

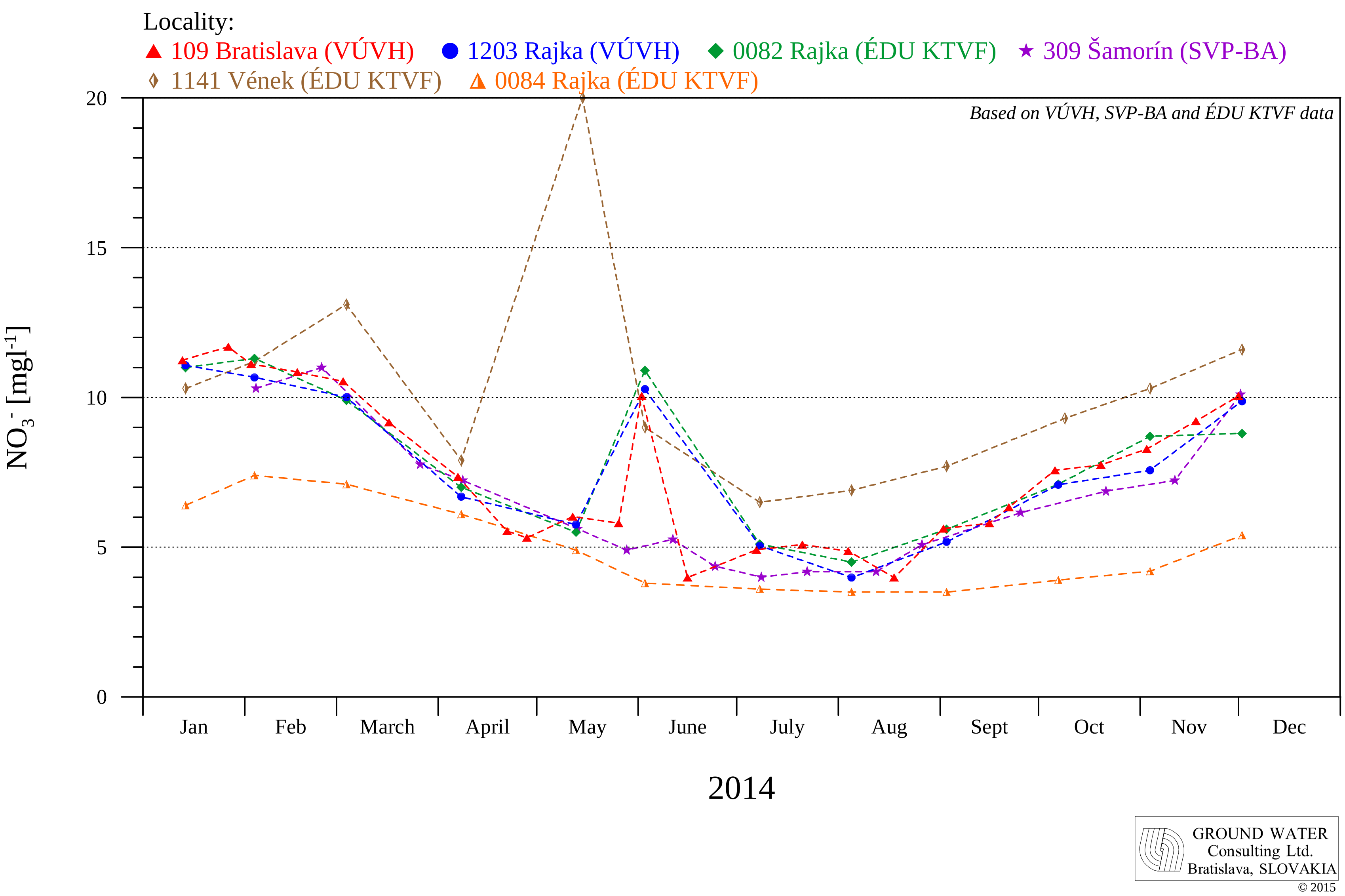


Fig. 2-8

Surface water quality

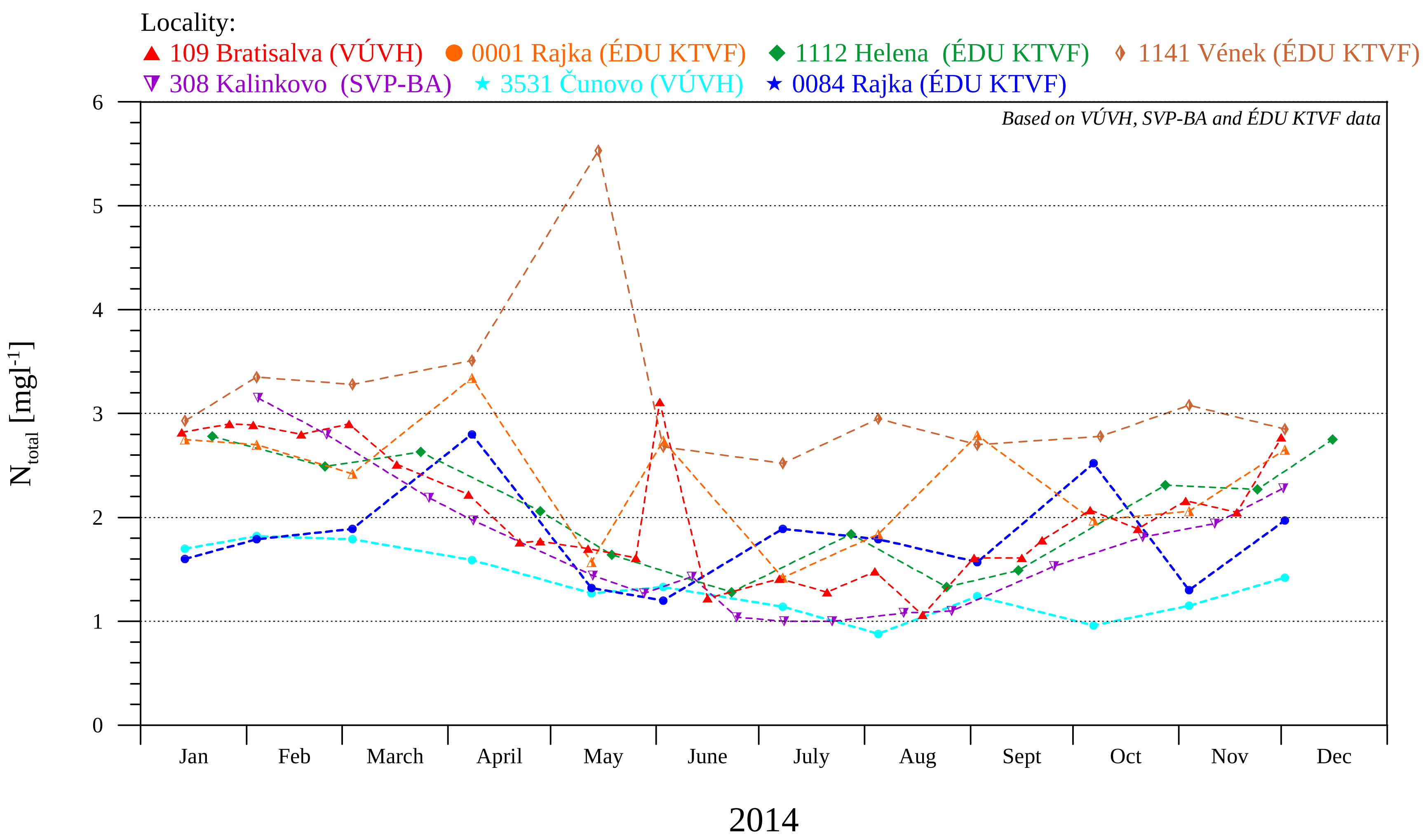
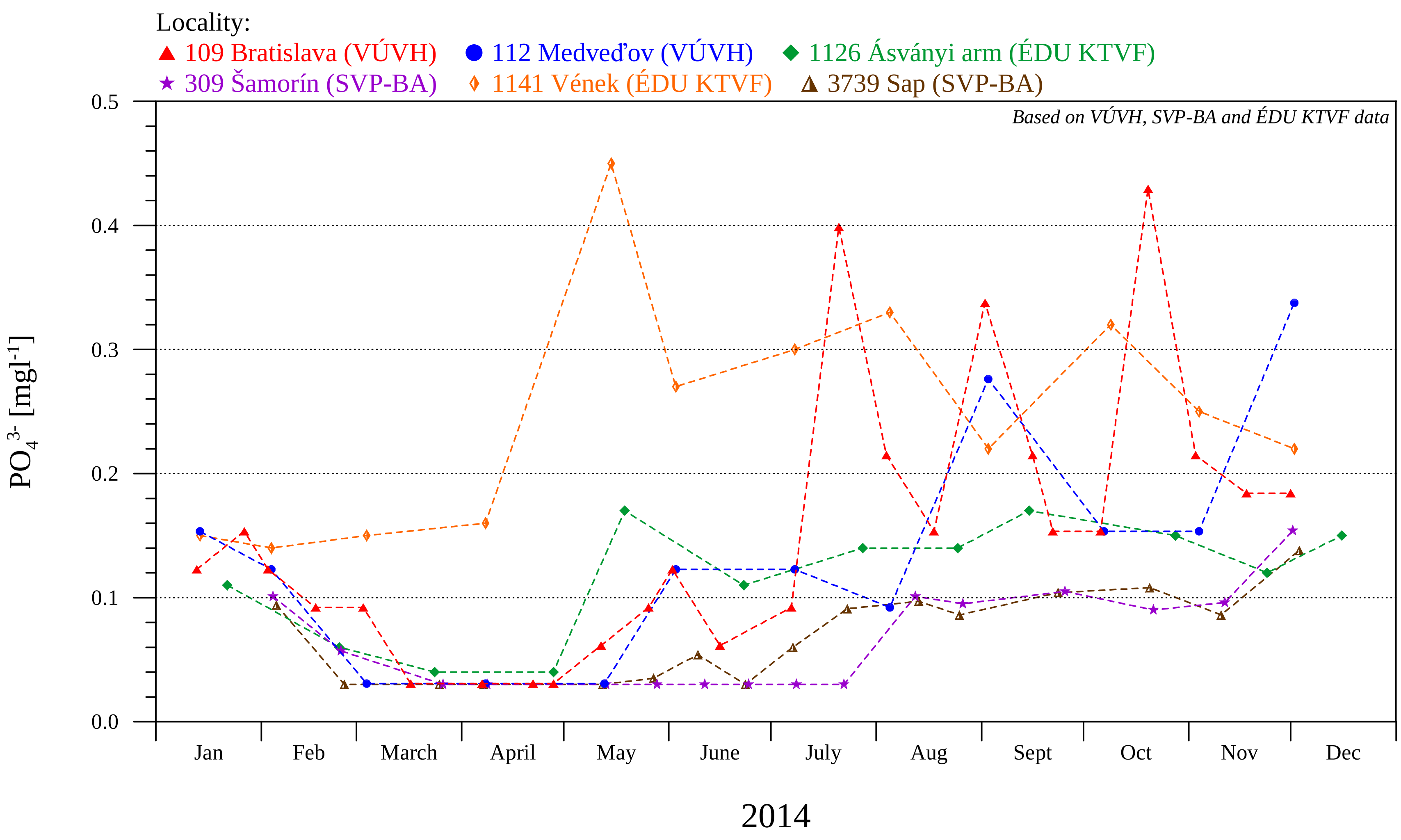


Fig. 2-9

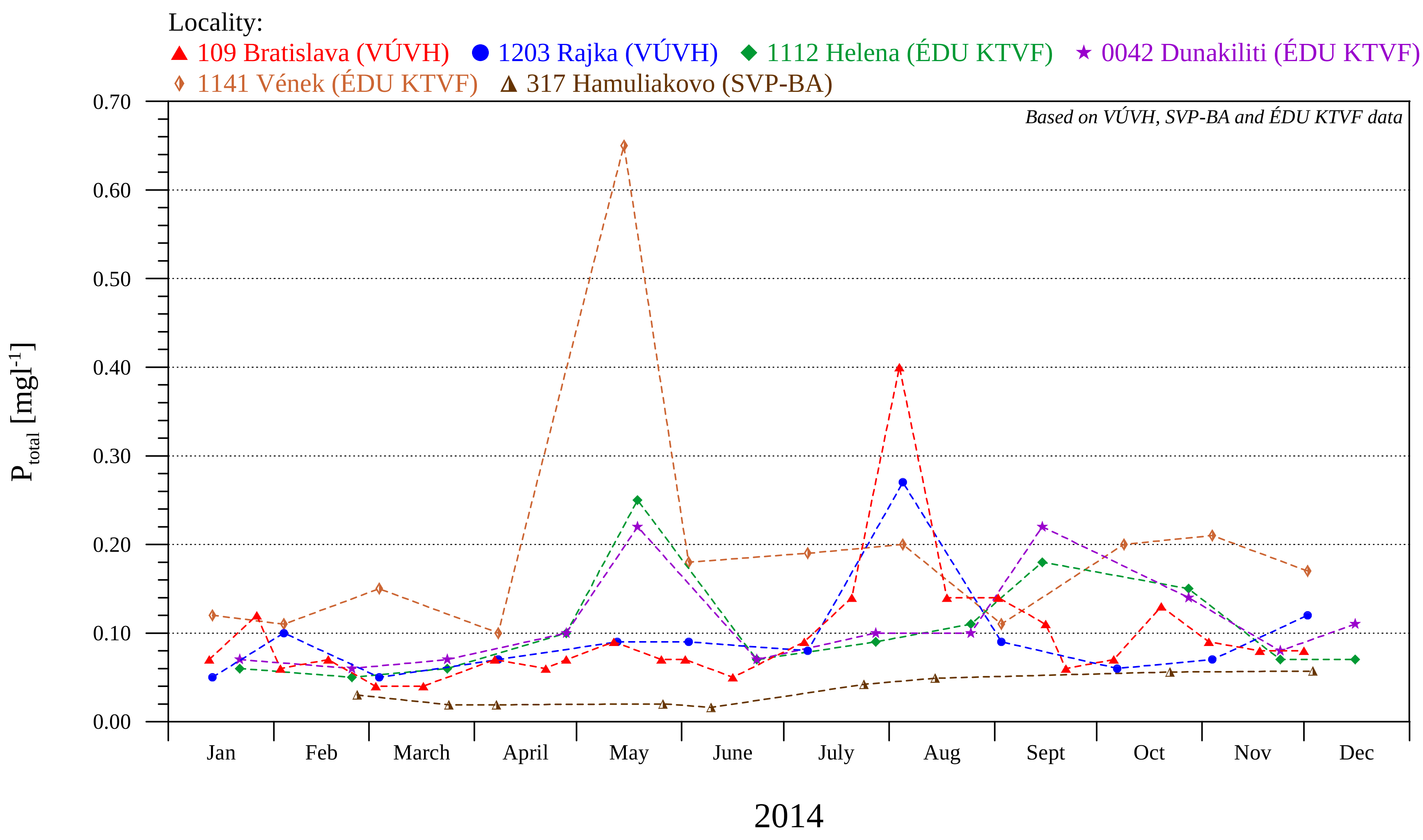
Surface water quality



GROUND WATER Consulting Ltd. Bratislava, SLOVAKIA

Fig. 2-10

Surface water quality



GROUND WATER Consulting Ltd. Bratislava, SLOVAKIA

Fig. 2-11

Surface water quality

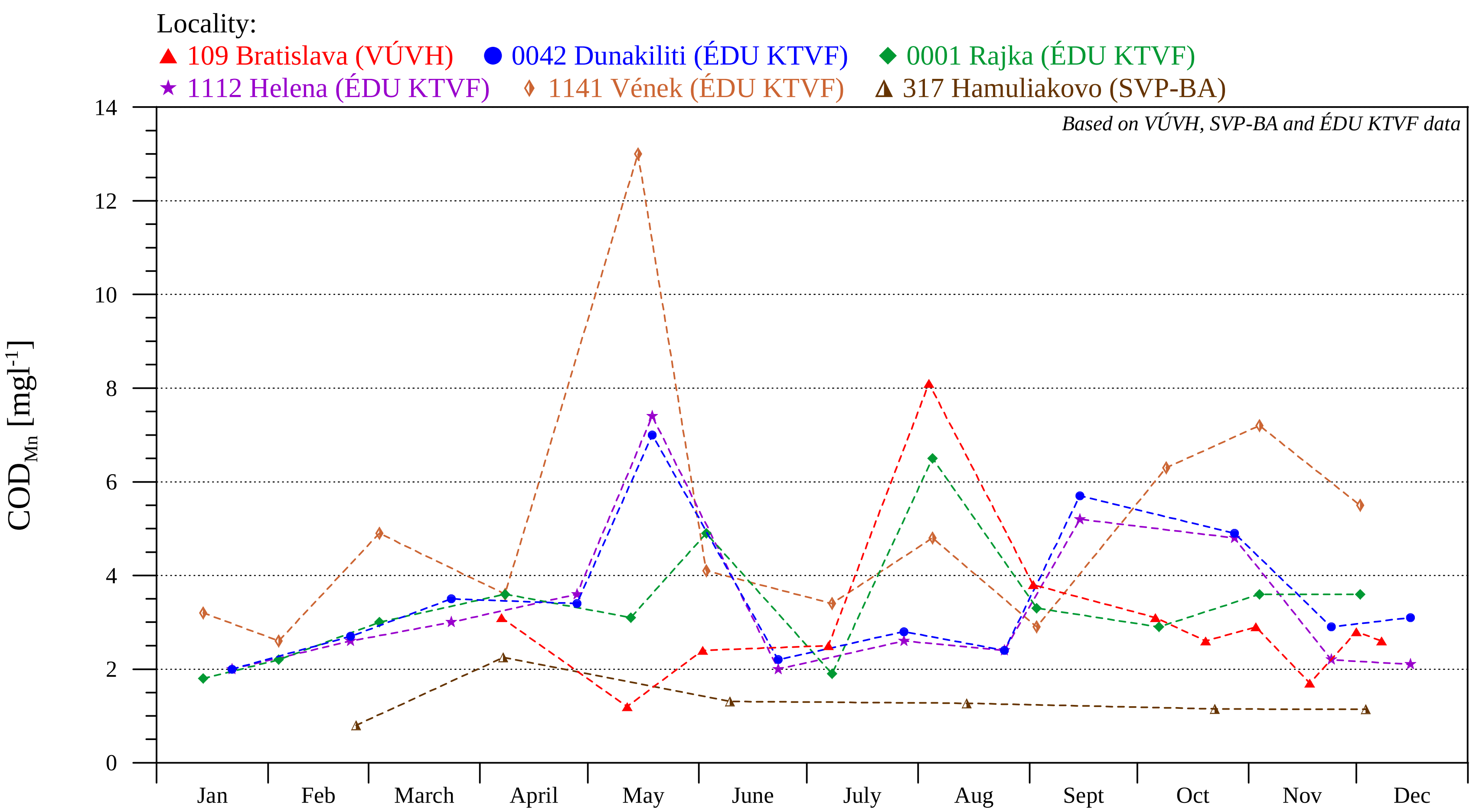
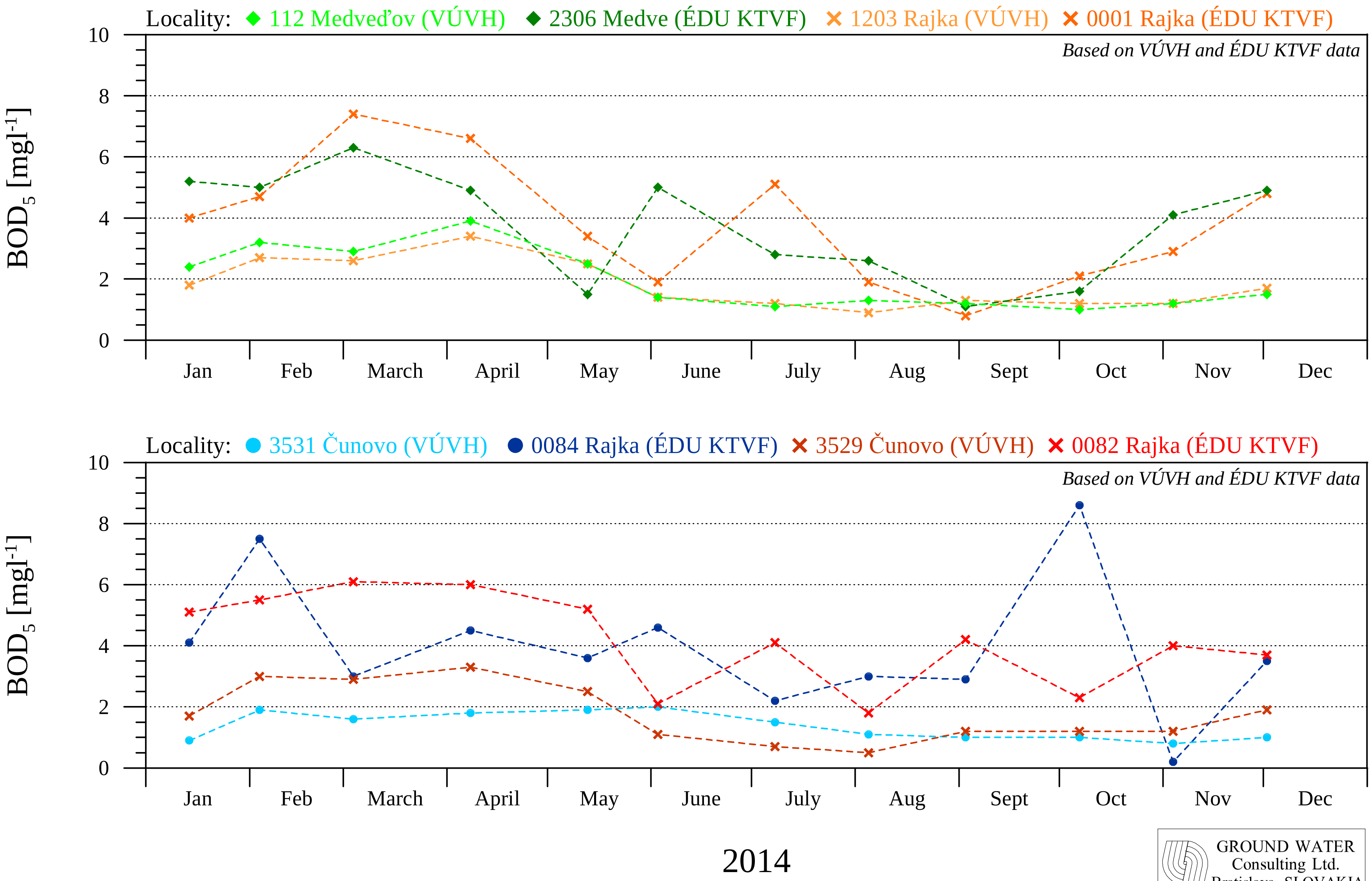


Fig. 2-12

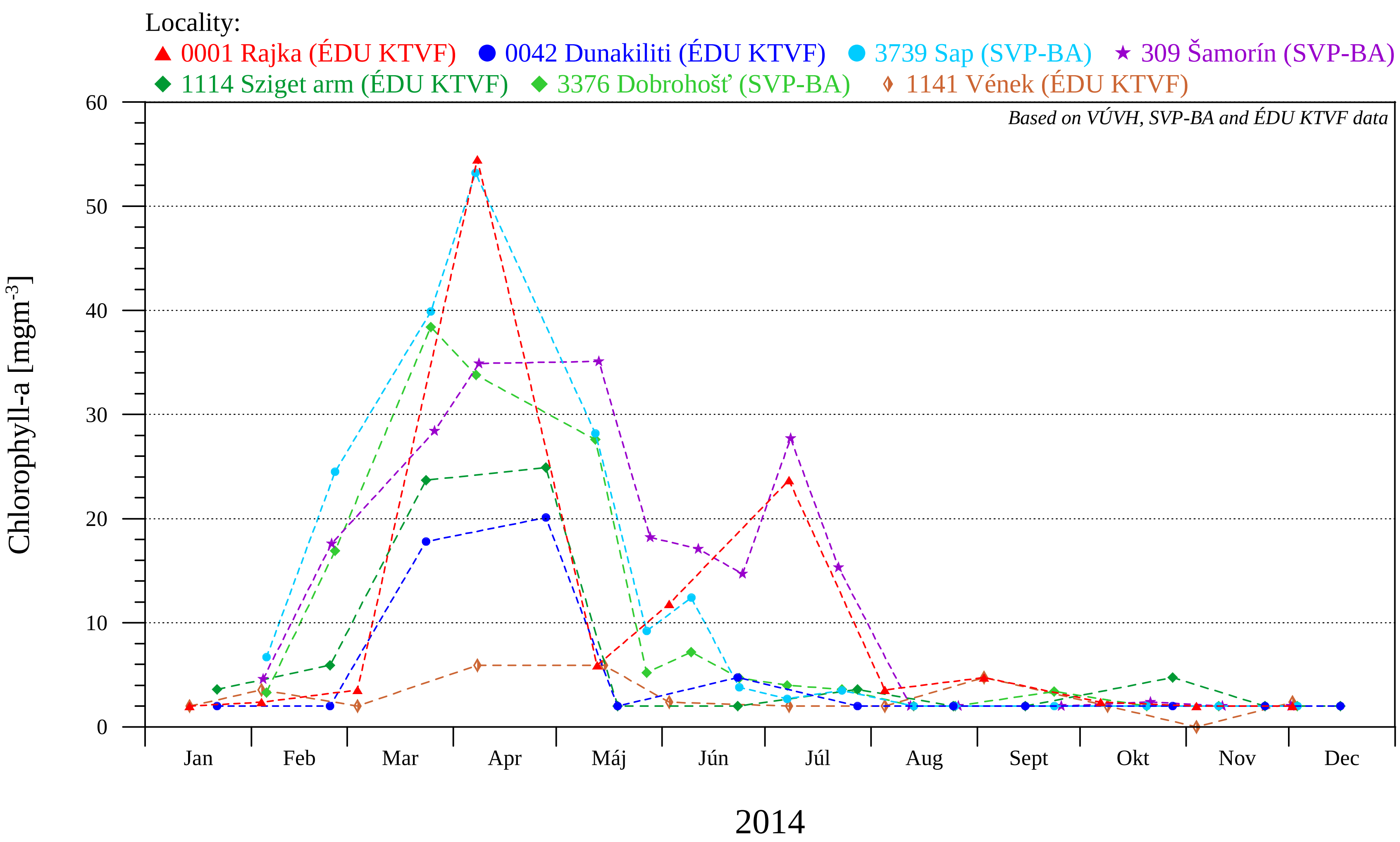
Surface water quality



GROUND WATER Consulting Ltd. Bratislava, SLOVAKIA

Fig. 2-13

Surface water quality



GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA

PART 3

Groundwater Regime

Monitoring of groundwater levels continued without changes also in the year 2014. The observed groundwater levels data were used for evaluation of impacts of applied technical measures and discharges into the Danube and the Mosoni branch of the Danube and impact of water supply on the groundwater regime. Groundwater levels in 2014 were monitored on 265 observation wells on the Slovak and the Hungarian territories (136+129). Monitoring objects are situated in the area of Žitný ostrov and in the Szigetköz region. The list of observation wells is given in the respective National Annual Reports on environmental monitoring. The situation of observation networks on both sides is shown in **Fig. 3-1**.

The evaluation of groundwater level data in 2014 in a local scale was done by the Parties themselves and is given in their National Annual Reports. In this Joint Report, the regional evaluation was jointly elaborated according to computed groundwater level equipotential lines. The equipotential lines were constructed in order to compare groundwater levels of the influenced area in the current year and in the period before construction of submerged weir and introducing the water supply into the river branches on Hungarian side. In accordance with the proposals accepted in the Joint Report in 2013, evaluation covers the hydrological and also the calendar year, similarly as in the previous year.

3.1. Joint evaluation of groundwater regime

Groundwater levels in the observed area are primarily influenced by surface water levels in the Danube and in the reservoir. Besides this, the groundwater level in the inundation area are strongly influenced by the water level in the Danube old riverbed. The adverse effect of drainage is significantly mitigated by the water supply system in the branch system. The hydrological regime of the Danube in 2014 was typical, with low flow in the winter period and rather frequent occurrence of discharge waves in the spring and summer period. However, the discharge waves were relatively low (not exceeding 6000 $m^3.s^{-1}$) and with short duration. Atypical was the occurrence of a rather high discharge wave in late autumn in October 2014. In the year 2014, there were no flooding of the inundation, except for short-term flooding of the lowest part of the inundation area during the highest discharge waves in May and October.

Groundwater levels started from a relatively low position at the beginning of hydrological year. The continuous decline of groundwater level continued until end of March, when annual minimum values occurred on most of observation objects. At objects distant from the Danube, the lows occurred during April or even early May. In the inland area of the lower part of the Žitný ostrov, where the regime of groundwater is affected by the channel system, and in the area behind the Mosoni Danube the minimum groundwater levels occurred in June, late July or early August. In April and May the groundwater levels under the influence of increasing flow rates began to rise. The groundwater level in late May and early June on objects near the Danube reflected the occurrence of discharge waves. After a temporary slight decline of groundwater levels another significant rise of groundwater levels occurred in September 2014, when increased amount of water was released into the Danube old riverbed due to the maintenance at Gabčíkovo hydropower plant. On most observation objects the maximal groundwater level in 2014 occurred in this period. Discharge waves in early August and in the second half of October were reflected only slightly and only on objects close to the Danube. At the end of the year the groundwater levels gradually slightly decreased, the groundwater level at objects in a greater distance from the Danube remained unchanged.

As in previous years, three hydrological situations were chosen in the period before introducing the water supply and in the year 2014 for computing the groundwater level differences. The selected hydrologic situations characterise the low, average and high flow rate conditions in the Danube, corresponding to flow rates approximately 1000, 2000 and 3000 m^3s^{-1}.

The selected dates and the corresponding flow rates in the Danube at Bratislava-Devín gauging station are the following (**Table 3-1, Fig. 3-2, Fig. 3-3a, b**):

Table 3-1: Selected dates and the corresponding flow rates in the Danube at Bratislava-Devín gauging station

hydrologic situation	before the water supply 1993		after the water supply 2014	
	date	Q ($m^3.s^{-1}$)	date	Q ($m^3.s^{-1}$)
low flow rate	09.03.1993	975.5	09.03.2014	1005
average flow rate	09.05.1993	1937	21.08.2014	1989
high flow rate	25.07.1993	2993	05.09.2014	3018

Low flow rate period was chosen at the end of winter period, in early March, when the flow rates reached 1000 $m^3.s^{-1}$. When compared with the low flow period in 1993, flow rates in 2014 were significantly lower for longer time. The hydrological and climatic situations can be regarded as comparable. The period for average flow rate in 2014 was chosen in the second half of August. The compared date was just after a smaller discharge wave similarly as in the year 1993. Also in this case the hydrological situation can be regarded as comparable, however the climatic situation is comparable only to a limited extent. The worst situation, regarding the comparability of the hydrological situation, was in case of high flow rate. Similar hydrological condition as in 1993 was found in early September 2014, when the decreasing flow rate achieved the desired value about 3000 $m^3.s^{-1}$. However, the preceding discharge wave did not achieved such a high flow and duration as in the year 1993. This fact influenced the comparison result.

The jointly constructed maps of equipotential lines for the selected dates, using the measured groundwater levels, are given on **Figs. 3-4 to 3-6**. In wells where the water level is measured once a week, the groundwater level for the selected dates was computed by linear interpolation. In all other wells the average daily values were used. Altitudes of groundwater levels are given on maps for each observation object that was used for calculating of equipotential lines. For calculation of equipotential lines the computed surface water level data in the Danube were used as well. These data were computed by calibrated model, using river morphology data and measured water levels data on the given stretch. The other surface water levels were not used for calculating the equipotential lines. The equipotential lines represent general groundwater levels and flow direction, and do not show the local influences of channels or river branch systems.

Differences between groundwater levels for selected hydrologic situations in years 1993 and 2014 are expressed in **Figs. 3-7 to 3-9**.

The evaluation is focused mainly on the area influenced by technical measures and discharges according to the intergovernmental Agreement and by the water supply realised on the Hungarian side. The influenced area in this sense is represented by the inundation and the flood-protected area on the Hungarian side, and partly by the inundation area on the Slovak side.

Low flow rate conditions (**Fig. 3-7**)

When comparing hydrological situations at low flow rate (about 1000 $m^3.s^{-1}$) in the period prior the implementation of technical measures and discharges according to the Agreement and in the year 2014 (2014 versus 1993), it can be stated that decrease can be seen in the vicinity of the lower part of the reservoir. Slight decrease from the reservoir can be seen also in the uppermost part of the inundation area. The decrease around the lower part of the reservoir is caused by the decrease of permeability of the reservoir bottom as compared with the situation immediately after its filling. In recent years, the decline of groundwater levels almost stopped and the area with decrease of groundwater level does not change significantly. Groundwater levels in a greater part of the Žitný ostrov area and in the Szigetköz remained unchanged. Slight increase of groundwater levels occurred in the inundation area at Kisbodak/Bodíky and in the inland area between Arak and Novákpuszta. In the lower part of the Szigetköz, downstream from Ásványráró and around the Bagoméri river branch system, and in the vicinity of the tail-race canal on the Slovak territory the groundwater levels were lower than in 1993. The groundwater level in this area is adversely influenced by the riverbed erosion in the tailrace canal and downstream the confluence of the tailrace canal and the Danube old riverbed. The water supply system in the lower part of the Hungarian inundation area is being finalized, so improving can be expected in this area. Increased groundwater levels in some areas at the Little Danube and behind the Mosoni Danube reflect local conditions.

In general the change of the groundwater levels in the area influenced by technical measures and discharges according to the Agreement mostly ranged between -0.7 and +0.7 m in comparison to groundwater levels in 1993. Slight decrease occurred mainly in the uppermost and in the lower part of Szigetköz area, while the increase was observed in the middle part of Szigetköz, both in the inundation and in the inland area. An increase of groundwater levels, which has been evoked by the water supply on the Slovak side, occurred also in the Slovak inundation area. Groundwater levels in the middle part of Žitný ostrov area and in the rest of upper and middle part of Szigetköz area remained unchanged. The decrease of groundwater levels around the lower part of the reservoir, reflecting the decrease in permeability of the reservoir bottom, reached -1.2 m. Decline in groundwater level around the confluence of the Danube old riverbed and the tail-race canal ranged mostly from -0.25 to -1.2 m. The groundwater flow direction in the upper part of the river to Dunakiliti still shows infiltration from the river and the reservoir into the surrounding area. Along the Danube old riverbed from Dunakiliti to the confluence with the tailrace canal the groundwater is drained and the flow direction turn towards the Danube old riverbed. Groundwater at the Ásványi river branch system and in the inland area is flowing mostly paralelly with the Danube, while at the estuary of the Mosoni Danube it seems that the ground water flows back to the Danube (**Fig. 3-4**).

Average flow rate conditions (**Fig. 3-8**)

Comparing groundwater levels in the period prior to the implementation of technical measures and in the evaluated year at average flow rate conditions in the Danube (about 2000 $m^3.s^{-1}$), the actual results show an increase of groundwater levels on a large part of the Szigetköz area. The groundwater level increase in the uppermost part of the Szigetköz and inundation area is slightly reduced by the groundwater level decrease in the vicinity of the reservoir, due to decreased permeability of the reservoir bottom. Therefore the average groundwater levels show no change in this part of the Szigetköz. The groundwater level increase in the upper and middle part of the Szigetköz area (including inundation) reaches 0.2-1.2 m. Slight decrease of the groundwater level can be seen in the lower part of the Szigetköz along the Danube stretch between Ásványráró and Medveďov, what includes the lower part of the Ásványi river branch system and the Bagoméri river branch system. This decrease in groundwater levels results from erosion of the riverbed. It is expected that decrease in the Hungarian river branch system will be eliminated after completion of ongoing construction works on the water supply system in this region. On the Slovak territory the impact of technical measures according to the Agreement appears in the vicinity of the lower part of reservoir, where increased water level eliminates the groundwater level decline, which results from the decrease of permeability of the reservoir bottom. Higher groundwater levels in the left-side inundation area reflect the different water supply regime in the river branch system in 1993 and 2014. Decrease in groundwater levels, which appears particularly on the left side of the reservoir, is due to the decrease of permeability of the reservoir bottom. In recent years, the decline of groundwater levels almost stopped in this area. In general, however, groundwater levels are higher or similar as in the period before damming the Danube. Decrease of groundwater levels can be also seen along the tailrace canal due to riverbed erosion. This decrease, in the case of average flow rates, reaches up to 0,7 m. On a large part of the upper, middle and lower Žitný ostrov area no change in groundwater levels were observed. Slight increase in the middle part of the Žitný ostrov area near the Little Danube reflects local conditions in the cannel system. The groundwater flow direction in the upper part of the river to the Dunakiliti shows infiltration from the river and the reservoir into the surrounding area. Along the Danube in the upper part of the inundation area the groundwater flows into the riverbed and the river is draining the adjacent area. In the middle and lower part of the inundation the groundwater flow is parallel with the Danube. The groundwater flow direction in the Szigetköz inland area remained unchanged (**Fig.3-5**).

High flow rate conditions (**Fig. 3-9**)

In the case of high flow rate conditions in the Danube (around 3000 $m^3.s^{-1}$) it is possible to see lower groundwater levels around the reservoir and along the Danube old riverbed, including the inundation area on both sides (**Fig. 3-9**). The decline around the reservoir, particularly on its left side and in the upper part of the Szigetköz, is caused by decreased permeability of the reservoir bottom. Besides this, the decrease in the vicinity of the lower part of the reservoir is enlarged by significantly lower water levels in the old riverbed, as well as its drainage effect. The decrease along the Danube old riverbed results from the difference in flow rates discharged into the Danube old riverbed in 1993 (approximately 760 $m^3.s^{-1}$, and more than 1100 $m^3.s^{-1}$ during several day just before the chosen date) and in 2014 (approximately 524 $m^3.s^{-1}$). This difference was reflected in significantly lower surface water level in 2014. The water level in the Danube old riverbed at Dunaremete gauging station reached 114.57 m.a.s.l., while in the year 1993 it was 115.41 m.a.s.l.. This is also the reason, why the groundwater level decline in 2014, against the year 1993, appears in the inland area behind the flood protective dikes. Groundwater levels in the outer part of upper and middle Szigetköz, in the lower Szigetköz and in the inland area of the middle Žitný ostrov, for the high flow rate conditions, have not changed. The groundwater level decrease along the Danube old riverbed reaches up to +1,25 m. In the lower part of the Szigetköz an increase of groundwater level can be seen. The increase in the lower part of Žitný ostrov area reflects the local conditions influenced by manipulations in the channel system. The groundwater flow direction in the upper part of the river to the Dunakiliti shows water supply from the Danube into the adjacent area (**Fig. 3-6**). The groundwater flow direction in the inland area, on both sides of the Danube, also documents the water supply from the river. In the inundation area along the Danube section from Dunakiliti to Ásványráró, in the vicinity of the riverbed, the groundwater is drained by the Danube old riverbed.

3.2. Conclusion

Based on the evaluation of groundwater regime it can be stated that the water supply into the right-side river branch system and into the Mosoni Danube plays an important role in influencing groundwater levels over the Szigetköz region. As a result of measures taken according to the intergovernmental Agreement, a significant increase in the groundwater levels occurred in the case of average flow rate conditions in the Danube. The increase in the upper part of the Szigetköz region and around the reservoir is reduced due to decrease of permeability of the reservoir bottom. Certain effect also have the adverse changes in sediment transport regime of the Danube, which can be probably related to measures in the Austrian section of the Danube just upstream of Bratislava implemented in recent years. In the case of low flow rates in the Danube the average groundwater levels remained mostly unchanged. Some increase of groundwater level appears in the middle of inundation area. The decrease in the lower part of the Szigetköz reflects the adverse effect of the riverbed erosion in the tailrace canal and downstream the confluence of the tailrace channel and the Danube old riverbed. Since the water supply system in the lower part of the Hungarian inundation area is being finalized, improving can be expected also in this area. In the case of high flow rate conditions, decline in the groundwater levels around the reservoir and along the Danube riverbed can be registered. Because of differences in hydrological conditions in 1993 and 2014 the groundwater level decline appears also in the inland area behind the flood protective dikes, but at some distance from the Danube old riverbed no changes were observed.

Monitoring results confirm the need of solving the water supply in the lower part of the inundation area on both sides, particularly in the case of low and average flow rate conditions. The water supply system in the lower part of the Hungarian inundation area is being finalized, so after its completion improving can be expected in this area. The positive influence of the water supply could be effectively supported by measures applied in the Danube old riverbed upstream of the confluence with the tail race channel. Such measures may improve the overall situation in the lower part of Szigetköz area and in the region of Istragov island on the Slovak side.

The increase in groundwater levels in the strip along the Danube old riverbed on both sides could be ensured only by increasing the water level in the Danube by technical measures implemented in the riverbed.

Fig. 3-1

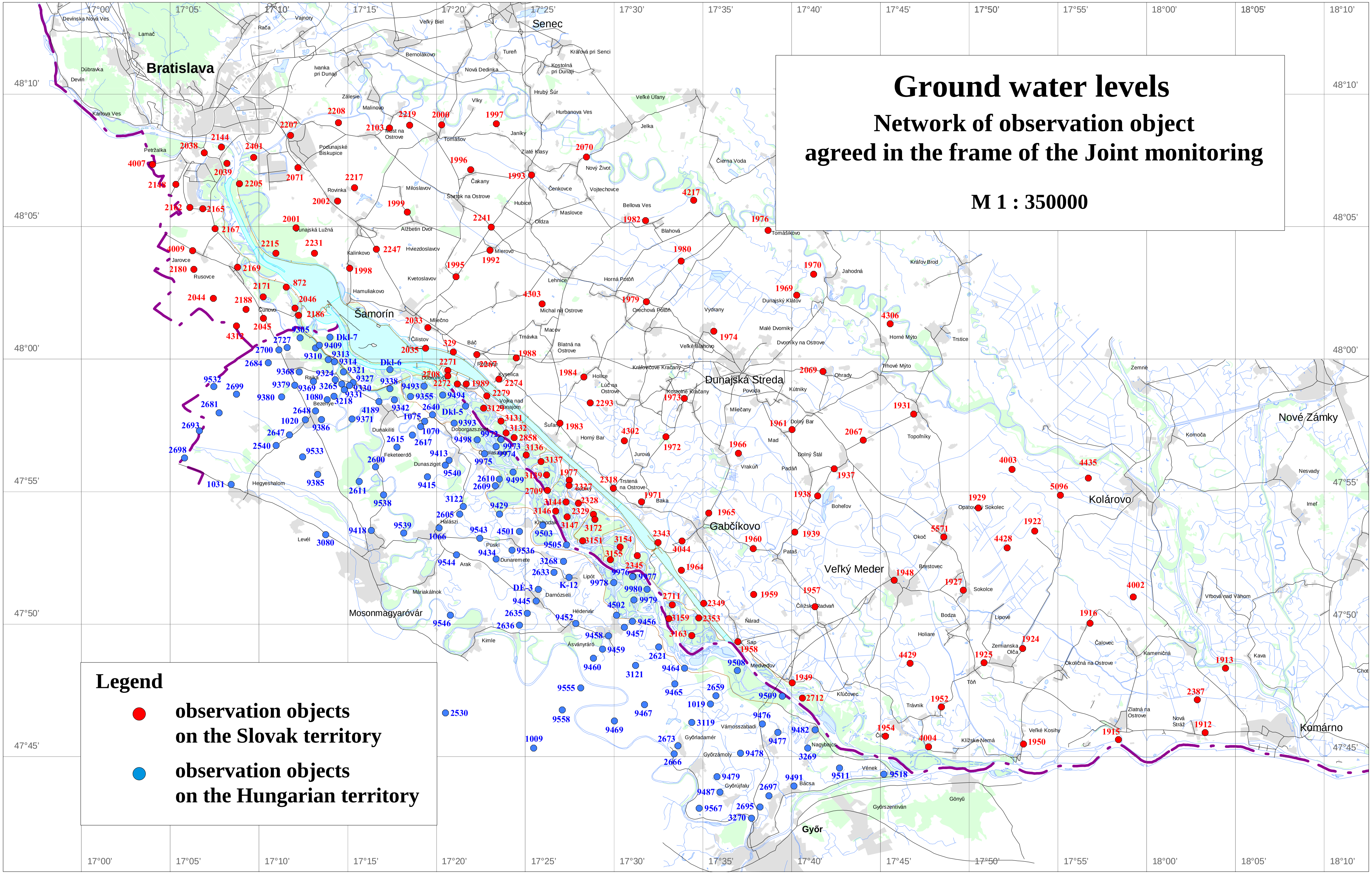

Ground water levels
Network of observation object
agreed in the frame of the Joint monitoring
M 1 : 350000
Legend
observation objects on the Slovak territory
observation objects on the Hungarian territory
Bratislava
Senec
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr

Fig. 3-2

Surface Water Flow Rate

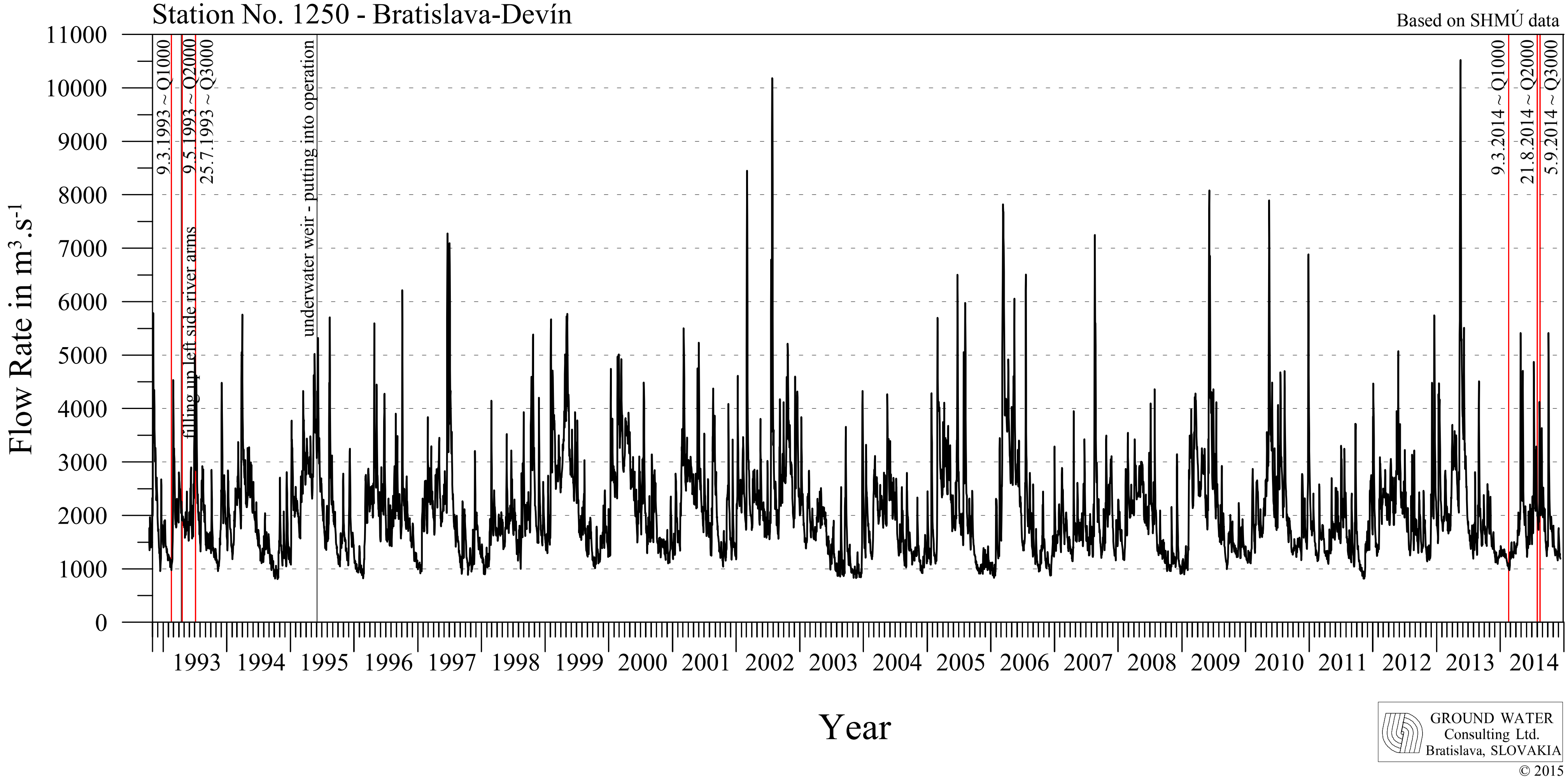


Fig. 3-3a

Surface water flow rate

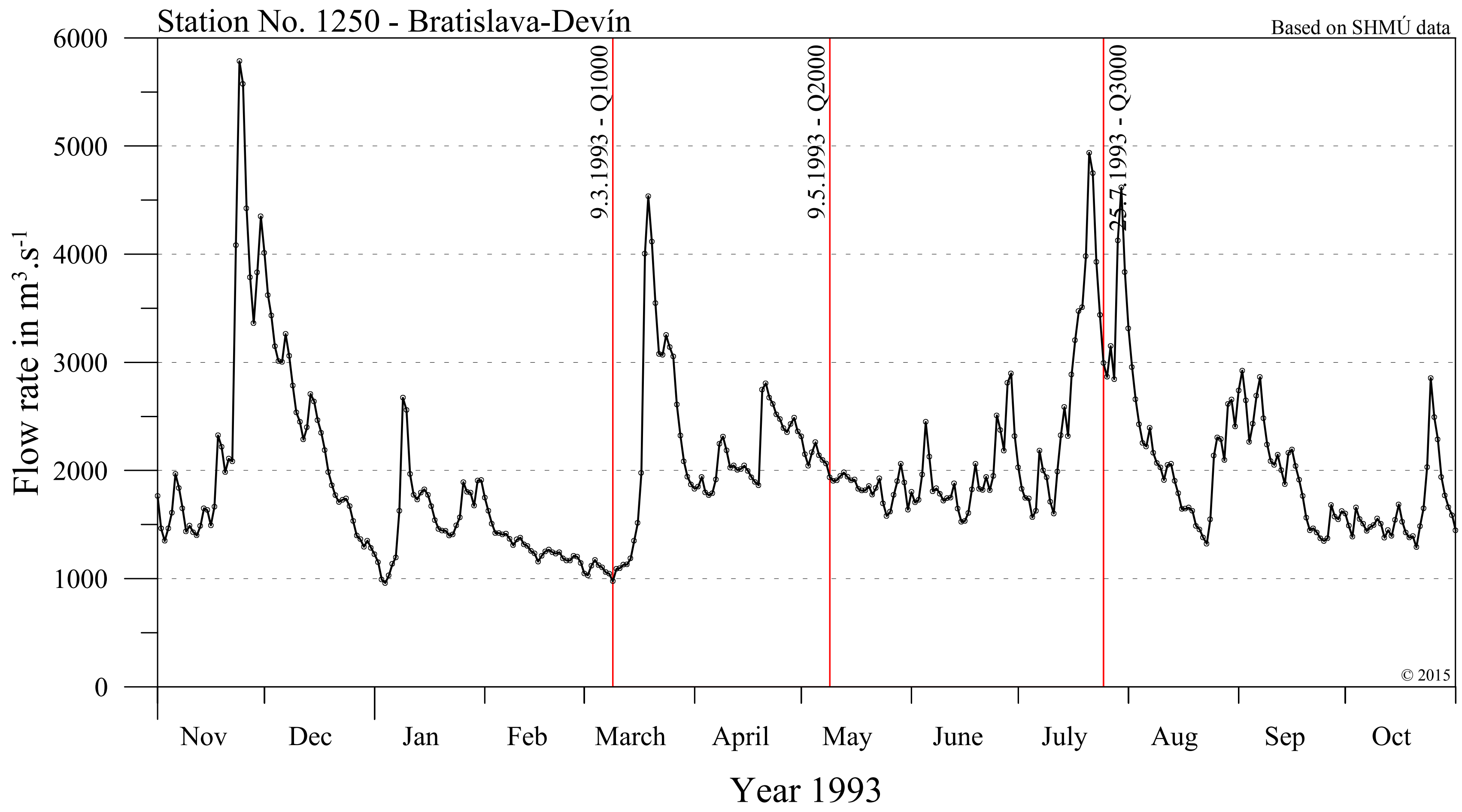


Fig. 3-3b

Surface water flow rate

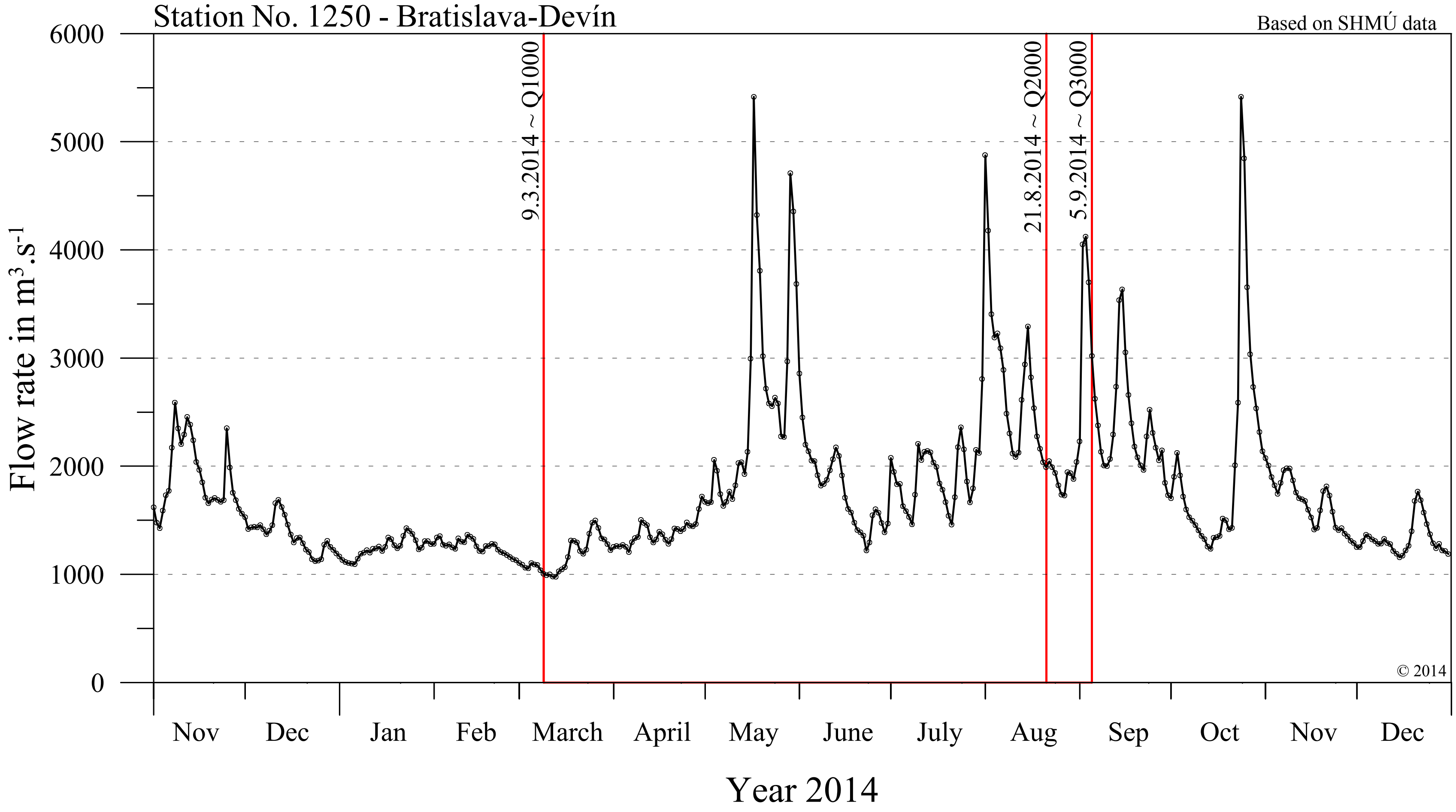
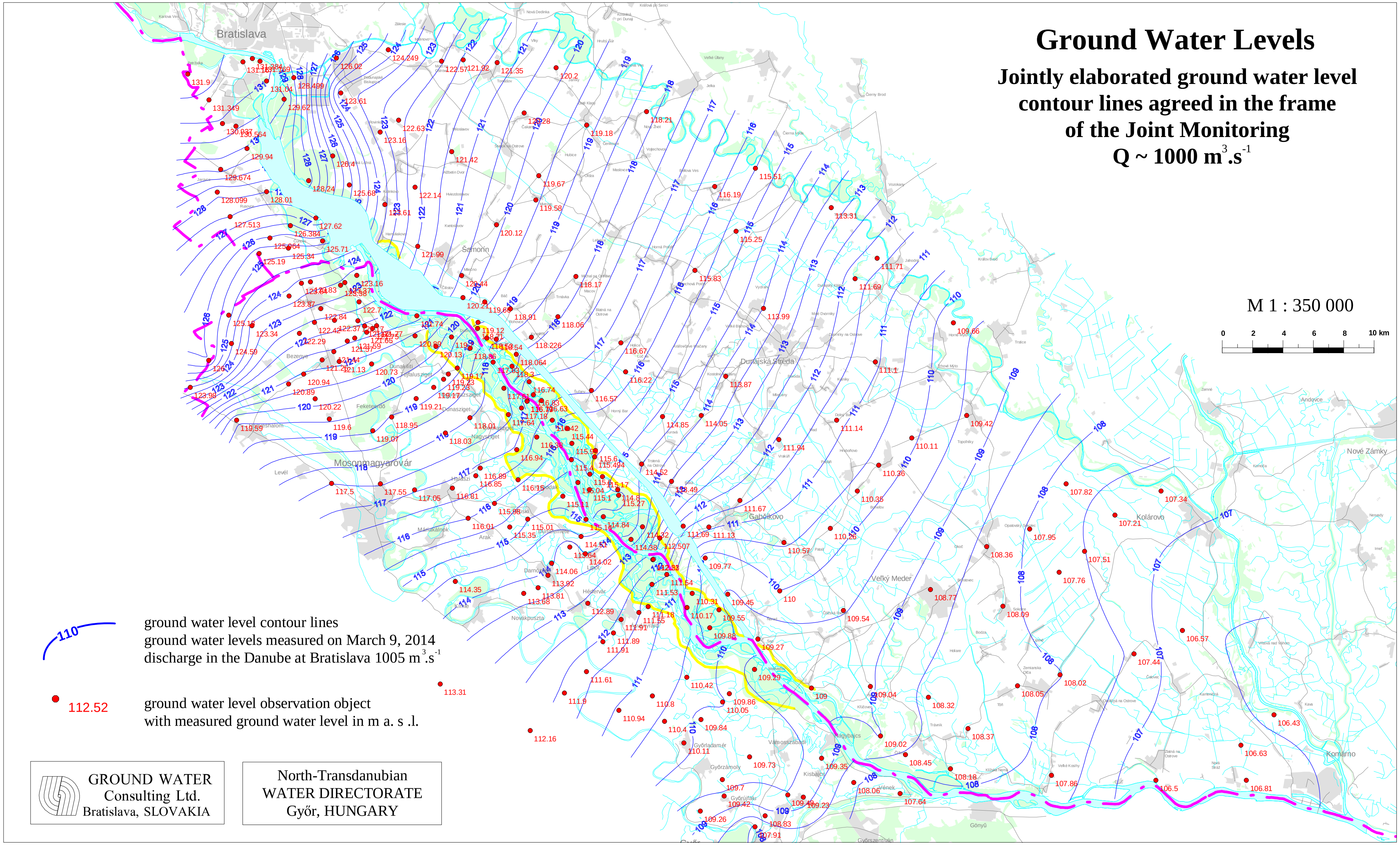


Fig. 3-4



Ground Water Levels
Jointly elaborated ground water level contour lines agreed in the frame of the Joint Monitoring
Q ~ 1000 m³.s⁻¹
M 1 : 350 000
0 2 4 6 8 10 km
Bratislava
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Komárno
Nové Zámky
Mosonmagyaróvár
Győr
ground water level contour lines
ground water levels measured on March 9, 2014
discharge in the Danube at Bratislava 1005 m³.s⁻¹
112.52
ground water level observation object
with measured ground water level in m a. s .l.
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
North-Transdanubian
WATER DIRECTORATE
Győr, HUNGARY

Fig. 3-5

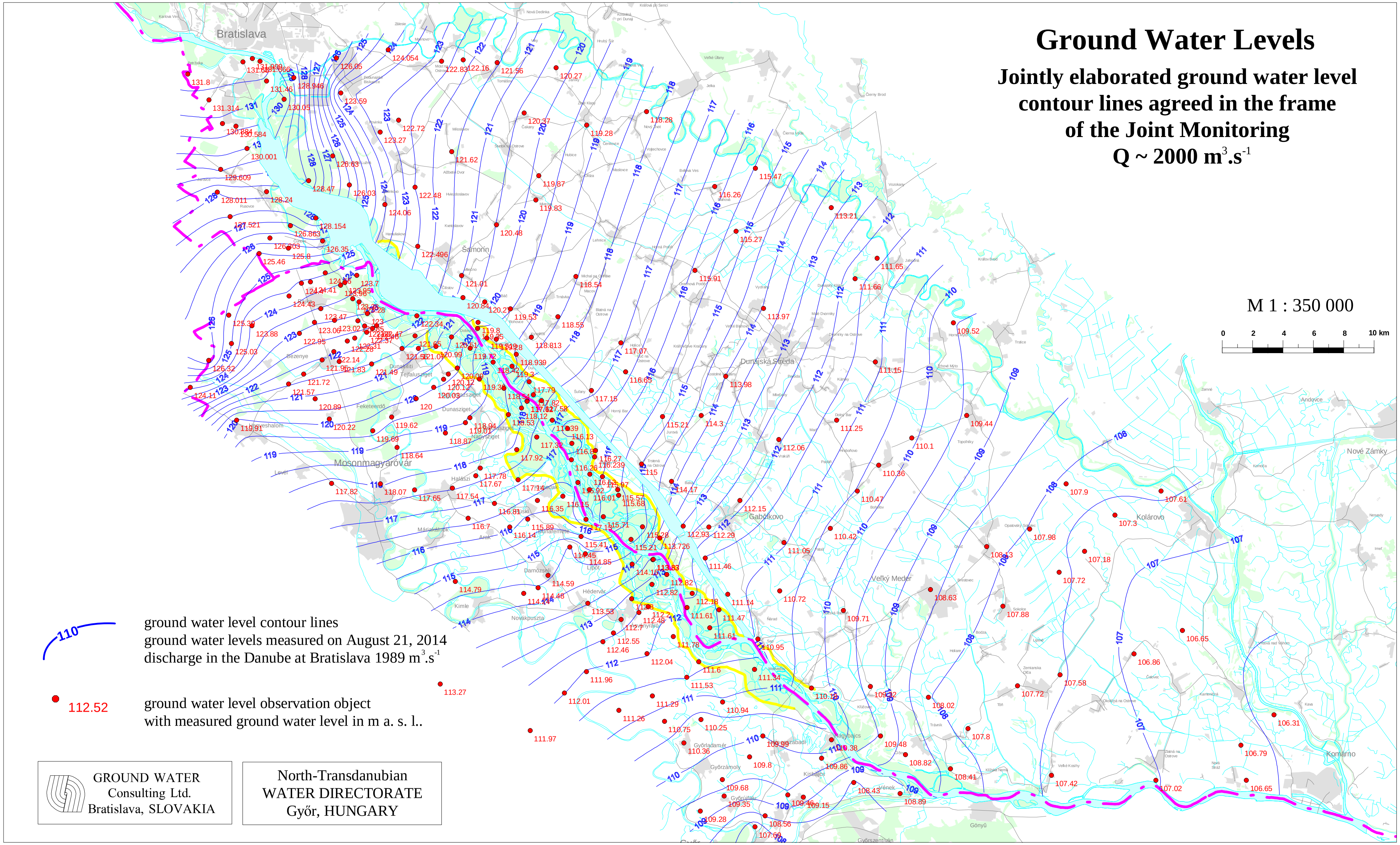

Ground Water Levels
Jointly elaborated ground water level contour lines agreed in the frame of the Joint Monitoring
Q ~ 2000 m³.s⁻¹
M 1 : 350 000
0 2 4 6 8 10 km
Bratislava
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr
110
ground water level contour lines
ground water levels measured on August 21, 2014
discharge in the Danube at Bratislava 1989 m³.s⁻¹
112.52
ground water level observation object
with measured ground water level in m a. s. l..
GROUND WATER Consulting Ltd. Bratislava, SLOVAKIA
North-Transdanubian WATER DIRECTORATE Győr, HUNGARY

Fig. 3-6

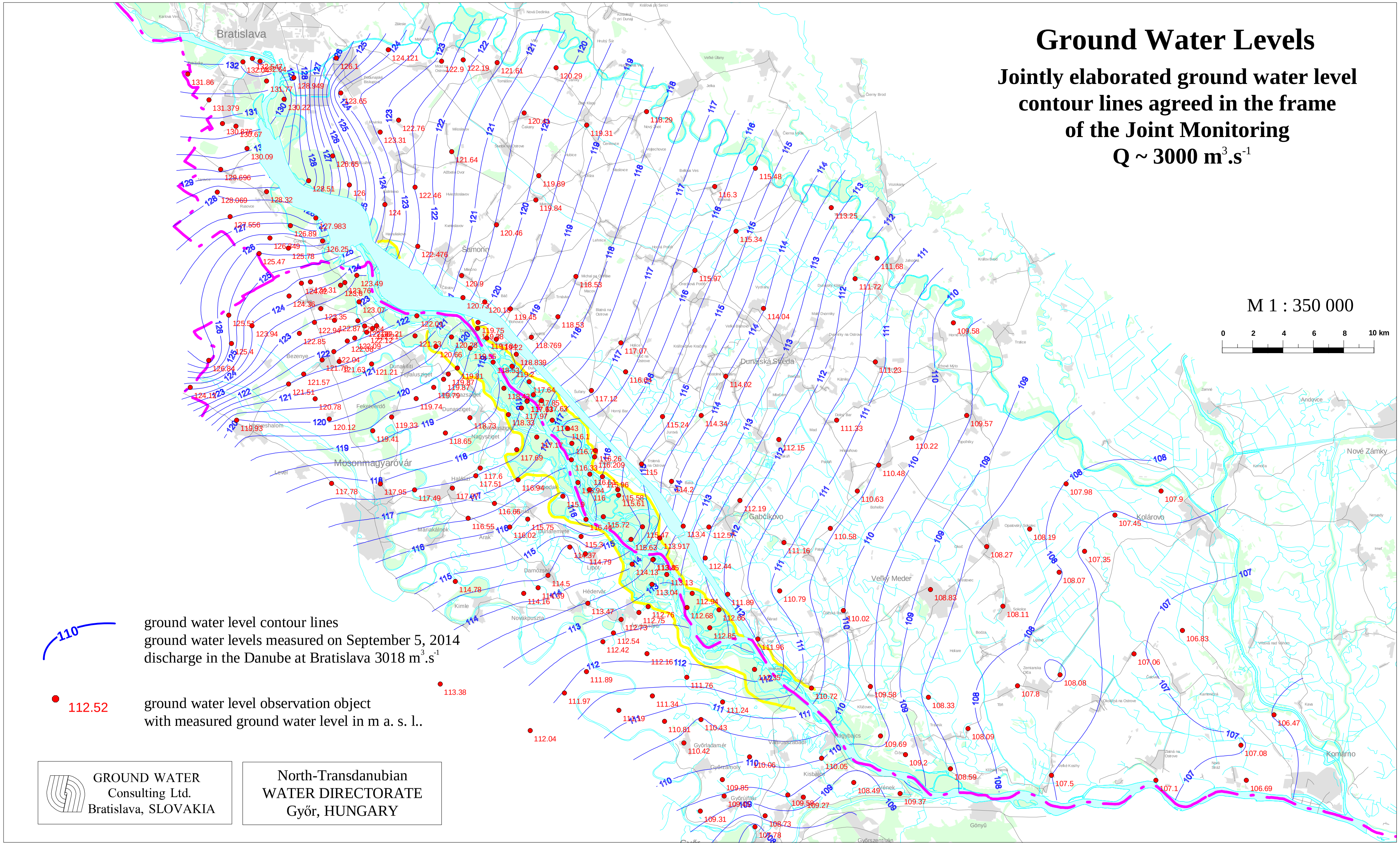
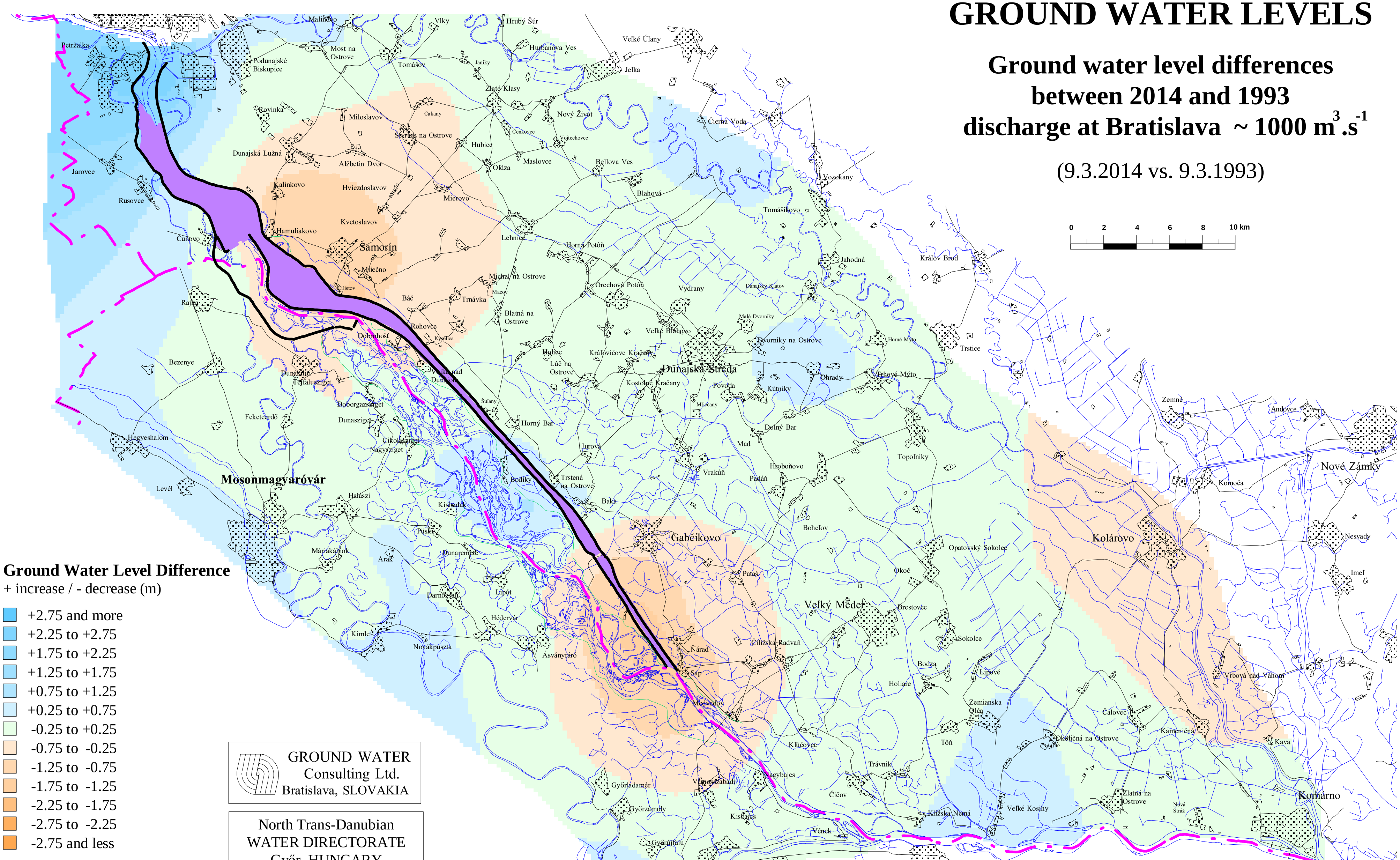

Ground Water Levels
Jointly elaborated ground water level contour lines agreed in the frame of the Joint Monitoring
Q ~ 3000 m3.s-1
M 1 : 350 000
0 2 4 6 8 10 km
ground water level contour lines
ground water levels measured on September 5, 2014
discharge in the Danube at Bratislava 3018 m3.s-1
112.52
ground water level observation object
with measured ground water level in m a. s. l..
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
North-Transdanubian
WATER DIRECTORATE
Győr, HUNGARY
Bratislava
Samorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár

Fig. 3-7

GROUND WATER LEVELS

Ground water level differences between 2014 and 1993 discharge at Bratislava ~ 1000 $m^3.s^{-1}$

(9.3.2014 vs. 9.3.1993)



Ground Water Level Difference
+ increase / - decrease (m)

- +2.75 and more
- +2.25 to +2.75
- +1.75 to +2.25
- +1.25 to +1.75
- +0.75 to +1.25
- +0.25 to +0.75
- -0.25 to +0.25
- -0.75 to -0.25
- -1.25 to -0.75
- -1.75 to -1.25
- -2.25 to -1.75
- -2.75 to -2.25
- -2.75 and less

GROUND WATER Consulting Ltd.
Bratislava, SLOVAKIA

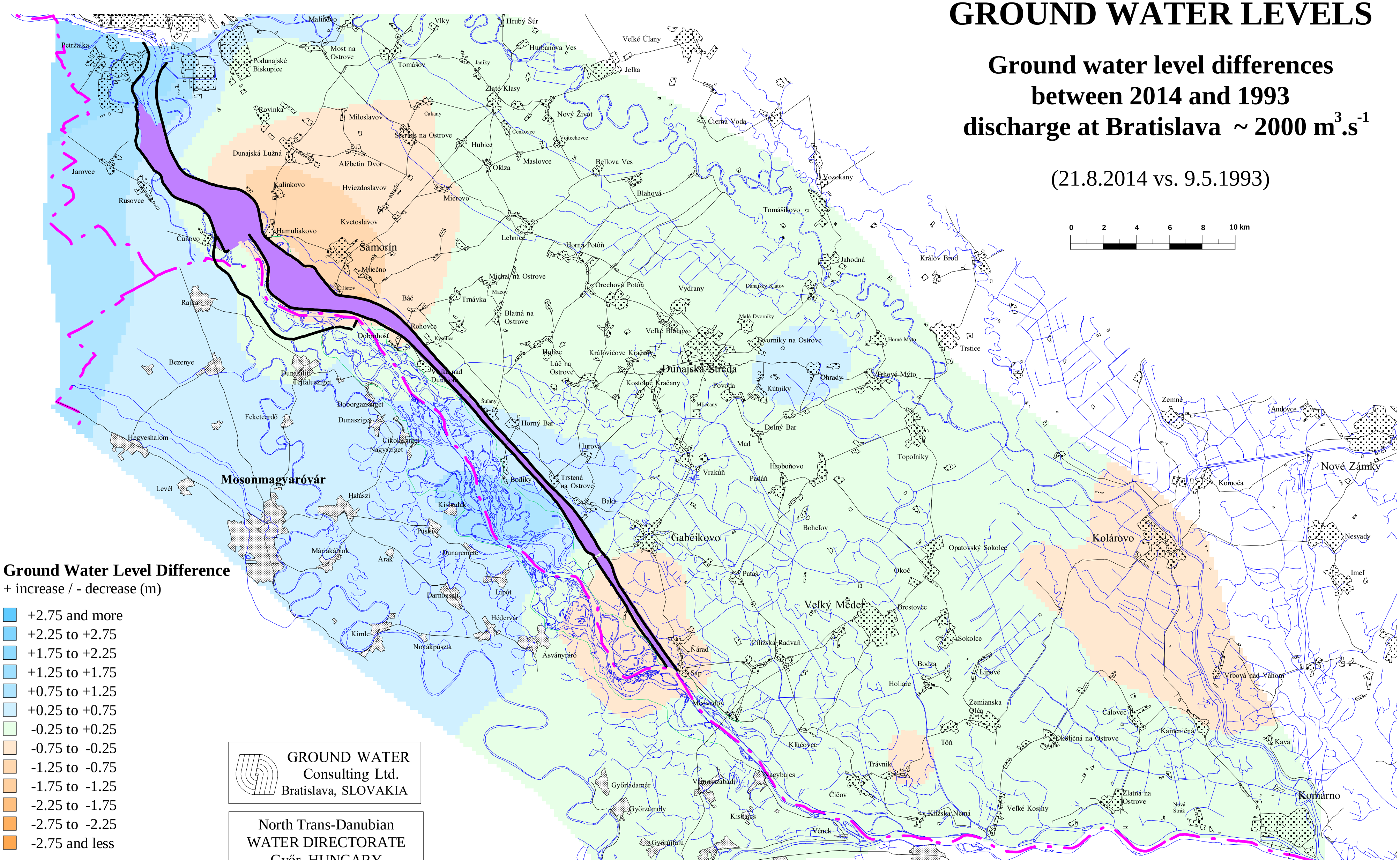
North Trans-Danubian WATER DIRECTORATE
Győr, HUNGARY

Fig. 3-8

GROUND WATER LEVELS

Ground water level differences between 2014 and 1993 discharge at Bratislava ~ 2000 $m^3.s^{-1}$

(21.8.2014 vs. 9.5.1993)



Ground Water Level Difference
+ increase / - decrease (m)

- +2.75 and more
- +2.25 to +2.75
- +1.75 to +2.25
- +1.25 to +1.75
- +0.75 to +1.25
- +0.25 to +0.75
- -0.25 to +0.25
- -0.75 to -0.25
- -1.25 to -0.75
- -1.75 to -1.25
- -2.25 to -1.75
- -2.75 to -2.25
- -2.75 and less

GROUND WATER Consulting Ltd. Bratislava, SLOVAKIA

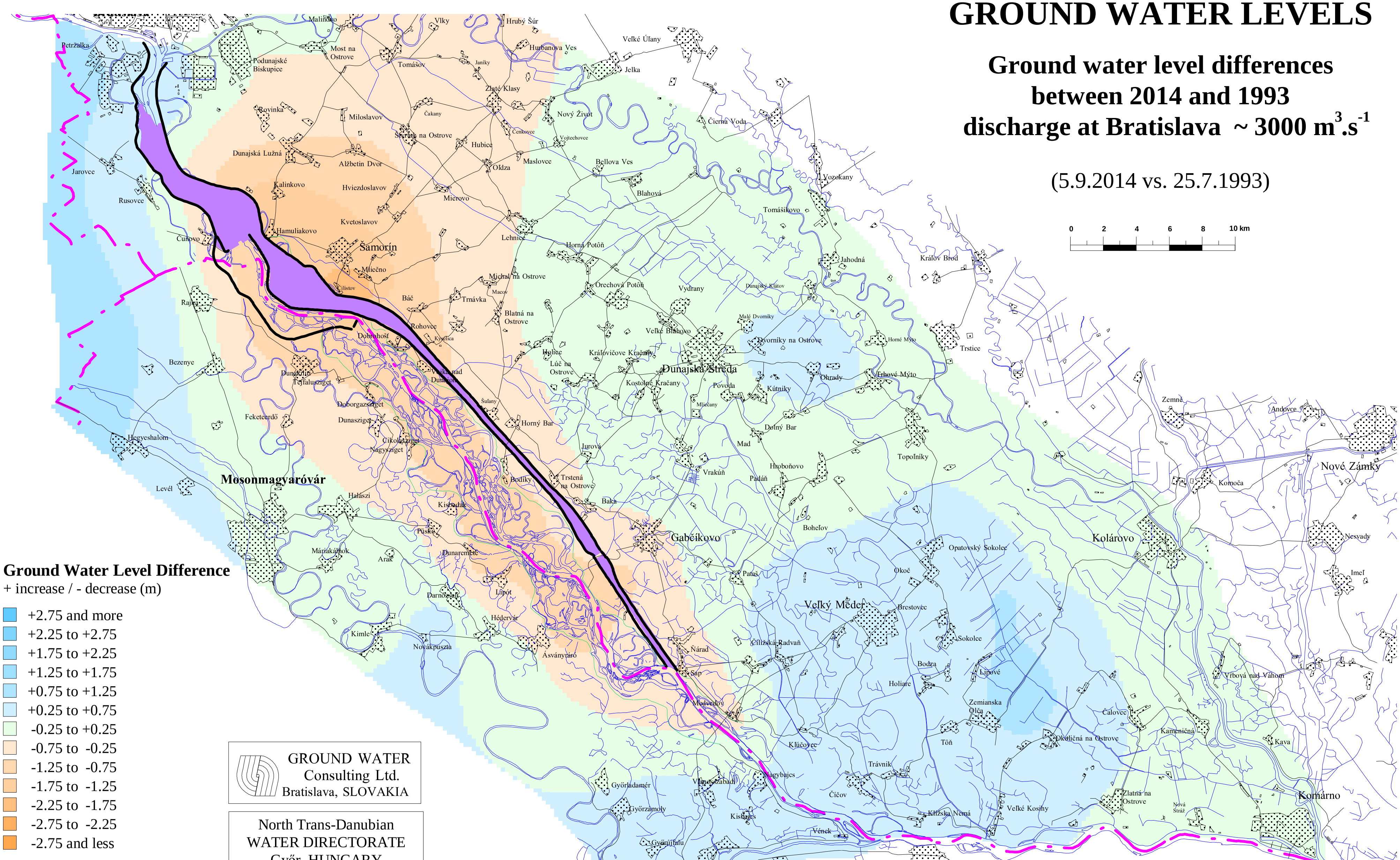
North Trans-Danubian WATER DIRECTORATE Győr, HUNGARY

Fig. 3-9

GROUND WATER LEVELS

Ground water level differences between 2014 and 1993 discharge at Bratislava ~ 3000 $m^3.s^{-1}$

(5.9.2014 vs. 25.7.1993)



Ground Water Level Difference
+ increase / - decrease (m)

- +2.75 and more
- +2.25 to +2.75
- +1.75 to +2.25
- +1.25 to +1.75
- +0.75 to +1.25
- +0.25 to +0.75
- -0.25 to +0.25
- -0.75 to -0.25
- -1.25 to -0.75
- -1.75 to -1.25
- -2.25 to -1.75
- -2.75 to -2.25
- -2.75 and less

GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA

North Trans-Danubian
WATER DIRECTORATE
Győr, HUNGARY

PART 4

Groundwater Quality

The groundwater quality on the Hungarian and Slovak territory is evaluated separately. The list of objects included in the joint monitoring is given in **Table 4-1** and **Table 4-2**, and their position is shown in **Fig. 4-1**. For the evaluation in the Joint Report representative objects for groundwater quality observation have been selected on both sides. Detailed evaluation of groundwater quality for each object included in the joint monitoring was done in the Slovak and Hungarian National Annual Reports on environmental monitoring in 2014. Monitoring data for the year 2014 in tabular form and the long-term graphical development of observed quality parameters for the period 1992-2014 form a part of the National Reports. The data from monitored objects are interpreted in relation to agreed limits for groundwater quality evaluation in the frame of intergovernmental Agreement from 1995. Due to changes in national legislations these limits have been modified in 2011. The limits are listed in **Table 4-3**.

4.1. Evaluation of the groundwater quality on the Hungarian territory

The subject of joint groundwater quality monitoring on the Hungarian side consists of 22 objects, consisting of 16 observation wells and 6 wells that are used for drinking water supply (water sources). While the observation wells have the screens located in the upper part of the gravel sediments, the water supply wells draw water from deeper horizons. The list of monitored objects is given in **Table 4-1**.

Table 4-1: List of monitoring objects on the Hungarian territory

	Country	Object No.	Locality
1	**Hungary**	**9310**	Rajka
2	**Hungary**	**9327**	Dunakiliti
3	**Hungary**	**9331**	Dunakiliti
4	**Hungary**	**9368**	Rajka
5	**Hungary**	**9379**	Rajka
6	**Hungary**	**9413**	Sérfenyősziget
7	**Hungary**	**9418**	Mosonmagyaróvár
8	**Hungary**	**9430**	Kisbodak
9	**Hungary**	**9544**	Halászi
10	**Hungary**	**9456**	Ásványráró
11	**Hungary**	**9457**	Ásványráró
12	**Hungary**	**9458**	Ásványráró
13	**Hungary**	**9475**	Győrzámoly
14	**Hungary**	**9480**	Győrzámoly
15	**Hungary**	**9484**	Vámosszabadi
16	**Hungary**	**9536**	Püski
17	**Hungary**	**Du-I**	water source Dunakiliti
18	**Hungary**	**T-II**	water source Feketeerdő
19	**Hungary**	**Da-I**	water source Darnózseli
20	**Hungary**	**K-5**	water source Győr - Révfalu
21	**Hungary**	**6-E**	water source Győr - Szőgye
22	**Hungary**	**25-E**	water source Győr - Szőgye

Data from wells that are used for drinking water supply are provided by Regional Water Companies. The groundwater quality monitoring in observation wells is carried out by the Győr-Moson-Sopron County Government Office, Department of Environment Protection and Nature Conservation (former North-Transdanubian Inspectorate of Environment and Water). The frequency of monitoring on water supply sources was four times a year, on the observation objects it was twice a year.

In the assessment of groundwater quality in the Joint Report four observation objects were selected on Hungarian territory (No. 9327, 9413, 9430 and 9456) that are mentioned below.

Observation well No. 9327, site: Dunakiliti

Based on long-term data, in the object No. 9327 a seasonal, periodical fluctuation of some water quality parameters is clearly observable. Periodicity primarily appears in changes of water temperature, pH and concentrations of nitrates. The groundwater has low salt content, like the Danube water. The water temperature from time to time exceeds the limit value of 12 °C (in the evaluated year once), but it has never reached the highest limit value (25 °C). Pollution by organic matter, expressed by COD_{Mn}, is rather balanced in last six years and the measured values meet the agreed limits in long-term. After a significant decrease in concentrations of ammonium ions and phosphates in the previous year, contents of these parameters have risen again, but in neither case have not exceeded the agreed groundwater quality limits for drinking purposes (**Table 4-3**). The nitrates content in past two years decreased to the level of detection limit (0.4 $mg.l^{-1}$). Manganese concentrations in last four years have increased and in the evaluated year the highest concentration of 0.45 $mg.l^{-1}$ occurred since the beginning of monitoring. Except the water temperature and manganese, also the iron content in May (0.26 $mg.l^{-1}$) slightly exceeded the limit value of 0.20 $mg.l^{-1}$. Other observed parameters occurred in quantities below respective limit values for groundwater quality evaluation.

Observation well No. 9413, site: Sérfenyősziget

The water temperature in this object is relatively balanced, because it is only to a small extent affected by meteorological conditions. Conductivity values in 2014 were similar as in the previous year, but the content of several water quality parameters (manganese, sodium, nitrates, chlorides, sulphates) slightly decreased. Slight decrease was recorded also in pH values. The content of nitrates in the period 2011-2013 exceeded the limit value (50 $mg.l^{-1}$). Sodium in the autumn decreased to the value of 6.9 $mg.l^{-1}$, which represents the lowest concentration from the start of monitoring. In the long term, the calcium content quite often varies over 100 $mg.l^{-1}$, which is the limit value for this indicator. Concentrations of ammonium and phosphate ions and the contamination by organic matter are low in long-term, and they are below the limit values. This object is characteristic by high manganese concentrations, that consistently exceed the limit value of 0.05 $mg.l^{-1}$. Even though that in the last two years the manganese concentrations decreased significantly (from 0.70 $mg.l^{-1}$ to a level of about 0.26 $mg.l^{-1}$), they are still far beyond the specified limit. In the case of iron, concentration of 0.28 $mg.l^{-1}$ was recorded in the autumn, which was already above the limit value for this parameter (0.2 $mg.l^{-1}$). Based on the data from 2014 it can be stated that from among the observed groundwater quality parameters the manganese, calcium, and in one case also magnesium and iron exceeded the agreed limit values.

Observation well No. 9430, site: Kisbodak

The groundwater in this object has a moderate salt content. The water temperature and the pH values show a slight seasonal fluctuation. The water temperature since 2001 often exceeds the limit value (12 °C). The electric conductivity is relatively balanced since 2002, without significant changes. The organic matter content show seasonal fluctuations, and it is below the limit value (3 $mg.l^{-1}$) in long-term. Low concentrations are characteristic for phosphates and nitrates in long-term. Ammonium ions content show a slight increase within the limit value. Sulphates, in comparison with the year 2013, when the lowest values (8.2 mgl^{-1} and 13.4 mgl^{-1}) had been recorded since the beginning of the monitoring, has increased again to the level of previous years (24.9 mgl^{-1} and 27.4 mgl^{-1}). Iron and manganese concentrations are permanently high in this object and significantly exceed the limit values. In terms of long-term development slight decline of manganese content was observed, but in the last four years its concentrations are relatively balanced and fluctuates around 4.0 $mg.l^{-1}$. In the evaluated year exceedances of limit values were registered in the case of manganese, water temperature and in one case also in the case of iron.

Observation well No. 9456, site: Ásványráró

The groundwater is of medium mineralization and has stable water temperature with a slight seasonal fluctuation. The conductivity values are balanced in last three years. The upward trend in the concentrations of ammonium ions stopped in 2008 and after a slight decrease it has stabilized at concentration higher than the limit value for this parameter. In last six years it oscillates around 1.5 $mg.l^{-1}$. The high ammonium ion content in the water in this object is considered to be background pollution from agricultural activities. From among the other observed nutrients, the content of nitrates and phosphates is low in long-term. The organic matter content, expressed by COD_{Mn}, does not show significant changes and is below the limit value in long-term. is rather balanced in last six years and the measured The groundwater has a high iron and manganese content, with seasonal fluctuation. Concentrations of these parameters significantly exceed the drinking water limit values. From the observed water quality data in 2014 results that ammonium ions, manganese and iron concentrations significantly exceeded the agreed limit values. The calcium content fluctuated just above the limit value and the water temperature in one case very closely (12.1 °C). exceeded the limit value of 12 °C. Concentrations of other observed parameters varied below the respective limit values.

4.2. Conclusions regarding the Hungarian territory

The above results show that the groundwater in shallow horizons of gravel sediments is enriched with iron and manganese. This also applies to other observation wells that were evaluated in the National Report. Iron and manganese concentrations in most observation wells permanently exceed the limit values.

Increased contents of nutrients and organic pollutants mostly relate to local contamination, which is of agricultural origin, or in some cases come from wastewater ponds. In general it can be stated that their content in observation objects has not changed significantly in comparison with the previous year. High contents exceeding the limit values are recorded only at certain objects. For example the water quality at object No. 9368 at Rajka is still affected by local pollution. High ammonium ion contents occur here in long-term, which exceed the limit value by tenfold (in some years up to hundredfold). Phosphates also fluctuate above the limit value and only the content of nitrates in the years 2007-2012 decreased below the limit value. However, in 2013 and 2014 there was always one concentration slightly exceeding the limit value (in 2014 52.8 $mg.l^{-1}$). Contents of ammonium ions occur above the limit value in long-term also on the object No. 9475 at Győrzámoly and also on the above evaluated object No. 9456 at Ásványráró, where the increasing concentrations has stabilized on the level of 1.5 $mg.l^{-1}$ in recent years. Obsolete animal breedings are gradually being disposed of, which is reflected in the groundwater quality improvement, e.g. on the object No. 9458 at Ásványráró, where no signs of fresh pollution were found. The content of nitrates and ammonium ions decreased, but the content of phosphates continues to be seven times higher than the limit value. The change in the concentration of nitrates in the object No. 9418 at Mosonmagyaróvár points to the impact of background pollution. From the long term point of view, after a decrease in nitrate concentrations, it is possible to see again an increase since 2005 and the measured values currently fluctuate around the limit value.

The organic pollution, expressed by COD_{Mn}, mostly meets the limit value. During the monitoring in some objects time-to-time occurred values exceeding the limit value, but since 2008 it was only twice on the object No. 9457 at Ásványráró. At this object in the past three years the organic pollution slightly increased (in the evaluated year 4.5 $mg.l^{-1}$ was measured, while the limit value is 3.0 $mg.l^{-1}$ - **Table 4-3**). On objects close to pollution sources located in the direction of groundwater flow (objects at Rajka and Ásványráró) the changes in groundwater quality related to livestock farming can be well and sensitively observed.

Inorganic and organic micro-pollution is monitored at selected objects (No. 9379, 9413, 9536, 9456 and 9480). In the year 2014, organic micro-pollution was found in concentrations below the limit values for groundwater quality evaluation (**Table 4-3**). From among the inorganic micro-pollutants the concentrations of copper, nickel, lead, cadmium and zinc in certain objects indicate slight pollution. In the case of arsenic exceeding of the highest limit value of 10 $\mu g.l^{-1}$ was found on two objects (11 $\mu g.l^{-1}$ in the object No. 9536 at Püski and 12.3 $\mu g.l^{-1}$ in the object No. 9456 at Ásványráró). Concentrations of mercury and chromium in the evaluated year did not reached the limit of detection.

The groundwater quality in deeper horizons of gravel sediments in the Szigetköz is monitored by production wells in water sources. Wells in the region at Győr have higher content of ammonium ions, organic matter, manganese and iron in comparison with the other monitored wells. Manganese and iron concentrations exceed the limit values or approach them. The concentrations are lower in wells where the water is drawn from a greater depth. The water extracted in water sources Dunakiliti I, Feketeerdő T-II and Darnózseli I is of satisfactory quality and the groundwater quality is characteristic by high stability. In general, the groundwater quality in wells producing potable water (occasionally after pre-treatment) is suitable for drinking water supply.

4.3. Evaluation of groundwater quality on the Slovak territory

The groundwater quality monitoring on the Slovak territory is carried out at 18 objects (10 observation objects and 8 water sources). Their list is given in **Table 4-2**. For the purposes of the Slovak-Hungarian monitoring data of the Western Slovakia Water Company (ZsVS), the Bratislava Water Company (BVS), Slovak Hydrometeorological Institute (SHMÚ) and Ground Water Consulting Ltd. (GWC) were used. Evaluation in the Joint Report is focused mainly on groundwater quality in water sources that are more representative because of their continual pumping.

Table 4-2: List of monitoring objects on the Slovak territory

	Country	Object No.	Location
1	**Slovakia**	**899**	Rusovce, right side of the reservoir
2	**Slovakia**	**888**	Rusovce, right side of the reservoir
3	**Slovakia**	**872**	Čunovo, right side of the reservoir
4	**Slovakia**	**329**	Šamorín, left side of the reservoir
5	**Slovakia**	**87**	Kalinkovo, left side of the reservoir
6	**Slovakia**	**170**	Dobrohošť
7	**Slovakia**	**234**	Rohovce
8	**Slovakia**	**262**	Sap
9	**Slovakia**	**265**	Kľúčovec
10	**Slovakia**	**3**	Kalinkovo, left side of the reservoir
11	**Slovakia**	**102**	water source Rusovce
12	**Slovakia**	**2559**	water source Čunovo
13	**Slovakia**	**119**	water source Kalinkovo
14	**Slovakia**	**105**	water source Šamorín
15	**Slovakia**	**467**	water source Vojka
16	**Slovakia**	**485**	water source Bodíky
17	**Slovakia**	**353**	water source Gabčíkovo
18	**Slovakia**	**907**	water source Bratislava – Petržalka

From among the water sources, three are situated on right side of the Danube (No. 102, 2559 and 907) and five on the left side (No. 119, 105, 353, 485 and 467), while the latter two are located between the Danube old riverbed and the derivation canal. The groundwater quality in the water sources is stable in long-term. The water source Bratislava - Pečniansky les (No. 907) is influenced by the water quality in the Danube. Unlike the other water sources, most parameters here fluctuate and show seasonality. Groundwater quality on the water source at Rusovce (No. 102) and Čunovo (No. 2559) has improved since damming the Danube. The quality on the water sources at Kalinkovo (No. 119) and Šamorín (No. 105) is influenced by the infiltration of surface water from the Danube and from the reservoir. The groundwater quality in the water source at Gabčíkovo (No. 353) differs due to prevailing direction of groundwater flow, coming from the inland area. In the water source at Vojka (No. 467) and Bodíky (No. 485) the groundwater quality is significantly influenced by local conditions.

Right side of the Danube

<u>The water sources at Rusovce – No. 102 and at Čunovo – No. 2559</u>

The groundwater quality in the water source at Rusovce is similar to the water quality in the water source at Čunovo, with certain differences in the values of some parameters. The concentrations of cations, anions and conductivity values on both water sources fluctuate in a narrow range. More significant differences in the measured values are recorded in the case of hydrogen carbonates, which are higher at Rusovce, and in the case of nitrates, which are higher at Čunovo. Small differences and slightly higher contents are registered in the case of calcium, magnesium and chlorides. The contents of these three parameters, together with hydrogen carbonates on the object No. 102 at Rusovce achieves the highest values within the monitored water sources. On both water sources there are low contents of ammonium ions and phosphates in long-term, which mostly vary below their detection limits. In the case of phosphates, in the object No. 102 at Rusovce one higher concentration of 0.32 $mg.l^{-1}$ occurred in the evaluated year, however the other three values were again below the detection limit (0.1 $mg.l^{-1}$). The manganese content is low on both water sources and in long-run satisfies the agreed limit value. The water temperature time to time exceeds the limit value of 12 °C. After a temporary decrease of organic pollution in the years 2009-2013 the COD_{Mn} values has increased again, especially at Rusovce, where higher value of 1.7 $mg.l^{-1}$ was recorded in August. The dissolved oxygen content decreased from the highest values recorded in the year 2013 (at Rusovce 7.77 $mg.l^{-1}$ and at Čunovo 6.94 $mg.l^{-1}$) to a maximum level of 3.13 $mg.l^{-1}$ at Rusovce and 5.17 $mg.l^{-1}$ at Čunovo. The time series of other groundwater quality parameters in water sources at Rusovce and Čunovo are similar, without significant changes. Except the water temperature, all other observed parameters satisfied the agreed limits in the evaluated year.

Waterworks at Bratislava No. – 907

With regard to the location of the water source Pečniansky les, near the Danube, the groundwater quality in the object No. 907 is significantly influenced by changes and fluctuation of chemical components in the Danube water. Values of individual parameters, particularly cations, anions, water temperature, dissolved oxygen content and nitrates concentration considerably fluctuate during the year. The water quality in this water source in the evaluated year has not changed and there were not recorded any high concentrations of observed parameters. In comparison with the other water sources, higher values of dissolved oxygen, nitrates and COD_{Mn} continue to be characteristic for this water source. The concentrations of manganese, ammonium ions and phosphates are in long-term below the detection limits of the applied analytical methods, or just above them. In the last three years, is similarly low also the content of iron. Except the water temperature, which slightly exceeded the limit value (12 °C), another exceedances of the observed parameters did not occurred in the evaluated year.

Left side of the Danube

Water sources at Kalinkovo No. – 116 and at Šamorín – No. 105

The groundwater quality in water sources situated on the left side of the Danube was not influenced by damming as much as the quality of the water sources on the right side. The groundwater chemistry in the water sources at Kalinkovo (No. 119) and at Šamorín (No. 105) is similar since the beginning of monitoring and the course and changes of majority of groundwater quality parameters are also similar. Slightly higher values occur in the water source at Kalinkovo in the case of potassium, manganese and ammonium ions. The ammonium ions content is the second highest from among the monitored water sources (higher is only in the object No. 485 at Bodíky). In the evaluated year the concentrations of ammonium ions varied from 0.06 $mg.l^{-1}$ to

0.12 mg.l^{-1}, but they are low in comparison with the agreed limit value (0.5 mg.l^{-1}). The second highest are also the contents of manganese, which sometimes exceed the limit value (0.05 mg.l^{-1}). The situation in the evaluated year has worsened, since all four concentrations were higher than the limit value and fluctuated in the range from 0.063 to 0.074 mg.l^{-1}. Similarly as in the year 2013, also in 2014 higher concentration of potassium 3.19 mg.l^{-1} was measured (the value of 3.31 mg.l^{-1} in 2013 was the highest since the start of monitoring).

In contrast to the object No. 119 at Kalinkovo, the contents of ammonium ions and manganese in the water source at Šamorín (object No. 105) are low and mostly fluctuate below the detection limits. The potassium content oscillates around 2 mg.l^{-1}. The water temperature on both water sources in August slightly exceeded the limit value according to the **Table 4-3**. Compared to 2013, the dissolved oxygen contents increased, at Šamorín they fluctuated up to 6,19 mg.l^{-1} and at Kalinkovo up to 5,64 mg.l^{-1} (the maximum in 2013 was 3,93 mg.l^{-1} and 3,49 mg.l^{-1}, respectively. In the past three years, the hydrogen carbonates and the magnesium contents are more volatile than in the previous period of monitoring, and concentrations recorded in the evaluated year indicate an upward trend. Overall, the contents of most groundwater quality parameters were similar to that in 2013, only the contents of dissolved oxygen, magnesium and hydrogen carbonates have increased slightly. The agreed limit values for groundwater quality assessment in 2014 has been exceeded by the manganese contents in the water source at Kalinkovo and once by the water temperature in both water sources. The other monitored groundwater quality parameters meet the agreed limit values on both water sources.

Waterworks at Gabčíkovo – No. 103 and 353

The groundwater quality in the water source Gabčíkovo differs from the groundwater quality in water sources at Kalinkovo and Šamorín due to the different groundwater flow direction. The values of a number of quality indicators are relatively balanced in this object: the water temperature, the content of calcium, sodium, chlorides, sulphates and also the conductivity values fluctuates only in a narrow ranges. Relatively balanced are also the nitrates concentrations, which in long-term oscillate around 4 mg.l^{-1} (in 2014 they fluctuated from 3.2 to 4.1 mg.l^{-1}). The dissolved oxygen contents are among the lowest ones, and in the evaluated year they varied from 0.22 to 0.46 mg.l^{-1}. The concentrations of sodium (about 5 mg.l^{-1}), potassium (about 1 mg.l^{-1}) and chlorides (about 10 mg.l^{-1}) are among the lowest from among all other monitored objects. The sodium and potassium concentrations reach only half of the values recorded in water sources at Šamorín or Kalinkovo. Contents of ammonium ions, phosphates, iron and manganese are low in long-term, and mostly oscillate at the level of detection limits of the analytical methods used. The organic pollution, expressed by COD_{Mn}, is below the detection limit (0.5 mg.l^{-1}) since 2002. By comparing the measured contents of monitored parameters in the year 2014 with the agreed limit values for groundwater quality evaluation (**Table 4-3**), it can be stated that except one concentration of phosphates another exceedances did not occurred.

Water sources at Vojka – No. 467 and Bodíky – No. 485

The groundwater quality in water sources at Vojka and Bodíky is strongly influenced by local conditions.

The groundwater in the water source at Vojka has a satisfactory quality for drinking purposes. Contrary to the other water sources, the time series of cations and chlorides are balanced. Concentrations of ammonium ions, manganese and iron, as well as the COD_{Mn} values are low in long-term and in the evaluated year the were lower than the detection limits. The water temperatures sometimes exceeds the limit value of 12 °C, in the evaluated year only once with a value of 13.7 °C. The content of nitrates was similar to that in 2013, and ranged from 3.1 to 3.5 $mg.l^{-1}$. In the period of years 2007-2014 improvement of redox conditions occurred in the water source at Vojka, and since than the dissolved oxygen content fluctuates around 2 $mg.l^{-1}$ (in 2014 from 1.17 $mg.l^{-1}$ to 1.76 $mg.l^{-1}$). In August, high phosphate concentration was recorded (1.20 $mg.l^{-1}$), which was not confirmed by the control sample in the second half of the month (0.14 $mg.l^{-1}$).

The water quality in the water source at Bodíky (No. 485) differs in a number of parameters. From among the monitored water sources, for this object are characteristic the lowest contents of dissolved oxygen, nitrates and sulphates, and conversely the highest values for water temperature, ammonium ions and especially manganese. The manganese concentrations exceed the agreed limit value at each determination, in the evaluated year they fluctuated from 0.46 to 1.0 $mg.l^{-1}$. The water temperature in 2014 was also above the limit value, and ranged from 12.4 to 13.4 °C. Concentrations of ammonium ions ranged from 0.22 to 0.38 $mg.l^{-1}$, so they were lower than the limit value for this parameter (0.5 $mg.l^{-1}$). The dissolved oxygen content was very low (0.06 to 0.26 $mg.l^{-1}$), and the nitrates did not reached the limit of determination (1 $mg.l^{-1}$). Similarly at in the water source at Vojka, also in this object high value for phosphates was measured (0.76 $mg.l^{-1}$) in August, which, however, was not confirmed by the control sample (at the end of the month was the content only 0.08 $mg.l^{-1}$). The organic pollution, expressed by COD_{Mn}, is mostly below the detection limit (0.5 $mg.l^{-1}$), although occasionally higher values occur, in 2014 it was a value of 0.97 $mg.l^{-1}$.

From among the monitored quality indicators on the water source at Bodíky the agreed limits were not met in the case of manganese and water temperature at each determination, and one times the content of phosphates exceeded the limit value. On the water source at Vojka exceeding of the agreed limit in 2014 was registered in the case of one concentration of phosphates and one value of water temperature.

4.4. Conclusions regarding the Slovak territory

Based on the above assessment it can be concluded that the quality of groundwater in the monitored water sources is stable in long-term and generally complies with the agreed limits for drinking water (**Table 4-3**). Exceedances of limits occur in the case of water temperature, manganese and in some years also in the case of iron. The limit value for the water temperature in 2014 was exceeded at seven monitored water sources. Only on the water source at Gabčíkovo the water temperature was lower than the limit value 12 °C at all four samplings. The manganese content exceeded the agreed limit value on the waterworks at Bodíky in each determination, similarly as in the other years of monitoring. Occasional exceedances of the limit value for manganese occurred also on the water source at Kalinkovo, however in the year 2014 all four measured concentrations were above the limit value.

Based on long-term measurements it can be stated that the organic pollution, expressed by COD_{Mn}, decreased during the observed period. From among nutrients the phosphates and ammonium ions occur in low concentrations at observed objects in long-term and currently they are mostly below the detection limits of applied analytical methods. Only at Bodíky and Kalinkovo the ammonium ions fluctuate above the detection limit, but do not exceed the limit value agreed for this groundwater quality parameter. During the evaluated year, three unusually high concentrations of phosphates occurred (at Bodíky, Vojka and Gabčíkovo), which exceeded the limit value. However, as it was previously mentioned, they were not validated by the control samplings. The highest contents of nitrates (up to 21.7 $mg.l^{-1}$), with strong seasonal variation, are registered on the water source Pečniansky les, due to its location close to the Danube. On the other objects the nitrates content recently varies at low level, from 3 to 8 $mg.l^{-1}$ or less (at Rusovce and Bodíky). The inorganic and organic micro-pollution observed in the evaluated year on water sources No. 353, 467 and 485 was low. Except the manganese, phosphates and the water temperature, another exceedances on monitored water sources in 2014 were not registered.

The groundwater quality in observation objects that are evaluated in the National Report is more influenced by local impacts. Monitoring results show that the agreed limits are exceeded more frequently in comparison with the water sources. Exceedances occur in case of ammonium ions, manganese, iron and water temperature. Inorganic and organic micro-pollution is monitored at selected observation objects (No. 888, 872, 329, 170, 234, 262 and 265). In 2014, the highest limit value was exceeded in two pesticides: in the case of atrazine in the object No. 234 and in the case of terbutryn in the objects No. 888 and 872. From among the inorganic pollution the nickel content exceeded the agreed limit value in the object No. 265. Other indicators of the organic and inorganic micro-pollution were found in concentrations below the limit values for groundwater quality evaluation (**Table 4-3**). From among the heavy metals the zinc, copper, cadmium, chromium and nickel concentrations indicate slight pollution at some observation objects. The arsenic, mercury and lead contents in the evaluated year did not reached the level of detection limit. Concentrations of all other analysed components of groundwater quality in observation objects in the year 2014 meet the agreed limits for drinking water quality.

Table 4-3: Groundwater quality limits for drinking purposes

Basic parameters - physical and chemical parameters

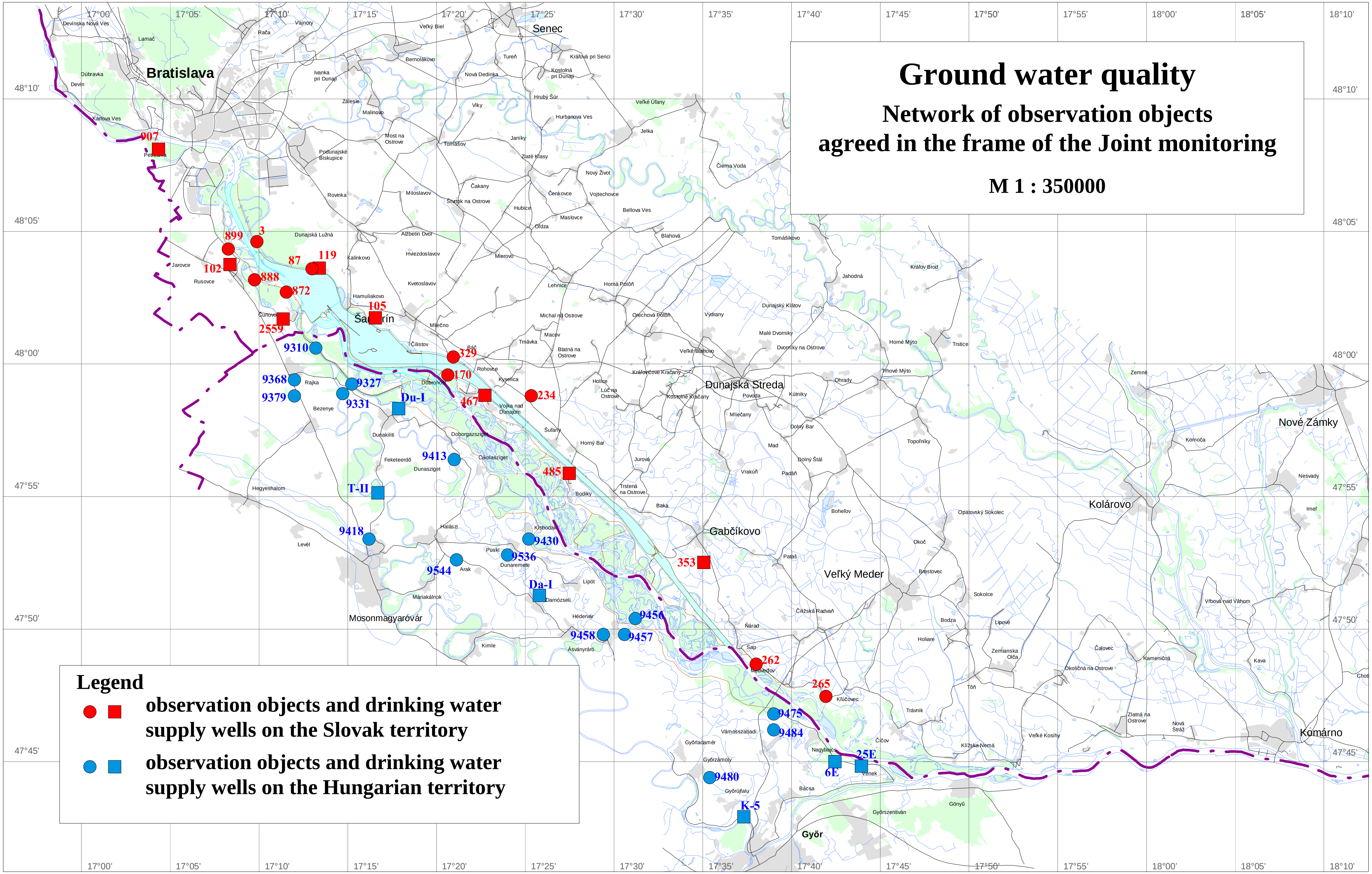
parameter	unit	limit value	highest limit value
temperature	°C	12	25
pH	-	6.5-9.5	
conductivity at 25 °C	$mS.m^{-1}$	250	
O_2	$mg.l^{-1}$	-	
COD_{Mn}	$mg.l^{-1}$	3	5
NH_4^+	$mg.l^{-1}$	0.5	
NO_3^-	$mg.l^{-1}$	50	
PO_4^{3-}	$mg.l^{-1}$	0.5	
Mn	$mg.l^{-1}$	0.05	
Fe	$mg.l^{-1}$	0.2	
Na^+	$mg.l^{-1}$	200	
K^+	$mg.l^{-1}$	10	12
Ca^{2+}	$mg.l^{-1}$	100	
Mg^{2+}	$mg.l^{-1}$	30	50
HCO_3^-	$mg.l^{-1}$	-	
Cl^-	$mg.l^{-1}$	250	
SO_4^{2-}	$mg.l^{-1}$	250	

Supplemental parameters – inorganic and organic micropollutants

parameter	unit	limit value	highest limit value
Inorganic micropollutants - heavy metals			
As	$\mu g.l^{-1}$		10
Cd	$\mu g.l^{-1}$		5
Cr	$\mu g.l^{-1}$		50
Cu	$\mu g.l^{-1}$	200	2000
Hg	$\mu g.l^{-1}$		1
Ni	$\mu g.l^{-1}$		20
Pb	$\mu g.l^{-1}$		10
Zn	$\mu g.l^{-1}$	200	3000
Organic micropollutants			
pesticides – sum	$\mu g.l^{-1}$		0.5
pesticides – individually	$\mu g.l^{-1}$		0.1
aldrin	$\mu g.l^{-1}$		$\Sigma \leq 0.03$
dieldrin	$\mu g.l^{-1}$		
heptachlor	$\mu g.l^{-1}$		0.03
heptachlor epoxide	$\mu g.l^{-1}$		0.03
trichloroethylene	$\mu g.l^{-1}$		$\Sigma \leq 10$
tetrachloroethylene	$\mu g.l^{-1}$		
DDT/DDD/DDE	$\mu g.l^{-1}$	1	5
HCH – sum	$\mu g.l^{-1}$		$\Sigma \leq 0.1$

HCH – hexachlorciclohexane

Fig. 4-1


Ground water quality
Network of observation objects
agreed in the frame of the Joint monitoring
M 1 : 350000
Legend
observation objects and drinking water supply wells on the Slovak territory
observation objects and drinking water supply wells on the Hungarian territory
Bratislava
Senec
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr
907
899
3
102
888
87
119
872
105
2559
9310
9368
9379
9327
9331
Du-I
329
170
467
234
9413
485
T-II
9418
9430
9536
9544
Da-I
353
9456
9457
9458
262
265
9475
9484
6E
25E
9480
K-5

PART 5

Soil Moisture Monitoring

5.1. Data collection methods

The soil moisture monitoring is carried out on the Slovak side on 20 monitoring areas (12 forest monitoring areas, 5 biological monitoring areas and 3 agricultural areas) and on the Hungarian side on 14 monitoring areas (6 forest monitoring areas and 8 agricultural areas). The list of monitoring areas is given in **Table 5-1** and **5-2** and their situation is shown in **Fig. 5-1**. The Slovak Party measures the soil moisture using a neutron probe to the prescribed depth or to the depth of the groundwater level. The Hungarian Party measures the soil moisture with a capacity probe to a maximum depth of 3 m. The soil moisture is expressed by the total soil moisture content in volume percentage. Measurements are performed at 10 cm depth intervals. The Hungarian Party in 2014 did not carried out the soil moisture measurements, therefore the development of soil moisture on the Hungarian territory could not be evaluated.

Table 5-1: List of monitoring stations on the Slovak side

	Country	Station No.	Locality and position
1	**Slovakia**	**2703**	Dobrohošť, inundation area
2	**Slovakia**	**2704**	Bodíky, inundation area
3	**Slovakia**	**2705**	Bodíky, inundation area
4	**Slovakia**	**2706**	Gabčíkovo, inundation area
5	**Slovakia**	**2707**	Kľúčovec, inundation area
6	**Slovakia**	**2716**	Rohovce, agricultural area
7	**Slovakia**	**2717**	Horný Bar - Šuľany, agricultural area
8	**Slovakia**	**2718**	Horný Bar, agricultural area
9	**Slovakia**	**2755**	Sap, inundation area
10	**Slovakia**	**2756**	Gabčíkovo, inundation area
11	**Slovakia**	**2757**	Baka, inundation area
12	**Slovakia**	**2758**	Trstená na Ostrove, inundation area
13	**Slovakia**	**2759**	Horný Bar - Bodíky, inundation area
14	**Slovakia**	**2760**	Horný Bar - Šuľany, inundation area
15	**Slovakia**	**2761**	Horný Bar - Bodíky, inundation area
16	**Slovakia**	**2762**	Vojka nad Dunajom, inundation area
17	**Slovakia**	**2763**	Vojka nad Dunajom, inundation area
18	**Slovakia**	**2764**	Dobrohošť, inundation area
19	**Slovakia**	**3804**	Medveďov, inundation area
20	**Slovakia**	**3805**	Kľúčovec, inundation area

Table 5-2: List of monitoring stations on the Hungarian side
(not observed in 2013 and 2014)

	Country	Station No.	Location
1	**Hungary**	**T02**	Halászi H15 – agricultural area
2	**Hungary**	**T03**	Dunakiliti 16 – agricultural area
3	**Hungary**	**T04**	Dunaremete – agricultural area
4	**Hungary**	**T06**	Rajka 0 – agricultural area
5	**Hungary**	**T09**	Püski P14 – agricultural area
6	**Hungary**	**T10**	Ásványráró A19 – agricultural area

	Country	Station No.	Location
7	**Hungary**	**T11**	Püski P5 – agricultural area
8	**Hungary**	**T12**	Lipót L18 – agricultural area
9	**Hungary**	**T15**	Hédervár 11B – forest stand
10	**Hungary**	**T16**	Dunasziget 22B – forest stand, inundation area
11	**Hungary**	**T17**	Dunasziget 15D – forest stand, inundation area
12	**Hungary**	**T18**	Lipót 4A – forest stand, inundation area
13	**Hungary**	**T19**	Ásványráró 27C – forest stand, inundation area
14	**Hungary**	**T20**	Dunakiliti 15E – forest stand, inundation area

5.2. Data presentation methods

The node of presentation of monitoring results have not changed. The soil moisture content is displayed in figures showing the average volume percentage of moisture for the depth interval from 0 to 100 cm and from 110 to 200 cm. At selected sampling sites the concrete soil moisture measurements are presented in colour charts with soil moisture time distribution for the entire monitoring period and for the entire measured depth. Monitoring data are comprehensively processed in the National Annual Reports on environmental monitoring and the graphical presentation of each monitoring site is given in Annexes.

5.3. Evaluation of results on the Hungarian side

Since no measurements on the Hungarian side were performed in 2014, no results were presented in this Joint Report..

5.4. Evaluation of results on the Slovak side

Soil moisture on the Slovak side are observed on sites located in the inundation area and flood-protected agricultural area (**Fig. 5-1**).

Monitoring sites located in the agricultural area (No. 2716, 2717, 2718)

Monitoring sites that are located in the agricultural area are situated behind the derivation channel on regularly cultivated agricultural land. The soil moisture content during the entire observation period runs similarly. Since 2004, slight increase of the soil moisture content can be seen, while the groundwater level position and fluctuation remained mostly unchanged. Since 2011, however, slight decrease of groundwater level can be seen, especially on sites No. 2716 and 2718, what in the depth interval 1-2 m below the surface was reflected in a decline of soil moisture content (**Fig. 5-2**).

The groundwater level at all three monitoring sites is relatively balanced. At the monitoring site No. 2716 the groundwater level usually fluctuates at a depth of 2.6 to 4.2 m, in the year 2014 it was from about 3.3 to 4.5 m. At the site No. 2717 the groundwater level fluctuates at a depth of 2.0 to 3.5 m (**Fig. 5-3**). The groundwater level at the site No. 2718 varies in the depth of 1.5 to 3.0 m, however in early 2014 has decreased to 3.3 m, which was the lowest level since starting the observation. As in 2013, the groundwater level was favourably affected by discharge waves that make it in a lesser or greater extent raised. The reason for the significant drop in groundwater levels at the beginning of the year was the long-term low flow rate period on the Danube, which mainly in March and April varied far below the long-term average values.

In the year 2014 the fluctuation of soil moisture content in both depth intervals depended on climatic conditions. Only during higher discharges in the Danube old riverbed in May and September the groundwater level partially influenced the layers in the depth around 2 m (**Fig. 5-3**).

The soil moisture values in the depth interval 0-1 m at the site No. 2716 mostly vary in the range between 5 to 20 %, in 2014 it was from 5 to 22 %. Values at the site No. 2717 usually fluctuate between 20 and 30 %, in 2014 they varied between 20 and 31 %. The soil moisture content at the site No. 2718 mostly reaches values between 25-35 %, in the year 2014 it was from 26 to 36 %. The soil moisture content in the winter period started at an average level and due to poor precipitations it rose only slightly until the end of March. Since the beginning of the growing season it began to decrease and declined almost until the end of July. Thanks to rich precipitations in late July, in August and particularly in the first half of September the soil moisture content has increased continuously and after a slight temporary decrease it was increasing until the end of the year. The maximal values at all three sites occurred at the end of the year, in December 2014. The lowest values for the year 2014 were recorded during July.

In the depth interval between 1 and 2 m the soil moisture values are more balanced. At the monitoring site No. 2716 they usually vary from 12 to 20 %, in 2014 were in the range from 11 to 16 %. At the monitoring site No. 2717 mostly reaches 28 to 37 %, in the year 2014 they fluctuated from 23 to 29 %. At the monitoring site No. 2718 they usually range from 16 to 30 %, in 2014 ranged from 17 to 28 %. Comparing to the previous year the soil moisture content in 2014 in this depth interval slightly decreased and at monitoring sites No. 2716 and 2717 it ranged on the level of the lowest values for the whole period of monitoring. The minimal average values of the soil moisture content were recorded during the summer; on sites No. 2716 and 2717 also during the winter period. Maximal average values occurred in September, when higher discharge was released into the Danube old riverbed.

Table 5-5: The minimal and maximal average soil moisture contents at agricultural monitoring sites

Monitoring site	Layers down to 1 m depth		Layers between 1-2 m depth	
	minimum [%]	maximum [%]	minimum [%]	maximum [%]
2716	5,38	22,19	11,63	15,99
2717	18,40	31,00	23,36	29,47
2718	26,00	36,25	17,49	28,41

Monitoring sites located in the inundation area (No. 2703-2707, 2755-2764, 3804, 3805)

The soil moisture in the inundation area, along with the groundwater level and precipitation, is highly dependent on natural or artificial floods. In the year 2014 a flood wave did not occur, however there were several discharge waves in May, August, September and October. None of these discharge waves flooded the inundation area, only short-term flooding of the lowest part of the inundation area occurred during the highest discharge waves in May and October. These two discharge waves influenced the soil moisture content in the upper soil layers in the depth interval 0-1 m at monitoring sites No. 2755, 2756, 3804 and 3805 in the area of Istragov and below the confluence of the tail race canal and the Danube old riverbed. On the rest of the monitoring sites the soil moisture content in the upper soil layers has been influenced only by climatic conditions. Deeper soil horizons in the depth between 1 and 2 m has been moisturized by every discharge wave, but in the upper part of inundation area only the bottom part of this depth interval was influenced. Thanks to the discharge wave in October and precipitations in November and December 2014, the soil moisture content at the end of the year was higher than at the beginning. On most of monitoring sites minimal values occurred in July, at several sites in April. The maximal average values occurred in September during increased discharges into the Danube old riverbed, or at the end of the year. Concerning the minimal and the maximal average values it can be generally stated that the minimal values in both depth intervals were higher than in the previous year at almost every monitoring site. The maximal values in the depth interval 0-1 m were lower or similar and in the depth interval 1-2 m they were lower in the upper and lower part of the inundation area, while in the middle part they were higher.

The thickness of soil profile at monitoring sites No. 2703, 2764, 2763, 2762 and 2761 in the upper part of the inundation area is low, similarly to the Hungarian side. The groundwater level at these places fluctuates only in the gravel layer. In 2014 the groundwater level on area No. 2703 fluctuated from 3.9 to 5.0 m, during increased discharge in September it raised to 2 m below the surface. On areas No. 2764, 2763, 2762 and 2761 the groundwater level changed from 2.0 to 4.8 m. Layers to 1 m depth are almost exclusively dependent on climatic conditions. Only higher flood waves can influence the soil moisture content by increasing the groundwater level. Layers below 1 m depth are also dependent on climatic conditions, however the bottom part of this depth interval was slightly influenced by discharge waves. Maximal average soil moisture contents occurred at the end of the year, only in the depth interval 1-2 m the maximal values at sites No. 2762, 2763 and 2764 occurred during increased discharge into the Danube old riverbed in September.

The thickness of the soil profile in the middle part of the inundation area is higher. In general the groundwater regime in this region is influenced by the water supply of the river branch system, introduced in May 1993. Moreover, the natural or artificial floods have significant influence on the groundwater level. The groundwater level in 2014 fluctuated slightly above the boundary between the soil profile and gravel layers - monitoring sites No. 2704, 2705, 2757, 2758, 2759, 2760 (**Fig. 5-5**) and in the growing season partially supplied the soils with water. During the year the groundwater level on area No. 2704 fluctuated from 2.4 to 4.0 m, during increased discharge in September it raised to 0.9 m below the surface. On areas No. 2705, 2757, 2758, 2759 and 2760 it mostly changed from 1.4-3.7 m (**Fig. 5-4a, Fig. 5-5**). The maximal values of average soil moisture content in both, in the layer down to 1 m depth and in the layer below 1 m depth occurred after the increased discharge into the Danube old riverbed or at the end of the year. Minimal values in the layer down to 1 m depth were mostly reached during the summer, in the layer below 1 m depth it was at the beginning of the year (January-February 2014 - **Fig. 5-4b**).

In the lower part of inundation area, downstream of confluence of the river branch system and the Danube old riverbed (monitoring sites No. 2706, 2756, 2755), the groundwater level usually fluctuates around the boundary between the soil profile and gravel layer (**Fig. 5-6a**). The groundwater level in 2014 fluctuated in the depth between

1.4 and 4.7 m. During discharge waves in May and October the groundwater level raised up to 0.4 m below the surface, the lowest part of the inundation area was even flooded. Until May 2014 the soil moisture was mostly dependent on precipitations. Thanks to the discharge wave in May the soil moisture content significantly increased, but with the decrease of flow rates the soil moisture also decreased. This scenario has repeated during every discharge wave until the end of October. Thanks to the discharge wave in October and precipitations in November and December 2014, the soil moisture content at the end of the year was higher than at the beginning. Minimal values in the layer down to 1 m depth occurred in July, in the depth below 1 m at the beginning of the year. Maximal values in both depth intervals occurred after the discharge waves in May and October or during the increased discharge into the Danube old riverbed in September 2014 (**Fig. 5-6a,b**).

Table 5-6: The minimal and maximal average soil moisture contents at monitoring sites in the inundation area

Monitoring site	Layers down to 1 m depth		Layers between 1-2 m depth	
	minimum [%]	maximum [%]	minimum [%]	maximum [%]
2703	10.87	24.52	13.20	19.77
2704	16.14	32.57	24.63	29.90
2705	41.77	48.92	42.13	44.14
2706	16.03	27.46	25.52	34.51
2707	10.91	22.16	15.09	29.06
2755	19.31	47.20	11.73	41.60
2756	20.74	31.38	32.00	43.83
2757	21.93	36.36	13.89	39.57
2758	36.83	43.42	17.81	45.27
2759	19.78	25.94	29.60	40.99
2760	15.19	35.93	10.19	24.61
2761	10.16	29.50	5.49	8.25
2762	23.39	34.15	31.20	42.68
2763	7.86	23.87	3.47	12.07
2764	18.29	31.45	6.31	8.16
3804	37.81	44.18	38.98	47.09
3805	30.23	43.64	19.94	40.73

The soil moisture contents at monitoring sites No. 2707, 3804, 3805, that are located in the inundation below the confluence of the tailrace canal and the Danube old riverbed, are highly influenced by the flow rate regime in the Danube. The maximum average values in 2014 in both, the layer down to 1 m depth and in the layer between 1 and 2 m depth, occurred after the highest discharge waves in 2014, in May and October. The lowest values occurred at the end of April and in July 2014. The groundwater level at monitoring sites No. 2707, 3804 and 3805 fluctuated in the depth 0.9-4.4 m, but during the discharge waves in May and October the groundwater level have raised to the surface. The riverbed erosion negatively influences also these monitoring areas. During low flow rates in the Danube, as it was in the period from January to April 2014, the groundwater level does not supply the soil profiles sufficiently.

Fig. 5-1

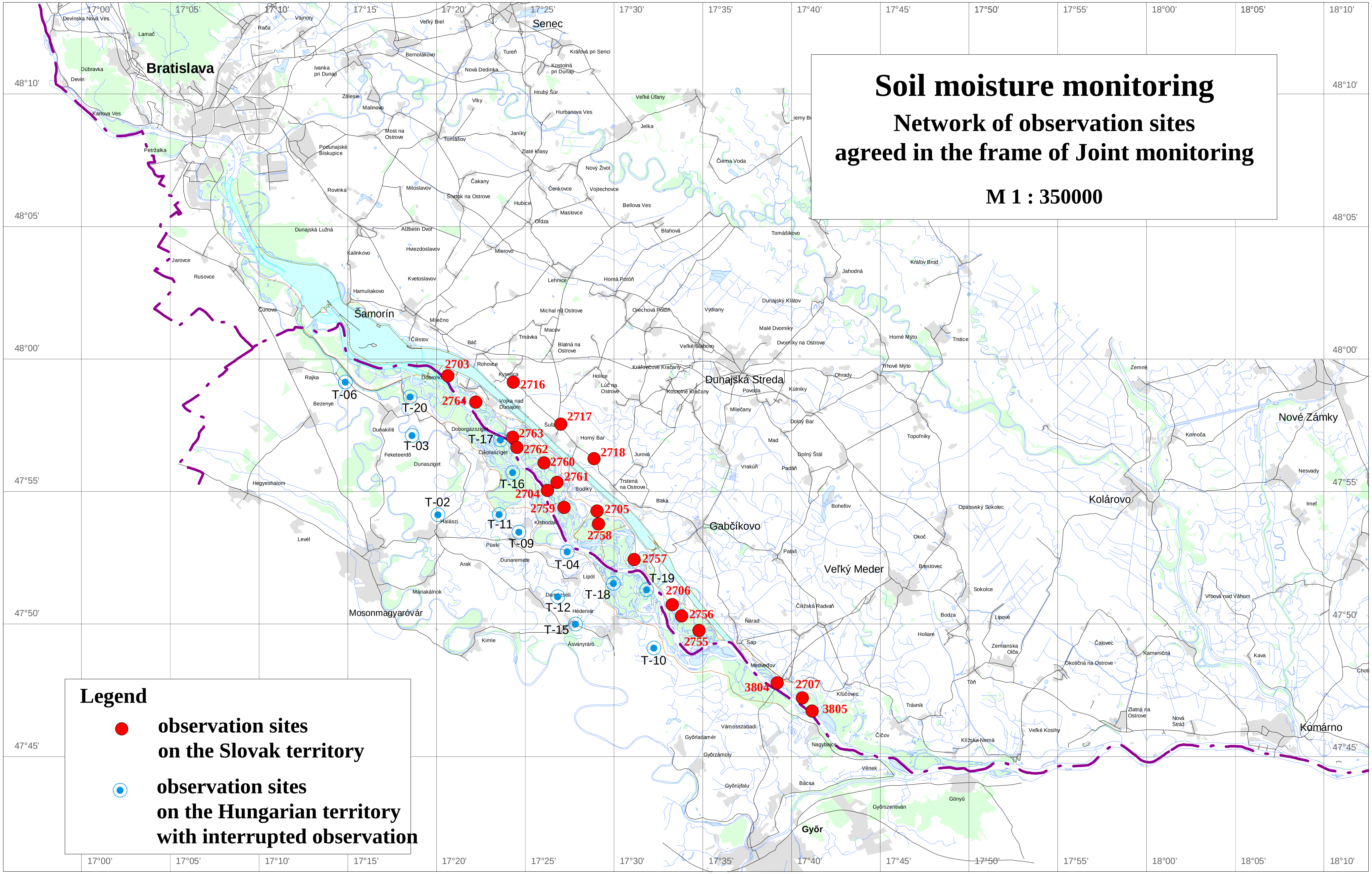
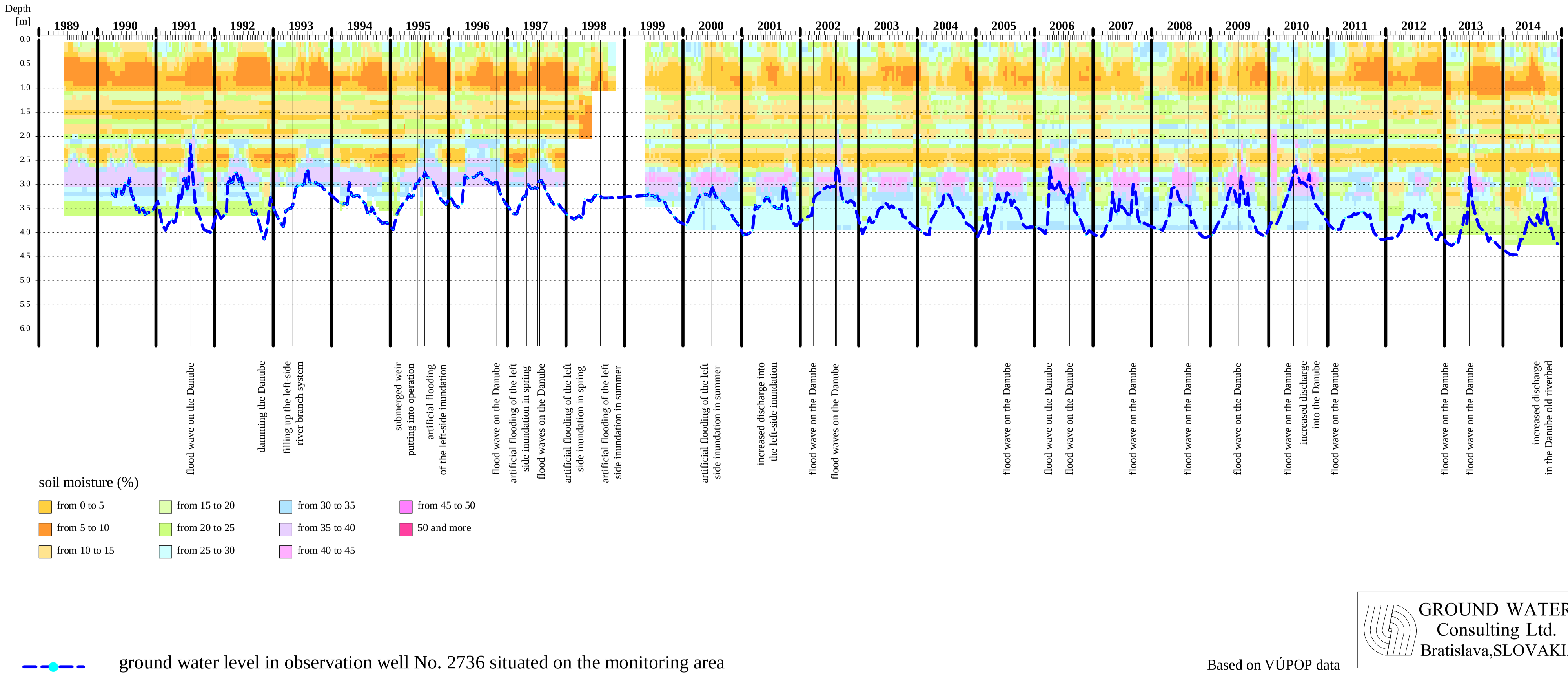

Soil moisture monitoring
Network of observation sites
agreed in the frame of Joint monitoring
M 1 : 350000
Legend
observation sites
on the Slovak territory
observation sites
on the Hungarian territory
with interrupted observation
Bratislava
Senec
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr
2703
2716
2764
2717
2763
2762
2718
2760
2761
2704
2759
2705
2758
2757
2706
2756
2755
3804
2707
3805
T-06
T-20
T-03
T-17
T-16
T-02
T-11
T-09
T-04
T-19
T-18
T-12
T-15
T-10

Fig. 5-2

Soil moisture monitoring

Locality: **2716 - Rohovce, MP-4**

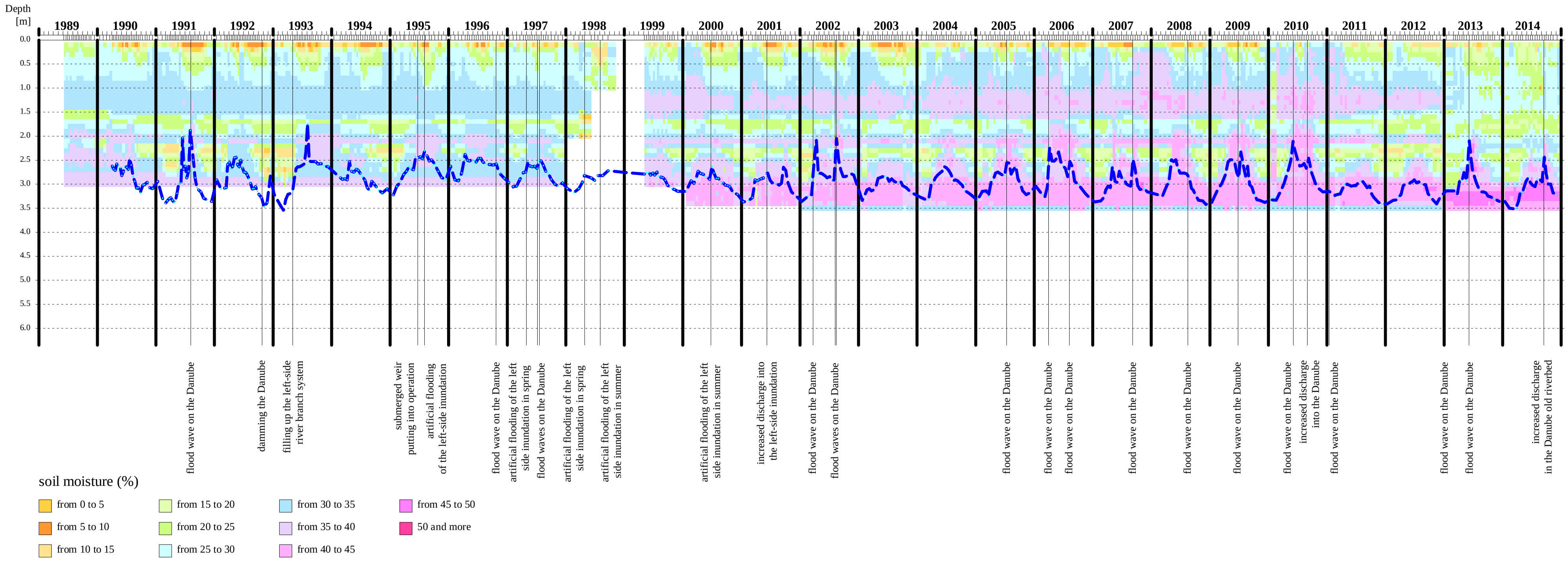


Based on VÚPOP data

GROUND WATER Consulting Ltd. Bratislava, SLOVAKIA

Fig. 5-3 Soil moisture monitoring

Locality: **2717 - Horný Bar - Šuľany, MP-5**



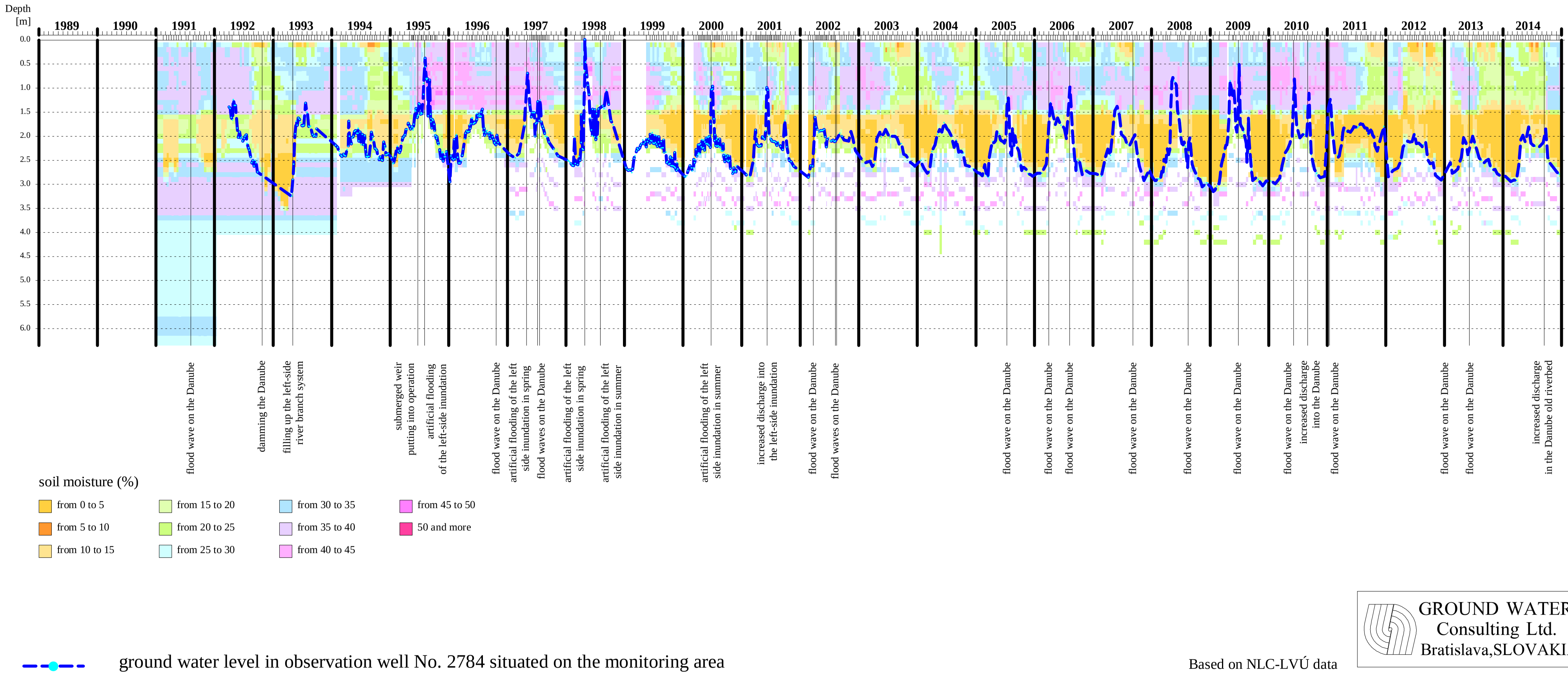
Based on VÚPOP data

GROUND WATER Consulting Ltd. Bratislava,SLOVAKIA

Fig. 5-4a

Soil moisture monitoring

Locality: **2760 - Horný Bar - Šuľany, L-8**

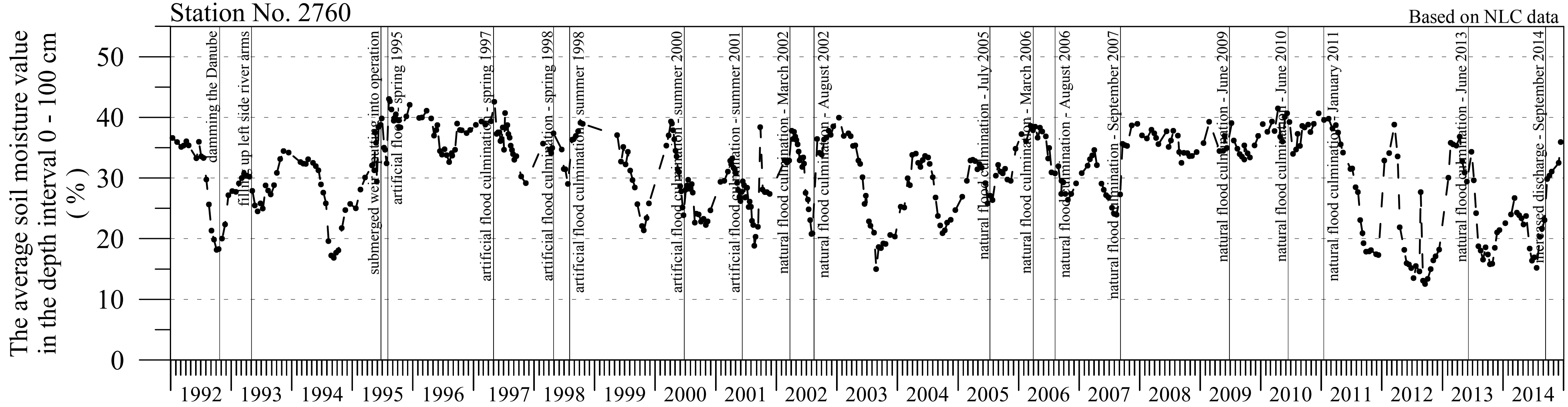


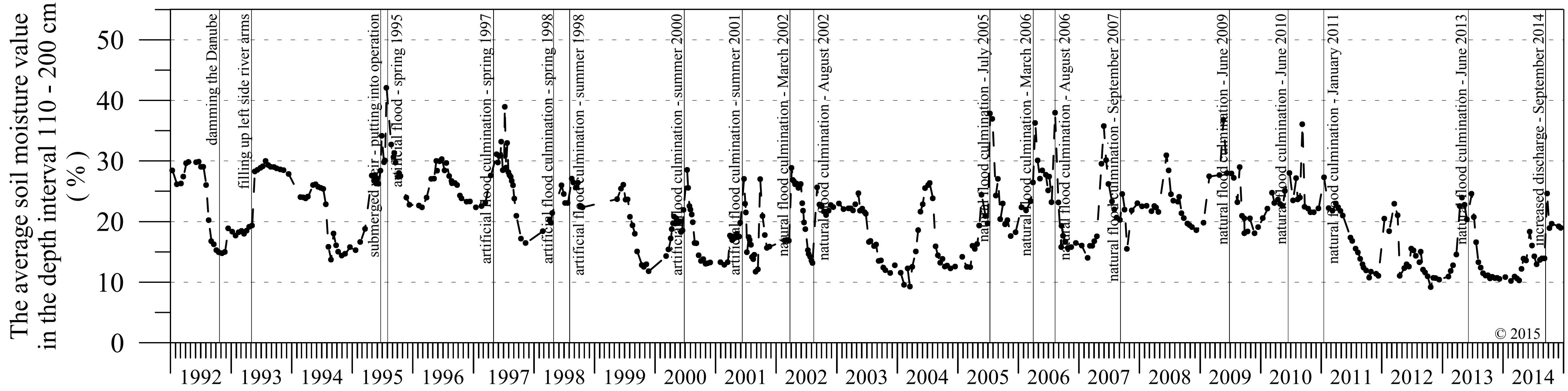
Based on NLC-LVÚ data

GROUND WATER Consulting Ltd. Bratislava,SLOVAKIA

Fig. 5-4b

S o i l   m o i s t u r e



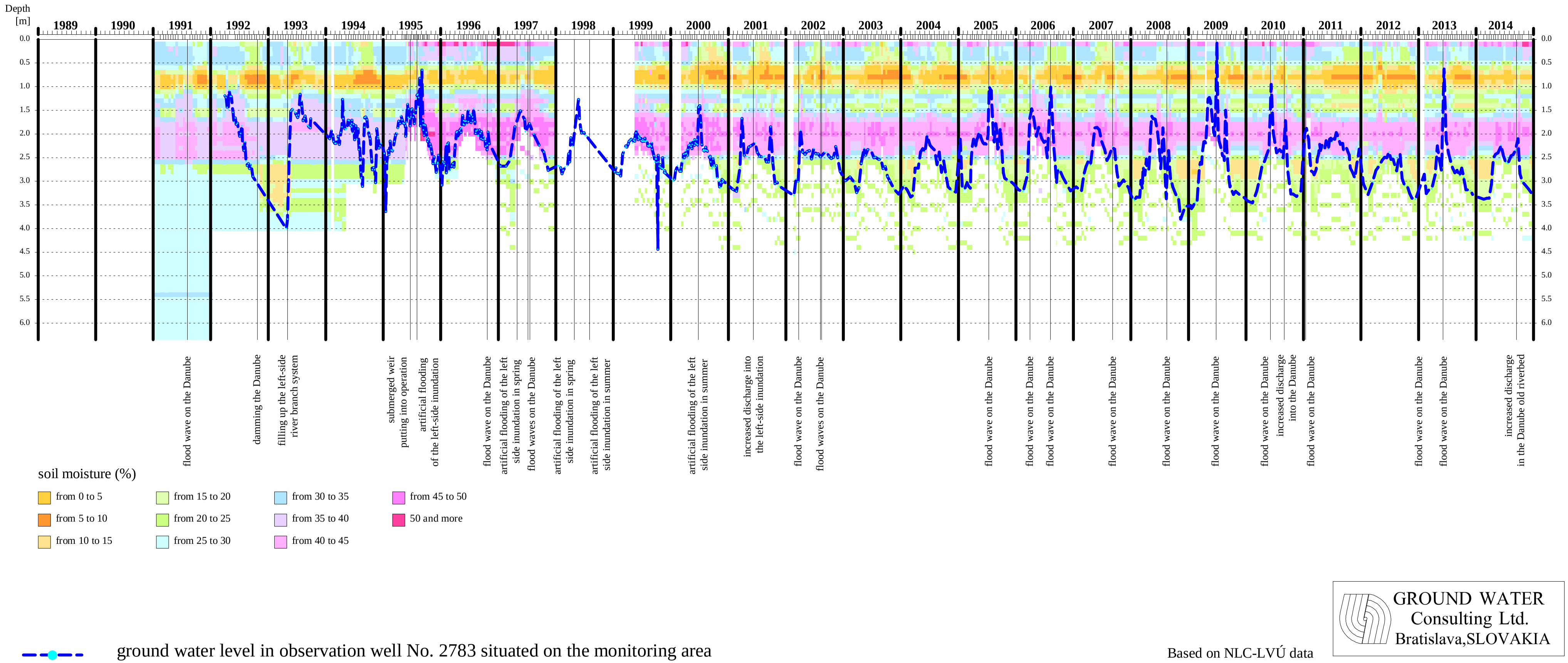


GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA

Fig. 5-5

Soil moisture monitoring

Locality: **2759 - Horný Bar - Bodíky, L-7**



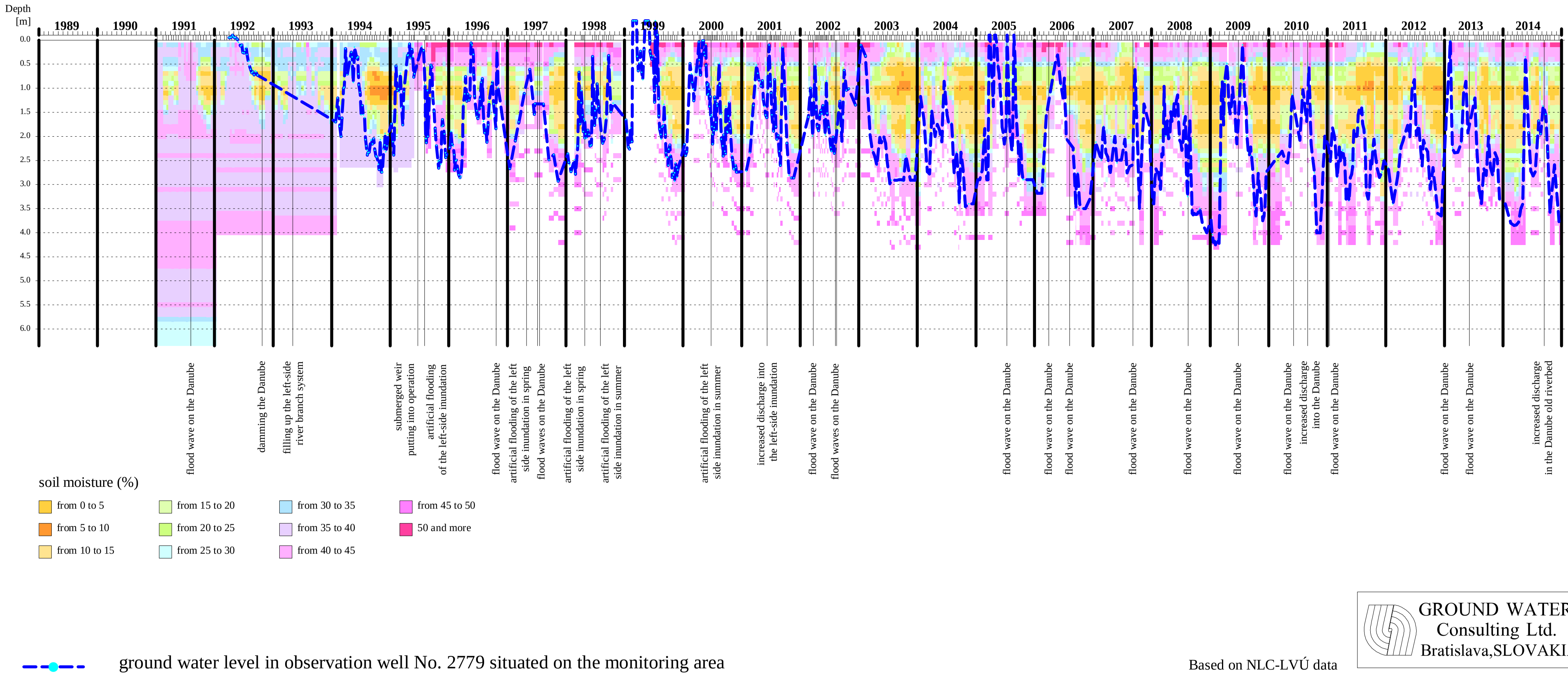
Based on NLC-LVÚ data

GROUND WATER Consulting Ltd. Bratislava,SLOVAKIA

Fig. 5-6a

Soil moisture monitoring

Locality: **2755 - Sap, L-3**

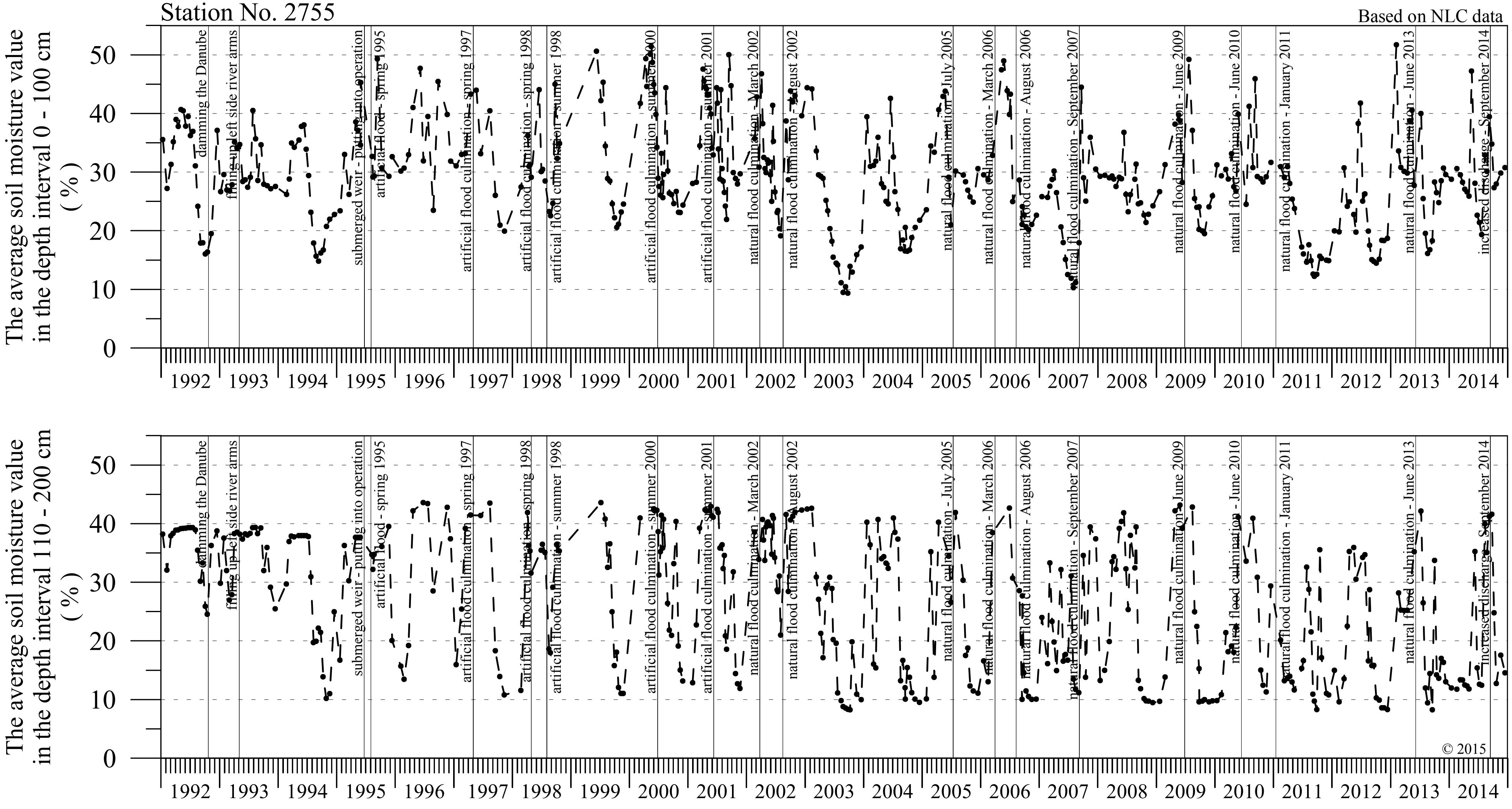


Based on NLC-LVÚ data

GROUND WATER Consulting Ltd. Bratislava,SLOVAKIA

Fig. 5-6b

Soil moisture



GROUND WATER Consulting Ltd. Bratislava, SLOVAKIA

PART 6

Forest Monitoring

The development of forests, as well as plant and animal communities evaluated in Part 7 – Biological Monitoring, was influenced by below-mentioned hydrological and climatic conditions:

- The average annual flow rate in 2014 belongs to below the average flow rates on the Danube (the third lowest average annual flow rate in the period of operation of the Gabčíkovo Hydropower Plant). The flow rate regime had a typical course, low flow rates in the winter period and higher flow rates in the spring and summer. In May, August, September and October there occurred discharge waves, whose common feature was their short duration. Neither discharge wave was not large enough to cause at least a partial flooding of inundation, except a short flooding of a small region at the confluence of the tail-race canal and the Danube old riverbed.
- In terms of total precipitations the year 2014 can be regarded as considerably above the average. Unfavourable was the time distribution of precipitations during the year, when the highest totals occurred in late summer and early autumn.
- In terms of average daily air temperatures the evaluated year can be characterized as slightly above the average, while the first half of the year was significantly above the average.

6.1. Evaluation of the Slovak territory

Monitoring sites on the Slovak territory are situated in the inundation area. The list of monitored sites is given in **Table 6-1** and their situation is shown in **Fig. 6-1**. In accordance with the intergovernmental Agreement the Slovak Party also in the year 2014 observed the development of basic growth parameters, weekly girth growth and the health state of trees by terrestrial way. In the evaluated year an areal evaluation of the health state of forest stands was also carried out, which generally takes place at three-year intervals. Slovak and Hungarian experts on forest monitoring have been cooperated within the INMEIN project on development of an innovative monitoring system providing a uniform approach for monitoring the floodplain forest using remote sensing methods.

In the Slovak inundation area the most productive cultivated poplar stands are monitored. At present the poplar clone Pannonia had already replaced the poplar clones I-214 and Robusta, as well as the white willow stand, on all originally observed areas. On two substitutive areas the weekly girth growth of the poplar clone I-214 are temporarily observed.

The development of most forest stands in the evaluated year did not show significant differences in comparison with the previous years.

The height increment quality classification in most of observed forest stands remains basically unchanged. Majority of stands is characterized by intensive or moderate growth increment. On the area No. 2687 a gradual improvement of height increment can be seen during the last five years. More significant decline in growth increment continued to be noticeable in the young poplar stand on area No. 2682, where the intensity of height increment in last three years have decreased from the quality level 40 below the quality level 36.

Table 6-1: List of the forest monitoring areas on the Slovak side

Area No.	Area label	River km	Locality	Tree species	Age of trees
2681	L-3	1812	Sap	poplar - *Populus x euroamericana Pannonia*	11
2682	L-4	1816	Gabčíkovo	poplar - *Populus x euroamericana Pannonia*	6
2683	L-5	1821.5	Baka	poplar - *Populus x euroamericana Pannonia*	7
2684	L-6	1824.5	Trstená na Ostrove	poplar - *Populus x euroamericana Pannonia*	10-(12)
2685	L-7	1828.5	Horný Bar – Bodíky	poplar - *Populus x euroamericana Pannonia*	15
2686	L-8	1831.5	Horný Bar – Šuľany	poplar - *Populus x euroamericana Pannonia*	8
2687	L-9	1830	Horný Bar – Bodíky	poplar - *Populus x euroamericana Pannonia*	14
2688	L-10	1834	Vojka nad Dunajom	last unsuccessful reforestation in 2008	-
5573	L-10a*	1834	Vojka nad Dunajom	poplar - *Populus x euroamericana I-214*	cca 20
2689	L-11	1834.5	Vojka nad Dunajom	poplar - *Populus x euroamericana Pannonia*	(12)-14
2690	L-12	1838	Dobrohošť	last unsuccessful reforestation in 2006	-
4436	L-12b*	1838	Dobrohošť	poplar - *Populus x euroamericana I-214*	cca 41
3802	L-25	1806	Medveďov	poplar - *Populus x euroamericana Pannonia*	19
3803	L-26	1803	Kľúčovec	poplar - *Populus x euroamericana Giant*	17

* - on substitutive areas marked by letters “a” or “b” only temporary measurement of weekly girth growth is carried out

The weekly girth growth measurements in young Pannonia poplar stands (monitoring areas No. 2681, 2683, 2684, 2686) have been started in 2011. The cumulative girth growth increment values of young poplars at individual areas were low, except the area No. 2683, where, compared to the previous year, significantly higher values were registered. In contrast, significantly lower cumulative girth growth increments were registered on the area No. 2681. Generally, in the evaluated year there were no significant fluctuations of hydrological and meteorological conditions, which could be put into unambiguous association with an intensification or slowing down of the diameter increments of poplars. After unsuccessful attempts the reforestation of areas No. 2688 and 2690 was not realized yet, thus the girth growth measurements continue to be carried out on the substitutive areas No. 5573 and 4436. At the start of monitoring on substitutive areas, values of cumulative increments were relatively high, but over the following 3-4 years they decreased significantly. In the year 2013 the diameter increment has temporarily increased again, but values in the evaluated year were again rather low. The reason of this fluctuation has not yet been clarified.

The zero weekly girth growth increments in most areas during the growing period were absent, or they were recorded only sporadically. An exception was the area No. 2686, where multiple zero increments were registered on two of the three observed trees. The length of the growth period was average in the evaluated year. The initiation of the growth in stands was recorded in early or mid April and the growth of trees mostly ended in the second half of September. Clear growth peak could not be identified on most of observed poplars. The exception was a significant growth peak on one of the trees on the area No. 2684 and two smaller growth peaks on trees on the area No. 2683. These facts, could not be clearly explained by the actual hydrometeorological conditions.

The monitored cultivated poplar stands (Pannonia and Giant clones) were without changes healthy and vital. Still is observed only isolated, weak attack by diseases and pests, on some areas a slight increase of technical and foliar pests was registered in the evaluated year.

The areal evaluation of the health state of the forest was based on aerial photography, that was realised within the INMEIN project in fall 2013. According to the results the health state on the area of interest is very good and stable. From the forest management point of view it can be stated that by implementation of hydrotechnical measures suitable conditions for the existence, development and production of floodplain forests has been ensured on the majority of the area. The portion of stands with defoliation up to 30 % remains above 90 % in long-term (**Fig. 6-2**), the hypothesis of a large scale adverse impact of the Gabčíkovo Power Plant on forest health has not been confirmed. The portion of moderately damaged stands (defoliation from 31 to 50%) in the evaluated year increased only slightly and the heavily damaged stands (defoliation above 50%) remain absent. Larger groups of damaged stands are found only in the upper part of the area above the intake structure at Dobrohošť and below, down to Vojka nad Dunajom, where improvement is expected, after the completed restoration measures (water supply). More detailed results are given in the National Annual Report on monitoring in 2014.

At the end it should be noted that the overall tendency in groundwater levels at most of observed sites is decreasing in long-term. For this reason it is necessary to emphasize the efficient use of existing weirs in the river branch system to mitigate the effects of groundwater level decline and to ensure annual artificial flooding of the area. It is also necessary to ensure an earlier increase of discharges to the river branch system, before the start of growing season.

6.2. Evaluation of the Hungarian territory

The forest monitoring in the Szigetköz area continued also in the year 2014. However, contrary to the previous year, significant change in the monitoring methodology has been introduced (INMEIN project). Measurements were previously carried out on permanent monitoring plots (**Table 6-2**), on numbered trees. Since, the number of observed areas decreased significantly due to felling, new approach has been applied in 2014. The forest compartments were sorted into strata according to species and age and from these strata were randomly selected plots for monitoring. The field measurements was carried out before the growing season at the end of the winter. Each of the trees on the monitoring plots was positioned by FieldMap Data acquisition system. Altogether, dendrometric measurements have been performed on 30 selected monitoring plots (**Table 6-3**). The measurement of dendrometric characteristics consists of diameter measurement at breast height and height measurement within the observed plot.

In addition, weekly girth growth increments were observed during the vegetation period in three forest compartments, where three monitoring plots are established. On selected plots three different tree species were observed, where 7 to 10 trees were weekly measured. A total of 26 numbered trees were monitored. The modified Hall-Liming girth growth tape was used for measurement.

Table 6-2: List of former forest monitoring areas on the Hungarian side

No.	Observation object	Location	Tree species	Age (2013)
1	9994B	Dunasziget 22C (22B)*	oak-ash mixed stand	58
2	9980	Lipót 4A/4	poplar "I-214"	28
3		Dunakiliti 15B	poplar "Pannonia"	26
4		Dunakiliti 5F	poplar "I-58/57"	25
5	9994A	Dunasziget 22A	poplar "Pannonia"	25
6	9500	Dunasziget 26C (25C)	poplar "Pannonia"	24
7		Dunasziget 7A (4A)	poplar "Pannonia"	23
8		Dunasziget 6B (5B)	poplar "Pannonia"	17
9	9508	Győrzámoly 6A (7A)	poplar "Robusta"	33
10		Győrzámoly 6B2	poplar "Pannonia"	17
11		Kisbodak 18M (15I)	poplar "Kornik"	18
12		Kisbodak 19E (16T)	white willow	24
13		Kisbodak 1A	poplar "Pannonia"	20
14		Lipót 11B	poplar "I-58/57"	25
15		Dunasziget 16A*	poplar „Pannonia"	28

* - measurement of weekly girth growth is carried out

Table 6-3: New monitoring plots in forest compartments on the Hungarian side

No.	Stratum	Tree species	Number of tree	Area
1	Ab10	Pedunculate oak *Quercus robur* (2), Sessile oak *Quercus petraea* (1)	3	2500
2	Ab8	Black locust *Robinia pseudoacacia*	30	200
3	-	-	-	-
4	Aa2	Poplar clone "Pannonia" *Populus x euroamericana Pannonia*	36	2000
5	D8	Pedunculate oak *Quercus robur* (28), American ash *Fraxinus americana* (1), Turkey oak (*Quercus cerris*) (1)	30	200
6	Aa1	Poplar clone "Pannonia" *Populus x euroamericana Pannonia* (9), White poplar *Populus alba* (2)	11	100
7	Ab8	White poplar *Populus alba*	27	100
8	Aa5	White willow *Salix alba*	52	2500
9	C8	Pedunculate oak *Quercus robur*	19	50
10	Aa4	White poplar *Populus alba*	18	700
11	Aa4	Poplar clone "Pannonia" *Populus x euroamericana Pannonia*	16	500
12	D11	Scots pine *Pinus sylvestris* (25), American ash *Fraxinus americana* (11), Field elm *Ulmus minor* (8), Silver birch *Betula pendula* (1)	45	500
13	Aa1	White willow *Salix alba* (31), American ash *Fraxinus americana* (1), Poplar clone "Pannonia" *Populus x euroamericana Pannonia* (1)	33	1000
14	Aa4	Poplar clone "Pannonia" *Populus x euroamericana Pannonia* (12), White willow *Salix alba* (2)	14	1000
15	Aa4	White willow *Salix alba*	16	500
16	Aa4	White willow *Salix alba*	17	700
17	Aa4	Poplar clone "Pannonia" *Populus x euroamericana Pannonia* (10), American ash *Fraxinus americana* (4), Maple ash *Acer negundo* (2), White willow *Salix alba* (1), White poplar *Populus alba* (1)	18	800
18	Aa4	European ash *Fraxinus excelsior* (9), Maple ash *Acer negundo* (4)	13	300

No.	Stratum	Tree species	Number of tree	Area
19	Aa2	Poplar clone "Pannonia" *Populus x euroamericana Pannonia*	17	200
20	D8	Pedunculate oak *Quercus robur*	21	50
21	C8	White willow *Salix alba*	11	300
22	C8	Pedunculate oak *Quercus robur*	33	100
23	Ab8	White poplar *Populus alba*	19	200
24	Ab11	Pedunculate oak *Quercus robur* (17), American ash *Fraxinus americana* (13), European ash *Fraxinus excelsior* (4), European alder *Alnus glutinosa* (1), Field elm *Ulmus minor* (1)	36	600
25	Aa5	White willow *Salix alba*	12	500
26	Aa4	Poplar clone "Pannonia" *Populus x euroamericana Pannonia*	7	500
27	Aa3	Poplar clone "Pannonia" *Populus x euroamericana Pannonia*	17	500
28	Bb10	White willow *Salix alba* (23), White elm *Ulmus laevis* (1)	24	700
29	Aa3	Poplar clone "Pannonia" *Populus x euroamericana Pannonia*	17	700
30	Ab5	White poplar *Populus alba* (10), Poplar clone "Pannonia" *Populus x euroamericana Pannonia* (3), American ash *Fraxinus americana* (2)	15	700
31	Ab2	White poplar *Populus alba* (6), White elm *Ulmus laevis* (4) , European ash *Fraxinus excelsior* (1)	11	1000

Because measurements regarding the year 2014 were carried at the end of winter period in early 2015, only one set of data has been obtained for each monitoring plot. The newly selected monitoring plots does not match formerly observed monitoring areas, thus no evaluation could have been done. The basic idea of the newly introduced INMEIN project is to develop an innovative monitoring system which could provide a uniform approach for monitoring the floodplain forest, complying with international standards. In addition, the system can serve for studying other terrestrial ecosystems and habitats (the naturalness assessments, habitat maps and studies of natural disturbances up to the examination of forest stand structure).

Concerning the areal evaluation of the health state of the forest joint aerial photography has been carried out in 2013 (within the INMEIN project). Evaluation on the Hungarian territory, however, has not been done yet.

Fig. 6-1

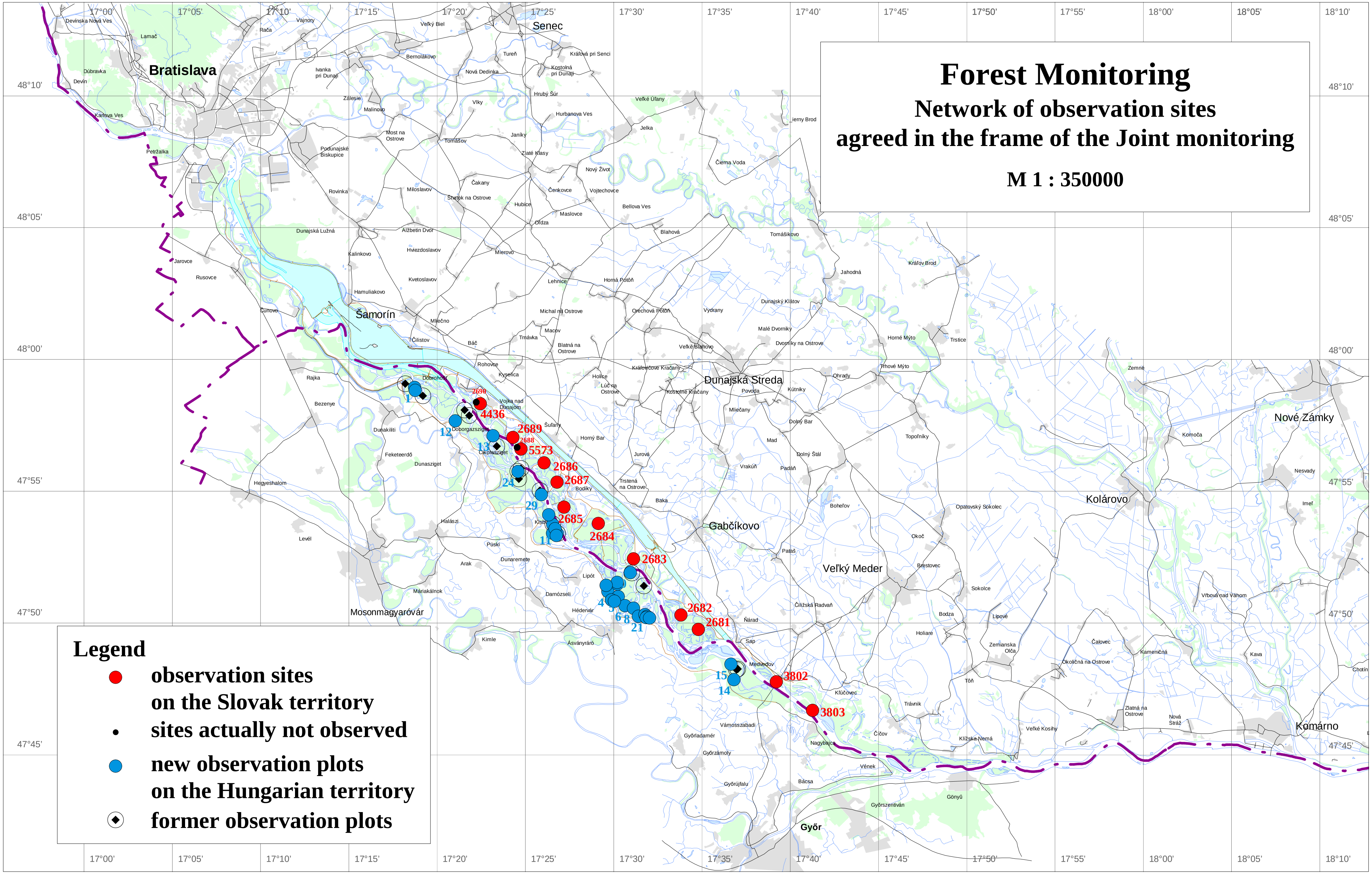
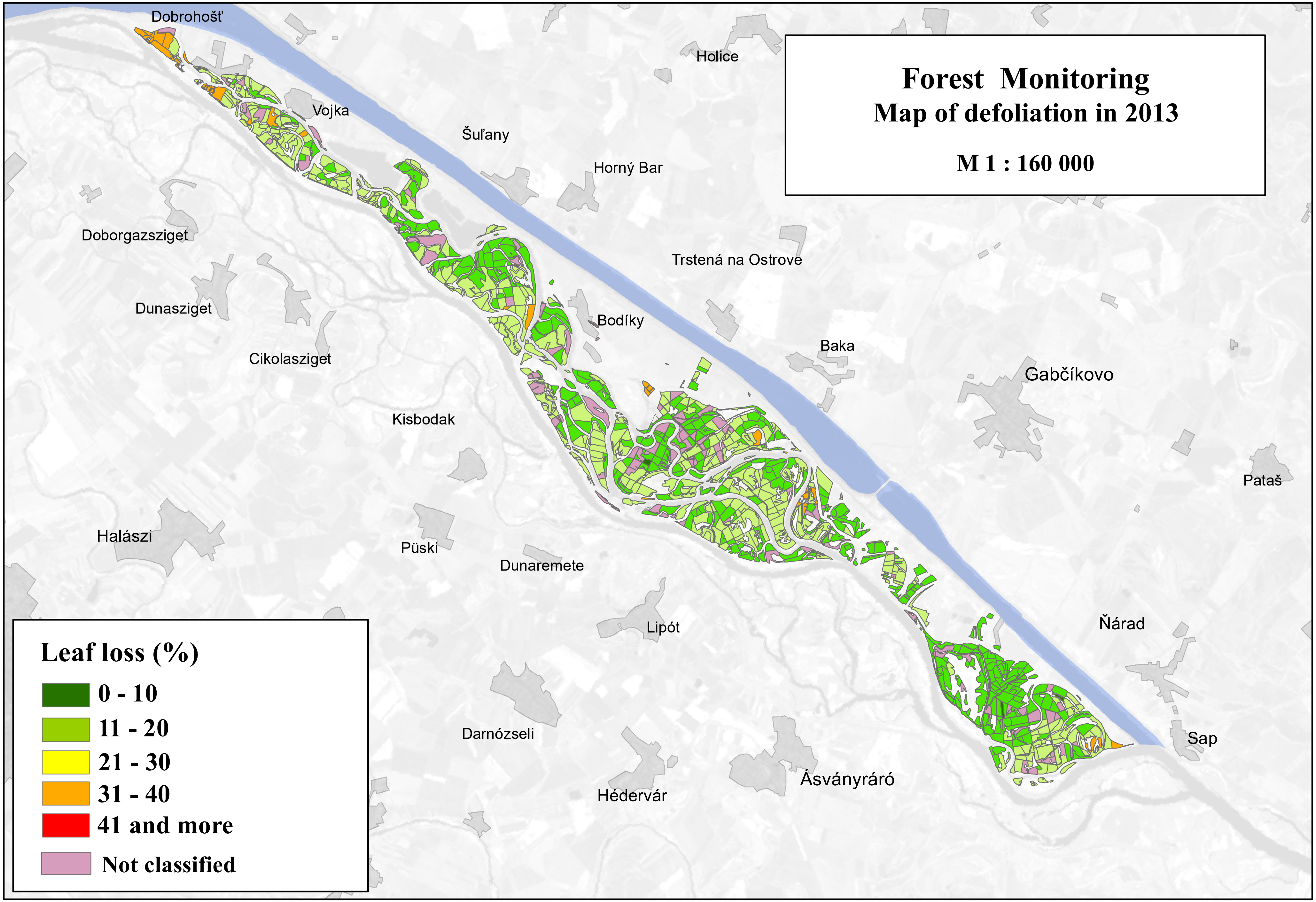

Forest Monitoring
Network of observation sites
agreed in the frame of the Joint monitoring
M 1 : 350000
Legend
observation sites
on the Slovak territory
sites actually not observed
new observation plots
on the Hungarian territory
former observation plots
Bratislava
Senec
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr
2690
4436
2689
2688
5573
2686
2687
2685
2684
2683
2682
2681
3802
3803
1
12
13
24
29
11
4
5
6
8
21
15
14
17°00'
17°05'
17°10'
17°15'
17°20'
17°25'
17°30'
17°35'
17°40'
17°45'
17°50'
17°55'
18°00'
18°05'
18°10'
48°10'
48°05'
48°00'
47°55'
47°50'
47°45'

Fig. 6.2


Forest Monitoring
Map of defoliation in 2013
M 1 : 160 000
Leaf loss (%)
0 - 10
11 - 20
21 - 30
31 - 40
41 and more
Not classified
Dobrohošť
Vojka
Šuľany
Horný Bar
Holice
Trstená na Ostrove
Bodíky
Baka
Gabčíkovo
Pataš
Ňárad
Sap
Doborgazsziget
Dunasziget
Cikolasziget
Kisbodak
Halászi
Püski
Dunaremete
Lipót
Darnózseli
Hédervár
Ásványráró

PART 7

Biological Monitoring

The monitoring of agreed groups of plants and animals in the year 2014 was performed only on the Slovak territory. The Hungarian Party suspended the biological monitoring, similarly as in 2012. The biological monitoring on the Slovak territory was performed on six complex monitoring areas, their position is displayed on **Fig. 7-1**. The list of observed groups of plants and animals is given in **Table 7-1**.

Table 7-1: The list of monitoring areas and monitoring sites

No.	Name	Id	Locality	Monitored groups									
								Macrozoobent.				Zoopl.	
				A	B	C	D	E	F	G	H	I	J
Slovak side – complex monitoring areas													
1	B-6	2600	Dobrohošť – Dunajské kriviny	●		●	●	●	●	●		●	●
2	B-9	2603	Bodíky – Bodícka brána	●	●	●	●	●	●	●		●	●
3	B-10	2604	Bodíky – Kráľovská lúka	●	●	●	●	●	●	●		●	●
4	B-14	2608	Gabčíkovo – Istragov	●	●	●	●	●	●	●		●	●
5	B-15	2609	Sap – Erčéd	●			●						
6	B-18	2612	Kľúčovec – Sporná sihoť	●	●	●	●	●	●	●		●	●
Hungarian side – monitoring sites (monitoring suspended in 2012 and 2014)													
1	28a	B-01	Dunasziget – oak forest	▪									
2	28b	B-02	Dunasziget – meadow	▪									
3	31	B-03	Halászi – oak forest Derék	▪									
4	30	B-04	Lipót – poplar forest, Gombócos closure	▪									
5	4	H-04	Dunasziget – Schisler dead arm		▪	▪						▪	▪
6	5	H-05	Zátonyi Danube									▪	▪
7	5, 6	H-06	Lipót – Lipóti marsh		▪	▪						▪	▪
8	7	H-07	Danube, rkm 1828		▪								
9	8	H-08	Zátonyi Danube		▪								
10	9	H-09	Dunasziget – Csákányi Danube		▪	▪						▪	▪
11	10	H-10	Danube, rkm 1833			▪							
12	2, 11	H-11	Danube, rkm 1839		▪	▪							
13	12	H-12	Gázfűi Danube, rkm 28.5			▪							
14		F-26	Dunaremete-Pálfi island, forest, river arm				▪	▪					
15		F-27	Rajka – forest Felső				▪						
16		F-28	Novákpuszta –alder forest				▪						
17	22	F-31	Lipót – Zsejkei channel						▪				
18	20	F-35	Mosonmagyaróvár – Mosoni Danube						▪				
19	17	F-17	Arak – Nagy Kerek, alder forest					▪					
20	19	F-19	Danube, rkm 1824				▪						
21		F-N3	Arak, Nováki channel						▪				
22		GAZ	Gázfűi Danube, Galambos					x	x	x	x		
23		MOS	Mosoni Danube, Szilos					x	x	x	x		

● – data provided according to the Agreement x – evaluation according to WFD methodology
▪ – observation not realized, monitoring suspended

Legend:
A - Phytocoenology (Braun-Blanquet)
B - Macrophytes (Kohler, on the Slovak side Braun-Blanquet as well)
C - Fish (Osteichthyes)
D - Terrestrial Molluscs (Gastropoda)
E - Aquatic Molluscs (Mollusca)

F - Dragonflies (Odonata – aquatic larvae on the Slovak side + flying imagines as supplement)
G - Mayflies and Caddisflies (Ephemeroptera and Trichoptera - aquatic larvae on the Slovak side + flying imagines as supplement)
H - other groups of macrozoobenthos according to the WFD requirements
I - Cladocerans (Cladocera)
J - Copepods (Copepoda)

Considering that for the year 2014 the Hungarian party do not provided any data from biological monitoring, evaluation of the Hungarian territory was not carried out in this Joint Report. This part provides a brief evaluation of those groups of aquatic animals that are observed under the methodology of WFD. A more detailed evaluation is given in Part 2 - Surface Water Quality.

A short description of climatic and hydrological conditions in the year 2014, which influenced the development of observed groups of fauna and flora is given in Part 6 – Forest Monitoring.

7.1. Phytocoenology

The left-side river branch system

On the area No. 2600, where the community of the driest type of floodplain forest occur, positive changes in last two years can be observed, after restoration interventions being carried out (the peripheral arm and the central depression are permanently supplied with water from the Dobrohošť canal). In the previous years disintegration of the tree layer had been registered, but currently its coverage slightly increases. The shrub layer continues to dominate. In line with the expectations, the synanthropic species in the herb layer have receded, the presence of newly appeared wetland species retains, and hydrophilic species and species indicating the moisture variation are returning.

Phytocoenoses on monitoring areas No. 2604 and 2612 can be considered stable. In terms of the species composition and the coverage of the tree and shrub layers significant changes were not observed in these stands. Because of the absence of flooding the herb layer on the area No. 2604 was well developed. The species composition was formed by native nitrophilous and strongly hydrophilic species, including rare species. Return of one invasive species with a negligible coverage was registered in the summer period. Because of the absence of flooding the coverage of the herb layer on the area No. 2612 also reached higher value. The number of species was comparable to the previous year, the most abundant were the native nitrophilous species. Fairly regular occurrence of floods contributes to long-term absence of invasive species in this region.

Plant communities on areas No. 2603, 2608 and 2609 in the previous years were affected by forest management interventions, that influenced their development. In the poplar stand on the area No. 2603 thinning in 2012 was realised, what almost eliminated the shrub layer. Its coverage in the evaluated year was already significantly higher and also the herb layer was almost closed. The gradual retreat of synanthropic and some invasive species continues, but also the hygrophilous species in the evaluated year had lower occurrence. Young stands on areas No. 2608 and 2609 are created by poplars, which gradually closes. Some poplars on the area No. 2608 in the evaluated had grown into the tree layer, poplars on the area No. 2609 created the tree layer already in the previous year and actually it has a relatively high coverage. The shrub layer therefore missing. Regarding the herb layer on the area No. 2608, the continuation of current trends can be confirmed: the dominance of native nitrophilous species, the persistence of newly appeared hydrophytes, and the week presence of invasive plants. In the plant undergrowth on the area No. 2609 the neophytic aster (*Aster lanceolatus*), the indigenous marshy summer snowflake (*Leucojum aestivum*) and the nitrophilous dewberry (*Rubus caesius*) species dominate again. Spreading of invasive species is still not noticeable.

The right-side river branch system

Phytocoenological observations were not carried out in the evaluated year.

7.2. Terrestrial molluscs

The left-side river branch system

Compared to the previous year the terrestrial mollusc’s communities on areas No. 2600, 2603, 2604 and 2612 did not show significant changes. The malacocoenosis of the area No. 2600 still has a character of the driest type of soft (or transitional) lowland forest. Its structure is stable with slight inter-annual fluctuations; an euryoecious representative, along with high portion of forest mesohygrophilous and euryhygric species, dominates at present. Hygrophilous species still survive in the malacocoenosis with a stable low abundance. Due to the location of the observed site the changes evoked by the flow restoration in the adjacent river arm and subsequent water supply into the part of the monitoring area has not appeared neither in the second year after the completion of these measures. Although the terrestrial malacocoenosis on the area No. 2603 is observed in the gradually closing poplar stand, the community in recent years seems to be typical for the driest type of soft lowland forest. Thanks to the last year's flood, several hygrophilous species have significant share in the malacocoenosis also in the evaluated year, the occurrence of euryoecious representatives is reduced. The terrestrial malacocoenosis on the area No. 2604 still has a significant wetland character and represents the wettest variant of a floodplain forest, with high species richness and dominance of forest hygrophilous and polyhygrophilous species and the presence of rare and scarce wetland species. The presence of forest mesohygrophilous and euryoecious representatives remains low even after forest management interventions in the vicinity during previous years; signs of ruderalisation of the malacocoenosis have not appeared. In the malacocoenosis on the area No. 2612 two polyhygrophilous and one hydrophilic species, which are pioneer species after the last year's flood, dominated also in the evaluated year. Spreading of these species was registered after the last year's flood in June and their high share has been retained also in the evaluated year. Mesohygrophilous species remain suppressed.

The malacocoenoses on areas No. 2608 and 2609 are degraded after the clear-cut of the forest stand in previous years. Their development currently reflects the impacts of forest management interventions, not the changed moisture conditions in the area. Signs of the malacocoenosis degradation on the area No. 2608 are significant even after six years after the reforestation of the area. In the malacocoenosis continues to dominate the euryoecious species and the reappearance of hygrophilous species is not observed. Regeneration of the malacocoenosis was not registered neither after the last year's flood, nor after the restoration measures in this region (the supplied amount of water is still not sufficient). The situation in the malacocoenosis on the area No. 2609 is more favourable. Although the dominance of a forest steppe and forest hygrophilous species persist, polyhygrophilous representatives appear in the samples and also the abundance of species of this ecological group, that have already been registered after the last year's flood, increases.

The right-side river branch system

The monitoring of terrestrial molluscs was not carried out in the evaluated year.

7.3. Aquatic macrophytes

The Danube and the right-side river branch system

Monitoring of macrophytes in the Danube old riverbed was carried out only on Hungarian monitoring sites No. 2 (at rkm 1839) and No. 7 (at rkm 1828), but the observation of these sites is suspended since 2011.

The left-side river branch system

Usually rich vegetation in the through-flowing river arm on the area No. 2603 have been decimated by the strong flood in the previous year. The development of macrophytes in the evaluated year was also relatively weak, more abundant was only one representative of the true aquatic vegetation. The development of aquatic vegetation in the dead arm on the area No. 2604 proceeded in aquatic environment. Thanks to the favourable water stages hydrophytes increasingly developed (in the shallower parts and in the open water area), but the population of wetland plants remained also preserved. This area is still rich in scarce species. The spring development of wetland species in observed river branch sections No. 1 and 2 on the area No. 2608 can be characterized as favourable. The macrovegetation was not monitored during the summer, but its development, thanks to revitalization interventions and to discharge waves, probably continued undisturbed. Usually richly overgrown river branch section No. 3 leading to the Danube was, similarly to the previous year, slightly inhabited by two species. The development of macrovegetation in the river arm on the area No. 2612 started belatedly due to uncovered bottom in the spring. Later, only the deepest part of the river arm (section No. 1) have been overgrown by species of the true aquatic vegetation, from among the sago pondweed (*Potamogeton pectinatus*) significantly dominated, while the invasive species *Elodea nuttallii* was missing. Shallower sections (No. 2 and 3) were again richly inhabited by wetland species, including several protected species.

The right-side river branch system

The monitoring of macrophytes was not carried out in the evaluated year.

7.4. Aquatic molluscs

The Danube

The evaluation of aquatic malacocoenoses in the Danube is based on data provided by the Slovak Party (Slovak observation areas No. 2600, 2608 and 2612). Based on these data the entire stretch of the Danube (derived section and the section downstream of the confluence of the tail-race canal and the Danube old riverbed) has been characterized by poor malacofauna in recent years, while the turning point of decline in species number and abundance was registered in 2005 after an extraordinary expansion of the non-native, invasive river nerite (*Theodoxus fluviatilis*). The gradual disappearance of most species in the following years was probably caused by interaction of several factors (hydrological, trophic, physical and chemical). The malacofauna of the Danube was regularly composed also by the ubiquistic zebra mussel (*Dreissena polymorpha*). However, in the evaluated year enrichment of the communities was registered, the most significant on observation area No. 2600, where 10 species was recorded. It can be assumed, that appearing species (mainly species of stagnant or slowly flowing waters) have been flushed out from the adjacent part of the inundation area. At the same time decline in abundance of above mentioned two non-native species was registered.

The left-side river branch system

Aquatic mollusc communities in the river branch system on the Slovak side are monitored at areas No. 2603 and 2604. On both areas signs of destruction of the malacocoenosis had been registered in the previous period, but after the last year's strong flood positive changes have been observed in terms of the development of communities. The area No. 2603 is characterized with suitable conditions for the development of a stabilized mollusc community. The malacocoenosis has been enriched in number and abundance of species, several species showed a year-round presence. The gradual destruction of the malacocoenosis on the area No. 2604 is probably caused by the frequent significant decrease of water level and the impact of invasive fish species. However, the malacocoenosis, after the last flushing of the dead arm, was relatively rich in species in the evaluated year, along with the dominance of ubiquistic mollusc species. Several species had a year-round presence.

The right-side river branch system

The monitoring of aquatic molluscs was suspended in the evaluated year.

7.5. Dragonflies (Odonata)

The Danube

In recent years the monitoring of dragonfly communities on areas No. 2600 and 2608 have been carried out, instead of the river branches, in the coastal zone of the Danube old riverbed, which was overgrown with macrophytes that provides suitable habitat for dragonflies. However, the odonatocoenoses are very poor in species and abundance in long-term, with frequent absence of representatives in the individual samples. Dragonflies in the evaluated year on the area No. 2600 were registered at each sampling, a total of four species were collected, the most frequently one rheophillic and one semirheophillic representative were present. The odonatocoenosis on the area

No. 2608 was formed by three species (2 rheophilous and 1 eurytopic), which were collected in the summer and autumn.

The left-side river branch system

Diverse and very rich community was again registered in the river branch on the area No. 2603, proving the variety of habitats. After the last year's flushing of the dead arm on the area No. 2604 the odonatocoenosis was enriched and the high number of species has been retained also in the evaluated year. The river arm belongs to valuable habitats. The community is formed mainly of eurytopic representatives and species typical for overwarmed waters. The monitoring of dragonflies at Foki weir on the area No. 2608 was restored after almost a ten-year break. In the relatively species-rich community semirheophilous species dominated in the spring and summer and stagnicolous species in the autumn. Diverse habitats (periodic water, smaller and larger river branches) on the area No. 2612 provide favourable conditions for dragonfly species with different ecological demands, including several protected and endangered species. In the evaluated year stagnicolous representatives dominated.

The right-side river branch system

The monitoring of odonatocoenosis on the Hungarian territory was not carried out in the evaluated year.

7.6. Crustaceans (Cladocera, Copepoda)

The Danube

Evaluation of the development of cladocerans and copepods communities is based on results of the Slovak Party at monitoring areas No. 2600 and 2608, which are situated on the diverted stretch of the Danube. The cladocerans and copepods communities were unstable and poor in species and abundance in last years. However, after the flood in June in the previous year they became richer. The species number on the area No. 2600 has been retained also in the evaluated year, but the share of euplanktonic species has again decreased. Samples of planktonic crustaceans on the area No. 2608 were poor again in the evaluated year, however the summary results indicate increased connectivity of the Danube with the adjacent inundation area.

The left-side river branch system

In terms of the development of cladocerans and copepods communities in the river arm on the area No. 2603 the trend of previous years continues, the species compositions of communities has not changed significantly. The tychoplanktonic species dominate, that are rinsed out of the richer inhabited littoral. In the species-richer community of copepods, species typical for old river arms have appeared. Tendency in the development of cladocerans and copepods communities in the dead arm on the area No. 2604 indicated a deterioration of trophic conditions in previous years due to isolation. The situation, however, has become better after the flood in last year. The species number of cladocerans has already increased in the previous year. In the evaluated year similar changes have been registered also in copepods. The dominance of euplanktonites in the medial has been retained. The monitoring area is considered as faunistic important habitat in terms of planktonic crustaceans. The cladocerans and copepods communities on the area No. 2608 were rich in species and abundant also in the evaluated year. The occurrence of species with affinity to flowing water in both communities documents the connection of the river arm with the main course of the Danube. The tendency of shallowing and gradual terrestrification of river arm on the area No. 2612 has been interrupted after its intensive flushing out in the last year. The communities of planktonic crustaceans in the evaluated year were represented mostly by common species, with the dominance of tychoplanktonic representatives, but the increased connectivity of the river arm with the inundation area is still documented.

The right-side river branch system

The monitoring of planktonic crustaceans was suspended in the evaluated year.

7.7. Mayflies and Caddisflies (Ephemeroptera, Trichoptera) and other groups of Macrozoobenthos

The Slovak Party performs the monitoring of mayflies and caddisflies in accordance with the methodology set out in the Agreement 1995. The monitoring methodology for macroinvertebrates (mayflies, caddisflies, dragonflies and aquatic molluscs) according to the Water Framework Directive has been implemented within the monitoring of the quality of surface waters (Part 2 - Surface water quality). The Hungarian Party suspended the observation of these groups of biota in the evaluated year, some results, however, are available within the monitoring of surface water quality.

The Danube

The Danube, according to the long-term results of the Slovak Party (monitoring areas No. 2600, 2603, 2608 and 2612), is inhabited by caddisflies and mayflies sporadically, however, in past three years enrichment of the caddisfly community may be seen. The presence of caddisflies in the samples of evaluated year was basically all year round, the community was formed mostly by 2-5 mainly rheophilous species with low abundances. Mayflies on monitoring areas No. 2600 and 2612 were missing again, on the two other areas 1-2 rheophilous species were recorded in autumn, with negligible abundance.

In the frame of the monitoring of surface water quality (Part 2 of this Joint Report) samples of macrozoobenthos in the Danube were taken in five profiles on the Hungarian side, and the results showed good ecological status.

The left-side river branch system

In terms of mayfly and caddisfly communities, all observed river branches in the left-side inundation area (monitoring areas No. 2603, 2604 and 2612) are very poor in long-term. Mayfly community also in the evaluated years consisted of 1-4 species, with irregular presence in samples. The abundance of representatives was more significant only on the area No. 2604. All year round presence of caddisflies was only in samples from the area No. 2604, on other locations the occurrence of only one species was confirmed.

The right-side river branch system

The monitoring of Mayflies and Caddisflies on the Hungarian territory was not carried out in the evaluated year.

7.8. Fish (Osteichthyes)

The Danube

The evaluation of ichthyofauna in the Danube use to be based on Slovak observation results at monitoring areas No. 2600 and 2608, and Hungarian observation results at monitoring sites No. 10 and 11. The Hungarian Party, however, suspended the monitoring of ichthyofauna in the evaluated year. Based on results from Slovak monitoring areas (which partly do not correspond to eupotamal) it can be stated that the ichthyocoenoses of the diverted stretch of the Danube is stable in recent years, with relatively low species diversity and abundance. Dominant presence have eurytopic and non-native invasive species. In samples, however, native rheophilous species regularly appear.

The left-side river branch system

In the stable ichthyocoenoses on the area No. 2603 (water supplying river arm) eurytopic and indifferent species dominate in long-term, rather abundant is also the occurrence of non-native goby species (*Neogobius sp.*). The ichthyocoenosis of the dead arm on the area No. 2604 has became poorer in the evaluated year in terms of species number and also abundance of the present species (temporary improving had been recorded in previous two years). The dominant position is still retained by the expansive black catfish (*Ameiurus melas*) and the non-native sun perch (*Lepomis gibosus*). Majority of present species can survive even at higher water temperature and lack of oxygen.

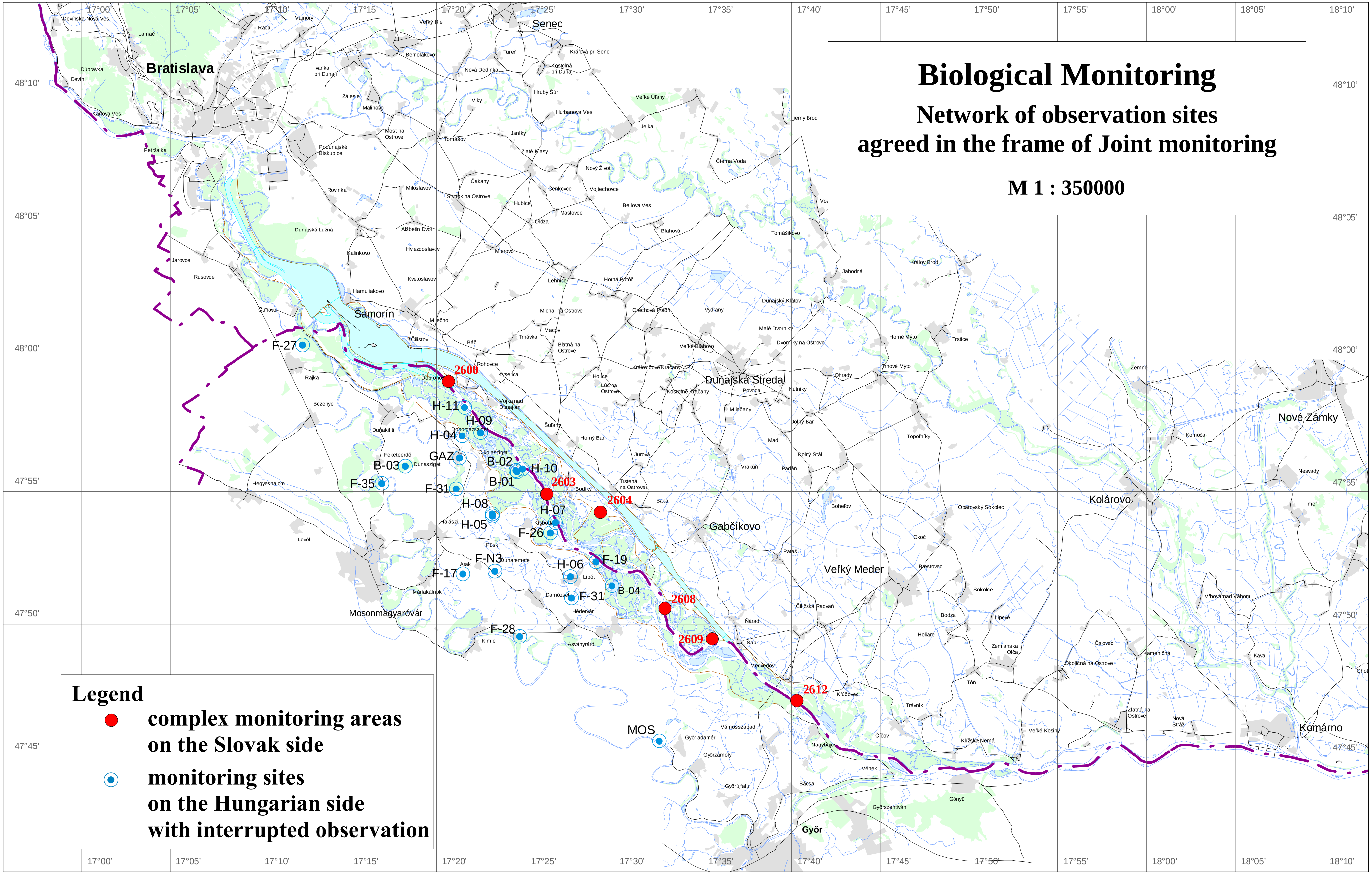
Part of the river arm upstream of the Foki weir on the area No. 2608 has been in contact with the main flow of the Danube for quite a long time and its ichthyocoenosis was again rich in species. Slight decline was registered in terms of the abundance of representatives. Also the part of the river arm downstream of Foki weir used to be rinsed out in past three years, therefore ichthyofauna relatively species-rich and abundant was registered in the evaluated year, approximately at the level of the previous year. Expansive behaviour of invasive goby species (*Neogobius sp.*) is still not observed in this part of the river arm.

The ichthyocoenosis of the shallow muddy river arm on the monitoring area No. 2612 remained poor in species and abundance, probably also due to fish-eating birds.

The right-side river branch system

The observation of ichthyofauna on the Hungarian territory was suspended in the evaluated year.

Fig. 7-1


Biological Monitoring
Network of observation sites
agreed in the frame of Joint monitoring
M 1 : 350000
Legend
complex monitoring areas
on the Slovak side
monitoring sites
on the Hungarian side
with interrupted observation
Bratislava
Senec
Šamorín
Dunajská Streda
Gabčíkovo
Veľký Meder
Kolárovo
Nové Zámky
Komárno
Mosonmagyaróvár
Győr
2600
2603
2604
2608
2609
2612
F-27
H-11
H-09
H-04
GAZ
B-03
F-35
F-31
B-02
H-10
B-01
H-08
H-05
H-07
F-26
F-N3
F-17
H-06
F-19
B-04
F-31
F-28
MOS

PART 8

8.1. Conclusion statements

Based on the results of environmental monitoring in 2014 the following conclusions can be stated.:

1. Considering to the recommendations approved in the Joint Report in 2013, the evaluation of surface water regime in the present Joint Report covers both, the hydrological and the calendar year 2014. The gauging station Bratislava-Devín plays a key role in determining the current amount of water to be released into the Danube old riverbed downstream of Čunovo weir. In the case of the hydrological year 2014 the average annual flow rate at Bratislava-Devín gauging station was 1809 $m^3.s^{-1}$, in the case of the calendar year 2014 it was 1788 $m^3.s^{-1}$. The flow regime of the Danube in 2014 was fairly typical, with low and balanced flow rates in the winter period and more significant discharge waves in May, during August, in the first half of September and in October. The annual minimum was recorded on March 12, 2014 at 943 $m^3.s^{-1}$, the annual maximum occurred on October 24, 2014 culminating at 5931 $m^3.s^{-1}$.

   Taking into consideration obligations mentioned in the intergovernmental Agreement, the Slovak Party was obliged to release into the Danube riverbed downstream of Čunovo dam an average annual discharge of 357 $m^3.s^{-1}$ in the case of hydrological year 2014, in the case of calendar year it was 353 $m^3.s^{-1}$. Based on measurements carried out at the Doborgaz and Helena gauging stations, the total average annual discharge released to the Danube downstream of Čunovo in the hydrological year 2014 was 422 $m^3.s^{-1}$, in the calendar year it was 418 $m^3.s^{-1}$. According to the modified method of average annual flow rate calculation, adopted in the Joint Annual Report on the environment monitoring in 2011, the reduction of discharge released into the Danube old riverbed was done for a period of 16 days. The average annual flow in the Danube old riverbed was then in the hydrological year 392 $m^3.s^{-1}$ and in the calendar year 388 $m^3.s^{-1}$, which means that the Slovak Party fulfilled the average annual discharge jointly agreed in the intergovernmental Agreement. According to the jointly accepted flow rate data the flow rate in the winter period was lower than the acceptable deviation for 34 days in the hydrological year or 50 days in the calendar year. The deficiencies in the winter period had not significant impact on the biota of the area affected.

   Concerning the water amount released into the Mosoni Danube the average annual discharge in both, the hydrological year and the calendar year 2014 was 35.2 $m^3.s^{-1}$. In the year 2014, technical maintenance of turbines was carried out during January (21 days) and in the period from February 9, 2014 to November 2, 2014 (264 days) reduced amount of water was released almost continuously during the planned preparatory and constructing works. With respect to the above mentioned limitations, the total amount of water discharged into the Mosoni Danube was lower than the water amount set out in the intergovernmental Agreement. The Hungarian Party have been informed about the exceptional water discharge into the Mosoni Danube due to the planned construction works by Slovak party at the negotiations of the Nominated Monitoring Agents on December 11, 2014.

2. In comparison with previous years no significant changes in the surface water quality have been registered in the year 2014. Several flow waves, which were usually of short duration, resulted in several higher values of parameters that are influenced by flow rate (suspended solids, iron, manganese, phosphates and total phosphorus). Some of monitored indicators were mostly similar or lower than in 2013 (water temperature, specific electric conductivity, nutrients). The pH values increased and from among basic cations and anions have slightly increased the contents of magnesium, sulphates and hydrogencarbonates. Oxygen conditions in the year 2014 can be classified as very good and also the situation in the right-side seepage canal has improved. Contamination by organic substances expressed by BOD_5 was mostly higher, while an increase in the case of COD_{Mn} was documented only at sampling sites on the right bank of the Danube old riverbed and in the right-side river branch system. When analysing the changes in suspended solids content at sampling sites in the Danube, generally it can be stated that the suspended solids content downstream of the reservoir (at Medveďov sampling site) during flood waves is lower than in the Danube at Bratislava, which demonstrates the settling effect of reservoir. Concentrations of heavy metals in 2014 were low, except two high concentrations of copper recorded in the Danube at Bratislava.

   The fluctuation of surface water quality parameters in the right-side river branch system since introducing the water supply in 1995 follows their fluctuation in the Danube. The water quality in the Mosoni Danube differs in the upper and lower section of the river. The water quality on the sampling site at Čunovo/Rajka follows the water quality in the Danube, while the water quality in the lower section of Mosoni Danube at Vének (upstream of the confluence with the Danube) is formed by its tributaries and local pollution from settlements. From the long-term point of view the pollution on this sampling site decreased, but the content of nutrients and the COD_{Mn} value compared to other sampling sites still reaches the highest values. The cleanest water is characteristic for the seepage canals, what results from its groundwater origin.

   In connection with different hydrological and climatic conditions, the development of chlorophyll-a in the evaluated year differed in comparison with the previous year. The highest values were recorded in the spring. In general, the chlorophyll-a content determined by the Slovak Party was higher than in 2013, while values recorded by the Hungarian Party were lower in comparison with the previous year. The monitoring of biological quality elements of the surface water in 2014, at jointly observed sampling sites and on sampling sites monitored by the Hungarian Party, was carried out according to the national methodologies and quality schemes for particular biological quality elements, in accordance with the Water Framework Directive. Based on the assessment of phytoplankton, phytobenthos, macrozoobenthos and macrophytes the surface water quality at individual sampling sites was classified into the II. or III. quality class, what corresponds to good or moderate ecological status. The Slovak Party determined moderate status on sampling sites in the Danube at Bratislava and Medveďov and in the Mosoni Danube at Čunovo, the Hungarian Party in the Danube old riverbed at Dunaremete, in the Mosoni Danube at Vének and in he Szigeti river arm.

   The evaluation of sampling sites observed only by the Slovak Party was carried out according to the methodology used in previous years. Macrozoobenthos, phytoplankton and phytobenthos were evaluated. Saprobe indexes varied mostly in the range corresponding to β-mesosaprobity, thus to an environment which provides suitable living conditions for a wide scale of organisms. In contrast to the year 2013, in the case of saprobic index of macrozoobenthos also α-mesosaprobity was documented on the sampling site No. 311 in the lower part of the reservoir. The phytoplankton abundance and also the average annual abundance in the evaluated year were higher than in the previous at seven sampling sites. The limit for the mass development was exceeded at six sampling sites (in the year 2013 it was at four sampling sites). Considering the abundance of phytoplankton, as the key determinant of saprobic index of biosestone, it can be stated that the hydropower plant neither in 2014 had any adverse impact on the level of saprobity.

The contamination of sediments in the influenced area assessed according to Canadian standard CSQG was low. The majority of measured values of organic micro-pollutants corresponded to an uncontaminated natural environment (values <TEL). The content of heavy metals on the Slovak territory slightly increased, on the Hungarian territory contents of zinc and mercury significantly decreased. Concentrations of inorganic and organic pollution, that varied in the range >TEL - <PEL, corresponded to a status when the adverse effects on biological life occur sporadically. Contrary to the previous year, only one concentration of mercury (in the Mosoni Danube at Vének) occurred, which just exceeded the limit value of the Probable Effect Level (PEL). Beyond this level, the adverse effects on biological life may occur frequently. The highest concentrations of organic micro-pollution were documented in the upper part of the reservoir and in the right-side river branch system. The highest concentrations of heavy metals were recorded in the lower part of the reservoir and in the Mosoni Danube at Vének. The lowest sediment pollution in 2014 has been documented in the Danube old riverbed at Sap on the Slovak territory and in the right-side seepage canal at Rajka on the Hungarian territory.

Based on comparison of water quality entering the influenced area (sampling site at Bratislava) and the water quality that leaves the influenced area (sampling site at Medveďov) it is evident, that the water quality that leaves the system is very similar to the quality of the incoming water.

3. Monitoring of groundwater levels continued without changes. Groundwater levels in assessed area are primarily influenced by surface water levels in the Danube and in the reservoir. Groundwater levels started from a relatively low position at the beginning of hydrological year. The continuous decline of groundwater level continued until end of March, when annual minimum values occurred on most of observation objects. In April and May the groundwater levels under the influence of increasing flow rates began to rise. During the year several discharge waves occurred, however they were relatively low and with short duration. The maximal groundwater levels mostly occurred during the discharge wave in September.

   Based on the evaluation of groundwater regime it can be stated that the water supply into the right-side river branch system and into the Mosoni Danube plays an important role in influencing groundwater levels over the Szigetköz region. As a result of measures taken according to the intergovernmental Agreement, a significant increase in the groundwater levels occurred in the case of average flow rate conditions in the Danube. The increase in the upper part of the Szigetköz region and around the reservoir is reduced due to decrease of permeability of the reservoir bottom. Certain effect also have the adverse changes in sediment transport regime of the Danube, which can be probably related to measures in the Austrian section of the Danube just upstream of Bratislava implemented in recent years. In the case of low flow rates in the Danube the average groundwater levels remained mostly unchanged. Some increase of groundwater level appears in the middle of inundation area. The decrease in the lower part of the Szigetköz reflects the adverse effect of the riverbed erosion in the tailrace canal and downstream the confluence of the tailrace channel and the Danube old riverbed. Since the water supply system in the lower part of the Hungarian inundation area is being finalized, improving can be expected also in this area. In the case of high flow rate conditions, decline in the groundwater levels around the reservoir and along the Danube riverbed can be registered. Because of differences in hydrological conditions in 1993 and 2014 the groundwater level decline appears also in the inland area behind the flood protective dikes, but at some distance from the Danube old riverbed no changes were observed.

Monitoring results confirm the need of solving the water supply in the lower part of the inundation area on both sides, particularly in the case of low and average flow rates. The water supply system in the lower part of the Hungarian inundation area is being finalized, so after its completion groundwater levels increase in the lower part of Ásványi river branch system and in the Bagoméri river branch systems is expected (the water supply system at the time of finalization of this Joint Report has already been completed). The positive influence of the water supply could be effectively supported by measures applied in the Danube old riverbed upstream of the confluence with the tail-race channel. Such measures may improve the overall situation in the lower part of Szigetköz area and in the region of Istragov island on the Slovak side. The increase in groundwater levels in the strip along the Danube old riverbed on both sides could be ensured only by increasing the water level in the Danube by measures implemented in the riverbed.

4. The groundwater quality monitoring on the Hungarian territory again confirmed the long-term results. The groundwater in the upper part of gravel sediments in Szigetköz is characterised by higher iron and manganese content. The iron and manganese contents consistently exceed the groundwater quality limits in most of observation objects. On these objects also concentrations of indicators reflecting local pollution, which is of agricultural origin or it originates from sewage ponds, are higher. High contents in the case of ammonium ions, phosphates and occasionally nitrates, which exceed the limit value, are registered only at several observation objects. Organic pollution usually meets the agreed limit value. In the past three years it has significantly increased only in one object at Ásványráró, where exceeded the limit value. Exceedances in some objects are recorded also in the case of water temperature, calcium, magnesium, potassium and sulphates.

   The groundwater quality in deeper horizons in Szigetköz is monitored by wells used for drinking water supply. Iron and manganese concentrations are lower in wells, where water is drawn from a greater depth. In the region at Győr the iron and manganese contents exceed the drinking water quality limit values or oscillates around them. The water extracted in the northern part of the Szigetköz is of satisfactory quality and the groundwater quality is characteristic by high stability. In general, the groundwater quality in wells producing potable water (occasionally after pre-treatment) is suitable for drinking water supply.

The groundwater quality parameters observed in water sources on the Slovak territory mostly fulfil the agreed groundwater quality limits. Exceedances occur in the case of water temperature, manganese and in some years also in the case of iron. In the evaluated year the limit value for the water temperature was exceeded in seven water sources, and in the case of manganese in two. The manganese content exceeded the limit value in each sampling at water source at Bodíky, similarly as in the other years of monitoring. The same situation was also in the water source at Kalinkovo, where the manganese in the previous years of monitoring exceeded the agreed limit only occasionally. In the evaluated year three unusually high concentrations of phosphates occurred, which exceeded the limit value, these however were not validated by the control samplings. Exceedances of limit values in the case of observation objects are more frequent and occur on more objects. The groundwater. The groundwater quality in these objects mostly reflects local influences. Exceedances in 2014 has occurred in the case of ammonium ions, manganese, iron, and water temperature. Other nutrients and the organic pollution, expressed by COD_{Mn}, in 2014 has met the limit values.

Inorganic and organic micro-pollution of groundwater is monitored at selected observation objects on the Hungarian and Slovak territory. In 2014, exceedances of agreed limits for inorganic micro-pollution were recorded in the case of arsenic in two observation objects on the Hungarian territory and from among the organic micro-pollution in the case of two pesticides, atrazine in one and terbutryn in two observation objects, on the Slovak territory.

5. The soil moisture monitoring in 2014 was carried out only on the Slovak side, the development of soil moisture on the Hungarian territory was therefore not evaluated. Measurements were carried out in the floodplain area and at agricultural sites in the flood-protected area. In general, the soil moisture content in the winter period started at an average level and due to poor precipitations it rose only slightly until the end of March. Several discharge waves occurred in May, August, September and October, none of these however flooded the inundation area. The soil moisture content in the upper soil layers on most of observation sites has been influenced only by climatic conditions.

   Regarding the soil moisture development at monitoring sites located on agricultural area on the Slovak side, it can be stated that the soil moisture content during the entire observation period runs similarly. Since 2004, slight increase of the soil moisture content can be seen, while the groundwater level position and fluctuation remained mostly unchanged. Since 2011, however, slight decrease of groundwater level can be seen on two observation sites. what in the depth interval 1-2 m below the surface was reflected in a decline of soil moisture content. In the year 2014 the fluctuation of soil moisture content in both depth intervals depended on climatic conditions. Only during higher discharges in the Danube old riverbed in May and September the groundwater level partially influenced the layers in the depth around 2 m. The minimal average values of the soil moisture content were recorded during the summer, the maximal values mostly occurred at the end of the year.

   The soil moisture in the inundation area, along with the groundwater level and precipitation, is highly dependent on natural or artificial floods. Only a short-term flooding of the lowest part of the inundation area occurred during the highest discharge waves in May and October. On the rest of the monitoring sites the soil moisture content in the upper soil layers has been influenced only by climatic conditions. Deeper soil horizons in the depth between 1 and 2 m has been moisturized by every discharge wave, but in the upper part of inundation area only the bottom part of this depth interval was influenced. Thanks to the discharge wave in October and precipitations in November and December 2014, the soil moisture content at the end of the year was higher than at the beginning. On most of monitoring sites minimal values occurred in July, at several sites in April. The maximal average values occurred in September during increased discharges into the Danube old riverbed, or at the end of the year.

6. In accordance with the intergovernmental Agreement the Slovak Party also in the year 2014 observed the development of basic growth parameters, weekly girth growth and the health state of trees by terrestrial way. In the evaluated year an areal evaluation of the health state of forest stands was also carried out, which generally takes place at three-year intervals. Slovak and Hungarian experts on forest monitoring have been cooperated within the INMEIN project on development of an innovative monitoring system providing a uniform approach for monitoring the floodplain forest using remote sensing methods. The development of most forest stands in the evaluated year did not show significant differences in comparison with the previous years. The monitored cultivated poplar stands were without changes healthy and vital. Still is observed only isolated, weak attack by diseases and pests. According to the results of areal evaluation of the health state of the forest the health state on the area of interest is very good and stable. From the forest management point of view it can be stated that by implementation of hydrotechnical measures suitable conditions for the existence, development and production of floodplain forests has been ensured on the majority of the area. The portion of stands with defoliation up to 30 % remains above 90 % in long-term.

   The forest monitoring in the Szigetköz area continued also in the year 2014. However, contrary to the previous year, significant change in the monitoring methodology has been introduced (INMEIN project). Measurements were previously carried out on permanent monitoring plots. Since, the number of observed areas decreased significantly due to felling, new approach has been applied in 2014. The forest compartments were sorted into strata according to species and age and from these strata were randomly selected plots for monitoring. The field measurements was carried out before the growing season at the end of the winter. Each of the trees on the monitoring plots was positioned by FieldMap Data acquisition system. Altogether, dendrometric measurements have been performed on 30 selected monitoring plots.

7. In the year 2014 the monitoring of agreed groups of plants and animals was performed only on the Slovak territory. The biological monitoring on the Hungarian side was not carried out, similarly as in 2012. In the uppermost part of the Slovak inundation area positive changes in last two years can be observed, after restoration interventions being carried out. In the previous years disintegration of the tree layer had been registered, but currently its coverage slightly increases. The shrub layer continues to dominate. In line with the expectations, the synanthropic species in the herb layer have receded, the presence of newly appeared wetland species retains, and hydrophilic species and species indicating the moisture variation are returning. Phytocoenoses on other monitoring areas can be considered stable. On areas where forest management interventions has been applied, formation of the tree layer

further continues, gradual retreat of synanthropic and invasive species is registered. On other areas the persistence of current trends, dominance of native nitrophilous species and retreat of ruderal species, can be confirmed.

Compared to the previous year the terrestrial mollusc’s communities did not show significant changes. In the uppermost part of the inundation the malacocoenosis has a character of the driest type of soft wood lowland forest. On the areas in the middle of inundation area several hygrophilous species have significant share in the malacocoenosis also in the evaluated year, and the occurrence of euryoecious representatives is reduced. The malacocoenoses on areas in the lower part of the inundation, where felling was done in previous years, are still degraded. On one of these sites regeneration of the malacocoenosis was not registered neither after the last year's flood, nor after the restoration measures in this region.

Usually rich vegetation in the through-flowing river arm have been decimated by the strong flood in the previous year. The development of macrophytes in the evaluated year was also relatively weak. The development of aquatic vegetation in the dead arm proceeded in aquatic environment. Thanks to the favourable water stages hydrophytes increasingly developed, but the population of wetland plants remained also preserved. This area is still rich in scarce species.

According to the monitoring data the entire stretch of the Danube is characterized by poor aquatic malacofauna in recent years. The turning point of decline in species number and abundance was registered in 2005 after an extraordinary expansion of the non-native, invasive river nerite (*Theodoxus fluviatilis*). The gradual disappearance of most species in the following years was probably caused by interaction of several factors – hydrological, trophic, physical and chemical. At present only the invasive species *Theodoxus fluviatilis* and the ubiquistic species *Dreissena polymorpha* has got regular and abundant occurrence in the Danube. However, in the evaluated year enrichment of the communities was registered, when 10 species was recorded. At the same time decline in abundance of above mentioned two non-native species was registered. Aquatic mollusc communities in the river branch system on the Slovak side are monitored on two areas. On both areas signs of destruction of the malacocoenosis had been registered in the previous period, but after the last year's strong flood positive changes have been observed in terms of the development of communities.

Diverse and very rich dragonfly communities were again registered in the river branch system on the Slovak side, proving the variety of habitats. After the last year's flushing of the observed dead arm the odonatocoenosis was enriched and the high number of species has been retained also in the evaluated year. The river arm belongs to valuable habitats. The community is formed mainly of eurytopic representatives and species typical for overwarmed waters. The lower part of the inundation area also provide favourable conditions for dragonfly species with different ecological demands, including several protected and endangered species. In the evaluated year stagnicolous representatives dominated.

The cladocerans and copepods communities in the observed stretch of the Danube, according to the Slovak results, were unstable and poor in species and abundance in last years. After the flood in June 2013 they became richer, but the share of euplanktonic species in the evaluated year has again decreased. The development of cladocerans and copepods communities in the river branch system shows that the trend of previous years continues, the species compositions of communities has not changed significantly, the tychoplanktonic species dominate. After the flood in the previous year increase of species number, both in cladocerans and also in copepods communities, have been registered in the observed dead arm.

Slovak Party performs the monitoring of mayflies and caddisflies in accordance with the methodology set out in the Agreement 1995. According to the Slovak results the Danube is inhabited by caddisflies and mayflies sporadically, however, in past three years enrichment of the caddisfly community may be seen. The presence of caddisflies in the samples of evaluated year was basically all year round, the community was formed mainly by rheophilous species with low abundances. Mayflies were recorded only in autumn, with negligible abundance. All observed river branches in the left-side inundation area are very poor in long-term. The mayfly community in the evaluated years consisted of 1-4 species, with irregular presence in samples. All year round presence of caddisflies was registered only on one monitoring area, on other locations the occurrence of only one species was confirmed..

The evaluation of ichthyofauna in the Danube used to be based on two monitoring areas on the Slovak and Hungarian territory. The Hungarian Party, however, suspended the monitoring of ichthyofauna in the evaluated year. Based on results from Slovak monitoring areas it can be stated that the ichthyocoenoses of the diverted stretch of the Danube is stable in recent years, with relatively low species diversity and abundance. Dominant presence have eurytopic and non-native invasive species. In samples, however, native rheophilous species regularly appear. Development of the ichthyocoenoses in the left-side inundation area in the evaluated year is stable, with the dominance eurytopic and indifferent species in long-term, rather abundant is also the occurrence of non-native goby species (*Neogobius sp.*). The ichthyocoenosis of the observed dead arm has became poorer in the evaluated year in terms of species number and also abundance of the present species (temporary improving had been recorded in previous two years). The dominant position is still retained by the expansive black catfish (*Ameiurus melas*) and the non-native sun perch (*Lepomis gibosus*).

8.2. Proposals

Proposals given in this chapter will be obligatory for both Parties and do not require further approval when the actual Joint Annual Report is approved and signed by Nominated Monitoring Agents.

1. The Slovak Party shall submit the Hungarian Party a proposal on optimisation of the monitoring, which is carried out under the intergovernmental Agreement of 1995.

APPENDIX A.1.

AGREEMENT
BETWEEN THE GOVERNMENT OF THE SLOVAK REPUBLIC AND GOVERNMENT OF THE REPUBLIC OF HUNGARY CONCERNING CERTAIN TEMPORARY TECHNICAL MEASURES AND DISCHARGES IN THE DANUBE AND MOSONI BRANCH OF THE DANUBE

The Government of the Slovak Republic

and

the Government of the Republic of Hungary

have agreed as follows:

Article 1

1. Immediately following the conclusion of this Agreement, the Slovak Party will increase the discharge of water through the intake structure at Čunovo into the Mosoni branch of the Danube to 43 m3/s subject to hydrological and technical conditions specified in Annex 1 to this Agreement. This value includes the flow of water through the seepage canal on the right side of the reservoir from Slovak territory into Hungarian territory.

2. The competent Slovak and Hungarian authorities shall take all necessary measures on their respective territories to enable the continuous flow of the increased discharge of water from Slovak territory into Hungarian territory.

3. The water will be distributed, on Hungarian territory, between the branch system on the right side of the Danube, the protected area and the Mosoni branch of the Danube.

Article 2

1. The day following the conclusion of this Agreement the discharge into the main riverbed of the Danube below the Čunovo weir will be increased to an annual average of 400 m3/s, in accordance with the rules of operation contained in Annex 2 to this Agreement. Discharges entering the main riverbed of the Danube through the inundation weir are excluded from the average calculation.

2. During the construction of the weir pursuant to Article 3 the discharge into the main riverbed of the Danube below the Čunovo weir will be regulated in accordance with Annex 3 to this Agreement.

Article 3

1. There will be a weir partly overflowed by water and constructed by the Hungarian Party in the main riverbed of the Danube, at rkm 1843. The main parameters of the weir are specified in Annex 4 to this Agreement.

2. The Parties undertake to ensure the issuance, without delay, of the administrative authorization required by their respective national legislation for the construction and maintenance of the weir in accordance with this Agreement.

3. The costs of the construction and maintenance of the weir will be borne by the Republic of Hungary.

4. The construction of the weir will begin not later that 10 days following the conclusion of this Agreement and is anticipated to be completed within a period of 50 days from the commencement of works.

Article 4

The Parties undertake to exchange those data of their environmental monitoring systems operating in the area that are necessary to assess the impacts of the measures envisaged in Articles 1-3. Collected data will be regularly exchanged and jointly and periodically evaluated with a view to making recommendations to the Parties. The observation sites, parameters observed, periodicity of data exchange, the methodology and periodicity of joint assessment are contained in Annex 5 to this Agreement.

Article 5

1. In the event that either Party believes the other Party is not complying with this Agreement, and f[illegible] to persuade the other Party that it is in breach, the Party may invoke the good offices of the Commission of the European Union and both Parties agree to give close cooperation to the Experts of the Commission and to take duly into consideration any opinion rendered by them.

2. If, for whatever reason, the good offices are not provided or are unsuccessful and the material breach continues to exist, the Party affected will be entitled to terminate this Agreement with a one month notice.

Article 6

This Agreement has a temporary character, pending the judgment of the International Court of Justice in the case concerning the Gabčíkovo-Nagymaros Project and is without prejudice to existing rights and obligations of the Parties as well as to their respective positions in the dispute before the Court and, in any event, unless otherwise agreed, it shall terminate 14 days after the judgment of the International Court of Justice in the case concerning the Gabčíkovo-Nagymaros Project.

Article 7

On the termination of this Agreement and unless otherwise agreed or decided, Hungary shall at its own expense remove the weir referred to in Article 3.

Article 8

This Agreement shall enter into force on the date of its signature.

Done at Budapest on the ..19.. day of April, 1995, in duplicate, in the Slovak, Hungarian and English languages, the English text to prevail in the event of any discrepancy.

For the Government
of the Slovak Republic

For the Government
of the Republic of Hungary

Annex No. 1

Hydrological and technical conditions for the increase of the discharges into the Mosoni Danube

1/ The increase of the discharge into the Mosoni Danube and into the right side seepage canal of the Hrušov reservoir from 20m³/sec up to 43 m³/sec will be ensured subject to the following hydrological and technical conditions:

1.1 Provided that minimum difference between the water-level of the Mosoni Danube and the Hrušov reservoir is 5.10 m.

1.2 Provided that the minimum water level of the Hrušov reservoir is 130.40 m above sea level.

1.3 Provided that the water-level of the Mosoni Danube does not exceed 125.30 m above sea level.

1.4 Provided that the entrances to the intake structure are unobstructed. Whenever the discharges of the Danube exceed 4000 m³/sec (involving the inundation of the flood-plain), the water-borne materials will move to a greater extent this may restrict the amount of water which can be provided.

1.5 Provided that there is no failure in the electricity network system. If the network system is damaged or in the event of any other failure of the generating capacity, the energy system will turn off automatically and the capacity of the intake structure will be reduced to half of the original.

2/ At the request of the Hungarian party the Slovak party will moderate the discharge for a period specified by the Hungarian party.

The selected site for the measuring of the discharge of the Mosoni Danube is a gauge at 0.160 km on the left bank of the canal on the territory of the Slovak Republic. The selected site for the measuring of the discharge of the right side canal of the Hrušov reservoir is on the regulating weir at 1.100 km on the territory of the Hungarian Republic.

Rules of operation

The volume of water discharged through the Čunovo weir into the main river bed of the Danube to correspond to the annual average of 400 m^3/sec.

The annual average discharge in Bratislava corresponds to 2025 m^3/sec. The annual average discharge into the main Danube river bed in each specific year will correspond to the formula:

$$V_{Danube} = \frac{(V_{Devin} \times 400)}{2025}$$

where V_{Devin} is the average yearly discharge in the Devín profile in the specific year.

V_{Danube} is the average yearly discharge to the main Danube river bed in the specific year.

- During the growing season the discharge into the main river bed will be higher than during the dormant season.
- The discharge into the main river bed of the Danube will correspond to actual discharges in the Devin profile.
- The discharges released through the inundation weir during flood will not be included in the calculation.

The discharges in the Devin profile together with the corresponding discharges at the Čunovo weir.

January		February		March		April		May		June	
600	250	600	250	600	250	600	400	600	400	600	400
2200	250	2000	250	1500	250	1100	400	700	400	700	400
2300	251	2100	258	1600	250	1200	400	800	400	800	400
2400	273	2200	280	1700	271	1300	400	900	400	900	400
[illegible]00	295	2300	301	1800	392	1400	400	1000	400	1000	418
2600	317	2400	323	1900	314	1500	400	1100	400	1100	440
2700	339	2500	345	2000	336	1600	400	1200	400	1200	462
2800	360	2600	367	2100	358	1700	400	1300	400	1300	483
2900	382	2700	389	2200	380	1800	400	1400	405	1400	505
3000	404	2800	410	2300	401	1900	414	1500	427	1500	527
3100	426	2900	432	2400	423	2000	436	1600	449	1600	549
3200	448	3000	454	2500	445	2100	458	1700	471	1700	571
3300	469	3100	476	2600	467	2200	480	1800	592	1800	592
3400	591	3200	498	2700	489	2300	501	1900	514	1900	600
3500	513	3300	519	2800	510	2400	523	2000	536	4600	600
3600	535	3400	541	2900	532	2500	545	2100	558		
3700	557	3500	563	3000	554	2600	567	2200	580		
3800	578	3600	585	3100	576	2700	589	2300	600		
3900	600	3700	600	3200	600	2800	600	4600	600		
4600	600	4600	600	4600	600	4600	600				

July		August		September		October		November		December	
600	400	600	400	600	250	600	250	600	250	600	250
700	400	900	400	1100	250	1500	250	1800	250	2000	250
800	400	1000	400	1200	262	1600	250	1900	264	2100	258
900	400	1100	400	1300	283	1700	271	2000	286	2200	280
1000	400	1200	400	1400	305	1800	292	2100	308	2300	301
1100	400	1300	400	1500	327	1900	314	2200	330	2400	323
1200	400	1400	400	1600	349	2000	336	2300	351	2500	345
1300	400	1500	400	1700	371	2100	358	2400	373	2600	367
1400	405	1600	400	1800	392	2200	380	2500	395	2700	389
1500	427	1700	421	1900	414	2300	401	2600	417	2800	410
1600	449	1800	442	2000	436	2400	423	2700	439	2900	432
1700	471	1900	464	2100	458	2500	445	2800	460	3000	454
1800	492	2000	486	2200	480	2600	467	2900	482	3100	476
00	514	2100	508	2300	501	2700	489	3000	504	3200	498
2000	536	2200	530	2400	523	2800	510	3100	526	3300	519
2100	558	2300	551	2500	545	2900	532	3200	548	3400	541
2200	580	2400	573	2600	567	3000	554	3300	569	3500	563
2300	600	2500	595	2700	589	3100	576	3400	591	3600	585
4600	600	2600	600	2800	600	3200	600	3500	600	3700	600
		4600	600	4600	600	4600	600	4600	600	4600	600

The capacity of the by-pass weir when open under conditions of a minimum water level in the reservoir (which is 128.2 m above sea level), is 290 m^3/sec. The discharge of 400 m^3/s can be assured under the condition that the water level in the reservoir is 128.45 m above sea level, and 600 m^3/sec under conditions of a water level of 129.05 m above sea level.

The water level in the reservoir is lowered only when required for construction or reparation works or when the discharge in Devín is below 925 m^3/s.

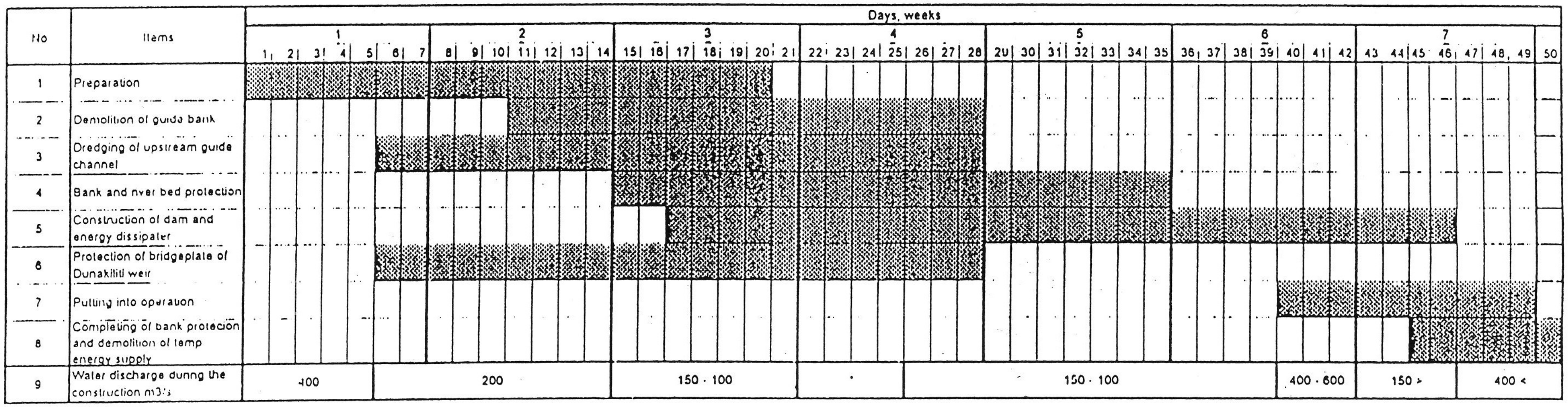
The possible differences in discharges which will be ascertained through monitoring by 31 Oct. will be adjusted within the shortest possible period by the end of the same year so that the average of 400 m^3/sec is attained.

The changes in the discharges through the Čunovo weir will occur at intervals of 200 m^3/sec. measured at the Devín site. Thus for instance at 800, 1000, 1200, 1400.... 2000, 2200 m^3/sec.

This distribution of the water resources shall be in force for 1995 and will be adjusted before the 1996 growing season on the basis of the results of a joint evaluation of the monitoring.

Annex No III.

Time table of planned underwater weir's construction at rkm 1843



* ecological minimum 50 m3/s

* Main parameters of the weir to be constructed at rkm 1843
of the Danube·

1. The weir which is partly overflowed by water will be constructed at rkm 1843 of the Danube.

2. Main parameters of the weir:

width between banks	300 m
width of the crest	5 m
width of the overflowed section	100 m
height of the center point of the overflowed section	121.80 B.s.l.
gradient of the downstream slope	1 : 10
gradient of the upstream slope	1 : 3

3. The elevation of the weir crest will be established in such a way that at the discharge of 600 m^3/s, the backwater at rkm 1851.7 of the Danube and elevation of 124.00 Bsl would not exceed.

4. The water level regulation at rkm 1843 take place when the discharge of the Danube is between 250-1300 m^3/s.

5. A maximum quantity of 150 m^3/s will be discharged into the right side branch system on the Hungarian side.

Based on the documentation approved under the number
No. VOD 161/A 28/1993-V
No. 21.663/17/1993

Annex No. 5

Matters relating to monitoring of environmental impacts .

Monitoring is divided into the following monitoring items:

Monitoring of surface water levels and discharges

the Danube:
profile at Devín
profile at Medveďov
profile at Komárno - Komárom
profile at Štúrovo - Esztergom
p file at Rajka
profile at Dobrohošť
profile at Dunaremete
profile downstream and upstream of overflowed weir at rkm 1843, (water level only)
Reservoir at Čunovo and the Danube downstream and upstream of the by-pass weir (water level only)
Reservoir at Gabčíkovo (water level only)
Tailrace canal downstream of Gabčíkovo (water level only)

Malý Danube:
at Bratislava
at Trstice

Mosoni Duna:
downstream of the intake structure at Čunovo
at Mecser
at Györ

Structures at Rajka
Seepage canal at Čunovo (on the Slovak territory)
No. 1. Lock of the outlet
No. 2. Lock of the water level control
No. 6. Lock of the water level control - Mosoni Duna
No. 1. Lock of the side branch Kility - Cikolai, Zátonyi Duna
No. 5. Lock at the seepage canal

Frequency of measurements: continuous on a daily basis

Monitoring of surface water quality

the Danube:
upstream Bratislava *
at Dobrohošt

at Gabčíkovo
at Medveďov *
at Gönyü
at Komárno - Komárom
at Štúrovo - Esztergom

Reservoir, bypass canal, seepage canals, river branches:

- upper part of the reservoir at Rusovce *
- the reservoir at Kalinkovo (left and right side)
- downstream of Mosoni Danube the intake structure
- the profile at Šamorín (left, middle and right side)
- the power canal at the ferry station
- the tailwater canal downstream of Gabčíkovo *
- the seepage canal at Čunovo *
- the seepage canal at Hamuliakovo
- the Mosoni Duna at Rajka
- the Mosoni Duna at Mecser
- the Mosoni Duna at Vének
- the Malý Dunaj at Kolárovo
- the river branches Helena and Doborgaz
- the Šulianske river branch

Frequency of measurement:
- stations marked by * - 12 times per year, between the 10th and 20th of each month,
- all other stations in: January, March, April, May, June, July, September, November, between the 10th and 20th of each month.

List of parameters:
- temperature, pH value, conductivity at 25°C, O_2
  cations: Li, Na, K, Ca, NH4, Mn, Mg, Fe
- anions: HCO3, Cl, SO4, NO3, NO2, PO4, P
- trace elements: Hg, Zn, As, Cu, Pb, Cr, Cd Ni, Vanadium
- COD, BOD, dissolved materials (mineralization)
- biological parameters: Saprobility index, bioseston, chlorophyll,
- number of algae, zooplancton, macrobenthos, according to the decision of the monitoring group,
- microbiological parameters, coliform bacteria, mezophilic bacteria, psychrophilic bacteria
- organic matters, TOC, Nonpolar extractable - UV, - IR, EOX, AOX, phenols, humic acids,
- organic micropollutants, polyaromatic hydrocarbons, - polychlorobiphenyls (and others, to be agreed)

Sediments:
- at jointly selected stations, e.g. at places of surface water quality sampling,
- three places in the Slovak and three in the Hungarian flood plain

Extent of parameters:

granulometric curves, organic matters and other selected parameters

Frequency of measurement: once per year in autumn

Monitoring of ground water levels

Monitoring of ground water levels will be carried out on wells between the Malý Danube and the Lajta - Mosoni Danube. Wells to be chosen in profiles based on maps containing all observation wells. [At least at 150 wells on the Slovak territory and at least at 100 wells on the Hungarian territory to be chosen.]

Frequency of measurement: once per week

Monitoring of ground water quality

Ground water quality will be monitored on the municipal water supply [and ground water] wells between the Malý Danube and the Laita - Mosoni Danube, [at least 10 localities on each territory. In addition to this other at least 10 selected ground water quality wells on each territory] should be monitored. These wells should be those which satisfy hygiene criteria for drinking water wells and sampling should be commonly agreed.

Frequency of measurement: once per month.

Quality should be evaluated according to the standards for drinking water in force in both countries.

Monitoring of soil moisture (aeration zone)

[At least 10] monitoring areas to be selected on each territory from among the localities already monitored.

Frequency of measurement: once every 10 days, but in winter (November, December, January and February) twice a month. Each locality should also include a ground water level monitoring well.

Monitoring of biota:

- microbenthos and macrobenthos in the Danube and river branches at places of water level measurements
- fish, in all surface waters
- [Forestry, on at least 8 selected places from among existing monitoring localities on each side]
- Special water related organisms as for example: Odonata, Ephemeroptera, Trichopetra, Braconidea and others, jointly selected.

Special monitoring

For the estimation of the impact of the overflowed weir special monitoring to be carried out. This will include measurements of flow velocities, water levels, water quality, micro and macro benthos, sediments, ground water quality in the impounded reach etc.

Submitting of data and reports:

Both sides will use data jointly agreed and will use jointly agreed methods of evaluation. All monitoring items and locations, and methods of measurements to be jointly agreed. Annual reports will include only measured data in tabulated, graphical and map forms with short explanations.

Joint and verification measurements will be carried out at any location where a discrepance occurs.

Data exchange will be carried out at three month intervals. Annual reports to be submitted as joint reports by the end of each calendar year and covering a period of a hydrological year.

Annual reports will be issued in English language with standardised graphical annexes in Hungarian or Slovak languages.

Statute

Monitoring will be carried out in accordance with the Statute of nominated Monitoring Agents.

Statute will be prepared by: Ing Arpád Kovács, Ministry of Environment (Hungary), Ing. Dominik Kocinger, Government plenipotentiary for the GNP (Slovakia)

Draft statute will be prepared jointly following the signing of this document and before 31.May 1995.

Text in square brackets [] contains Slovak proposals subject to agreement by the Monitoring Agents.

APPENDIX A.2.

STATUTE
on the activities of the Nominated Monitoring Agents
envisaged in the

"Agreement
between the Government of Republic of Hungary and
the Government of the Slovak Republic
concerning Certain Temporary Technical Measures and
Discharges in the Danube and the Mosoni Branch of the Danube",
signed on April 19, 1995

According to the Article 4 of the "Agreement between the Government of Republic of Hungary and the Government of the Slovak Republic concerning Certain Temporary Technical Measures and Discharges in the Danube and the Mosoni Branch of the Danube", signed on April 19, 1995 (in the following Agreement) the Parties undertake to exchange data of their environmental monitoring systems operating in the affected area which are necessary to assess the environmental impacts of the measures envisaged in Articles 1-3 of the Agreement.

According to the assignment contained in the Article 4 and Annex 5 of the Agreement, Nominated Monitoring Agents (Representatives of Parties):

Árpád Kovács, Deputy State Secretary of the Ministry for Environment and Regional Policy of Hungary

and

Dominik Kocinger, Plenipotentiary of Government of Slovak Republic for Construction and Operation of Gabčíkovo-Nagymaros Waterworks

agreed on the Statute concerning the exchange of data and joint periodical evaluation thereof (in the following Statute).

Article 1

1. Nominated Monitoring Agents are responsible for the exchange and evaluation of data from the environmental monitoring systems of the Parties which are necessary to assess the environmental impacts of the measures envisaged in Articles 1-3 of the Agreement.

2. The Nominated Monitoring Agents will submit the joint evaluations and proposals prepared periodically to their respective Governments.

Article 2
Data from the environmental monitoring system

1. The monitoring sites, objects and items based on Annex 5 of the Agreement are specified in the Annexes to this Statute. Annex 1 contains monitoring sites, objects and items for the Slovak Republic, and Annex 2 contains monitoring sites, objects and items for Hungary, both Annexes specifying the dates of data exchange.

2. The in situ survey of monitoring sites and objects or joint measurements will be carried out where a discrepancy occurs to measured data, or through agreement by the Nominated Monitoring Agents.

3. The Nominated Monitoring Agents are entitled to change or add a monitoring site, object or item by mutual consent.

4. Exchange of the data is made through the Nominated Monitoring Agents in writing and on magnetic media. The Nominated Monitoring Agents undertake to put at each other's disposal necessary topographical maps (M 1:10000) and any other maps in other scale under mutual agreement.

Article 3
Monitoring evaluation

1. The joint evaluation of exchanged data refers to one hydrological year. The Joint Annual Report will be carried out four months following the respective hydrological year. The Joint Annual Report will be prepared in Slovak, Hungarian and English languages, the English text shall prevail in the event of any discrepancy.

2. The National Annual Report will include the measured data in tabular, graphical and map forms with short explanations. The Parties will exchange National Annual Report three months following the respective hydrological year, and Nominated Monitoring Agents will call a meeting to carry out the joint evaluation of presented data.

Article 4
Activity of Nominated Monitoring Agents

1. Meetings will be held according to need, but at least two times in a calendar year. Meetings are called by both sides alternately. All necessary conditions for a meeting have to be secured by the receiving Party, and the meeting is chaired by the Nominated Monitoring Agent of the receiving Party. Minutes from the meeting will be prepared and will be signed by both Nominated Monitoring Agents.

2. Nominated Monitoring Agents have the right to invite experts to the meetings.

3. When a joint measurements or an in situ site survey will be carried out the receiving Party is obliged to secure all necessary conditions for measurement and access to the monitored site or object, subject to mutual agreement.

4. Meetings of the Nominated Monitoring Agents are to be held in the Slovak and Hungarian languages. Minutes from the meetings are prepared in the Hungarian, Slovak and English languages, the English text will prevail in the event of any discrepancy.

Article 5
Miscellaneous Provisions

1. All expenses connected to the activity of Nominated Monitoring Agents and meetings are covered by the Parties independently. Expenses connected to the preparation of the English version of the Joint Annual Report are covered by the Parties equally.

2. The Nominated Monitoring Agents begin their activities upon the approval of this Statute.

3. This Statute shall terminate with the termination of the Agreement.

4. This Statute is prepared in duplicate, in the Slovak, Hungarian and English languages, the English text will prevail in the event of any discrepancy.

Agreed at Gabčikovo on 29th May, 1995.

....
Kovács Árpád
Nominated Monitoring Agent
of the Republic of Hungary

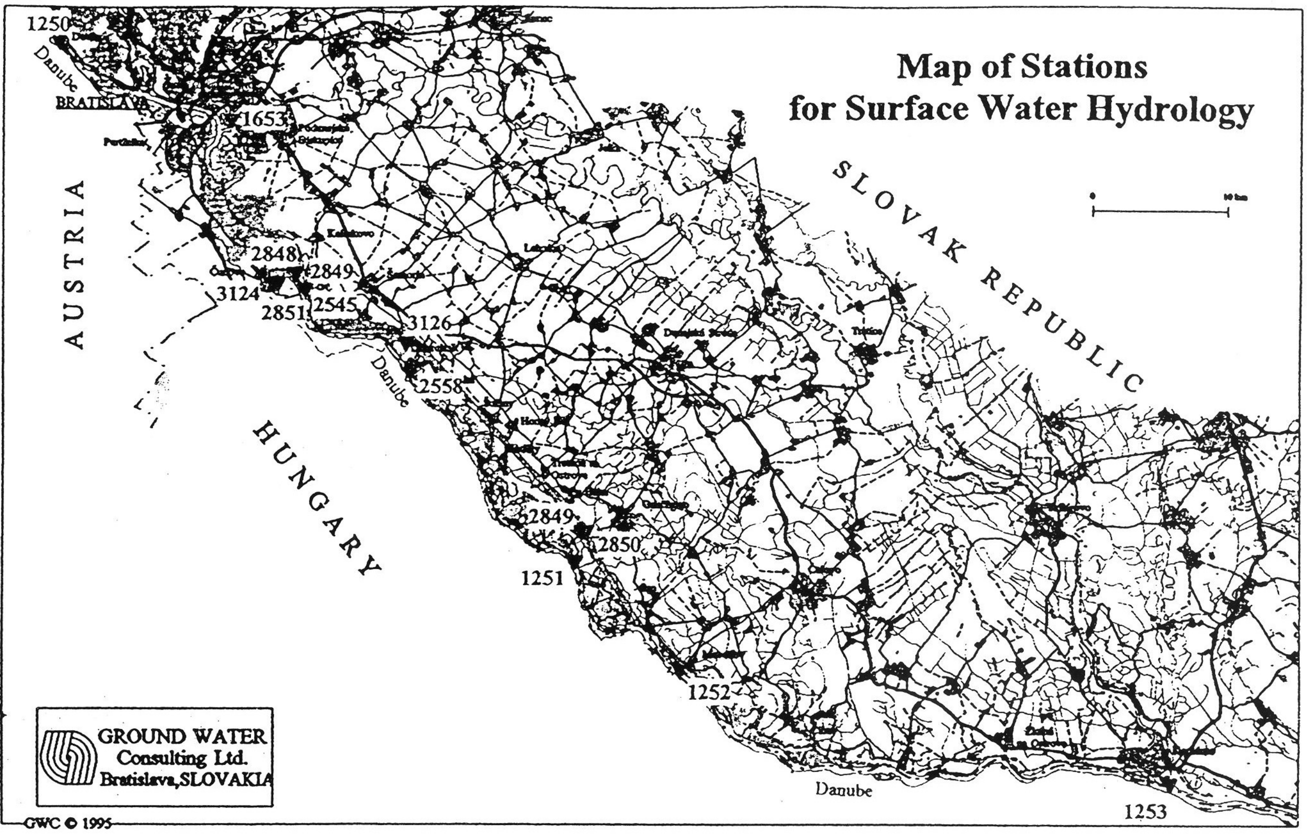
....
Dominik Kocinger
Nominated Monitoring Agent
of the Slovak Republic

ANNEX 1

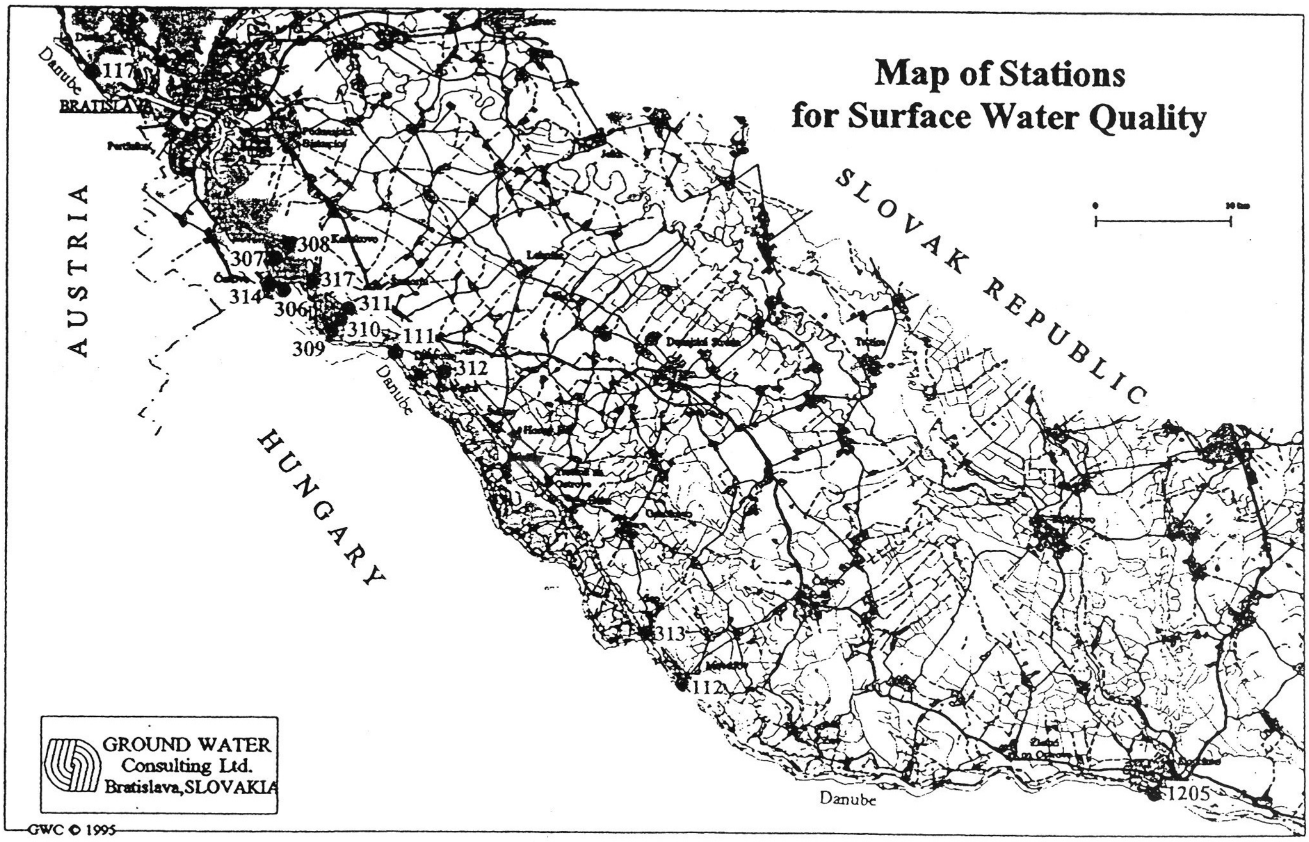
Monitoring areas, objects and items

of Slovak Republic

Contents



Map of Stations
for Surface Water Hydrology
AUSTRIA
HUNGARY
SLOVAK REPUBLIC
BRATISLAVA
Danube
Danube
Danube
1250
1653
2848
2849
3124
2851
2545
3126
2558
2849
2850
1251
1252
1253
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
GWC © 1995



Map of Stations
for Surface Water Quality
AUSTRIA
HUNGARY
SLOVAK REPUBLIC
BRATISLAVA
Danube
Danube
Danube
117
308
307
317
314
306
311
310
111
309
312
313
112
1205
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
GWC © 1995

List of Stations for Surface Water Hydrology

Station No.	Situated on	Location	H	Q	Q - daily average
1250	Danube	Bratislava-Devín	H	Q	Q - daily average
2545	Danube	Hamuliakovo	H	-	
2558	Danube	Dobrohošť	H	Q	Q - daily average
1251	Danube	Gabčikovo	H	-	
1252	Danube	Medveďov	H	Q	Q - daily average
1253	Danube	Komárno	H	Q	Q - daily average
2848	Danube - Reservoir	By-pass Weir upstream	H	-	
2849	Danube - Old river bed	By-pass Weir downstream	H	Q	
2851	Mosoni Danube	Intake structure at Čunovo	H	Q	Q - daily average
3126	Danube - Power channel	Intake structure at Dobrohošť	H	Q	Q - daily average
2849	Danube - Power channel	Gabčíkovo upstream	H	-	
2850	Danube - Outlet channel	Gabčíkovo downstream	H	Q	
3124	Seepage canal	Čunovo	H	Q	
1653	Malý Danube	Malé Pálenisko	H	Q	Q - daily average

Frequency of measurements:
H - surface water level, measured daily at 7.00 a.m.
Q - surface water discharge, corresponding to measured surface water level at 7.00 a.m.
Q daily average - surface water discharge, evaluated from continuous surface water level measurements

Data exchange:
H,Q - daily
Q daily average - quarterly

Data sheet for Surface Water Hydrology

Dominik Kocinger
Nominated Monitoring Agent for Slovak republic

Joint Monitoring Data

Date: DD.MM.YYYY

Station No.	Situated on	Location	Surface Water level (m a.s.l.)	Discharge (m^3s^{-1})
1250	Danube	Bratislava-Devín	***.**	*****.**
2545	Danube	Hamuliakovo	***.**	-
2558	Danube	Dobrohošť	***.**	*****.**
1251	Danube	Gabčíkovo	***.**	-
1252	Danube	Medveďov	***.**	*****.**
1253	Danube	Komárno	***.**	*****.**
2848	Danube - Reservoir	By-pass Weir upstream	***.**	-
2849	Danube - Old river bed	By-pass Weir downstream	***.**	*****.**
2851	Mosoni Danube	Intake structure at Čunovo	***.**	*****.**
3126	Danube - Power channel	Intake structure at Dobrohošť	***.**	*****.**
2849	Danube - Power channel	Gabčíkovo upstream	***.**	-
2850	Danube - Outlet channel	Gabčíkovo downstream	***.**	*****.**
3124	Seepage canal	Čunovo	***.**	*****.**
1653	Malý Danube	Malé Pálenisko	***.**	*****.**

Data exchanged on a daily basis.
Daily average discharge exchanged quarterly.

List of Stations for Surface Water Quality

Station No.	Situated on	Location	Sample taken from
117	Danube	Bratislava - Karlova Ves	Left bank
111	Danube	Hrušov	Left bank
112	Danube	Medveďov	Middle
1205	Danube	Komárno	Middle
307	Danube - Reservoir	Kalinkovo	Navigation channel
308	Danube - Reservoir	Kalinkovo	Left side
309	Danube - Reservoir	Šamorín	Right side
310	Danube - Reservoir	Šamorín	Navigation channel
311	Danube - Reservoir	Šamorín	Left side
312	Danube - Power channel	Vojka	Left bank
313	Danube - Outlet channel	Sap	Left bank
306	Mosoni Danube	Čunovo	Middle
314	Seepage canal	Čunovo	Middle
317	Seepage canal	Hamuliakovo	Middle
	River arm	Dobrohošť	Left bank

Frequency of measurements, List of parameters:

12 times per year (monthly)
Temperature, pH, Conductivity, O_2
Na^+, K^+, Ca^{2+}, Mg^{2+}, Mn, Fe, NH_4^+
HCO_3^-, Cl^-, SO_4^{2-}, NO_3^-, NO_2^-, PO_4^{2-}
total P, total N
Hg, Zn, As, Cu, Cr, Cd, Ni
COD_{Mn}, BOD_5
Suspended silts (dried at 105°C)
Saprobity index, Clorophyll-a, Coliform Bacteria
Fecalcoli, Streptococcus, Number of Bacteria
TOC, UV oil, total dissolved solids (dried at 105°C)

4 times per year
Number of Algae, Zooplancton, Macrobenthos

Once per year
Sediments
total P, total N, organic and anorganic micropollutants

Data exchange: quarterly, yearly

Data sheet for Surface Water Quality

Dominik Kocinger
Nominated Monitoring Agent for Slovak republic

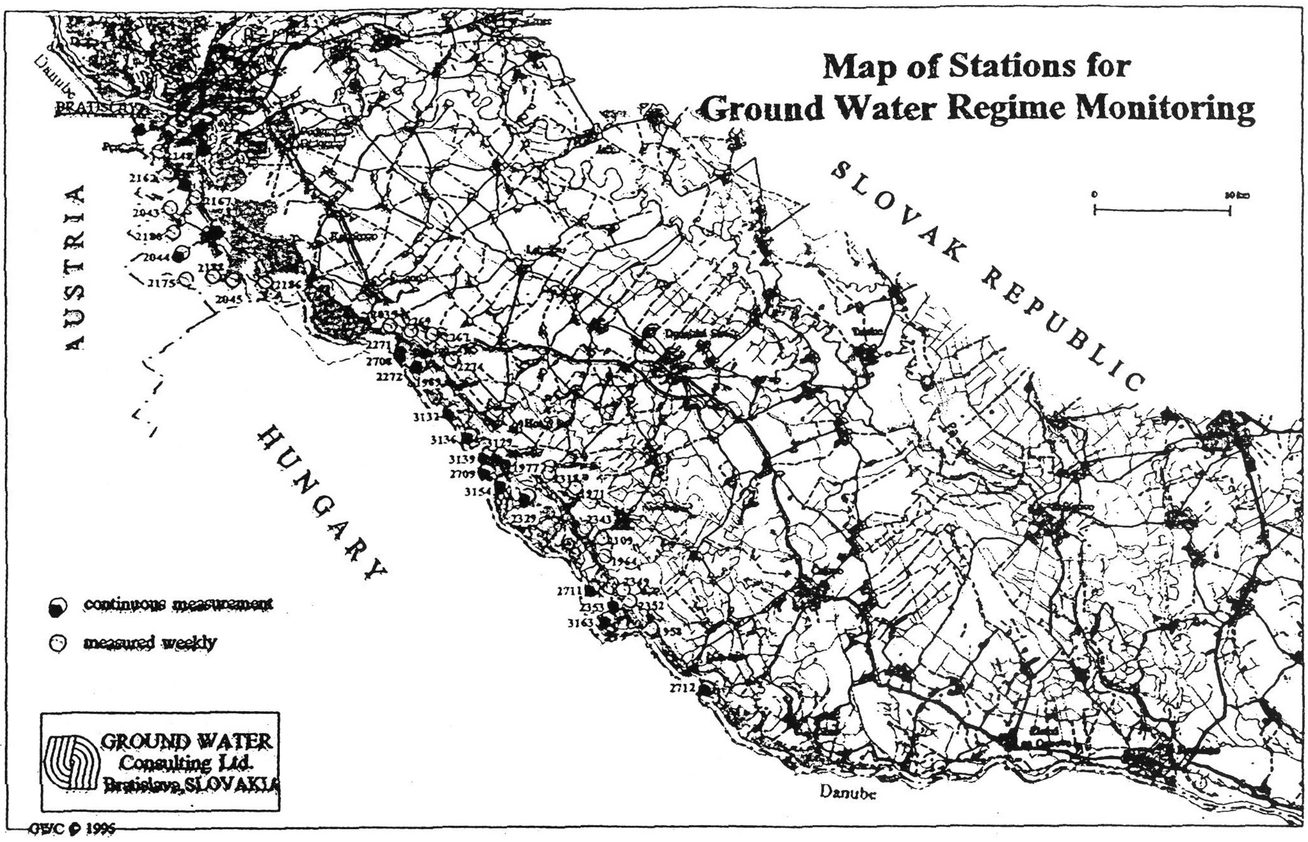
Joint Monitoring Data

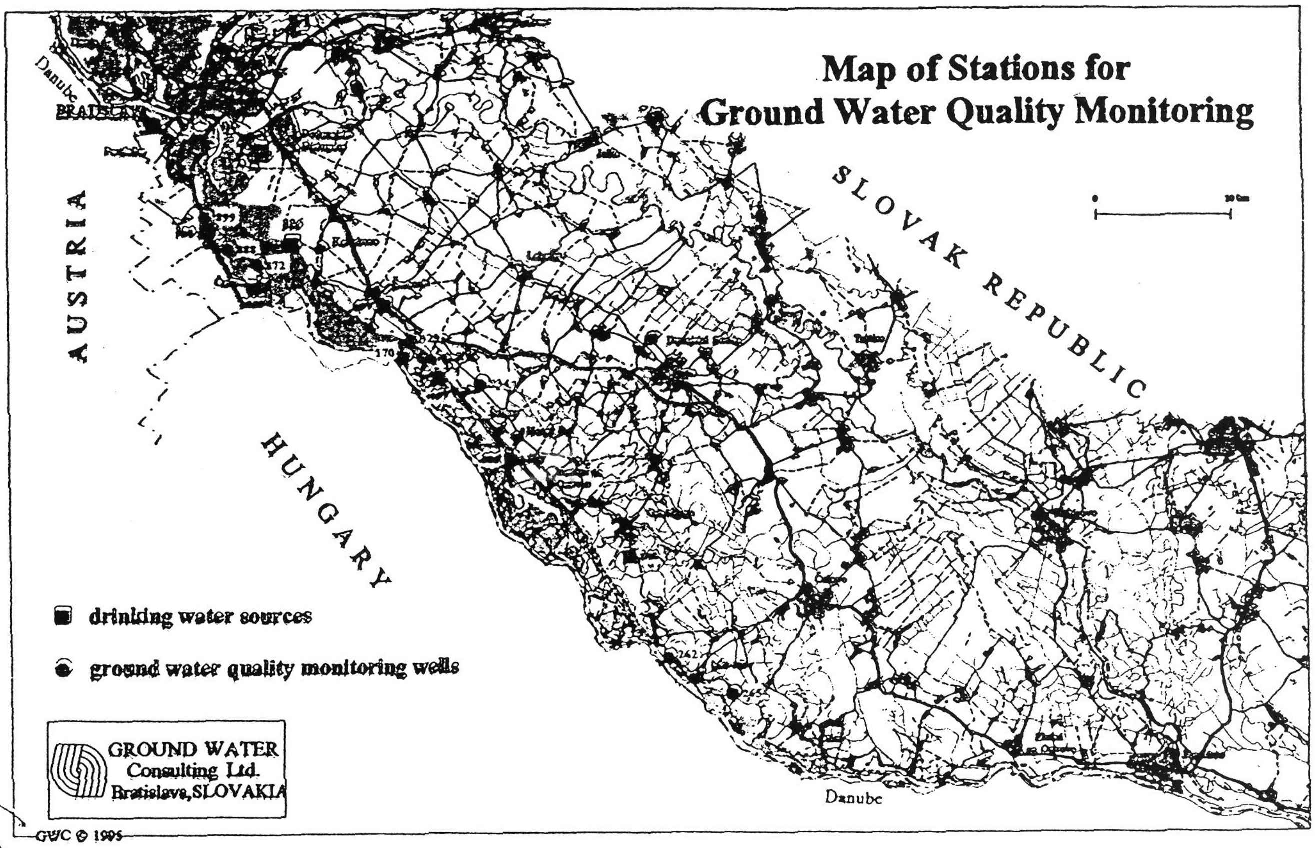
Station No.: ****
Date: DD.MM.YYYY

Item	Value	Unit
Temperature	**.*	°C
pH	*.*	-
Conductivity	***.**	
O_2	***.**	
Na^+	***.**	
K^+	***.**	
Ca^{2+}	***.**	
Mg^{2+}	***.**	
Mn	***.**	
Fe	***.**	
NH_4^+	***.**	
HCO_3^-	***.**	
Cl^-	***.**	
SO_4^{2-}	***.**	
NO_3^-	***.**	
NO_2^-	***.**	
PO_4^{2-}	***.**	
total P	***.**	
total N	***.**	
Hg	***.**	
Zn	***.**	
As	***.**	
Cu	***.**	
Cr	***.**	
Cd	***.**	
Ni	***.**	

Item	Value	Unit
COD_{Mn}	***.**	
BOD_5	***.**	
suspended silts	***.**	
Saprobity index	***.**	-
Clorophyll-a	***.**	
Coliform Bacteria	***.**	
Fecalcoli	***.**	
Streptococcus	***.**	
Number of Bacteria	***.**	
TOC	***.**	
UV oil	***.**	
total dissolved solids	***.**	

Data exchanged quarterly.


Map of Stations for
Ground Water Regime Monitoring
AUSTRIA
HUNGARY
SLOVAK REPUBLIC
BRATISLAVA
Danube
continuous measurement
measured weekly
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
GWC © 1995


Map of Stations for
Ground Water Quality Monitoring
AUSTRIA
HUNGARY
SLOVAK REPUBLIC
BRATISLAVA
Danube
drinking water sources
ground water quality monitoring wells
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
GWC © 1995

List of Stations for Ground Water Regime Monitoring

Station No.	Measured
Right side of the Danube	
2148	weekly
2162	weekly
2167	weekly
2043	weekly
2180	weekly
2044	continuously
2175	weekly
2188	weekly
2045	weekly
2186	weekly
2169	weekly
2165	weekly
2041	weekly
2039	weekly
2144	weekly
Left side of the Power Channel	
2035	weekly
2269	weekly
2267	weekly
2274	weekly
2318	weekly
1971	weekly
2343	weekly
2109	weekly

Station No.	Measured
1964	weekly
2349	weekly
2352	weekly
1958	weekly
2712	weekly
Inundation area	
2271	continuously
2708	continuously
2272	weekly
1989	continuously
3132	continuously
3136	continuously
3139	continuously
3129	continuously
1977	continuously
2709	continuously
3154	continuously
2329	continuously
2711	continuously
2353	continuously
3163	continuously

Frequency of measurements:
measured continuously - measured every hour
measured weekly - measured once a week (on Wednesday)

Data exchange: monthly

Data sheet for Ground Water Regime Monitoring

Dominik Kocinger
Nominated Monitoring Agent for Slovak republic

Joint Monitoring Data

Station No.: ****
Date: DD.MM.YYYY

Date dd.mm.yy	Ground Water Level (m a.s.l.)
01.06.95	***.**
02.06.95	***.**
03.06.95	***.**
04.06.95	***.**
05.06.95	***.**
.	.
.	.
27.06.95	***.**
26.06.95	***.**
27.06.95	***.**
28.06.95	***.**
29.06.95	***.**
30.06.95	***.**

Data exchanged on a monthly basis.

List of Stations for Ground Water Quality

Station No.	Location	Situated	Sampled
Municipal Wells for Drinking Water Supply			
102	Rusovce	Right side of the Reservoir	monthly
2559	Čunovo	Right side of the Reservoir	monthly
116	Kalinkovo	Left side of the Reservoir	monthly
457	Šamorin	Left side of the Reservoir	monthly
467	Dobrohošť	Inundation area	monthly
485	Bodiky	Inundation area	monthly
103	Gabčikovo	Left side of the Outlet channel	monthly
	Bratislava-Petržalka	Right side of the Danube	monthly
Ground Water Quality Observation Wells			
899	Rusovce	Right side of the Reservoir	quarterly
888	Rusovce	Right side of the Reservoir	quarterly
872	Čunovo	Right side of the Reservoir	quarterly
329	Šamorin	Left side of the Reservoir	quarterly
170	Dobrohošť	Inundation area	quarterly
234	Rohovce	Left side of the Power channel	quarterly
262	Sap	Left side of the Danube	quarterly
265	Klúčovec	Left side of the Danube	quarterly

Frequency of measurements, List of parameters:

4 times per year
Temperature, pH, Conductivity, O_2
Na^+, K^+, Ca^{2+}, Mg^{2+}, Mn, Fe, NH_4^+
HCO_3^-, Cl^-, SO_4^{2-}, NO_3^-, NO_2^-, PO_4^{2-}
COD_{Mn}, TOC
SiO_3^-

Data exchange: quarterly

Data sheet for Ground Water Quality

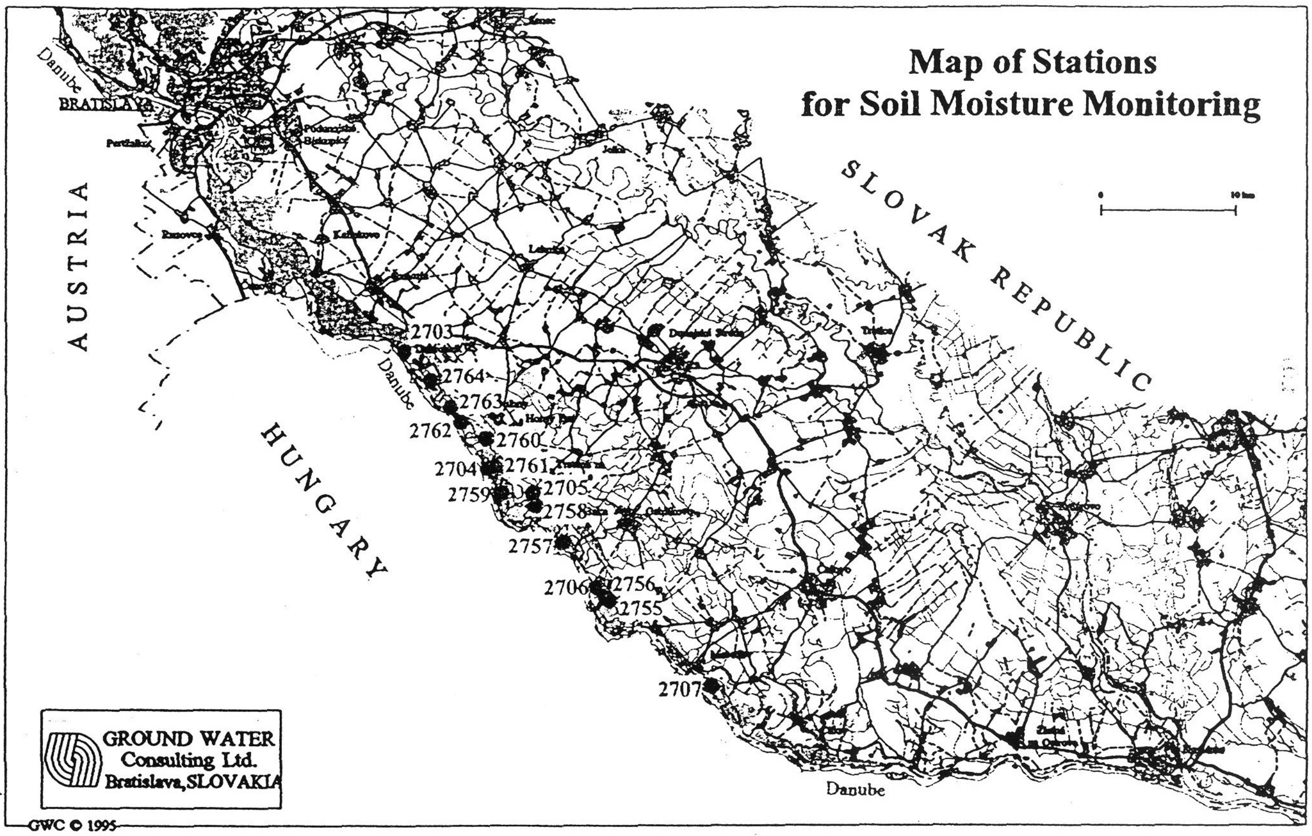
Dominik Kocinger
Nominated Monitoring Agent for Slovak republic

Joint Monitoring Data

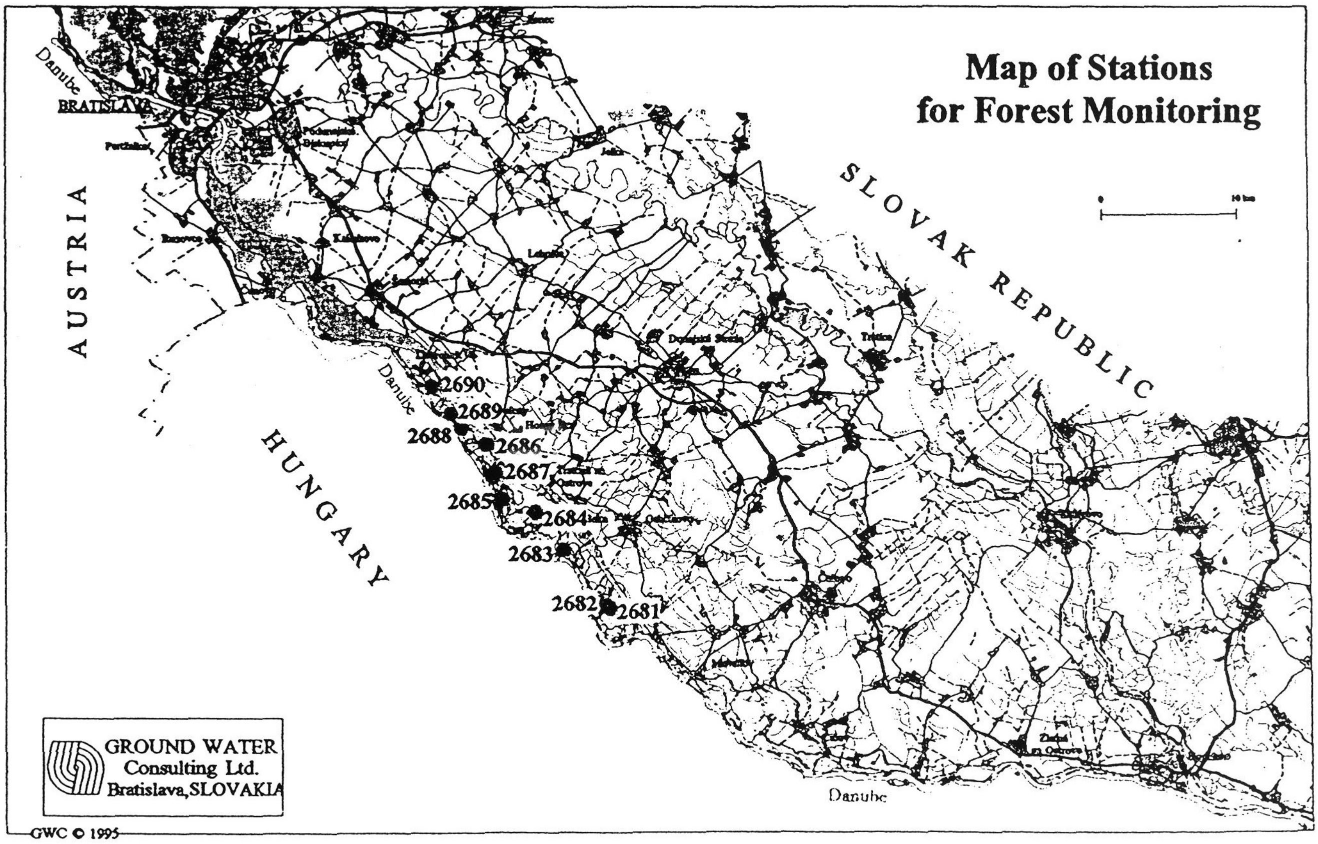
Station No.: ****
Date: DD.MM.YYYY

Item	Value	Unit
Temperature	**.*	°C
pH	*.*	-
Conductivity	***.**	
O_2	***.**	
Na^+	***.**	
K^+	***.**	
Ca^{2+}	***.**	
Mg^{2+}	***.**	
Mn	***.**	
Fe	***.**	
NH_4^+	***.**	
HCO_3^-	***.**	
Cl^-	***.**	
SO_4^{2-}	***.**	
NO_3^-	***.**	
NO_2^-	***.**	
PO_4^{2-}	***.**	
COD_{Mn}	***.**	
TOC	***.**	
SiO_3^-	***.**	

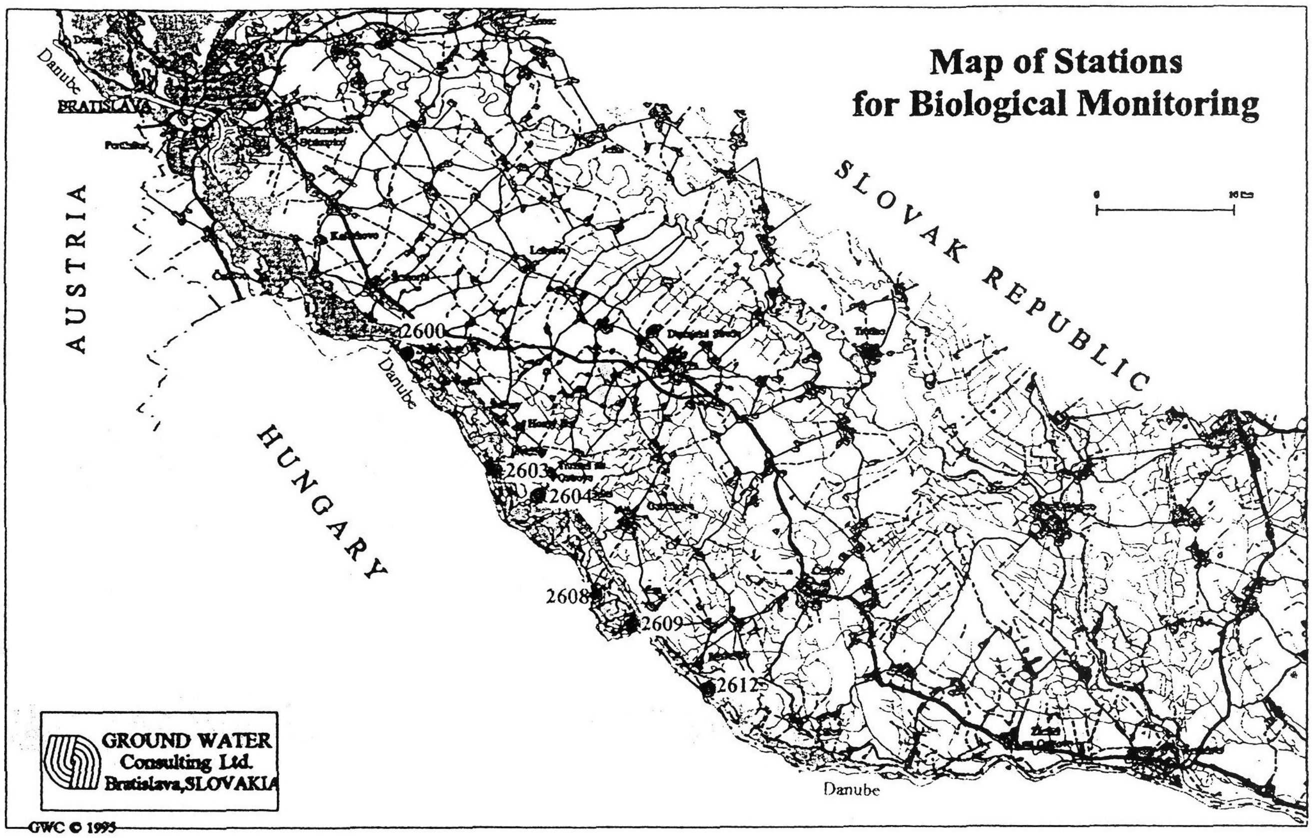
Data exchanged quarterly.



Map of Stations
for Soil Moisture Monitoring
SLOVAK REPUBLIC
AUSTRIA
HUNGARY
BRATISLAVA
Danube
Danube
Danube
2703
2764
2763
2762
2760
2704
2761
2759
2705
2758
2757
2706
2756
2755
2707
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
GWC © 1995



Map of Stations
for Forest Monitoring
SLOVAK REPUBLIC
AUSTRIA
HUNGARY
BRATISLAVA
Danube
Danube
Danube
2690
2689
2688
2686
2687
2685
2684
2683
2682
2681
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
GWC © 1995


Map of Stations
for Biological Monitoring
Danube
BRATISLAVA
AUSTRIA
SLOVAK REPUBLIC
HUNGARY
2600
Danube
2603
2604
2608
2609
2612
Danube
GROUND WATER
Consulting Ltd.
Bratislava, SLOVAKIA
GWC © 1995

List of Stations for Soil Moisture Monitoring

Station No.	Name of Station	Location
2703	MP-6	Dobrohošť
2704	MP-9	Bodíky
2705	MP-10	Bodíky
2706	MP-14	Gabčíkovo
2707	MP-18	Kľúčovec
2764	L-12	Dobrohošť
2763	L-11	Vojka nad Dunajom
2762	L-10	Vojka nad Dunajom
2761	L-9	Horný Bar - Bodíky
2760	L-8	Horný Bar - Šuľany
2759	L-7	Horný Bar - Bodíky
2758	L-6	Trstená na Ostrove
2757	L-5	Baka
2755	L-4	Gabčíkovo
2755	L-3	Sap

Frequency of measurements, List of parameters:

Measured in vertical profile each 10 cm until ground water level is reached.
In the period March - Octobre measured with frequency 10 days.
In the period Novembre - February measured once per month.

Data exchange: quarterly

Data sheet for Soil Moisture Monitoring

Dominik Kocinger
Nominated Monitoring Agent for Slovak republic

Joint Monitoring Data

Station No.: ****
Date: DD.MM.YYYY

Depth (m b.s.)	Water content (%)
0.10	**.**
0.20	**.**
0.30	**.**
0.40	**.**
0.50	**.**
0.60	**.**
0.70	**.**
0.80	**.**
0.90	**.**
1.00	**.**
.	.
.	.
.	

Data exchanged quarterly.

List of Stations for Forest Monitoring

Station No.	Name of Station	Location	Prevailing Type of Forest
2690	L-12	Dobrohošť	Poplar "I214"
2689	L-11	Vojka nad Dunajom	Poplar "Robusta, Alder
2688	L-10	Vojka nad Dunajom	Poplar "I214"
2687	L-9	Horný Bar - Bodíky	Poplar "I214"
2686	L-8	Horný Bar - Šuľany	Poplar "Robusta", "I214"
2685	L-7	Horný Bar - Bodíky	Poplar "Robusta"
2684	L-6	Trstená na Ostrove	Poplar "Robusta"
2683	L-5	Baka	Poplar "I214"
2682	L-4	Gabčíkovo	Poplar "Robusta"
2681	L-3	Sap	Willow

List of items: increase of diameter, (loss of leaves - proposed).

Frequency of measurements: Twice per year.

List of Stations for Biological Monitoring

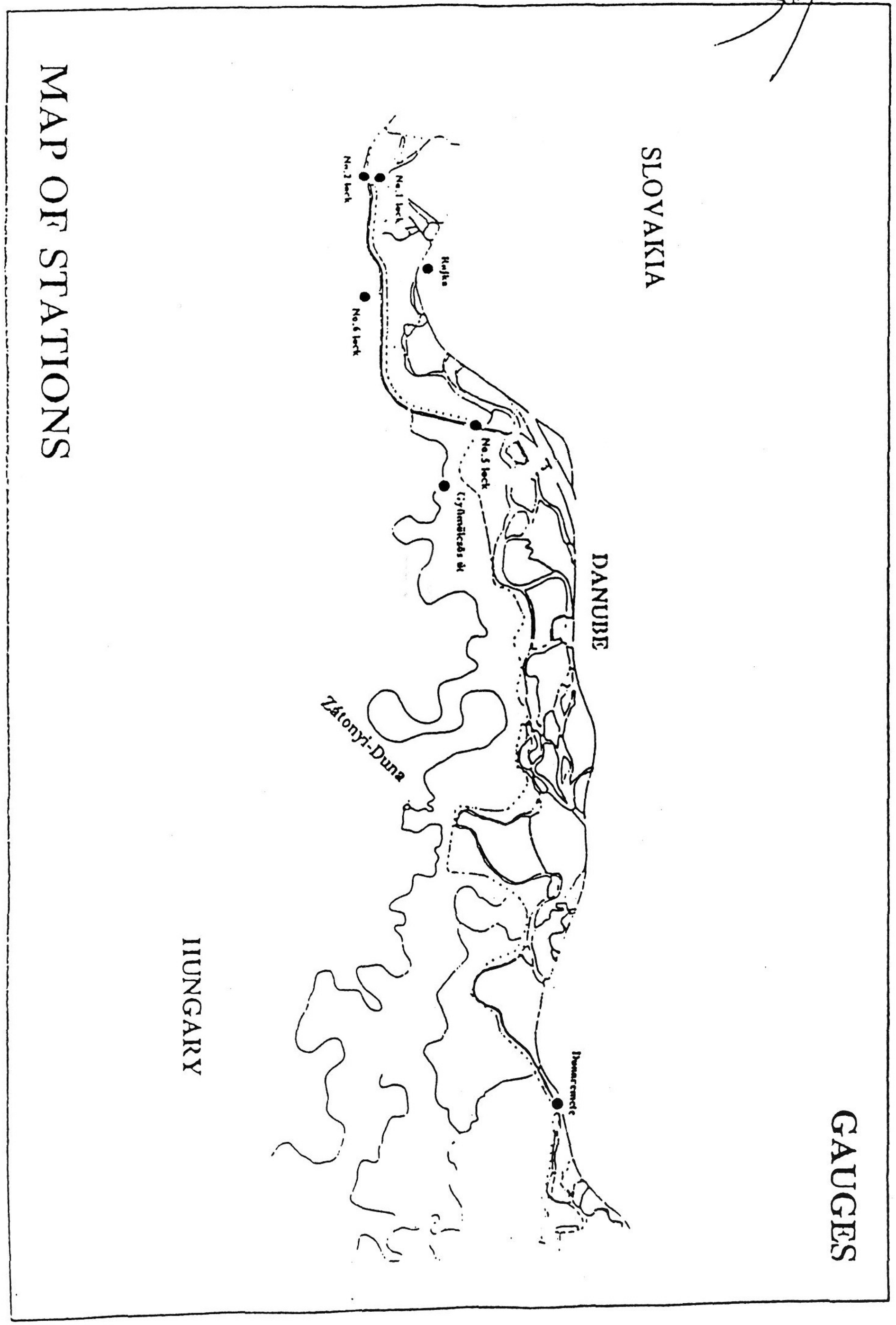
Station No.	Location	Situated
2600	Dobrohošť	Inundation area
2603	Bodíky	Inundation area
2604	Bodíky	Inundation area
2608	Gabčíkovo	Inundation area
2609	Sap	Inundation area
2612	Kľúčovec	Downstream confluence of Old Danube and Tail-race Canal

Frequency of measurements, List of parameters:

Twice or Three times per year
Planctonic crustacea (Cladocera, Copepoda)
Macrophyton
Mollusca
Pisces
Odonata
Ephemeroptera
Trichoptera
(Heteroptera, Coleoptera-Curculionidae - proposed)
(Phytocenoses - proposed)

Monitored data:
Species, dominance

Data exchange: yearly



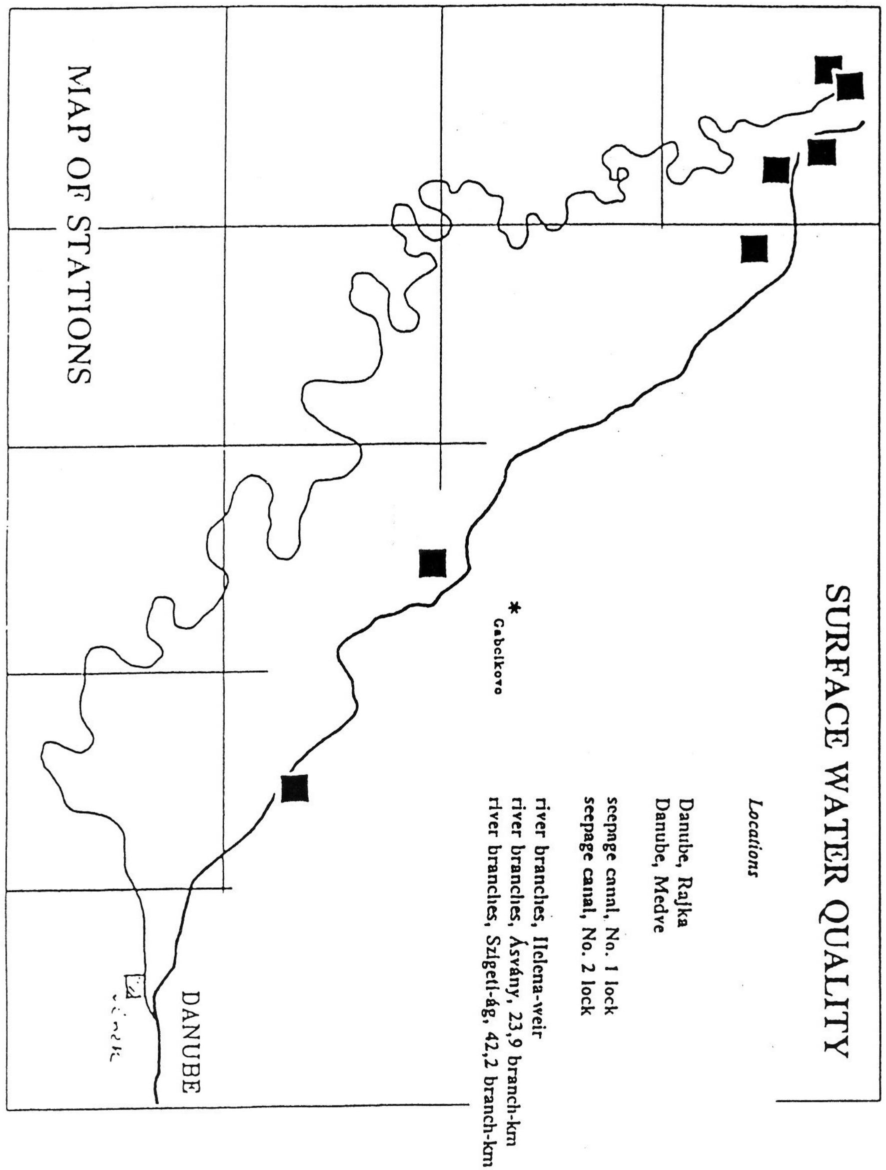
MAP OF STATIONS

GAUGES (Daily Data)

List of Stations

Danube, Rajka (*water level only*)
Danube, Dunaremete (water level only)
Danube, Komárom
Mosoni-Duna, Mecsér*
Mosoni-Duna, Győr (Bácsa) (water level only)
Seepage canal, No.1 lock upstream
Seepage canal, No.1 lock downstream
Seepage canal, No.2 lock upstream
Seepage canal, No.2 lock downstream
Seepage canal, No.5 lock upstream
Seepage canal, No.5 lock downstream
Seepage canal, No.6 lock upstream
Seepage canal, No.6 lock downstream
Zátonyi-Duna, lock of the side branch upstream
Zátonyi-Duna, lock of the side branch downstream
upstream and downstream of weir at 1843 rkm (planned)
Helena-weir (planned)

Information: Daily Report
** Monthly Report*



MONITORING OF SURFACE WATER QUALITY

List of parameter

Temperature, pH, conductivity, O_2

Na, K, Ca, Mg, Mn, Fe, NH_4

Hg, Zn, As, Cu, Cr, Cd, Ni,

HCO_3, Cl, SO_4, NO_3, NO_2, PO_4, total P, total N

COD, BOD, suspended silts

saprobity index, clorophyll-a, coliform bacteria, fecalcoli, streptococcus, number of bacteria, number of algae*, zooplancton*, macrobenthos*

TOC, UV oil, total dissolved-salt

Frequency of measurements: 12 times per year
** : 4 times per year*

Methodology: on basis of the Statutes of the Hungarian-Slovak Boundary Waters Commission, Statute of the Water Quality Subcommission, Annex 5

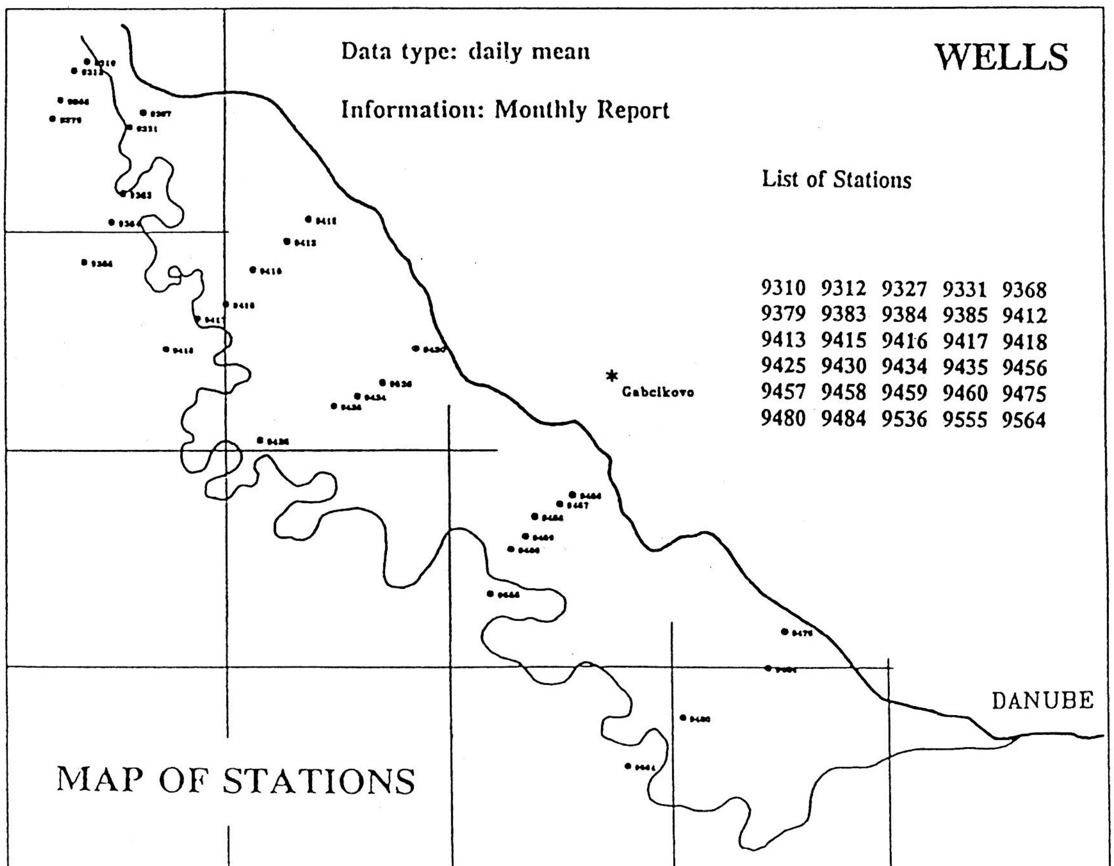
SEDIMENTS

list of parameters

total P, total N, organic and anorganic micropollutant

Frequency of measurements: once per year

Methodology: on basis of the Statutes of the Hungarian-Slovak Boundary Waters Commission, Statute of the Water Quality Subcommission, Annex 5


Data type: daily mean
Information: Monthly Report
WELLS
List of Stations
9310 9312 9327 9331 9368
9379 9383 9384 9385 9412
9413 9415 9416 9417 9418
9425 9430 9434 9435 9456
9457 9458 9459 9460 9475
9480 9484 9536 9555 9564
Gabcikovo
DANUBE
MAP OF STATIONS

Ministry of Environment
and Regional Policy
HUNGARY

Árpád Kovács
Deputy Secretary of State

Szigetköz Monitoring Data

DATE ****

Location	surface water level [m asl]	discharge [m³/s]
Danube, Rajka	****	
Danube, Dunaremete	****	
Danube, Komárom	****	****
Mosoni-Duna, Győr (Bácsa)	****	
Seepage canal, No.1 lock upstream	****	****
Seepage canal, No.1 lock downstream	****	
Seepage canal, No.2 lock upstream	****	****
Seepage canal, No.2 lock downstream	****	
Seepage canal, No.5 lock upstream	****	****
Seepage canal, No.5 lock downstream	****	
Seepage canal, No.6 lock upstream	****	****
Seepage canal, No.6 lock downstream	****	
Zátonyi-Duna, lock of the side branch upstream	****	****
Zátonyi-Duna, lock of the side branch downstream	****	

Ministry of Environment
and Regional Policy
HUNGARY

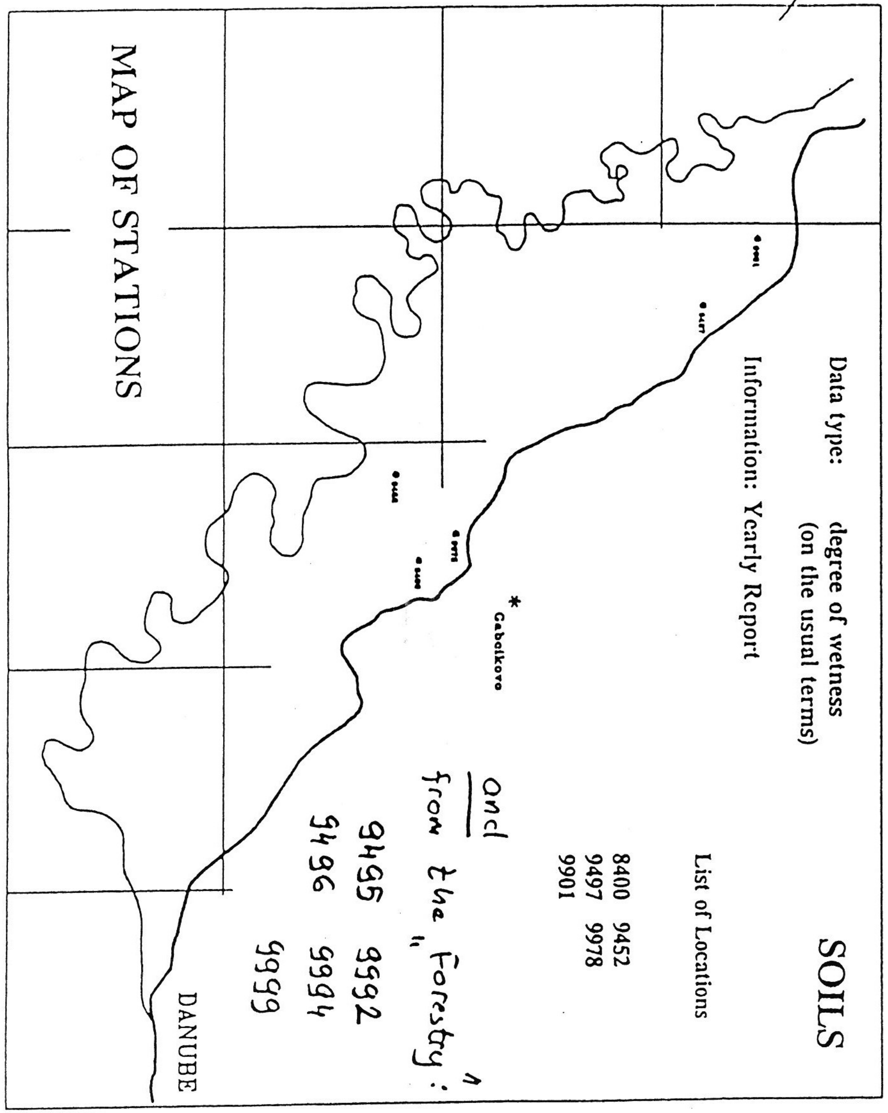
Árpád Kovács
Deputy Secretary of State

Szigetköz Monitoring Data

GROUND WATER LEVEL

Number of well : ****

Date	m a.s.l.
1995.06.01	***.**
1995.06.02	***.**
1995.06.03	***.**
1995.06.04	***.**
1995.06.05	***.**
1995.06.06	***.**
1995.06.07	***.**
1995.06.08	***.**
1995.06.09	***.**
1995.06.10	***.**
1995.06.11	***.**
1995.06.12	***.**
1995.06.13	***.**
1995.06.14	***.**
1995.06.15	***.**
1995.06.16	***.**
1995.06.17	***.**
1995.06.18	***.**
1995.06.19	***.**
1995.06.20	***.**
1995.06.21	***.**
1995.06.22	***.**
1995.06.23	***.**
1995.06.24	***.**
1995.06.25	***.**
1995.06.26	***.**
1995.06.27	***.**
1995.06.28	***.**
1995.06.29	***.**
1995.06.30	***.**



COMPONENTS OF GROUND WATER QUALITY' MONITORING

Temperature, pH, conductivity, DO_2,

Na, K, Ca, Mg, Mn, Fe, NH_4

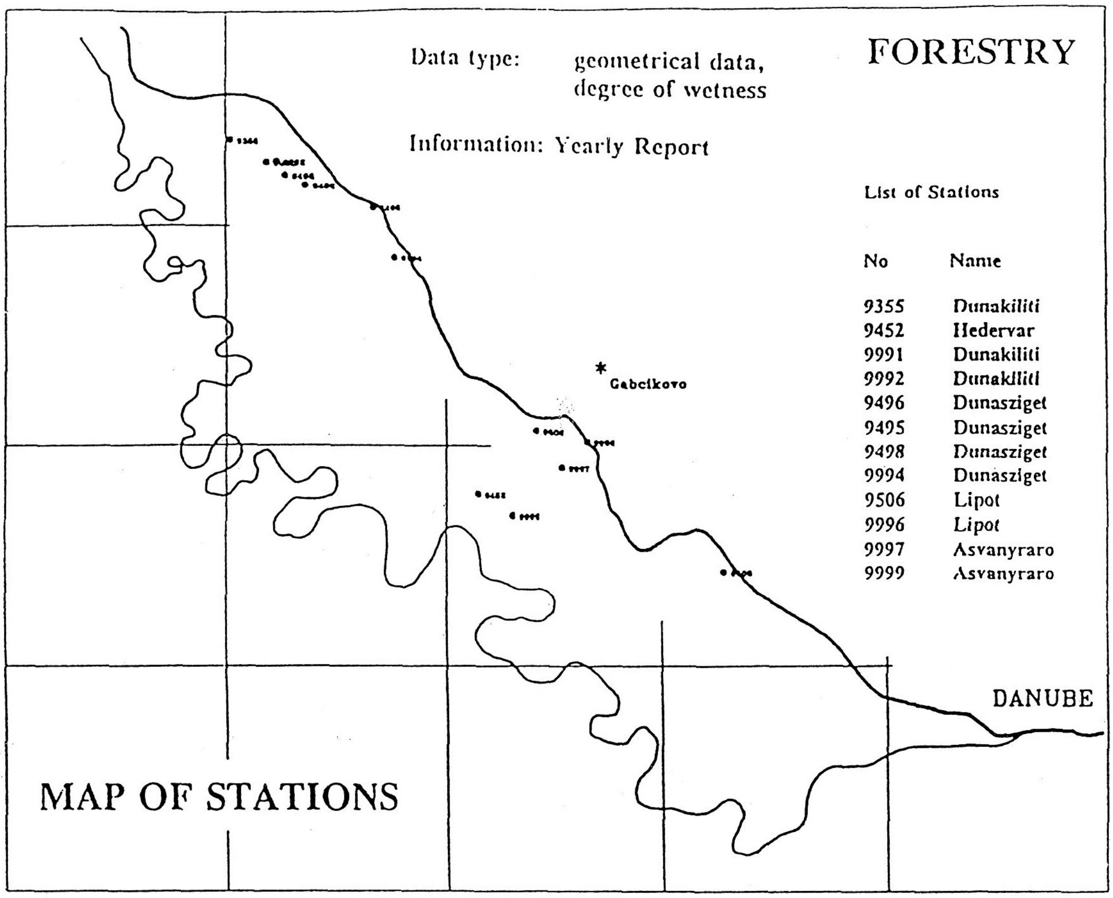
HCO_3, Cl, SO_4, NO_3, NO_2, PO_4

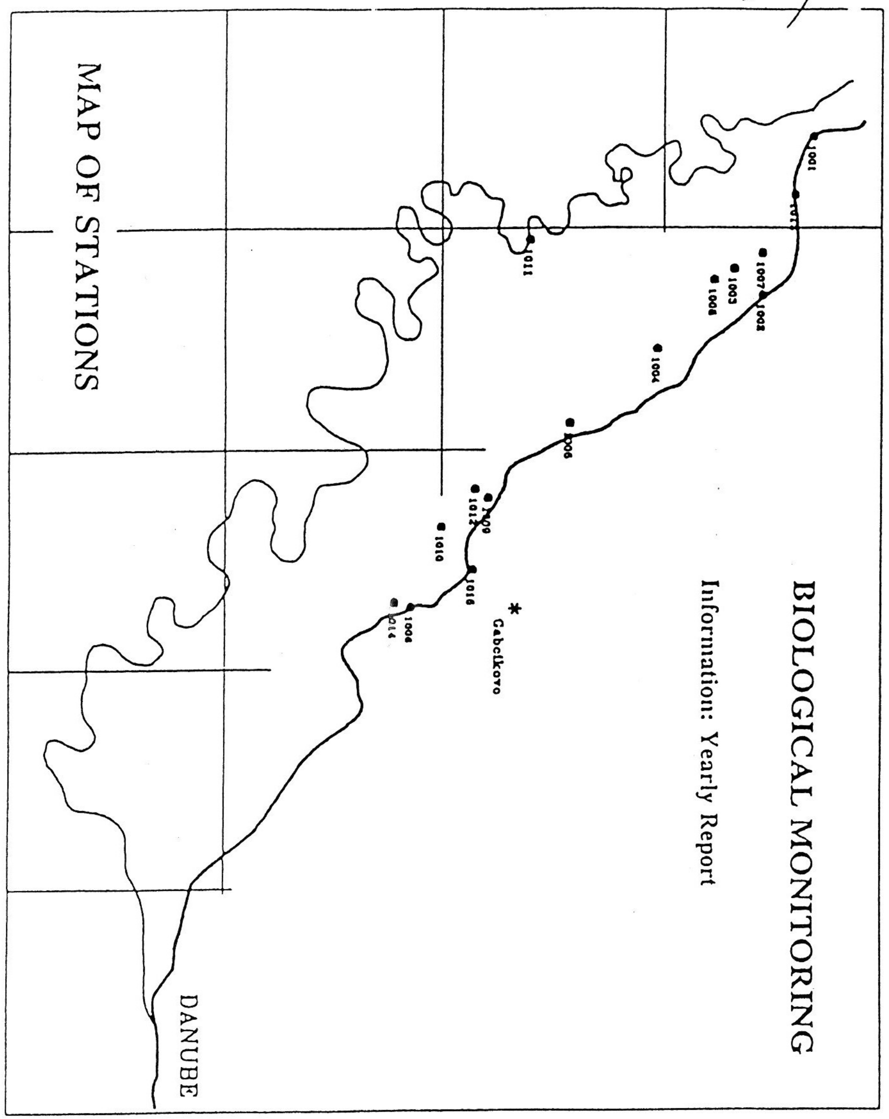
COD, TOC

silicates

Frequency of measurements: 4 times per year

Methodology: on basis of the Statutes of the Hungarian-Slovak Boundary Waters Commission, Statute of the Water Quality Subcommission, Annex 5


FORESTRY
Data type: geometrical data, degree of wetness
Information: Yearly Report
List of Stations
No Name
9355 Dunakiliti
9452 Hedervar
9991 Dunakiliti
9992 Dunakiliti
9496 Dunasziget
9495 Dunasziget
9498 Dunasziget
9994 Dunasziget
9506 Lipot
9996 Lipot
9997 Asvanyraro
9999 Asvanyraro
Gabcikovo
DANUBE
MAP OF STATIONS



BIOLOGICAL MONITORING

AQUTIC ORGANISMS

Planctonic crustacea (Cladocera, Copepoda)

Location
- **Main channel : 1001, 1009**
- **Side arms: 1003, 1010,**
- **Mosoni-Duna: 1011**

Sampling: May, July, September

Biological data: species and specimen number / l (calculated from 100 l)

Macrophyton

Location
- **Main channel : 1001, 1009**
- **Side arms: 1002**
- **Protected area: 1012**

Sampling: May, July, September

Biological data: floristics, cenology (Braun-Blanqet method)

Mollusca

Location

Main channel : 1001, 1015
Side arms: 1003

Sampling: once/year

Biological data: species and specimen number / sample

Pisces

Location
- Main channel : 1013, 1006
- Side arms: 1014, 1007
- Mosoni-Duna: 1011

Sampling: bi-monthly

Biological data: species dominance (400 * 6 * 3 meter cubic water)

SEMIAQUTIC ORGANISMS

Odonata

Location
- **Main channel** : 1001
- **Side arms:** 1005, 1008
- **Mosoni-Duna:** 1011

Sampling: May, July, August

Biological data: species, dominance

Ephemeroptera

Location
- **Main channel** : 1001
- **Side arms:** 1004, 1010

Sampling: May, June, August, September

Biological data: species, dominance

Trichoptera

Location
- Main channel : 1001
- Side arms: 1004, 1010

Sampling: May, July, August

Biological data: species, dominance

+ Heteroptera, Coleoptera – Curculionidae

– after the agreement of the Experts

A P P E N D I X A.3.

Zápisnica
z rokovania zástupcov pre monitorovanie,
konaného 25. apríla 2007 v Győri

Prítomní: podľa prezenčnej listiny
Miesto: úradná miestnosť Severozadunajského riaditeľstva pre ochranu životného prostredia a vodné hospodárstvo (ÉDUKÖVIZIG)
Dátum: 25. apríl 2007

Rokovanie za maďarskú stranu viedol zástupca pre monitorovanie Emil Janák, riaditeľ ÉDUKÖVIZIG; za slovenskú stranu zástupca pre monitorovanie Dominik Kocinger, splnomocnenec vlády Slovenskej republiky pre výstavbu a prevádzku Sústavy vodných diel Gabčíkovo - Nagymaros.

Body programu:

1. Prerokovanie návrhu maďarskej strany na zmeny Štatútu o činnosti zástupcov pre monitorovanie v zmysle medzivládnej Dohody z roku 1995
2. Detailné prerokovanie návrhu maďarskej strany na zmeny, týkajúce sa miest monitorovania, okruhu sledovaných ukazovateľov a frekvencie meraní, ktoré sú uvedené v prílohe Štatútu.
3. Rôzne.

K bodu 1

Zástupcovia pre monitorovanie sa na rokovaní dohodli na nasledovnom:

a) V preambule Štatútu sa doplní nasledovná veta:
Pri prevádzkovaní environmentálneho monitorovacieho systému budú uplatnené aj Smernice Európskej únie, vrátane Smernice 2000/60/ES Európskeho parlamentu a Rady určujúcej rámec opatrení Európskeho spoločenstva v oblasti vodnej politiky (Rámcová smernica o vode) prijatej 23. októbra 2000, a Aarhuskej dohody o prístupe k informáciám, o účasti verejnosti na rozhodovacom procese a o zabezpečení práva na spravodlivosť v záležitostiach životného prostredia.

b) V Článku 1 bod 1 sa doplní nasledovná veta:
Prevádzkovaný environmentálny monitoring je v súlade s operatívnym monitoringom podľa Rámcovej smernice o vode.

c) V Článku 2 bod 4 sa mení prvá veta nasledovne:
Výmena údajov sa uskutočňuje prostredníctvom poverených zástupcov pre monitorovanie v písomnej a digitálnej forme.

d) V Článku 3 sa bod 1 mení nasledovne:
Spoločné vyhodnotenie vymenených údajov sa vzťahuje na jeden kalendárny rok. V prípade prietokov a hladín povrchových vôd sa hodnotenie bude vzťahovať na hydrologický rok. Spoločná výročná správa bude vyhotovená šesť mesiacov po

ukončení kalendárneho roka.

e) V Článku 3 bod 2 sa druhá veta mení nasledovne:
Národné ročné správy si strany vymenia štyri mesiace po ukončení kalendárneho roka a poverení zástupcovia pre monitorovanie zvolajú poradu na spoločné vyhodnotenie predložených údajov.

f) Článok 3 sa doplní o nasledovný bod 3:
Po schválení a výmene Národných ročných správ budú tieto zverejnené na webových stránkach. Adresa slovenskej webovej stránky je www.gabcikovo.gov.sk, adresa maďarskej webovej stránky je www.kvvm.hu.

g) V Článku 4 bod 4 sa druhá veta mení nasledovne:
Zápisnice z rokovaní sa vyhotovujú v slovenskom a maďarskom jazyku.

K bodu 2

Zástupcovia pre monitorovanie sa na rokovaní dohodli na nasledovných zmenách miest monitorovania, okruhu sledovaných ukazovateľov a frekvencie meraní.

a) Hydrológia povrchových vôd
V miestach monitorovania prietokov a hladín povrchových vôd, v meraných ukazovateľoch ani vo frekvencii meraní neboli navrhnuté žiadne zmeny.

b) Morfológia povrchových vôd
Zástupcovia pre monitorovanie sa zhodli na tom, že posudzovanie zmien morfológie je dôležité a k novému systému hodnotenia je potrebné. Vypracovanie metodiky stanovili po roku 2007, frekvencia meraní bude raz za tri roky. Zástupcovia pre monitorovanie sa dohodli na tom, že prvé meranie sa uskutoční najneskôr v roku 2009. Sledovanie morfologických zmien je potrebné skoordinovať s aktivitami prebiehajúcimi v rámci slovensko-maďarskej Komisie hraničných vôd.

c) Fyzikálno-chemické prvky
V prípade kvality povrchových vôd sa zástupcovia pre monitorovanie dohodli, že sledovanie kvality povrchových vôd bude prebiehať na rovnakých miestach pozorovania (profiloch) ako doteraz s frekvenciou 12-krát ročne, t.j. raz za mesiac. Zo zoznamu stanovovaných ukazovateľov boli vynechané baktérie a zooplanktón. Riasy a makrozoobentos boli presunuté medzi hydrobiologické prvky. Zástupcovia pre monitorovanie sa dohodli, že v záujme zosúladenia monitorovania podľa Dohody z roku 1995 a programu monitorovania hraničných vôd na vybraných profiloch sa obrátia na slovensko-maďarskú Komisiu hraničných vôd.

d) Hydrobiologické prvky
Zástupcovia pre monitorovanie sa dohodli nasledovne:
- fytoplanktón: maďarská strana 4-krát za rok v období apríl-september
  slovenská strana 12-krát v období marec-október, so zahustením v letných mesiacoch
- fytobentos: 2-krát za rok
- bentické bezstavovce (makrozoobentos): 2-krát za rok
- makrofyty: 2-krát za rok
- ryby: raz za tri roky

Monitorovanie sa bude uskutočňovať v súlade s metodikou dohodnutou v rámci Komisie hraničných vôd.

e) Kvalita sedimentov

Analýza kvality sedimentov na maďarskej strane bude uskutočňovaná na 7 monitorovacích miestach (2x staré koryto Dunaja, 3x ramenná sústava, 1x pravostranný priesakový kanál, 1x Mošonský Dunaj). Na slovenskej strane sa kvalita sedimentov bude uskutočňovať na 6 monitorovacích miestach (2x staré koryto Dunaja, 4x zdrž). Analýzy budú zamerané na stanovenie obsahu anorganických mikropolutantov (Cu, Cr, Zn, Pb, Cd, Ni, Hg, As), obsahu živín (celkový fosfor, celkový dusík) a obsah organických mikropolutantov PAH (suma, resp. 10 vybraných zložiek). Frekvencia odberov bude raz ročne, pri nízkych vodných stavoch, spravidla na jeseň.

f) Kvantita podzemných vôd

Pri sledovaní hladín podzemných vôd vo frekvencii meraní neboli navrhnuté žiadne zmeny. Na maďarskej strane v rámci optimalizácie mierne klesol počet sledovaných studní na 126. Na slovenskej strane sa zmeny v počte studní nepredpokladajú. Presný zoznam objektov je v prílohe zápisnice.

g) Kvalita podzemných vôd

Sledovanie kvality podzemných vôd bude prebiehať na rovnakých objektoch ako doteraz. Zo sledovaných ukazovateľov boli vynechané dusitany, TOC a kremičitany. Na vybraných lokalitách na maďarskej strane (pozorovacie objekty č. 9379, 9413, 9536, 9456 a 9480) bolo navrhnuté sledovanie ťažkých kovov (As, Ni, Zn, Pb, Hg, Cu, Cd, Cr) a organických mikropolutantov (pesticídy a tetrachlóretylén) s frekvenciou raz za rok. Na slovenskej strane sú ťažké kovy a vybrané organické mikropolutanty (okrem tetrachlóretylénu) merané takmer na všetkých studniach.

h) Pôdna vlhkosť

Meranie pôdnej vlhkosti sa bude uskutočňovať bez zmeny, podľa doterajšej metodiky. Frekvenciu meraní je potrebné prispôsobiť nasledovnej schéme: v zimných mesiacoch raz mesačne (január, február, november, december), vo vegetačnom období približne raz za dva týždne (marec-október), to jest cca 20-21 meraní.

i) Les

Zástupcovia pre monitoring sa zhodli, že dôležitou súčasťou hodnotenia zdravotného stavu lesov je plošné hodnotenie na základe leteckého snímkovania. Je potrebné dohodnúť spoločnú metodiku a spôsob hodnotenia na základe skúseností slovenskej strany. Spoločné letecké snímkovanie sa má uskutočniť v roku 2008.

Ohľadom ostatných monitorovaných ukazovateľov sa vzhľadom na budúci monitoring musia odborníci oboch strán dohodnúť do konca roka 2007. Slovenská strana informovala maďarskú stranu, že sledovanie základných dendrometrických charakteristík, spolu s podpornými údajmi (hladina podzemnej vody a pôdna vlhkosť) považuje naďalej za nevyhnutné.

j) Ostatné biologické skúmania

V rámci biologického monitoringu sa monitorovanie makrozoobentosu presunulo medzi hydrobiologické prvky. Hodnotenie bude prebiehať na základe metodiky RSV. Aj monitoring rýb bol presunutý medzi hydrobiologické prvky, s frekvenciou raz za tri roky. Hodnotenie bude prebiehať na základe metodiky RSV. Naďalej bude prebiehať monitoring doteraz sledovaných vybraných skupín zooplanktónu (Cladocera a Copepoda), bentických bezstavovcov - makrozoobentosu (Mollusca, Odonata, Ephemeroptera a Trichoptera) a suchozemských rastlín a suchozemských slimákov v doterajšom rozsahu. V tejto oblasti skúmania je potrebné ďalšie zosúlaďovanie miest, skupín a metodiky pozorovania.

Odborníci oboch strán zmeny uvedené v tabuľkách v prílohe tejto zápisnice do konca roka 2007 zapracujú do komplexnej prílohy štatútu.

K bodu 3

a) Slovenská strana informovala maďarskú stranu, že prevádzkové údaje poskytované v rámci dennej výmeny údajov budú k dispozícii na internetovej stránke. Navrhla maďarskej strane, aby sa po sprístupnení internetovej stránky denné zasielanie údajov zastavilo a údaje by sa mailom alebo faxom zaslali len v prípade poruchy pri prístupe na internet, alebo na základe telefonickej požiadavky. Slovenská strana navrhla archiváciu údajov na internete na dobu 40 dní. Maďarská strana poukázala na súvislosť problematiky poskytovania prevádzkových údajov s dohodami v rámci Komisie hraničných vôd. Prisľúbila, že sa k požiadavke slovenskej strany vyjadrí neskôr.

b) Slovenská strana zopakovala svoju skoršiu požiadavku na rozšírenie výmeny údajov o údaje spred roku 1992, tam kde sú takéto údaje k dispozícii. Maďarská strana v zásade s takýmto rozšírením súhlasí, avšak k obdobiu, na ktoré sa takáto výmena bude vzťahovať, sa vyjadrí neskôr.

V Győri, 25. apríla 2007.

Emil Janák
zástupca pre monitoring
za maďarskú stranu

Dominik Kocinger
zástupca pre monitoring
za slovenskú stranu

a) Hydrológia povrchových vôd

Slovenská strana

Číslo profilu	Tok	Lokalita
1250	Dunaj	Bratislava - Devín
2848	Dunaj	zdrž - Čunovo
2552	Dunaj	Čunovo - staré koryto
2545	Dunaj	Hamuliakovo
2558	Dunaj	Dobrohošť
1251	Dunaj	Gabčíkovo
1252	Dunaj	Medveďov
1600	Dunaj	Komárno
1653	Malý Dunaj	Bratislava - Malé Pálenisko
2851	Mošonské rameno Dunaja	Čunovo
3126	Dobrohošťský kanál	Dobrohošť - napustný objekt
2849	prívodný kanál	Gabčíkovo - horná hladina
2850	odpadový kanál	Gabčíkovo - dolná hladina
3124	pravostranný priesakový kanál	Čunovo - horná hladina
3125	pravostranný priesakový kanál	Čunovo - dolná hladina
4045	ramenná sústava	línia A
4046	ramenná sústava	línia B1
4047	ramenná sústava	línia B2
4048	ramenná sústava	línia C
4049	ramenná sústava	línia D
4050	ramenná sústava	línia E
4051	ramenná sústava	línia F1
4052	ramenná sústava	línia F3
4053	ramenná sústava	línia G
4054	ramenná sústava	línia H1
4055	ramenná sústava	línia H3
4056	ramenná sústava	línia J
4057	ramenná sústava	materiálová jama B

Maďarská strana

Číslo profilu	Tok	Lokalita
000001	Dunaj	Rajka
000002	Dunaj	Dunaremete
000005	Dunaj	Komárom
000017	Mošonský Dunaj	Mecsér
000018	Mošonský Dunaj	Bácsa
003871	Mošonský Dunaj	stavidlo VI - horná voda
003872	Mošonský Dunaj	stavidlo VI - dolná voda
003873	Mošonský Dunaj	stavidlo I - horná voda
003874	Mošonský Dunaj	stavidlo I - dolná voda

Číslo profilu	**Tok**	**Lokalita**
003875	priesakový kanál	stavidlo II - horná voda
003876	priesakový kanál	stavidlo II - dolná voda
003939	Dunaj	Hať Dunakiliti - horná voda
003940	priesakový kanál	stavidlo V - horná voda
003941	priesakový kanál	stavidlo V - dolná voda
004516	ramenná sústava	Helena
110092	chránená strana	stavidlo VII - horná voda
110106	Zátoňský Dunaj	Gyümölcsös út - horná voda
110144	Zátoňský Dunaj	Gyümölcsös út - dolná voda
110161	Dunaj	Hať Dunakiliti - dolná voda
110113	ramenná sústava	Z-1, horná voda
110127	ramenná sústava	Dobrorgaz 15
110115	ramenná sústava	B-2, horná voda
110114	ramenná sústava	B-2, dolná voda
110117	ramenná sústava	B-3, horná voda
110116	ramenná sústava	B-3, dolná voda
110170	ramenná sústava	Z-6, horná voda
110171	ramenná sústava	Z-6, dolná voda
110152	ramenná sústava	Z-8, horná voda
110153	ramenná sústava	Z-8, dolná voda
110119	ramenná sústava	B-4, horná voda
110118	ramenná sústava	B-4, dolná voda
110129	ramenná sústava	B-5, horná voda
110128	ramenná sústava	B-5, dolná voda
110162	ramenná sústava	B-6, horná voda
110138	ramenná sústava	B-7, horná voda
110198	ramenná sústava	B-8, horná voda
110131	ramenná sústava	B-9, horná voda
110133	ramenná sústava	B-11, horná voda
110132	ramenná sústava	B-11, dolná voda
110142	ramenná sústava	Z-12, horná voda
110141	ramenná sústava	Z-12, dolná voda
110155	ramenná sústava	Z-10, horná voda
110157	ramenná sústava	uzáver Gatya,horná voda

b) Morfológia povrchových vôd

Metodika meraní bude stanovená po roku 2007, frekvencia meraní bude raz za tri roky.

c) Fyzikálno-chemické prvky

Slovenská strana

Číslo profilu	Tok	Lokalita
109	Dunaj	Bratislava - Nový most, stred
4016	Dunaj	Dobrohošť, rkm 1843, nad prehrádzkou
4025	Dunaj	Dobrohošť, rkm 1839,6 - ľavá strana
3739	Dunaj	Sap, staré koryto, nad rkm 1812
112	Dunaj	Medveďov - most, stred
1205	Dunaj	Komárno - most, stred
307	Dunaj - zdrž	Kalinkovo - kyneta
308	Dunaj - zdrž	Kalinkovo - ľavá strana
309	Dunaj - zdrž	Šamorín - pravá strana
311	Dunaj - zdrž	Šamorín - ľavá strana
3530	Dunaj - odpadový kanál	Sap - ľavá strana
3529	Mošonské rameno Dunaja	Čunovo - stred
3531	pravostranný priesakový kanál	Čunovo
317	ľavostranný priesakový kanál	Hamuliakovo
3376	Dobrohošťský kanál	Dobrohošť - ľavá strana

Maďarská strana

Číslo profilu	Tok	Lokalita
0001	Dunaj	Rajka, rkm 1848
0043	Dunaj	nad prehrádzkou, rkm 1843
0043	Dunaj	pod prehrádzkou, rkm 1843
0002	Dunaj	Dunaremete
2306	Dunaj	Medve
1141	Mošonský Dunaj	Vének
0082	priesakový kanál	stavidlo I
0084	priesakový kanál	stavidlo II
1112	ramenná sústava	Helena
1114	ramenná sústava	Szigetské rameno, km 42,2
1126	ramenná sústava	Ásváňske rameno, km 23,9

Rozsah sledovaných ukazovateľov, frekvencia mesačne:

teplota, pH, merná vodivosť, O_2

Na^+, K^+, Ca^{2+}, Mg^{2+}, NH_4^+, Mn, Fe (nefiltrované)

Hg, Zn, As, Cu, Cr, Cd, Ni, Pb (všetko filtrované)

HCO_3^-, Cl^-, SO_4^{2-}, NO_3^-, NO_2^-, PO_4^{3-}, celkový P, celkový N

$CHSK_{Mn}$, BSK_5, nerozpustené látky (sušené pri 105°C)

TOC, NEL-UV, rozpustené látky (sušené pri 105°C)

index saprobity biosestónu , chlorofyl-a

d) Hydrobiologické prvky

fytoplanktón: maďarská strana 4-krát za rok v období apríl-september
slovenská strana 12-krát v období marec-október,
so zahustením v letných mesiacoch

fytobentos: 2-krát za rok

bentické bezstavovce (makrozoobentos): 2-krát za rok

makrofyty: 2-krát za rok

ryby:
maďarská strana 5 monitorovacích miest (2x staré koryto Dunaja, 2x ramenná sústava, 1x Mošonský Dunaj))
slovenská strana 6 monitorovacích miest (2x staré koryto Dunaja, 4x ramenná sústava)
Frekvencia: raz za tri roky

e) Kvalita sedimentov

maďarská strana: 7 monitorovacích miest (2x staré koryto Dunaja, 3x ramenná
slovenská strana: 6 monitorovacích miest (2x staré koryto Dunaja, 4x zdrž)

anorganické mikropolutanty: Cu, Cr, Zn, Pb, Cd, Ni, Hg, As
obsah živín: celkový fosfor, celkový dusík
organické mikropolutanty: PAH (suma, resp. 10 vybraných zložiek)

Frekvencia: 1 krát ročne, spravidla na jeseň

f) Kvantita podzemných vôd

Slovenská strana

Studňa č.	Lokalita
1912	Nová Stráž
1913	Kameničná - Hadovce
1915	Zlatná na Ostrove
1916	Štúrová-Stará lúka
4002	Kameničná - Piesky
1922	Bodza - Lúky
1924	Zemianska Olča
1925	Tôň
1927	Sokolce
1928	Okoč
1929	Okoč - Goliáš
1931	Topoľníky
4435	Kolárovo
1937	Dolný Štál
1938	Boheľov
1939	Padáň - Majer
4428	Bodza - Maderét
1943	Kolárovo
4003	Okoč - Aszod
1948	Veľký Meder
1949	Medveďov
1950	Veľké Kosihy
4004	Kližská Nemá
1952	Trávnik
1954	Číčov
4429	Číčov - Kec
1957	Čiližská Radvaň
1958	Sap
1959	Ňárad
1960	Gabčíkovo - Čierny Les
1961	Mad
4306	Trhové Mýto
1964	Gabčíkovo
1965	Gabčíkovo
1966	Vrakúň
1969	Dvorníky
1970	Jahodná
1971	Baka
1972	Kračany - Dobor
1973	Kostolné Kračany
1974	Vydrany
1976	Veľké Blahovo - Lúky
1977	Bodíky

Studňa č.	Lokalita
4302	Lúč na Ostrove - Antónia Dvor
1979	Michal na Ostrove - Kolónia
1980	Michal na Ostrove - Lúky
4217	Blahová - Sever
1982	Blahová
1983	Horný Bar- Šuľany
1984	Holice
1988	Rohovce
1989	Dobrohošť
4303	Macov
1992	Mierovo
1993	Zlaté Klasy - Rastice
1995	Kvetoslavov
1996	Čakany
1997	Janíky - Búštelek
1998	Kalinkovo
1999	Miloslavov - Alžbetin Dvor
2000	Tomášov
2001	Podunajské Biskupice - Topoľové
2002	Rovinka
2003	Most na Ostrove
2033	Šamorín - Mliečno
2035	Šamorín - Čilistov
2038	Bratislava - Petržalka
2039	Petržalka - Ovsište
4007	Bratislava - Petržalka - Colnica Berg
4009	Bratislava - Jarovce
2044	Rusovce
2045	Čunovo - hranica
2046	Čunovo
2067	Hroboňovo
2069	Ohrady
2070	Nový Život - Eliášovce
2071	Podunajské Biskupice
4044	Gabčíkovo
872	Čunovo (len zmena čísla objektu z 2123)
2144	Bratislava - Petržalka
2148	Petržalka - Kopčianska ul.
2162	Petržalka
2165	Petržalka
2167	Petržalka
2169	Rusovce
2171	Čunovo
4312	Čunovo
2180	Jarovce
2186	Čunovo
2188	Rusovce - Dolné pole

Studňa č.	Lokalita
2205	Bratislava - Vlčie hrdlo (Slovnaft)
2207	Bratislava - Podunajské Biskupice
2208	Bratislava-Vrakuňa
2215	Bratislava - Podunajské Biskupice - Lieskovec
2217	Rovinka
2219	Malinovo
2231	Kalinkovo
2241	Mierovo
2247	Dunajská Lužná - Nová Lipnica
2267	Báč
329	Šamorín - Mliečno (len zmena čísla objektu z 2269)
2271	Dobrohošť - Dunajské kriviny
2272	Dobrohošť
2274	Kyselica
2279	Vojka
2293	Holice - Stará Gala
2318	Trstená na Ostrove
2327	Bodíky
2328	Bodíky
2329	Bodíky - Kráľovská lúka
2343	Gabčíkovo
2345	Malé Vranie - Dekanské
2349	Gabčíkovo
2353	Sap - Čiližská sihoť
2387	Nová Stráž
2401	Bratislava - Vlčie hrdlo (Slovnaft)
2708	Dobrohošť - Dunajské kriviny
2709	Bodíky - Malá sihoť, línia D
2711	Gabčíkovo - Dunajský ostrov
2712	Kľúčovec - Sporná sihoť
3129	Vojka nad Dunajom - Dolné mačacie
3132	Vojka nad Dunajom - Vrbiny
3136	Vojka nad Dunajom - Vrbiny
3139	Šuľany - Dunajské sihote
3147	Bodíky - Mlynské
3154	Baka - Obecný ostrov
3163	Sap - Riečina
2710	Bodíky - Kráľovská lúka
3172	Bodíky - Kráľovská lúka
2858	Vojka nad Dunajom - Dolné vrbiny
3131	Vojka nad Dunajom - pri Veľkej Žofín
3137	Šuľany - Dunajské sihote
3144	Bodíky - línia E
3146	Bodíky - Malá sihoť
3151	Bodíky - Malobodícke
3155	Baka - Nová trieda, Ostrov Orliaka morského
3159	Gabčíkovo - Dunajský ostrov, Istragov

Maďarská strana

Studňa č.	Ozn.	Lokalita
000062	1019	Győrladamér
000066	2659	Vámosszabadi
000072	2666	Győrladamér
000119	2681	Hegyeshalom
000134	2647	Bezenye
000135	2648	Bezenye
000140	2640	Dunakiliti
000143	2600	Feketeerdő
000144	2611	Feketeerdő
000147	2615	Feketeerdő
000148	2617	Feketeerdő
000151	2609	Cikolasziget
000152	2610	Cikolasziget
000159	2605	Halászi
000188	1009	Lébény
003470	1020	Bezenye
003473	1031	Hegyeshalom
003476	2698	Hegyeshalom
003509	2694	Győrladamér
003587	1066	Halászi
003592	1075	Tejfalusziget
003593	1080	Bezenye
003621	2695	Győr-Kisbácsa
003623	2697	Győr-Kisbácsa
003624	2693	Rajka
003625	2699	Rajka
003626	2700	Rajka
003627	2727	Rajka
003682	3080	Mosonmagyaróvár
003815	3119	Győrladamér
003817	3121	Ásványráró
003818	3122	Halászi
003878	4189	Dunakiliti
003882	4501	Kisbodak
003887	4502	Ásványráró
003936	2530	Lébény
003937	2540	Hegyeshalom
004121	3270	Győr
004122	3269	Kisbajcs
004123	3268	Dunaremete
004126	3265	Rajka
004129	3218	Bezenye
004322	2635	Magyarkimle
004323	2636	Magyarkimle
004327	2684	Rajka

Studňa č.	Ozn.	Lokalita
004328	2633	Dunaremete
110328	2621	Ásványráró
110502	8440	Lipót
110503	8444	Darnózseli
110504	8500	Rajka
110610	9310	Rajka
110619	9327	Dunakiliti
110621	9330	Dunakiliti
110628	9355	Dunakiliti
110634	9368	Rajka
110637	9379	Rajka
110638	9380	Rajka
110643	9385	Bezenye
110657	9409	Rajka-Dunakiliti
110660	9413	Sérfenyősziget
110661	9415	Halászi
110664	9418	Mosonmagyaróvár
110675	9434	Püski
110676	9435	Püski
110685	9456	Ásványráró
110686	9457	Ásványráró
110687	9458	Ásványráró
110688	9459	Ásványráró
110689	9460	Ásványráró
110700	9478	Győrzámoly
110702	9479	Győrzámoly
110714	9493	Dunakiliti
110715	9494	Dunakiliti
110716	9495	Dunakiliti
110719	9498	Dunasziget
110720	9499	Dunasziget
110723	9502	Kisbodak
110724	9503	Kisbodak
110729	9508	Győrzámoly
110749	9536	Püski
110758	9546	Kimle
110771	9555	Mecsér
110772	9558	Mecsér
110784	9567	Győrújfalu
110800	9972	Dunasziget
110802	9974	Dunasziget
110803	9975	Dunasziget
110806	9978	Ásványráró
110807	9979	Ásványráró
110808	9980	Ásványráró
110814	Dkl-5	Doborgaz
110815	Dkl-6	Dunakiliti

Studňa č.	Ozn.	Lokalita
110816	Dkl-7	Rajka
110622	9331	Dunakiliti
110609	93051	Rajka
110612	93131	Rajka
110616	93211	Rajka
110617	93241	Rajka
110623	93381	Dunakiliti
110624	93421	Dunakiliti
110636	93711	Dunakiliti
110644	93861	Bezenye
110649	93931	Dunasziget
110673	94291	Püski
110682	94451	Darnózseli
110684	94521	Hédervár
110690	94641	Ásványráró
110691	94651	Dunaszeg
110693	94671	Dunaszeg
110695	94691	Dunaszentpál
110699	94761	Vámosszabadi
110701	94771	Vámosszabadi
110705	94821	Nagybajcs
110709	94871	Győrújfalu
110712	94911	Bácsa
110730	95091/B	Győrzámoly
110732	95111	Kisbajcs
110737	95181	Vének
110748	95321	Rajka
110751	95381	Mosonmagyaróvár
110753	95402	Dunasziget
110755	95431	Halászi
110757	95451	Mosonmagyaróvár
110801	99731/B	Cikola
110804	99761/B	Ásványráró
110805	99771/B	Ásványráró

g) Kvalita podzemných vôd

Slovenská strana

Studňa č.	Lokalita
102	Rusovce - vodný zdroj
2559	Čunovo - vodný zdroj
119	Kalinkovo - veľkozdroj, S-10
105	Šamorín - veľkozdroj, S-2
467	Vojka - vodný zdroj, HV-1
485	Bodíky - vodný zdroj, HB-2
103	Gabčíkovo - veľkozdroj, HAŠ-5
907	Bratislava-Petržalka, veľkozdroj Pečenský les, PL-4
899/1	Rusovce - pozorovací vrt PZO-26/I
888/1	Rusovce - pozorovací vrt PZO-23/I
872/1	Čunovo - pozorovací vrt PZO-19/I
329/1	Šamorín - pozorovací vrt 7265/I
87/7	Kalinkovo - pozorovací vrt PZ-13/7
170/2	Dobrohošť - pozorovací vrt PV-3/2
234/1	Rohovce - pozorovací vrt HGP/A-18/1
262/1	Sap - pozorovací vrt HGZ-26/1
265/1	Kľúčovec - pozorovací vrt 7366/1
3/3	Kalinkovo - pozorovací vrt PZ-1/3

Maďarská strana

Studňa č.	Lokalita
110610	Rajka
110619	Dunakiliti
110622	Dunakiliti
110634	Rajka
110637	Rajka
110660	Dunasziget
110664	Mosonmagyaróvár
110674	Kisbodak
110676	Arak
110685	Ásványráró
110686	Ásványráró
110687	Ásványráró
110698	Győrzámoly
110703	Győrzámoly
110706	Vámosszabadi
110749	Püski

Rozsah sledovaných ukazovateľov, frekvencia 2 krát za rok:
teplota vody, pH, merná vodivosť, O_2
Na^+, K^+, Ca^{2+}, Mg^{2+}, Mn, Fe, NH_4^+, HCO_3^-, Cl^-, SO_4^{2-}, NO_3^-, PO_4^{3-}, $CHSK_{Mn}$

raz ročne:
maďarská strana: vo vybraných studniach
ťažké kovy (As, Ni, Zn, Pb, Hg, Cu, Cd, Cr)
organické mikropolutanty (pesticídy a tetrachlóretylén)

slovenská strana: vo vybraných studniach
ťažké kovy (As, Ni, Zn, Pb, Hg, Cu, Cd, Cr)
organické mikropolutanty (pesticídy a iné)

h) Pôdna vlhkosť

Slovenská strana

Číslo objektu	Monitorovacia plocha	Lokalita
2703	MP-6	Dobrohošť
2704	MP-9	Bodíky
2705	MP-10	Bodíky
2706	MP-14	Gabčíkovo
2707	MP-18	Kľúčovec
2716	MP-4	Rohovce
2717	MP-5	Horný Bar - Šuľany
2718	MP-6	Horný Bar
2755	L-3	Sap
2756	L-4	Gabčíkovo
2757	L-5	Baka
2758	L-6	Trstená na Ostrove
2759	L-7	Horný Bar - Bodíky
2760	L-8	Horný Bar - Šuľany
2761	L-9	Horný Bar - Bodíky
2762	L-10	Vojka nad Dunajom
2763	L-11	Vojka nad Dunajom
2764	L-12	Dobrohošť
3804	L-25	Medveďov
3805	L-26	Kľúčovec

Maďarská strana

Číslo objektu	Lokalita
9355	Dunakiliti 15E
9452	Hédervár 11B

Číslo objektu	Lokalita
9498	Dunasziget 11D
9972	Dunasziget 15D
9994	Dunasziget 22B
9995	Lipót 4A
9996	Lipót 27C
9997	Ásványráró 6G
9998	Ásványráró 6D
2605	Halászi
2630	Püski
2653	Rajka
7920	Ásványráró
9443	Lipót

Frekvencia meraní:
zimné mesiace (január, február, november, december): raz mesačne
vegetačné obdobie (marec-október): raz za dva týždne

i) Les

Plošné hodnotenie zdravotného stavu lesov na základe leteckého snímkovania.
Frekvencia: raz za tri roky
Spoločné snímkovanie v roku 2008

Ostatné monitorované ukazovatele a monitorované plochy dohodnúť do konca roka 2007.

j) Ostatné biologické skúmania

Vybrané skupiny zooplanktónu (Cladocera a Copepoda), bentických bezstavovcov - makrozoobentosu (Mollusca, Odonata, Ephemeroptera a Trichoptera) a suchozemských rastlín a suchozemských slimákov budú uskutočňované v rozsahu doterajšieho monitoringu. Je potrebné ďalšie zosúlaďovanie miest, skupín a metodiky pozorovania.

Jegyzőkönyv
a monitoringgal megbízottak
2007. április 25.-én, Győrben megtartott tárgyalásáról

Jelenlevők: jelenléti ív szerint
Helyszín: ÉDUKÖVIZIG hivatalos helyisége
Dátum: 2007. április 25.

A tárgyalást a magyar fél részéről a monitoringgal megbízott képviselő, Janák Emil, az ÉDUKÖVIZIG igazgatója; szlovák oldalról monitoringgal megbízott képviselő, Dominik Kocinger, a Szlovák Köztársaság Bős-Nagymaros vízierőmű rendszer kiépítésének és üzemelésének kormánymeghatalmazottja vezette.

Programpontok:

1. A magyar fél javaslatának megtárgyalása a monitoringgal megbízott képviselők tevékenységéről szóló Alapszabály változtatására az 1995. évi kormányközi megállapodás értelmében.
2. A magyar fél változtatásokra vonatkozó javaslatának részletes megtárgyalása, a monitorozás helyeit illetően, a figyelt mutatók körére és a mérési gyakoriságra, amelyek az alapszabály mellékletében vannak feltüntetve.
3. Egyéb.

Az 1. ponthoz

A tárgyaláson a monitoringgal megbízottak a következőkben állapodtak meg:

a) Az alapszabály preambuluma a következő mondattal egészül ki:
A környezeti monitoring rendszer üzemeltetésében alkalmazva lesznek az EU irányelvei, beleértve a Európai Parlament és a Tanács, 2000. október 23.-án elfogadott 2000/60/EK irányelvét a vízvédelmi politika terén a közösségi fellépés kereteinek meghatározásáról (Vízkeretirányelv), és az Aarhusi egyezmény a környezeti ügyekben az információhoz való hozzáférésről, a nyilvánosságnak a döntéshozatalban történő részvételéről és az igazságszolgáltatáshoz való jog biztosításáról.
b) Az 1. cikk 1. pontja a következő mondattal egészül ki:
Az üzemeltetett környezeti monitoring összhangban van a Vízkeretirányelv szerinti operatív monitoringgal.
c) A 2. cikk 4. pontjának az első mondata a következőképpen változik:
Az adatok cseréjére monitoringgal megbízott képviselők útján valósul meg, írásos és digitális formában.
d) A 3. cikk 1. pontja a következőképpen változik:
A kicserélt adatok közös értékelése egy naptári évre vonatkozik. A felszíni vízhozam és vízszintek esetében az értékelés hidrológiai évre vonatkozik. A közös éves jelentés hat hónappal a naptári év vége után kerül elkészítésre.

e) A 3. cikk 2. pontjának második mondata a következőképpen változik:
A nemzeti éves jelentéseket a felek a naptári év vége után négy hónappal kicserélik és a monitoringgal megbízott képviselők tanácskozást hívnak össze az előterjesztett adatok közös kiértékelésére.

f) A 3. cikk kiegészül egy 3. ponttal:
A nemzeti éves jelentések jóváhagyása és cseréje után a weboldalakon ezeket nyilvánosságra hozzák. A szlovák weboldal címe www.gabcikovo.gov.sk, a magyar weboldal címe www.kvvm.hu.

g) A 4. cikk 4. pontjának második mondata a következőképpen változik:
A tárgyalások jegyzőkönyve szlovák és magyar nyelven kerül elkészítésre.

A 2. ponthoz

A monitoringgal megbízott képviselők a tárgyaláson a következő változtatásokban állapodtak meg a monitorozási helyek, a figyelt mutatók körét és a mérési frekvenciák vonatkozóan.

a) Felszíni víz hidrológia
A felszíni vizek vízhozamainak és vízszintjeinek monitorozási helyszínek, mért paraméterek, valamint a mérések gyakoriságára vonatkozó semmilyen változtatást nem javasolnak.

b) Felszíni víz morfológia
A monitoring képviselői megegyeztek abban, hogy a meder morfológiájának elbírálása fontos, és az új értékelési rendszerhez szükséges. A módszer kidolgozása 2007. év után kerül megállapításra, a mérési gyakorisága háromévente lesz. A monitoring képviselői megállapodtak abban, hogy az első mérést legkésőbb 2009-ben elvégzik. A morfológiai változások megfigyelését koordinálni kell a Szlovák-Magyar Határvízi Bizottság kereteiben történő tevékenységekkel.

c) Fiziko-kémiai elemek
A felszíni vizek minősége esetében a monitoring képviselői megállapodtak, hogy a felszíni vizek minőségének figyelése ugyanazokon a helyeken (szelvényekben) történik mint eddig, 12-szer évente, vagyis havonta egyszer. A vizsgált paraméterek listájából a baktériumok és a zooplankton lett kihagyva. Az algák, illetve a makrozoobenton átkerült a hidrobiológiai elemek közé. A monitoring képviselői megállapodtak abban, hogy az 1995 évi megállapodás szerinti monitoring és a határvízi monitoring program összehangolása érdekében a Szlovák-Magyar Határvízi Bizottsághoz fordulnak.

d) Hidrobiológiai elemek
A monitoring képviselői a következőkben állapodtak meg:
- fitoplankton: magyar fél 4-szer, az április-szeptember időszakban
szlovák fél 12-szer, március-október időszakban, a nyári hónapokban sűrűbben
- fitobenton: évente 2-szer
- bentikus gerinctelenek (makrozoobenton): évente 2-szer
- makrofiták: évente 2-szer
- halak: 3 évente egyszer
A monitorozás a Határvízi Bizottság keretében megállapodott módszertannal összhangban történik meg.

e) Üledék minősége

Az üledékek minőségének elemzését a magyar fél részéről 7 monitorozási helyen fogják megvalósítani (2-szer az Öreg-Duna meder, 3-szor ágrendszer, 1-szer jobboldali szivárgó csatorna, 1-szer Mosoni-Duna). Szlovák oldalon az üledékek minőségének elemzését 6 monitorozási helyen fogják megvalósítani (2-szer az Öreg-Duna meder, 4-szer tározó). Az elemzések során az szervetlen mikroszennyezők tartalom kerül bemérésre (Cu, Cr, Zn, Pb, Cd, Ni, Hg, As), tápanyag tartalom (összes foszfor, összes nitrogén) és a szerves mikroszennyezők PAH tartalmát (összege, ill. 10 kiemelt összetevő). A mintavétel gyakorisága évente egyszeri, alacsony vízállásoknál, rendszerint ősszel.

f) Felszín alatti víz mennyisége

A felszín alatti vizek vízszintjeinek megfigyelésében a mérések gyakoriságában semmilyen változtatást nem javasoltak. A magyar oldalon az optimalizálás keretében mérsékelten csökkent a megfigyelt kutak száma 126-ra. Szlovák fél részéről a kutak számában nem várható változás. A kutak pontos jegyzéke a jegyzőkönyv mellékletét képezi.

g) Felszín alatti víz minősége

A felszín alatti vizek minőségének megfigyelése ugyanazokon a kutakon történik, mint eddig. A megfigyelt mutatók közül a nitrit, a TOC és a szilikátok voltak kihagyva. A kiválasztott helyszíneken a magyaroldalon (a 9379, 9413, 9536, 9456 és 9480 számú megfigyelési kutakon) javasolták a nehézfémek (As, Ni, Zn, Pb, Hg, Cu, Cd, Cr) és szerves mikroszennyezők (peszticidek és tetraklór-etilén) figyelését is évente egyszer. A szlovák oldalon a nehézfémek és kiemelt szerves mikroszennyezőket (tetraklór-etilén kivételével) majdnem az összes kúton mérik.

h) Talajnedvesség

A talajnedvesség mérése változások nélkül fog történni, az eddigi módszertan alapján. A mérés gyakoriságát a következő sémához szükséges igazítani: a téli hónapokban havonta egyszer (január, február, november, december) a vegetációs időszakban megközelítőleg két hetente egyszer (március-október), ez kb. 20-21 mérés.

i) Erdő

A monitoring képviselői megegyeztek abban, hogy az erdők egészségi állapot értékelésének fontos része a légi felvételek alapján készült területi értékelés. Szükség van közös módszertanban és értékelési módszerben való megállapodásra a szlovák fél tapasztalatai alapján. A közös légi felvételezésnek a 2008-as évben kell megvalósulnia.

Tekintettel az egyéb monitorozási mutatókra a következő monitoringgal kapcsolatban, a két fél szakértőinek 2007. év végéig kell megállapodniuk. A szlovák fél tájékoztatta a magyar felet, hogy az alap dendrometrikus jellemzők megfigyelését, az alátámasztó adatokkal (a felszín alatti vízszintek és a talajnedvesség) együtt, továbbra is nélkülözhetetlennek tartja.

j) Egyéb biológiai vizsgálatok

A biológiai monitoring keretében a makrozoobenton monitoringja átkerült a hidrobiológiai elemek közé. Az értékelés a Víz Keretirányelv módszertan alapján történik. A halak monitoringja is átkerült a hidrobiológiai elemek közé, háromévenként egyszeri gyakorisággal. Az értékelés a Víz Keretirányelv módszertan alapján történik. Az eddigi zooplankton (Cladocera, Copepoda), bentikus gerinctelenek – makrozoobenton (Mollusca, Odonata, Ephemeroptera és Trichoptera) kiemelt csoportjai, és a szárazföldi növények és szárazföldi csigák monitoringja továbbra is az eddigi mértékben történik. Ebben a vizsgálati területben további egyeztetés szükséges a helyek, csoportok és megfigyelési módszertanok vonatkozóan.

A jelen jegyzőkönyv mellékletében a táblázatokban feltüntetett változtatásokat a két fél szakértői a 2007 év végéig beillesztik a szabályzat összetett mellékletébe.

A 3. ponthoz:

a) A szlovák fél tájékoztatta a magyar felet, hogy a napi adatcsere keretében szolgáltatott üzemelési adatok az internetes oldalon lesznek elérhetőek. Javasolta a magyar félnek, hogy az internetes oldal megnyitása után a napi adatküldést állítsák le, és az adatokat csak internet kapcsolat meghibásodás, vagy telefonos igény esetén küldjék e-mailen vagy faxon. A szlovák fél az interneten levő adatok archiválását 40 napra javasolja. A magyar fél rámutatott az üzemelési adatok szolgáltatásának problémája és a HVB keretében levő megállapodások összefüggéseire. Megígérte, hogy a szlovák fél igényével kapcsolatosan később nyilatkozik.

b) A szlovák fél megismételte korábbi kérelmét az 1992. év előtti adatok cseréjének bővítésére, ott ahol az ilyen adatok elérhetők. A magyar fél az ilyen bővítéssel elvileg egyetért, azonban az időszakra, amelyre ez a csere vonatkozna, később nyilatkozik.

Győr, 2007.04.25.

Janák Emil	Dominik Kocinger
monitoringgal megbízott képviselő	monitoringgal megbízott képviselő
a magyar fél részéről	a szlovák fél részéről

a) Felszíni víz hidrológia

Szlovák oldal

Szelvény száma	Vízfolyás	Helyszín
1250	Duna	Bratislava - Devín
2848	Duna	tározó - Čunovo
2552	Duna	Čunovo – öreg meder
2545	Duna	Hamuliakovo
2558	Duna	Dobrohošť
1251	Duna	Gabčíkovo
1252	Duna	Medveďov
1600	Duna	Komárno
1653	Kis Duna	Bratislava - Malé Pálenisko
2851	Mosoni Duna	Čunovo
3126	Doborgazi csatorna	Dobrohošť - vízpótló műtárgy
2849	felvízi csatorna	Gabčíkovo - felvíz
2850	alvízi csatorna	Gabčíkovo - alvíz
3124	jobboldali szivárgó csatorna	Čunovo - felvíz
3125	jobboldali szivárgó csatorna	Čunovo - alvíz
4045	mellékágrendszer	A küszöbvonal
4046	mellékágrendszer	B1 küszöbvonal
4047	mellékágrendszer	B2 küszöbvonal
4048	mellékágrendszer	C küszöbvonal
4049	mellékágrendszer	D küszöbvonal
4050	mellékágrendszer	E küszöbvonal
4051	mellékágrendszer	F1 küszöbvonal
4052	mellékágrendszer	F3 küszöbvonal
4053	mellékágrendszer	G küszöbvonal
4054	mellékágrendszer	H1 küszöbvonal
4055	mellékágrendszer	H3 küszöbvonal
4056	mellékágrendszer	J küszöbvonal
4057	mellékágrendszer	B kavics gödör

Magyar oldal

Szelvény száma	Vízfolyás	Helyszín
000001	Duna	Rajka
000002	Duna	Dunaremete
000005	Duna	Komárom
000017	Mosoni Duna	Mecsér
000018	Mosoni Duna	Bácsa
003871	Mosoni Duna	VI. zsilip - felvíz
003872	Mosoni Duna	VI. zsilip - alvíz
003873	Mosoni Duna	I. zsilip - felvíz
003874	Mosoni Duna	I. zsilip - alvíz

Szelvény száma	Vízfolyás	Helyszín
003875	szivárgó csatona	II. zsilip - felvíz
003876	szivárgó csatorna	II. zsilip - alvíz
003939	Duna	Dunakiliti duzzasztó - felvíz
003940	szivárgó csatona	V. zsilip - felvíz
003941	szivárgó csatorna	V. zsilip - alvíz
004516	mellékágrendszer	Helena
110092	mentett oldal	VII. zsilip - felvíz
110106	Zátonyi Duna	Gyümölcsös út - felvíz
110144	Zátonyi Duna	Gyümölcsös út - alvíz
110161	Duna	Hať Dunakiliti - alvíz
110113	mellékágrendszer	Z-1, felvíz
110127	mellékágrendszer	Dobrorgaz 15
110115	mellékágrendszer	B-2, felvíz
110114	mellékágrendszer	B-2, alvíz
110117	mellékágrendszer	B-3, felvíz
110116	mellékágrendszer	B-3, alvíz
110170	mellékágrendszer	Z-6, felvíz
110171	mellékágrendszer	Z-6, alvíz
110152	mellékágrendszer	Z-8, felvíz
110153	mellékágrendszer	Z-8, alvíz
110119	mellékágrendszer	B-4, felvíz
110118	mellékágrendszer	B-4, alvíz
110129	mellékágrendszer	B-5, felvíz
110128	mellékágrendszer	B-5, alvíz
110162	mellékágrendszer	B-6, felvíz
110138	mellékágrendszer	B-7, alvíz
110198	mellékágrendszer	B-8, felvíz
110131	mellékágrendszer	B-9, felvíz
110133	mellékágrendszer	B-11, felvíz
110132	mellékágrendszer	B-11, alvíz
110142	mellékágrendszer	Z-12, felvíz
110141	mellékágrendszer	Z-12, alvíz
110155	mellékágrendszer	Z-10, felvíz
110157	mellékágrendszer	Gatyai zárás, felvíz

b) Felszíni víz morfológia

A módszer kidolgozása 2007. év után kerül megállapításra, a mérési gyakorisága három évente lesz.

c) Fiziko-kémiai elemek

Szlovák oldal

Szelvény száma	Vízfolyás	Helszín
109	Duna	Bratislava - Nový most, közepe
4016	Duna	Dobrohošť, rkm 1843, fenékküszöb felett
4025	Duna	Dobrohošť, rkm 1839,6 - bal oldal
3739	Duna	Sap, staré koryto, nad rkm 1812
112	Duna	Medveďov - híd, közepe
1205	Duna	Komárno - híd, közepe
307	Duna - tározó	Kalinkovo – hajózási vonal
308	Duna - tározó	Kalinkovo - bal oldal
309	Duna - tározó	Šamorín - jobb oldal
311	Duna - tározó	Šamorín - bal oldal
3530	Duna - alvíz csatorna	Sap - bal oldal
3529	Mosoni Duna	Čunovo - közepe
3531	jobboldali szivárgó csatona	Čunovo
317	baloldali szivárgó csatorna	Hamuliakovo
3376	Doborgazi csatorna	Dobrohošť - bal oldal

Magyar oldal

Szelvény száma	Vízfolyás	Helyszín
0001	Duna	Rajka, rkm 1848
0043	Duna	fenékküszöb felett, rkm 1843
0043	Duna	fenékküszöb alatt, rkm 1843
0002	Duna	Dunaremete
2306	Duna	Medve
1141	Mosoni Duna	Vének
0082	szivárgó csatona	I. zsilip
0084	szivárgó csatorna	II. zsilip
1112	mellékágrendszer	Helena
1114	mellékágrendszer	Szigeti ág, km 42,2
1126	mellékágrendszer	Ásványi ág, km 23,9

<u>Figyelt paraméterek terjedelme, gyakoriság havonta:</u>
vízhőmérséklet, pH, vezetöképesség, O_2
Na^+, K^+, Ca^{2+}, Mg^{2+}, NH_4^+, Mn, Fe (filtráció nélkül)
Hg, Zn, As, Cu, Cr, Cd, Ni, Pb (minden filtráció után)
HCO_3^-, Cl^-, SO_4^{2-}, NO_3^-, NO_2^-, PO_4^{3-}, összes P, összes N
$KOI_{Mn,}$ BOI_5, lebegő anyag (105°C-nál szárított)
TOC, NEL-UV, összes oldott anyag (105°C-nál szárított)
bioszeszton szaprobitása , klorofil-a

d) Hidrobiológiai elemek

<u>fitoplankton:</u> magyar oldal évente 4-szer, április-szeptember idöszakba
szlovák oldal 12-szer, március-október idöszakba,
nyári hónapokban sűrűbben

<u>fitobentosz:</u> évente 2-szer

<u>bentikusé gerinctelenek (makrozoobenton):</u> évente 2-szer

<u>makrofiták:</u> évente 2-szer

<u>halak:</u>
magyar oldal 5 monitorozási helyszín (2x a Duna öreg medre, 2x mellékágrendszer, 1x Mosoni Duna))
szlovák oldal 6 monitorozási helyszín (2x Duna öreg medre, 4x mellékágrendszer)

Gyakoriság: három évente egyszer

e) Üledék minősége

magyar oldal: 7 monitorozási helyszín (2x Duna öreg medre, 3x mellékágrendszer , 1x szivárgó csatorna, 1x Mosoni Duna)
szlovák oldal: 6 monitorozási helyszín (2x Duna öreg medre, 4x tározó)

szervetlen mikroszennyező: Cu, Cr, Zn, Pb, Cd, Ni, Hg, As
tápanyag tartalom: összes foszfor, összes nitrogén
szerves mikroszennyező: PAH (összege, illetve. 10 kiemelt össztevő)

Gyakoriság: évente 1-szer, rendszerint ősszel

f) Felszín alatti víz mennyisége

Szlovák oldal

Kútszám	Helyszín
1912	Nová Stráž
1913	Kameničná - Hadovce
1915	Zlatná na Ostrove
1916	Štúrová-Stará lúka
4002	Kameničná - Piesky
1922	Bodza - Lúky
1924	Zemianska Olča
1925	Tôň
1927	Sokolce
1928	Okoč
1929	Okoč - Goliáš
1931	Topoľníky
4435	Kolárovo
1937	Dolný Štál
1938	Boheľov
1939	Padáň - Majer
4428	Bodza - Maderét
1943	Kolárovo
4003	Okoč - Aszod
1948	Veľký Meder
1949	Medveďov
1950	Veľké Kosihy
4004	Kližská Nemá
1952	Trávnik
1954	Číčov
4429	Číčov - Kec
1957	Čiližská Radvaň
1958	Sap
1959	Ňárad
1960	Gabčíkovo - Čierny Les
1961	Mad
4306	Trhové Mýto
1964	Gabčíkovo
1965	Gabčíkovo
1966	Vrakúň
1969	Dvorníky
1970	Jahodná
1971	Baka
1972	Kračany - Dobor
1973	Kostolné Kračany
1974	Vydrany
1976	Veľké Blahovo - Lúky
1977	Bodíky

Kútszám	Helyszín
4302	Lúč na Ostrove - Antónia Dvor
1979	Michal na Ostrove - Kolónia
1980	Michal na Ostrove - Lúky
4217	Blahová - Sever
1982	Blahová
1983	Horný Bar- Šuľany
1984	Holice
1988	Rohovce
1989	Dobrohošť
4303	Macov
1992	Mierovo
1993	Zlaté Klasy - Rastice
1995	Kvetoslavov
1996	Čakany
1997	Janíky - Búštelek
1998	Kalinkovo
1999	Miloslavov - Alžbetin Dvor
2000	Tomášov
2001	Podunajské Biskupice - Topoľové
2002	Rovinka
2003	Most na Ostrove
2033	Šamorín - Mliečno
2035	Šamorín - Čilistov
2038	Bratislava - Petržalka
2039	Petržalka - Ovsište
4007	Bratislava - Petržalka - Colnica Berg
4009	Bratislava - Jarovce
2044	Rusovce
2045	Čunovo - hranica
2046	Čunovo
2067	Hroboňovo
2069	Ohrady
2070	Nový Život - Eliášovce
2071	Podunajské Biskupice
4044	Gabčíkovo
872	Čunovo (csak kútszám változás, 2123 helyett)
2144	Bratislava - Petržalka
2148	Petržalka - Kopčianska ul.
2162	Petržalka
2165	Petržalka
2167	Petržalka
2169	Rusovce
2171	Čunovo
4312	Čunovo
2180	Jarovce
2186	Čunovo
2188	Rusovce - Dolné pole

Kútszám	Helyszín
2205	Bratislava - Vlčie hrdlo (Slovnaft)
2207	Bratislava - Podunajské Biskupice
2208	Bratislava-Vrakuňa
2215	Bratislava - Podunajské Biskupice - Lieskovec
2217	Rovinka
2219	Malinovo
2231	Kalinkovo
2241	Mierovo
2247	Dunajská Lužná - Nová Lipnica
2267	Báč
329	Šamorín - Mliečno (csak kútszám változás, 2269 helyett)
2271	Dobrohošť - Dunajské kriviny
2272	Dobrohošť
2274	Kyselica
2279	Vojka
2293	Holice - Stará Gala
2318	Trstená na Ostrove
2327	Bodíky
2328	Bodíky
2329	Bodíky - Kráľovská lúka
2343	Gabčíkovo
2345	Malé Vranie - Dekanské
2349	Gabčíkovo
2353	Sap - Čiližská sihoť
2387	Nová Stráž
2401	Bratislava - Vlčie hrdlo (Slovnaft)
2708	Dobrohošť - Dunajské kriviny
2709	Bodíky - Malá sihoť, línia D
2711	Gabčíkovo - Dunajský ostrov
2712	Kľúčovec - Sporná sihoť
3129	Vojka nad Dunajom - Dolné mačacie
3132	Vojka nad Dunajom - Vrbiny
3136	Vojka nad Dunajom - Vrbiny
3139	Šuľany - Dunajské sihote
3147	Bodíky - Mlynské
3154	Baka - Obecný ostrov
3163	Sap - Riečina
2710	Bodíky - Kráľovská lúka
3172	Bodíky - Kráľovská lúka
2858	Vojka nad Dunajom - Dolné vrbiny
3131	Vojka nad Dunajom - pri Veľkej Žofín
3137	Šuľany - Dunajské sihote
3144	Bodíky - línia E
3146	Bodíky - Malá sihoť
3151	Bodíky - Malobodícke
3155	Baka - Nová trieda, Ostrov Orliaka morského
3159	Gabčíkovo - Dunajský ostrov, Istragov

Magyar oldal

Törzsszám	Kútszám	Helyszín
000062	1019	Győrladamér
000066	2659	Vámosszabadi
000072	2666	Győrladamér
000119	2681	Hegyeshalom
000134	2647	Bezenye
000135	2648	Bezenye
000140	2640	Dunakiliti
000143	2600	Feketeerdő
000144	2611	Feketeerdő
000147	2615	Feketeerdő
000148	2617	Feketeerdő
000151	2609	Cikolasziget
000152	2610	Cikolasziget
000159	2605	Halászi
000188	1009	Lébény
003470	1020	Bezenye
003473	1031	Hegyeshalom
003476	2698	Hegyeshalom
003509	2694	Győrladamér
003587	1066	Halászi
003592	1075	Tejfalusziget
003593	1080	Bezenye
003621	2695	Győr-Kisbácsa
003623	2697	Győr-Kisbácsa
003624	2693	Rajka
003625	2699	Rajka
003626	2700	Rajka
003627	2727	Rajka
003682	3080	Mosonmagyaróvár
003815	3119	Győrladamér
003817	3121	Ásványráró
003818	3122	Halászi
003878	4189	Dunakiliti
003882	4501	Kisbodak
003887	4502	Ásványráró
003936	2530	Lébény
003937	2540	Hegyeshalom
004121	3270	Győr
004122	3269	Kisbajcs
004123	3268	Dunaremete
004126	3265	Rajka
004129	3218	Bezenye
004322	2635	Magyarkimle
004323	2636	Magyarkimle
004327	2684	Rajka

Törzsszám	Kútszám	Helyszín
004328	2633	Dunaremete
110328	2621	Ásványráró
110502	8440	Lipót
110503	8444	Darnózseli
110504	8500	Rajka
110610	9310	Rajka
110619	9327	Dunakiliti
110621	9330	Dunakiliti
110628	9355	Dunakiliti
110634	9368	Rajka
110637	9379	Rajka
110638	9380	Rajka
110643	9385	Bezenye
110657	9409	Rajka-Dunakiliti
110660	9413	Sérfenyősziget
110661	9415	Halászi
110664	9418	Mosonmagyaróvár
110675	9434	Püski
110676	9435	Püski
110685	9456	Ásványráró
110686	9457	Ásványráró
110687	9458	Ásványráró
110688	9459	Ásványráró
110689	9460	Ásványráró
110700	9478	Győrzámoly
110702	9479	Győrzámoly
110714	9493	Dunakiliti
110715	9494	Dunakiliti
110716	9495	Dunakiliti
110719	9498	Dunasziget
110720	9499	Dunasziget
110723	9502	Kisbodak
110724	9503	Kisbodak
110729	9508	Győrzámoly
110749	9536	Püski
110758	9546	Kimle
110771	9555	Mecsér
110772	9558	Mecsér
110784	9567	Győrújfalu
110800	9972	Dunasziget
110802	9974	Dunasziget
110803	9975	Dunasziget
110806	9978	Ásványráró
110807	9979	Ásványráró
110808	9980	Ásványráró
110814	Dkl-5	Doborgaz
110815	Dkl-6	Dunakiliti

Törzsszám	Kútszám	Helyszín
110816	Dkl-7	Rajka
110622	9331	Dunakiliti
110609	93051	Rajka
110612	93131	Rajka
110616	93211	Rajka
110617	93241	Rajka
110623	93381	Dunakiliti
110624	93421	Dunakiliti
110636	93711	Dunakiliti
110644	93861	Bezenye
110649	93931	Dunasziget
110673	94291	Püski
110682	94451	Darnózseli
110684	94521	Hédervár
110690	94641	Ásványráró
110691	94651	Dunaszeg
110693	94671	Dunaszeg
110695	94691	Dunaszentpál
110699	94761	Vámosszabadi
110701	94771	Vámosszabadi
110705	94821	Nagybajcs
110709	94871	Győrújfalu
110712	94911	Bácsa
110730	95091/B	Győrzámoly
110732	95111	Kisbajcs
110737	95181	Vének
110748	95321	Rajka
110751	95381	Mosonmagyaróvár
110753	95402	Dunasziget
110755	95431	Halászi
110757	95451	Mosonmagyaróvár
110801	99731/B	Cikola
110804	99761/B	Ásványráró
110805	99771/B	Ásványráró

g) Felszín alatti víz minősége

Szlovák oldal

Kútszám	Helyszín
102	Rusovce – ivóvíz bázis
2559	Čunovo - ivóvíz bázis
119	Kalinkovo - ivóvíz bázis, S-10
105	Šamorín - ivóvíz bázis, S-2
467	Vojka - ivóvíz bázis, HV-1
485	Bodíky - ivóvíz bázis, HB-2
103	Gabčíkovo - ivóvíz bázis, HAŠ-5
907	Bratislava-Petržalka, ivóvíz bázis Pečenský les, PL-4
899/1	Rusovce - figyelő kút PZO-26/I
888/1	Rusovce - figyelő kút PZO-23/I
872/1	Čunovo - figyelő kút PZO-19/I
329/1	Šamorín - figyelő kút 7265/I
87/7	Kalinkovo - figyelő kút PZ-13/7
170/2	Dobrohošť - figyelő kút PV-3/2
234/1	Rohovce - figyelő kút HGP/A-18/1
262/1	Sap - figyelő kút HGZ-26/1
265/1	Kľúčovec - figyelő kút 7366/1
3/3	Kalinkovo - figyelő kút PZ-1/3

Magyar oldal

Kútszám	Helyszín
110610	Rajka
110619	Dunakiliti
110622	Dunakiliti
110634	Rajka
110637	Rajka
110660	Dunasziget
110664	Mosonmagyaróvár
110674	Kisbodak
110676	Arak
110685	Ásványráró
110686	Ásványráró
110687	Ásványráró
110698	Győrzámoly
110703	Győrzámoly
110706	Vámosszabadi
110749	Püski

Figyelt paraméterek terjedelme, gyakoriság évente 2-szer:
vízhőmérséklet, pH, vezetőképesség, O_2
Na^+, K^+, Ca^{2+}, Mg^{2+}, Mn, Fe, NH_4^+, HCO_3^-, Cl^-, SO_4^{2-}, NO_3^-, PO_4^{3-}, KOI_{Mn}

évente egyszer:
magyar oldla: kiválasztott kutakban
nehéz fémek (As, Ni, Zn, Pb, Hg, Cu, Cd, Cr)
szerves mikroszennyezők (peszticidek a tetraklór-etilén)

szlovák oldal: kiválasztott kutakban
nehéz fémek (As, Ni, Zn, Pb, Hg, Cu, Cd, Cr)
szerves mikroszennyezők (peszticidek, egyebek)

h) Talajnedvesség

Szlovák oldal

Azonosító	Monitoring terület	Helyszín
2703	MP-6	Dobrohošť
2704	MP-9	Bodíky
2705	MP-10	Bodíky
2706	MP-14	Gabčíkovo
2707	MP-18	Kľúčovec
2716	MP-4	Rohovce
2717	MP-5	Horný Bar - Šuľany
2718	MP-6	Horný Bar
2755	L-3	Sap
2756	L-4	Gabčíkovo
2757	L-5	Baka
2758	L-6	Trstená na Ostrove
2759	L-7	Horný Bar - Bodíky
2760	L-8	Horný Bar - Šuľany
2761	L-9	Horný Bar - Bodíky
2762	L-10	Vojka nad Dunajom
2763	L-11	Vojka nad Dunajom
2764	L-12	Dobrohošť
3804	L-25	Medveďov
3805	L-26	Kľúčovec

Magyar oldal

Azonosító	Helyszín
9355	Dunakiliti 15E
9452	Hédervár 11B
9498	Dunasziget 11D

Azonosító	Helyszín
9972	Dunasziget 15D
9994	Dunasziget 22B
9995	Lipót 4A
9996	Lipót 27C
9997	Ásványráró 6G
9998	Ásványráró 6D
2605	Halászi
2630	Püski
2653	Rajka
7920	Ásványráró
9443	Lipót

Mérési gyakoriság:
téli hónapok (január, február, november, december): havonta
tenyészeti időszak (március-október): kéthetente

i) Erdő

Erdők egészségi állapot területi értékelése a légi felvételek alapján.
Gyakoiság: három évente egyszer
Közös felvételezés 2008-ban.

Egyébb monitorozási mutatók és monitorozási területek 2007 év végéig megállapodásra jutnak.

j) Egyéb biológiai vizsgálatok

Zooplankton (Cladocera, Copepoda), bentikus gerinctelenek – makrozoobenton (Mollusca, Odonata, Ephemeroptera és Trichoptera) kiemelt csoportjai, és a szárazföldi növények és szárazföldi csigák monitoringja továbbra is az eddigi monitorozás mértékben történik. További egyeztetés szükséges a helyek, csoportok és megfigyelési módszertanok vonatkozóan.

APPENDIX A.4.

Zápisnica

z prerokovania a podpísania Spoločnej výročnej správy za rok 2012
zo spoločného slovensko-maďarského monitorovania,
stanoveného medzivládnou Dohodou z 19. apríla 1995

Prítomní:

za maďarskú stranu:

Dr. Zoltán Illés, PhD.	štátny tajomník Ministerstva rozvoja vidieka pre otázky životného prostredia, zástupca pre monitorovanie
Dr. István Teplán	hlavný radca, Sekretariát štátneho tajomníka pre otázky životného prostredia, Ministerstvo rozvoja vidieka
Mária M. Galambos	hlavný radca pre verejnú správu, Ministerstvo rozvoja vidieka, Odbor medzinárodných vzťahov
Péter Kovács,	riaditeľ odboru, Ministerstvo vnútra, Odbor vodného hospodárstva
Dorottya Illés	expert, Ministerstvo vnútra, Odbor vodného hospodárstva
Krisztina Koczka	pozorovateľ, Ministerstvo rozvoja vidieka, Odbor ochrany prírody
Pál Benyó,	tlmočník

za slovenskú stranu:

Ing. Ladislav Lazár,	splnomocnenec vlády pre výstavbu a prevádzku Sústavy vodných diel Gabčíkovo - Nagymaros, zástupca pre monitorovanie
Ing. Peter Panenka	expert, vedúci Odboru stratégie, Vodohospodárska výstavba š.p.
Dr. Zoltán Hlavatý, PhD.,	expert, Konzultačná skupina Podzemná voda
Ing. Daniela Horanská	vedúca sekretariátu

1. Zástupcovia oboch strán pre monitorovanie, Ing. Ladislav Lazár a Dr. Zoltán Illés vyhodnotili plnenie odporúčaní uvedených v správe za rok 2011.
2. Zástupcovia oboch strán prerokovali a prijali Spoločnú výročnú správu za rok 2012.
3. Strany sa dohodli, že Národné ročné správy z monitorovania za rok 2013 vypracujú do 15. mája 2014.

4. Strany potvrdili zámer uskutočniť dlhodobé hodnotenie výsledkov doterajšieho monitorovania s cieľom optimalizácie sledovaných ukazovateľov a frekvencie ich monitorovania. Splnomocnenci sa dohodli, že o ďalšom postupe prác rozhodnú po 15. máji 2014, pri príležitosti výmeny Národných ročných správ za rok 2013. Ďalej sa dohodli aj na tom, že posúdia možnosť a spôsob prepojenia tejto práce s blížiacim sa 20. výročím medzivládnej zmluvy o spoločnom monitorovaní (2015). Odborníci strán na základe toho upravia harmonogram prác a predpokladaný rozpočet a predložia ich na schválenie.

Budapešť, 23. januára 2014.

....
Dr. Zoltán Illés, PhD.
za maďarskú stranu

....
Ing. Ladislav Lazár
za slovenskú stranu

Jegyzőkönyv

az 1995. április 19-i kormányközi megállapodásban meghatározott közös magyar- szlovák monitoring 2012-évi Közös Éves Jelentésének megtárgyalásáról és aláírásáról

Résztvevők:

A magyar fél részéről:

Dr. Illés Zoltán, PhD.	környezetügyért felelős államtitkár, Vidékfejlesztési Minisztérium, monitorozással megbízott képviselő,
Dr. Teplán István	főtanácsadó, Környezetügyért felelős Államtitkár Titkársága, Vidékfejlesztési Minisztérium
M. Galambos Mária	közigazgatási főtanácsadó, Vidékfejlesztési Minisztérium, Nemzetközi Kapcsolatok Fõosztálya
Kovács Péter	fõosztályvezető, Belügyminisztérium, Vízgyűjtő-gazdalkodási Fõosztály
Illés Dorottya	szakértő, Belügyminisztérium, Vízgyűjtő-gazdalkodási Fõosztály
Koczka Krisztina	megfigyelő, Vidékfejlesztési Minisztérium, Természetmegőrzési Fõosztály
Benyó Pál,	tolmács

A szlovák fél részéről:

Ing. Lazár Ladislav	a Bős-Nagymarosi Vízlépcsőrendszer építésével és működtetésével megbízott kormánymeghatalmazott, monitorozással megbízott képviselő
Ing. Panenka Peter	szakértő, Stratégiai osztály vezetője, Vodohospodárska výstavba š.p.
Dr. Hlavatý Zoltán, PhD.	szakértő, Ground Water Consulting
Ing. Horanská Daniela	titkárságvezető

1. A két Fél monitoing felelőse, Ing. Lazár Ladislav és Dr. Illés Zoltán kiértékelte a 2011-évi jelentésben szereplő javaslatok teljesítését.
2. A két Fél képviselője megtárgyalta és elfogadta az 2012-évi Közös Éves Jelentést.
3. A Felek megegyeztek abban, hogy a 2013-évi megfigyelésekről szóló Éves Nemzeti Jelentéseket 2014. május 15-ig készítik el.

4. A Felek megerősítették azt a szándékukat, hogy elvégzik az eddigi monitorozás eredményeinek hosszú távú értékelését azzal a céllal, hogy optimalizálják a megfigyelt paramétereket és azok monitorozási gyakoriságát. A Meghatalmazottak megállapodtak abban, hogy a munka tovább előrehaladásáról a 2013. évi nemzeti jelentések cseréjének alkalmával, 2014. május 15. után döntenek. Megállapodtak továbbá abban is, hogy mérlegelik ennek a munkának összekapcsolási lehetőségét és módját a közös monitoringról szóló kormányközi megállapodás közelgő 20. évfordulójával (2015). A Felek szakértői ennek alapján módosítják a munkatervet valamint a becsült költségvetést és benyújtják jóváhagyásra.

Budapest, 2014. január 23.

....

Dr. Illés Zoltán, PhD.
a magyar fél részéről

....

Ing. Lazár Ladislav
a szlovák fél részéről

APPENDIX A.5.

Zápisnica z rokovania odborníkov na monitorovanie povrchových a podzemných vôd uskutočňovaného podľa medzivládnej Dohody z 19. apríla 1995

Dátum:	24. marec 2014, 4. apríl 2014 a 15. apríl 2014
Miesto:	Severo-zadunajské vodohospodárske riaditeľstvo (*ÉDUVIZIG*), Árpád utca 28-32, Győr Slovenský hydrometeorologický ústav (*SHMÚ*), Jeséniova 17, Bratislava
Maďarská strana:	József Katona, ÉDUVIZIG Gabriella Simon Mohácsné, ÉDUVIZIG
Slovenská strana:	Zoltán Hlavatý, Konz. sk. PODZEMNÁ VODA Ondrej Tausberík, SHMÚ
Predmet rokovania:	1. Zosúladenie metodiky vyčísľovania a zaokrúhľovania prietokov 2. Hodnotenie podzemných vôd za rok 2013 3. Rôzne

V zmysle bodu 2 kapitoly 8.2 Odporúčania Spoločnej výročnej správy z monitorovania životného prostredia v roku 2012 sa na základe návrhu maďarskej strany 24.3.2014 v Győri, 4.4.2014 v Bratislave a 15. apríla 2014 opäť v Győri uskutočnili rokovania v súvislosti s hodnotením kvantity povrchových vôd.

K bodu 1.

Keďže zaokrúhľovanie prietokov vyčísľovaných slovenskou (4 číslice) a maďarskou stranou (3 číslice) je dané softvérom používaným na spracovanie údajov, odborníci oboch strán sa dohodli nasledovne:

- doterajšia metodika vyčísľovania a zaokrúhľovania prietokov na oboch stranách zostáva nezmenená;
- poskytovanie údajov v rámci spoločného monitorovania podľa medzivládnej Dohody z roku 1995 zostáva nezmenené;
- v Národných správach a v Spoločnej správe pri výpočte mesačných a ročných priemerov sa bude pod 1000 zaokrúhľovať na 3 číslice, nad na 4 číslice (t.j. 10420; 6785; 520; 25,3; 2,45; 0,234).

Odborníci sa ďalej dohodli, že:

- výpočet mesačných a ročných priemerov bude vychádzať z priemerných denných údajov;
- mesačné a ročné minimá a maximá budú vychádzať zo skutočne stanovených minimálnych a maximálnych vodných stavov alebo prietokov (nie z priemerných denných hodnôt). Pokiaľ by uvedené podklady neboli k dispozícii a minimá alebo maximá budú vychádzať z priemerných denných hodnôt, táto skutočnosť sa výslovne uvedie v texte.

- pri sčítavaní prietokov z dvoch staníc (napr. Mošonský Dunaj a pravostranný priesakový kanál, resp. staré koryto Dunaja a pravostranná ramenná sústava) sa zaokrúhlenie podľa vyššie uvedenej zásady uskutoční až po sčítaní údajov;
- pri hodnotení plnenia prietokov v zmysle medzivládnej Dohody z roku 1995 zatiaľ ostáva v platnosti hodnota 7 % prijateľnej odchýlk, avšak pre objektívne hodnotenie prepúšťaných denných prietokov odborníci zostavia tabuľku denných odchýliek.

K bodu 2.

Pre hodnotenie podzemných vôd za hydrologický rok 2013 sa odborníci dohodli nasledovne:
- pre porovnanie období s nízkymi prietokmi (Q1000) bol predbežne zvolený termín 10.12.2012 (prípadná alternatíva 27.11.2012);
- pre porovnanie období s priemernými prietokmi (Q2000) bol predbežne zvolený termín 22.3.2013. Ďalšou alternatívou je termín 27.5.2013 alebo 16.2.2013;
- pre porovnanie období s vysokými prietokmi bol (Q3000) bol predbežne zvolený termín 12.1.2013. Ako alternatíva môže byť termín 6.7.2013 alebo 2.7.2013.

K bodu 3.

Odborníci pre monitorovanie povrchových a podzemných vôd sa dohodli, že pri hodnotení roku 2013 uskutočnia aj vyhodnotenie pre obdobie kalendárneho roka. Pokiaľ sa pri hodnotení nevyskytnú problémy, v záujme zosúladenia hodnotenia povrchových a podzemných vôd s hodnotením ostaných zložiek prírodného prostredia (kvalita vôd, pôdna vlhkosť, les a biota) navrhnú zmenu hodnoteného obdobia z hydrologického roka na kalendárny rok.

Výmenu údajov za rok 2013 odborníci predbežne dohodli na 15.4.2013.

Zápisnica bola vyhotovená v slovenskom a maďarskom jazyku v dvoch vyhotoveniach.

Győr, 15. apríl 2014.

....	Mohácsiné S. Gabriella	....
József Katona	Gabriella Simon Mohácsi	Zoltán Hlavatý
ÉDUVIZIG	ÉDUVIZIG	KS PODZEMNÁ VODA

Jegyzőkönyv
az 1995. április 19-ei kormányközi Megállapodás alapján történő felszíni és felszínalatti vizek monitoring szakértői tárgyalásról

Időpont:	2014. március 24., 2014. április 4. és 2014. április 15.
Helyszín:	Észak-dunántúli Vízügyi Igazgatóság (*ÉDUVIZIG*), Árpád út 28-32, Győr Szlovák Hidrometeorológiai Intézet (*SHMÚ*), Jeséniova 17, Bratislava
Magyar fél:	Mohácsiné Simon Gabriella, ÉDUVIZIG Katona József, ÉDUVIZIG
Szlovák fél:	Hlavatý Zoltán, Ground Water Consulting Tausberík Ondrej, SHMÚ
Tárgy:	1. Vízhozamok számítási és kerekítési metodikájának összehangolása 2. Felszín alatti vizek 2013. évi értékelése 3. Egyebek

A 2012. évi környezeti monitoring Közös Éves Jelentés, 8.2 Javaslatok fejezete 2. pont értelmében a Magyar fél javaslata alapján 2014. március 24-én Győrött, 2014. április 4-én Pozsonyban és 2014. április 15-én ismét Győrött egyeztetésekre került sor a felszíni vizek mennyiségi értékelésével kapcsolatában.

<u>1. pont.</u>

Mivel a vízhozamok számításánal a kerekítés a szlovák (4 számjegy) és a magyar oldalon (3 számjegy) az adatok feldolgozásához használt szoftverből adódik, a két fél szakértői következőképpen állapodtak meg:

- a vízhozamok számszerűsítésének és kerekítésének eddigi munkamódszere mindkét félnel változatlan marad;
- az 1995. évi kormányközi Megállapodás szerinti közös monitoring adatszolgáltatás változatlan marad;
- a Nemzeti Jelentésekben és a Közös Jelentésben a havi és az éves átlagok számításakor a kerekítés 1000 alatt 3 számjegyre, afölött 4 számjegyre történik (azaz 10420; 6785; 520; 25,3; 2,45; 0,234).

A szakértők továbbá megállapodtak, hogy:

- a havi és az éves átlagok számítása a napi átlag adatokon alapul;
- a havi és az éves minimumok és maximumok a ténylegesen megállapított vízszint vagy vízhozam minimumokon és maximumokon alapulnak (nem az átlagos napi értéken). Amennyiben a fenn említett alapadatok nem állnak rendelkezésre és a minimumok és a maximumok átlagos napi adatokon alapulnak, ennek ténye a szövegben feltüntetésre kerül.

- két állomás vízhozamainak összeadásakor (pl. a Mosoni Duna és a jobboldali szivárgó csatorna, ill. az Öreg-Duna meder és a jobboldali ágrendszer) fenti elv szerint történő kerekítése az adatok összeadása után történik;
- az 1995. évi kormányközi Megállapodás szerinti vízhozamok értékelésének teljesítésénél egyelőre érvényben marad a 7 %-os elfogadható eltérés értéke, azonban az átadott napi vízhozam értékek objektív értékelése céljából a szakértők összeállítják a napi eltérések táblázatát.

2. pont.

A 2013-as hidrológiai év felszínalatti vizek értékelésénél a szakértök következőképpen állapodtak meg:

- az alacsony vízhozamú (Q1000) időszakok összehasonlításához előzetesen a 2012.12.10-i időpont volt kiválasztva (lehetséges változat 2012.11.27);
- a közepes vízhozamú (Q2000) időszakok összehasonlításához előzetesen a 2013.3.22-i időpontot választották ki. További lehetséges változat a 2013.5.27. vagy 2013.2.16.
- a magas vízhozamú (Q3000) időszakok összehasonlításához előzetesen a 2013.1.12-i időpont lett kiválasztva. Alternatív változat a 2013.7.6-i illetve 2013.7.2-i időpont lehet.

3. pont.

A felszíni és a felszínalatti vizek monitoring szakértői megállapodtak abban, hogy a 2013. év értékelésénél naptári évre kiterjedő értékelést is végrehajtanak. Amennyiben az értékelésnél nem lépnek fel problémák a többi természeti környezet összetevő (vízminőség, talajnedvesség, erdő és az élőlények) értékelésével, a felszíni és a felszínalatti vizek értékelésének összehangolása érdekében javasolni fogják az értékelési időszak változtatását hidrológiai évről naptári évre.

A szakértők az adatcserét előzetesen 2014.4.15-re beszélték meg.

A jegyzőkönyv szlovák és magyar nyelven készült 2-2 példányban.

Győr, 2014. április 15.

....	Mohácsiné S. Gabriella	....
Katona József	Mohácsiné Simon Gabriella	Hlavatý Zoltán
ÉDUVIZIG	ÉDUVIZIG	GROUND WATER Consulting

A P P E N D I X A.6.

Zápisnica

z prerokovania a podpísania Spoločnej výročnej správy za rok 2013 zo spoločného slovensko-maďarského monitorovania, stanoveného medzivládnou Dohodou z 19. apríla 1995

Prítomní:

za slovenskú stranu:

Ing. Ladislav Lazár,	splnomocnenec pre výstavbu a prevádzku SVD G-N, zástupca pre monitorovanie
Mgr. Maroš Nikolaj, PhD.,	riaditeľ TBD, Vodohospodárska výstavba, š.p.
RNDr. Zoltán Hlavatý, PhD.	Konzultačná skupina Podzemná voda, s.r.o.
Mgr. Lenka Koprivová,	odborný referent, MDVRR
Mgr. Renáta Vadkertiová,	odborný referent, MDVRR
Andor Buják,	tlmočník

za maďarskú stranu:

Dr. András Rácz,	zástupca štátneho tajomníka pre otázky životného prostredia Ministerstva pôdohospodárstva Maďarska, zástupca pre monitorovanie,
Dr. Bálint Dobi,	vedúci oddelenia, Odbor ochrany životného prostredia, Ministerstva pôdohospodárstva Maďarska
Mária M. Galambos,	referent, Odbor medzinárodných vzťahov, Ministerstvo pôdohospodárstva Maďarska
Dr. János Mikó,	referent, Odbor verejnej správy, Ministerstvo pôdohospodárstva Maďarska
Laura Martinov,	referent, Odbor ochrany životného prostredia, Ministerstvo pôdohospodárstva Maďarska
Pál Benyo,	tlmočník

1. Zástupcovia oboch strán pre monitorovanie, Ing. Ladislav Lazár a Dr. András Rácz vyhodnotili plnenie odporúčaní uvedených v Spoločnej správe za rok 2012.
2. Zástupcovia oboch strán vzájomne odovzdali Národné ročné správy za r. 2013 (v tlačenej verzii).
3. Zástupcovia oboch strán prerokovali a prijali Spoločnú výročnú správu za rok 2013.
4. Strany sa dohodli, že Národné ročné správy z monitorovania za rok 2014 vypracujú do 15. mája 2015.
5. Strany potvrdili zámer uskutočniť dlhodobé hodnotenie výsledkov doterajšieho monitorovania s cieľom optimalizácie sledovaných ukazovateľov a frekvencie ich monitorovania. Splnomocnenci sa dohodli, že vypracujú spoločný návrh optimalizácie monitorovania, ktorý bude predstavený v rámci vedeckej konferencie pri príležitosti 20. výročia podpísania Medzivládnej dohody, usporiadanej v priebehu roka 2016.

6. Slovenská strana oboznámila maďarskú stranu so zámerom rozšírenia malej vodnej elektrárne umiestnenej v nápustnom objekte prepúšťajúcom vodu do Mošonského ramena Dunaja a s tým súvisiacou mimoriadnou reguláciou vody. Zástupca maďarskej strany pre monitorovanie poďakoval za poskytnutie informácie.

v Bratislave, dňa 11. 12. 2014

za maďarskú stranu:	za slovenskú stranu:
....	....
Dr. András Rácz	Ing. Ladislav Lazár

Jegyzőkönyv
az 1995. április 19-i kormányközi megállapodásban
meghatározott közös magyar- szlovák monitoring
2013-évi Közös Éves Jelentésének megtárgyalásáról és aláírásáról

Résztvevők:

A magyar fél részéről:

Dr. Rácz András	környezetügyért felelős helyettes államtitkár, monitoring felelős, Földművelésügyi Minisztérium,
Dr. Dobi Bálint	főosztályvezető, Földművelésügyi Minisztérium, Környezetmegőrzési Főosztály
M. Galambos Mária	referens, Földművelésügyi Minisztérium, Nemzetközi Kapcsolatok Főosztálya
Dr. Mikó János	közigazgatási és hatósági referens, Földművelésügyi Minisztérium
Martinov Laura	referens, Földművelésügyi Minisztérium, Környezetmegőrzési Főosztály
Benyo Pál	tolmács

A szlovák fél részéről:

Ing. Lazár Ladislav	a Bős-Nagymarosi Vízlépcsőrendszer építésével és működtetésével megbízott kormánymeghatalmazott, monitorozással megbízott képviselő
Mgr. Nikolaj Maroš, PhD.	igazgató, Műszaki és biztonsági felügyelet, Vodohospodárska výstavba š.p.
Dr. Hlavatý Zoltán, PhD.	szakértő, Ground Water Consulting
Mgr. Vadkertiová Renáta	kormánybiztosi titkárság
Mgr. Koprivová Lenka	kormánybiztosi titkárság
Buják Andor	tolmács

1. A két Fél monitoing felelőse, Ing. Lazár Ladislav és Dr. Rácz András értékelte a 2012-évi Közös jelentésben szereplő javaslatok teljesítését.
2. A két Fél képviselője kölcsönösen átadta egymásnak az 2013-évi Nemzeti Jelentések nyomtatott változatát.
3. A két Fél képviselője megtárgyalta és elfogadta az 2013-évi Közös Éves Jelentést.
4. A Felek megegyeztek abban, hogy a 2014-évi megfigyelésekről szóló Éves Nemzeti Jelentéseket 2015. május 15-ig készítik el.
5. A felek megerősítették azt a szándékukat, hogy elvégzik az eddigi monitorozás eredményeinek hosszú távú értékelését azzal a céllal, hogy optimalizálják a megfigyelt paramétereket és a monitorozás gyakoriságát. A meghatalmazottak megállapodtak abban, hogy elkészítik a monitorozás optimalizálására vonatkozó közös javaslatot, amelyet a Kormányközi Megállapodás 20. Évfordulója

alkalmából a 2016. év folyamán megrendezésre kerülő tudományos konferencia alkalmával mutatnak be.

6. A Szlovák fél tájékoztatást adott a Mosoni Dunába vizet áteresztő műtárgyban elhelyezett kis vízerőmű bővítésének tervéről és azzal összefüggő rendkívüli vízszabályozásról. A magyar fél monitoring felelőse köszönettel vette a tájékoztatást.

Bratislava, 2014 december 11.

A magyar fél részéről:	A szlovák fél részéről:
....	....
Dr. Rácz András	Ing. Ladislav Lazár