Fairway Rehabilitation and Maintenance

MASTER PLAN

for the Danube and its navigable tributaries:

National Action Plans

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1 Executive summary

These action plans illustrate the status and planned next steps for rehabilitation and maintenance activities in the Danube riparian countries. It is based on the Fairway Rehabilitation and Maintenance Master Plan for the Danube and its navigable tributaries as it was endorsed by a large majority of the Danube Transport Ministers in December 2014. By means of the action plans at hand, the **implementation status of the Master Plan shall be monitored and steered**. Two updates a year (October and May) are foreseen to provide the necessary information. This document provides the first update of the action plans provided in June 2015 and aims to illustrate the required actions for 2016, plan the national budgets and specify further sources of finance.

Fairway conditions were difficult along the whole Danube in the first nine months of 2015, especially on the Lower Danube. There, **water discharge was significantly below the multi-annual average** and the Low Navigable Water level was not met on most or all days of the months July, August and September. Combined with the lack of financial means for maintenance, this lead to a complete blockage of the fairway, long waiting times as well as vessel groundings. Critical locations such as Belene and Vardim entirely dropped below the minimum fairway depth of 2.50 m in months August and September 2015.

With the exceptions of Romania and Bulgaria, operational expenditures 2015 are expected to be at a comparable size to 2014 in most of the Danube countries and amount to approx. 30 Mio € altogether (for the countries that have provided data [1],[2]). Considering the comparably worse hydrological conditions in the year 2015, considerably higher budget efforts would however have been required to achieve the agreed levels of service. The **operational budget needs for 2016** are higher than for 2015 in most of the countries. In some countries (Croatia, Bulgaria) those financial needs are not yet secured due to the ongoing budget negotiations. In order to achieve better fairway conditions and avoid critical situations in the year 2016, significant efforts have to be made to secure the necessary operational budget. In total at least 3.5 million Euros required for operational activities are not yet secured (status November 2015). **Investments in maintenance and rehabilitation** have been taken this year and will be intensified in 2016, both mainly within the framework of the recently started CEF project FAIRway. In this project, which runs until 2020, European funds contribute a major share of the necessary investment. In most of the countries however, **more than half of the investment needs until 2020 as stated in the Master Plan are not secured yet**.

[1] Germany, Serbia and Moldavia have not provided all or parts of the data. Data from Romania includes the Danube Fairway and the Danube Black Sea Canal and thus also financial means for lock maintenance in the latter.
[2] Please keep in mind that the figures given are overall sums. The distribution over the different relevant cost categories may vary and show additional issues, which is outlined in the country sections of this report.

2 Introduction

Purpose of action plans

In their conclusions of 3rd December 2014 regarding the Fairway Rehabilitation and Maintenance Master Plan for the Danube and its Navigable Tributaries, the Danube Transport Ministers agreed to "establish (...) national roadmaps which identify individual actions, responsibilities, funding resources and intermediate milestones for the implementation of these measures and to communicate these roadmaps by 30th June 2015 to the relevant coordinating bodies". This is in line with Regulation (EU) No 1315/2013 of the European Parliament and of the Council of 11 December 2013 on Union guidelines for the development of the trans-European transport network, obliging EU Member States to preserve a good navigation status, while respecting the applicable environmental law. In the Danube Region the "Joint Statement on Guiding Principles for the Development of Inland Navigation and Environmental Protection in the Danube Basin", endorsed in 2007 by the ICPDR (International Commission for the Protection of the Danube River), Danube Commission and the International Sava River Basin Commission (ISRBC), thereby is a key tool providing guidance for the planning and implementation of waterway projects.

Scope of action plans

Based on the ministerial conclusions of December 2014, Priority Areas 1a of the EU Strategy for the Danube Region initiated the elaboration of national action plans in spring 2015. They follow a harmonized structure in order to provide an improved overview of actions taken and planned along the Danube.

The action plans shall be updated continuously and twice a year (October and May) in order to serve as a proper monitoring and steering tool. Contents for these updates will be provided in the framework of the CEF-financed FAIRway project.

In the October update, focus will be laid on the status of critical locations, hydrological conditions and rehabilitation and maintenance activities undertaken in the course of the year as well as the resulting budget needs for the coming calendar year. An outlook on planned actions, milestones and funding sources of the coming year will be provided as well.

The May update will provide an illustration of the above mentioned aspects for the preceding year as well as an update on the operational and investment budgets and planned actions, milestones and funding sources for the current year. The investment requirements stated in the Masterplan 2014 will be updated as well. Shipping organisations will provide their view on critical locations of the past season. This shall make sure that yearly data suitable for long term analysis is collected.

The summarising tables on cost and budget in this report allow only limited comparison between the riparian states, as the national accounting practices vary (e.g. some countries summarize more activities under "maintenance and rehabilitation" than others). The main purpose is to illustrate the cost and budget development over the years per year, indicate financing needs and outline the shares of national and European funding.

Introduction

The Master Plan and the action plans are designed as living documents. This means that their structure and content will be elaborated in order to provide the most benefit for the maintenance and rehabilitation process of the Danube and its navigable tributaries. The aim is to standardize and simplify the data gathering process as much as possible, the use of electronic support tools is envisaged.

Scope of current report

This document updates the first roadmap document of June 2015 and the Fairway Rehabilitation and Maintenance Master Plan for the Danube and its Navigable Tributaries. It is the first action plan to be elaborated within the FAIRway project.

It focuses on the most critical sections as identified by a sample of 24 important shipping organisations in December 2014, as does the roadmap of June 2015. From the user perspective, the locations and stretches marked yellow in the map and listed in the table below cause the biggest navigational problems and should consequently be treated with the highest priority.

location and length (km)			right bank / left bank	name of sector or location
river-km (from - to)		length		
2,321.70	2,312.00	9,50	DE / DE	Straubing (lock)–Straubing-Sand (port)
2,312.00	2,282.50	29,70	DE / DE	Straubing-Sand (port)–Deggendorf
2,282.50	2249,90	32,50	DE / DE	Deggendorf – Vilshofen (backwater Kachlet)
2,230.40	2229,30	1,10	DE / DE	Tailwater Kachlet and Auerbacher Eck
2,014.00	2,013.50	0,50	AT / AT	Weißenkirchen
2,010.20	2,008.90	1,30	AT / AT	Dürnstein
1,888.40	1,887.60	0,80	AT / AT	Treuschütt
1,884.70	1,883.50	1,20	AT / AT	Hainburg
1,735.50	1,733.70	1,80	HU / SK	Nyergesújfalu

1,698.00	1,697.00	1,00	HU / HU	Dömös
1,638.40	1,637.40	1,00	HU / HU	Budafok
1,559.80	1,559.70	0,10	HU / HU	Dunaföldvár
1,558.50	1,557.50	1,00	HU / HU	Solt
1,408.20	1,400.00	8,20	HR / RS	Apatin
309,00	308,00	1,00	RO / RO	Cochirleni
568,20	567,80	0,40	BG / RO	Milka Island
567,00	566,70	0,30	BG / RO	Belene Island
562,00	561,50	0,50	BG / RO	Coundur Island
541,60	541,00	0,60	BG / RO	Vardim Island
538,50	537,00	1,50	BG / RO	Giska Island
425,90	425,20	0,70	BG / RO	Kosui Island

Some waterway administrations decided to report on additional critical sections. Furthermore, it needs to be taken into account that the critical sections are subject to variations. Follow-up enquiries among the Danube users are foreseen.

Recommended Levels of Service

Notwithstanding the provisions of the TEN-T Regulation (1315/2013), the "European Agreement on Main Inland Waterways of International Importance" (AGN) and the "Recommendations on Minimum Requirements for Standard Fairway Parameters, Hydrotechnical and Other Improvements on the Danube" published by the Danube Commission, the waterway management experts represented in NEWADA duo recommended different minimum Levels of Service for the different phases in the waterway maintenance cycle. The recommended minimum Level of Service related to fairway depth was thereby defined as 2.50 m at Low Navigable Water Level (LNWL or ENR / Etiage navigable et de regularisation), i.e. on 94% (343 days) of the year, calculated on the basis of the discharge observed over a period of 30 years with the exception of ice periods. It should however be noted that these minimum Levels of Service only apply to the countries participating in NEWADA duo.

With few exceptions (e.g. in Germany[3], Slovakia and Hungary), this level of service should normally be achievable with conventional maintenance measures (ranging from surveying, fairway marking/relocation to dredging), that is, without structural interventions on the infrastructure. The overall aim is to reduce the need for physical interventions by gaining more accurate information on the actual status of critical waterway locations. Thereby, budgets needed for maintenance and rehabilitation activities should be optimised, environmental impacts reduced, while at the same time achieving the recommended levels of service. This consolidated action plans provide a solid

[3] Germany has not been partner of the NEWADA duo project and consequently has not agreed on the minimum Levels of Service developed in this project.

and transparent data basis for a more targeted maintenance and rehabilitation strategy in the Danube Region.

The FAIRway project

The FAIRway project (07/2015 – 06/2020) is the main overarching initiative to implement the activities of the Danube Fairway Master Plan. Seven project partners represent six riparian states (viadonau (Austria), ARVD - Waterborne Transport Development Agancy (Slovakia), OVF - Orszagos Vizugyi Foigazgatosag together with NDA - Nemezeti Infrastruktura Fejleszto Zrt. (Hungary), AVP - Agencija za vodne putove (Croatia), EAEMDR - Executive Agency for Exploration and Maintenance of the Danube River (Bulgaria), AFDJ - Administration of the Lower Danube (Romania), ACN - Administration of the Navigable Canals (Romania)).

As a first step, FAIRway coordinates the updates of the national action plans of the countries participating in the project. The remaining countries (Germany, Bosnia and Hercegovina, Serbia, Moldova and Ukraine) were invited to provide their contributions via the EU Strategy for the Danube Region (Priority Area 1a on Inland Waterways). The related country chapters are attached to this report as an Annex.

Further activities within FAIRway comprise:

- Outlining of pilot activities for hydrological services based on the national action plans
- Coordinated purchase of advanced equipment for hydrological services (gauging stations, surveying vessels etc.)
- Realization and Evaluation of pilot activities:
    - Basic data for all critical sections
    - Coherent monitoring scheme for the navigation status
    - Harmonised water level forecasts
    - Optimized relocation of the fairway
- Develop innovative approaches
- Prepare documentation for selected future implementation measures

The FAIRway budget amounts to 23.4 Mio €, including an EU co-financing (CEF) of 19.6 Mio €.

Adoption of action plans

The action plans are prepared within the FAIRway project. The FAIRway Steering Committee will be asked to approve the action plans for the countries participating in the project (Austria, Slovakia, Hungary, Croatia, Romania and Bulgaria) from a technical point of view. However, the Steering Group of PA1a remains the body responsible for final coordination and adoption of the action plans for all Danube riparian countries.

3 Synthesis and conclusions

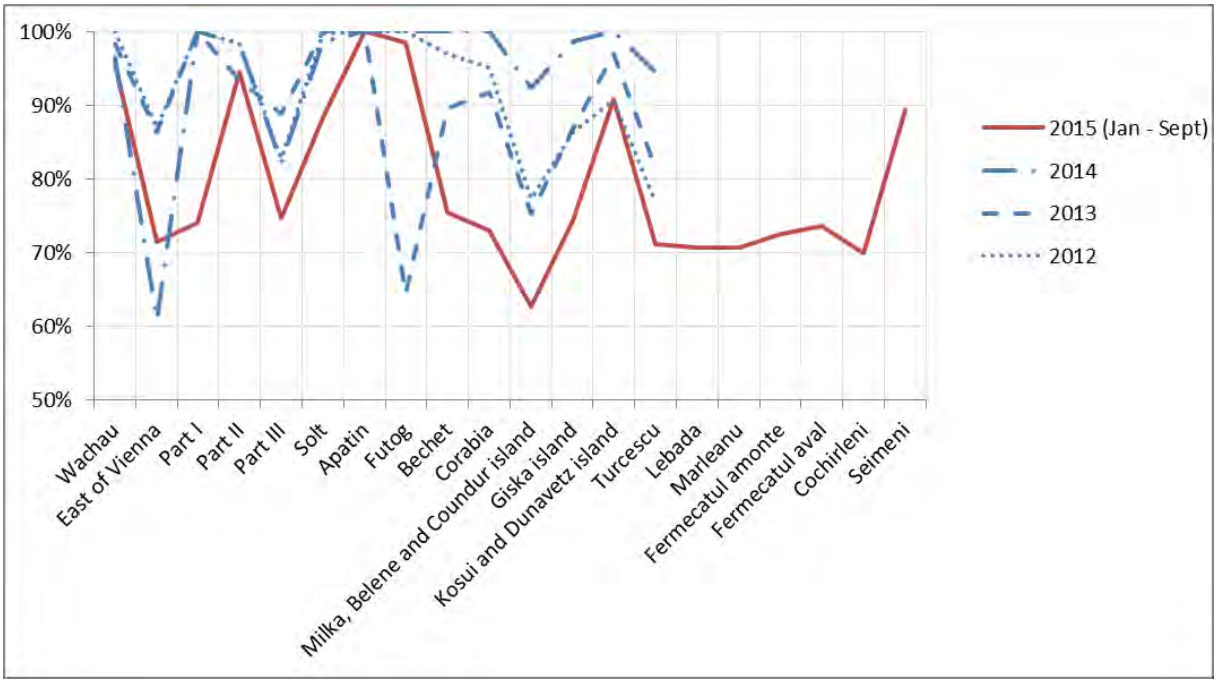
This report illustrates the condition of the Danube fairway in the first three quarters of 2015, including the difficult summer months. Its primary aim is to show the shortcomings occurred 2015 and prepare the required actions in 2016. This also comprises the national rehabilitation and maintenance budget planning for 2016 including identification of sources of finance.

The upcoming update in May 2016 will provide data for comparison and analysis of yearly values and provide the opportunity to specify the actions to be implemented in the course of the year.

Fairway conditions

Fairway conditions were difficult along the whole Danube in 2015, especially on the Lower Danube. There, water discharge was significantly below multi-annual average and the Low Navigable Water level was not met on most or all days of the months July, August and September. Combined with the lack of financial means for maintenance, this lead to a complete blockage of the fairway, long waiting times as well as vessel groundings. Critical locations on the Lower Danbue – such as Belene and Vardim – entirely dropped below the minimum fairway depth of 2.50 m in months August and September 2015.

Comparing the latest data from January–September 2015 with the data of previous years (% of days with fairway depth > 2,50m), it can be observed that the most critical locations are dynamic and shift between the years. So far, the most critical locations were encountered on the Lower Danube in 2015, whereas the Upper Danube still offered comparably better fairway conditions until August 2015. The opposite picture could be observed in the year 2014. Whereas the worst sections on the Upper and Middle Danube are concentrated on a limited number of critical locations in 2015, the bad fairway conditions are generally applicable to large stretches of the Lower Danube. The worst locations in the first nine months of 2015 were concentrated in the Milka/Belene/Condour Island area.



Expenditures and budgets for maintenance and rehabilitation

The summarising tables on cost and budget in this chapter allow only limited comparison between the riparian states, as the national accounting practices vary (e.g. some countries summarize more activities under "maintenance and rehabilitation" than others). The main purpose is to illustrate the cost and budget development over the years, indicate financing needs and outline the shares of national and European funding.

With the exceptions of Romania and Bulgaria, operational expenditures 2015 are expected to be at a comparable size to 2014 in most of the Danube countries and amount to approx. 30 Mio € altogether (for the countries that have provided data [4],[5]). Considering the comparably worse hydrological conditions in the year 2015, considerably higher budget efforts would however have been required to achieve the agreed levels of service.

[4] Germany, Serbia and Moldavia have not provided data. Data from Romania includes the Danube Fairway and the Danube Black Sea Canal and thus also financial means for lock maintenance in the latter.
[5] Please keep in mind that the figures given are overall sums. The distribution over the different relevant cost categories may vary and show additional issues, which is outlined in the country sections of this report.

Operational budgets and expenditures in Euros		2014	2015			2016		
		Expenditures	Estimated expenditures	Secured budget	Estimated financing gap	Required budget	Secured budget	Estimated financing gap
DE - Germany		n/a	n/a	n/a	n/a	n/a	n/a	n/a
AT - Austria		8.172.780	8.074.684	8.557.605		7.629.278	7.629.278	-
SK - Slovakia		2.942.128	2.869.700	3.510.000		3.081.000	3.081.000	-
HU - Hungary		731.170	886.705	886.705		2.003.489	4.864.480	-
HR - Croatia (Danube, Sava, Drava)		941.000	1.049.200	1.049.200		1.789.200	-	-1.789.200
RS - Serbia (Danube, Sava)		1.182.500	n/a	n/a	n/a	n/a	n/a	n/a
BA - Bosnia and Herzegovina		98.512	98.512	98.512		127.822	127.822	-
RO - Romania	Danube	6.661.150	6.640.000	6.640.000		18.334.577	18.164.577	-170.000
	Danube-Black Sea Canal	7.871.582	9.395.960	9.395.960				
BG - Bulgaria		155.991	265.000	203.000	-62.000	1.576.750	-	-1.576.750
MD - Moldova		n/a	n/a	n/a	n/a	n/a	n/a	n/a
UA - Ukraine		181.700	n/a	n/a	n/a	n/a	n/a	n/a
Sum		**28.938.513**	**29.279.761**	**30.340.982**	**-62.000**	**34.542.116**	**33.867.157**	**-3.535.950**

The estimated operational budgets for 2016 are higher than for 2015 in most of the countries. In some countries (Croatia, Bulgaria) those financial needs are not yet secured due to the ongoing budget negotiations. In order to achieve better fairway conditions and avoid critical situations in the year 2016, significant efforts have to be made to secure the necessary operational budget. In total at least 3.5 million Euros required for operational activities are not yet secured (status October 2015).

Investment budgets and expenditures in Euros		2015 - 2020			
		Required investments: Master Plan 2014	**Secured budget** (EU cofinanced actions: FAIRway, HUMARK etc.)	**Remaining investment gap**	
DE - Germany		n/a	n/a	n/a	n/a
AT - Austria		-	-	-	-
SK - Slovakia		8,080,000	2,030,000	-6,050,000	-75%
HU - Hungary		4,333,700	27,332,037		
HR - Croatia (Danube, Sava, Drava)		4,588,000	1,683,000	-2,905,000	-63%
RS - Serbia (Danube, Sava)		5,383,000	-	-5,383,000	-100%
BA - Bosnia and Herzegovina		300,000	-	-300,000	-100%
RO - Romania	Danube	41,058,000	6,551,100	-34,506,900	-84%
	Danube-Black Sea Canal	-	*198,884,393**	-	-
BG - Bulgaria		21,132,000	8,947,067	-12,184,933	-58%
MD - Moldova		-	-	-	-
UA - Ukraine		1,500,000	-	-1,500,000	-100%
Sum		**86,374,700**	**46,543,204**	**-62,829,833**	**-73%**

* the secured budget relates to the modernization of locks at the Danube-Black Sea Canal. Locks were excluded from the Master Plan. To make the required and secured budgets comparable, the amount was excluded from the sum.

Investments in maintenance and rehabilitation have been taken this year and will be intensified in 2016, both mainly within the framework of the recently started CEF project FAIRway. In this project, which runs until 2020, European funds contribute a major share of the necessary investment. In most of the countries however, more than half of the investment needs until 2020 as stated in the Master Plan are not secured yet. Altogether, the required investments that are not yet covered by projects amount to around 63 million Euros or 75% of the needs stated in the Master Plan (needs assessment 2014).

4 Austria

viadonau– Österreichische Wasserstraßen-Gesellschaft mbH (state owned) is responsible for fairway maintenance, rehabilitation and upgrade.

4.1 AT | Status report on main critical locations 2012 – September 2015

Number of days with fairway depths >2,50 m on main critical locations

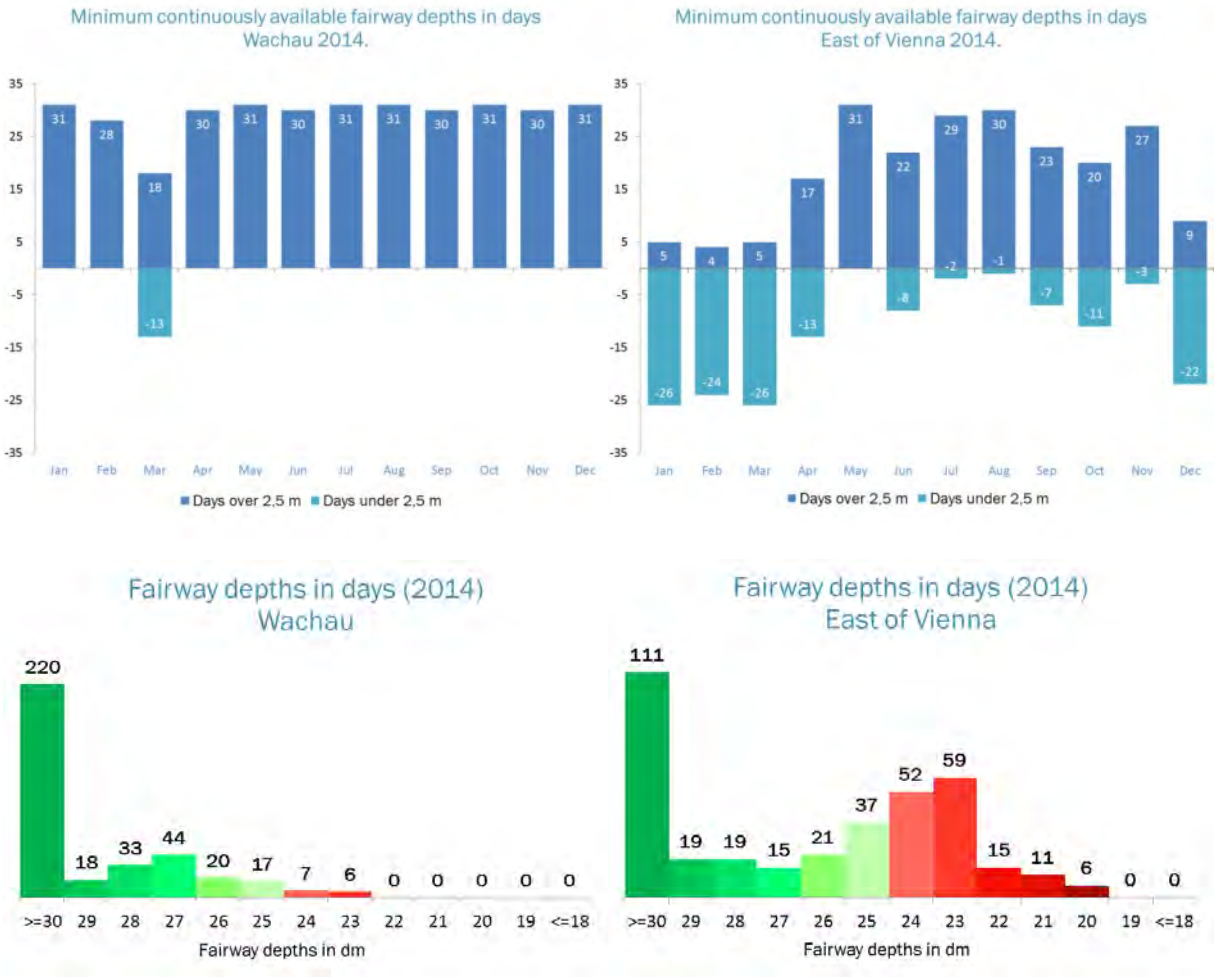
Critical location	2012	2013	2014
Wachau	366	359	352
East of Vienna	318	315	222

Status of critical locations 2013

In the first half of 2013 both free-flowing stretches of the Danube in Austria recorded the availability of consistent water depths of more than 2.5 metres in the main channel. This was also the case during the months of October and November, which are normally characterised by low water levels. The high waters in June caused sedimentation of approximately 1.3 million m³ of gravel and fine sediment in the fairway leading to restrictions on the availability of fairway depths to the east of Vienna during the following months of July and August when water levels fell. By the end of 2013 dredging carried out by viadonau had resulted in approximately 470,000 m³ of aggradation sediment being removed from the fairway.

The impact of the high water in June 2013 on the stretch east of Vienna was drastic. Decreasing water levels during the months of July and August led to a minimum water depth of 2.5 metres on just 36% of days. With average daily water levels of just 30 cm above low navigable water level (LNWL 2010) recorded at the Wildungsmauer reference gauge in the second half of the month of December, fairway depth in the deep channel was below 2.5 metres for 35% of days in this month.

Status of critical locations 2014



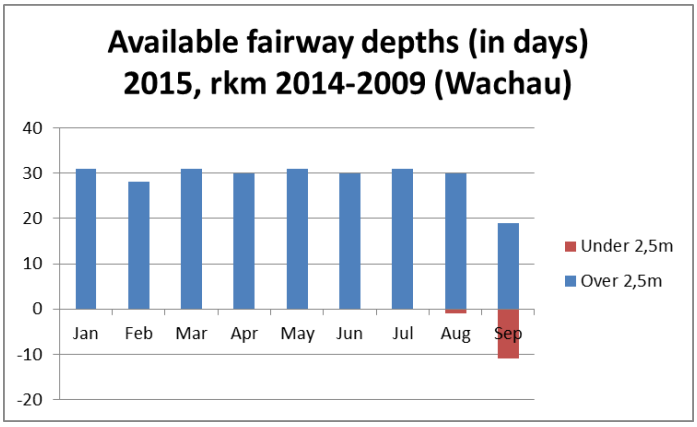
In 2014, vessels in both free flowing sections of the Danube in Austria enjoyed constant fairway depths in excess of 2.5 metres, with the exception of six days in the four months of May, July, August and November. A comparison of long-term discharge data for the Austrian Danube (1981 to 2014) shows that water discharge during the months of January to April and December was significantly below average.

A minimum fairway depth of 2.5 metres was available in the Wachau section for 352 days, or about 96% of the year. Only on 13 days (in March) did the water depth in this section of the Danube fall below 2.5 metres. A water depth of at least 27 decimetres was available for navigation for 315 days on this stretch of the river.

The low water levels in the months of January to April and December had a drastic effect on the free-flowing section east of Vienna. To make matters worse, dredging work to remove sediment deposited on the riverbed in the fairway by the floods in June 2013 continued into the first half of 2014. Four significantly shallow sections of the river still had a total of about 100,000 m^3 of sediments to be removed. The section east of Vienna therefore only had a minimum fairway depth of 2.5 metres for 222 days, or about 61% of the year. However, a water depth of 23 and 24

decimetres meant that navigation could still use this section for a further 111 days. In 2014, the navigable depth of the fairway was only less than 23 decimetres on 32 days.

Status of critical locations January – September 2015



The first 9 months of 2015 were characterised by difficult waterway conditions in the free flowing section of the Austrian Danube between Vienna and Bratislava: in the spring season (between January and March) 22 days (or 24%) with a fairway depth less than 2,50 metres were registered. In the summer season (July – September) even 56 days (or 61%) with a fairway depth lower than 2,50 metres were recorded due to the low discharge levels (see next section).

The second free-flowing section – in the Wachau valley – was faced with comparably good conditions: in the months January until July 2015 a fairway depth of over 2,50 metres could be provided on all days (100%). Available fairway depth dropped below 2,50 metres on one day in August and on 11 days in September 2015.

4.2 AT | Hydrological conditions on main critical locations 2012 – September 2015

The following table contains information about the number of days with a flow discharge (m^3/s) above multiannual average flow discharge for the main critical locations as identified by the Danube waterway users in a survey concluded in December 2014. For the Austrian section of the Danube, these main critical locations are Weißenkirchen and Dürnstein in the Wachau valley and Treuschütt and Hainburg in the section east of Vienna. The reference gauge station for critical locations in the Wachau valley is Kienstock (river-km 2015.21), for those in the section east of Vienna it is Wildungsmauer (river-km 1894.72).

Calculations for discharge values in days as given in the following table were performed on the following assumptions:

1) "Multiannual" refers to the years 1981–2010 which is the period on which the latest calculation of characteristic water levels for the Austrian section of the Danube (i.e. KWD 2010) was based.

2) "Average flow discharge" is the arithmetic mean of the mean annual discharge for the years 1981–2010.

Critical location	2012	2013	2014
Wachau	199	162	83
East of Vienna	187	155	95

AT | Water level information on main critical locations 2012 – September 2015**Critical location**	**Reference gauges**	**No of days ≥ LNWL**		
		2012	**2013**	**2014**
Wachau	Kienstock + Dürnstein	366	365	365
East of Vienna	Wildungsmauer + Thebenerstraßl	366	365	355

Relevant data for nine automatic gauging stations along the Austrian Danube are published online via www.doris.bmvit.gv.at/en/fairway-information/water-levels/. Gauging data are refreshed online once per hour.

In hydrological terms, the years 2012 and 2013 saw very good fairway conditions along the free-flowing sections of the Austrian Danube (Wachau and east of Vienna). The average daily water level at the gauging station Wildungsmauer (reference gauge for the river stretch east of Vienna) was 316 cm in 2013, a level of just over 40 cm higher than during the previous four years. On no single day of the years 2012-2013 did water levels fall below the low navigable water level (LNWL 2010). Water levels exceeded the average water level (AWL 2010) for around 42% of the period.

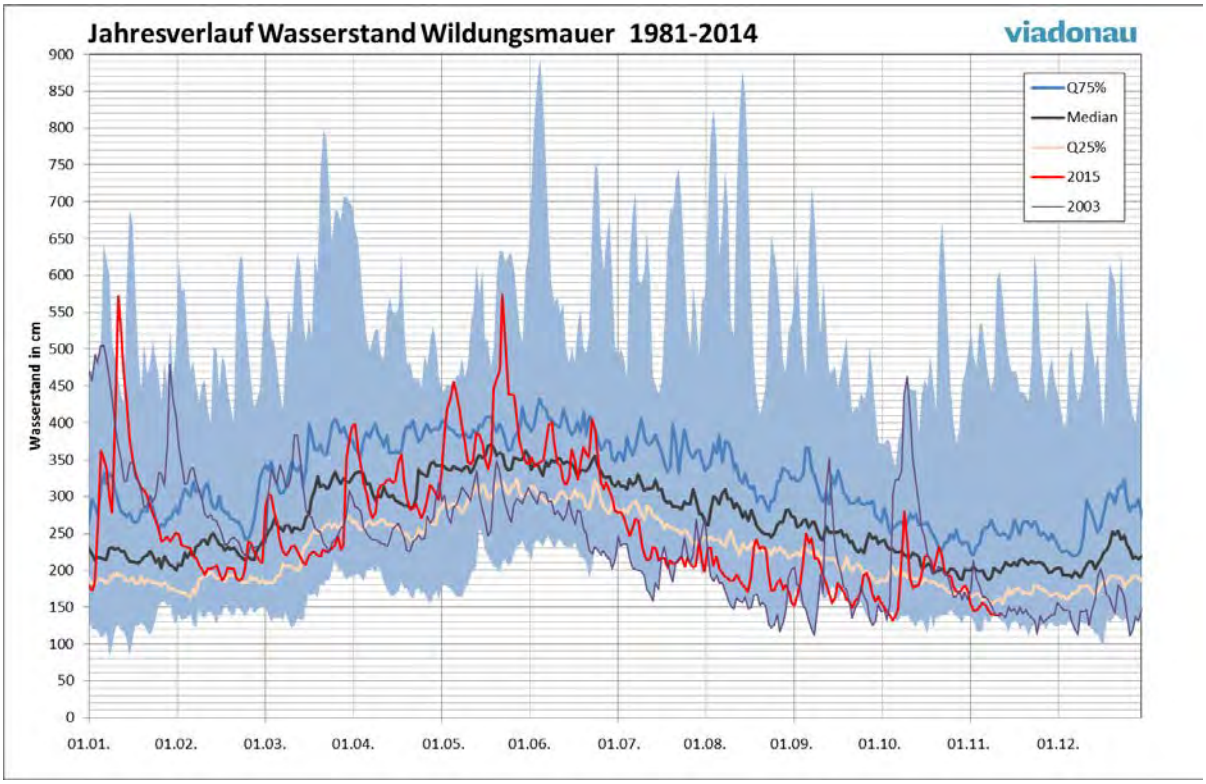
June 2013 was characterised by a high-water event which — depending on the section of the Danube — is only likely to occur every 100 to 300 years. Maximum discharge rates of between 9,500 and 11,500 m^3 per second were recorded and were consistently higher than even the high-water event in August 2002. The flood caused sedimentation of approximately 1.3 million m^3 of gravel and fine sediment in the fairway. This, along with falling water levels in August, had a detrimental effect on available fairway depths.

In 2014, the average water levels at the Wildungsmauer gauge (reference gauge for the river east of Vienna) was 255 cm – the lowest figure since 2011. Although water levels only fell to the minimum water level (RNW 2010) on ten days of the year in 2014, navigation had to cope with particularly unusual and difficult fairway conditions at various periods throughout the year (e.g. in March, April and June). Low water levels characterised the winter months of January, February and December, with average daily water levels at the Wildungsmauer gauge approximately 1 metre below those of 2013. In March the water level (daily average) fell below the minimum water

level (RNW 2010) on ten occasions. In contrast, average daily water levels in the traditional low water months of September to November were 12 centimetres higher than in 2013.

In the period between January and September 2015 relatively bad conditions were encountered in the free-flowing and critical locations east of Vienna. Water level gauges fell below the median value in a large part of the year. The severest water level conditions were observed in the summer months of July until September 2015, with water levels that approach the low values of the one of the worst years in recent history, the year 2003. The statistically exceptional low water period of summer 2015 was followed by a continued low water season in autumn 2015.

Water level gauge East of Vienna 1981 - 2014

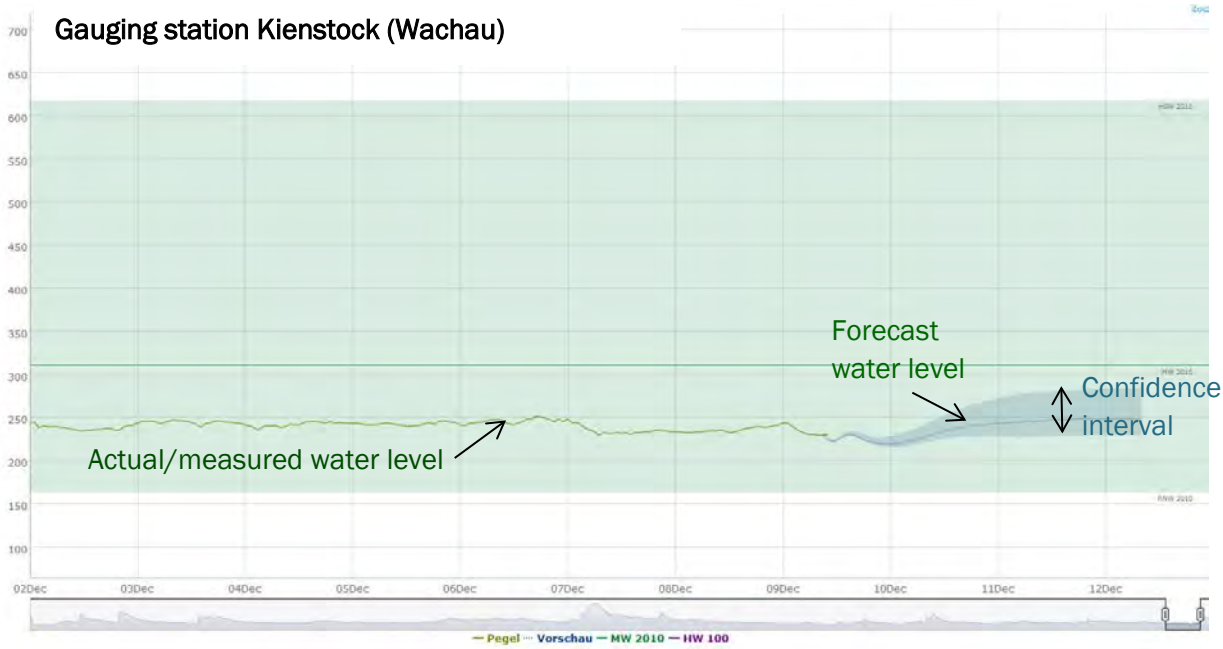


4.3 AT | Water level prognoses for critical locations

Low water level forecasts are provided online at www.doris.bmvit.gv.at/en/fairway-information/water-levels/ for the two Austrian critical locations Wachau (gauge Kienstock) and east of Vienna (gauge Wildungsmauer). Forecasts range from 24 hours to 72 hours in advance. The calculated forecast water level is displayed together with a confidence interval.

These low water level forecasts were developed under the scientific guidance of the Technical University of Vienna and are generated by automated computer-aided model calculations. The accuracy of the 72 hour forecast ranges between +/- 10 cm with an 80% probability. Accuracy levels largely depend on the quality of the underlying meteorological prognoses. The prognosis

simulates the natural discharge of the river and does not display short-term influences and variations (e.g. as caused by operation of hydroelectric power stations).



4.4 AT | Time from surveying to action: maintenance philosophy

In 2012, viadonau's customer-oriented waterway management – based on the pillars of monitoring, planning, implementation and informing – was integrated into the company's process map and several key services for inland navigation were revised and improved. The key principle of viadonau's maintenance philosophy is proactive waterway management, i.e. to provide the continuity of the fairway before the beginning of the annual low water period, which usually lasts from October until February. This means that dredging interventions at critical locations in both free-flowing sections of the Austrian Danube are performed starting with the beginning of September. As an immediate measure, the most critical locations are dredged in a sequential manner according to prioritisation and only at a minimum width of the fairway in order to safeguard the continuity of the fairway. From a user point of view, it is more effective to provide a minimum fairway depth at a minimum fairway width than to dredge the entire width of the fairway at the most critical locations at the expense of available fairway depths.

As viadonau does not dispose of in-house dredging equipment, these services have to be contracted on the market which entails a certain lead time for tendering. To cut down on lead times, after public tendering viadonau has concluded multi-annual framework contracts for 50% of the planned dredging measures, including a response time of maximum three weeks between the time of order and start of the maintenance works on site.

In addition to lead times necessitated by procurement procedures, dredging interventions have to be approved according to Austrian water, nature protection (including EU Natura2000 and Water Framework Directive), navigation and national park laws (the latter east of Vienna in case of dredging beyond the limits of the fairway). Public tendering of dredging measures can only be performed after the official legal notifications have been received by the competent authorities.

To decrease the time for receiving official notifications (which might take up to six months according to Austrian law), viadonau strives to obtain multi-annual notifications which are valid for different dredging areas.

In the light of all these aspects, the minimum time from riverbed surveying (which is performed in-house at viadonau) to action (start of dredging works which have to be tendered on the market) amounts to around three weeks, but only in case that all official legal notifications (water, nature protection, navigation and – for the free-flowing section east of Vienna – national park law) are available and the works can be performed on call based on a valid framework contract with the contractor. In all other cases, the time from surveying to action is dependent on the lead time for obtaining (an) official legal notification(s) and for procurement procedures.

4.5 AT | Key issues and related activities 2014 – September 2015

Related to the key issues illustrated in the Fairway Rehabilitation and Maintenance Master Plan (version: December 2014):

	Key issues	*Need for action*	*Activities performed 2014*
AT 01	Maintaining water level measurements during extreme weather events	Establishment of back-up energy supply systems at automatic gauging stations	*Equipping most important water gauging stations with high-capacity batteries in combination with solar panels to keep gauges running as stand-alone systems*
AT02	Maintaining technical equipment of gauging stations to avoid data errors and gaps	Staff for weekly or even daily on-site checks	*Inventory of existing gauging stations and classification regarding priority, identification of human and financial resources*
AT 03	Limited flexibility and limited dredging capacity on the market due to small number of dredging service providers	Support opening-up of limited market for dredging activities	*Monitoring of dredging market (currently only a handful of main contractors) in terms of equipment used, costs per cubic metre etc. Preparation of multi-annual framework contract for dredging services with contractors.*

AT 03 Activities performed January – September 2015

The main structural improvement regarding this key issue (limited dredging market) was the tendering and contracting of dredging services within a new multi-annual framework. This framework provides more opportunities for reacting quickly on emerging needs. The framework contract was put into force in August and allowed a swift response to the low water period which started already in July 2015.

4.6 AT | Review of rehabilitation and maintenance activities 2014 – September 2015

The following activities relate to all critical locations as identified in the Rehabilitation and Maintenance Master Plan (version December 2014):

Riverbed surveying activities 2014

In 2014, viadonau performed 291 riverbed surveys of which 210 were performed with multi-beam equipment and 81 with single-beam equipment. Surveying areas included entire free-flowing sections, entire reservoirs of river power plants, commercial, authority and leisure ports (74 entities), transhipment sites and landing stages (10 entities), critical locations (fords and lateral accumulations) (99 entities), dumping areas (related to dredging intervention at critical locations) (22 entities), scours (2 entities), side arms (2 entities), as well as bridges, sills, dive culverts and other objects (4 entities). In addition, 37 riverbed surveys were performed in connection with the integrated river engineering project to the east of Vienna (in the area between river-km 1890.00 and 1883.50).

The following main, fairway-related riverbed surveying activities took place, in accordance with a standardised annual procedure. Critical locations are monitored on the basis of a catalogue of critical locations in order to support consistent data provision and monitoring.

River-km (from-to)	Frequency of surveying	Type of survey (single-/multi-beam)
Free-flowing sections:		
1921.00 to 1872.70	February + March September + October	Single-beam + multi-beam Single-beam
1921.00 to 1872.70*	June	Single-beam + multi-beam
2038.00 to 1997.30	March + April October + November	Single-beam Single-beam
2038.00 to 1997.30*	June	Single-beam + multi-beam
Shallow section monitoring on entire Austrian stretch:		
2223.40 to 2096.02	Monthly	Single-beam
2094.21 to 1949.57	Monthly	Single-beam
1948.88 to 1872.70	Monthly	Single-beam
Sections in reservoirs of river power plants:		
2223.20 to 2203.40	January	Single-beam
2146.60 to 2119.70	January	Single-beam
2060.10 to 2038.50	May	Multi-beam
1998.00 to 1980.50	May	Single-beam
2162.60 to 2147.40	July	Multi-beam
1979.80 to 1949.40	July	Single-beam

* only critical locations according to catalogue of critical locations

Riverbed surveying activities January – September 2015

During the first 9 months of 2015 hydrographic surveys were carried out according to plan and partly intensified. Apart from surveying activities in port areas, bridges and non-navigable side arms, 96 surveys took place in areas with potentially critical navigation conditions (fords and areas with lateral sedimentation). Some 82% of the latter group of survey activities was carried out with multi-beam equipment. Most surveys took place in the free-flowing and critical areas east of Vienna (62 out of 96 measurements).

Fairway relocation activities 2014

Due to the very limited cross-section of the Austrian section of the Danube, fairway relocation is usually no option for fairway maintenance at viadonau. In 2014, the width of the fairway in the area of Dürnstein (Wachau valley, river-km 2010.20 to 2008.90) was narrowed from 180 m to 150 m in order to reduce future maintenance efforts (dredging of lateral sediment). The safety of navigation in this area is not affected by this measure.

Fairway relocation activities January – September 2015

From January to September 2015 no significant relocation activities took place on the Austrian stretch of the Danube.

Dredging activities 2014

The following fairway dredging measures for commercial navigation were implemented on the Austrian Danube:

Designation of assignment	Dredging site		Dumping or placement site		Beginning of service	End of service	Material	Utilisation	m³
	from river-km	to river-km	from river-km	to river-km					
Schlögener Schlinge	2.186,50	2.186,20	2.181,90	2.181,30	22.05.2014	05.06.2014	Fine sediment	Dumping	11.508,00
Inzeller Scheibe - Kleinmaßnahme	2.185,00	2.184,80	2.181,90	2.181,30	02.06.2014	03.06.2014	Fine sediment	Dumping	3.200,00
Ennshafen - Restarbeiten FS	2.112,00	2.112,00	2.111,80	2.111,00	17.10.2014	27.11.2014	Fine sediment	Dumping	33.280,20
Ennshafen - Restarbeiten Kies	2.112,00	2.112,00	2.115,00	2.115,00	06.10.2014	16.10.2014	Gravel	Dumping	10.191,24
Hochau/Dornach, Hößgang/Struden	2.085,70	2.077,40	2.088,40	2.085,10	04.02.2014	24.03.2014	Gravel	Dumping	71.074,66
Haufenrand Aggsbach	2.027,80	2.027,50	2.029,10	2.028,50	10.11.2014	27.11.2014	Gravel	Bank structuring	1.965,16
Furt Hinterhaus	2.020,10	2.019,40	2.029,10	2.028,50	10.11.2014	20.11.2014	Gravel	Bank structuring	20.392,93
Furt Hofarnsdorf	2.019,40	2.018,60	2.029,75	2.028,50	01.04.2014	28.04.2014	Gravel	Bank structuring	23.529,78
Furt Weißenkirchen	2.014,60	2.013,50	2.023,40	2022,80	06.11.2013	05.02.2014	Gravel	Bank structuring	89.730,79
Haufenrand Dürnstein	2.010,30	2.009,20	2.029,10	2.028,50	10.09.2014	29.09.2014	Gravel	Bank structuring	21.139,65
Furt Rothenhof	2.005,90	2.005,00	2.023,20	2.022,80	13.10.2014	28.10.2014	Gravel	Bank structuring	20.472,00
Lände Hollenburg	1.993,90	1.993,60	1.993,50	1.993,10	11.02.2014	12.02.2014	Fine sediment	Dumping	1.647,80
Ölhafen Theiss	1.993,50	1.993,10	1.993,00	1.992,50	13.02.2014	26.02.2014	Fine sediment	Dumping	7.572,50
Havarieabsetzplatz Wien	1.930,31	1.930,16	1.931,00	1.930,50	03.12.2014	04.12.2014	Fine sediment	Dumping	864,26
Hafeneinfahrt Albern	1.918,40	1.918,10	1.914,90	1.914,00	24.11.2014	26.11.2014	Gravel	Dumping	3.706,57
Hafeneinfahrt Lobau	1.917,30	1.916,25	1.913,40	1.912,80	04.11.2014	18.11.2014	Gravel	Dumping	20.022,78
Hafen Lobau	1.917,30	1.916,30	1.914,90	1.912,80	23.01.2014	19.02.2014	Gravel	Dumping	16.977,00
Furt Regelsbrunn	1.898,30	1.897,90	1.898,60	1.897,80	03.03.2014	11.04.2014	Gravel	Dumping	29.645,30
Furt Rote Werd	1.896,65	1.895,75	1.901,80	1.900,80	26.02.2014	15.04.2014	Gravel	Dumping	30.542,00
Furt Rote Werd	1.896,45	1.895,95	1.901,80	1.900,80	08.09.2014	26.09.2014	Gravel	Dumping	30.542,59
Furt Treuschütt	1.888,40	1.887,70	1.891,00	1.890,40	27.08.2014	05.10.2014	Gravel	Dumping	44.434,95
Furt Bad Deutsch-Altenburg	1.886,90	1.886,10	1.889,90	1.889,00	06.10.2014	09.12.2015	Gravel	Dumping	41.258,29
Haufenrand Hainburg	1.884,50	1.884,00	1.884,00	1.883,50	22.04.2014	09.05.2014	Gravel	Dumping	12.942,58
Furt Käsmacher	1.875,74	1.875,27	1.884,00	1.883,50	01.12.2014	15.12.2014	Gravel	Dumping	20.001,59

In total, 566.642 m³ were dredged for commercial navigation in 2014.

Dredging activities January – September 2015

Designation of assignment	Dredging site		Dumping or placement site		Beginning of service	End of service	Material	m^3
	from river-km	to river-km	from river-km	to river-km				
Anlegestelle Obermühl	2177,8 li	2177,7 li	2.177,40	2.177,20	19.02.2015	20.02.2015	Fine sediment	1.015,78
Anlegestelle Untermühl	2168,0 li	2167,8 li	2.167,50	2.167,10	10.02.2015	10.03.2015	Fine sediment	10.111,33
Furt Weissenkirchen	2.013,90	2.013,60	2.023,00	2.022,80	22.09.2015	06.10.2015	Gravel	16.524,00
Furt Petronell Witzelsdorf	1.892,30	1.891,80	1.899,70	1.899,00	08.12.2014	30.01.2015	Gravel	27.552,91
Furt Bad Deutsch-Altenburg	1.886.90	1.886,10	1.904,60	1.903,40	10.03.2015	05.05.2015	Gravel	36.865,64
Furt Treuschütt	1.888,40	1.888,70	1.906,80	1.906,20	10.03.2015	*07.05.2015*	Gravel	31.625,68
Erhaltungsbaggerung Furt Petronell-Witzelsdorf	1.893,40	1.891,80	1.906,80	1.906,20	03.08.2015	28.08.2015	Gravel	37.928,41
Erhaltungabaggerung Furt Treuschütt	1.888,40	1.887,60	1.901,80	1.900,80	09.09.2015	18.09.2015	Gravel	14.697,00
Erhaltungsbaggerung Furt Bad Deutsch-Altenburg I	1.887,60	1.886,10	1.891,10	1.890,50	17.08.2015	21.08.2015	Gravel	16.035,78
Erhaltungsbaggerung Furt Regelsbrunn	1.899,00	1.898,50	1.904,60	1.904,05	22.08.2015	02.09.2015	Gravel	13.785,99
Erhaltungsbaggerung Furt Bad Deutsch-Altenburg II	1.887,00	1.886,80	1.891,10	1.890,50	03.09.2015	05.09.2015	Gravel	7.294,00
Erhaltungabaggerung Furt Käsmacher	1.875,70	1.875,10	1.884,00	1.883,50	05.09.2015	09.09.2015	Gravel	14816,00
Erhaltungsbaggerung Furt Rote Werd	1.896,50	1.895,50	1.904,60	1.903,40	31.08.2015	08.09.2015	Gravel	13.700,06

In total, 227.136,57 m3 were dredged for commercial navigation in the first nine months of 2015.

4.7 AT | Operational and investment costs

Operational expenditures 2014 and budget needs 2015

Need areas	Operational expenditures 2014	Additional yearly need (Masterplan)	Secured operational budget 2015	Estimated Financing gap 2015
Minimum fairway parameters (width/depth)	5.689.414	-	6.382.733	0
Surveying of the riverbed	1.300.027	-	989.969	0
Water level gauges	1.183.339	40.400	1.184.903	0
Marking of the fairway	-	-	-	-
Availability of locks / lock chambers	-	-	-	-
Information on water levels and forecasts	-	-	-	-
Information on fairway depths	-	-	-	-
Information on marking plans	-	-	-	-
Meteorological information	-	-	-	-
Other needs	-	-	-	-
Sum	**8.172.780**		**8.557.605**	**0**

Operational expenditures 2015 and budget needs 2016

Need areas	Estimated operational expenditures 2015	Required operational budget 2016	Secured operational budget 2016	Remaining financing gap 2016
Minimum fairway parameters (width/depth)	5.989.764	5.503.413	5.503.413	0
Surveying of the riverbed	979.035	1.001.185	1.001.185	0
Water level gauges	1.105.885	1.124.680	1.124.680	0
Marking of the fairway				
Availability of locks / lock chambers				
Information on water levels and forecasts				
Information on fairway depths				
Information on marking plans				
Meteorological information				
Other needs				
Sum	**8.074.684**	**7.629.278**	**7.629.278**	**0**

Investments taken for Rehabilitation and Maintenance

No investments are required or foreseen in the period until 2020.

4.8 AT | Status and Outlook: actions, milestones and funding sources

AT 01: Water level measurements during extreme weather events		
Planned activities:	Ensuring automatic water level measurements, validity checks and real-time data transfer throughout extreme weather events and providing these data to management systems	
Current shortcomings:	Currently, there are no shortcomings identified	
Possible funding:	Budget availability 2015/2016: Sufficient funding is available through national/company budgets.	
Next steps:	Reach state of the art in real-time data transfer, integration of real-time data into management systems, automatic validity checks with cameras	until 31.12.2015
AT 02: Technical equipment of gauging stations		
Planned activities:	Increase the efficiency in the maintenance of the gauging network system, automatic validity checks with cameras	
Current shortcomings:	Lack of market analysis regarding suitable equipment and software	
Possible funding:	Budget availability 2015/2016: Sufficient funding is available through national/company budgets.	
Next steps:	Installation of software for automatic checks	until 31.12.2015
AT 03: Limited dredging market		
Planned activities:	Europe-wide tendering or dredging contracts in order to attract additional tenderers, e.g. from Germany, the Netherlands or Slovakia etc. Feasibility of purchasing a dredging pontoon for in-house use in "emergency cases". In order to cut down on reaction times and procedures, a multi-annual framework contract was prepared and Europe-wide tendering took place in spring 2015	
Current shortcomings:	According to public procurement law, contract must be awarded to tenderer with lowest prices; problem in cases of parallel actions (several critical sectors to be dredged at once) if in both cases the same tenderer is awarded (bottleneck = equipment)	
Possible funding:	Budget availability 2015/2016: Sufficient funding is available through national/company budgets.	
Next steps:	Award of multi-annual framework contract to tenderers for dredging measures in free-flowing sections	In force since August 2015

5 Slovakia

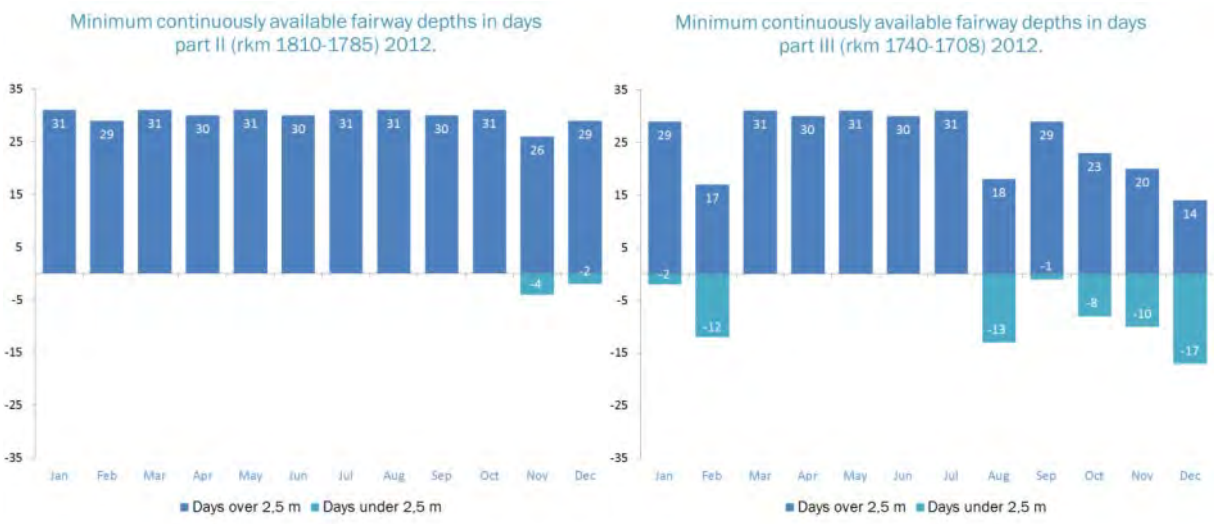
SVP - Slovak Water Management Enterprise (state owned) is responsible for fairway maintenance, rehabilitation and upgrade.

5.1 SK | Status report on main critical locations 2012 - September 2015

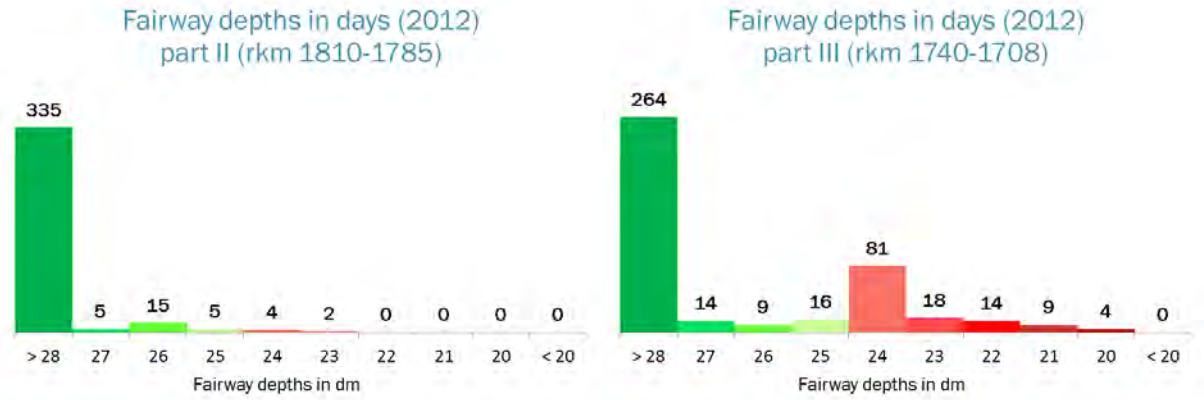
Number of days with fairway depths > 2.5m on main critical locations

Critical location	2012	2013	2014
part I. (rkm 1880 – 1863)	366	365	365
part II. (rkm 1810 – 1785)	360	341	359
part III. (rkm 1740 – 1710)	303	324	300

Status of critical locations 2012

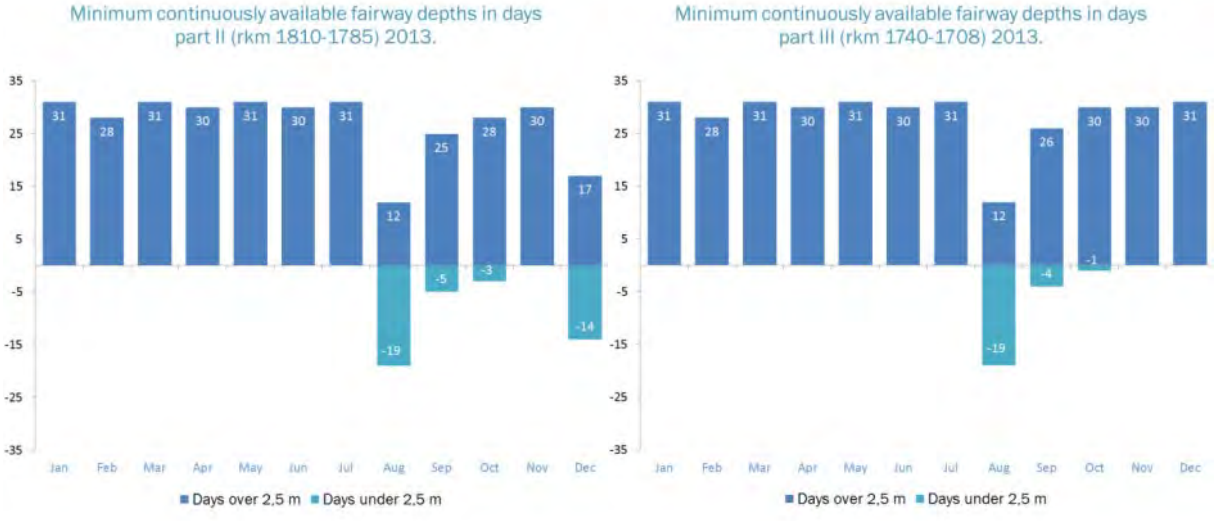


In 2012, for the two critical sections defined based on measurements (Part II. rkm 1810 – 1785 and Part III. rkm 1740 – 1708) fairway depths of 2,5 m or more were realised on 360 days (98,4%) and 303 days (82,8%). Based on measurements no depth below 2,5 m in the Part I. – rkm 1880 – 1863) was measured and recorded in 2012. In graphs below also you can see the availability of the depths in both critical stretches, that was no day below 2,3 m in Part II. and 27 days below 2,3 m in Part III.



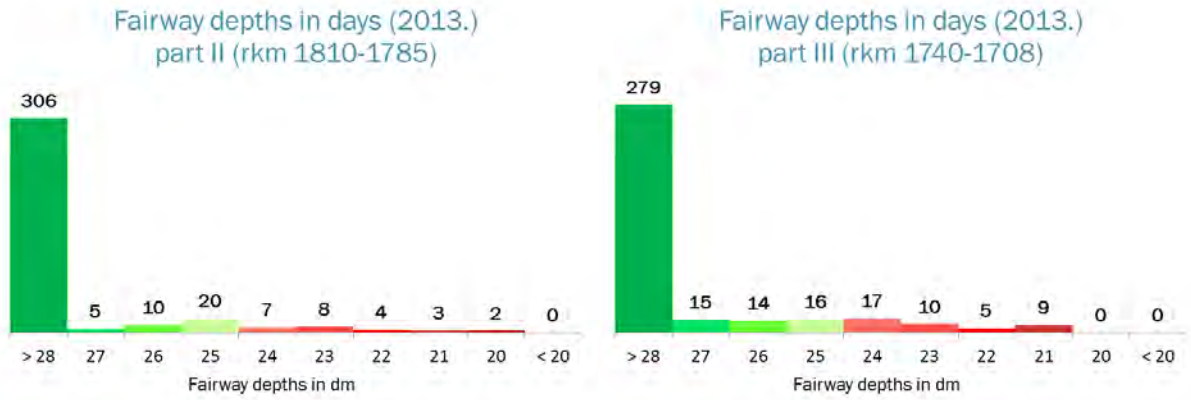
The main reasons for not meeting the level of service and availability of 2,5 m depth is that on both stretches the river bottom is from stone (stony riverbed or stony threshold – rocky bottom) which is actually not possible to remove via currently using technology for dredging (maybe detonation and removing of the stone after that).

Status of critical locations 2013



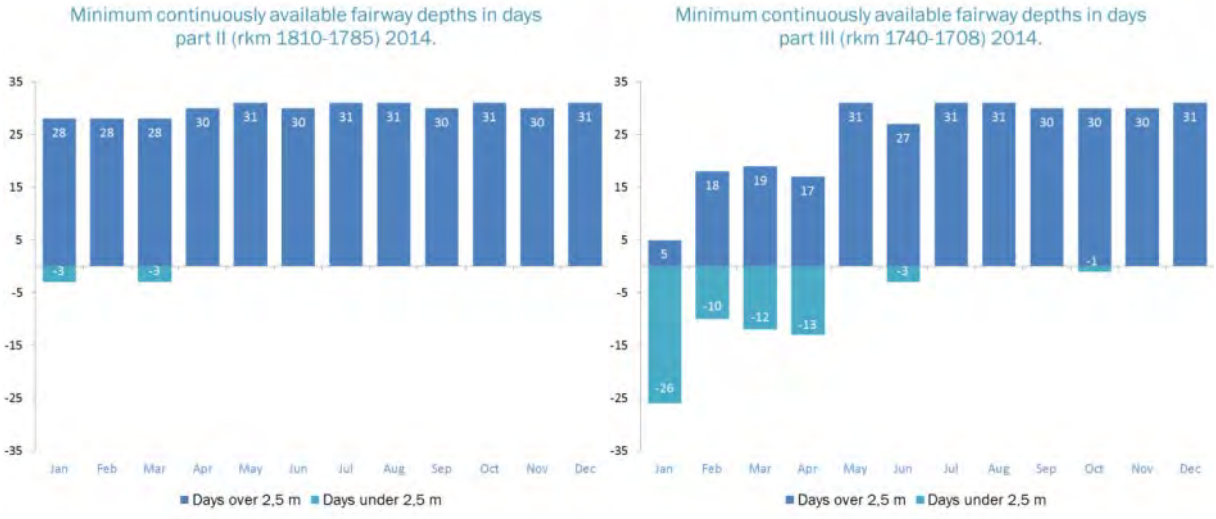
In 2013, for the two critical sections defined based on measurements (Part II. rkm 1810 – 1785 and Part III. rkm 1740 – 1708) fairway depths of 2,5 m or more were realised on 341 days (93,4%) and 324 days (88,8%). Based on measurements no depth below 2,5 m in the Part I. – rkm 1880 – 1863) was measured and recorded in 2013. In graphs below also you can see the

availability of the depths in both critical stretches, that only 9 days was below 2,3 m in Part II. and 14 days below 2,3 m in Part III.

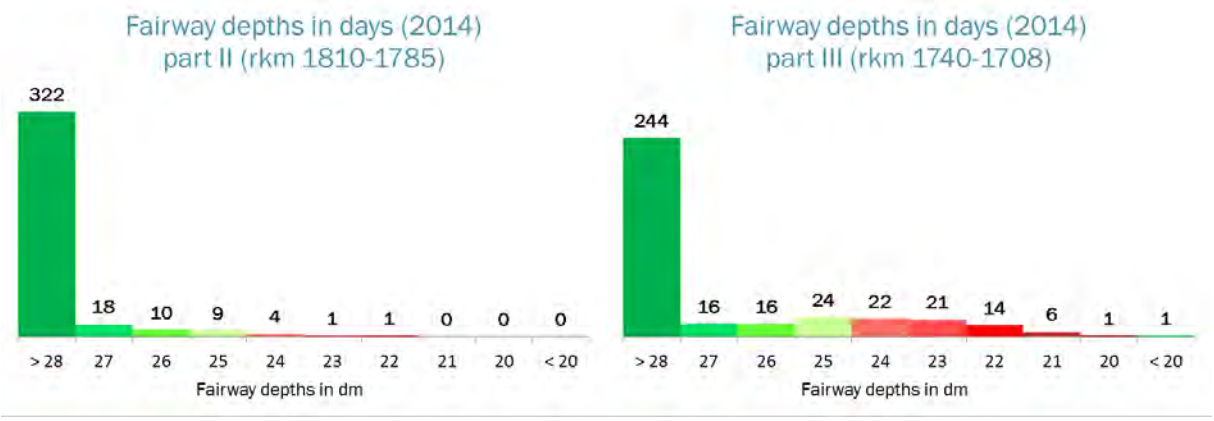


The main reasons for not meeting the level of service and availability of 2,5 m depth is that on both stretches the river bottom is from stone (stony riverbed or stony threshold – rocky bottom) which is actually not possible to remove via currently using technology for dredging (maybe detonation and removing of the stone after that). Comparing to the year before and after the 2013 was characterised by a high-water event which occurs every 100 years.

Status of critical locations 2014

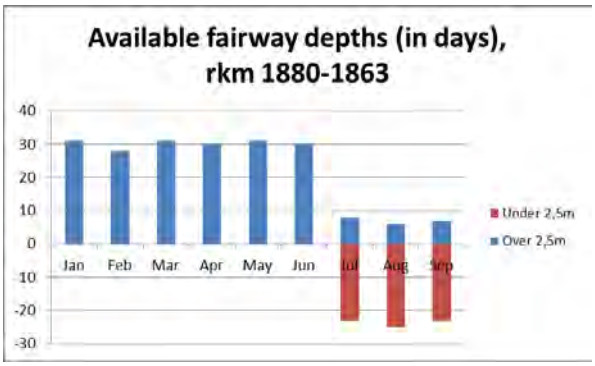


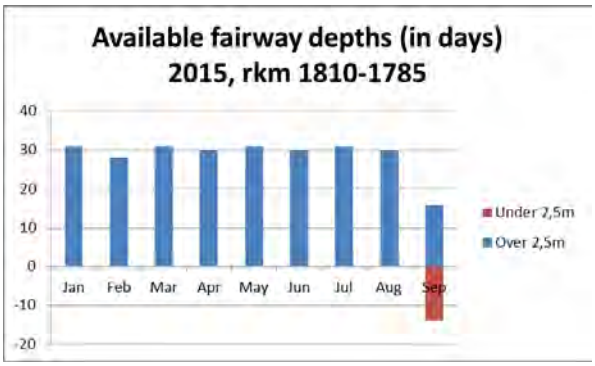
In 2014, for the two critical sections defined based on measurements (Part II. rkm 1810 – 1785 and Part III. rkm 1740 – 1708) fairway depths of 2,5 m or more were realised on 359 days (98,3%) and 300 days (82,2%). Based on measurements no depth below 2,5 m in the Part I. – rkm 1880 – 1863) was measured and recorded in 2014. In graphs below also you can see the availability of the depths in both critical stretches, that only 1 day was below 2,3 m in Part II. and 22 days below 2,3 m in Part III. (1 day of 1,9 m of depth).

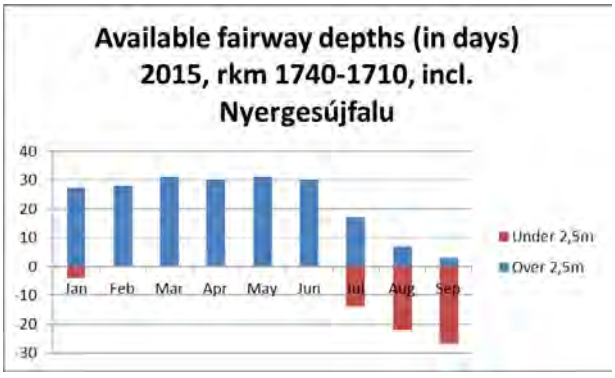


The main reasons for not meeting the level of service and availability of 2,5 m depth is that on both stretches the river bottom is from stone (stony riverbed or stony threshold – rocky bottom) which is actually not possible to remove via currently using technology for dredging (maybe detonation and removing of the stone after that).

Status of critical locations January – September 2015







In 2015 (period January – September), for all three measured sections, Part I. (rkm 1880 – 1863) fairway depth of 2,5 m and more were realised on 202 (74%) days, for Part II. (rkm 1810 – 1785) on 258 (94,5%) days and for Part III. (rkm 1740 – 1710) on 204 (74,7%) days. In graphs also you can see the availability of the depths in all three sections in days, which were above or below the 2,5 m, in Part III. (the most critical section rkm 1735,5 – 1733,7 – Cenkov (in HU language – Nyergesujfalu)) also were 16 days below 2,0 m (3 days with 1,7 m of depth only).

The main reasons for not meeting the level of service and availability of 2,5 m depth is that on Part II. and Part III. the river bottom is from stone (stony riverbed or stony threshold – rocky bottom) which is actually not possible to remove via currently using technology for dredging (maybe detonation and removing of the stone after that). In Part I. the regular dredging intervention was done according to the plan.

In total, the navigation conditions in mentioned period, especially since beginning of July were worsened due to a low water period on Danube, which also corresponds with the information regarding the appearance of fords, shallows and narrows provided from dispatching of SVP, Branch Bratislava and Branch Danube.

5.2 SK | Hydrological conditions on main critical locations 2012 – September 2015

The following table contains information about the number of days with a flow discharge (m3/s) above multiannual average flow discharge for the main critical locations as identified by the Slovak Water Management Enterprise during the surveys and maintenance works on Danube. For the Slovak section of the Danube (common AT-SK, national, common SK-HU), these main critical locations are stretches rkm 1880-1863 with reference gauge station in Devin, rkm 1810 – 1785 with reference gauge station Medvedov and rkm 1740 – 1710 with reference gauge station in Sturovo. The most critical section on the entire Slovak stretch of Danube regarding the available width and depth is on rkm 1735,5 – 1733,7 (Cenkov = Nyergesujfalu) which is situated on common SK-HU stretch of Danube.

Calculations for discharge values in days as given in the following table were performed on the following assumptions:

Critical location	2012	2013	2014	Until September 2015
part I. (rkm 1880 – 1863) reference gauge - Devin	183	163	88	100
part II. (rkm 1810 – 1785) reference gauge Medveďov	191	168	86	99
part III. (rkm 1740 – 1710) reference gauge Štúrovo	170	191	88	107

5.3 SK | Water level information on main critical locations 2012 – September 2015

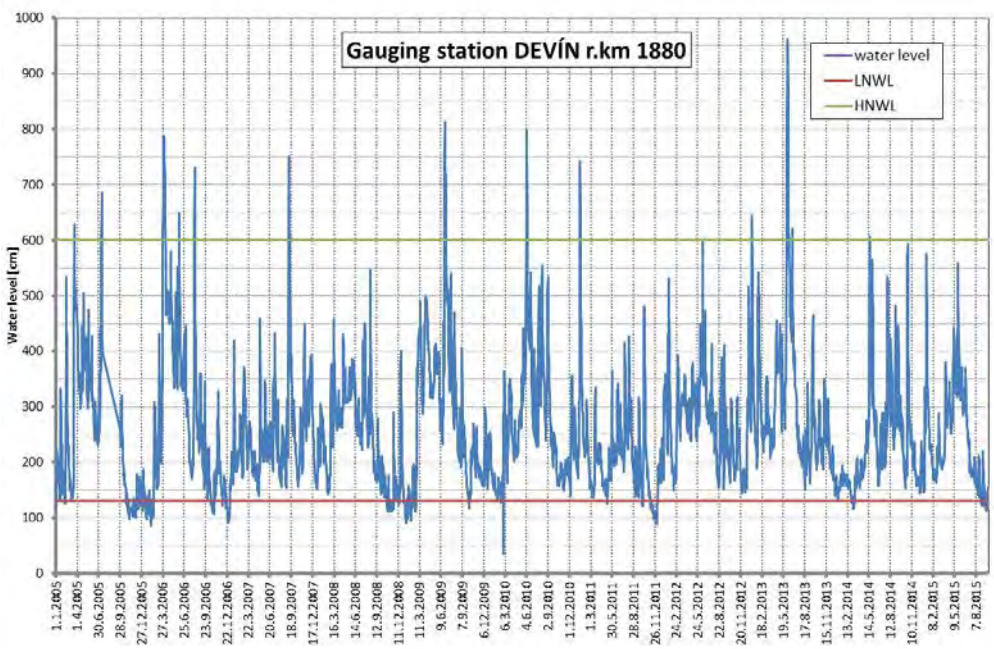
The following table contains information about the number of days with a water level (cm) above Low navigation Water Level for the main critical parts of the Slovak Danube.

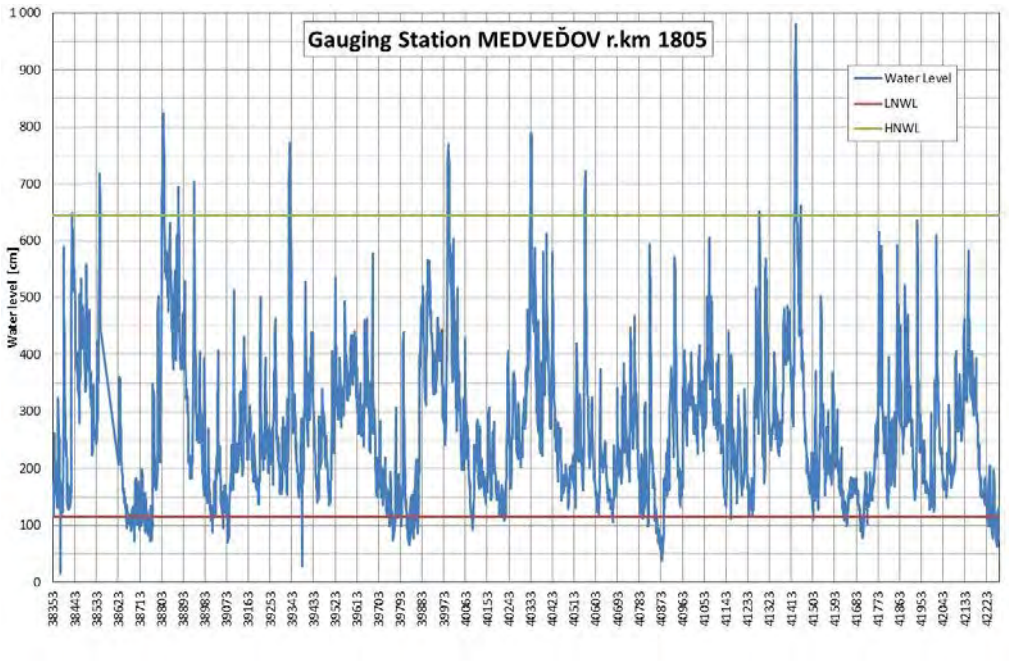
Critical location	Reference gauge	No of days above LNWL			
		2012	2013	2014	Until September 2015
part I. (rkm 1880 – 1863)	Devin	366	362	349	260
part II. (rkm 1810 – 1785)	Medvedov / Gonyu	366	362	348	243
part III. (rkm 1740 – 1710)	Sturovo / Komarom	319	334	292	273

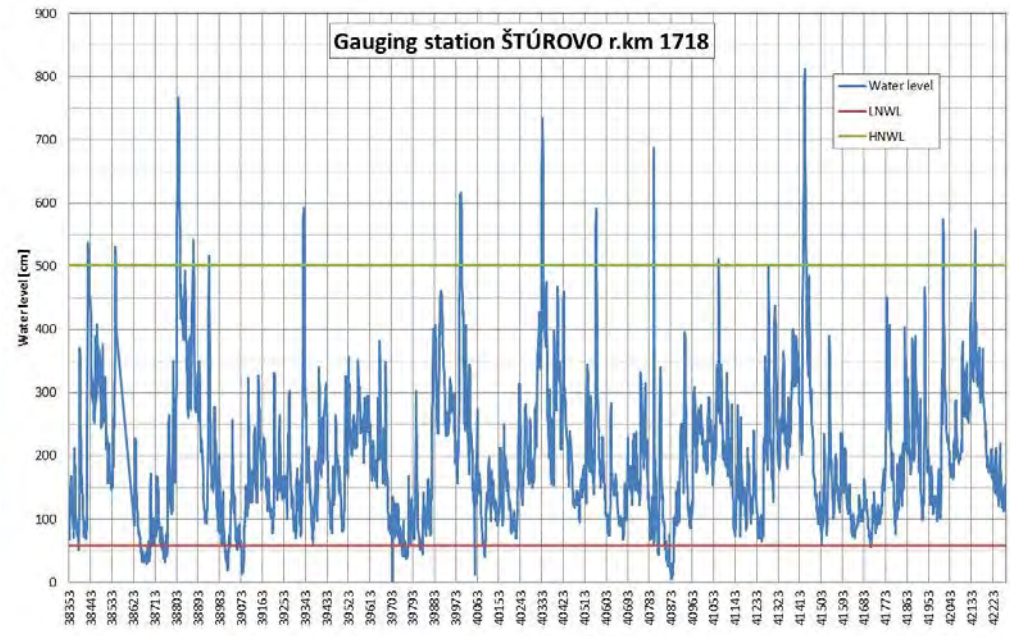
16 water gauge stations including 5 main ones (Devín, Bratislava, Medveďov, Komárno, Štúrovo) are located along on entire Slovak section of the Danube. Slovak Hydrometeorological Institute (SHMÚ) provides actual water stages in 15 –minutes time step for the last hour and in hourly time step for the last 24 hours.

These data are available at: http://www.shmu.sk/en/?page=1&id=hydro_vod_ba

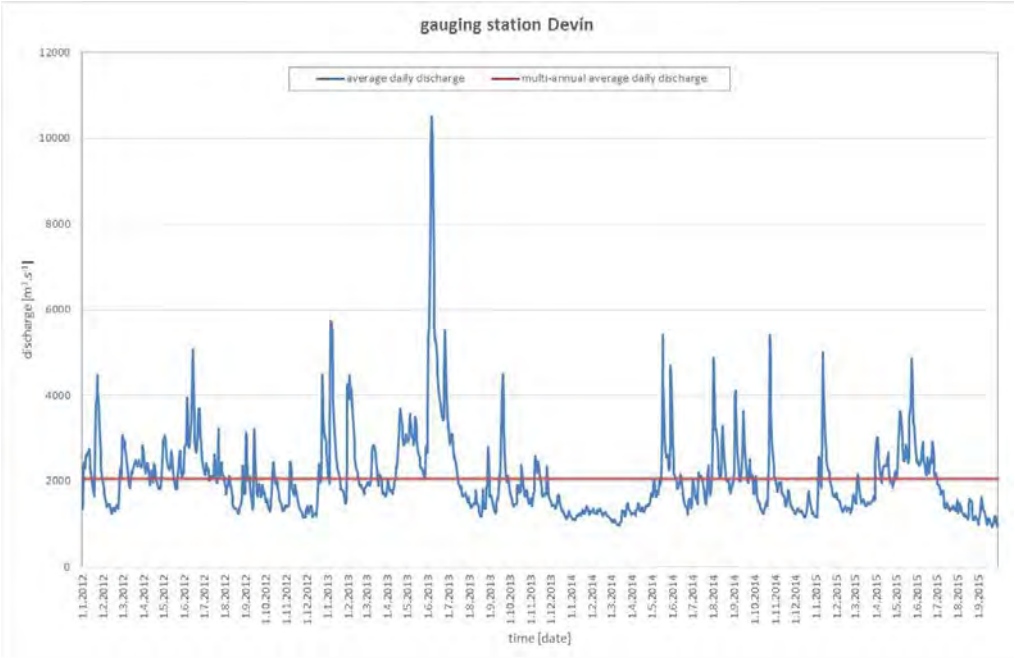
The following graphs represent the course of water level in particular gauging stations during the time period from 1.1.2005 till 30.9.2015. Values of LNWL and HNWL were provided by Danube Commission.



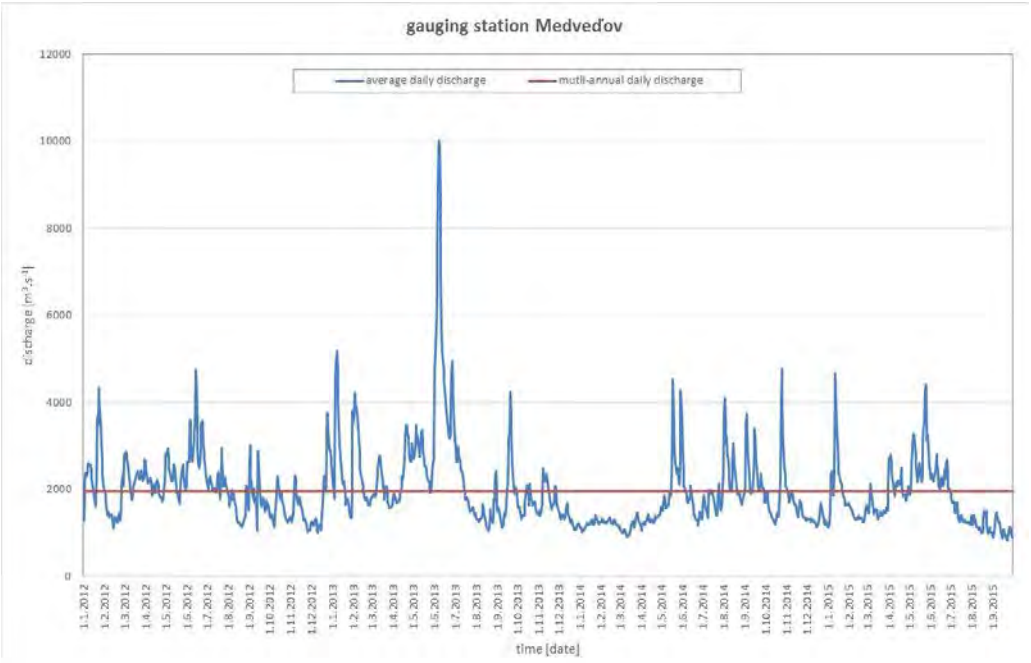




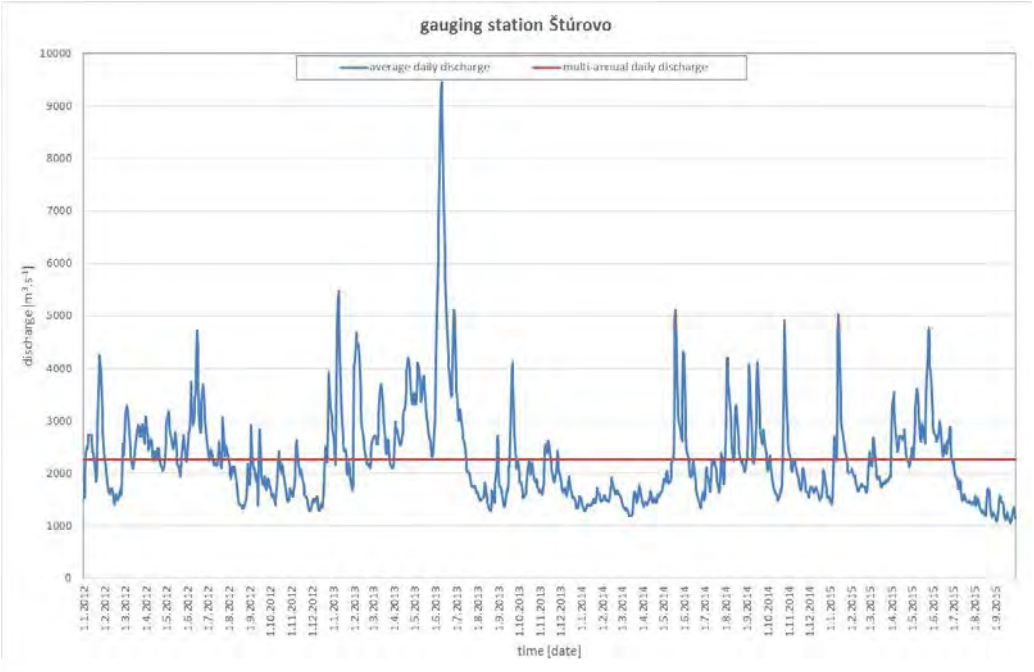
Discharge measurements at gauging station DEVÍN 1.1.2012 - 1.9.2015



Discharge measurement at gauging station MEDVEĎOV 1.1.2012 – 1.9.2015



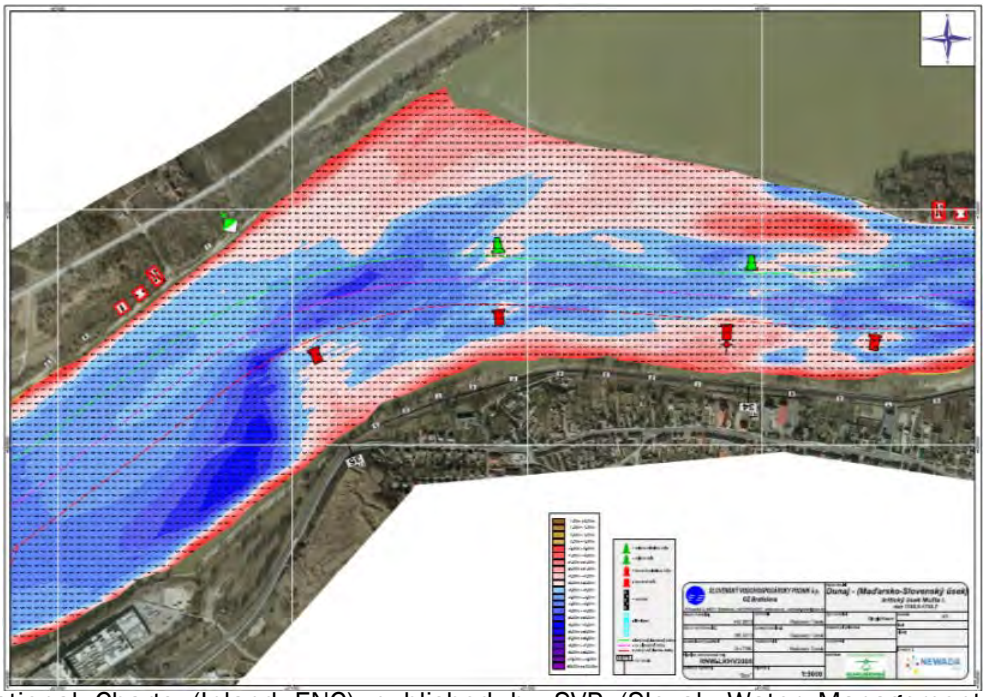
Discharge measurements at gauging station ŠTÚROVO 1.1.2012 – 1.9.2015



5.4 SK | Time from surveying to action: maintenance philosophy

Surveying of the entire Danube River has been done 1x per year by single beam (common and national stretches). Based on results from the measurement the maintenance activities are planned. The performance of the dredging itself is done based on the "Project of dredging", which has been elaborated every two years and approved on Transboundary Water Commission (TWC) Level for the common stretches with Austria and Hungary. SVP is using the own fleet of dredgers and therefore there is no need of having public procurement for the execution of works. Costs spent for dredging on common stretches are shared between the partners based on agreement on TWC.

Monitoring of the fairway has been done on weekly basis. Each week two marking vessels are navigating on the Danube and controlling the position of the buoys and shoreline signs. Also the monitoring of the critical section is done by marking vessels in parallel with fairway monitoring activities. Critical section information has been provided daily based on information from the Hungarian partner Eduvizig and SVP Branch Gabcikovo. Information from both branches is collected by SVP Dispatching in Bratislava which informs the Transport Authority, Division of Inland Navigation. The Transport Authority is the organisation responsible for the providing of the daily status of critical section on entire stretch of Danube (rkm 1880-1708). The web service for the providing of the critical section information is under development. The PDFs on critical sections are prepared by SVP, Hydrography Department and provided on FIS portal as the annex for the critical section. Depths are displayed based on LNWL. Estimated entire processing time starting with the measurement via data processing until the final result (availability of the depth information) is approximately 5 working days per 10 km of the river stretch.



The Electronic Navigational Charts (Inland ENC) published by SVP (Slovak Water Management Enterprise) according to the law as the organisation responsible for maintenance has to create a update the Inland ENC for the navigable stretches of the waterways in Slovakia. Since 2013 we are producing the IENC charts also with depth information for the entire SK stretch of Danube (rkm 1880-1708). The Inland ENC charts have been updated once a year including the depth information. All the necessary information according to the IE standard has been included into the charts and also charts contain the RIS index information.

During the implementation of the IRIS EU projects (II & III) also the WLAN hotspots at the Captaincy building of Transport Authority in Bratislava, Port of Bratislava and Lock of Gabcikovo were installed and available. Further the development of the application of Slovris for the smartphone (Slovris App) and also the development of the Slovak FIS (Fairway Information Service) Portal, which both display the water levels, notices to skippers, weather and ice information, weather warnings, operation status of the Lock Gabcikovo and current navigability conditions on the Slovakian entire stretch of Danube (rkm 1880-1708). In 2012, the Slovakian NtS server was linked with Austrian and German systems.

5.5 SK | Key issues and related activities 2014 – September 2015

Related to the key issues illustrated in the Fairway Rehabilitation and Maintenance Master Plan (version: December 2014):

	Key issues	*Need for action*	*Activities performed 2014*
SK 01	Level of detail of monitoring data is suboptimal for exact and cost-effective planning of dredging interventions	Support acquisition of up-to-date multi-beam sounding vessels, equipment and software	*Definition of the action within the proposed FAIRway Project*

SK 02	Out-of-date information technology, missing database for monitoring data	Support establishment of Fairway Management System	*Definition of the action within the proposed FAIRway Project*
SK 03	Insufficient number of skilled staff to monitor of the fairway	Secure education and provision of well-trained staff in the short, medium and long term	*Action will be partly done by project FAIRway, partly national company budget*
SK 04	Different departments performing the monitoring as an impediment to efficient planning	Support coordination of interfaces and establishment of common database for planning of interventions	*Harmonisation of the activities and measurements, exchange of the information*
SK 05	Different coordinate systems used for measurements in border stretches as an impediment to efficient planning	Support cross-border harmonisation of monitoring standards	*Data exchange will be done in UTM format based on TWC experts agreement*
SK 06	Old and dredging and marking fleet and equipment	Support acquisition of up-to-date dredging and marking vessels and equipment	*Definition of types of the new dredgers – topic for investment project (follow-up FAIRway)*
SK 07	Lack of staff and resulting missing flexibility in case of urgencies (related to dredging activities).	Secure education and provision of well-trained staff in the short, medium and long term	*Actually staff well-trained, but closely to retirement, new staff in parallel with acquisition of new dredgers*
SK 08	Frequent need to adjust fairway marking as substitution for dredging activities	Support implementation of semi-automated marking plans based on a common Fairway Management System	*Coordination between marking and maintenance department done, actions maintained by Branch Danube*

	Key issues	*Need for action*	*Activities performed January – September 2015*
SK 01	Level of detail of monitoring data is suboptimal for exact and cost-effective planning of dredging interventions	Support acquisition of up-to-date multi-beam sounding vessels, equipment and software	Market research, preparation of the technical specification
SK 05	Different coordinate systems used for measurements in border stretches as an impediment to efficient planning	Support cross-border harmonisation of monitoring standards	Harmonization via transboundary water commissions
SK 06	Old and dredging and marking fleet and equipment	Support acquisition of up-to-date dredging and marking vessels and equipment	Preparation of the specification for marking vessel

5.6 SK | Review of rehabilitation and maintenance activities 2014 – September 2015

The following activities relate to all critical locations as identified in the Rehabilitation and Maintenance Master Plan (version December 2014):

Surveying activities 2014

The following river bed surveying activities (listed below in table) took place according to the annual procedure. Critical locations are monitored within the entire measurement but since 2015 we are planning of doing extra measurements of the critical sections besides the entire stretch measurement. Based on agreement on the Transboundary Water Commission SK-HU in 2014 the not the entire common stretch SK-HU was measured, only the agreed part, and the part of rkm 1736 – 1775 is missing in the 2014 measurement. In 2015 all the measurements of the entire stretch will be done according to the plan.

River-km (from-to)	Frequency of surveying	Type of survey (single/multibeam)
1872 – 1853	1x per year (done in 5-6/2014)	Single beam
1880 – 1872	2x per year (done in 5 and 10/2014)	Single beam
1736 – 1708	1x per year (done in 9/2014)	Single beam
8,3 – 25,7 (inflow canal Gabcikovo)	1x per year (done in 6-7/2014)	Single beam
26,0 – 1856 (reservoir Hrusov)	1x per year	Single beam
0,0 – 0,8 (outflow canal Gabcikovo)	1x per year	Single beam

Surveying activities January – September 2015

The following river bed surveying activities (listed below in table) took place according to the annual procedure. Critical locations are monitored within the entire measurement but since 2015 we are performing extra measurements of the critical sections besides the entire stretch measurement.

River-km (from-to)	Frequency of surveying	Type of survey (single/multibeam)
1880 – 1872	2x per year (done in 5 and 10-11/2015)	Single beam
1872 – 1853	1x per year (done in 6/2015)	Single beam
30 – 35	1x per year (done in 4/2015)	Single beam
9 – 1853	1x per year (done in 7/2015)	Single beam
0 – 9	1x per year (done in 8/2015)	Single beam
1766 – 1811	1x per year (all critical section on this stretch – done in 5/2015)	Single beam
26 – 1853	1x per year (done in 10/2015)	Single beam
1750 – 1811	1x per year (depending on water level	Single beam

	– if not possible -postponed for spring 2016)	

Fairway relocation activities 2014

The fairway monitoring and marking has been done on weekly basis in Slovakia based on the approved Project of the Marking of the fairway. The changes of the fairway have not been done on the regular basis. The changes of the fairway were done in the area of the Old Bridge in Bratislava according to the NtS published from Transport Authority. If any changes of the fairway are required, then they are done within the annual budget for monitoring and marking of the fairway.

River-km (from-to)	Frequency of relocation interventions	Comments
Old Bridge in Bratislava rkm 1868,14	2014	Relocation of the fairway due to bridge reconstruction

Fairway relocation activities January – September 2015

The fairway monitoring and marking has been done on weekly basis in Slovakia based on the approved Project of the Marking of the fairway. The changes of the fairway have not been done on the regular basis. According to the navigation measure no. 157/2015 the relocation has been done on 29.9.2015 on the rkm 35,0 – 30,0 in reservoir Hrusov due to sedimentation and having better navigation condition. Also temporary relocations of the fairway in the area of the Old Bridge in Bratislava have been done according to the NtS published from Transport Authority. If any changes of the fairway are required, then they are done within the annual budget for monitoring and marking of the fairway.

Navigation conditions were during the period January – September 2015 not good due to ongoing low water levels, which show the records from dispatching concerning the frequency of appearance of the fords, narrows and shallows (critical locations).

River-km (from-to)	Frequency of relocation interventions	Comments
Old Bridge in Bratislava rkm 1868,14	2015	Relocation of the fairway due to bridge reconstruction
35,0 – 30,0	29.9.2015	Relocation due to sedimentation

Dredging activities 2014

Designation of assignment	Dredging site		Placement site		Begin-ning of service	End of service	Mate-rial	Utilisa-tion	m3
	from river-km	to river-km	from river-km	to river-km					
dredging of Danube at junction with Vah	1 766,00	1 765,30	1 765,50	1 762,50	02.06. 2014	11.11. 2014	gravel -sand	Storage on the bank	147 826
regulation dredging	1 865,50	1 864,35	basin of gravel pit Gravelslovex		08.04. 2014	11.11. 2014	gravel -sand	storage	98 344
regulation dredging	1 732,55	1 732,15	1 733,00	1 733,00	19.11. 2014	26.11. 2014	gravel -sand	Storage on the bank	8 405

In total, 254.575 m³ were dredged for commercial navigation in 2014.

Dredging activities January – September 2015

We are doing the maintenance of the fairway based on the parameters of the fairway which have to be guaranteed, width of the fairway on rkm 1790 -1880 is 120m (depth 2,5m + 0,2m) and on rkm 1790 – 1709,8 is 150m (depth 2,8m + 0,2m)

Designation of assignment	Dredging site		Placement site		Begin-ning of service	End of service	Mate-rial	Utilisa-tion	m3
	from river-km	to river-km	from river-km	to river-km					
Regulation dredging of Danube on national stretch	1865,20	1864,50	basin of gravel pit Gravelslovex		11.05.2 015		gravel -sand	Storage	64 570 (until end 9/2015)
regulation dredging	1786,60	1786,10	1779,0		23.06.2 015	26.08.2 015	gravel -sand	storage	25 372
regulation dredging	Cunette of the reservoir				02.07.2 015	25.09.2 015	gravel -sand	Storage on the bank	70 000

In total, 159.942 m³ were dredged for commercial navigation in in the first nine months of 2015.

5.7 SK | Operational and investment costs

Operational expenditures 2014 and budget needs 2015

Need areas	Operational Cost 2014	Additional yearly need (Masterplan)	Operational Budget 2015	Remaining financing gap 2015
Minimum fairway parameters (depth / width)	2.423.978	632.000	2.000.000	-
Surveying of the riverbed	52.160	260.000	100.000	212.610
Water level gauges		0		-
Marking of the fairway	465.990	610.000	510.000	565.990
Availability of locks / lock chambers		0		-
Information on water levels and forecasts		0		-
Information on fairway depths		0		-
Information on marking plans		0		-
Meteorological information		0		-
Other needs		0		-
Sum	**2.942.128**	**1.502.000**	**3.510.000**	**934.128**

Operational expenditures 2015 and budget needs 2016

Need areas	Estimated operational expenditures 2015	Required operational budget 2016	Secured operational budget 2016	Remaining financial gap 2016
Minimum fairway parameters (depth / width)	2.293.700	2.500.000	2.500.000	-
Surveying of the riverbed	75.000	80.000	80.000	-
Water level gauges		0		-
Marking of the fairway	501.000	501.000	501.000	-
Availability of locks / lock chambers		0		-
Information on water levels and forecasts		0		-
Information on fairway depths		0		-
Information on marking plans		0		-
Meteorological information		0		-
Other needs		0		-
Sum	**2.869.700**	**3.081.000**	**3.081.000**	**0**

Investments taken for Rehabilitation and Maintenance 2014 – September 2015

Need areas	Required additional investment 2014 – 2020 according to FRMMP EURO	Investment cost secured by EU co-financing 2015 – 2020 (EUR)	Estimated investment expenditures 2015 (incl.. EU co-financing) EURO
Minimum fairway parameters (dredging)	6.100.000	0	0
Surveying of the riverbed	450.000	500.000	0
Water level gauges	0	0	0
Marking of the fairway	1.510.000	1.510.000	0
Availability of locks / lock chambers	0	0	0
Information on water levels and forecasts	0	0	0
Information on fairway depths	20.000	20.000	0
Information on marking plans	0	0	0
Meteorological information	0	0	0
Other needs	0	0	0
Sum	**8.080.000**	**2.030.000**	**0**

Planned investments 2016

Need areas	Remaining required investment 2016 – 2020 based on FRMMP EURO	Required investment budget 2016 (incl. EU Co-financing)	Secured national investment budget 2016 (excl. EU co-financing) EURO	Secured investment budget 2016 (only EU co-financing)	Remaining investment need 2017-2020 (%) not secured by EU co-financing
Minimum fairway parameters (dredging)	6.100.000	0	0	0	
Surveying of the riverbed	450.000	500.000	75.000	425.000	
Water level gauges	0	0	0	0	
Marking of the fairway	1.510.000	1.510.000	226.500	1.283.500	
Availability of locks / lock chambers	0	0	0	0	
Information on water levels and forecasts	0	0	0	0	
Information on fairway depths	20.000	0	0	0	
Information on marking plans	0	0	0	0	
Meteorological information	0	0	0	0	
Other needs	0	0	0	0	
Sum	**8.080.000**	**2.010.000**	**301.500**	**1.708.500**	**71%**

5.8 SK | Outlook: actions, milestones and funding sources

SK 01: Level of detail of monitoring data is suboptimal for exact and cost-effective planning of dredging interventions		
Planned activities:	Support acquisition of up-to-date multi-beam sounding vessels, equipment and software, managing of the purchasing	
Current shortcomings:	Missing of the multi-beam sounding vessel	
Possible funding:	Budget availability 2015/2016: Funding through Project FAIRway (CEF)	
Next steps:	If project approved, then definition of the condition for the public procurement, competition itself, purchasing of the vessel with all requested devices, starting of the using (measurements)	Until 2017
SK 02: Out-of-date information technology, missing database for monitoring data		
Planned activities:	Support establishment of Fairway Management System, Establishment, development and installation of the management system is planned within the implementation of the FAIRway Slovakia project	
Current shortcomings:	Missing system actually	
Possible funding:	Budget availability 2015/2016: Funding through Project FAIRway (CEF)	
Next steps:	Fairway Management System installation	Until 2017-2018
SK 03: Insufficient number of skilled staff to monitor of the fairway		
Planned activities:	Actually only experienced staff available (closely to retirement), securing of the well-trained staff after purchasing of the new marking vessel (from the project FAIRway Slovakia)	
Current shortcomings:	Lack of new experienced staff due to company budget limitation (budget depending on Ministry annual budget)	
Possible funding:	Budget availability 2015/2016: Funding through Project FAIRway (CEF) and company budget	
Next steps:	New marking vessel, needs of having new trained staff	Until 2017-2018
SK 04: Different departments performing the monitoring as an impediment to efficient planning		
Planned activities:	Development and installation of the common database, monitoring done by hydromorphology department (single beam) & by Branch Danube (before and after dredging intervention)	
Current shortcomings:	Missing common database	
Possible funding:	Budget availability 2015/2016: Funding through Project FAIRway (CEF)	
Next steps:	Definition of the structure and content of the database (based on NEWADA duo database task result)	until 2017-2018

SK 05: Different coordinate systems used for measurements in border stretches as an impediment to efficient planning		
Planned activities:	Actually exchanging of the data are based on UTM coordinate system and all cross-border partners exchange the data according to the agreements done on TWC level	
Current shortcomings:	A little bit complicated exchange process	
Possible funding:	Budget availability 2015/2016: Funding through company budget, CBC funds	
Next steps:	Definition of the problems, possible solutions, proposals on TWC level	in progress
SK 06: Old and dredging and marking fleet and equipment		
Planned activities:	Acquisition of the new marking vessel, modernisation and purchasing of new dredgers later in next investment project	
Current shortcomings:	Old fleet of dredgers (high maintenance fee), old marking vessels, modernisation and acquisition requested	
Possible funding:	Budget availability 2015/2016: Project FAIRway (CEF) for marking vessel (multioperational vessel), for dredgers – follow up investments funds	
Next steps:	Acquisition of marking vessel	until 2017
SK 07: Lack of staff and resulting missing flexibility in case of urgencies (related to dredging activities)		
Planned activities:	Ensuring of the well-trained and educated staff in parallel with purchasing of the new dredgers	
Current shortcomings:	Old fleet of dredgers (high maintenance fee)	
Possible funding:	Budget availability 2015/2016: Investments funds	
Next steps:	Definition of the possible projects	until 2018-2019
SK 08: Frequent need to adjust fairway marking as substitution for dredging activities		
Planned activities:	Installation of the Fairway Management System (planning in following project NEWADA III), harmonisation with marking department (marking trips done on weekly basis)	
Current shortcomings:	Missing Management system or common database	
Possible funding:	Budget availability 2015/2016: Funding through Danube Transnational Programme (NEWADA III project), FAIRway Project	
Next steps:	Definition of the structure of the database (possibility of using existing database structure developed within NEWADA duo – Marking plans task)	until 2018

6 Hungary

The **General Directorate of Water Management** is responsible for fairway maintenance. It has three subordinated regional organizations (Water Directorate, VIZIG) for waterway maintenance on the Danube:

- North-Transdanubean Water Directorate (1,811-1,708 rkm)
- Middle-Danube-Valley Water Directorate (1,708-1,560 rkm)
- Lower-Danube-Valley Water Directorate (1,560-1,433 rkm)

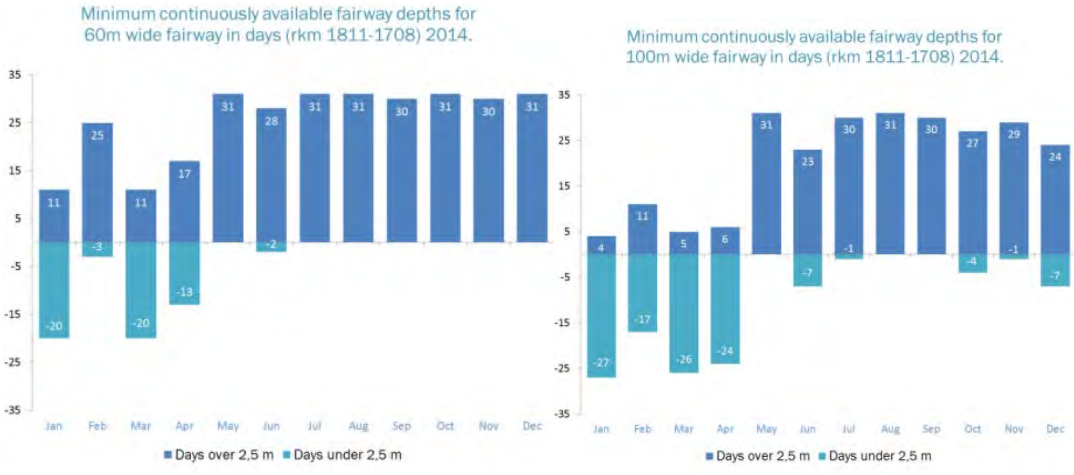
6.1 HU | Status report on main critical locations 2012 – September 2015

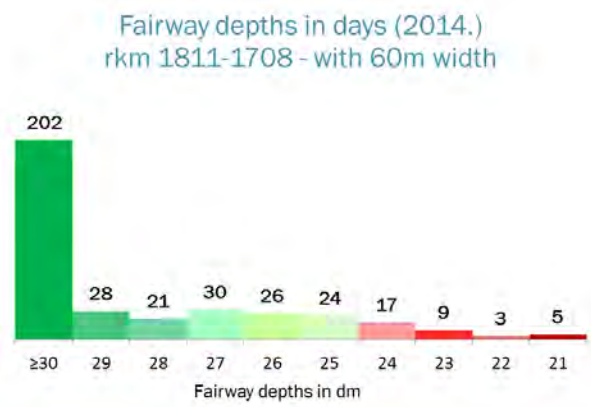
Number of days with fairway depths > 2.5m on main critical locations (as identified by the Danube waterway users in a survey by PA1a concluded in December 2014)

1,811 - 1,708 rkm

Critical location	2012	2013	2014
Nyergesújfalu critical location with **60 meters** wide fairway	304	314	307
Nyergesújfalu critical location with **100 meters** wide fairway	286	304	256

Fairway width (range of values accounts for different curve radii): 60 to 100 m in Slovakia and Slovak - Hungarian border section, 80 to 120 m in Hungarian Danube (rkm 1708-1433) section based on Fairway Rehabilitation and Maintenance Master Plan.



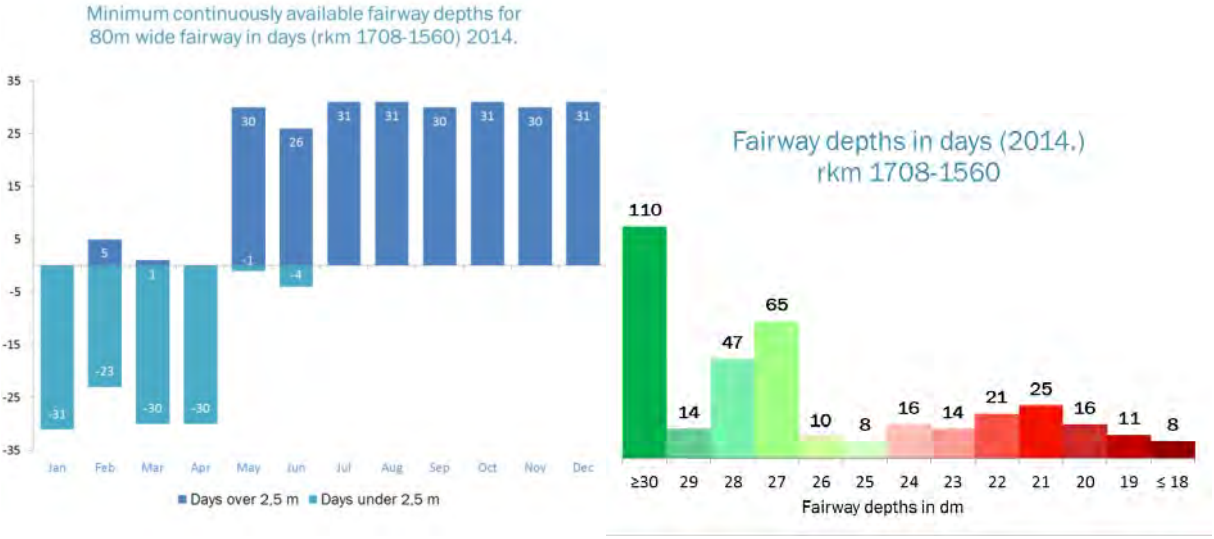


1,708 - 1,560 rkm

Number of days with fairway depths > 2.5m on main critical locations

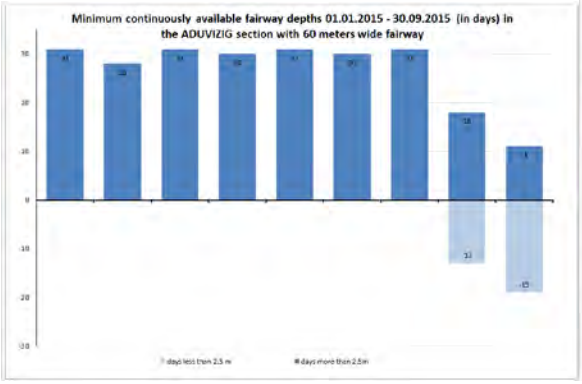
Critical location	2012	2013	2014
Kisapostag critical location with **80 meters** wide fairway	287	284	246

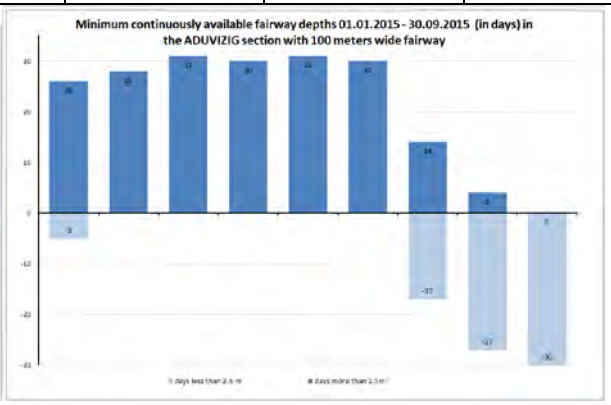
Fairway width (range of values accounts for different curve radii): 80 to 120 m in Hungarian Danube (rkm 1708-1433) section based on Fairway Rehabilitation and Maintenance Master Plan.

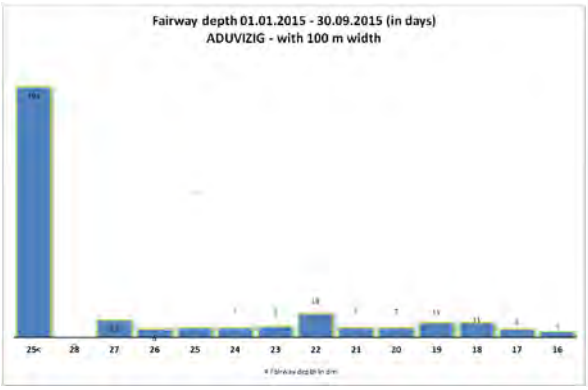


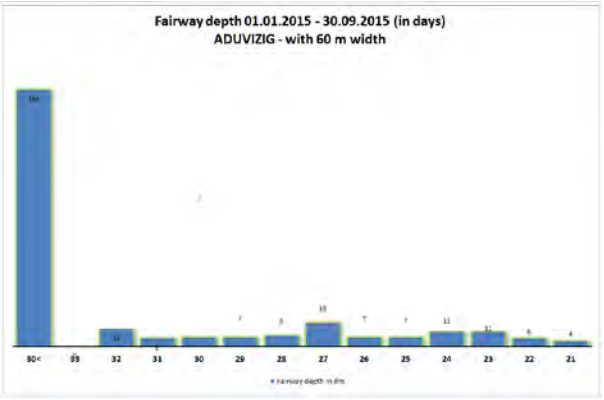
1,560 - 1,433 rkm

Critical location	2012	2013	2014	01.01.2015 - 30.09.2015
Solt critical location with **60 meters** wide fairway	365	365	360	241
Solt critical location with **100 meters** wide fairway	293	318	232	111









6.2 HU | Hydrological conditions on main critical locations 2012 – September 2015

Number of days with flow discharge above multiannual average flow discharge for the main critical locations:

Critical location	2012	2013	2014
Nyergesújfalu	20	82	26
Kisapostag	179	194	107
Solt	273	287	209
Göd	194	107	108

In hydrological terms, the years 2015 saw good fairway conditions from winter time to summer's end along the free-flowing sections of the Hungarian Danube, but in autumn the water level was very less.

6.3 HU | Water level information on main critical locations 2012 – September 2015

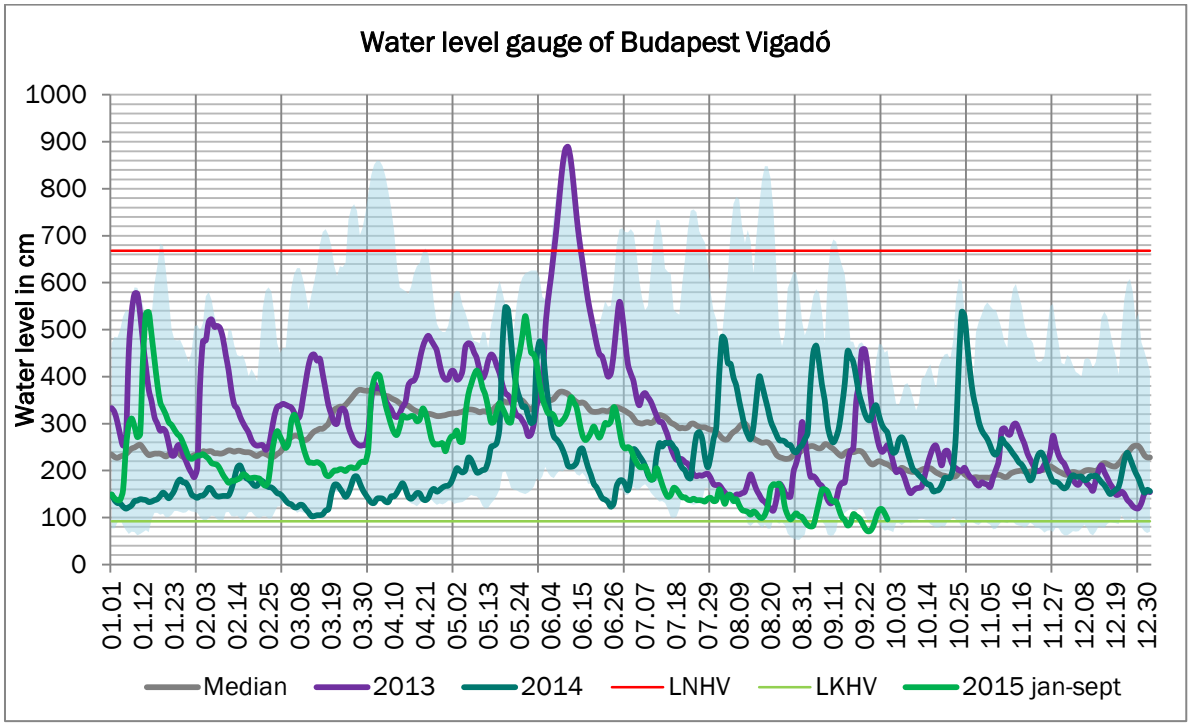
Critical location	Reference gauge	No of days above LNWL		
		2012	2013	2014
Nyergesújfalu	Esztergom	366	365	360

In hydrological terms, the years 2012 and 2013 saw very good fairway conditions along the free-flowing sections of the Hungarian Danube, but in 2014 the flow discharge was less, especially in the first half of the year.

The average daily water level at the gauging station Esztergom (reference gauge for the critical section Nyergesújfalu) was 167 cm in 2014, a level of just over 40 cm lower than the average of the previous five years (206 cm). Only on 5 days of the year 2014 did water levels fall below the low navigable water level (LNWL 2014).

In hydrological terms, the years 2015 saw very good fairway conditions from winter time to summer's end along the free-flowing sections of the Hungarian Danube, but in autumn the flow discharge was very less.

On 11 days of the year 2015 did water levels fall below the low navigable water level (LNWL 2006).



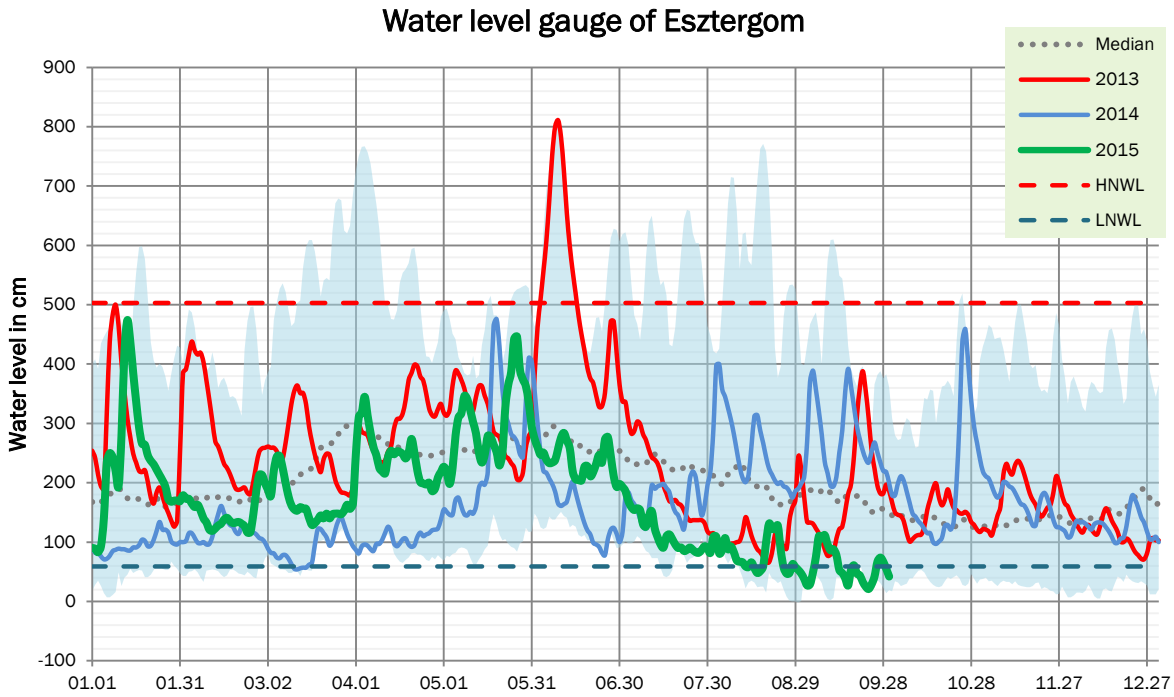
Critical location	Reference gauge	No of days above LNWL		
		2013	2014	2015*
Göd	Budapest	364	357	262

In hydrological terms, the years 2012, 2013 and 2014 saw very good fairway conditions along the Danube section of 1708 - 1506 rkm. But in 2015* (jan-sept) the daily water levels at the gauging station Budapest not exceeded the average water level (AWL 1981-2014) for around 80 % of the period.

Water levels January – September 2015

For 2015 we have daily water level till the end of September. Since the middle of July there is a low-water period, which became serious since August. The average water discharge dropped below 1000 m3/s, the minimum was 860 m3/s at Nagybajcs (the LNWL discharge is 1010 m3/s).

Till the end of September at Esztergom water gauge we see 26 days below ENR low water level while in 2014 through the whole year we had only 5 days.

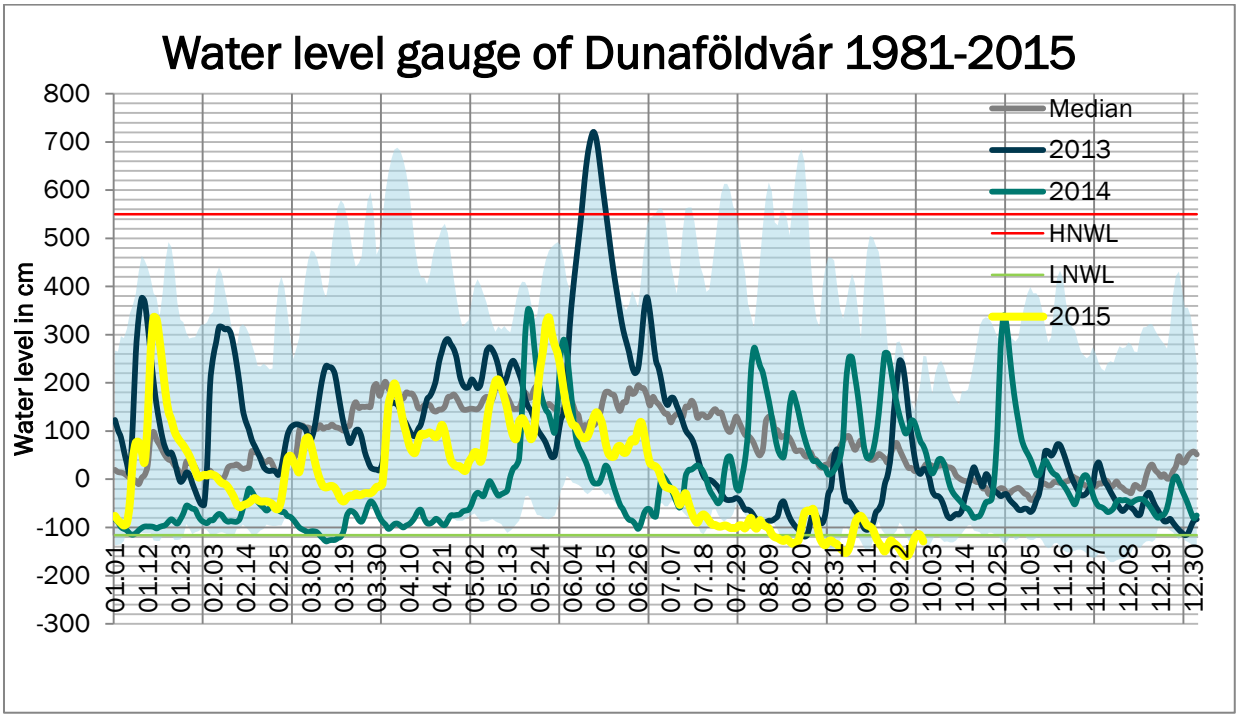


Critical location	Reference gauge	No of days above LNWL		
		2012	2013	2014
Kisapostag	Dunaföldvár	366	364	357

In hydrological terms, the years 2012, 2013 and 2014 saw very good fairway conditions along the Danube section of 1708 - 1506 rkm. The daily water levels at the gauging station Dunaföldvár exceeded the average water level (AWL 1981-2014) for around 40-20 % of the period.

Critical location	Reference gauge	No of days above LNWL			
		2012	2013	2014	01.01.2015 - 30.09.2015
Solt	Dunaföldvár	366	364	357	236

In hydrological terms, the years 2012 - 2014 saw very good fairway conditions along the Danube section of 1506 - 1433 rkm. No single day of the year 2012 did water levels fall below the low navigable water level (LNWL 2010) and water levels are only 2 days below LNWL in 2013 and 8 days in 2014. In hydrological terms, in the summer of 2015 there was a low water period on the Danube. Along the Danube section of 1506-1433 rkm were the water levels more than 30 days below the LNWL.



June 2013 was characterised by a high-water event which — depending on the section of the Danube — is only likely to occur every 100 to 300 years. Maximum discharge rates of between 9,500 and 11,500 m³ per second were recorded and were consistently higher than even the high-water event in 1965.

1,708 - 1,560 rkm

Number of days with fairway depths > 2.5m on main critical locations

Critical location	2013	2014	2015*
Göd critical location with **80 meters** wide fairway	284	286	190

Fairway width (range of values accounts for different curve radii):80 to 120 m in Hungarian Danube (rkm 1708-1433) section based on Fairway Rehabilitation and Maintenance Master Plan.

A min. fairway depth of 2.5 m was available in Middle-Danube section for 190 days/273 days (~66%). However between January and Junius the water depths of at least 23 dm was available for the navigation, but after that period the water level had a drastic effect on the Hungarian Danube: In September the navigable depth of the fairway was only less than 20 dm on 15 days, and less than 18 dm on 6 days.

6.4 HU | Water level prognoses for critical locations

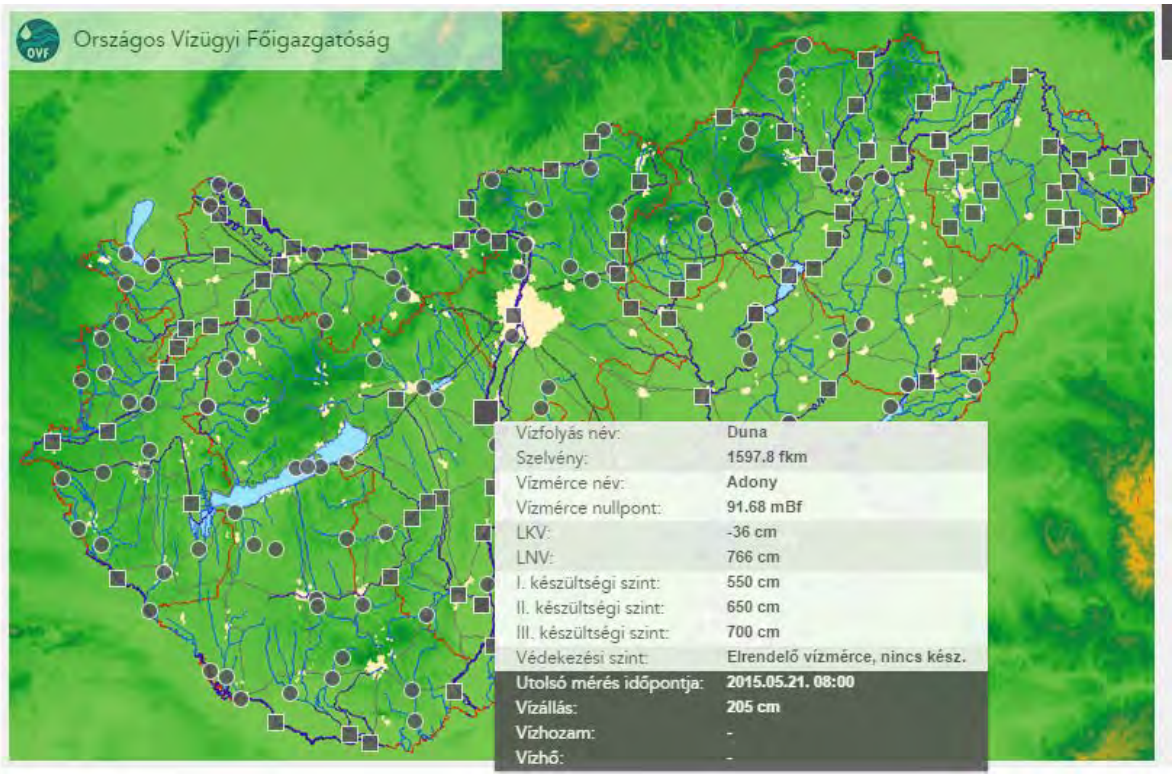
The water level forecasts have been developed under the scientific guidance of the OVF and are generated by automated computer-aided model calculations. The own developed operative

hydrological forecasting system of Hungarian Hydrological Forecasting Service (HHFS) is a complex tool containing snow accumulation and snowmelt, soil frost, effective rainfall, runoff, flood routing and backwater effect modules, extended with statistical error correction modules

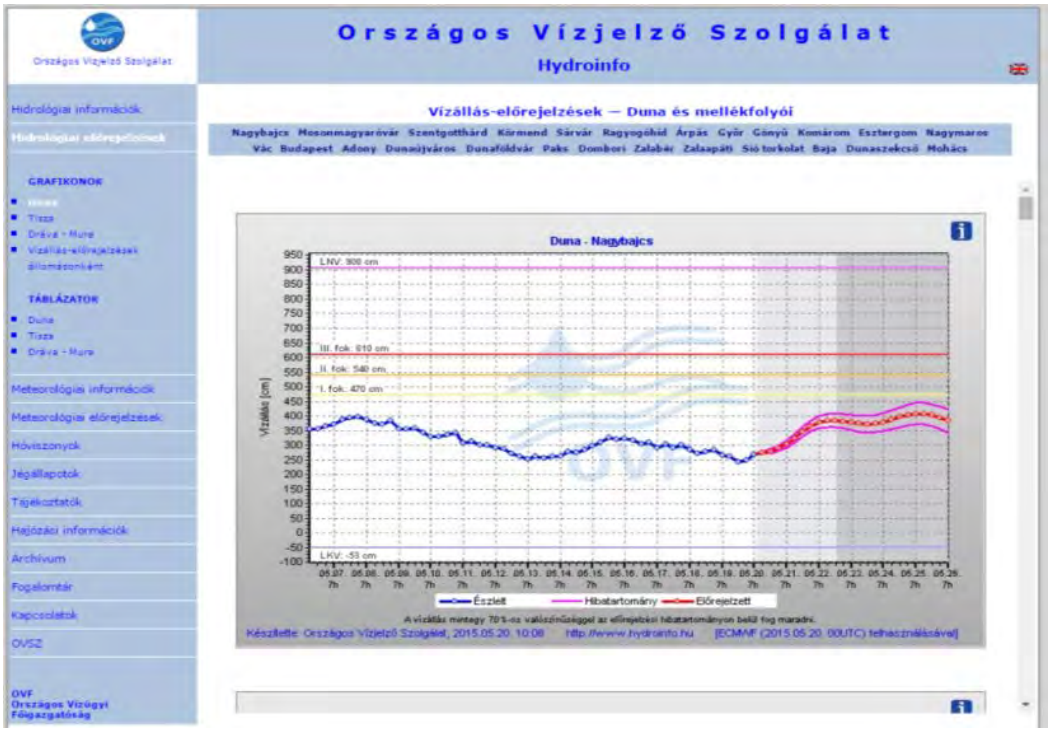
The forecasting system of HHFS prepares and disseminates **water level forecasts with 6-day lead time once a day for Danube** (and also Tisza, Drava) rivers and their tributaries. The forecast process is based on modelling rainfall/runoff processes along the **entire Danube basin** until Almjas (Croatia). In case of floods or other unexpected events, four forecasts can be reasonably made and also disseminated per day. The accuracy of the 72 hour forecast ranges between **+/- 10 cm with 80% probability**. Accuracy levels largely depend on the quality of the underlying meteorological prognoses. The prognosis simulates the natural discharge of the river and does not display short term influences and variations (e.g. as caused by operation of hydroelectric power stations).

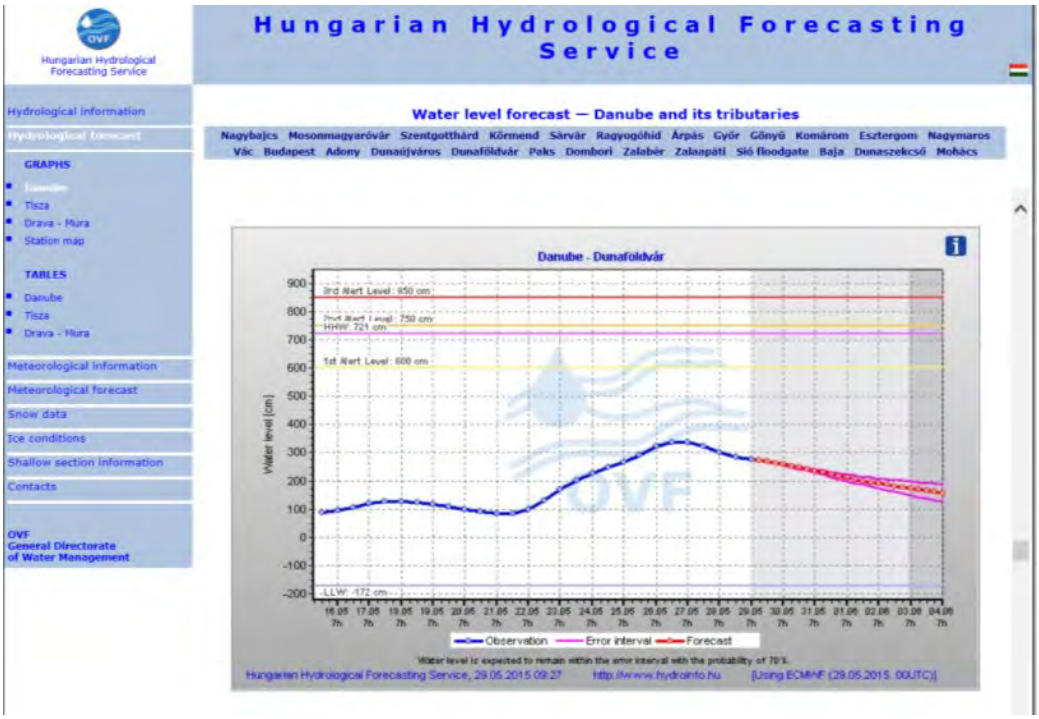
HHFS produces water level forecasts for fifteen gauging stations **along the whole Hungarian Danube not only for critical locations**. However, equivalent water-levels methods can be used to estimate water level forecasts at critical locations. Relevant data are published online via www.hydroinfo.hu. Gauging data are **refreshed online daily.** Also data for all Danube gauge stations are published online via www.vizugy.hu and the Directorate webpages **refreshed online every hour**.

The forecasts are available both Hungarian and English language as well on the web page. English version of the water level forecasts for the fifteen gauging stations of the Hungarian Danube section is published online on www.hydroinfo.hu/en/hidelo/hidelo_graf_duna.html.



Water levels at www.vizugy.hu – OVF web page





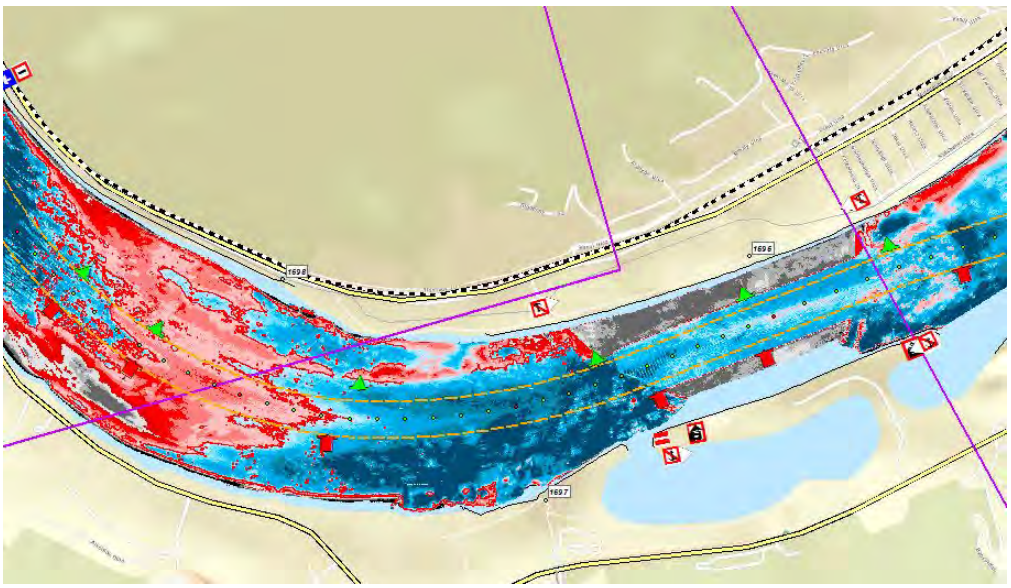
Water levels prognosis www.hydroinfo.hu – Hungarian Hydrological Forecasting Service (OVF web page – Hungarian and English language)

6.5 HU | Time from surveying to action: maintenance philosophy

The current shallow sections along the Hungarian Danube have been presented in an easily comprehensible way via the directly responsible Directorate's websites, using an updated map design on the basis of systematic surveys. Measurements are implemented by combining the single-beam and multi-beam surveying techniques. After every survey the raw and processed data on ESRI GIS software tools to the Marking Plan are stored.

There was no dredging activity in 2014 done by the Hungarian waterway administration for improving fairway conditions.

Marking plan:



6.6 HU | Key issues and related activities 2014-September 2015

	Key issues	*Need for action*	*Activities performed 2014*
HU 01	Level of detail of monitoring data is suboptimal for exact planning	Support acquisition of up-to-date multi-beam sounding equipment and vessels	*Market research of multi-beam sounding equipment for FAIRway project*
HU 02	Old monitoring equipment and fleet (related to fairway marking)	Support acquisition of up-to-date vessels and maintenance-free buoys that make marking more cost-effective	*Prepare national CEF project for improving fairway marking system*

6.7 HU | Review of rehabilitation and maintenance activities 2014 – September 2015

The following activities relate to all critical locations as identified in the Rehabilitation and Maintenance Master Plan (version December 2014)

Surveying activities 2014

River-km (from-to)	Frequency of surveying	Type of survey (single/multi beam)
1811–1775	1	Single beam
1657 - 1637	1	Multi beam
1611 - 1560	1	Multi beam
1538 - 1512	1	Single beam
1488 - 1484	5	Single beam
1559.8 - 1559.7	1	Multi beam
1558.5 - 1557.5	1	Multi beam
1555.8 - 1554.6	1	Multi beam
1552.0 - 1551.0	1	Multi beam
1493.5 - 1492.5	1	Multi beam
1483.5 - 1482.5	1	Multi beam
1480.1 - 1479.1	1	Multi beam
1472.5 - 1471.5	1	Multi beam

Fairway relocation activities 2014

River-km (from-to)	Frequency of relocation interventions	Comments
1480.32-1480.12	2	Bridge reconstruction

Fairway marking activities 2014

River-km (from-to)	Frequency of fairway marking activities	Comments
1811 – 1708	Two time a week from 1811 to 1791 Every second week from 1791 to 1708	Fairway marking is done by ÉDU VIZIG together with Slovak SVP
1708 - 1560	Every week from 1708 to 1560	Fairway marking is done by KDV VIZIG
1560 - 1433	Every week from 1560 to 1433	Fairway marking is done by ADU VIZIG

Dredging activities 2014

The following fairway dredging measures for commercial navigation were implemented:
In total, 0 m3 were dredged for commercial navigation in 2014 (no dredging activities).

6.8 HU | Operational and investment costs

Operational expenditures 2014 and budget needs 2015

Need areas	Operational expenditures 2014	Additional yearly need (Masterplan)	Secured operational budget 2015	Estimated Financing gap 2015
Minimum fairway parameters (width/depth)		600.000	0	600.000
Surveying of the riverbed	95.710	144.000	141.516	98.194
Water level gauges	8.282	0	35.584	
Marking of the fairway	627.178	17.500	676.927	
Availability of locks / lock chambers		n/a	n/a	
Information on water levels and forecasts		17.000	15.839	1.161
Information on fairway depths		0	0	0
Information on marking plans	Included in marking of the fairway	25.000	1.000	24.000
Meteorological information		0	15.839	
Other needs		0	0	0
Sum	**731.170**	**803.500**	**886.705**	**647.965**

Operational expenditures 2015 and budget needs 2016

Need areas	Estimated operational expenditures 2015	Required operational budget 2016	Secured operational budget 2016	Remaining financing gap 2016
Minimum fairway parameters (width/depth)	0	1.000.000	150.000	850.000
Surveying of the riverbed	141.516	175.957	850.242	
Water level gauges	35.584	53.710	164.696	
Marking of the fairway	676.927	710.466	3.602.542	
Availability of locks / lock chambers	n/a	n/a	n/a	n/a
Information on water levels and forecasts	15.839	31.678	50.000	
Information on fairway depths	0	0	0	0
Information on marking plans	1.000	Included in marking of the fairway	47.000	
Meteorological information	15.839	31.678	0	31.678
Other needs	0	0	0	0
Sum	**886.705**	**2.003.489**	**4.864.480**	**881.678**

Investments taken for Rehabilitation and Maintenance 2014 – September 2015

Need areas	Required additional investment 2014 – 2020 according to FRMMP EURO	Investment cost secured by EU co-financing 2015 – 2020 (EUR)	Estimated investment expenditures 2015 (incl.EU co-financing) EURO	Estimated investment expenditures 2015 (excl.EU co-financing) EURO
Minimum fairway parameters (dredging)	150.000	6.200.000	81.410	
Surveying of the riverbed	749.700	4.214.038	4.000	
Water level gauges	150.000	4.800.000	0	
Marking of the fairway	3.187.000	8.675.000	16.026	
Availability of locks / lock chambers	n/a	0	0	
Information on water levels and forecasts	50.000	62.564	0	
Information on fairway depths	0	1.220.000	0	
Information on marking plans	47.000	620.000	0	
Meteorological information	0	524.038	0	
Other needs	0	1.016.397	2.600	
Sum	**4.333.700**	**27.332.037**	**104.036**	

Planned investments 2016

Need areas	Remaining required investment 2016 – 2020 based on FRMMP	Required investment budget 2016 (incl. EU Co-financing)	Secured national investment budget 2016 (excl. EU co-financing)*	Secured investment budget 2016 (only EU co-financing)	Remaining investment need 2017-2020 (%) not secured by EU co-financing
		EURO			
Minimum fairway parameters (dredging)			527.775	2.990.726	
Surveying of the riverbed		1.316.423	82.800	469.200	
Water level gauges		1.980.000	0	0	
Marking of the fairway		2.361.777	354.266	2.007.510	
Availability of locks / lock chambers		0	0	0	
Information on water levels and forecasts		31.538	0	0	
Information on fairway depths		4.240	636	3.604	
Information on marking plans		4.240	636	3.604	
Meteorological information		316.543	318	1.802	
Other needs		85.004	12.751	72.254	
Sum		**9.618.265**	**979.182**	**5.548.699**	

6.9 HU | Outlook: actions, milestones and funding sources

HU 01: Level of detail of monitoring data		
Planned activities:	Purchasing multi-beam sounding equipment and surveying vessel within FAIRway project	
Current shortcomings:	Currently, there are no shortcomings identified	
Possible funding:	CEF 85%, National budget 15%	
Next steps:	Preparing NIF – OVF agreement on FAIRway project. Preparing public procurement documentation for the time FAIRway project is approved	30.07.2015
HU 02: Old monitoring equipment and fleet (related to fairway marking)		
Planned activities:	Purchasing equipment within national CEF project called "*Improving fairway marking on the Hungarian section of the Danube in the Rhine-Danube corridor*" • Fairway marking vessels - 3 pcs • High-speed patrol boats - 3 pcs • Intelligent light buoys - 115 pcs • New floating unlighted buoys - 210 pcs • Light bank markers - 55 pcs • New bank marks and navigation control marks - 300 pcs New river km marks - 400 pcs	
Current shortcomings:	Currently, there are no shortcomings identified	
Possible funding:	CEF 85%, National budget 15%	
Next steps:	Preparing NIF – OVF agreement on CEF fairway marking project Preparing public procurement documentation for the marking vessels and patrol boat for time CEF fairway marking project is approved	30.07.2015

7 Croatia

AVP - Agency for Inland Waterways (within the Ministry of Maritime Affairs, Transport and Infrastructure) is responsible for fairway maintenance, rehabilitation and upgrade.

7.1 HR | Status report on main critical locations 2012 – September 2015

Number of days with fairway depths > 2.5m on main critical locations

Danube

Critical location	2012	2013	2014
Apatin sector	366	365	365

The Danube stretch in Croatia is characterized with sufficient depths therefore the envisaged level of service was achieved, but due to river morphology (large number of sandbars and islands) required fairway width is not always fulfilled. The tables above show the number of days that do not meet the fairway dimensions in terms of width.

The Apatin sector is characterised with unstable riverbed, where the flow direction during the low water period is highly subject to changes. Therefore, the available depth during the same water level may not have the same values. Compared to 2011, when frequent changes were present, the situation in 2012, 2013 and 2014 is stabilized and there was no reallocation of the fairway as the most favourable depth was held throughout the year within the fairway limits. Here applies the general conclusion that for water levels lower than +130 at Apatin gauge, often can lead to interferences in navigation.

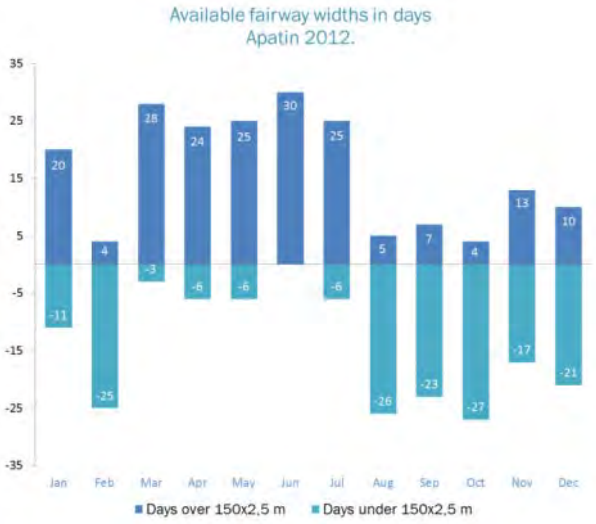
In 2012 interference in navigation was present for the water levels lower than +90 at Apatin gauge; in 2013 interference in navigation was present for the water levels lower than +100 at Apatin and in 2014 there was no interference in navigation due to favourable water levels.

Status of critical locations in 2012

Number of days < 200/150/120m width

*

Crtitical sector in 2012	200 x 2,5	150 x 2,5	120 x 2,5	100 x 2,5
Apatin	364	171	95	0

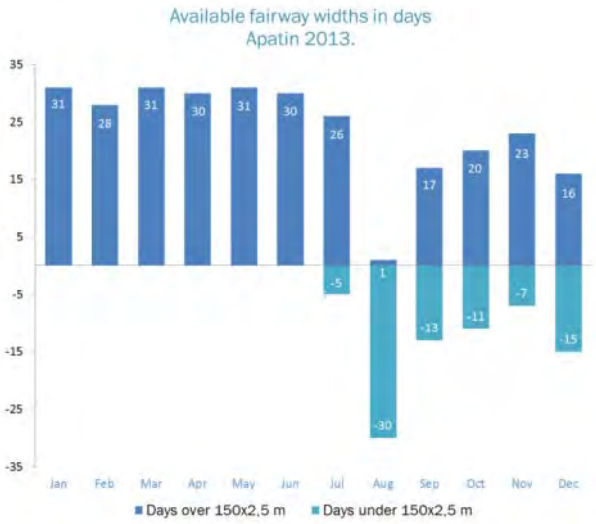


Status of critical locations in 2013

Number of days < 200/150/120m width

**

Crtitical sector in 2013	200 x 2,5	150 x 2,5	120 x 2,5	100 x 2,5
Apatin	176	81	52	0



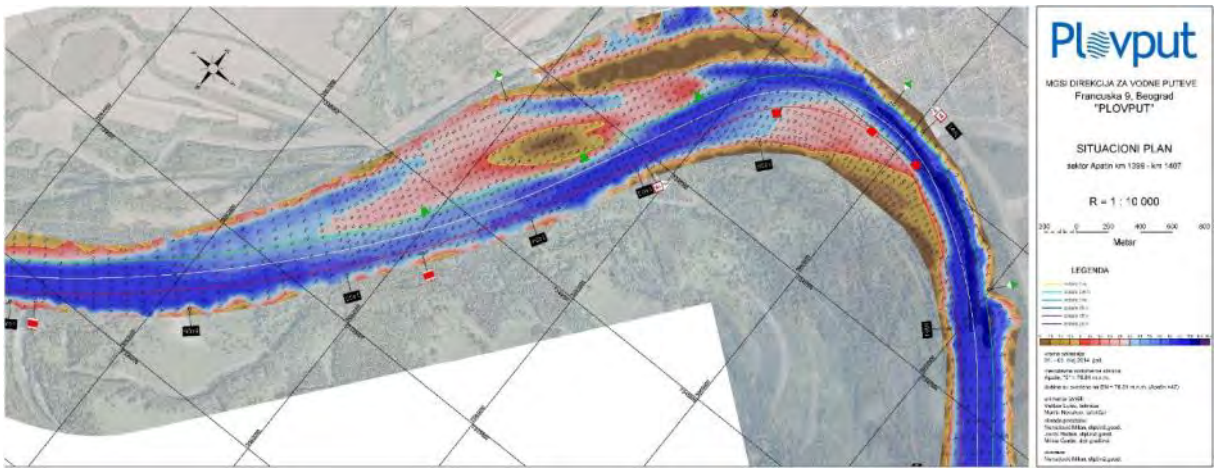
Status of critical locations in 2014

Number of days < 200/150/120m width

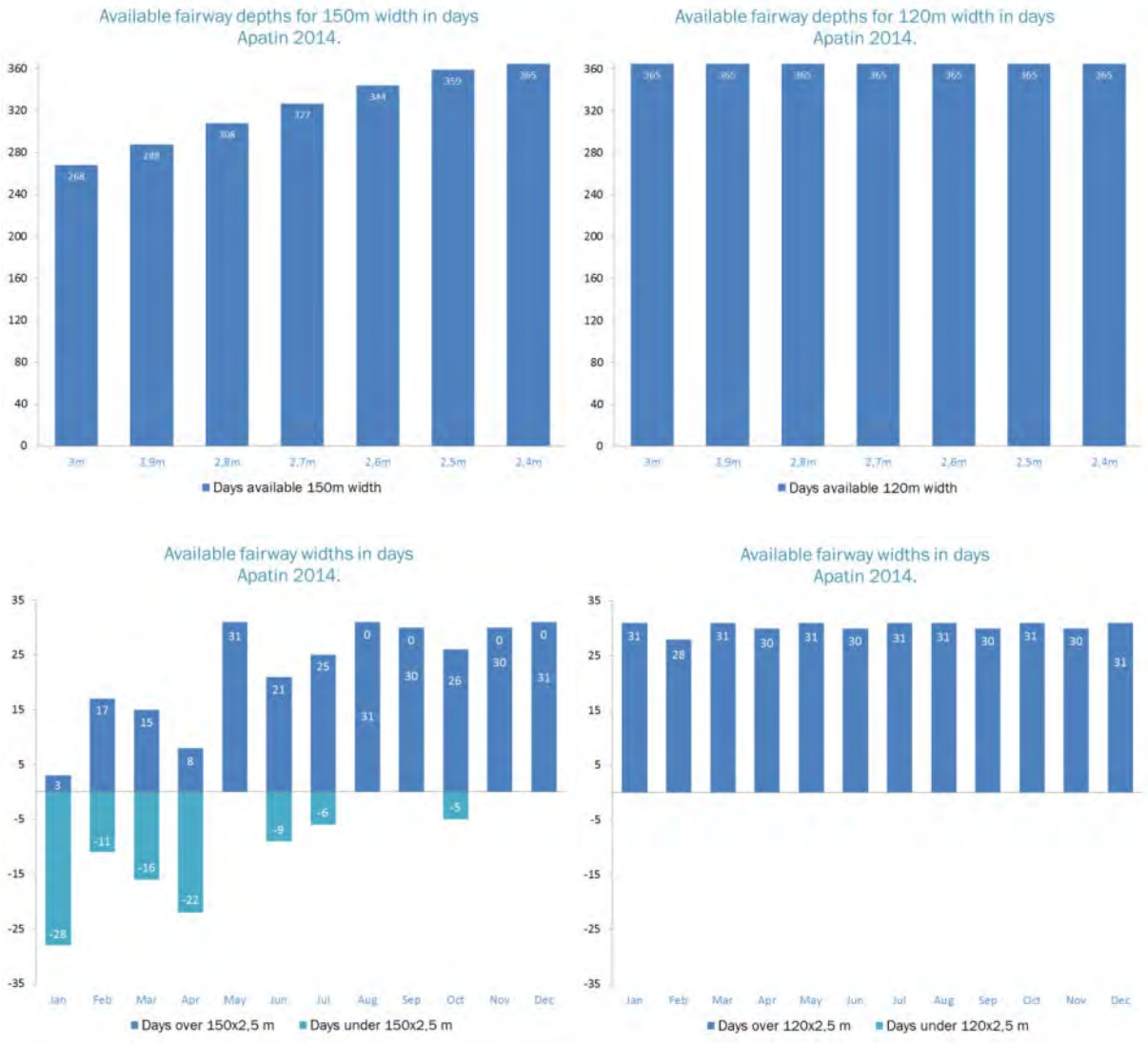
Crtitical sector in 2014	200 x 2,5	150 x 2,5	120 x 2,5	100 x 2,5
Apatin	288	97	0	0

The Llayout of the critical sector Apatin from May 2014 is presented in the *Figure 15*. This sector was characterised by positive morphological developments in 2012, 2013 and 2014, compared to situation from the late 2011 (when navigation was completely stopped during the low water period, due to insufficient water depth).

Figure 15: Apatin, layout, May 2014



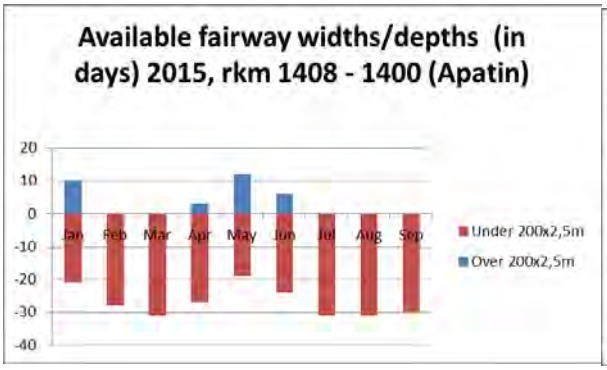
Number of days in 2014 with available fairway parameters is presented in *Figure 16-18*. For reduced fairway width of 120 m, which is above the minimum Level of Service for the Republic of Serbia, over the whole year 3m depth was available. This confirms that Apatin is not the most critical sector for navigation in Serbia, in terms of available fairway depth and width.

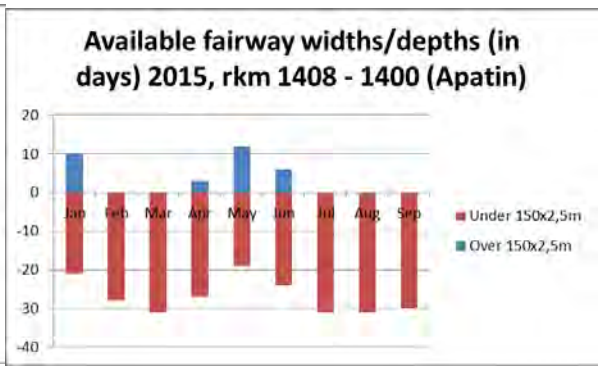


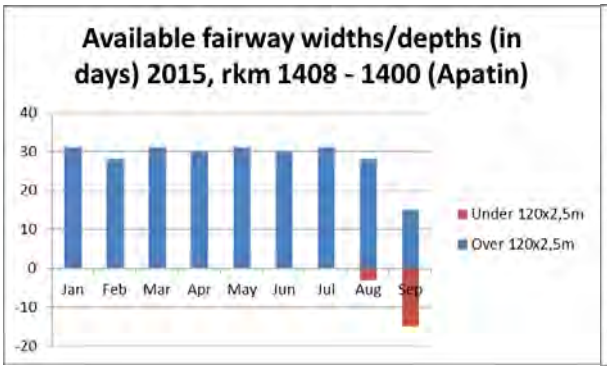
Status of critical locations in 2015

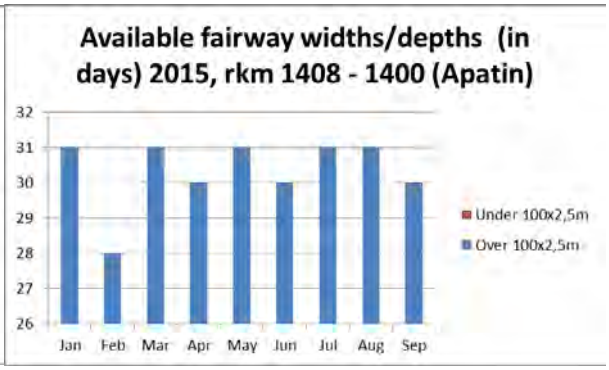
Number of days < 200/150/120m width

Crtitical sector in 2015	200 x 2,5	150 x 2,5	120 x 2,5	100 x 2,5
Apatin	242	242	18	0









During 2015, the situation in Apatin section was stable and there was no reallocation of the fairway as the most favourable depth was held throughout the year within the fairway limits of 100m.

7.2 HR | Hydrological conditions on main critical locations 2012– Sept 2015

Number of days with flow discharge above multiannual average flow discharge for the main critical locations.

Danube

Critical location	2012	2013	2014
Apatin	151	217	134

* Data provided by PLOVPUT

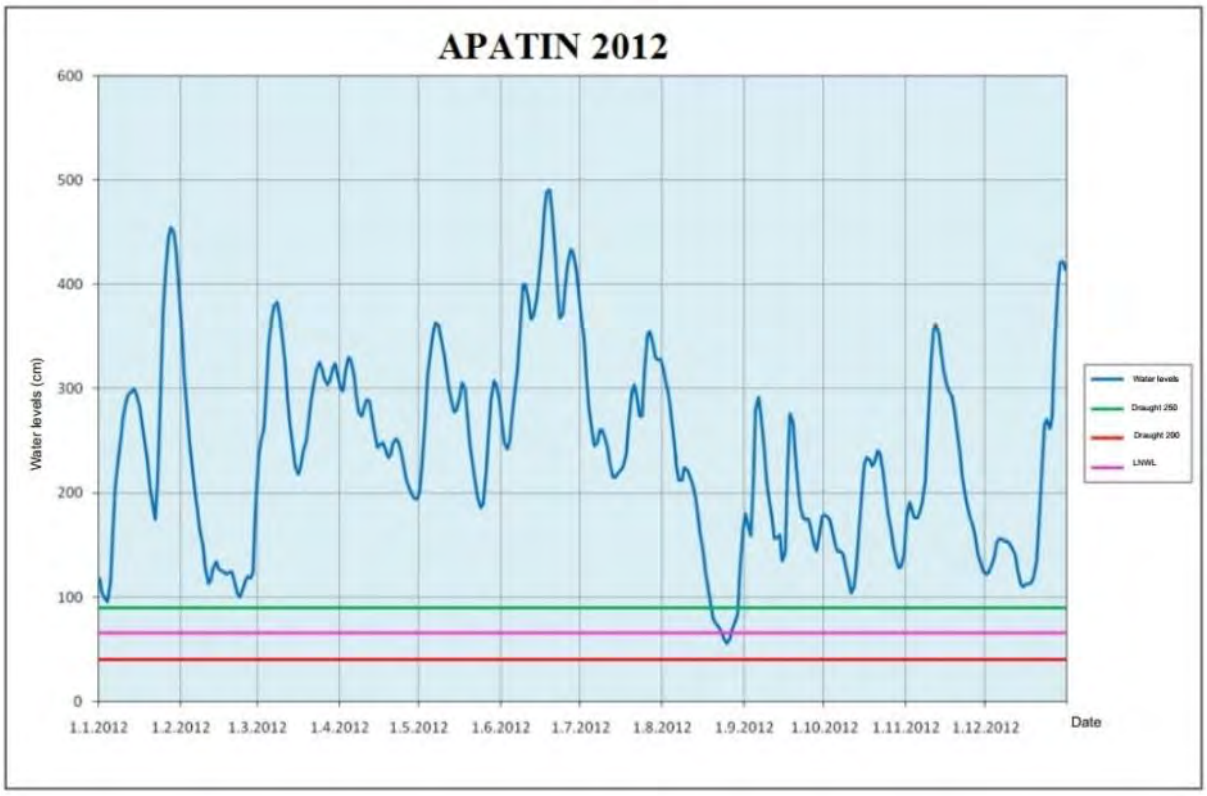
7.3 HR | Water level information on main critical locations 2012-2014

For the Apatin gauging station, no days below LNWL were recorded for 2012, 2013 and 2014, meaning that hydrological conditions were favourable for navigation. In the period January-September 2015, 18 days with water levels below LNWL have been recorded*.

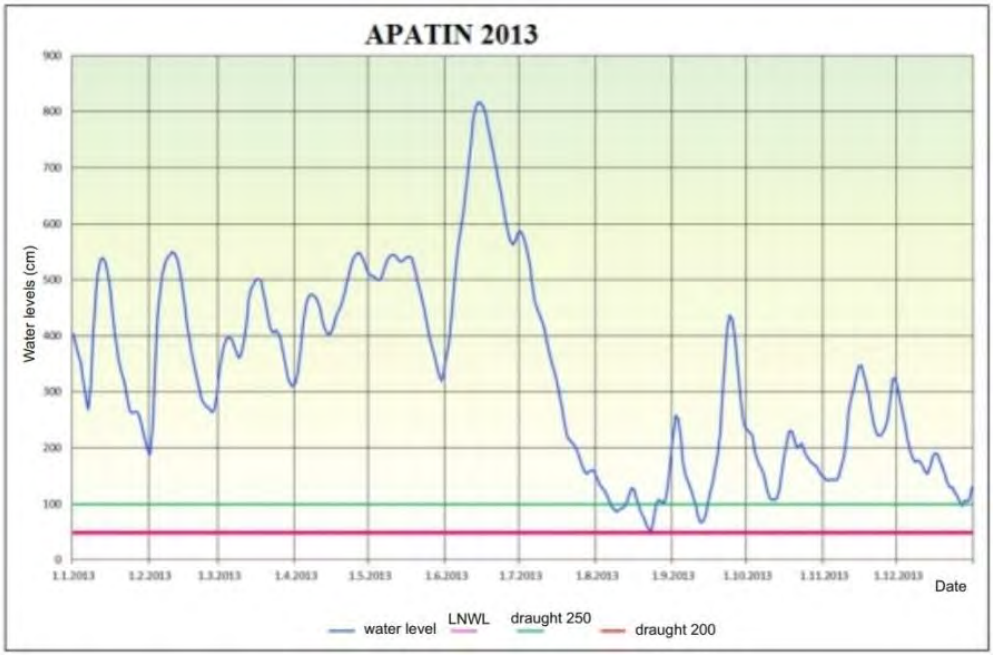
Danube

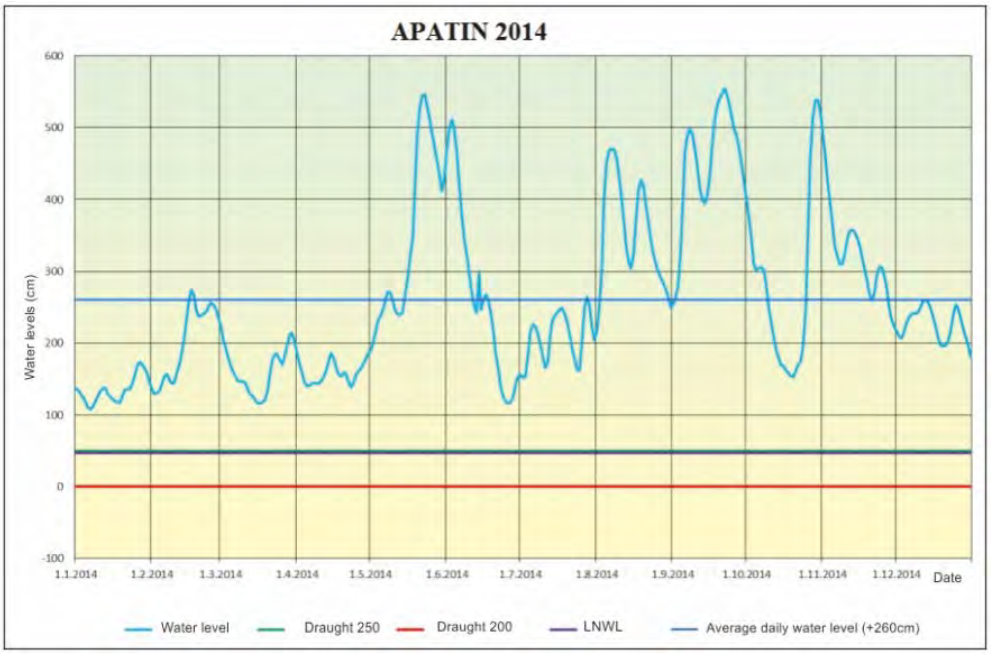
Critical location	Reference gauge	No of days above LNWL		
		2012	2013	2014
Apatin*	Apatin	366	365	365

*Data provided by PLOVPUT

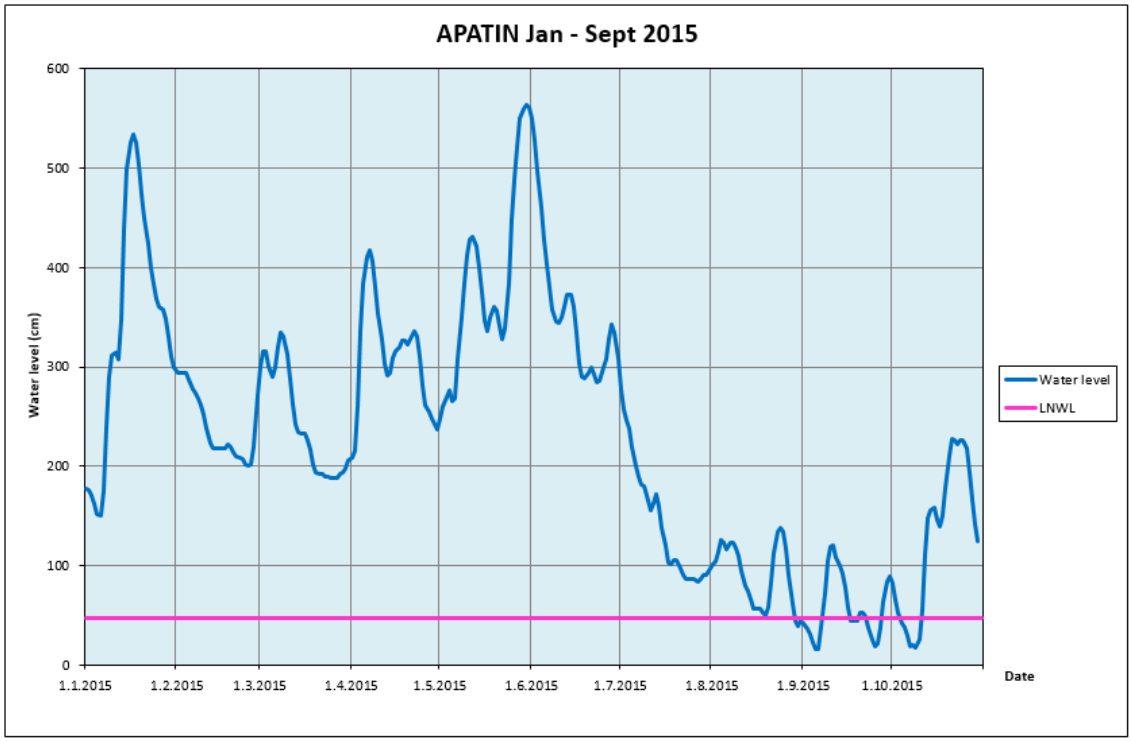


In 2012 at the gauging station Apatin the water level under low navigable water level was present only for a short period in August.





The years 2013 and 2014 were very good in hydrological terms and there was no single day that water levels fell below the low navigable water level.



In 2015 (Jan- Sept) at the gauging station Apatin the water level under low navigable water level was present in short period in August and in September.

7.4 HR | Water level prognoses for critical locations

The only identified critical location on Croatian/Serbian part of the Danube is sector Apatin (on Serbian side). Relevant data for Apatin gauge station is published online via the Republic Hydrometeorologial Service of Serbia (RHMZ). Gauging data are refreshed every day. Four-day forecasts are available daily online at http://www.hidmet.gov.rs.

Regarding activities in Croatia, the hydrological forecasts modelling project for the Sava river in Croatia started in year 2014, using MIKE 11 software tools which is cooperation between meteorological and hydrological service and Croatian Waters.

Within the FAIRway project the installation of 4 new gauging stations is planned together with water level forecast until 2020 on the Danube river on most critical locations.

7.5 HR | Time from surveying to action: maintenance philosophy

Activities of technical maintenance of inland waterways in Croatia are prescribed by the Regulation on technical maintenance of inland waterways and they are consisting of the following activities:

1. Preparation of technical maintenance,
2. Riverbed surveying and preparation of adequate technical documentation,
3. Maintaining the adequate waterways depth,
4. Maintenance the of aids to navigation for the technical improvement of navigation conditions,
5. Waterway marking,
6. Maintenance of equipment and devices (hardware and software) used for RIS,
7. Removal of floating and sunken objects from the fairway that threaten the safety of navigation,
8. Intervention maintenance of the fairway by order of inspections for safety navigation on inland waterways,
9. Regular maintenance of local waters and aids to navigation in the port area.

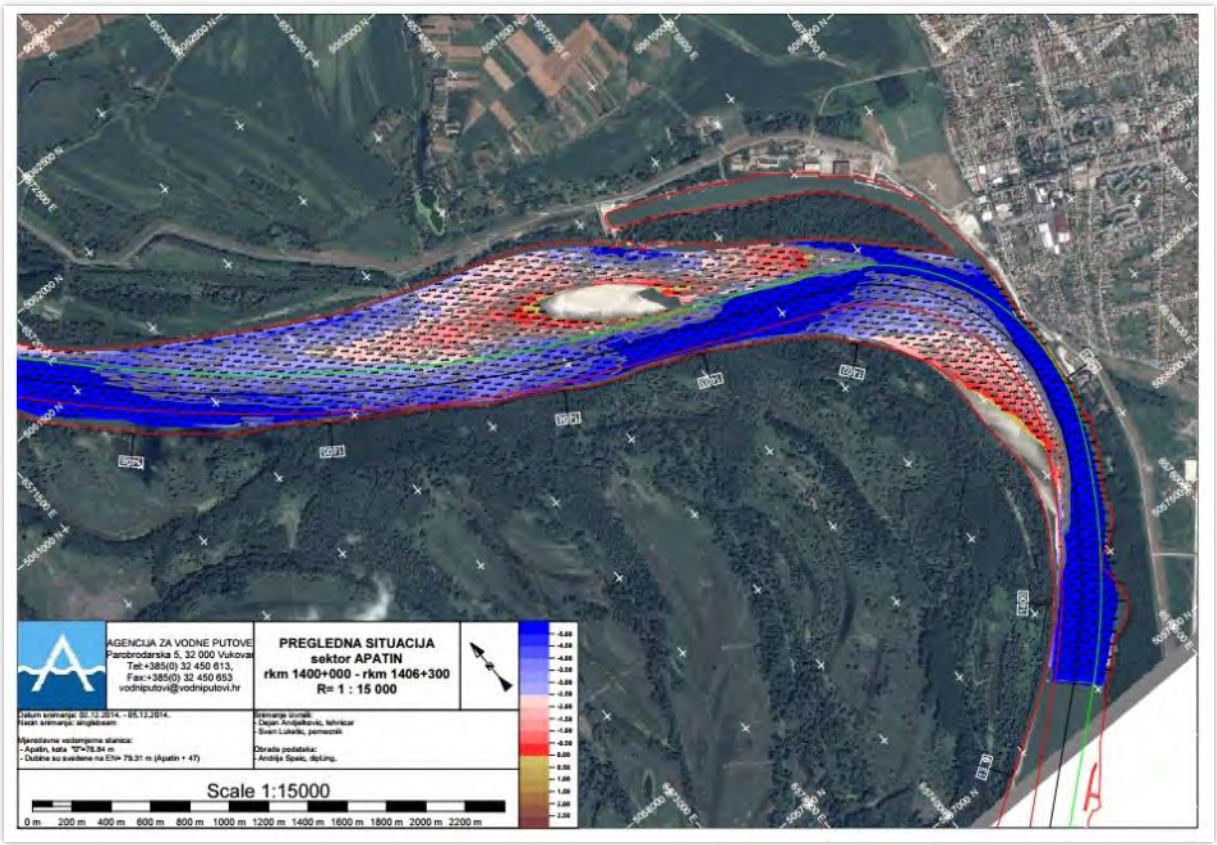
Fairway monitoring is done according to an Annual work plan. To be able to know the fairway conditions we need to perform a surveying which is done according to annual surveying plan. This plan consists of annual surveying of all national waterways with main surveying of critical locations and waterway objects on which the maintenance works are planned. Plan also contains surveying of fairway locations for production of geodetic and morphological surfaces in order to update the technical documentation. It also contains processing of recorded data and preparation of technical maintenance documentation for each river stretch and individual waterway objects.

Permanent locations are annually monitored (locations that are already defined). Based on the annual plan decision is made on the method, the type of equipment and the vessel which will be

used for monitoring. On our disposal are single-beam and multi-beam - depending on the location type monitoring staff determines the equipment that will be used.

Monitoring operations are done regularly in a form of hydrographical surveys, and are done by AVP staff. Post-monitoring is not a practice in AVP but our experts are performing the comparison of surveying results with last year surveying results. If it is established that the surveying results are not satisfying the surveying activities are performed once again.

After AVP receives specific notification that requires our staff to make surveying of river stretch hydrographical crew is ready next day to go surveying (if the river conditions are favourable to make a surveying). For short sections (1 -1,5 km) surveying takes app 1 day. Processing and publication of the data takes 2 day after surveying.



Above is shown graphical map of Apatin sector (2014 survey). According to good practice, maps consist of two-dimensional representation of depth figures – blue contour lines represent more than 2.5 metres in relation to low navigable water level and red contour lines less than 2.5 metres in relation to low navigable water level. AVP is planning to disseminate shallow section information for all shallow sections online once per year and if necessary often whenever problem arrives.

When the need for dredging arises and the surveying data is processed and all necessary documentation is done – dredging companies have satisfaction response time of max 2-3 weeks due to framework contracts that are signed for period of three years.

7.6 HR | Key issues and related activities 2014 – September 2015

	Key issues	*Need for action*	*Activities performed 2014*
HR 01	Old monitoring fleet and equipment	Support retrofit and acquisition of up-to-date single-beam sounding equipment, software and vessels	*AVP participated together with partner countries in preparation of the FAIRway project where the purchase of new equipment is envisaged*
HR 02	Insufficient number of skilled staff	Secure education and provision of well-trained staff in the short, medium and long term	*No activities performed in this field duo lack of budget especially regarding the restriction in public sector for the inability of employment*
HR 03	The number and the accuracy of gauging stations should be raised	Support increasing the number and quality of gauging stations	*DHMZ performed regular maintaining of existed gauging stations. Together with AVP participated in preparation of the FAIRway project where the purchase of new equipment (gauging stations) is envisaged*
HR 04	Insufficient and hardly predictable financial backings	Secure predictable and sufficient financial means for waterway maintenance	*No activities performed in this field. Main problem is financial backup and we are trying to get additional financial resources. Lesser intensity of bilateral cooperation with Serbian side*
HR 05	Deterioration of equipment of dredging companies	Support acquisition of modern vessels at AVP or dredging companies	*AVP does not perform the dredging activities directly –dredging firms are subcontracted*
HR 06	Cumbersome procurement procedures for dredging activities	Support simplification of procedures for procurement and allow concessions	*Preparation of documentation that will enable the concessions for dredging activities*
HR 07	Not enough vessels available with AVP to provide quick reaction on needed marking interventions; equipment and vessel malfunctions	Support acquisition of modern maintenance and marking vessels	*AVP participated together with partner countries in the preparation of the FAIRway project where the purchase of new equipment and marking vessel is envisaged*
HR 08	Inefficient procedures, suboptimal link between surveying and marking department, insufficient data storage and analysis facilities.	Support development and harmonisation of adequate IT tools	*No activities performed in this field due to not enough adequate staff. The part of needs will be resolved within the FAIRway project – IT tool that will be developed within the project- waterway asset management system (It enables availability calculations, planning and optimization of rehabilitation measures up to an assessment of budgeting needs for different levels of service)*

HR 09	The low number and the accuracy of gauging stations; non-existence of water level forecasts	Support cooperation between actors involved in water level information and increase the number of additional gauging stations	*The hydrological forecasts modelling project started in year 2014, using MIKE 11 software tools, and in cooperation with Croatian Waters (Sava river). Established great communication between AVP and DHMZ – together participated in planning of FAIRway project where the installation of (4) new gauging stations is planned together with water level forecast until 2020 on the Danube river*

	Key issues	*Need for action*	*Activities performed Jan – Sept 2015*
HR 01	Old monitoring fleet and equipment	Support retrofit and acquisition of up-to-date single-beam sounding equipment, software and vessels	*Start of the FAIRway project where the purchase of new equipment is envisaged*
HR 03	The number and the accuracy of gauging stations should be raised	Support increasing the number and quality of gauging stations	*DHMZ performed regular maintaining of existed gauging stations. Start of FAIRway project where the purchase of new equipment (gauging stations) is envisaged*
HR 07	Not enough vessels available with AVP to provide quick reaction on needed marking interventions; equipment and vessel malfunctions	Support acquisition of modern maintenance and marking vessels	*Start of FAIRway project where the purchase of new equipment and marking vessel is envisaged*
HR 09	The low number and the accuracy of gauging stations; non-existence of water level forecasts	Support cooperation between actors involved in water level information and increase the number of additional gauging stations	*The hydrological forecasts modelling project started in year 2014, using MIKE 11 software tools, and in cooperation with Croatian Waters (Sava river). Established great communication between AVP and DHMZ – tstart of FAIRway project where the installation of (4) new gauging stations is planned together with water level forecast until 2020 on the Danube river*

7.7 HR | Review of rehabilitation and maintenance activities 2014 – September 2015

The following activities relate to all critical locations as identified in the Rehabilitation and Maintenance Master Plan (version December 2014).

Surveying activities 2014

The river bed surveying is done according to annual surveying plan. This plan consists of annual surveying of whole Danube sector (SB) with main surveying of critical locations and waterway

objects on which the maintenance works are planned. The plan also contains surveying of fairway locations for production of geodetic and morphological surfaces in order to update the technical documentation.

River-km (from-to)	Frequency of surveying	Type of survey (single/multibeam)
1.433,10-1295,50	Once per year together with detailed survey of all critical locations*	Single-beam
1.311,40-1.307,60	Once	Multi-beam
Sava, rkm 321-329	Once	Single-beam
Drava, rkm 0-12	Once	Single-beam

* 17 critical sectors in joint Danube sector with Republic of Serbia.

Surveying activities January - September 2015

River-km (from-to)	Frequency of surveying	Type of survey (single/multibeam)
1.433,10-1295,50	Once per year together with detailed survey of all critical locations (surveying is still ongoing)	Single-beam
Sava, rkm 552-553	Once	Single-beam
Drava, rkm 13-15	3x in 2015	Single-beam

Fairway relocation activities 2014 – September 2015

None – due to sufficient depths there was no need for fairway relocation only narrowing the fairway due to insufficient width. The fairway width of 100m was provided on the entire Danube stretch.

Dredging activities 2014

The following fairway dredging measures for commercial navigation were implemented:

Designation of assignment	Dredging site		Placement site		Beginning of service	End of service	Material	Utilisation	m3
	from river-km	to river-km	from river-km	to river-km					
Drava river – Nemetin port	13+200	13+450	8+600	10+600	28.03. 2014.	10.05. 2014.	Fine sedi-ment	Dump-ing	16.142,00
Drava river – Nemetin port	13+025	13+435	8+500	10+000	17.10. 2014.	31.12. 2014.	Fine sedi-ment	Dump-ing	34.687,80

In total, 50.829,8 m³ were dredged for commercial navigation in 2014 (Drava river).

Dredging activities 2015

The following fairway dredging measures for commercial navigation were implemented:

Designation of assignment	Dredging site		Placement site		Beginning of service	End of service	Material	Utilisation	m3
	from river-km	to river-km	from river-km	to river-km					
Drava river – Nemetin port	13+200	15+500	9+700	9+000	23.04. 2015.	18.07. 2015.	Fine sedi-ment	Dump-ing	39.503,92
Sava river	552	553	552	553	17.07.2015.	01.09.2015.	Fine sedi-ment	Dump-ing	15.150,00

In total, 54.653,92 m³ were dredged for commercial navigation in 2015 from January - September.

7.8 HR | Operational and investment costs

Operational expenditures 2014 and budget needs 2015

Need areas	Operational expenditures 2014	Additional yearly need (Masterplan)	Secured operational budget 2015	Estimated Financing gap 2015
Minimum fairway parameters (width/depth)	338.000	487.000	400.000	425.000
Surveying of the riverbed	43.000 *	268.000	50.000	261.000
Water level gauges		18.000	10.000	8.000
Marking of the fairway	560.000	360.000	540.000	380.000
Availability of locks / lock chambers				0
Information on water levels and forecasts			30.000	
Information on fairway depths				0
Information on marking plans				0
Meteorological information			5.000	
Other needs		319.200	14.200	305.000
Sum	**941.000**	**1.425.510**	**1.049.200**	**1.379.000**

*Surveying activities are under AVP budget (state budget). Only project development is made by external contractors.

Operational expenditures 2015 and budget needs 2016

Need areas	Estimated operational expenditures 2015	Required operational budget 2016	Secured operational budget 2016*	Remaining financing gap 2016
Minimum fairway parameters (width/depth)	400.000	1.000.000		1.000.000
Surveying of the riverbed	50.000	70.000		70.000
Water level gauges	10.000	10.000		10.000
Marking of the fairway	540.000	580.000		580.000
Availability of locks / lock chambers				
Information on water levels and forecasts	30.000	30.000		30.000
Information on fairway depths		80.000		80.000
Information on marking plans				
Meteorological information	5.000	5.000		5.000
Other needs	14.200	14.200		14.200
Sum	**1.049.200**	**1.789.200**		**1.789.200**

*Due to elections there is only temporary financing for the first three months in 2016

Investments taken for Rehabilitation and Maintenance 2014 – September 2015

Need areas	Required additional investment 2014 – 2020 according to FRMMP EURO	Investment cost secured by EU co-financing 2015 – 2020 (EUR)	Estimated investment expenditures 2015 (incl.EU co-financing) EURO
Minimum fairway parameters (dredging)	1.000.000*		280.000
Surveying of the riverbed	241.000**	433.000	
Water level gauges	57.000**	75.000	
Marking of the fairway	3.230.000***	1.000.000	
Availability of locks / lock chambers	n/a		
Information on water levels and forecasts	0	175.000	
Information on fairway depths	60.000		
Information on marking plans	0		
Meteorological information	0		
Other needs	0		
Sum	**4.588.000**	**1.683.000**	**280.000**

* In the period 2015-2017 dredging activities on Drava river will be performed (via concessions) in total value of cca 4.2 mil€. Total % of investments per year is uncertain for now. Concessions are carried out under the Ministry of agriculture - directorate for water management.

** Investment regarding surveying equipment and water level gauges will be achieved via FAIRway project (100% of investment by the end of project in 2020).

*** Investment regarding marking of the fairway will be achieved via FAIRway project (28% of investment by the end of project in 2020).

Planned investments 2016

Need areas	Remaining required investment 2016 – 2020 based on FRMMP	Required investment budget 2016 (incl. EU Co-financing)	Secured national investment budget 2016 (excl. EU co-financing)*	Secured investment budget 2016 (only EU co-financing)	Remaining investment need 2017-2020 (%) not secured by EU co-financing
	EURO	EURO			
Minimum fairway parameters (dredging)	720.000	280.000			
Surveying of the riverbed	241.000	247.000		247.000	
Water level gauges	57.000	42.750		42.750	
Marking of the fairway	3.230.000	570.000		570.000	
Availability of locks / lock chambers	n/a				
Information on water levels and forecasts	0	16.000		16.000	
Information on fairway depths	60.000				
Information on marking plans	0				
Meteorological information	0				
Other needs	0				
Sum	4.308.000	**1.155.75**		**875.750**	**63%**

*due to elections there is only temporary financing for the first three months in 2016

7.9 HR | Outlook: actions, milestones and funding sources

HR 01: Old monitoring fleet and equipment		
Planned activities:	Preparation of projects for purchasing needed equipment and vessels (financed from EU funds)	
Current shortcomings:	Lack of qualified staff needed for project implementation, not enough budget	
Possible funding:	Budget availability 2015/2016: EU funds/national budget	
Next steps:	Application for EU co-financing	Until 2020
HR 02: Insufficient number of skilled staff		
Planned activities:	We are planning to have additional education of our staff in future, but still do not know exact start time	
Current shortcomings:	National restrictions of hiring new staff doe to a lack of national funds/budget for additional staff	
Possible funding:	Budget availability 2015/2016: National fund	
Next steps:	We hope that the purchase of new equipment/vessels will open the possibility of hiring new workers and additional education	tbd
HR 03: The number and the accuracy of gauging stations should be raised		
Planned activities:	DHMZ plans the activities for the whole hydrological stations network on yearly basis. Within the FAIRway project it is planned installation of 4 new gauging stations and modernisation of existing gauging stations	
Current shortcomings:	The uncertainty of funding	
Possible funding:	Budget availability 2015/2016: EU funds/national budget	
Next steps:	To plan the achievable activities in year 2015, depending on available funding	Until 2017
HR 04: Insufficient and hardly predictable financial backings		
Planned activities:	Planning of projects that could help us provide additional funds for waterway maintenance	
Current shortcomings:	Insufficient communication between all relevant institutions	
Possible funding:	Budget availability 2015/2016: EU funds/national budget	
Next steps:	Planning of projects that could help us provide additional funds for waterway maintenance	tbd
HR 05: Deterioration of equipment of dredging companies		
Planned activities:	No planned activities	
Current shortcomings:	Not enough funds/budget	
Possible funding:	Budget availability 2015/2016: EU funds/privat budget	
Next steps:	N/A	tbd

HR 06: Cumbersome procurement procedures for dredging activities		
Planned activities:	Start of tendering procedures for concessions - waterway will be maintained more efficiently – no more time waste on a time consuming procedures	
Current shortcomings:	Time consuming procedures	
Possible funding:	Budget availability 2015/2016: national budget	
Next steps:	Concession procedures for Sava, Drava and Danube	tbd
HR 07: Not enough vessels available with AVP to provide quick reaction on needed marking interventions; equipment and vessel malfunctions		
Planned activities:	Preparation of projects for purchasing needed equipment and vessels (financed from EU funds)	
Current shortcomings:	Lack of staff needed to research the current needs, not enough budget	
Possible funding:	Budget availability 2015/2016: EU funds/national budget	
Next steps:	Purchase of equipment within the FAIRway project	Until 2020
HR 08: Inefficient procedures, suboptimal link between surveying and marking department, insufficient data storage and analysis facilities		
Planned activities:	The part of needs will be resolved within the FAIRway project – IT tool that will be developed within the project-waterway asset management system	
Current shortcomings:	With enough funds for future operation we would be able to plan activities that would improve current status quo	
Possible funding:	Budget availability 2015/2016: EU funds/national budget	
Next steps:	Improve link between surveying and marking department using IT tool developed within FAIRway project	Until 2020
HR 09: The low number and the accuracy of gauging stations; non-existence of water level forecasts		
Planned activities:	Hydrological forecasts modelling	
Current shortcomings:	The project started with modelling the Kupa river and a part of the Sava river from Slovenian border to Sisak. The model will be expanded to Danube river	
Possible funding:	Budget availability 2015/2016: The funding of the project is national at the moment, but DHMZ is going to apply for EU funds	
Next steps:	To continue with the modelling. To increase the number of gauging stations where needed	Until 2020

8 Romania

The **Administration of the Lower Danube (AFDJ)** and the **Administration of the Navigable Canals (ACN)** are responsible for fairway maintenance, rehabilitation and upgrade.

8.1 RO | Status report on main critical locations 2012-September 2015

Number of days with fairway depths > 2.5m on main critical locations

Danube

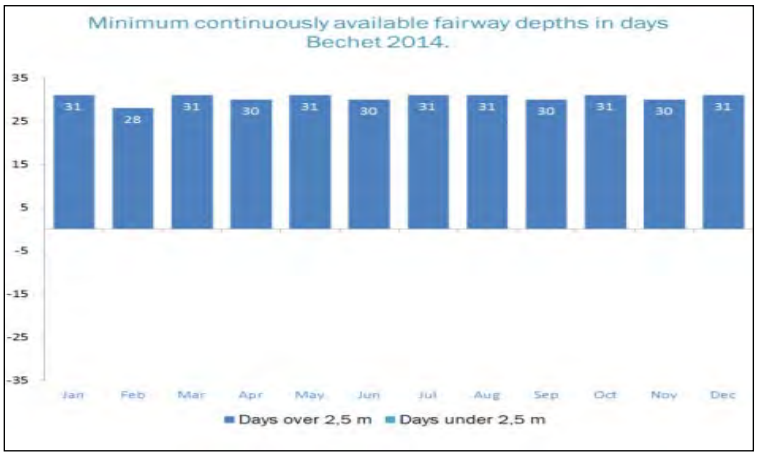
Critical location	2012	2013	2014
Bechet	355	327	365
Corabia	348	335	365
Turcescu	281	297	345
Cochirleni	196	234	319
Seimeni	323	329	365

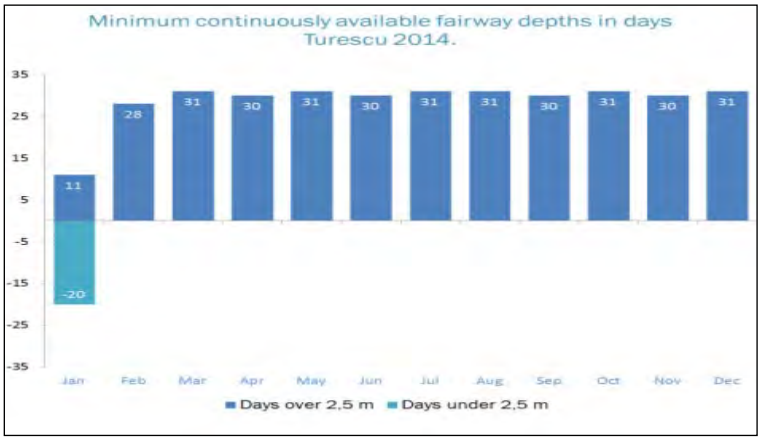
Status of critical locations 2013

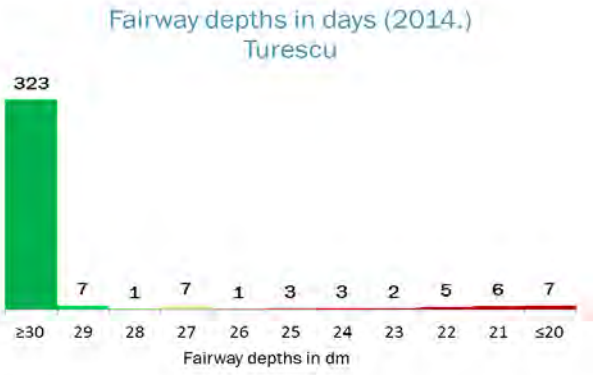
In the first half of the year 2013, no depths below 2.5m were registered. Depths below 2,5 only occurred during July - October when levels fall, which is usually the period with the lowest levels of the year and requiring calibration works for the fairway.

In 2013, the navigation problems were met in the downstream area of Calarasi where frequent accumulations of sediment occurred, which required dredging works to ensure the fairway depths, resulting in a volume of 370,000 m³ of material.

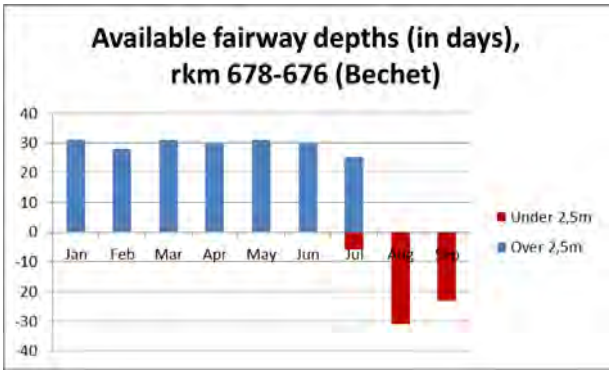
Status of critical locations 2014

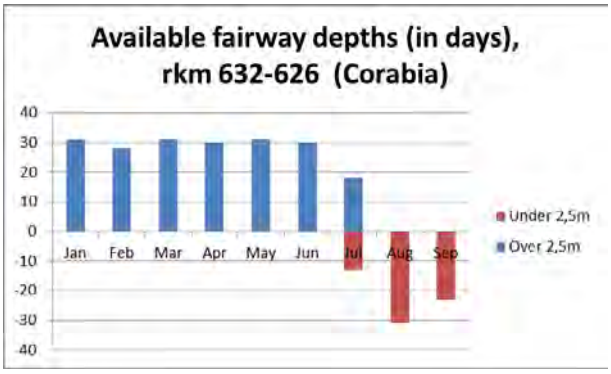


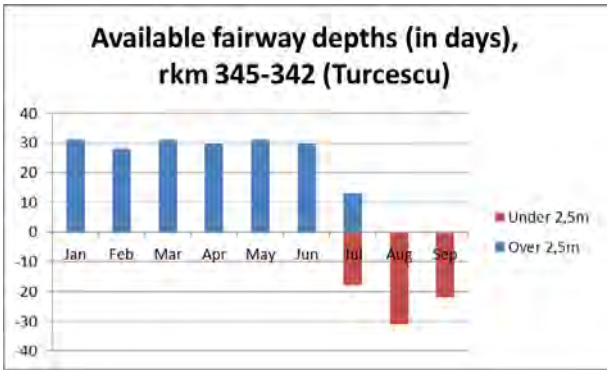


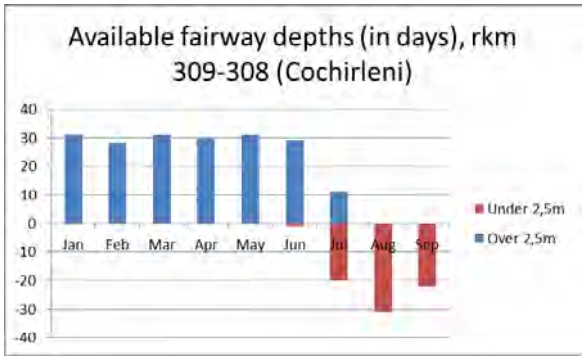


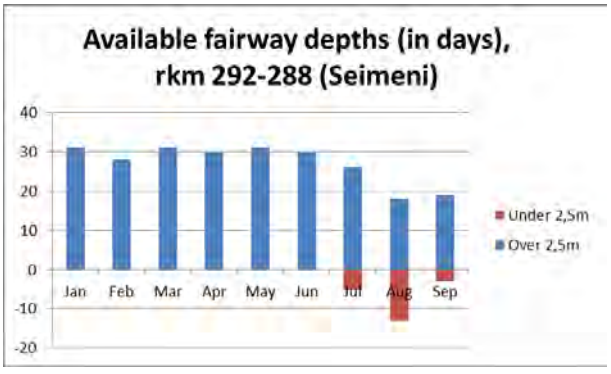
For most critical areas, the level of service was met in 2014, with water depths more than 2.5m in the fairway area, due to favourable hydrological situation. The minimum water level was higher than low navigable water level, creating the conditions for positive navigation conditions.







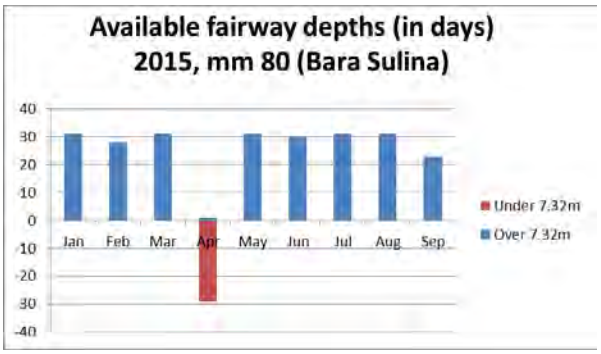


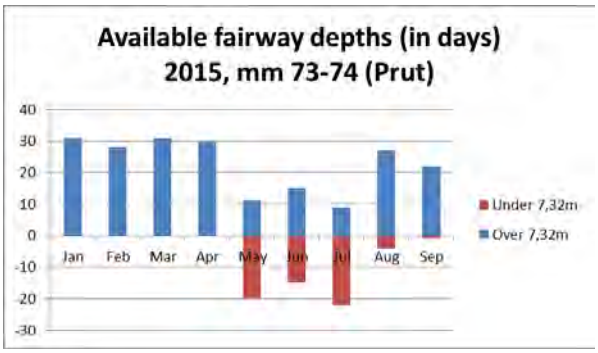


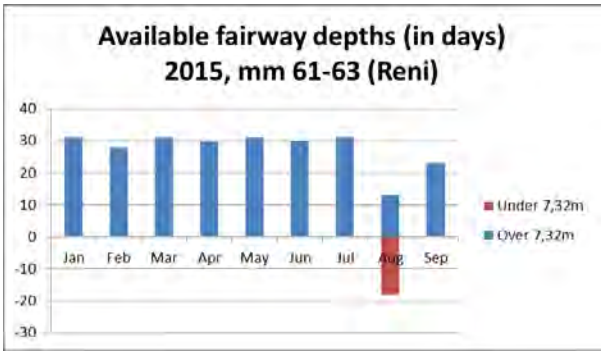
Status of critical locations January-September 2015

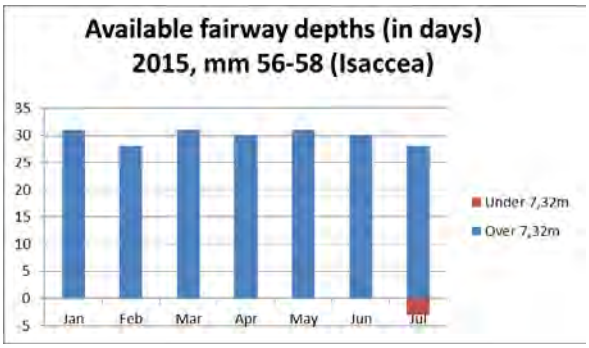
In period January-June 2015, a minimum fairway depth of 2.5m was available on the entire sector of Romanian Danube, when the water levels were above LNWL values. Thus, in January -July they was available the fairway depths over 2.5m, in all critical points, for 181 days, or 100% for the first half of the year.

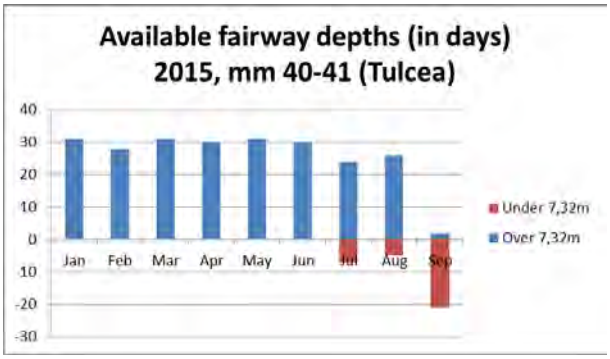
Starting with middle month July, the water levels fall drastically, having negative effects on navigability. During this period were recorded levels below LNWL values which required intervention on the fairway dimensions. So, in July, in most of the critical points, the depths were less than 2.5m for 10-15 days, and in August and September, the depths were below 2.5m, even 2.1m, for 31 days (September). As shown in the above situation, for this critical period (July - October) were recorded depths below 2.5 m as follows: Bechet (60 days), Corabia (67 days), Turcescu (71 days), Cochirleni (74 days), Seimeni (21 days) . During this period , which were unfavorable for navigation conditions , has been took a series of measures by increasing the number of surveys, supplementation floating signals, reducing the fairway widths so as to ensure navigation depths, and marking vessels remained in the field for the entire period in order to rapid interventions. Also, to ensure the navigation depths in shallow sections, the dredging works were started in the most difficult critical points.











For the maritime sector of Danube, were encountered problems related to navigation depth, in the main critical areas, on the section downstream Galati: Prut, Reni, Isaccea, Tulcea, Sulina bar (entrance on the Black Sea). To note, in this sector, the minimum navigation depth is 7.32m (24

feet) and has a maritime navigation regime. Special problems were only in the Prut, in the period May-July, when they recorded a total of 62 days. In general, here in most areas, they were ensured the navigation depths because of dredging works which were carried out in most areas. Referring to navigation conditions on the River on this sector they were meet on entire period, depths over 2.5m.

Danube-Black Sea Canal
In the years 2012-2014 fairway depths were over 2.5 m on the Danube-BlackSea Canal for the whole year:

Critical location	2012	2013	2014
confluence with the Danube river km 64-65 - DBSC	365	365	365
Port Medgidia km 37- DBSC	365	365	365
Downstream Navodari lock – CPAMN	365	365	365
Port Luminita – river branch Luminita	365	365	365

Starting with July 2015,ACN completed dredging works in critical location "Confluence DBSC with the Danube river km 300". This location will not be reported in the next 2-3 years as critical point.

8.2 RO | Hydrological conditions on main critical locations 2012-September 2015

Number of days with flow discharge above multi-annual average flow discharge for the main critical locations.

Critical location	2012	2013	2014
Bechet	105	211	233
Corabia	108	171	218
Turcescu	137	202	236
Cochirleni	51	156	199
Seimeni	51	156	199

The table shows that the 2014 year is much better, regarding the hydrological point of view. Usually the low water period is in August-October, which represents 25% of the year.

By hydrological point of view, the period of 2015, January-September, it is characterized by a period with very low flow discharge and long periods with values below the multi-annual flow discharge. Since late June, rates were below multi-annual values, about 110 days, and it causing problems in providing navigation conditions.

8.3 RO | Water level information on main critical locations 2012-September 2015

Please, provide information about main critical locations - water level information (reference gauge, number of days) above LNWL.

Critical location	Reference gauge	No of days above LNWL		
		2012	2013	2014
Bechet	Bechet	332	329	365
Corabia	Corabia	328	325	365
Turcescu	Calarasi	319	325	365
Cochirleni	Cernavoda	331	325	365
Seimeni	Cernavoda	331	325	365

Analyzing the water level information for the Romanian sector of the Danube from a hydrological point of view, one sees that in the year 2014 conditions were much better than in previous years. This was decisive in ensuring that the navigation conditions were favourable, with fairway depths more than 2.5m.
The average daily water level was 311cm in Bechet and 266cm in Calarasi, with about 30cm - 40cm higher than previous years and the minimum water levels were over the low navigable water level value.

January - September 2015

In terms of water levels, the period from January to middle of June, favourable conditions for navigation were encountered. In this period the levels had values above average annual, in April, registering the maximum. Starting with end of June, the levels fell steadily throughout July, August and September. Thus, in all sections have been recorded levels with values below LNWL, which represent about 25%. The number of days with values above LNWL, for the period January-September 2015, was : Bechet 212 days, Corabia 200 days, Calarasi 211 days, Cernavoda 216 days.

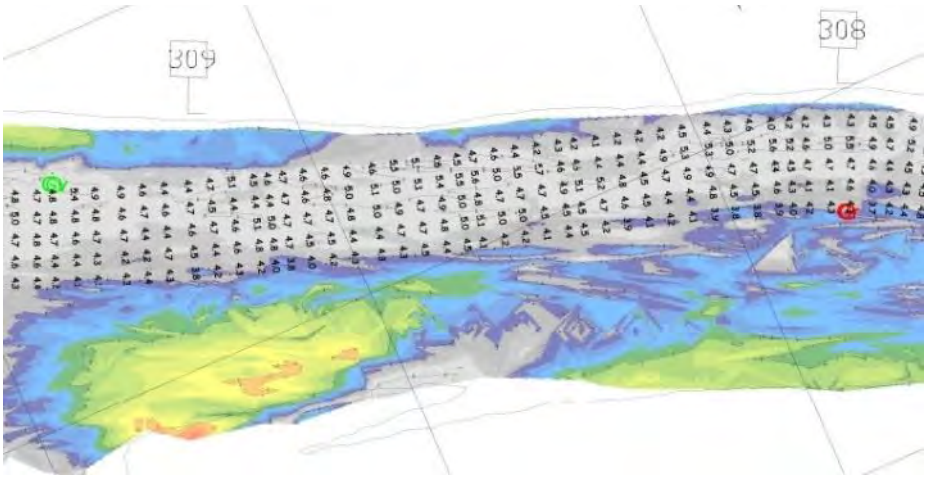
8.4 RO | Water level prognoses for critical locations

Water level information is transmitted on a daily basis from a total of 23 gauge stations, on www.afdj.ro web site and forecast for three gauge stations with a range of 48 hours. On the administration web site, daily data are provided about actual real depths for the critical locations including a drawing for every location. The water level forecasts take into consideration the information from the water level sensors (every 15 minutes) near critical locations and the information from gauge station forecasts.

8.5 RO | Time from surveying to action: maintenance philosophy

For maintenance, each year AFDJ has prepared an action plan established for precarious situations. The main actions consist in carrying out works to ensure navigation conditions. The

main goal is to be able to foresee navigation problems and prepare rapid interventions if needed. For this, critical areas are permanently monitored by measurements and marking works. When needed, dredging works (prepared in advance) are carried out. It is also important to provide updated information on the situation depths in critical areas. Information about water levels, depths, weather is published on a daily basis. Current information about shallow sections is presented in an easy way and is updated based on field verification (weekly, monthly, yearly). Users can have an overview on areas and easily observe problem areas, represented by different colour codes.



To facilitate waterway users access to current infrastructure data, WLAN hotspots were installed at Iron Gate I locks, Calafat, Giurgiu and Galati. Also, the development of a mobile devices application (MobileRIS) was launched, which comfortably displays all infrastructure data such as water levels. The Electronic Navigational Charts published by AFDJ are continuously updated.

8.6 RO | Key issues and related activities 2014 – September 2015

Romanian Danube

	Key issues	*Need for action*	*Activities performed 2014*
RO 01	Insufficient number of sounding vessels	Support acquisition of up-to-date sounding equipment to raise the coverage of surveyed areas.	*Submitted project proposal on the Regional Operational Programme program for feasibility study for technical vessels including sounding vessels* *Defining of the action within the proposed FAIRway project*
RO 02	Insufficient number of automatic gauging stations.	Support acquisition of additional automatic gauging stations, especially for critical sections.	*Submitted project proposal on the Regional Operational Programme for feasibility study for rehabilitating and extending the network of hydrometric stations on the Romanian sector of Danube* *Defining of the action within the proposed FAIRway project*

Action Plan: Romania

RO 03	Lack of dredging equipment, specialized personnel and deficiency of investments in river regulation	Support acquisition of dredging equipment performance to increase the efficiency of working problem areas and the possibility of intervention at any time where it is needed	*Ensuring the enough budget for dredging works for 2014* *Submitted project proposal on the Regional Operational Programme for feasibility study for technical vessels including dredger* *Defining of the action within the proposed PATTERN project - Pilot Activities to Develop the Technical and Operational Capacity for Danube Fairway Rehabilitation including dredging equipment acquisition* *Submitted project proposal on the Regional Operational Programme for feasibility study for riverbank protection on the Sulina Canal* *Submitted project proposal on the Regional Operational Programme for feasibility study for improving the navigation condition on the Danube between Calarasi – Braila – DUNARE 1* *Defining of the action within the proposed FAST Danube project for the feasibility study for review the technical solution for improving the navigation condition on the Romanian - Bulgarian Danube common sector and complementary study*
RO 05	Lack of efficient vessels and special equipment for marking.	Support acquisition of vessels equipped with advanced machines to perform operations board assembly / disassembly floating signals.	*Submitted project proposal on the Regional Operational Programme for feasibility study for technical vessels including marking vessels* *Defining of the action within the proposed FAIRway project* *Defining of the action within the proposed PATTERN project -Pilot Activities to Develop the Technical and Operational Capacity for Danube Fairway Rehabilitation, including marking vessel acquisition*
RO 06	Insufficient number of buoys and position monitoring equipment. Unavailable automated system for the transmission of information on the buoys. The dissemination of information could be improved.	Support acquisition of buoys and monitoring equipment. Support establishment of an automated monitoring system and improve the provision of information on fairway marks.	*Purchased 65 de buoys equipped with monitoring equipment* *In NEWADA duo project was implementing the monitoring system for marking*
RO 07	Unavailable forecast for water levels.	Support establishment of a water level forecast	*Submitted project proposal on the Regional Operational Programme for feasibility study for rehabilitating and extending the network of hydrometric stations on the Romanian sector of Danube- HyQ project* *AFDJ developed a geodesic network of support within the project BORD, financed on Regional Operational Programme* *IRIS Europe 3 project has developed a mathematical model for the water level on the*

			selected pilot sector (Corabia-Bechet)
RO 08	Information could be provided customer-friendly using established river information portals.	Support customer-friendly processing and dissemination of information.	*AFDJ developed a new version of the AFDJ site AFDJ forwarded the information to the FIS PORTAL*
RO 09	Unavailable digital terrain models for shallow sections.	Support set-up of digital terrain models for shallow sections.	*IRIS Europe 3 project has developed a DTM on the selected pilot sector (Corabia-Bechet)*
RO 10	Insufficient number and quality of weather stations.	Support improvement of meteorological information.	*Submitted project proposal on the Regional Operational Programme for feasibility study for rehabilitating and expanding the network of hydrometric stations on the Romanian sector of Danube – HyQ project*
RO 11	Missing interconnection with databases of other waterway administrations to exchange data.	Support interconnection between databases of different waterway administrations.	*In the NEWADA duo project was developed a centralized database between 4 waterway administrations RO/BG/SR/HR for signalling scheme*

Action Plan: Romania

	Key issues	*Need for action*	*Activities performed Jan – Sept 2015*
RO 01	Insufficient number of sounding vessels	Support acquisition of up-to-date sounding equipment to raise the coverage of surveyed areas.	*Implement the project on the Regional Operational Programme for feasibility study for technical vessels including sounding vessels* *Defining of the pilot action within the FAIRway project*
RO 02	Insufficient number of automatic gauging stations.	Support acquisition of additional automatic gauging stations, especially for critical sections.	*Implement the project pilot on the Regional Operational Programme for feasibility study for rehabilitating and extending the network of hydrometric stations on the Romanian sector of Danube* *Defining of the pilot action within the FAIRway project*
RO 03	Lack of dredging equipment, specialized personnel and deficiency of investments in river regulation	Support acquisition of dredging equipment performance to increase the efficiency of working problem areas and the possibility of intervention at any time where it is needed	*Ensuring the enough budget for dredging works for 2015* *Implement the project on the Regional Operational Programme for feasibility study for technical vessels including dredger* *Implement the project proposal on the Regional Operational Programme for feasibility study for riverbank protection on the Sulina Canal* *Implement the project proposal on the Regional Operational Programme for feasibility study for improving the navigation condition on the Danube between Calarasi – Braila – DUNARE 1* *Implement the FAST Danube project for the feasibility study for review the technical solution for improving the navigation condition on the Romanian - Bulgarian Danube common sector and complementary study*
RO 05	Lack of efficient vessels and special equipment for marking.	Support acquisition of vessels equipped with advanced machines to perform operations board assembly / disassembly floating signals.	*Implement the project on the Regional Operational Programme for feasibility study for technical vessels including marking vessels* *Defining of the pilot action within the FAIRway project*
RO 07	Unavailable forecast for water levels.	Support establishment of a water level forecast	*Implement the project on the Regional Operational Programme for feasibility study for rehabilitating and extending the network of hydrometric stations on the Romanian sector of Danube- HyQ project* *AFDJ developed a geodesic network of support within the project BORD, financed on Regional Operational Programme*
RO 08	Information could be provided customer-friendly using established river information portals.	Support customer-friendly processing and dissemination of information.	*AFDJ forwarded the information to the FIS PORTAL*

Action Plan: Romania

RO 10	Insufficient number and quality of weather stations.	Support improvement of meteorological information.	*Implement the project on the Regional Operational Programme for feasibility study for rehabilitating and expanding the network of hydrometric stations on the Romanian sector of Danube – HyQ project*

Danube Black Sea Canal

	Key issues	*Need for action*	*Activities performed 2014*
RO 02	Insufficient number of automatic gauging stations.	Support acquisition of additional automatic gauging stations, especially for critical sections.	*DBSC: ACN has an ongoing project through which will be acquisition a new automatic gauging system.*
RO 03	Lack of dredging equipment, specialized personnel and deficiency of investments in river regulation	Support acquisition ofdredgingequipmentperformancetoincrease the efficiency ofworkinproblem areas andthepossibilityofintervention at any timewhere it is needed	*DBSC: ACN performed dredging works by contracting a specialized company*
RO 04	Inefficient procedures. The documentation to draw up a contract for dredging is time consuming.	Support standardization and simplification of documentation procedures.	*DBSC: In the process of contracting companies that do dredging ACN follows the national legislation and internal procedures regarding acquisitions*
RO 05	Lack of efficient vessels and special equipment for marking.	Support acquisition of vessels equipped with advanced machines to perform operations board assembly / disassembly floating signals.	*DBSC: No acquisitions have been made during 2014*
RO 06	Insufficient number of buoys and position monitoring equipment. Unavailable automated system for the transmission of information on the buoys. The disseminationofinformationcouldbeimproved	Support acquisition of buoys and monitoring equipment. Support establishment of an automated monitoring system and improve the provision of information on fairway marks.	*DBSC: No acquisitions have been made during 2014*
RO 09	Unavailable digital terrain models for shallow sections.	Support set-up of digital terrain models for shallow sections.	*DBSC: PDF files are presented on the company's website regarding shallow sections*
RO 10	Insufficient number and quality of weather stations.	Support improvement of meteorological information.	*DBSC: 12 weather stations implemented.*

	Key issues	*Need for action*	*Activities performed 2015*
RO 01	Insufficient number of sounding vessels	Support acquisition of up-to-date sounding equipment to raise the coverage of surveyed areas.	DBSC:Defining of the action within the proposed FAIRway project
RO 02	Insufficient number of automatic gauging stations.	Support acquisition of additional automatic gauging stations, especially for critical sections.	DBSC:Defining of the action within the proposed FAIRway project
RO 03	Lack of dredging equipment, specialized personnel and deficiency of investments in river regulation	Support acquisition of dredging equipment performance to increase the efficiency of working problem areas and the possibility of intervention at any time where it is needed	DBSC: ACN finalized dredging works in order to assure the optimum navigation conditions
RO 07	Unavailable forecast for water levels.	Support establishment of a water level forecast	DBSC:Defining of the action within the proposed FAIRway project

8.7 RO | Review of rehabilitation and maintenance activities 2014–September 2015

The following activities relate to all critical locations as identified in the Rehabilitation and Maintenance Master Plan (version December 2014):

Surveying activities 2014

The following river bed surveying activities took place, in accordance with an annual plan. The critical locations are measured (multi-beam) at least four times a year (with a higher frequency during low water period). It should be mentioned that monthly surveys at critical locations are performed by single-beam equipment and the detailed surveys (multi-beam) are performed four to five times a year at different water levels. The table below shows the table critical points monitored.

Danube

River-km (from-to)	Frequency of surveying	Type of survey (single/multi-beam)
836,00-839,00	5 per year	SB+MB
820,00-823,00	1 per month	SB+MB
783,00-785,00	1 per month	SB+MB
759,00-761,00	1 per month	SB+MB
675,00-678,00	1 per month	SB+MB
626,00-632,00	1 per month	SB+MB

610,00-613,00	1 per month	SB+MB
344,00-345,00	1 per month	SB
322,00-326,00	1 per month	SB
317,00-318,00	1 per month	SB
308,00-309,50	1 per month	SB
296,00-297,00	1 per month	SB+MB
275,00-276,00	1 per month	SB+MB
250,00-252,00	1 per month	SB+MB
242,00-245,00	1 per month	SB+MB
195,00-197,00	1 per month	SB+MB
189,00-191,00	1 per month	SB+MB
153,00-155,00	1 per month	SB+MB
101,00-103,00	1 per month	SB+MB
73,00-74,00	1 per month	SB+MB
51,00-53,00	1 per month	SB+MB
40,00-41,00	1 per month	SB+MB
30,00-31,00	1 per month	SB+MB
0,00-2,00	1 per week	SB+MB
21,00-24,00 (Borcea branch)	5 per year	SB

Riverbed surveying activities January - September 2015

The following river bed surveying activities were performed in the mentioned period, in accordance with an annual plan and depending on the required (water levels and fairway dimensions). The shallow sections were monitored by detailed surveys and control surveys. During this period, especially the shallow sections, have been measured at least once per month and during the low water period AFDJ performed surveys weekly. Also, surveys were carried out for dredging works and surveys for relocation the fairway. The table below shows the sections monitored.

River-km (from-to)	Frequency of surveying	Type of survey (single/multi-beam)
839,00-610,00	1 per month	SB+MB
345,00-308,00	1 per month	SB
300,00-0,00	1 per month	SB+MB

Danube-Black Sea Canal

River-km (from-to)	Frequency of surveying	Type of survey (single/multi-beam)
0-64,410 DBSC	1 per a year	SB
0 – 27 PAMNC	1 per a year	SB
64+530-64+450 DBSC	1 per month during dredging	SB
37-38 DBSC	1 per a year	SB
1-2 PAMNC	1 per a year	SB
0-1 PAMNC – Luminita Branch	1 per a year	SB

Fairway relocation activities 2014

Danube

River-km (from-to)	Frequency of relocation interventions	Comments
0,00-1075,00	1 per month	Monthly field inspections are performed with specialized vessels and depending on the situation, recourse to the fairway buoying works.

Danube-Black Sea Canal

In 2014 no fairway relocation took place on the Danube Black Sea Canal due to dredging activities.

River-km (from-to)	Frequency of relocation interventions	Comments
-	n/a	On the Danube Black Sea Canal fairway relocation activities are executed only during low water levels and during 2014 there was no need for this kind of activities.

Fairway relocation activities January - September 2015

Danube

River-km (from-to)	Frequency of relocation interventions	Comments
0,00-1075,00	1 per month	Monthly field inspections are performed with specialized vessels and depending on the situation, recourse to the fairway buoying works.

During the low water period (started on July) weekly was performed interventions on the field to check the fairway dimensions and the physical condition of the marking signals and when necessary, because of the lows water levels, situated below LNWL, proceeded to narrowing the

fairway. Due to changes in the riverbed, in Corabia area, the fairway trajectory was relocated to ensure the navigation depths.

Danube-Black Sea Canal

In 2015 no fairway relocation took place on the Danube Black Sea Canal due to dredging activities.

Dredging activities 2014

Danube

The following fairway dredging measures for navigation conditions insurance were implemented on the Romanian Danube:

Location	Dredging site (river-km)		Beginning of service	End of service	Material	m³
	From	To				
Bechet	676.50	677.00	12.12.2014	14.12.2014	Fine sediment	1,513.00
Cochirleni	304.00	305.00	05.11.2014	18.11.2014	Fine sediment	10,290.00
Seimeni	289.00	292.00	01.09.2014	30.12.2014	Fine sediment	89,382.00
Albanesti	275.00	276.00	02.10.2014	30.12.2014	Fine sediment	55,421.00
Harsova	249.00	251.00	05.09.2014	30.12.2014	Fine sediment	97,639.00

On the river Danube the 254.245 m³ were dredged with the third parties to ensure navigation conditions in 2014. For the maritime Danube, a volume of 169.680 m³ was dredged in 2014 with own resources. For 2014, a total volume of 423.925 m³ was dredged to ensure navigation conditions.

Danube-Black Sea Canal

River-km (from-to)	Dredging months	Cubic metre dredged
64+530-64+450	January	32.285
	February	26.655
	March	28.755

In total 87.695 m³ were dredged for commercial navigation on the Danube Black Sea Canal in 2014.

Dredging activities January-September 2015

Danube

The following fairway dredging measures for navigation conditions insurance were implemented on the Romanian Danube:

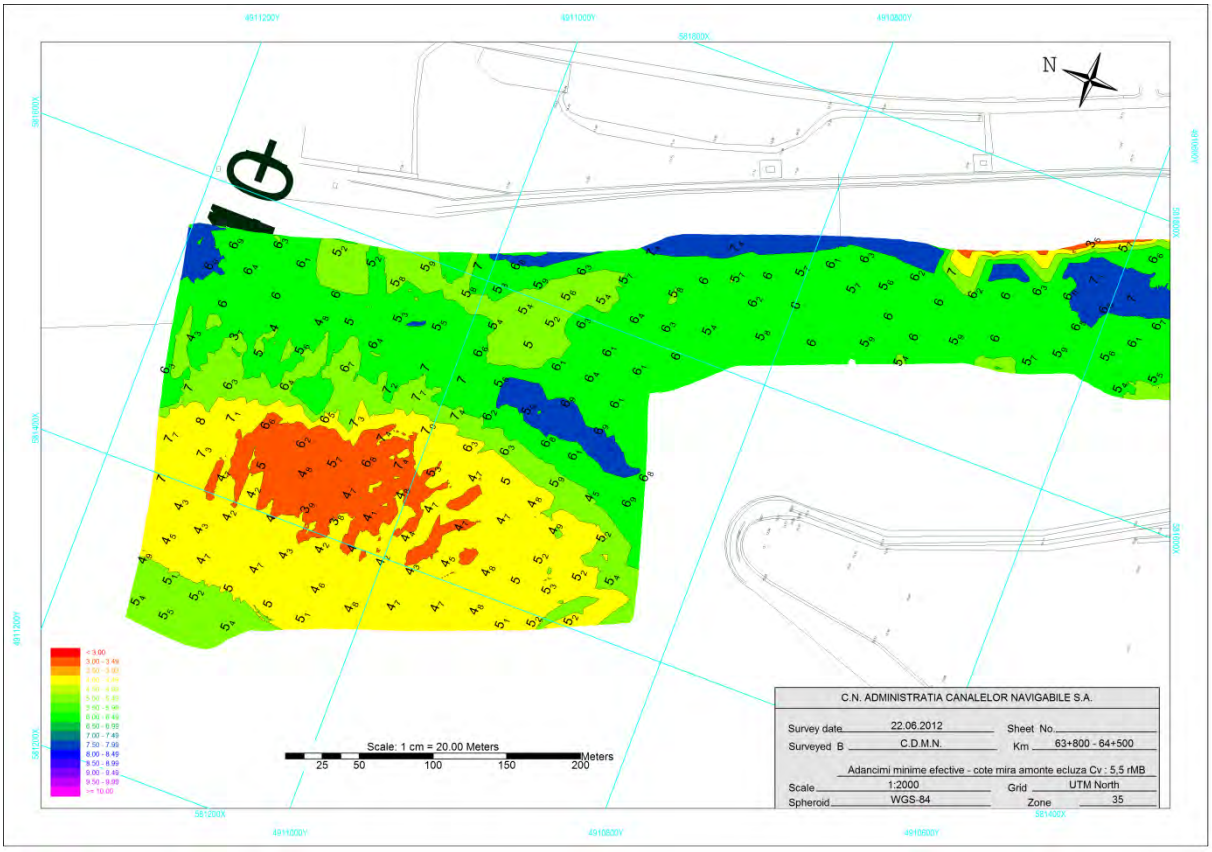
Location	Dredging site (river-km)		Beginning of service	End of service	Material	m³
	From	To				
Bechet	676.60	677.40	27.08.2015	-	Fine sediment	33,601.00
Corabia	627.40	627.80	08.09.2015	11.09.2015	Fine sediment	5,939.00
Seimeni	289.00	292.00	02.09.2015	-	Fine sediment	18,586.00
Albanesti	274.00	276.00	01.09.2015	-	Fine sediment	15,095.00
Capidava	280.00	281.50	18.09.2015	-	Fine sediment	5,000.00
Giurgeni	243.00	245.00	04.09.2015	-	Fine sediment	18,008.00
I. Lupu	194.00	197.50	11.08.2015	-	Fine sediment	16,674.00
Prut	133.00	137.00	25.06.2015	06.08.2015	Fine sediment	291,845.00
Isaccea	103.00	107.00	06.08.2015	02.09.2015	Fine sediment	83,735.00
Sulina Bar	0.50	0.80	03.04.2015	01.05.2015	Fine sediment	63,520.00

On the river Danube the 112.903 m³ were dredged with the third parties to ensure navigation conditions in period January-September 2015. For the maritime Danube, a volume of 439.100m³ was dredged in period January-September 2015 with own resources. For period January - September 2015, a total volume of 552.003 m³ was dredged to ensure navigation conditions.

Danube-Black Sea Canal

River-km (from-to)	Dredging months	Cubic metre dredged
63+550- 64+000 64+010-64+550	March	52.100
	April	47.550
	May	60.540
	June	41.755
	July	47.610

In total, 249.555 m³ were dredged with the third parties for commercial navigation on the Danube Black Sea Canal in 2015.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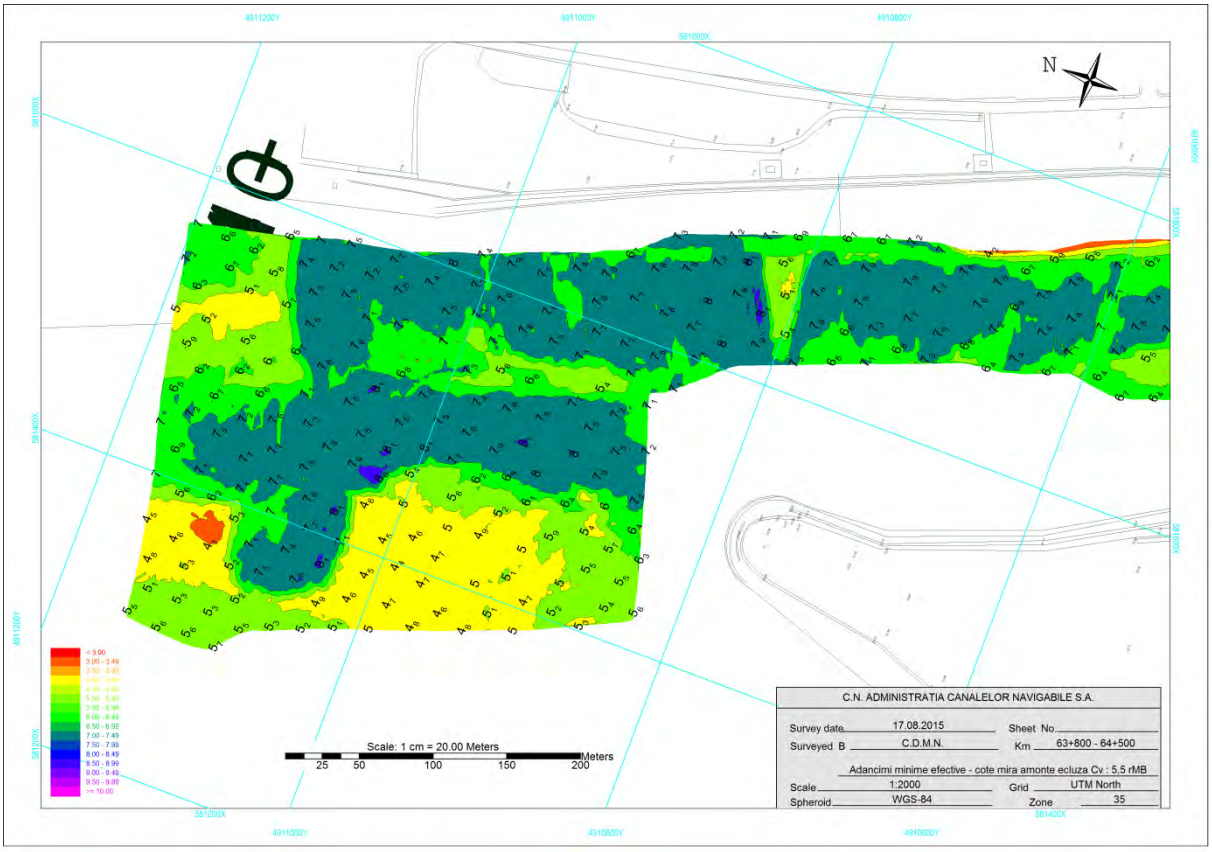
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Spheroid WGS-84
Zone 35

8.8 RO | Operational and investment costs

Operational expenditures 2014 and budget needs 2015

Need areas	Operational expenditures 2014			Add. yearly need (Master plan)	Secured operational budget 2015			Estim. Financing gap 2015
	Danube	Danube-Black Sea Canal	Danube and Black Sea Canal		Danube	Danube Black Sea Canal	Danube and Black Sea Canal	
Minimum fairway parameters (width/depth)	2.605.000	353.900	2.958.900	536.000	2.600.000	1.019.051	3.619.051	-
Surveying of the riverbed	742.200	800	743.000	1.000	740.000	4.875	744.875	-
Water level gauges	-	-	-	30.000	-	-	-	30.000
Marking of the fairway	3.313.950	-	3.313.950		3.300.000	17.554	3.317.554	-
Availability of locks / lock chambers	-	7.445.682*	7.445.682	-	-	8.130.774	8.130.774	-
Information on water levels and forecasts	-	-	-	-	-	-	-	-
Information on fairway depths	-	-	-	-	-	-	-	-
Information on marking plans	-	-	-	-	-	-	-	-
Meteorological information	-	-	-	-	-	-	-	-
Other needs	-	-	-	-	-	223.706**	223.706	-
Sum	**6.661.150**	**7.871.582***	**14.532.732**	**567.000**	**6.640.000**	**9.395.960**	**16.035.960**	**30.000**

* The initial amount of operational expenditures for locks/lock chambers provided in the Roadmaps of June 2015 was €71.200. Due to additional actions in 2014 (one chamber of each lock is being modernized), the amount had to be raised to €7.445.682. This results in a raise of overall operational cost for 2014 (for ACN) from 425.900 (June 2015 roadmap) to €7.871.582€).

**Cost are related to maintenance works for hydrotechnical construction works along the canals (especially the silting of water collecting ditches along the service roads and ditches up to the natural ground level - the difference between water level and natural ground level is up to 50 m) It can only be part of the budget if it is related to the fairway. Furthermore, if it is budgeted, it cannot be a financing gap. That`s why I deleted this amount from the financing gap column.

- All cost for “Water level gauges”,” Information on water levels and forecasts”, “Information on fairway depths” and “Meteorological information” was included in Surveying of the river bed
- All costs for “Information on marking plans” was included in Marking of the fairway

Operational expenditures 2015 and budget needs 2016 (AFDJ and ACN)

Need areas	Estimated operational expenditures 2015	Required operational budget 2016	Secured operational budget 2016	Remaining financing gap 2016
Minimum fairway parameters (width/depth)	3.619.051	2.917.120	2.867.120	50.000
Surveying of the riverbed	744.875	805.100	785.100	20.000
Water level gauges	-	-	-	-
Marking of the fairway	3.317.554	3.547.619	3.447.619	100.000
Availability of locks / lock chambers	8.130.774	10.841.032	10.841.032	-
Information on water levels and forecasts	-	-	-	-
Information on fairway depths	-	-	-	-
Information on marking plans	-	-	-	-
Meteorological information	-	-	-	-
Other needs	223.706	223.706	223.706	-
Sum	**16.035.960**	**18.334.577**	**18.164.577**	170.000

Operational expenditures 2015 and budget needs 2016 AFDJ

Need areas	Estimated operational expenditures 2015	Required operational budget 2016	Secured operational budget 2016	Remaining financing gap 2016
Minimum fairway parameters (width/depth)	2.600.000	2.750.000	2.700.000	50.000
Surveying of the riverbed	740.000	800.000	780.000	20.000
Water level gauges	-	-	-	-
Marking of the fairway	3.300.000	3.500.000	3.400.000	100.000
Availability of locks / lock chambers	-	-	-	-
Information on water levels and forecasts	-	-	-	-
Information on fairway depths	-	-	-	-
Information on marking plans	-	-	-	-
Meteorological information	-	-	-	-
Other needs	-	-	-	-
Sum	**6.640.000**	**7.050.000**	**6.880.000**	**170.000**

Operational expenditures 2015 and budget needs 2016 (ACN)

Need areas	Estimated operational expenditures 2015	Required operational budget 2016	Secured operational budget 2016	Remaining financing gap 2016
Minimum fairway parameters (width/depth)	1.019.051	167.120	167.120	-
Surveying of the riverbed	4.875	5.100	5.100	-
Water level gauges	0	0	0	-
Marking of the fairway	17.554	47.619	47.619	-
Availability of locks / lock chambers	8.130.774	10.841.032	10.841.032	-
Information on water levels and forecasts	-	-	-	-
Information on fairway depths	-	-	-	-
Information on marking plans	-	-	-	-

Meteorological information	-	-	-	-
Other needs	223.706	223.706	223.706	-
Sum	**9.395.960**	**11.284.577**	**11.284.577**	-

Investments taken for Rehabilitation and Maintenance 2014 – September 2015

The figures in this table comprise AFDJ and ACN Need areas	Required additional investment 2014 – 2020 according to FRMMP EURO	Additional investment need 2015 – 2020	Investment cost secured by EU co-financing 2015 – 2020 (EUR)	Estimated investment expenditures 2015 (incl.EU co-financing) EURO	Estimated national investment expenditures 2015 (excl.EU co-financing)
	23.500.000		360.000	360.000	-
Minimum fairway parameters (width/depth)	5.433.000		787.750	247.750	131.200
Surveying of the riverbed	300.000		596.000	367.000	-
Water level gauges	10.274.000		4.360.000	360.000	-
Marking of the fairway	400.000	228.000.000*	198.884.393	57.495.361	8.624.304
Availability of locks / lock chambers	206.000		227.350	-	-
Information on water levels and forecasts	400.000		-	-	-
Information on fairway depths	80.000		-	-	-
Information on marking plans	365.000		220.000	20.000	-
Meteorological information	100.000		-	-	-
Other needs	**41.058.000**	**228.000.000***	**205.435.493**	**58.850.111**	**8.755.504**

*For the availability of lock chambers, ACN reported an additional investment need of 228.000.000 Euro with this action plan update. This sum is covered by the EU-funded project "Modernization of Locks. Equipment and installation" which is to be finished in 2018. The project includes:

- rehabilitation of the locks Cernavoda and Agigea;
- rehabilitation and upgrading of the basic and auxiliary equipment serving these locks;
- the main pumping station in Cernavoda (SPC) and other 3 pumping stations protecting villages against floods;
- rehabilitation of the Ovidiu lock including the high waters galleries;
- rehabilitation of the high waters galleries of the Navodari lock.

The required additional investment need was thuis raised from € 41.058.000 in the Masterplan 2014 to thus raised to € 268.058.000 in this action plan update Oct 2015.

This project was included in the figures in column 4 and five of the table above and will be part of the reporting of the upcoming action plans.

Planned investments 2016

Need areas	Remaining required investment 2016 – 2020 EURO	Required investment budget 2016 (incl. EU Co-financing) EURO	Secured national investment budget 2016 (excl. EU co-financing) EURO	Secured investment budget 2016 (only EU co-financing)	Remaining investment need 2017-2020 (%)
Minimum fairway parameters (dredging)	23.140.000	0	0	0	100%
Surveying of the riverbed	5.185.250	290.000	43.500	246.500	84%
Water level gauges	-67.000	204.000	31.000	173.400	-
Marking of the fairway	9.914.000	2.000.000	300.000	1.700.000	55%
Availability of locks / lock chambers	170.904.639	31.667.435	19.778.443	11.898.992	1%
Information on water levels and forecasts	206.000	206.000	30.900	175.100	-
Information on fairwaydepths	400.000	-	-	-	100%
Information on markingplans	80.000	-	-	-	100%
Meteorologicalinformation	345.000	200.000	30.000	170.000	32%
Other needs	100.000	120.000	-	-	100%
Sum	**201.452.385**	**34.687.435**	**20.213.843**	**14.363.992**	

8.9 RO | Outlook: actions, milestones and funding sources

Danube and Danube Black Sea Canal

RO 01: Insufficient number of sounding vessels		
Plannedactivities:	*Support acquisition of up-to-date sounding equipment to raise the coverage of surveyed areas managing of the purchasing*	
Current shortcomings:	Insufficient of the up-to-date sounding vessels and equipment, modernisation and acquisition requested	
Possible funding:	Budget availability 2015/2016: Funding through Regional Operational Programme – feasibility study for technical vessels CEF Programme – FAIRway project	

Next steps:	AFDJ: Finalisation the feasibility study for sounding vessels Acquisition of sounding vessels and equipments Danube Black Sea Canal: Finalization of feasibility study for design and built 2 multifunctional vessels Design and built 2 multifunctional vessels (depending the financial resources)	Until 2017 Until June 2016 Until June 2018
RO 02: Insufficient number of automatic gauging stations.		
Planned activities:	Support acquisition of additional automatic gauging stations, especially for critical sections.	
Current shortcomings:	Insufficient number of automatic gauging stations , especially for critical sections	
Possible funding:	Budget availability 2015/2016: Funding through Regional Operational Programme – HyQ Project/ CEF Programme – FAIRway project next call of CEF Programme or next Operational Programme	
Next steps:	Finalisation the feasibility study for rehabilitating and extending the network of hydrometric stations Organising the tender for automatic gauging station for installation automatic gauging station in a selected pilot areas Installation automatic gauging station in a selected pilot areas Submitting the proposal for rehabilitating and extending the network of hydrometric stations Organising the tender and implementing the gauging network system	Until 2018
RO 03: Lack of dredging equipment, specialized personnel and deficiency of investments in river regulation		
Planned activities:	Support acquisition of dredging equipment performance to increase the efficiency of working problem areas and the possibility of intervention at any time where it is needed	
Current shortcomings:	AFDJ: Limited national dredging market, missing dredging equipment for river sector problem areas and the possibility of intervention at any time where it is needed Lack of new specialized personnel due to the restrictions of national legislation Low level waterway infrastructure Danube Black Sea Canal: One of the important issues to ACN is to ensure the stability of navigable canals banks, in area where the gap between service road level and natural ground level is up to 55 m (about 20 km on Danube Black Sea canal –each shore and about 7 km on Poarta alba Midia Navodari canal –on each shore)	

Possible funding:	*Budget availability 2015/2016: Funding through CEF Programme – PATTERN project and ensure enough budget for dredging works and personnel training through state budget/AFDJ budget* *ROP – feasibility study for* for riverbank protection on the Sulina Canal ROP – feasibility study for improving the navigation condition on the Danube between Calarasi – Braila – DUNARE 1 *CEF Programme for* feasibility study for review the technical solution for improving the navigation condition on the Romanian - Bulgarian Danube common sector and complementary study – FAST DANUBE	
Next steps:	Finalisation the feasibility study for dredging vessels Acquisition of dredging equipment New dredging equipment needs of having new specialized personnel – training will be made Finalisation feasibility study for riverbank protection on the Sulina Canal Finalisation feasibility study for improving the navigation condition on the Danube between Calarasi – Braila – DUNARE 1 Finalisation feasibility study for review the technical solution for improving the navigation condition on the Romanian - Bulgarian Danube common sector and complementary study – FAST DANUBE River engineering works for improving waterway infrastructure on the Sulina Canal, Calarasi – Braila, Romanian - Bulgarian Danube common sector Danube Black Sea canal : Currently ACN is looking to identify the possible financial resources for execution of works . -If ACN identify the financial allocation for this project, the feasibility study (financed by ISPA funds) for protection and consolidation of banks will be revised and updated Design and execution of works (protection and consolidation of banks)	*End of 2018* *End of 2018* *Until 2017* *Until 2020*
***RO* 04: Inefficient procedures. The documentation to draw up a contract for dredging is time-consuming.**		
Planned activities:	Support standardization and simplification of documentation procedures.	
Current shortcomings:	Inefficient procedures	
Possible funding:	*Budget availability 2015/2016: Funding through AFDJ budget/state budget*	
Next steps:	*Preparing specific documentation for the efficient procedures concerning with existing standards and national legislation*	*Until 2016*

Action Plan: Romania

RO 05: Lack of efficient vessels and special equipment for marking.		
Planned activities:	*Support acquisition of vessels equipped with advanced machines to perform operations board assembly / disassembly floating signals.*	
Current shortcomings:	Missing the efficient vessels and special equipment for marking	
Possible funding:	Budget availability 2015/2016: Funding through Regional Operational Programme – Feasibility study for technical vessels CEF Programme – FAIRway project and PATTERN project	
Next steps:	Finalisation the feasibility study for marking vessels Organising the tender and purchasing the vessels	Until 2017
RO 06: Insufficient number of buoys and position monitoring equipment. Unavailable automated system for the transmission of information on the buoys. The dissemination of information could be improved		
Planned activities:	*Support acquisition of buoys and monitoring equipment. Support establishment of an automated monitoring system and improve the provision of information on fairway marks.*	
Current shortcomings:	*Insufficient number of buoys and position monitoring equipment*	
Possible funding:	Budget availability 2015/2016: Funding through: CEF Programme – FAIRway project AFDJ budget/state budget	
Next steps:	Preparing the technical specification for public acquisition	Until 2016
RO 07 Unavailable forecast for water levels		
Planned activities:	*Support establishment of a water level forecast*	
Current shortcomings:	Unavailable forecast for water levels	
Possible funding:	Budget availability 2015/2016: Funding through Regional Operational Programme – HyQ Project CEF Programme – FAIRway project next call of CEF Programme or next Investment Programme	
Next steps:	Finalisation the feasibility study for rehabilitating and extending the network of hydrometric stations Organising the tender for automatic gauging station for installation automatic gauging station in a selected pilot areas Installation automatic gauging station in a selected pilot areas Submitting the proposal for rehabilitating and extending the network of hydrometric stations Organising the tender and rehabilitation and extension the gauging network system	Until 2018

Action Plan: Romania

RO 08: Information could be provided customer-friendly using established river information portals.		
Planned activities:	*Support customer-friendly processing and dissemination of information.*	
Current shortcomings:	Insufficient quality and frequency of transmitting information to users	
Possible funding:	Budget availability 2015/2016: Funding through AFDJ budget/state budget	
Next steps:	Increasing technical capacity for processing and publishing fairway information	Until 2016
RO 09: Unavailable digital terrain models for shallow sections.		
Plannedactivities:	*Support set-up of digital terrain models for shallow sections.*	
Currentshortcomings:	*Unavailable digital terrain models for shallow sections*	
Possiblefunding:	Budget availability 2015/2016: Funding through AFDJ budget/ state budget CEF Programme – FAIRway project CBC Programme	
Next steps:	Acquisition of software for creating the DTM Realisation of data base for hydrographical and hydrological data	Until 2016
RO 10: Insufficient number and quality of weather stations.		
Planned activities:	*Support improvement of meteorological information.*	
Current shortcomings:	*Insufficient number and quality of weather stations.*	
Possible funding:	Budget availability 2015/2016: Funding through Regional Operational Programme – HyQ Project CEF Programme – FAIRway project next call of CEF Programme or next Investment Programme	
Next steps:	Finalisation the feasibility study for rehabilitating and extending the network of hydrometric stations Organising the tender for automatic gauging station for installation automatic gauging station in a selected pilot areas Installation automatic gauging station in a selected pilot areas Submitting the proposal for rehabilitating and extending the network of hydrometric stations Organising the tender and rehabilitation and extension the gauging network system	Until 2018

Action Plan: Romania

RO 11: Missing interconnection with databases of other waterway administrations to exchange data		
Planned activities:	*Support interconnection between databases of different waterway administrations.*	
Current shortcomings:	*Insufficient interconnection with databases of other waterway administrations to exchange data*	
Possible funding:	Budget availability 2015/2016: Funding through Regional Operational Programme – HyQ Project CEF Programme – FAIRway project CBC Programme AFDJ budget/state budget	
Next steps:	Acquisition of hardware and software for creating data base Creating data base with the same structure with other waterway administrations for improving the data exchange service	Until 2016

9 Bulgaria

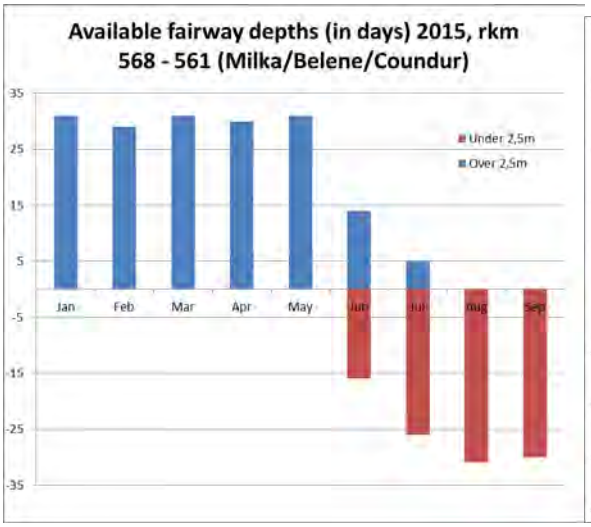
EAEMDR – Executive Agency "Exploration and Maintenance of the Danube River" (public authority within Ministry of Transport) is responsible for fairway maintenance, rehabilitation and upgrade.

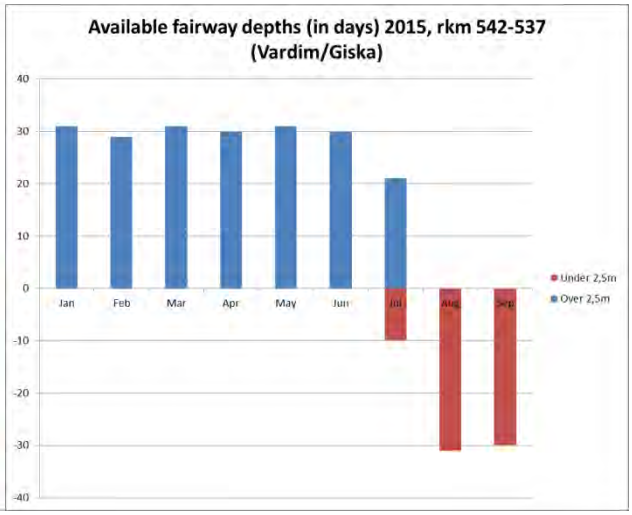
9.1 BG | Status report on main critical locations 2012-September 2015

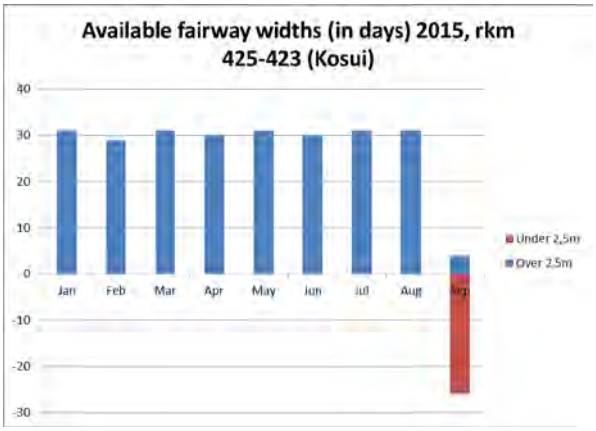
Number of days with fairway depths > 2.5m on main critical locations (as identified by the Danube waterway users in a survey concluded in December 2014):

Critical location	2012	2013	2014
km 610 - km 607	318	327	365
km 591 - km 584	345	346	365
km 569 - km 561	283	275	337
km 548 - km 540	292	309	360
km 540 - km 536	316	317	360
km 525 - km 520	339	314	352
km 476 - km 472	337	326	365
km 463 - km 460	366	365	365
km 458 - km 455	341	365	365
km 441 - km 435	366	365	365
km 426 - km 420	332	354	365
km 414 - km 410	345	341	365
km 408 - km 399	342	365	365
km 395 - km 390	345	365	365
km 386 - km 382	346	358	365

Status of critical locations Jan – September 2015







The low water levels in the months of June and especially in July, August and September had a drastic effect on the navigation in the Bulgarian part of the Danube River. In June 2015 the total amount of days with available fairway depth over 2.5 m was 14 days. However, a water depth of 23 and 24 decimetres could still be used for navigation in this section. The situation became worse in July, August and September, while the water depth was under 2.5 m respectively 26, 31, 30 days. The navigation was not totally stopped but some restrictions to the convoys were imposed.

9.2 BG | Hydrological conditions on main critical locations 2012-2014

Number of days with flow discharge above multiannual average flow discharge for the main critical locations.

Critical location	2012	2013	2014
Svishtov km 554.300	78	168	205
Ruse km 495.600	84	176	211
Silistra km 375.500	75	165	210

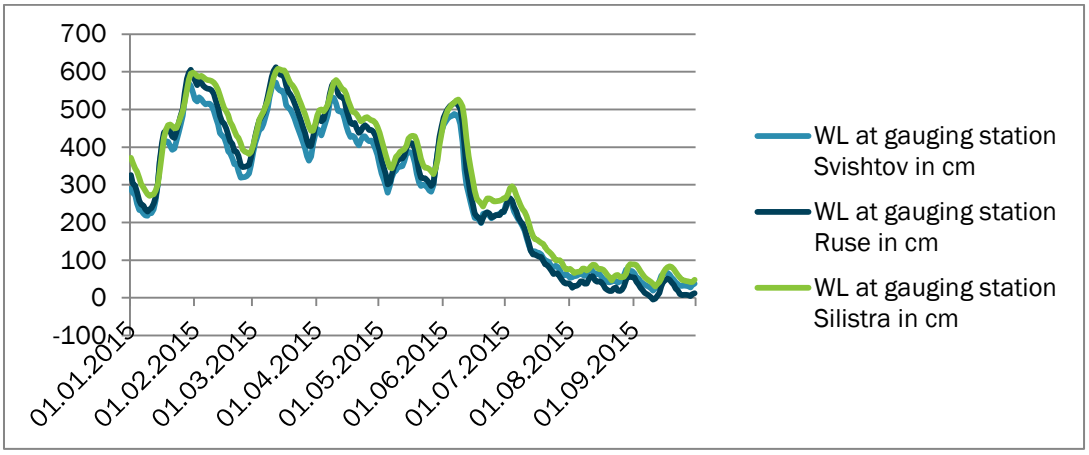
* In the critical locations flow discharge measurements are not performed with the necessary frequency. In order number of days with flow discharge above multiannual average flow discharge to be calculated additional data is needed. The data used as a base for the above table is collected in gauging stations near critical sections.

9.3 BG | Water level information on main critical locations 2012- September 2015

Critical location	Reference gauge	No of days above LNWL		
		2012	2013	2014
567.00-566.70 – Belene island 562.00-561.50 – Coundur island 541.60-541.00 – Vardim island	Svishtov km 554.300	337	326	365
523.80-523.20 – Batin island 475.70-475.30 – Gostin island	Ruse km 495.600	341	329	365
391.60-391.10 – Vetren island 383.50-382.50 – Chaika island	Silistra km 375.500	325	326	365

EAEMDR implemented the project “Improvement of the systems for navigation and topohydrographic measurements”, under OPT 2007-2013. Within the project, 9 automatic hydrometric stations were installed along the common Bulgarian-Romanian section. The parameters measured by the automatic stations are: water levels; temperature of the water; turbidity; temperature and humidity of air; wind speed and direction; amount, type, and duration of precipitation (rain, snow); intensity of precipitation; atmospheric pressure; solar radiation, visibility. The information for all parameters is displayed on 9 electronic displays.

Water level gauge at Svishtov, Ruse, Silistra 1 January 20 15 – 30 September 2015



9.4 BG | Water level prognoses for critical location

Water level forecasts for Ruse and Silistra are provided online at http://www.appd-bg.org/siteen/wrap.php?3

On the basis of the collected data daily, monthly, annual and multi-annual prognosis are prepared. Daily forecasting of the expected water levels is done for Ruse and Silistra. These are short term forecasts – concerning the next two days. Every Wednesday a weekly forecast is done for the expected tendency in water levels change and the expected highest and lowest water levels for Ruse and Silistra.

9.5 BG | Time from surveying to action: maintenance philosophy

N/A

9.6 BG | Key issues and related activities 2014

	Key issues	*Need for action*	*Activities performed 2014*
BG 01	Old or insufficient measuring equipment	Support acquisition of up-to-date (renewed single-beam and additional multi-beam) sounding equipment	*Preparation of Fairway project under CEF*
BG 02	Limited number of skilled personnel	Secure education and provision of well-trained staff in the short, medium and long term	*A training course on AutoCAD Civil 3D and ArcGIS Desktop, applicable for free-flowing river sections, was performed during the summer of 2014; several EAEMDR employees were trained*

BG 03	To a large extend, interventions are planned on short term due to rapidly changing fairway conditions	Support improvement of monitoring procedures, data basics and methods for analysis and planning of interventions	*Preparation of Fairway project under CEF – Waterway Asset Management System*
BG 04	Inefficient allocation of resources due to suboptimal information support system, lack of consistent database of riverbed surveys and cumbersome procedures	Support introduction of a Fairway Management System	*Preparation of Fairway project under CEF – surveying vessels, gauging stations, water level prognosis and WAMS*
BG 05	Only very little dredging works of the fairway have been performed for many years because of insufficient dredging equipment and limited financial resources	Support acquisition of up-to-date dredging equipment Increase available annual resources for dredging works Support implementation of structural river engineering measures	*Preparation of tender documentation for the delivery of dredging equipment within TAF-DRP* *Project "Modernization and optimization of the rehabilitation activities in the common Bulgarian-Romanian section of the Danube River" (del. of dredging equipment) was included in OPTTI 2014-2020* *The project "Improving the navigation conditions for the Romanian-Bulgarian common sector of the Danube" includes the implementation of structural river engineering measures and is currently under preparation – new terms of reference for a feasibility study, Environmental Impact Assessment (EIA), Appropriate Assessment (AA), tender documents for a design and construction contract (FIDIC Yellow) as well as for the supervision of works, and an application for EU funding are being prepared. The project FAST Danube applied for funding under CEF.*
BG 06	High traffic risks due to loss or incorrectness of navigation signs provoked by accidents with ships or insufficient maintenance	Enable improved surveillance of navigation activities by electronic means Increase resources for maintenance of floating signs	*Fulfilled activity for delivery of floating and coastal navigational signs (160 floating navigational signs (buoys); 980 coastal navigational signs; 20 coastal lighthouses; **system for control of location for floating signs and coastal light beacons in real time**) within project „Improvement of the systems for navigation and topohydrographic measurements along the Danube River" under OPT 2007-2013* *Preparation of Fairway project under CEF – marking vessel* *Project "Modernization and optimization of the rehabilitation activities in the common Bulgarian-Romanian section of the Danube*

			River" - marking vessel
BG 07	Insufficient marking equipment	Support acquisition of monitoring and marking equipment	*Preparation of Fairway project under CEF and preparation of project Modernization and optimization of the rehabilitation activities in the common BG-RO section of the Danube River under OPTTI 20014-2020*
BG 08	Limited number of skilled personnel (regarding fairway marking)	Secure education and provision of well-trained staff in the short, medium and long term	-

	Key issues	***Need for action***	***Activities performed in the period 1 January-30 September 2015***
BG 01	Old or insufficient measuring equipment	Support acquisition of up-to-date (renewed single-beam and additional multi-beam) sounding equipment	*Preparation of Fairway project under CEF and approval of the project proposal*
BG 03	To a large extend, interventions are planned on short term due to rapidly changing fairway conditions	Support improvement of monitoring procedures, data basics and methods for analysis and planning of interventions	*Preparation of Fairway project under CEF and approval of the project – Waterway Asset Management System*
BG 04	Inefficient allocation of resources due to suboptimal information support system, lack of consistent database of riverbed surveys and cumbersome procedures	Support introduction of a Fairway Management System	*Preparation of Fairway project under CEF and approval of the project proposal – surveying vessels, gauging stations, water level forecast and WAMS*
BG 05	Only very little dredging works of the fairway have been performed for many years because of insufficient dredging equipment and limited financial resources	Support acquisition of up-to-date dredging equipment Increase available annual resources for dredging works Support implementation of structural river engineering measures	*The project FAST Danube applied for funding under CEF and the project proposal was approved.*

BG 06	High traffic risks due to loss or incorrectness of navigation signs provoked by accidents with ships or insufficient maintenance	Enable improved surveillance of navigation activities by electronic means Increase resources for maintenance of floating signs	*The delivered floating and coastal navigational signs within project „Improvement of the systems for navigation and topohydrographic measurements along the Danube River" under OPT 2007-2013 were positioned according the requirements with the newly established GPS geodetic network under the same project. The system for control of location for floating signs and coastal light beacons in real time has been testing and will be fully operable till the end of 2015.*
BG 07	Insufficient marking equipment	Support acquisition of monitoring and marking equipment	*Preparation of Fairway project under CEF and approval of the project*

9.7 BG | Review of rehabilitation and maintenance activities 2014 – September 2015

The following activities relate to all critical locations as identified in the Rehabilitation and Maintenance Master Plan (version December 2014)

Surveying activities 2014

River-km (from-to)	Frequency of surveying	Type of survey (single/multibeam)
км 491 – км 491.600	2 times for 2014	Single beam
km 488.700	5 times for 2014	Single beam
km 514 – km 499	1 time for 2014	Single beam
km 530 – km 514 km 518 – km 517	1 time for 2014 1 time for 2014	Single beam
km 536 – km 530	1 time for 2014	Single beam
km 547 – km 536	1 time for 2014	Single beam
km 571 – km 559 km 569 – km 566 km 563 – km 561	1 time for 2014 1 time for 2014 1 time for 2014	Single beam
km 558 – km 548	1 time for 2014	Single beam
km 429 - km 422	2 times for 2014	Single beam
km 387 – km 382	1 time for 2014	Single beam

Riverbed surveying activities January – September 2015

During the period 1 January – 30 September 2015 the following surveys were performed on rkm: km 568 – km 560, km 476 – km 472, km 544 – km 534, km 469.2 – km 463, km 495.4 – km

494.8, Popina island, Ruse-Giurgiu bridge. Totally 491 cross profiles, and 14 longitudinal measurements with total length 495.46 km were surveyed.

Fairway relocation activities 2014

During 2014 no relocation interventions of the fairway trajectory were performed. The only changes with regard to the navigational channel were connected with mounting and dismounting of damaged or accidentally moved by convoys buoys (41 times).

Fairway relocation activities January – September 2015

In the period 1 January 2015 – 30 September 2015 no relocation interventions of the fairway trajectory were performed.

Dredging activities 2014

No dredging activities on the fairway were performed during 2014. In-house dredging activities for deepening the entrance of EAEMDR's specialized port of total volume of 4700 m^3 was performed during the year. The main reason for not performing dredging on the fairway is that EAEMDR do not possess suitable dredging equipment to perform on the fairway. The extremely limited financial sources additionally hamper the execution of dredging works.

9.8 BG | Operational and investment costs

Operational expenditures 2014 and budget needs 2015

Need areas	Operational expenditures 2014	Additional yearly need (Masterplan)	Secured operational budget 2015	Estimated Financing gap 2015
Minimum fairway parameters (width/depth)		642.000	-	642.000
Surveying of the riverbed	10.669	600.000	36.000	574.669
Water level gauges		3.500	5.000	-
Marking of the fairway	145.322	20.000	162.000	3.322
Availability of locks / lock chambers		n/a	n/a	n/a
Information on water levels and forecasts		-	-	-
Information on fairway depths		-	-	-
Information on marking plans		-	-	-
Meteorological information		-	-	-
Other needs		-	-	-
Sum	**155.991**	**1.265.500**	**203.000**	**1.219.991**

The total budget of EAEMDR for 2014 was 1.269.333 € and was distributed as follows:

Staff costs:	689.418
Operational costs:	415.273
Taxes:	6.987
Membership due/fees:	128.793
Capital costs:	28.859

Operational expenditures and budget needs 2016

Need areas	Estimated operational expenditures 2015	Required operational budget 2016	Secured operational budget 2016	Remaining Financing gap 2016
Minimum fairway parameters (width/depth)	0	642.000		642.000
Surveying of the riverbed	36.000	600.000		600.000
Water level gauges	5.000	5.000		5.000
Marking of the fairway	162.000	268.750		268.750
Availability of locks / lock chambers	n/a	n/a		n/a
Information on water levels and forecasts	15.000	14.000		14.000
Information on fairway depths	6.000	6.000		6.000
Information on marking plans	6.000	6.000		6.000
Meteorological information	15.000	15.000		15.000
Other needs	20.000	20.000		20.000
Sum	**265.000**	**1.576.750**	**0***	**1.576.750**

* The budget for 2016 is not set up yet. Preliminary figures could be available by January 2016.

Investments taken for Rehabilitation and Maintenance 2014 – September 2015

Need areas	Required additional investment 2014 – 2020 according to FRMMP EURO	Investment cost secured by EU co-financing 2015 – 2020 (EUR)	Estimated investment expenditures 2015 (incl. EU co-financing)	Estimated national investment expenditures 2015 (excl. EU co-financing) EURO
Minimum fairway parameters (dredging)	8.020.000	0		
Surveying of the riverbed	3.810.000	3.727.822	154.822	23.223
Water level gauges	0	500.000		
Marking of the fairway	9.215.000	4.044.245	844.245	126.636
Availability of locks / lock chambers	n/a	n/a	n/a	
Information on water levels and forecasts	0	125.000		
Information on fairway depths	12.000	320.000		
Information on marking plans	0	0		
Meteorological information	75.000	80.000		
Other needs	0	150.000		
Sum	**21.132.000**	**8.947.067**	**999.067**	**149.589**

Planned investments 2016

Need areas	Remaining required investment 2016 – 2020 based on FRMMP EURO	Required investment budget 2016 (incl. EU Co-financing)	Secured national investment budget 2016 (excl. EU co-financing) EURO	Secured investment budget 2016 (only EU co-financing)	Remaining investment need 2017-2020 (%)
Minimum fairway parameters (dredging)	8.020.000	0	0	0	
Surveying of the riverbed	58.955	3.570.000	535.500	3.034.500	
Water level gauges		300.000	45.000	255.000	
Marking of the fairway	5.044.119	1.000.000	150.000	850.000	
Availability of locks / lock chambers		n/a	n/a	n/a	
Information on water levels and forecasts		0	0	0	

Information on fairway depths		320.000	48.000	272.000	
Information on marking plans	0	0	0	0	
Meteorological information		20.000	3.000	17.000	
Other needs		40.000	6.000	34.000	
Sum	**13.123.074**	**5.250.000**	**787.500**	**4.462.500**	**54%**

9.9 BG | Outlook: planned actions, milestones and funding sources

BG 01: Old or insufficient measuring equipment		
Planned activities:	One of the project "Improvement of the systems for navigation and topo-hydrographic measurements along the Danube River" components is delivery of a hydrographic surveying vessel which will be equipped with a multi-beam echo sounder	
Current shortcomings:	The delivery of the vessel was postponed for the next operational programme on Transport and transport infrastructure 2014-2020	
Possible funding:	OPTTI 2014-2020	
Next steps:	Project "Improvement of the systems for navigation and topo-hydrographic measurements along the Danube River" will be implemented into two stages. The second one - delivery of a hydrographic surveying vessel will be financed under OPTTI 2014-2020. Within FAIRWAY project supply of equipment is foreseen –a small surveying vessel. It should be equipped for sounding (incl.multi-beam), hydrological and hydrographical surveys, sediment sampling, etc.	2013-2015 2015-2017
BG 02: Education and skilled staff		
	Sufficient training for personnel to operate the delivered equipment, requirements are included in the terms of reference. A project for improving the administrative capacity of the Agency is foreseen.	
Current shortcomings:	None identified	
Possible funding:	Operational Programme "Good governance" 2014-2020 Budget availability 2015/2016: Funding through national budget	
Next steps:	Application of a project proposal under the Operational Programme "Good governance" 2014-2020, Implementation of activity 5.5 – enrich the knowledge base of waterway administrations within FAIRWAY project	- 2015-2020

BG03: Improved monitoring procedures, data quality and analyses		
Planned activities:	Currently EAEMDR operates 9 automatic hydrological and 9 automatic meteorological stations, delivered within project "Improvement of the systems for navigation and topo-hydrographic measurements along the Danube River", OPT2007-2013 Delivery of additional number of gauging stations, surveying vessel and integration of WAMS is foreseen in project FAIRWAY. A common project idea for harmonization of administrative procedures (incl. fairway maintenance) is currently under discussion with AFDJ – Galati.	
Current shortcomings:	Insufficient data available and non-state-of-the-art methods of gathering of fairway information (multi beam)	
Possible funding:	CEF CBC Ro-Bg 2014-2020	
Next steps:	Implementation of FAIRWAY project and preparation of application for CBC Ro-Bg 2014-2020	2020

Fairway Rehabilitation and Maintenance Master Plan for the Danube and its navigable tributaries:

ANNEX

to the

NATIONAL ACTION PLANS

UPDATE OCTOBER 2015

Coordinated by **Priority Area 1a** of the **EU Strategy for the Danube Region**.

10 Germany

The **Federal Waterways and Shipping Administration (WSV)** is responsible for fairway maintenance, rehabilitation and upgrade.

For Germany, no comparable data on cost and budget is available. Thus, chapter 3.8 (Operational and investment cost) does not contain data.

Furthermore, no status update on actions is available. The German Roadmap of June 2015 remained unchanged and is given below.

10.1 DE | Status report on main critical locations 2012-2014

Number of days with fairway depths above 2.00 m (target value[6]) for main critical locations

Critical location	2012	2013	2014
Lock Straubing– Port Straubing-Sand	352	362	335
Port Straubing-Sand– Deggendorf	332	359	320
Deggendorf–Vilshofen	352	330	272
Auerbacher Eck Tailwater lock Kachlet	Here are no limitations in terms of fairway depths (bedrock) but this a bottleneck concerning fairway width (location to be omitted next report)		

Status of critical sections

During 2012–2014 there was no critical sedimentation in the first section from **lock Straubing to port Straubing-Sand**. That is why the number of days with fairway depths above 2.00 m (target value[1]) is equal to the number of days with available water levels above LNWL (cf. 2.3).

Regarding the section from **port Straubing-Sand up to the city of Deggendorf** dredging activities had to be undertaken above all in the (late) summer of 2012. Sedimentation formed an obstacle above all in the low water period end of July. In 2013 existing sedimentation do not yield fairway limitations due to sufficient available water levels (sole exception: few days in August). The main reasons for not meeting the target value[1] of 2.00 m below LNWL in 2014 lied in the combination of required dredging works and low water levels in April and June.

[6] In the free flowing section between Straubing and Vilshofen a fairway depth of 2.50 m as defined by NEWADA duo is neither developable nor maintainable. In this section the objective is to maintain the fairway depth of 2.00 m related to LNWL (in Germany: RNW).

In section **Deggendorf–Vilshofen** in 2012 sedimentation lead to fairway limitations only for a couple of days in August, combined with particularly low water levels. 2013 was characterized by massive disturbing sedimentation in August and September due to the recent flood event. In 2014 the fairway still was restricted above all in March, April and June followed by short periods in August and September.

10.2 DE | Hydrological conditions on main critical locations 2012-2014

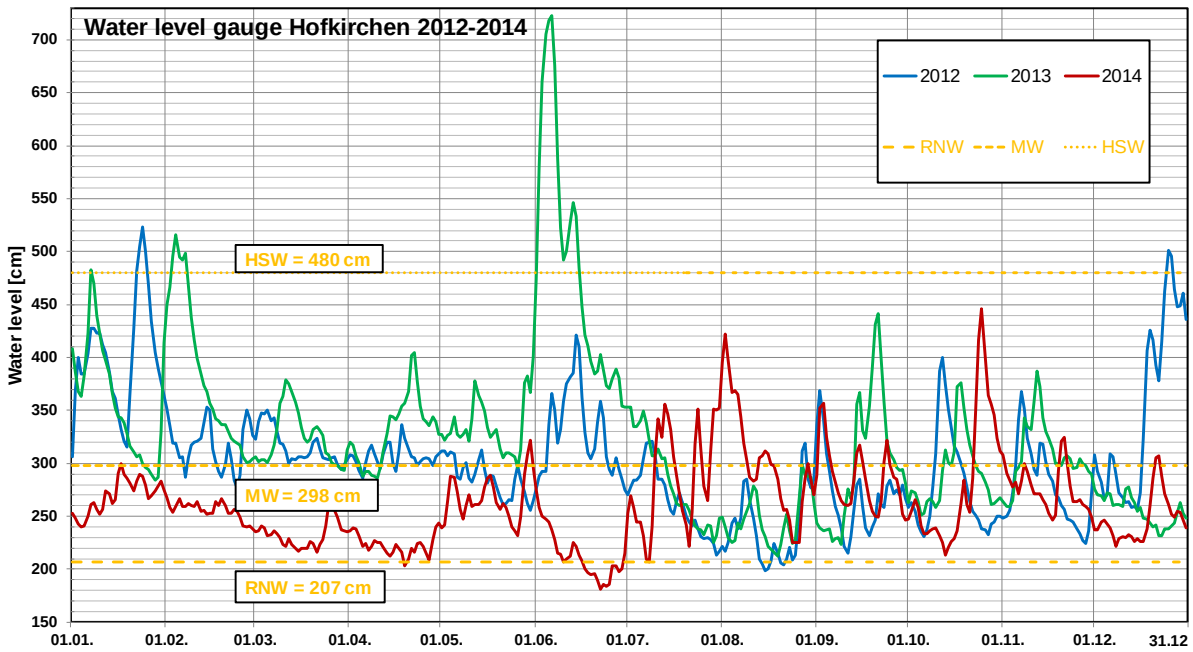
Number of days with water levels above multiannual average flow discharge (MW)

Critical location	Reference gauge	No. of days above MW		
		2012	2013	2014
Lock Straubing–Port Straubing-Sand	Pfelling	157	219	51
Port Straubing-Sand–Deggendorf	Pfelling	157	219	51
Deggendorf–Vilshofen	Hofkirchen	185	224	59
Auerbacher Eck Tailwater lock Kachlet	Passau	204	175	83

10.3 DE | Water level information on main critical locations 2012-2014

Number of days with water levels above LNWL (in Germany: RNW)

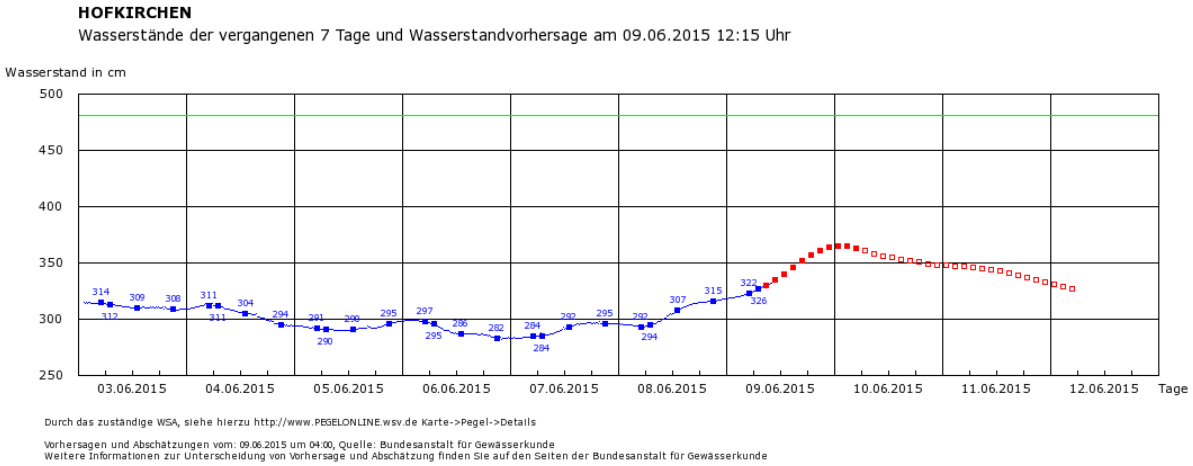
Critical location	Reference gauge	No. of days above LNWL (RNW)		
		2012	2013	2014
Lock Straubing–Port Straubing-Sand	Pfelling	352	362	335
Port Straubing-Sand–Deggendorf	Pfelling	352	362	335
Deggendorf–Vilshofen	Hofkirchen	360	365	351
Auerbacher Eck Tailwater lock Kachlet	Passau	365	365	354



From a hydrological point of view, 2013 was a wet year for the German Danube, which also includes a flood event in June 2013 (cf. 2.2), which is only likely to occur approximately every 40 years (reference gauge Hofkirchen: upstream effects from dike break in Deggendorf and confluence river Isar). While there were few low water periods in 2012, there were remarkable low water periods in 2014 above all for the section Straubing–Deggendorf (upstream confluence Isar).

10.4 DE | Water level prognoses for critical locations

Current water levels (1x/hour for flood events) and 48–72 h forecasts (floods: provision by Bavaria, low water: provision by WSV) for 9 automatic gauge stations along the German Danube are available online: https://www.pegelonline.wsv.de, http://www.hochwasserzentralen.de and www.elwis.de. Data is transferred regularly via landline (back-up: GPRS). The water level forecast for the critical locations within the section Straubing–Vilshofen (gauges Pfelling, Deggendorf and Hofkirchen) are provided online in order to facilitate early recognition of low water periods (cf. example figure gauge station Hofkirchen).



10.5 DE | Time from surveying to action: maintenance philosophy

For a better understanding of relevant operation, maintenance and administration processes (including reporting channels), it is essential to briefly describe the **organisational structure** of the Federal Waterways and Shipping Administration (WSV) which is a subordinate body of the Federal Ministry of transport and Digital Infrastructure (BMVI). For the southern district the responsible authority at intermediate level is the branch office of the Directorate-General for waterways and shipping (GDWS) located in Würzburg. More than 1,500 employees at different locations are engaged in issues concerning the federal waterways Main, Main-Danube-channel and Danube. The Waterways and Shipping Office in Regensburg (more than 300 employees) is the authority at lower level which is responsible for operation and maintenance of the Danube. That includes four local branch offices (operating centres in Regensburg, Straubing, Deggendorf and Passau) as well as a construction depot in Passau.

The WSV has nationwide implemented **regional sounding concepts** each taking into account specific local boundary conditions and constraints in terms of techniques and processes. Updates in a concept are conducted dependent on requirements while each year all concepts are subject to a performance review by the BMVI. Concepts contain determination as regards staff (capacity, skills), equipment, techniques, and frequency of measurements. Moreover, there are organisational specifications (TQM, operating times, goal realisation level, standardisation) and the assessment of future need for action (meeting standards, acquisition/provision, training concept). Each year **dredging statistics** and charts are prepared ex-post for documentation purposes and to set up the future sediment management (lessons learned, identification of critical locations).

Sedimentation and corresponding fairway limitations are reported to the responsible branch office within **2 days** (in case of imminent danger on the very same day) after surveying. Sometimes, branch offices execute additional soundings to determine the extent or cubature of a deposit. Dredging companies are ordered via tendering procedure based on the edited data (preparation, post-processing). The whole process (detection of an obstacle ➔ beginning of

required dredging works on site) lasts **3 weeks** on average. In uncritical situations where the regulation of shipping traffic is initially sufficient, dredging is postponed until several measures can be tendered as one cluster.

After receiving information from the branch office the Shipping Office announces relevant fairway depths/limitations on the very same day (the next day at latest) via Notices to skippers. Announcements include entries for the whole German Danube with highlighted current changes. **Publication** is done via ELWIS (www.elwis.de), apps for smartphones, e-mail news service and at locks (score board, display panel). IENCs are available and updated every 4 years (including fairway information, but no bathymetric IENCs).

Additional information (no key issue of maintenance): Generally, knowledge of the reach Straubing–Vilshofen is postulated for the skippers including possible locations for two-way traffic. In case of special incidents or imminent danger (e.g. floods, naval accidents, limitations of certain vessel combination, closures, one-way traffic, prohibition of downstream navigation) separate Directives are issued. Sometimes river police and branch office staff have to be on site in order to warn inland navigation (sharp lookout). Besides, also the dredging activities are announced via Directive.

10.6 DE | Key issues and related activities

Activities performed related to the key issues illustrated in the Fairway Rehabilitation and Maintenance Master Plan (version: December 2014):

	Key issues	*Need for action*	*Activities performed 2014*
DE 01	20% of dredging works may be conducted by WSV itself, while 80% are tendered (providing sufficient available capacity)	Preserve a certain percentage of execution by the authority itself to keep professional expertise, equipment, skilled staff, autonomy, and the capacity to act in special market or emergency situations	*Dredging activities overall: 125.935 m³* *Thereof government-operated: 0 m³*
DE 02	Enhancing the information on water levels	Implementation of an hourly push-mode (currently pull-mode via modem)	*Planning, design and preparation works but no realisation*

10.7 DE | Review of rehabilitation and maintenance activities

The following activities relate to the entire German Federal Waterway Danube.

Surveying activities

Monitoring of the fairway is conducted annually. Every two years the navigable water beyond the fairway is recorded. These measurements (survey for several purposes) are performed by the sounding vessel “Kepler” via trifold multibeam echosounder (each producing a swath of depth readings from a single ping). Furthermore, the free flowing section Straubing–Vilshofen is measured each year to safeguard safety and ease of shipping by means of multiple single beams mounted on a frame (sounding vessel “Tangens”). Additional surveying is executed after special incidents (e.g. floods, naval accidents). The following table exclusively contains scheduled interregional soundings. Additional local soundings which are conducted by the branch offices (see 2.3) are neither projectable nor calculable. Surveying activities in the context of new constructions or upgrading measures are also not included.

River-km (from-to)	Frequency of surveying	Type of survey (single/multibeam)
2201,7 – 2247,0	Once p.a.	Trifold Multibeam echosounder
2247,0 – 2327,5	Twice p.a.	Trifold Multibeam echosounder (1x) Multiple single beams mounted on a frame (1x)
2327,5 – 2414,7	Once p.a.	Trifold Multibeam echosounder

Fairway relocation activities

Not relevant in Germany in 2014: Due to the geometrical and hydraulic boundary conditions at the German Danube (e.g. small width, narrow curves, small discharges) there is rarely opportunity to relocate the fairway.

Dredging activities

The following fairway dredging measures for commercial navigation were conducted on the German Danube.

Designation of assignment	Dredging site (river-km)	Dumping or placement site (river-km)	Beginning and end of service	Material	Quantity m³
Erlau (reservoir Jochenstein)	2214,650 - 2214,400	2213,800 - 2213,200	23.11.2013 - 03.12.2013	Sand / Gravel	9.792,20
Passau (tailwater Kachlet)	2222,280 - 2222,080	2221,000 - 2219,000	25.11.2013 - 04.02.2014	Sand / Gravel	13.828,20
	2228,400 - 2228,200	2225,000 - 2224,000	16.12.2013 - 17.12.2013	Sand / Gravel	1.630,90
	2228,400 - 2228,200	2225,000 - 2224,000	17.12.2013 - 19.12.2013	Sand / Gravel	4.473,00
	2230,872 - 2230,780	2231,200 S - 2231,100 S	10.01.2014 - 04.02.2014	Sand / Gravel	23.521,40
	2256,555 - 2256,155	2230,872 - 2230,780	24.03.2014 - 17.04.2014	Sand / Gravel	23.836,00
	2256,555 - 2256,155	2268,150 - 2268,150	13.05.2014 - 28.05.2014	Sand / Gravel	11.257,20
	2284,450 - 2283,980	2282,400 - 2282,250	20.01.2014 - 22.01.2014	Sand / Gravel	4.560,40
	2285,850 - 2285,650	2282,400 - 2282,250	12.03.2014 - 17.03.2014	Sand / Gravel	250,00
	2285,925 - 2285,875	2282,400 - 2282,250	12.03.2014 - 17.03.2014	Sand / Gravel	83,50
Straubing - Vilshofen	2285,800 - 2285,650	2282,400 - 2282,250	18.03.2014	Sand / Gravel	250,00
(free flowing section)	2266,475 - 2266,050	2278,000 - 2277,200	18.03.2014	Sand / Gravel	1.563,90
	2267,400 - 2267,250	2278,000 - 2277,200	18.03.2014	Sand / Gravel	417,20
	2263,400 - 2263,025	2261,900 - 2261,600	20.03.2014 - 21.03.2014	Sand / Gravel	2.178,20
	2261,175 - 2260,850	2261,900 - 2261,600	24.03.2014 - 26.03.2014	Sand / Gravel	1.750,00
	2259,325 - 2258,750	2261,900 - 2261,600	09.04.2014 - 16.04.2014	Sand / Gravel	2.785,20
	2349,000 - 2348,700	2348,740 - 2348,375	01.07.2013 - 06.05.2014	Sand / Gravel	5.585,80
	2349,000 - 2348,700	2350,840 - 2350,400	01.07.2013 - 06.05.2014	Sand / Gravel	5.994,50
Pfatter (tailwater Straubing)	2351,200 - 2350,400	2352,125 - 2351,685	01.07.2013 - 06.05.2014	Sand / Gravel	1.226,10
	2351,200 - 2350,400	2352,800 - 2352,625	01.07.2013 - 06.05.2014	Sand / Gravel	817,40
	2349,000 - 2348,700	2348,740 - 2348,375	01.07.2013 - 06.05.2014	Sand / Gravel	3.108,59
	2267,250 - 2267,200	Removal	18.08.2014 - 26.08.2014	Sand / Gravel	1.202,00
Straubing - Vilshofen	2256,150 - 2255,000	Removal	20.08.2014 - 26.08.2014	Sand / Gravel	4.151,60
(free flowing section)	2309,100 - 2308,825	Removal	27.08.2014 - 01.09.2014	Sand / Gravel	1.671,90

In total 125.935 m³ were dredged for commercial navigation in 2014.

10.8 DE | Operational and investment costs

For Germany, no data on cost and budget is available.

10.9 DE | Status and Outlook: actions, milestones and funding sources

DE 01: **20% of dredging works may be conducted by WSV itself (providing sufficient available capacity for government-operation)**		
Planned activities:	Continuous training (personnel), maintenance and repair (gear) to provide skilled operational staff and appropriate equipment	
Current shortcomings:	No current shortcomings identified	
Possible funding:	Budget availability 2015/2016: Sufficient national funding is available	
Next steps:	Market Observation (current dredging prices), monitoring waterway (safety and ease of shipping)	permanent
DE 02: Improved water level information		
Planned activities:	Provision of hardware Implementation of an hourly push-mode	
Current shortcomings:	No current shortcomings identified	
Possible funding:	Budget availability 2015/2016: National Funding is assured	
Next steps:	Improvement of central EDP systems in terms of availability including redundancy	until 12/16

11 Serbia

PLOVPUT (Directorate for Inland Waterways within the Ministry of Construction, Transport and Infrastructure) is responsible for fairway maintenance.

11.1 RS | Status report on main critical locations 2012-September 2015

Number of days with fairway depths > 2.5m (on the fairway width reduced to 100 m – minimum LoS) on main critical locations:

Danube

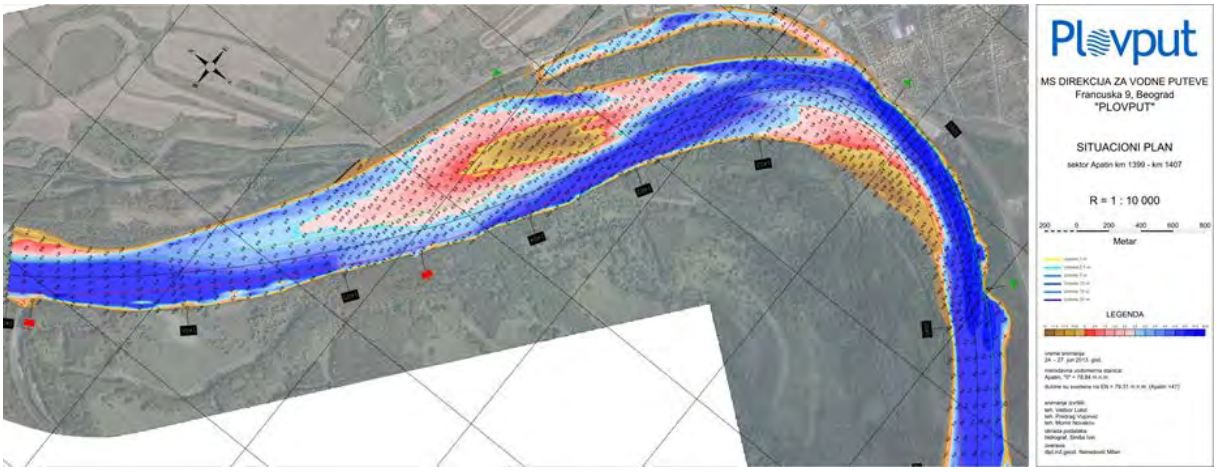
Critical location	2012	2013	2014
Apatin	366	365	365
Futog	366	235	365

The critical sector Apatin was identified as the most critical one by Danube waterway users in a survey by PA1a concluded in December 2014. Apatin is however not the most critical sector for navigation in terms of available fairway parameters (depth and width). The most critical sector for navigation in terms of available fairway parameters (depth and width) is Futog.

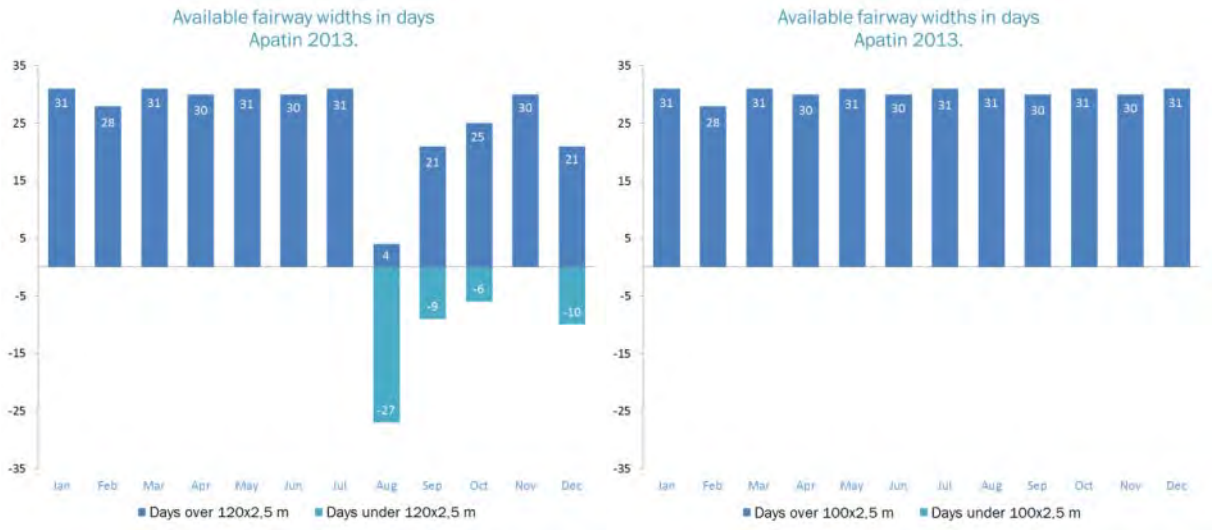
Status of main critical locations in 2013

Layout of the critical sector Apatin from July 2013 is presented in the *Figure 1*. This sector was characterised by positive morphological developments in 2012 and 2013, compared to situation from the late 2011 (when navigation was completely stopped during the low water period, due to insufficient water depth).

Figure 1: Apatin, layout, July 2013

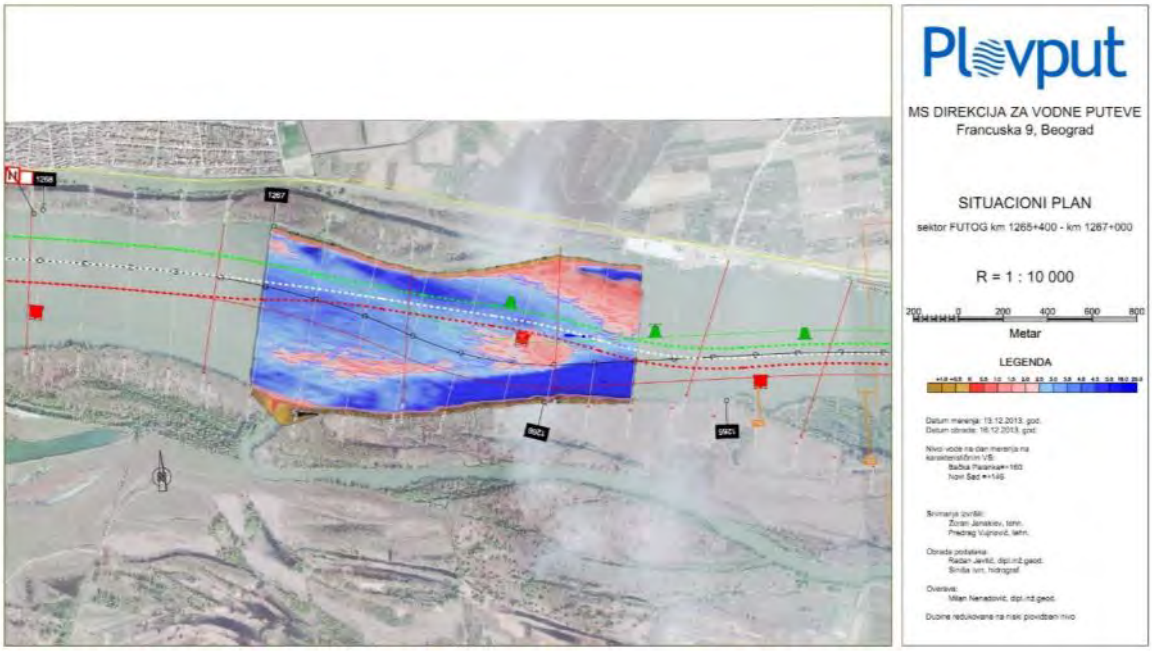


Number of days in 2013 with available fairway parameters are presented in *Figures 2-7*. For reduced fairway width of 100 m, which is the minimum Level of Service for the Republic of Serbia, over the whole year 3.0 m depth was available.



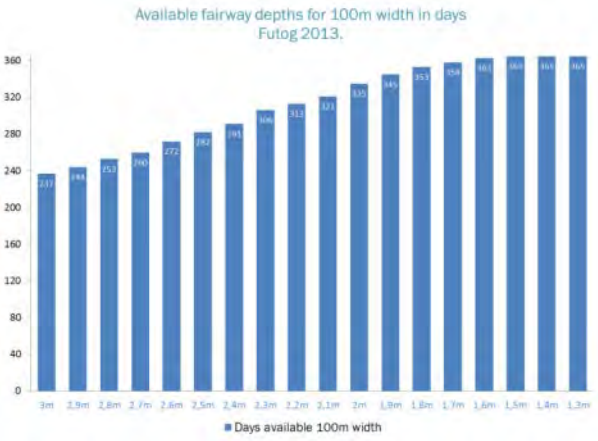
Layout of the critical sector Futog from December 2013 is presented at the *Figure 8*.

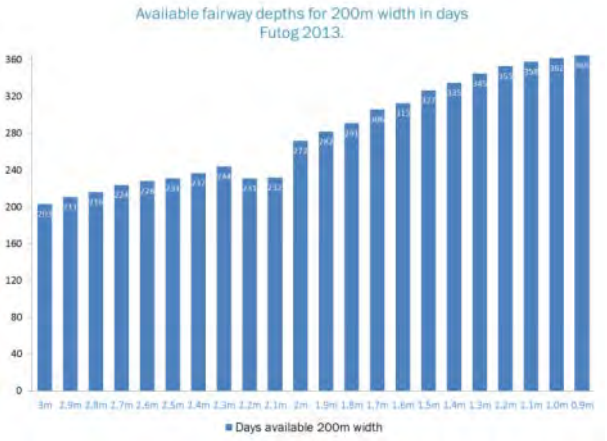
Figure 8: Futog, layout, December 2013

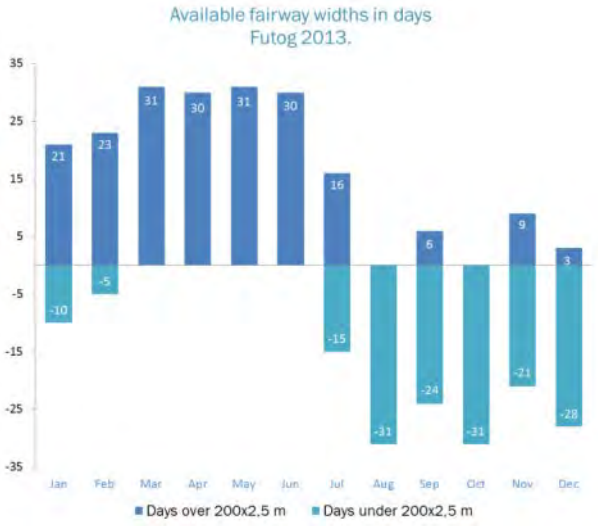


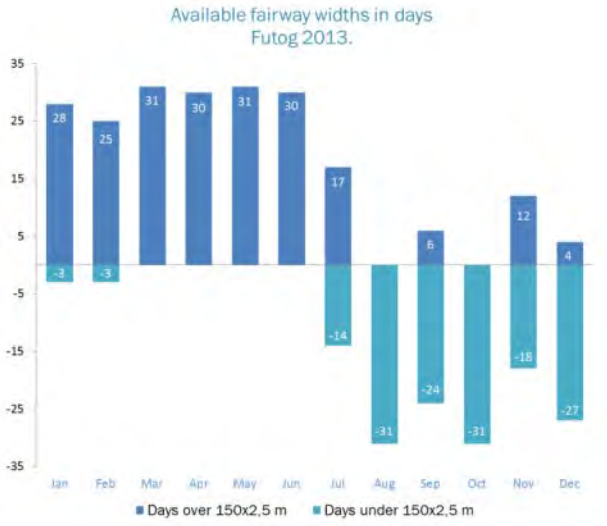
Even with the relatively favourable hydrological conditions which prevailed in 2013, fairway width at the critical sector Futog needed to be reduced from comfortable 200 m to 100 m, which is the defined minimum Level of Service in the Republic of Serbia, due to intensive morphological developments. From *Figures 9-14*, it can be observed that maximum fairway width was not achieved for most of the year. Situation was better if taken into account reduction of the fairway width. With the reduced fairway width up to 100 m, 2.5 m depth was available for 282 days. Further reduction of the fairway width to 80 m would not have any major impact on the available

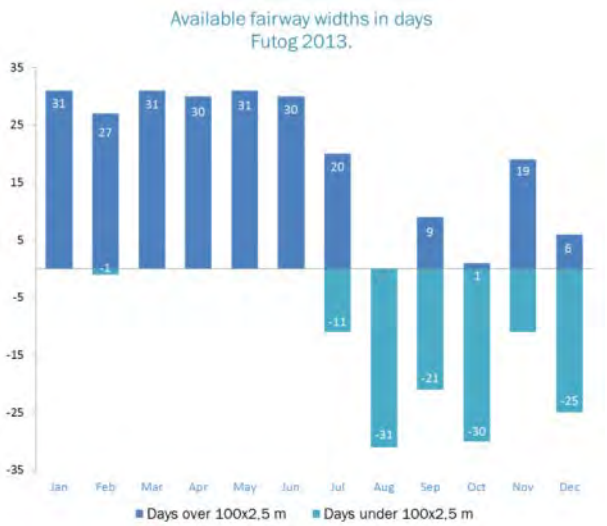
depth, due to specific morphological characteristics of this critical sector, which is the reason why this sector is the most critical one for navigation, in terms of available fairway parameters.







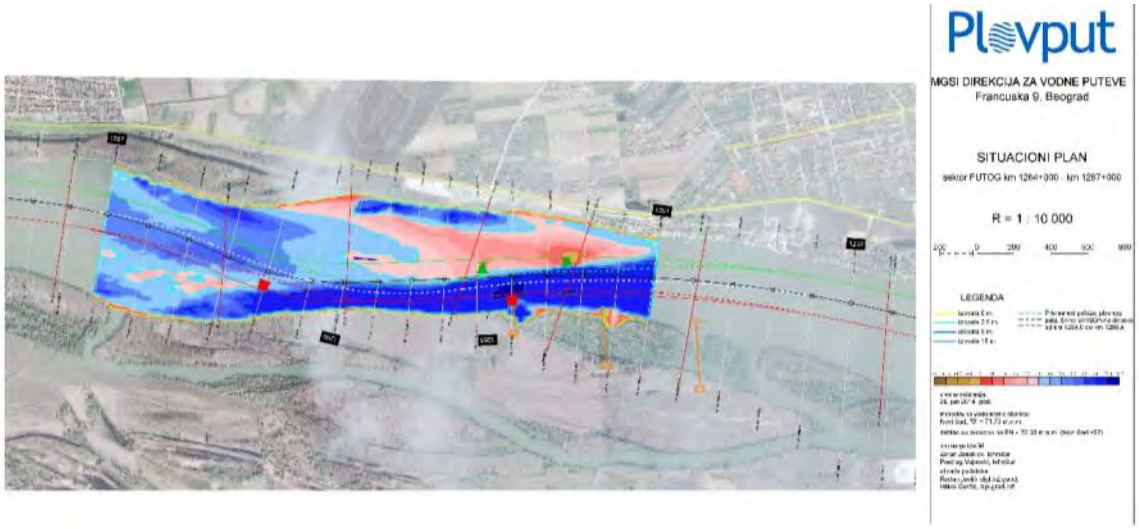




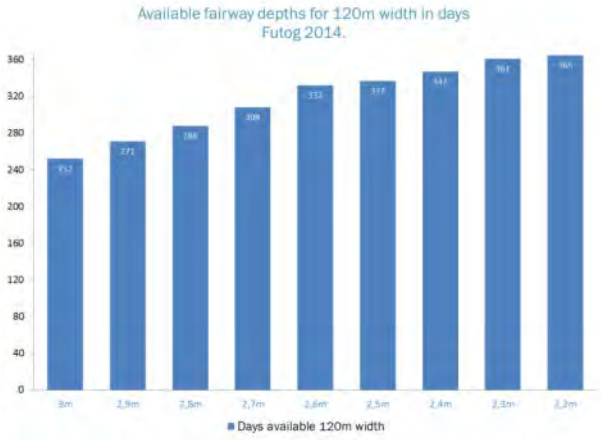
Status of main critical locations in 2014

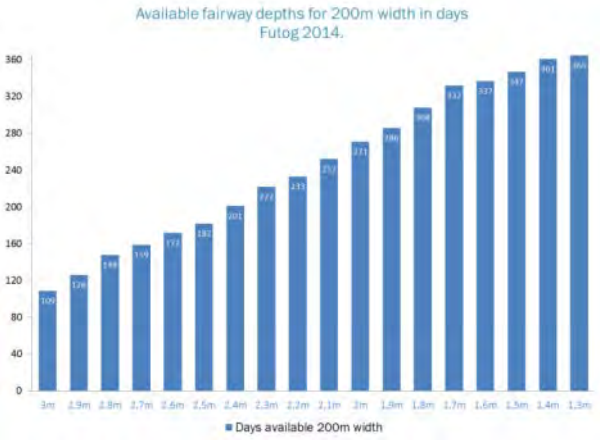
Layout of the critical sector Futog from August 2014 is presented at the *Figure 19*.

Figure 19: Futog, layout, August 2014



Situation on the critical sector Futog was better in 2014 compared to 2013, having in mind available fairway depth and width. Fairway width is still reduced to the minimum Level of Service, which is 100 m, but fairway depth of 2.5 m was achieved throughout the whole year (365 days), while 2.5 m depth on 120 m width was available for 337 days. Data for 2014 are presented at *Figures 20-25*, while comparison of data from 2014 and 2013 is given at the *Figure 26*.



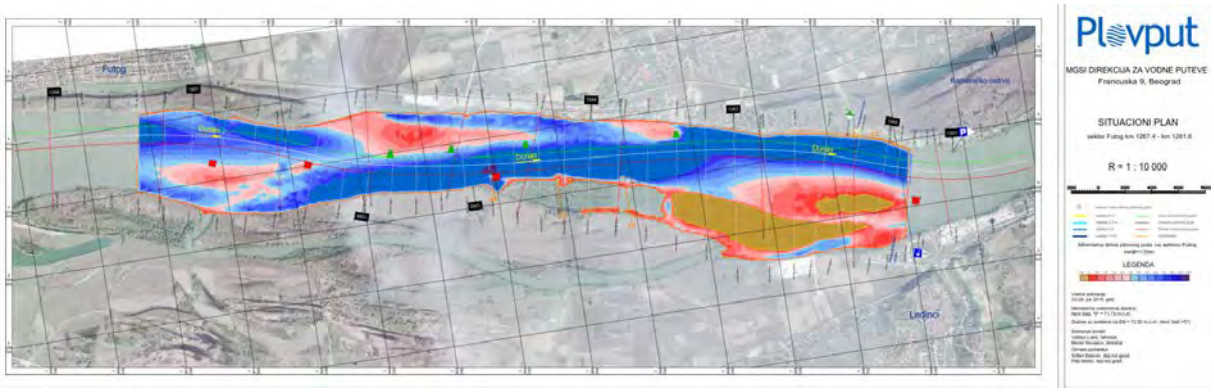


Status of main critical locations in the period January-September 2015

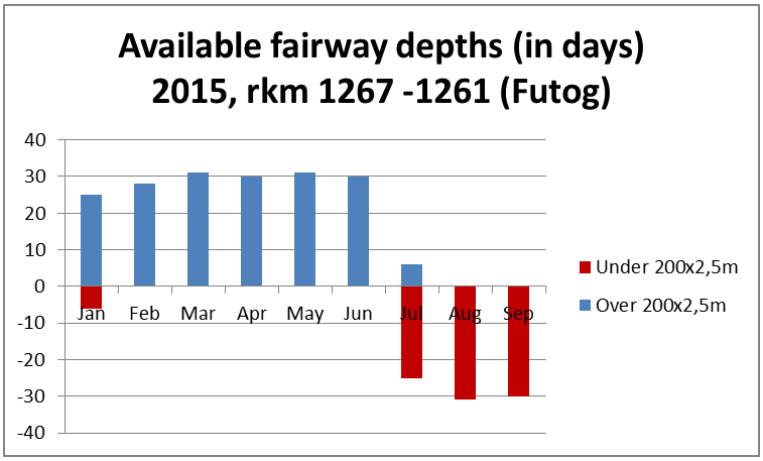
As of this National Action Plan, the Apatin critical section will be dealt with in the Croatian chapter.

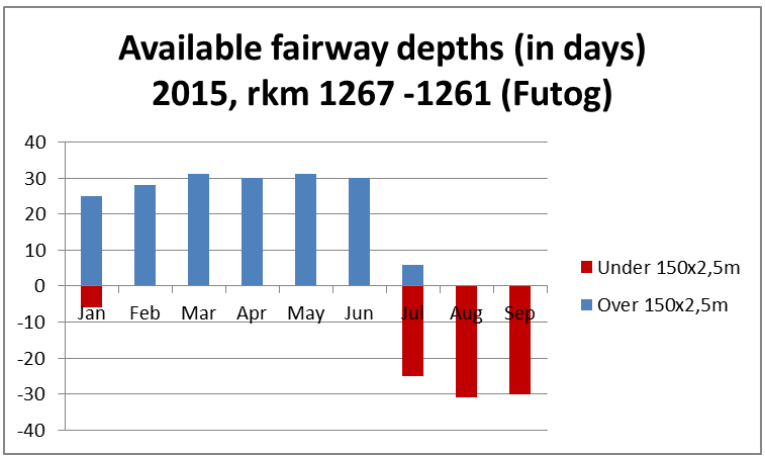
The situation on the critical sector Futog was a bit worse in the period January-September 2015 compared to respective period of 2014, having in mind available fairway depth and width.

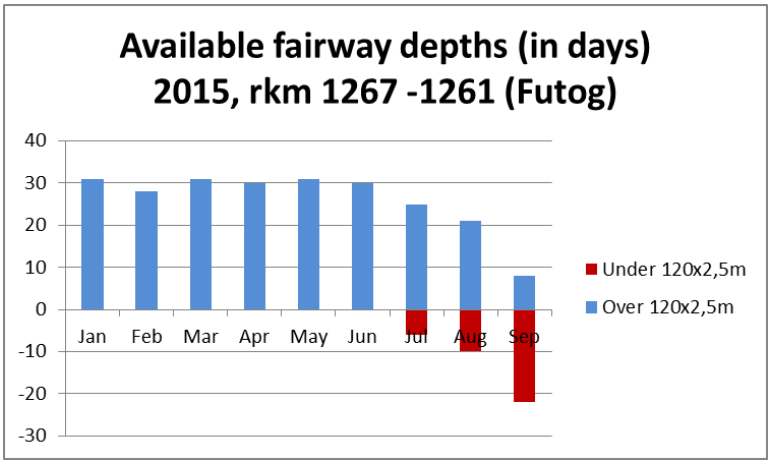
Figure: Futog, layout, July 2015

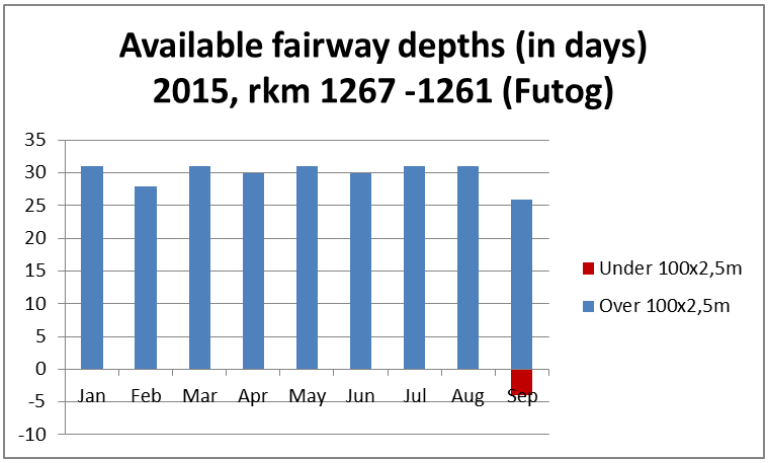


Fairway width is still reduced to the minimum Level of Service, which is 100 m. On the 100 m fairway width, fairway depth of 2.5 m was achieved for 269 days out of 273 days in the period January-September (98.5%). On the 120 m fairway width, fairway depth of 2.5 m was achieved for 233 days out of 273 days in the period January-September (85.3%).









Sava River

Number of days with fairway depths > 2.5m (on fairway width 750 m) on main critical locations:

Critical location	2012*	2013*	2014
Sabac	n/a	n/a	306
Kamicak	n/a	n/a	346

*Not available due to lack of budgetary means for surveying

11.2 RS | Hydrological conditions on main critical locations 2012-2014

Danube

Critical location	2012	2013	2014
Apatin	151	217	134
Futog	128	213	163

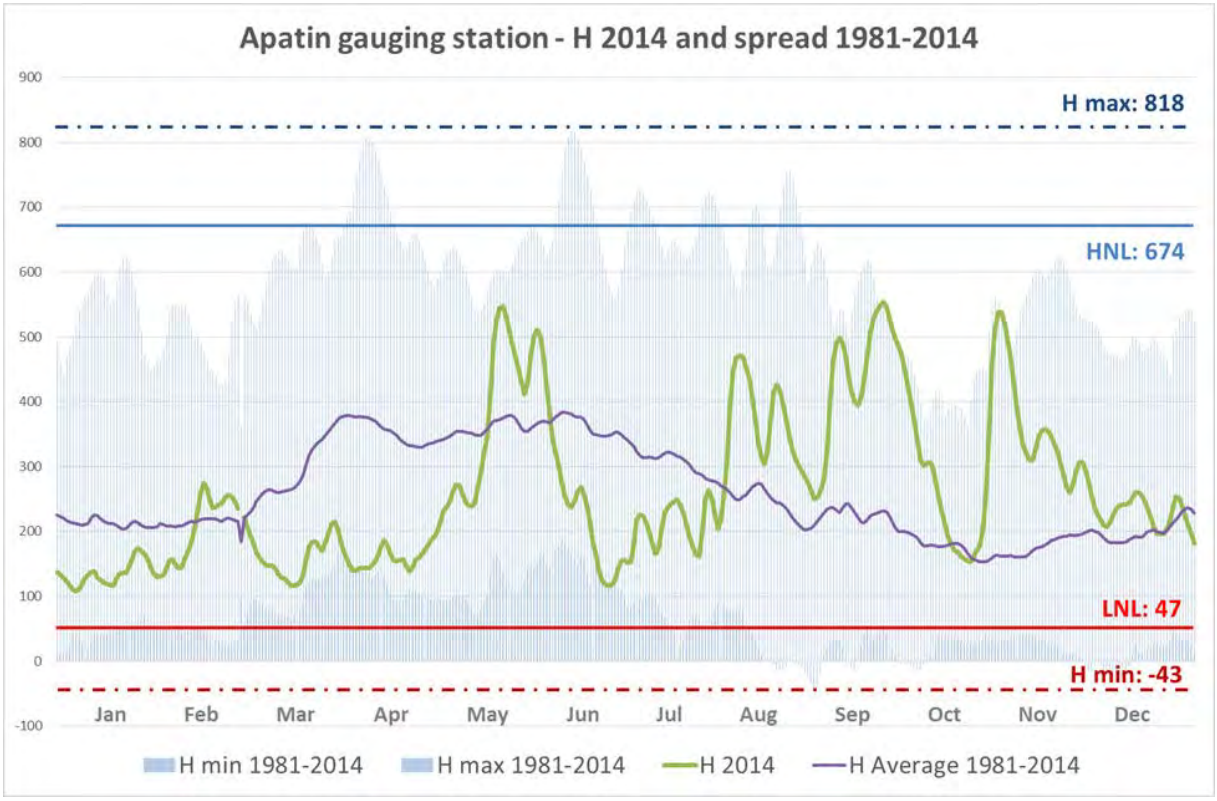
11.3 RS | Water level information on main critical locations 2012-2014

Danube

Critical location	Reference gauge	No of days above LNWL		
		2012	2013	2014
Apatin	Apatin	366	365	365
Futog	Novi sad	366	363	365

Water level data for the **gauging station Apatin** are presented in the Figure 27.

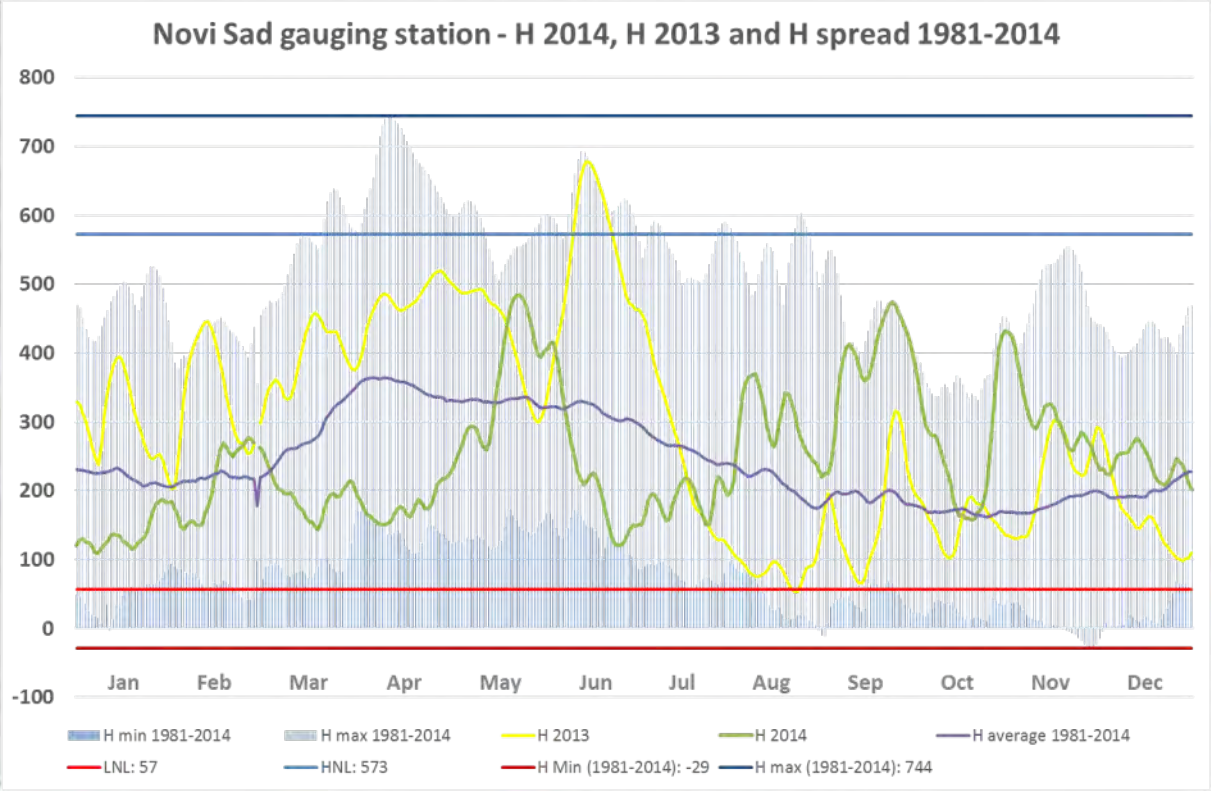
Figure 27: Apatin gauging station, H 2014 and H spread 1981-2014



For Apatin gauging station, no days bellow LWNL were recorded for 2012, 2013 and 2014, meaning that hydrological conditions were favourable for navigation. In the period January-September 2015, 18 days with water levels below LNL have been recorder.

Water level data for the **gauging station Novi Sad** (which is the reference gauging station for the critical sector Futog) are presented in the Figure 27.

Figure 28: Novi Sad gauging station, H 2014 and H spread 1981-2014



For Novi Sad gauging station, no days bellow LNL were recorded for 2012 and 2014, while only 2 days bellow LNL were recorded in 2013, confirming that hydrological conditions were favourable for navigation. In the period January-September 2015, 21 days with water levels below LNL have been recorded.

11.4 RS | Water level prognoses for critical locations

Water level forecast are available for gauging stations, for the period of 2-4 days.

11.5 RS | Time from surveying to action: maintenance philosophy

Not available at the moment.

11.6 RS | Key issues and related activities 2014

	Key issues	*Need for action*	*Activities performed 2014*
RS 01	Limitations of available data due to insufficient number of vessels and surveying equipment Limited budget for monitoring activities	Support acquisition/retrofit of up-to-date single-beam sounding equipment, software and vessels Enforce cooperation with AVP on joint stretch and improve data exchange	*No activities due to limited budget* *Established cooperation with AVP continued, hydrographic survey data for 2014 have been exchanged, improving overall frequency and density of acquired data*
RS 02	Insufficient number of skilled staff	Secure education and provision of well-trained staff in the short, medium and long term Facilitate different geographical organization of surveying teams to allow more effective and efficient performances Enable expert exchange with other Danube waterway administrations	*No activities due to limited budget*
RS 03	Insufficient number of automatic gauging stations in the free flowing section	Support acquisition and operation of additional gauging stations.	*In progress*
RS 04	Further absence of budget for dredging activities will lead to deterioration of navigation conditions, while the cost-benefit ratio of these activities is very favourable.	Secure sufficient and predictable financial means	*No activities due to limited budget*
RS 05	Old marking vessels and equipment	Support acquisition of up-to-date marking vessels and buoys	*No activities due to limited budget*
RS 06	Inefficiencies due to missing comprehensive database and web tool for navigation aids	Support development of a web application for marking activities on the Danube and its tributaries integrating Croatia and Romania	*Completed*
RS 07	Limited number of skilled personnel and inability to employ new staff due to Government regulation and restrictions	Secure education and provision of well-trained staff in the short, medium and long term	*No activities due to limited budget*

RS 08	The low number of gauging stations results in incomplete water level information and lead to inaccurate forecasts.	Support acquisition and operation of additional gauging stations.	*No activities due to limited budget*
Other	Provision of dynamic fairway information to users	Lunching of Navigational Bulletin, an on-line fairway information services portal for the Republic of Serbia (Danube, Sava and Tisza Rivers)	*The following dynamic, daily updated data are being published: water levels, forecasts of water levels, wind data, active Notices to Skippers, active status of the marking system, available fairway depth and width at critical locations, available vertical clearances at bridges, availability of locks, availability of RIS services, contact information of relevant authorities.*

No information was provided on activities Jan – Sept 2015

11.7 RS | Review of rehabilitation and maintenance activities 2014

The following activities relate to all critical locations as identified in the Rehabilitation and Maintenance Master Plan (version December 2014):

Surveying activities 2014

Danube

River-km (from-to)	Frequency of surveying	Type of survey (single/multibeam)
1.433 – 1.299	1	Singlebeam (CRO survey data) – 50 m cross-sections for critical sectors
1.299 – 1.170	1-2	Singlebeam - 50 m cross-sections for critical sectors
1.170 – 865	1	Singlebeam – no critical sectors
865 – 845	1	Singlebeam – no critical sectors

Sava River

River-km (from-to)	Frequency of surveying	Type of survey (single/multibeam)
Remark	Due to flood in May 2014, measurements of flooded areas have been performed	Singlebeam

Surveying activities January-September 2015

Danube

River-km (from-to)	Frequency of surveying	Type of survey (single/multibeam)
1.433 – 1.299	1-2	Singlebeam – 200 m whole stretch and 50 m cross-sections for critical sectors (Apatin sector surveyed twice)
1.299 – 1.170	1-2	Singlebeam – 200 m whole stretch and 50 m cross-sections for the most critical sectors (Futog and Susek)

Fairway relocation activities 2014

Danube

River-km (from-to)	Frequency of relocation interventions	Comments
1.267 – 1.261	3	*Realignment of the fairway at the critical sector Futog due to dynamic morphological developments*

Fairway relocation activities January-September 2015

Danube

River-km (from-to)	Frequency of relocation interventions	Comments
1.267 – 1.261	2	*Realignment and reduction of the width of the fairway at the critical sector Futog due to dynamic morphological developments*

Dredging activities 2014

The following fairway dredging measures for commercial navigation were implemented:

- Dredging of sediment from entrances to winter ports and from winter ports on the Danube River (Novi Sad, Ivanovo and Kovin)

In total, 60.000 m^3 of sediment from entrances to winter ports and winter ports were dredged for commercial navigation in 2014 (Danube).

No dredged for commercial navigation have been performed in 2014 on the Sava River.

Dredging activities January-September 2015

No dredging activities performed (on 1st of October dredging of sediment from entrance to winter port and from winter port on the Danube River in Novi Sad started).

11.8 RS | Operational and investment costs

Actual operational costs 2014

Need areas	Actual costs 2014 (Euro)
Minimum fairway parameters (dredging)	200.000
Surveying of the riverbed	200.000
Water level gauges	-
Marking of the fairway	650.000
Availability of locks / lock chambers	Not applicable
Information on water levels and forecasts	500
Information on fairway depths	1.000
Information on marking plans	500
Meteorological information	500
River Information Services	130.000
Sum	**1.182.500**

Secured operational budget 2015

Not available.

Planned investments 2015-2016

There are no investments planned 2015 and 2016.

Need areas	Required additional investment according to FRMMP EURO
Minimum fairway parameters (depth / width)	0
Surveying of the riverbed	260.000
Water level gauges	48.000
Marking of the fairway	5.075.000
Availability of locks / lock chambers	0
Information on water levels and forecasts	0
Information on fairway depths	0
Information on marking plans	0
Meteorological information	0
River Information Services	0
Sum	**5.383.000**

11.9 RS | Outlook: planned actions, milestones and funding sources

No activities planned due to budget limitations.

12 Bosnia and Herzegovina

Currently there is no agency on state level which is responsible for maintenance, rehabilitation and upgrade.

12.1 BA | Status report on main critical locations 2012-2014

Number of days with fairway depths > 2.5m on main critical locations (as identified by the Danube waterway users in a survey by PA1a concluded in December 2014):

Critical location	2012	2013	2014
From rkm 69,7 To rkm 72,9			
From rkm 79,9 To rkm 85,8			
From rkm 88,3 To rkm 101,9			
From rkm 103,5 To rkm 109,8			
From rkm 173,8 To rkm 176,6			
From rkm 177,8 To rkm 187,4			
From rkm 189,2 To rkm 202,5			
From rkm 202,5 To rkm 225,1			
From rkm 225,1 To rkm 260,7			
From rkm 260,7 To rkm 306,8			
From rkm 306,8 To rkm 331,5			
From rkm 364,4 To rkm 395,5			
From rkm 417,1 To rkm 445,7			
From rkm 445,7 To rkm 459,9			
From rkm 459,9 To rkm 480,4			

From rkm 480,4 To rkm 511,8			

The main reasons for not meeting the level of service are the following:

The Sava river waterway needs huge and comprehensive rehabilitation and reconstruction works in order to ensure considerable and fully usage of the waterway. The rehabilitation and reconstruction works should also ensure necessary conditions for safe navigation along the Sava river, which concedes afterwards regular maintenance works of the navigation path. Sava river waterway is included in the core transport network in Bosnia and Herzegovina, and its rehabilitation is one of the priorities in the transport sector in the country. Bosnia and Herzegovina shall again apply for EU funds for preparation of necessary study and technical documentation needed for further execution of construction works. Once the works are completed and fairway infrastructure parameters are harmonised with the appropriate parameters along the Danube fairway, the regular maintenance works shall be established, following the principles and guidelines from the Fairway Maintenance Master Plan (cycle of monitoring, planning, execution, information), including usage of best practices and experience of other countries in the Danube region in this respect.

Bosnia and Herzegovina currently maintains the fairway signalling system of the Sava river fairway from rkm 343 to rkm 211 on BiH and Croatian fairway/river banks, and from rkm 211 to rkm 178 for BiH part of the fairway/river bank, according to the Agreement between the Government of the Republic of Croatia and the Council of ministers of Bosnia and Herzegovina on inland waterways navigation, its signalling and maintenance.

12.2 BA | Hydrological conditions on main critical locations 2012-2014

Not applicable (please see the explanation given above).

12.3 BA | Water level information on main critical locations 2012-2014

Not applicable (please see the explanation given above).

12.4 BA | Water level prognoses for critical locations

Not applicable (please see the explanation given above).

12.5 BA | Time from surveying to action: maintenance philosophy

Not applicable (please see the explanation given above).

12.6 BA | Key issues and related activities 2014

In the Fairway Rehabilitation and Maintenance Master Plan (version December 2014), no key issues were identified.

12.7 BA | Review of rehabilitation and maintenance activities 2014

Surveying activities 2014

No surveying activity has been performed in 2014 (please see explanation above).

Fairway relocation activities 2014

No relocation activities have been performed in 2014.

Dredging activities 2014

No dredging activities have been performed in 2014.

12.8 BA | Operational and investment costs

Operational expenditures 2014 and budget needs 2015

Need areas	Operational expenditures 2014	Additional yearly need (Masterplan)	Secured operational budget 2015	Estimated Financing gap 2015
Minimum fairway parameters (width/depth)				
Surveying of the riverbed				
Water level gauges				
Marking of the fairway	98,512	0	98,512*	-
Availability of locks / lock chambers				
Information on water levels and forecasts				
Information on fairway depths				
Information on marking plans				
Meteorological information				
Other needs				
Sum	98,512	0	98,512	-

*Maintenance of the marking system on the Sava river for 2015

Operational expenditures 2014 and budget needs 2015

Need areas	Estimated operational expenditures 2015	Required operational budget 2016	Secured operational budget 2016	Remaining financing gap 2016
Minimum fairway parameters (width/depth)				
Surveying of the riverbed				
Water level gauges				
Marking of the fairway	98,512*	127.822	127.822	0
Availability of locks / lock chambers				
Information on water levels and forecasts				
Information on fairway depths				
Information on marking plans				
Meteorological information				
Other needs				
Sum	98,512	127.822	127.822	**0**

Investments taken for Rehabilitation and Maintenance 2014 – September 2015

Need areas	Required additional investment 2014 – 2020 according to FRMMP EURO	Investment cost secured by EU co-financing 2015 – 2020 (EUR)	Estimated investment expenditures 2015 (incl.EU co-financing) EURO
Minimum fairway parameters (dredging)	0	-	
Surveying of the riverbed	0	-	
Water level gauges	0	-	
Marking of the fairway	300.000	-	0
Availability of locks / lock chambers	0	-	
Information on water levels and forecasts	0	-	
Information on fairway depths	0	-	
Information on marking plans	0	-	
Meteorological information	0	-	
Other needs	0	-	
Sum	300.000	-	**0**

Planned investments 2016

Need areas	Remaining required investment 2016 – 2020 based on FRMMP	Required investment budget 2016 (incl. EU Co-financing)	Secured national investment budget 2016 (excl. EU co-financing)	Secured investment budget 2016 (only EU co-financing)	Remaining investment need 2017-2020 (%) not secured by EU co-financing
	EURO		EURO		
Minimum fairway parameters (dredging)	0				
Surveying of the riverbed	0				
Water level gauges	0				
Marking of the fairway	300.000				100%
Availability of locks / lock chambers	0				
Information on water levels and forecasts	0				
Information on fairway depths	0				
Information on marking plans	0				
Meteorological information	0				
Other needs	0				
Sum	0	n/a			

12.9 BA | Outlook: planned actions, milestones and funding sources

No information provided

13 Moldova

No update has been provided by Moldova for October 2015. The text of Roadmap June 2015 is given below.

Fairway administration and maintenance of the Danube waterway in Moldova is carried out by the Romanian AFDJ on the basis of a bilateral agreement.

13.1 MD | Status report on main critical locations 2012-2014

According to the Fairway Rehabilitation and Maintenance Master Plan (version December 2014), there are no critical locations.

13.2 MD | Hydrological conditions on main critical locations 2012-2014

Not relevant.

13.3 MD | Water level information on main critical locations 2012-2014

Not relevant.

13.4 MD | Water level prognoses for critical locations

Not available.

13.5 MD | Time from surveying to action: maintenance philosophy

Not available.

13.6 MD | Review of rehabilitation and maintenance activities 2014

According to the Fairway Rehabilitation and Maintenance Master Plan (version December 2014), no rehabilitation and maintenance activities were implemented.

Key issues and related activities 2014

In the Fairway Rehabilitation and Maintenance Master Plan (version December 2014), no key issues were identified.

13.7 MD | Operational and investment costs

Actual operational costs 2014

Need areas	Actual costs 2014 (Euro)
Minimum fairway parameters (dredging)	n/a
Surveying of the riverbed	n/a
Water level gauges	n/a
Marking of the fairway	n/a
Availability of locks / lock chambers	n/a
Information on water levels and forecasts	n/a
Information on fairway depths	n/a
Information on marking plans	n/a
Meteorological information	n/a
Other needs	n/a
Sum	**n/a**

Secured operational budget 2015

No data provided.

Planned investments 2015-2016

Need areas	Required additional investment according to FRMMP	Planned % of required additional investment		Sum (%)
	EURO	2015	2016	
Minimum fairway parameters (depth / width)	-			
Surveying of the riverbed	-			
Water level gauges	-			
Marking of the fairway	-			
Availability of locks / lock chambers	-			
Information on water levels and forecasts	-			
Information on fairway depths	-			

Information on marking plans	-			
Meteorological information	-			
Other needs	-			
Sum	**-**			

13.8 MD | Outlook: planned actions, milestones and funding sources

Not relevant.

14 Ukraine

No data has been provided by Ukraine. The information below was taken from the June 2015 roadmap.

Responsible for fairway maintenance, rehabilitation and upgrade:

The State Enterprise «Ukrainian Sea Ports Authority» of the Ministry of Infrastructure of Ukraine is responsible for maintenance, rehabilitation and upgrade.

14.1 UA | Status report on main critical locations 2012-2014

Status report on main critical locations 2012-2014 According to the list of Main Inland Waterways of Europe ("Blue Book") of the UNECE, the strech of the Danube river from 0 to 116 km Chilia branch, on which the Danube-Black Sea Deep Navigation Route (hereinafter - DNR Danube - Black Sea) runs, is defined as waterway E80 -09 with planned sediments of vehicles – up to 7,2m ("Blue Book" developed under the European Agreement on Main Inland Waterways of International Importance (Decree of the President of Ukraine dated 28.09.2009 № 767/2009 «On accession of Ukraine to the European Agreement on Main Inland Waterways of International Importance (AGN)").

Number of days with fairway depths > 2.5m on main critical locations

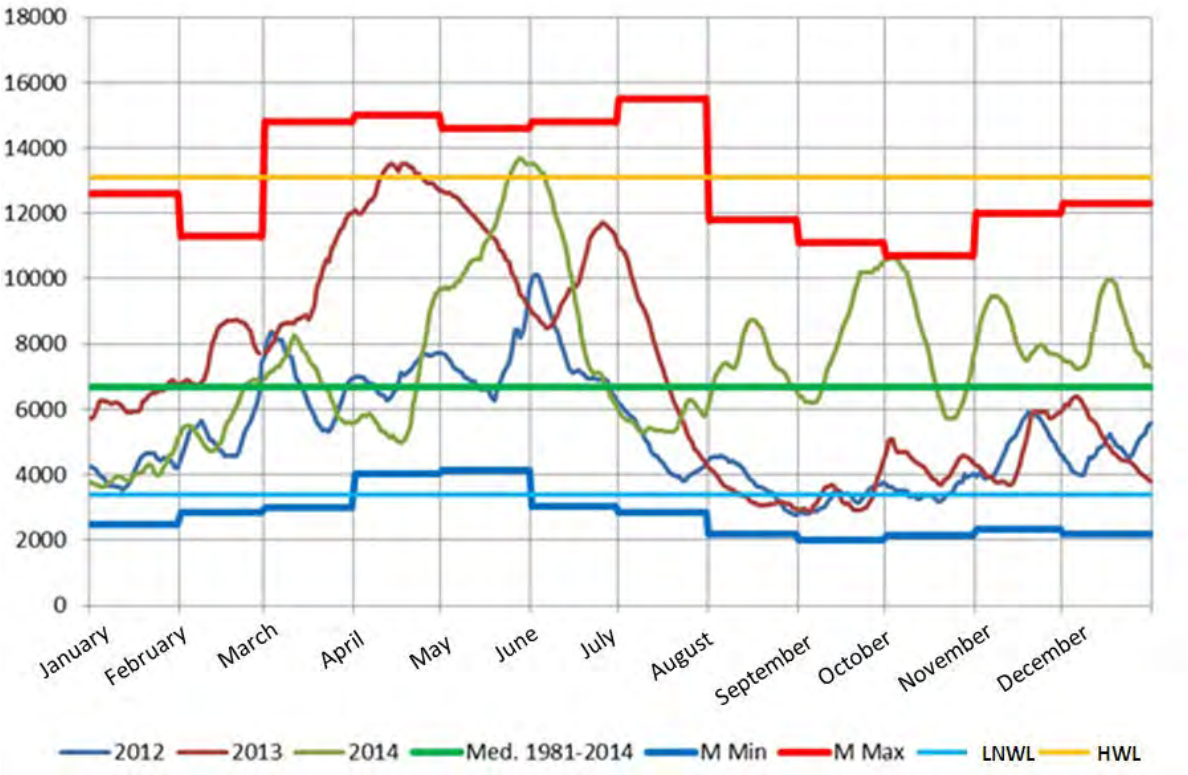
Critical location	2012	2013	2014
0 - 60 km	366	365	365
60 – 116 km	366	365	365
44 – 72 mile	366	365	365

14.2 UA | Hydrological conditions on main critical locations 2012-2014

Number of days with flow discharge above multiannual average flow discharge for the main critical locations.

Critical location	2012	2013	2014
0 – 60 km	91	173	222
60 - 116 km	91	173	222
44 – 72 mile	91	173	222

Duty of water in cm/sec on waterpoint Reny 1981-2014



14.3 UA | Water level information on main critical locations 2012-2014

Please, provide information about main critical locations - water level information (reference gauge, number of days) above LNWL.

Critical location	Reference gauge	No of days above LNWL		
		2012	2013	2014
0-60 km	Vylkove	330	348	363
60-116 km	Izmail	305	328	365
44-72 mile	Reni	327	326	365

14.4 UA | Water level prognoses for critical locations

Responsible for hydrometeorological problems on the Ukrainian part of the Danube river is Danube Hydrometeorological Observatory (DHMO)

One of the main tasks of the Danube Hydrometeorological Observatory (Izmail) is the hydrometeorological support of companies and organizations of the Danube region. However, forecasts of water levels of the Danube waterway are issuing from Germany to the Black Sea and

have different earliness. Forecasts with periodicity of 24 to 72 hours and 17 items produced daily. Once a decade, forecasts of water levels characteristic (average, minimum and maximum) per decade (11 points) and once a month – forecast of characteristic of water levels of the Danube in the coming month are produced.

Forecasts of water levels of the Danube are transmitted to marine economy enterprises, and are placed on the websites of the Danube Hydrometeorological Observatory (www.dhmo.org.ua) and the River Information Service of Ukraine (http://ukrris.com.ua/).

Reliability of hydrological forecasts for the period 2012-2014 was:

- 97-98% (daily);
- 92-96% (ten-day);
- 76-85% (monthly).

To improve the accuracy of forecasting methods of tiered regime of navigation on the Danube, above all – for a month, experts of Ukrainian Hydrometeorological Institute (Kyiv), based on processing a large volume of initial information, using the method of appropriate daily increases in water levels, daily forecasting methods have been developed, and characteristic of ten days and monthly water levels. These methods are underlying the computer program "analytical and expert system prediction of navigable water level of the Danube" which is passed for testing to the Danube Hydrometeorological Observatory.

Preliminary test results show that forecasts of water levels of the Danube that are based on developed techniques have high enough justification. The use of computer technology in the Danube Hydrometeorological Observatory for hydrological forecasting opens up new opportunities to improve the quality of customer service.

14.5 UA | Time from surveying to action: maintenance philosophy

The hydrometeorological regime and its variability is one of the main factors determining the possibilities of Danube navigation.

Difficulties for shipping in the Ukrainian part of the Danube occur in the following situations:

- The minimum water levels in the summer-autumn low-flow period;
- Maximum water levels during the spring and summer flooding;
- The sharp reduction of depth in the limiting areas of river as a consequence of sediment deposits after climbing flood or flooding rain;
- Periods of ice phenomena of high intensity (thick ice drifting, ice jams, ice formations).

Therefore, a key principle of providing services to shipping companies consists in presenting daily in time operational hydrological information and forecasts on actual and expected characteristics of the hydrological regime of the Danube.

Long-term hydrological monitoring, conducted at the Ukrainian part of the Danube, revealed certain trends in changes in the hydrological regime affecting shipping conditions.

In the future, a permanent mathematical model of the Danube Delta should be created, which will perform a variety of calculations of expected changes in morphology and hydrological processes in the delta, taking into account possible climate change scenarios, water flow and sediments of the Danube, Black Sea level and planned hydro-technical measures.

14.6 UA | Key issues and related activities 2014

	Key issues	*Need for action*	*Activities performed 2014*
UA 01	Maintenance of the waterway	Ensuring compliance with the international environmental conventions and bilateral agreements with Romania	*Maintenance of onshore navigation facilities – 355, incl .: leading – 2, luminous – 54, informative – 128, kilometer (miles)– 171. Modernized - installed on a plastic base – 23 informative and luminous signs. Floating navigation facilities - 45.*

14.7 UA | Review of rehabilitation and maintenance activities 2014

The following activities relate to all critical locations as identified in the Rehabilitation and Maintenance Master Plan (version December 2014)

Surveying activities 2014

River-km (from-to)	Frequency of surveying	Type of survey (single/multibeam)
Sea approach channel Bystre	2 times per year	multibeam
64,0-65,8 km	1 time per year	single

Fairway relocation activities 2014

River-km (from-to)	Frequency of relocation interventions	Comments
64,0-65,8 km	1 per year	moving of staff marking of the fairway and the establishment of additional Floating safety sings through the shift of natural fairway toward the left bank of 50-70 m.

Dredging activities 2014

Currently the Ministry of Infrastructure of Ukraine provides implementation of operational dredging and support to navigation depths exclusively on sea approach channel, the DNRW Danube - Black Sea (3,4 km from the entire length of the track (172 km) of the DNR Danube - Black Sea).

On the river side of the DNR Danube - Black Sea, the dredging on the shallows is partly implemented. Since 2005, work on the project at the site of the River Danube from the Black Sea to Reni is not being performed.

Works on the section of the Danube River - namely dredging river shallow sections (sections located along the state border with Romania) - are carried out as works in transboundary waters, which are regulated by the bilateral agreements between the Governments of Ukraine and Romania on the Ukrainian-Romanian State Border Cooperation and Mutual Assistance on Border Issues (signed on 17.06.2003, entered in force on 12.05.2004) and the Agreement between the Government of Ukraine and the Government of Romania on Cooperation in the Field of Water Management in Transboundary Waters (signed on 30.09.1997, entered in force on 28.01.1999) and are to be agreed with the Romanian side.

14.8 UA | Operational and investment costs

Actual operational costs 2014

Need areas	Actual costs 2014 (Euro)
Minimum fairway parameters (dredging works on the DNR Danube – Black Sea)	7.770
Surveying of the riverbed	-
Water level gauges	46.200
Marking of the fairway	-
Availability of locks / lock chambers	-
Information on water levels and forecasts	30.600
Information on fairway depths	-
Information on marking plans	-
Meteorological information	51.500
Other needs	53.400
Sum	**181.700**

Secured operational budget 2015

n/a

Planned investments 2015-2016

Need areas	Required additional investment according to FRMMP	Planned % of required additional investment		Sum (%)
	EURO	2015	2016	
Minimum fairway parameters (depth / width)	-			
Surveying of the riverbed	-			
Water level gauges	300.000	17,0	-	17,0
Marking of the fairway	-			
Availability of locks / lock chambers	-			
Information on water levels and forecasts	540.000	6,0	-	6,0
Information on fairway depths	-			
Information on marking plans	-			
Meteorological information	360.000	15,0	-	15,0
Other needs	300.000	18,0	-	18,0
Sum	**1.500.000**	**12,8**	**-**	**12,8**

14.9 UA | Outlook: planned actions, milestones and funding sources

UA 01: Maintenance of the waterway		
1. Hydrographic survey		
River - km (to-from) Critical locations	**Planned frequency of surveying**	**Type of survey (single/planned)**
Sea approach channel Bystre	2 times per year	planned
10,0-10,5 km	2 times per year	planned
31,2-32,5 km	2 times per year	planned
36,4-38,3 km	2 times per year	planned
46,5-49,3 km	2 times per year	planned
51,2-53,0 km	2 times per year	planned
61,0-63,0 km	2 times per year	planned
64,0-65,8 km	2 times per year	planned
68,5-70,0 km	2 times per year	planned
72,0-74,0 km	2 times per year	planned
76,0-76,5 km	2 times per year	planned
46,3-48,0 miles	2 times per year	planned
56,0-57,5 miles	2 times per year	planned

Fairway 0-116 км	1 time per year	planned
Fairway 44-72 mile	1 time per year	planned
Ruk Solomoniv 0-12 km	1 time per year	planned
Ruk Ivanesht' 0-13 km	1 time per year	planned
2. Modernization and development of navigation facilities		
Location	**Planned activity**	**Number**
0-60 km	Introduction of plastic shore signs	6 pieces
0-116 km	Introduction of new type of buoys	10 pieces
Possible financing:		Implemented by funds under the SItate Institution "Derzhhydrigraphiya" costs for navigation – hydrographic safety navigation provision, according to the annual financial plans approved by the Ministry of Infrastructure of Ukraine