Joint approachement Romanian-Bulgarian for the waterway maintenace

EXECUTIVE AGENCY
EXPLORATION AND MAINTENANCE OF THE DANUBE RIVER

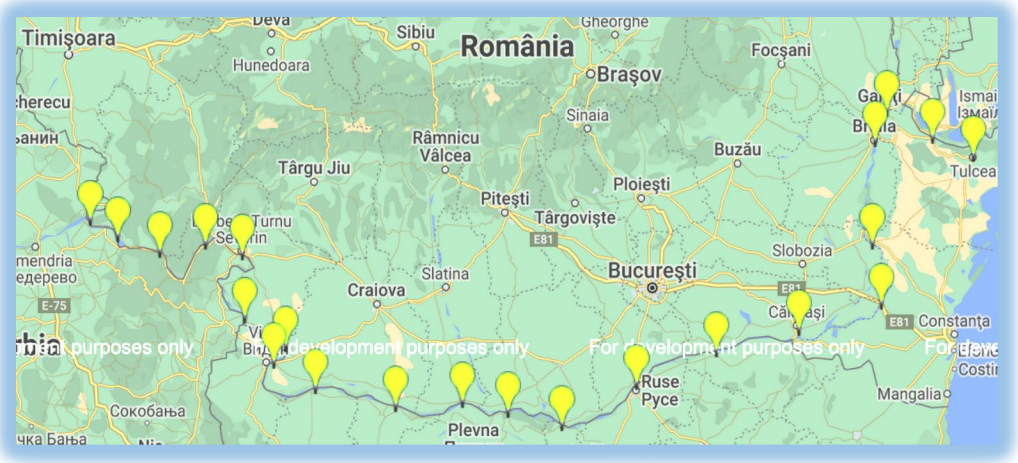
Agenda

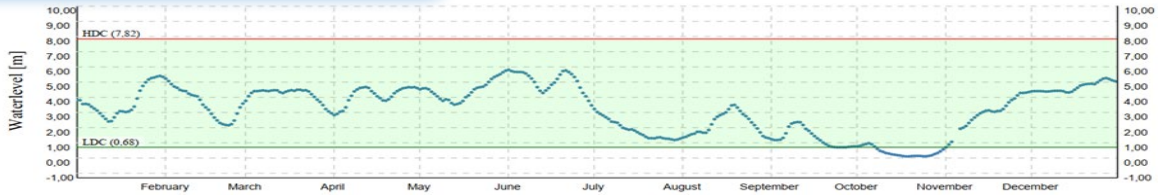
- *Analysis of the hydrological conditions – 2023*
- *Analysis of the navigation conditions – 2023*
- *Maintenance activities performed – 2023*
- *Necessary measures for navigation conditions (2024)*

Hydrological conditions

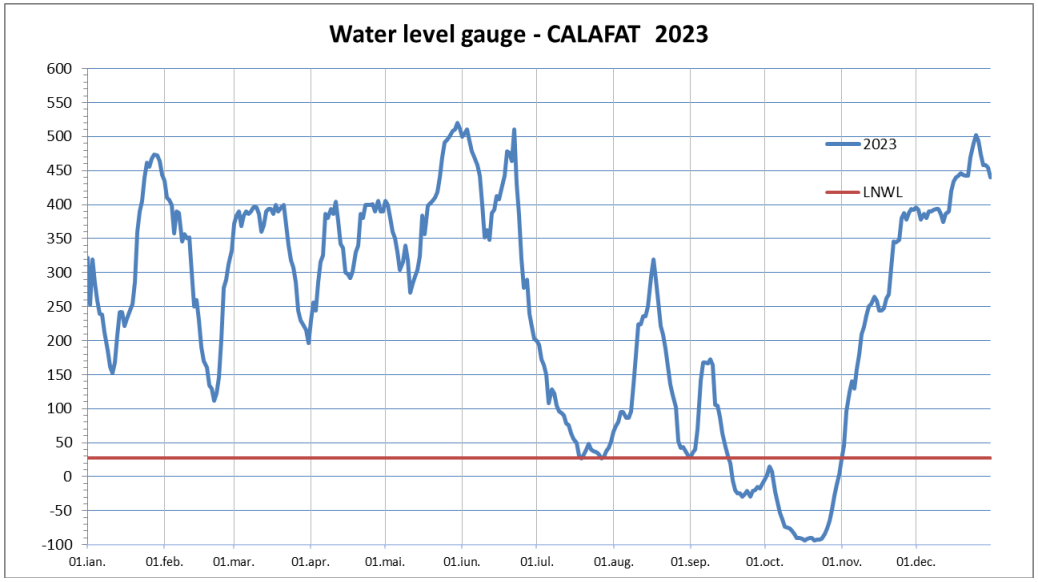
From a hydrological point of view, 2023 can be considered unexceptional, without particular deviations from the typical multiyear average norms. The average annual water discharge is close to the multiyear average. There is a normal seasonality. It is characterized by spring high water in May, June and low water in September, October.

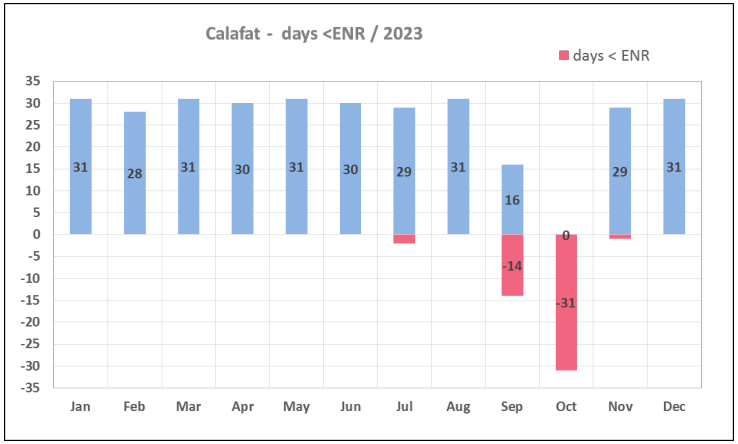
In generally, favorable hydrological conditions were recorded, with the exception of October when the water levels approached the LNWL values.





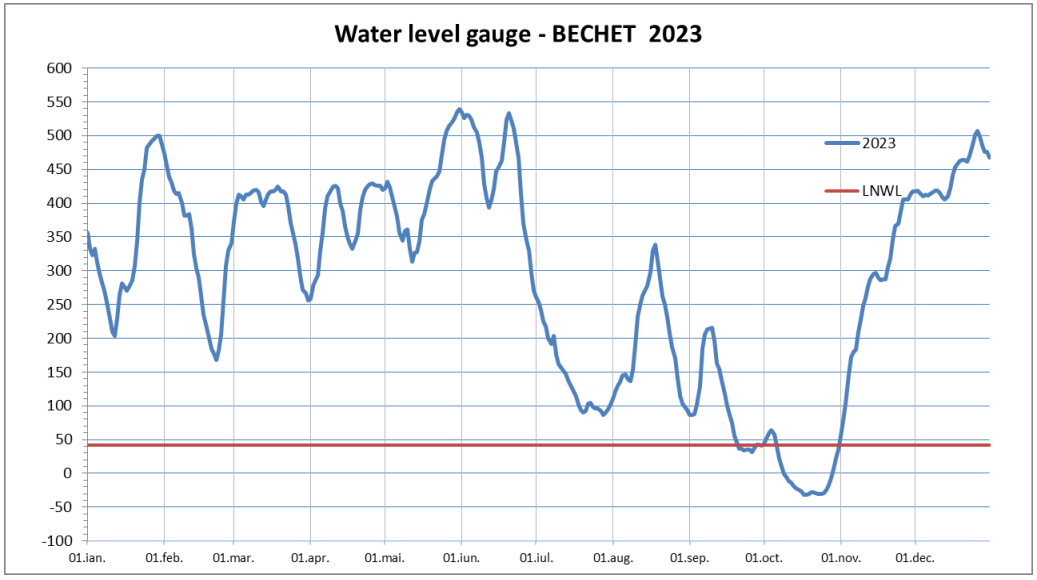
Hydrological conditions

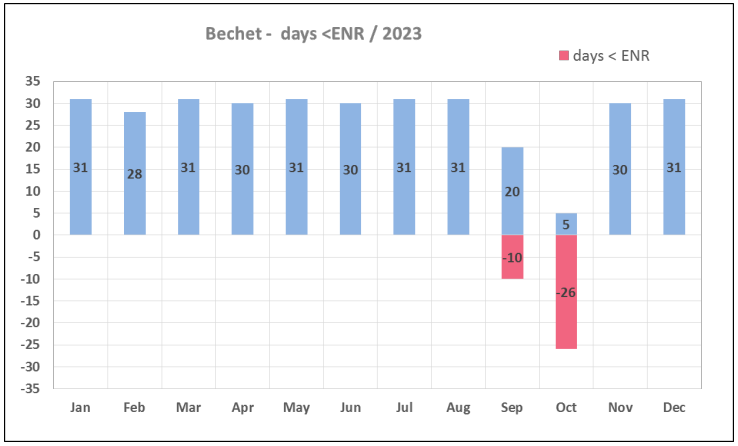




Days < ENR / 48

M=520cm / m = -94cm

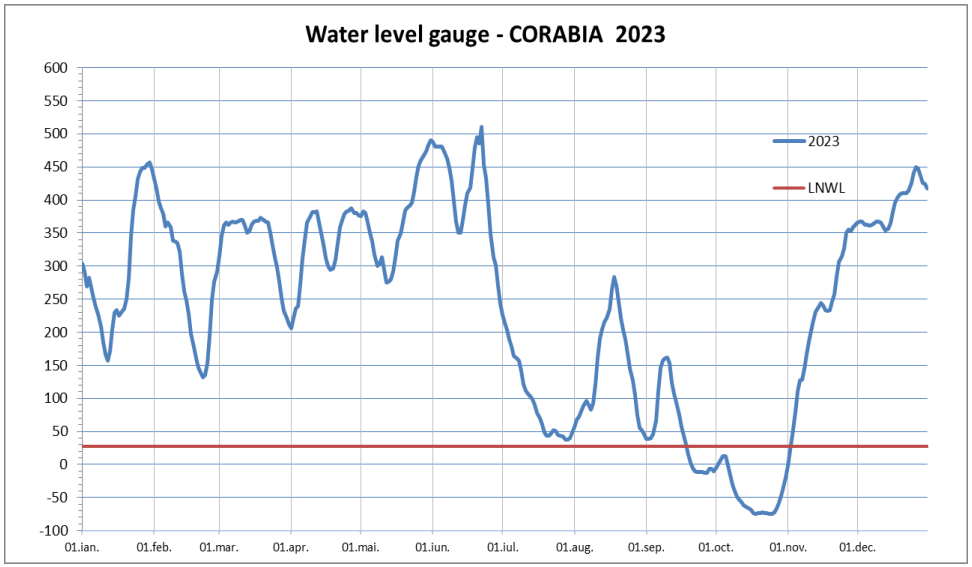


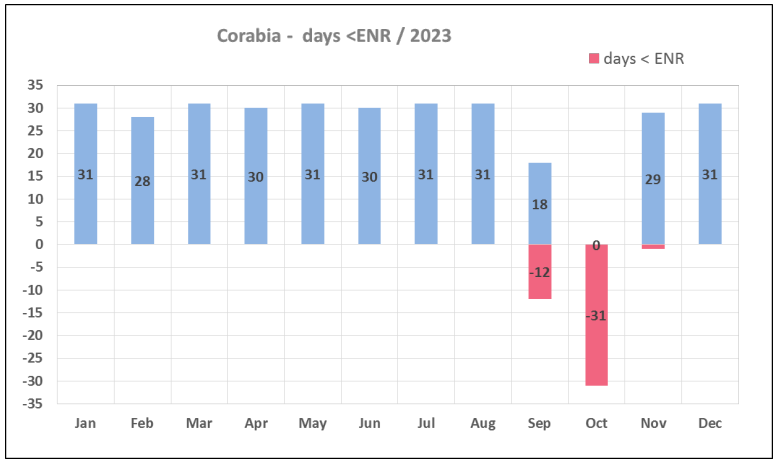


Days < ENR / 36

M=539cm / m = -32cm

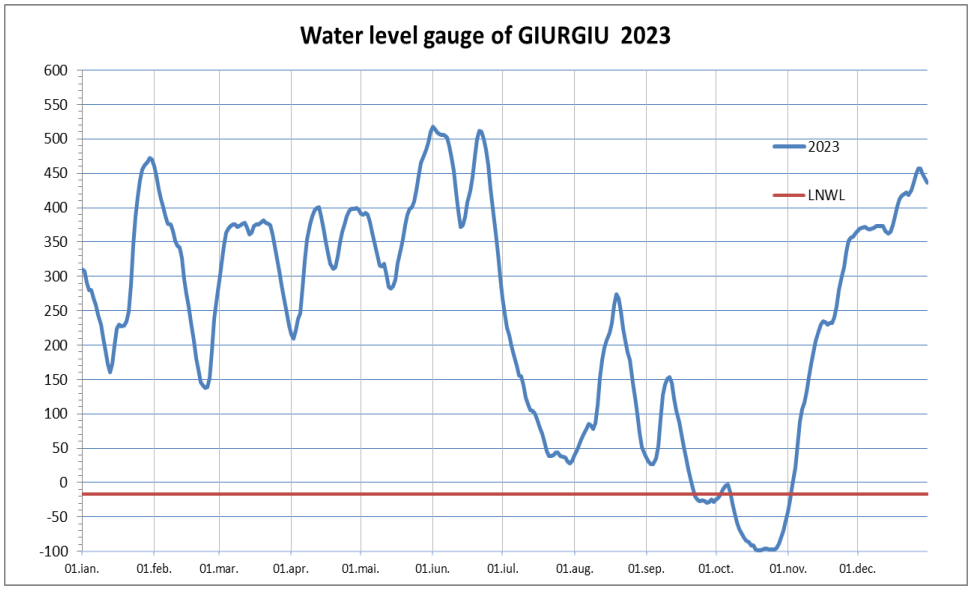
Hydrological conditions

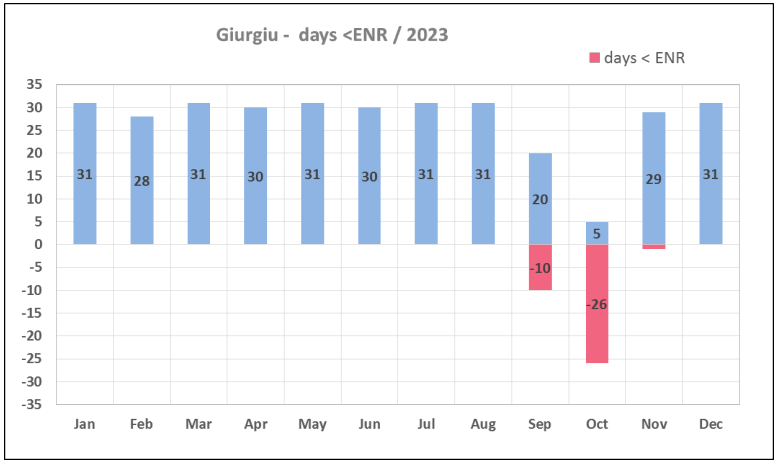




Days < ENR / 44

M=495cm / m = -75cm

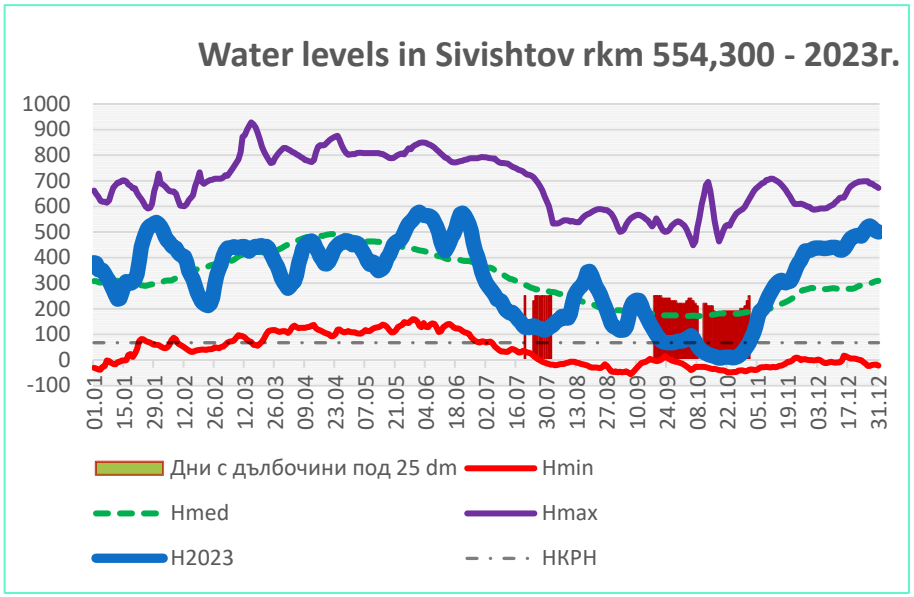




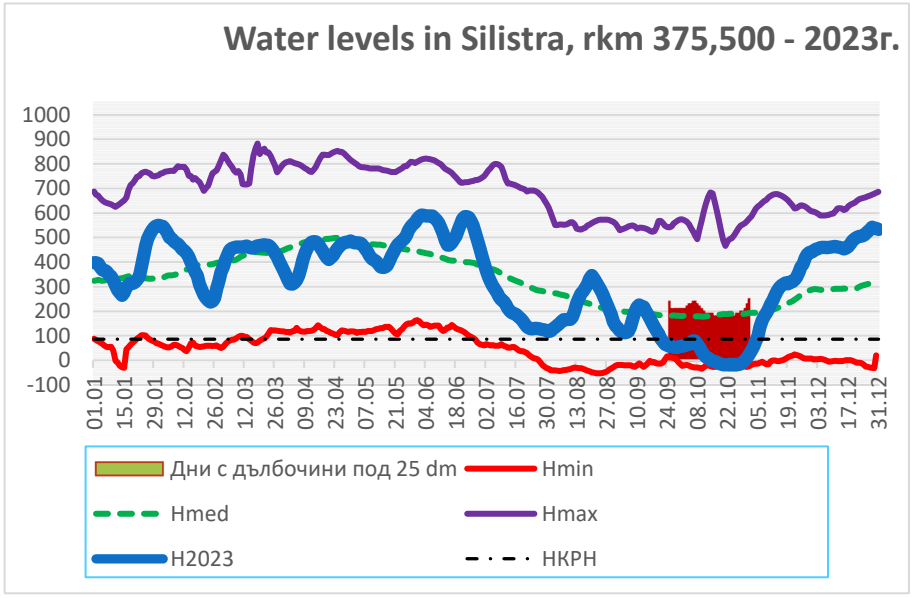
Days < ENR / 37

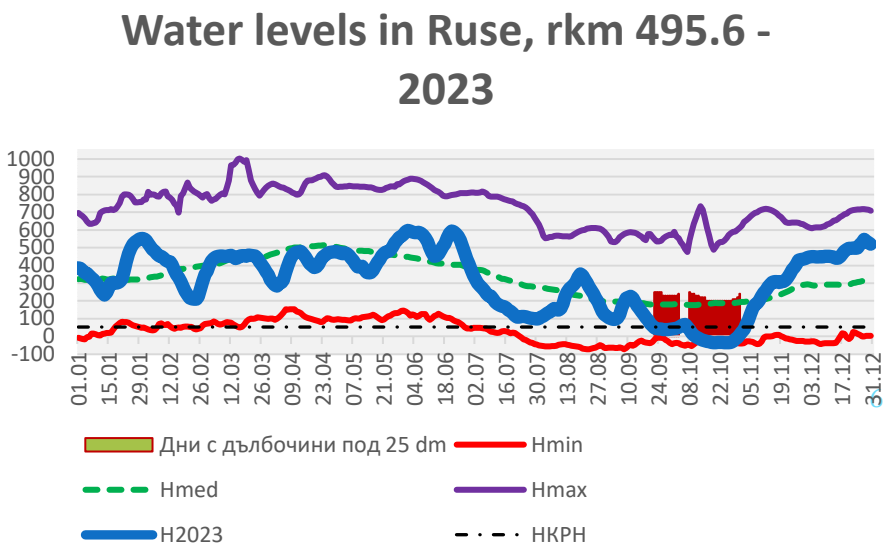
M=518cm / m = -99cm

Water levels 2023



2023 г.	Number of days below LNWL	Number of days with depths under 25 dm	Min. water level	Mid. water level	Max. water level
Svishtov	29	53	8	317	578
Ruse	38	45	-36	316	597
Silistra	44	38	-18	329	592





Number of days below LNWL and number of days with bottlenecks

km	610	536	536	445	445	375
Year	Svishtov		Ruse		Silistra	
	№ of days below LNWL	№ of days with bottlenecks	№ of days below LNWL	№ of days with bottlenecks	№ of days below LNWL	№ of days with bottlenecks
2011	73	195	76	95	78	83
2012	28	83	25	29	41	39
2013	36	90	35	51	38	24
2014	0	28	0	13	0	0
2015	80	150	77	115	72	71
2016	18	93	18	74	18	74
2017	32	143	28	113	23	52
2018	75	107	71	94	78	76
2019	68	96	64	72	75	59
2020	17	26	16	15	24	19
2021	50	68	49	65	55	68
2022	105	141	111	112	120	108
2023	29	53	38	45	44	38

Number of days during which the DC recommendations were not fulfilled

Year	Area		
	Svishtov	Ruse	Silistra
2011	122	19	5
2012	55	4	0
2013	54	16	0
2014	28	13	0
2015	70	38	0
2016	75	56	56
2017	111	85	29
2018	32	23	0
2019	28	8	0
2020	9	0	0
2021	18	16	13
2022	36	1	0
2023	24	7	0

Hydrological conditions

Reffering the Danube flow discharge, in the period January-September, the flow discharge had values below the multi-annual average. In October was recorded the values below 3000 m^3 / s (even 1951 m^3 / s), and starting with November, the flow discharge started to increase until the end of the year.

The maximum flow discharge was 10111 m^3 / s.

Moreover, the last published forecasts for October (minimum values) showed the unfavorable situation.

Forecast 7 days

Secțiunea		24.09.2023	25.09.2023	26.09.2023	27.09.2023	28.09.2023	29.09.2023	30.09.2023	01.10.2023
Bazias	Q(m^3/s)	2500	2500	2500	2600	2700	2700	2800	2900
P.D.F. II	Q(m^3/s)	2770							
Calafat	H(cm)	-21	-28	-31	-26	-21	-15	-7	-3
Etiaj = 50	Q(m^3/s)	2510	2450	2430	2470	2510	2560	2630	2660
Faza I = 550	+ΔH(cm)								
Faza II = 600	Gheața								
Bechet	H(cm)	35	34	32	32	35	39	43	48
Etiaj = 42	Q(m^3/s)	2720	2710	2690	2690	2720	2760	2800	2850
Faza I = 550	+ΔH(cm)								
Faza II = 600	Gheața								
Corabia	H(cm)	-12	-12	-14	-15	-13	-9	-5	-1
Etiaj = 23	Q(m^3/s)	2798	2798	2776	2766	2787	2830	2873	2917
Faza I = 500	+ΔH(cm)								
Faza II = 550	Gheața								
Tr. Măgurele	H(cm)	16	15	14	14	15	18	21	25
Etiaj = 34	Q(m^3/s)	2590	2580	2570	2570	2580	2620	2650	2700
Faza I = 500	+ΔH(cm)								
Faza II = 550	Gheața								
Zimnicea	H(cm)	40	39	38	38	38	40	43	47
Etiaj = 57	Q(m^3/s)	2980	2970	2960	2960	2960	2980	3020	3060
Faza I = 530	+ΔH(cm)								
Faza II = 610	Gheața								
Giurgiu	H(cm)	-27	-29	-29	-30	-30	-29	-26	-22
Etiaj = 44	Q(m^3/s)	2810	2790	2790	2780	2780	2790	2820	2860
Faza I = 570	+ΔH(cm)								
Faza II = 640	Gheața								
Oltenița	H(cm)	4	2	2	1	1	1	3	6
Etiaj = 44	Q(m^3/s)	2730	2710	2710	2690	2690	2690	2720	2760
Faza I = 550	+ΔH(cm)								
Faza II = 630	Gheața								
Călărași	H(cm)	-32	-36	-37	-38	-38	-38	-36	-34
Etiaj = -1	Q(m^3/s)	3040	2990	2980	2970	2970	2970	2990	3020
Faza I = 550	+ΔH(cm)								
Faza II = 620	Gheața								
Fetești	H(cm)	-19	-24	-26	-27	-28	-28	-26	-23
	Q(m^3/s)	2335	2314	2306	2302	2298	2298	2306	2318
Faza I = 565	+ΔH(cm)								
Faza II = 665	Gheața								
Cernavodă	H(cm)	-60	-65	-68	-69	-70	-70	-68	-64
Etiaj = -39	Q(m^3/s)	640	622	611	608	604	604	611	625
Faza I = 500	+ΔH(cm)								
Faza II = 600	Gheața								
Hârșova	H(cm)	28	22	19	18	17	17	18	21
Etiaj = 19	Q(m^3/s)	531	510	499	495	492	492	495	506
Faza I = 580	+ΔH(cm)								
Faza II = 610	Gheața								
Vadu Oii	H(cm)	53	46	43	42	41	41	42	44
Etiaj = 19	Q(m^3/s)	3309	3241	3211	3202	3192	3192	3202	3221
Faza I = 600	+ΔH(cm)								
Faza II = 700	Gheața								
Brăila	H(cm)	104	97	94	92	91	90	91	92
Etiaj = 46	Q(m^3/s)	3300	3210	3180	3160	3140	3130	3140	3160
Faza I = 560	+ΔH(cm)								
Faza II = 610	Gheața								
Galați	H(cm)	111	105	101	100	99	98	99	100
Faza I = 560	+ΔH(cm)								
Faza II = 600	Gheața								
Grindu	H(cm)	104	98	94	93	92	91	92	93
	Q(m^3/s)	3430	3340	3290	3270	3260	3250	3260	3270
Faza I = 540	+ΔH(cm)								
Faza II = 580	Gheața								
Isaccea	H(cm)	87	81	78	76	75	74	74	75
Etiaj = 42	Q(m^3/s)	3390	3280	3220	3180	3170	3150	3150	3170
Faza I = 380	+ΔH(cm)								
Faza II = 508	Gheața								
Tulcea	H(cm)	70	65	63	61	61	60	60	61
Etiaj = 29	Q(m^3/s)	1740	1680	1660	1630	1630	1620	1620	1630
Faza I = 320	+ΔH(cm)								
Faza II = 410	Gheața								

Hydrological conditions

Regarding the next period, the forecasts show values above the annual average, favorable for navigation conditions.

Thus, based on medium- and long-term statistical elements, the forecast of average and extreme monthly flows for the period February-April was issued.

(source : INHGA).

	Februarie 2024		Martie 2024		Aprilie 2024	
	m.a.		m.a.		m.a.	
Q maxim (mc/s)		8500		9500		9500
Q mediu (mc/s)	5300	7200	6700	8000	7900	8500
Q minim (mc/s)		5800		5500		6500

In the table, in the column "m.a." it is present the average multiannual value of the flows corresponding to the month.

This long-term prognosis will be updated by short-term prognosis, published daily for a period of 7 days

Hydrological conditions

Winter 2023-2024 is characterized as relatively warm. From 01.12.2023 to 12.02.2024 the weather is much warmer than normal for the period.

The minimum air temperature recorded in Giurgiu was - 9.3 ° C (23.01.2024), and -3 ° C (05.12.2023) .

The average monthly temperature for HMS-Ruse for December-February is 2.7°C, by 12.02.2024 it's 4.4° C. The average monthly temperature for HMS-Ruse for December-February is 2.7°C.

The highest maximal temperature is 20.4°C measured on 11.02.2024, and the lowest minimum temperatures is -8.7°C, measured on 23.01.2024.

In the winter of 2023-2024, no ice phenomena were reported in the common Danube River sector.

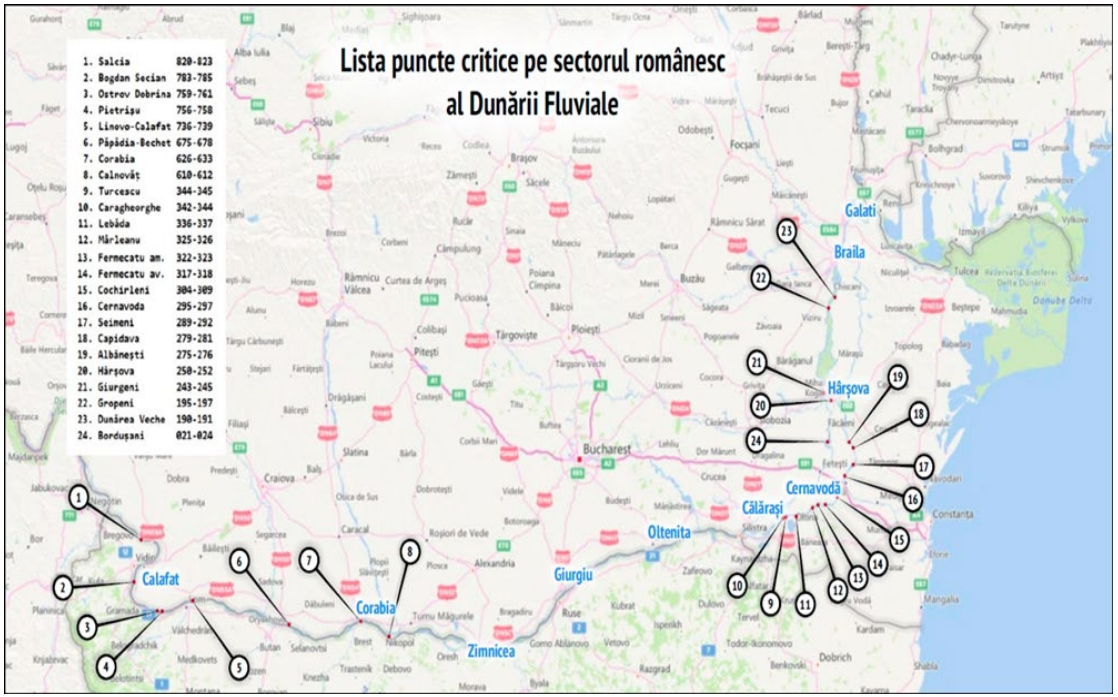
Temperature characteristic HMS – Ruse

Date	December	January	February
1	4.8	6.0	2.2
2	9.3	7.9	3.0
3	5.5	8.9	6.6
4	1.1	10.7	8.8
5	2.1	9.2	13.0
6	5.5	8.7	14.5
7	1.0	10.0	14.0
8	1.2	0.5	13.6
9	1.1	-3.8	11.3
10	0.5	-3.3	13.4
11	1.5	-1.5	17.4
12	5.0	0.5	12.5
13	5.3	-0.5	
14	7.3	3.5	
15	4.0	6.6	
16	3.0	4.0	
17	3.6	2.4	
18	6.8	5.1	
19	5.8	8.3	
20	5.1	2.1	
21	4.0	-1.8	
22	5.9	-5.3	
23	5.6	-5.4	
24	8.5	-1.6	
25	14.6	4.8	
26	12.0	5.3	
27	10.9	3.8	
28	5.6	2.7	
29	8.9	1.9	
30	9.9	1.9	
31	7.4	1.1	
Month	**December**	**January**	**February**
t min	-2.1	-8.7	-3.2
t med	5.6	3.0	4.6
t max	19.8	18.5	20.4

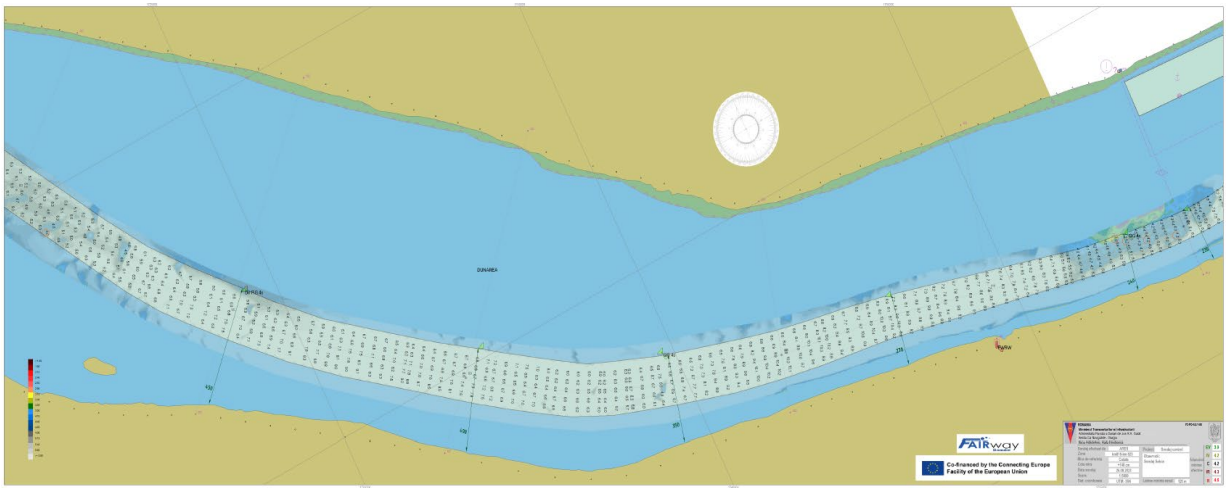
Navigation conditions– critical locations

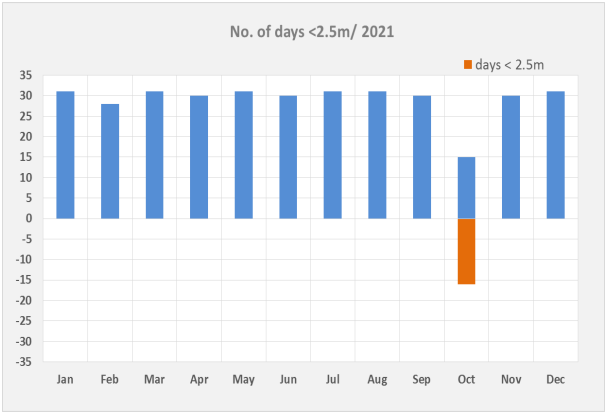
Due to the low parameters of the fairway, the most critical sectors in the Danube river Romanian-Bulgarian common sector , where it was necessary to make interventions, are the following:

1. Garla / rkm 840
2. Salcia / rkm 820
3. Bogdan / rkm 783
4. Dobrina / rkm 762
5. Bechet / rkm 677
6. Corabia / rkm 630
7. Calnovat / rkm 615
8. Calnovat / rkm 610

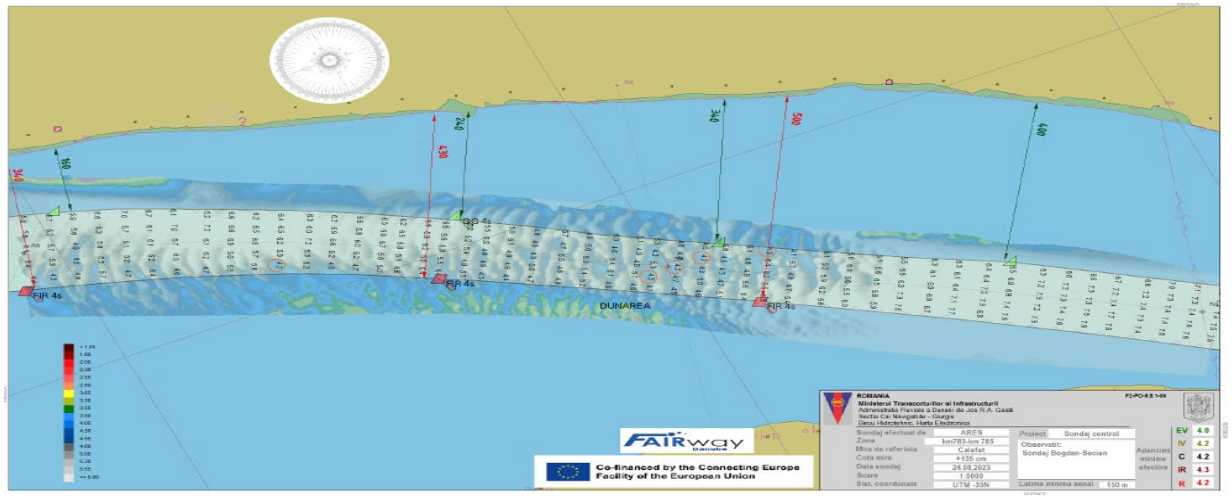


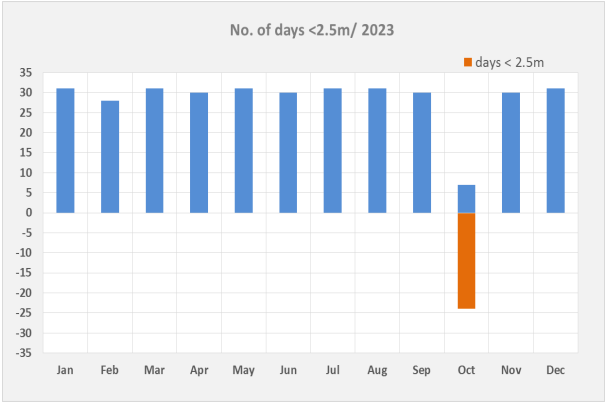
Navigation conditions





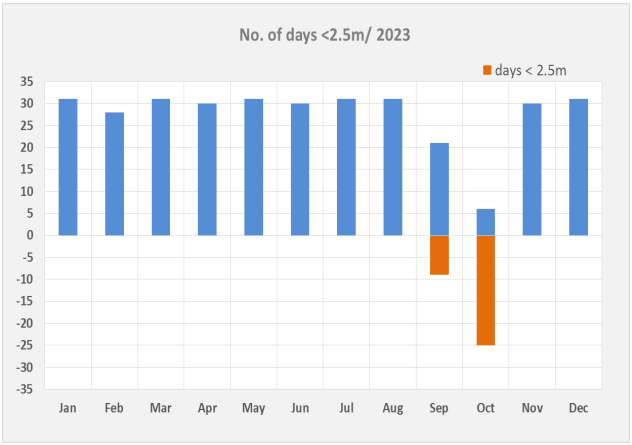
Salcia / rkm 818 – rkm 824 /min. width – 120m/ days <2.5m – 16



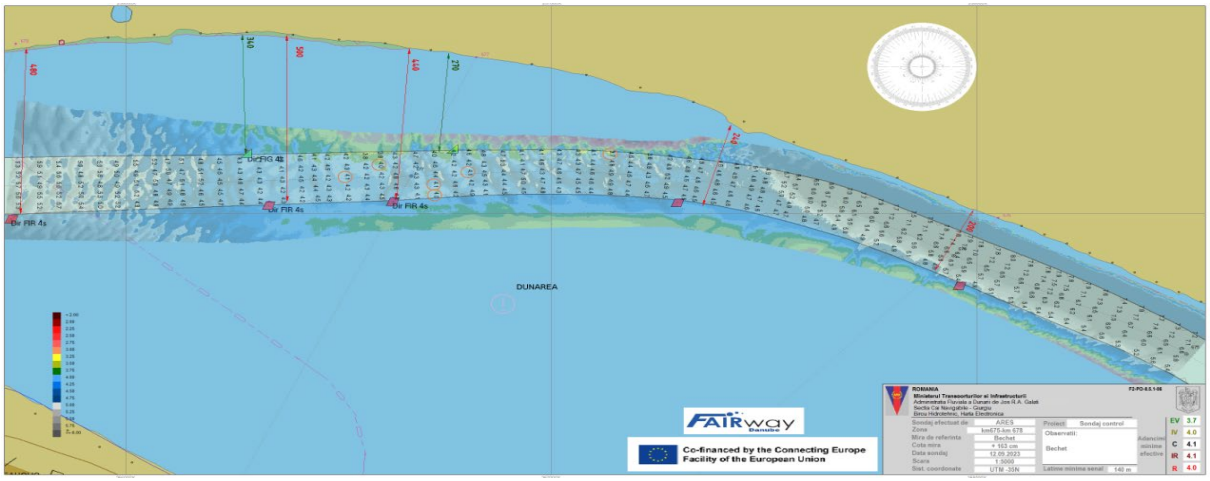


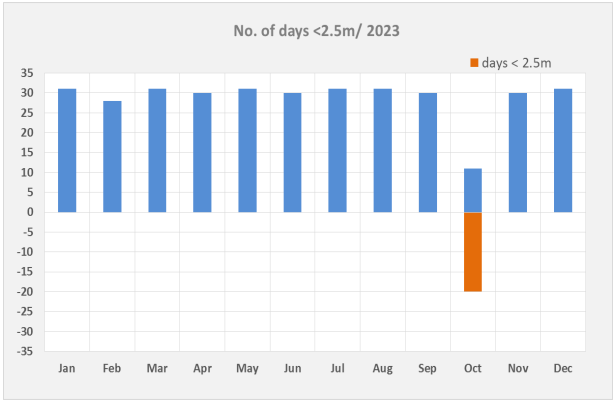
Bogdan / rkm 783 – rkm 785 /min. width – 140m days <2.5m - 24

Navigation conditions



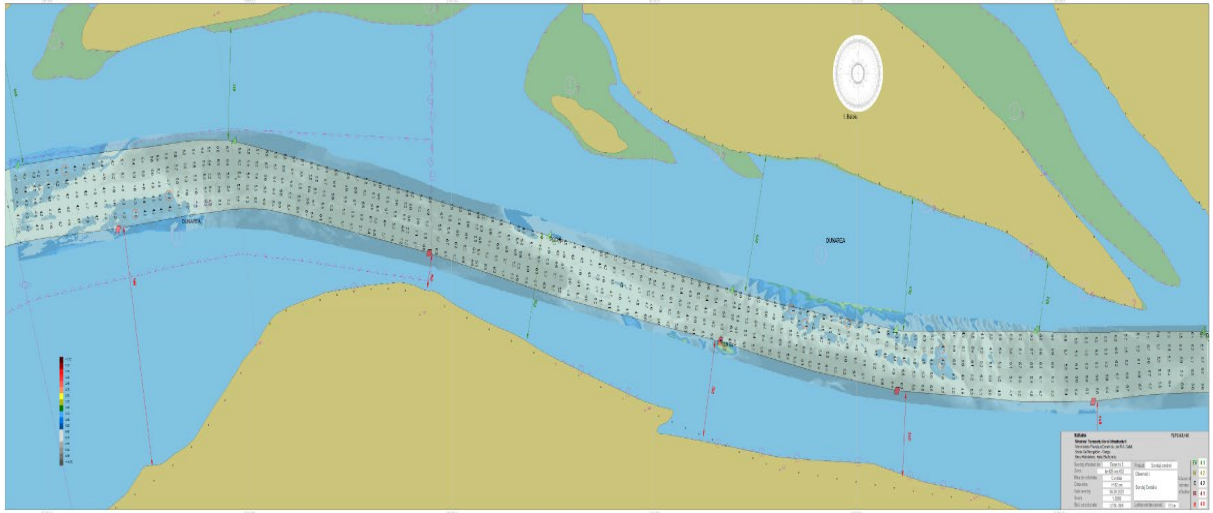
Dobrina / rkm 759 – rkm 763 /min. width – 100m/ days <2.5m – 34

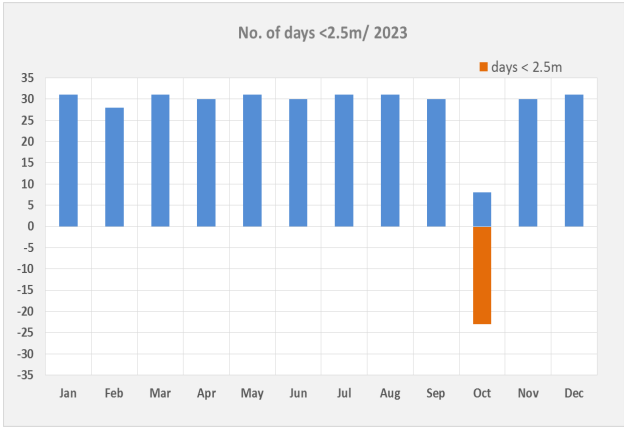




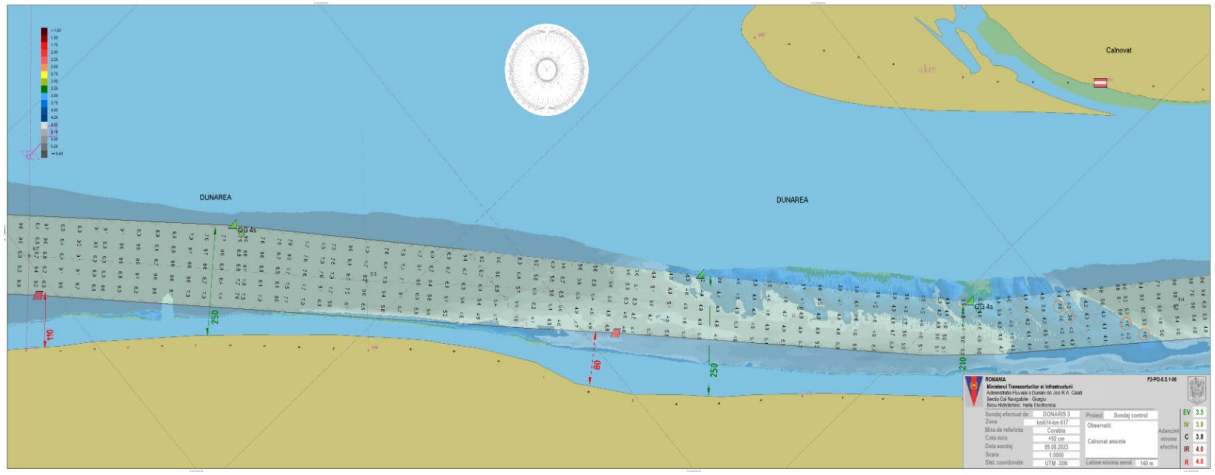
Bechet / rkm 675 – rkm 678 / min. width – 140m / days <2.5m - 20

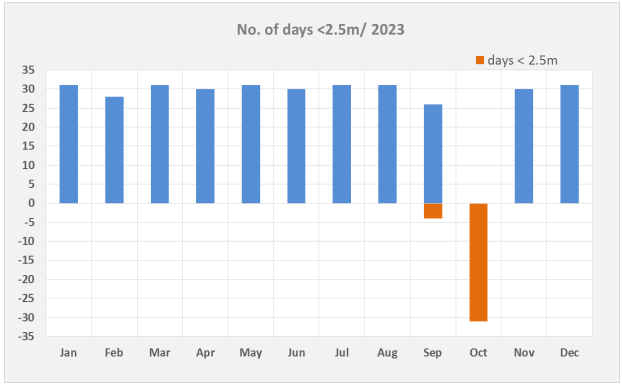
Navigation conditions





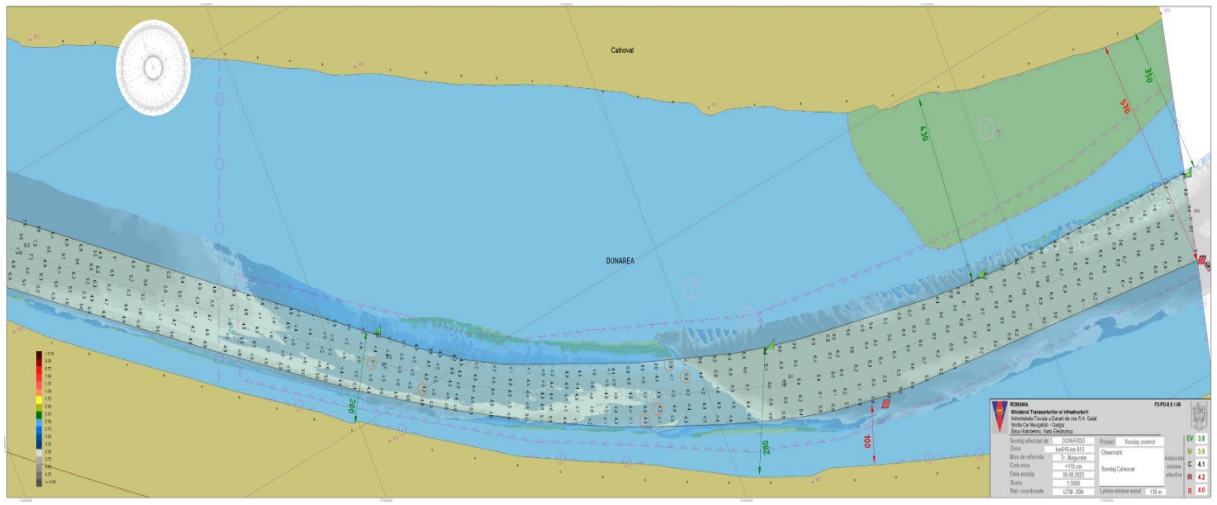
Corabia / rkm 626 – rkm 632 /min. width – 150m/ days <2.5m – 23

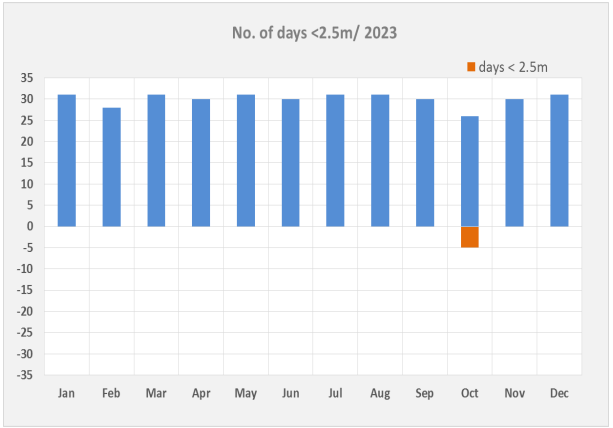




Calnovat am. / rkm 614 – rkm 617 /min. width – 140m/ days <2.5m - 35

Navigation conditions





Calnovat / rkm 610 – rkm 613/ min. width – 140m /days <2.5m – 5

NAVIGATION CONDITIONS

During 2023 in the common stretch 25 bottlenecks were active.
For the sector between Ruse and Somovit limiting were bottlenecks Belene and Vardim (rkm. 565.000 – 563.000 and rkm. 547.000 – 544.000), while for the sector between Ruse to Silistra limiting were bottlenecks Mishka and Brashlyan (rkm. 463.000 – 460.000 and rkm. 458.000 – 455.000).

Схеми на всички критични райони в българския участък

(от км.374.10 до км. 610.00)

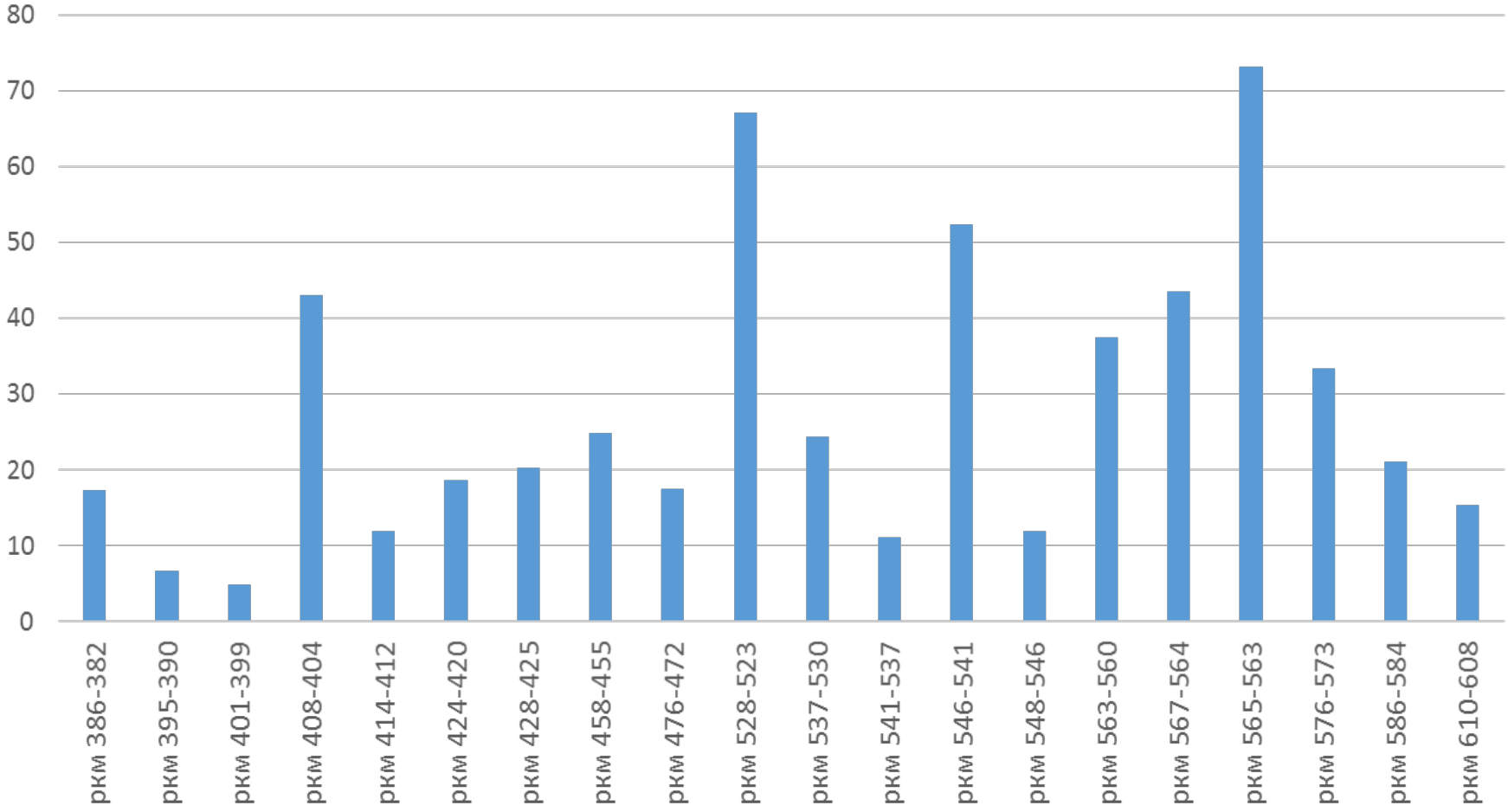
387.00 – 385.00	395.00 – 392.00	400.00 – 398.00	406.00 – 403.00	414.00 – 412.00	423.00 – 421.00
425.00 – 423.00	428.00 – 425.00	458.00 – 455.00	463.00 – 460.00	476.00 – 472.00	489.00 – 486.00
525.00 – 522.00	529.00 – 527.00	533.00 – 530.00	539.00 – 536.00	545.00 – 543.00	547.00 – 545.00
556.00 – 554.00	562.00 – 560.00	565.00 – 563.00	576.00 – 573.00	586.00 – 584.00	591.00 – 589.00

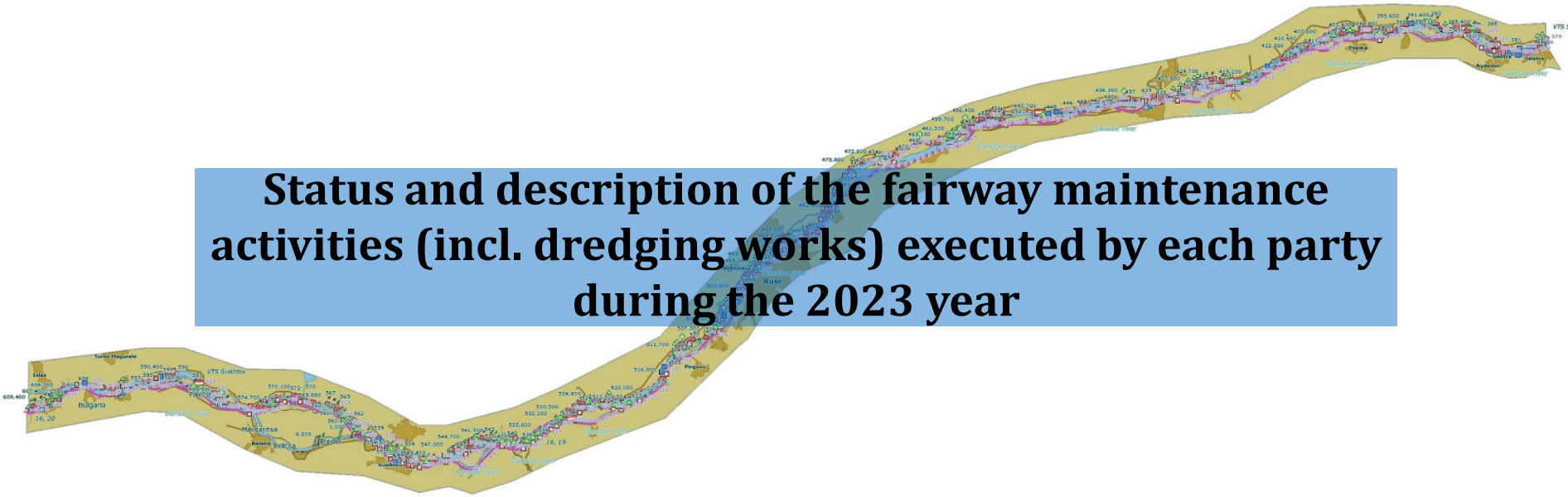
609.00 – 554.00

Bottlenecks <25 dm for 2023

Year	2023			
Quarter of the year	I	II	III	IV
rkm. 387-382	0	0	6	29
rkm. 396-390	0	0	6	32
rkm. 400-398	0	0	0	12
rkm. 407-404	0	0	0	22
rkm. 414-412	0	0	0	22
rkm. 424-420	0	0	0	21
rkm. 428-425	0	0	0	14
rkm. 458-455	0	0	10	30
rkm. 476-472	0	0	0	19
rkm. 528-523	0	0	9	27
rkm. 537-530	0	0	0	22
rkm. 545-540	0	0	10	26
rkm. 547-545	0	0	19	32
rkm.565 – 563	0	0	13	30
rkm. 576-573	0	0	11	30
rkm. 586-584	0	0	5	30
rkm. 610-608	0	0	9	32

Frequency of occurrence of bottlenecks in identified critical sections on the Bulgarian stretch



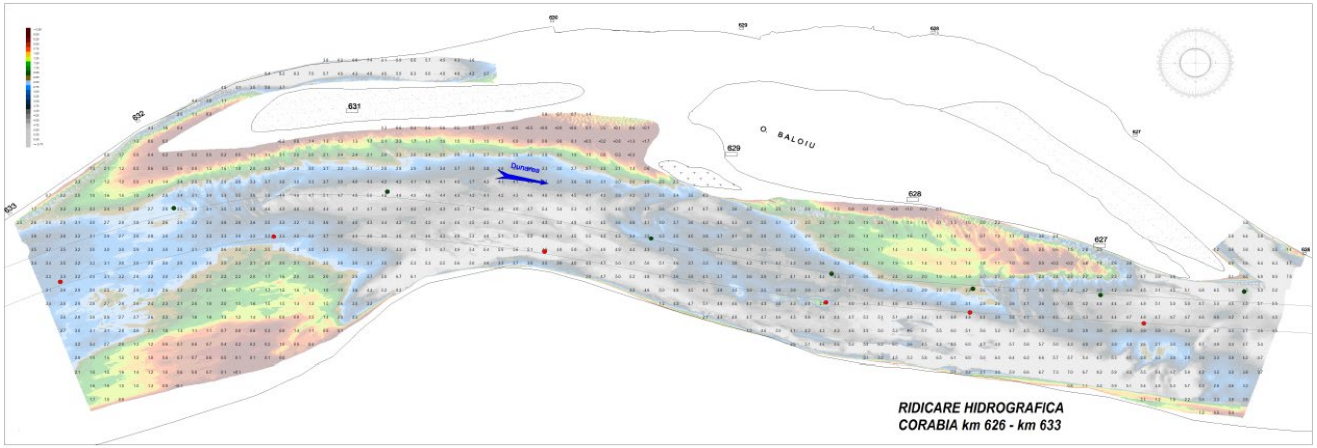


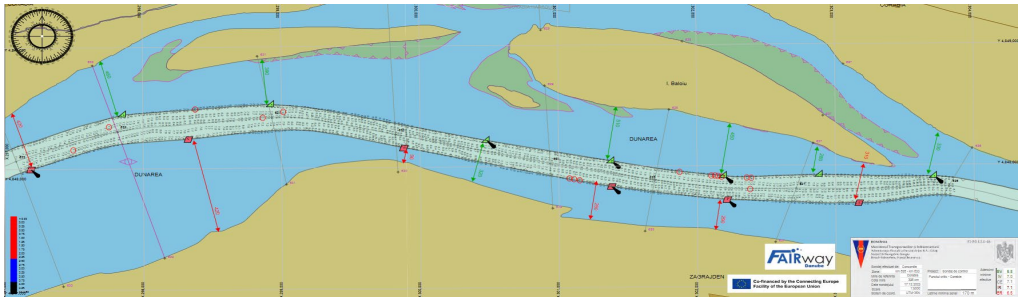
Status and description of the fairway maintenance activities (incl. dredging works) executed by each party during the 2023 year

Maintenance activities

Taking into account the assurance of navigability throughout the year, the areas with difficult crossings were constantly monitored through surveys , marking and dredging activities, especially during low water period.

At the critical locations: Calnovat, Calnovat upstream, Corabia, Bechet, Dobrina, Bogdan-Secian, Salcia and Garla Mare, single beam and multi-beam surveys were performed - 63 surveys (SB), 37 surveys (MB), 13 survey (discharge).





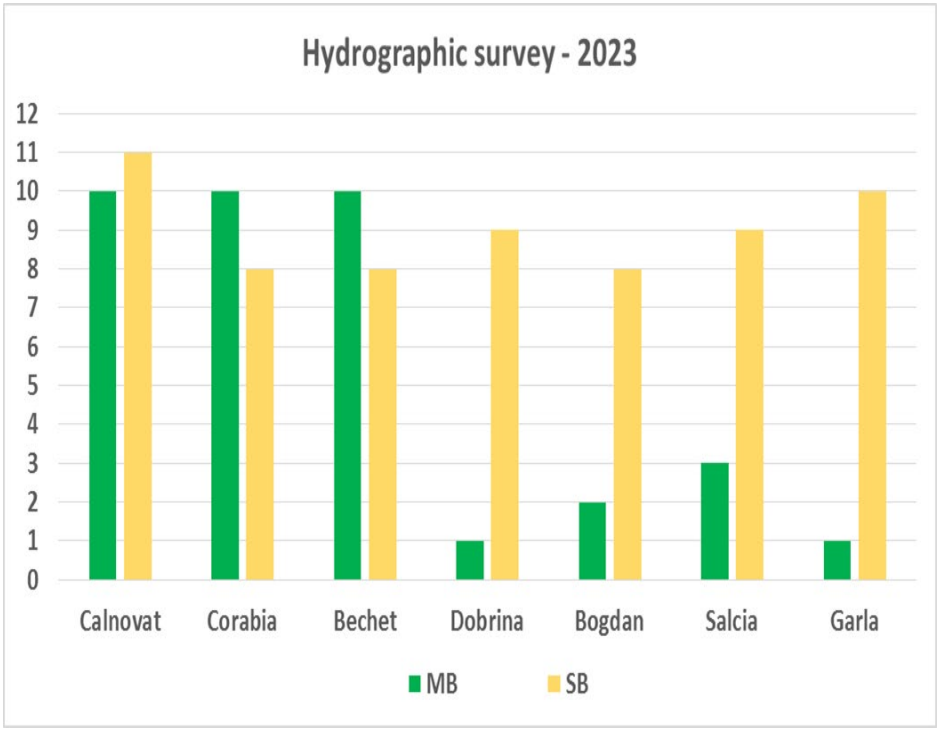
Hydrographic surveys

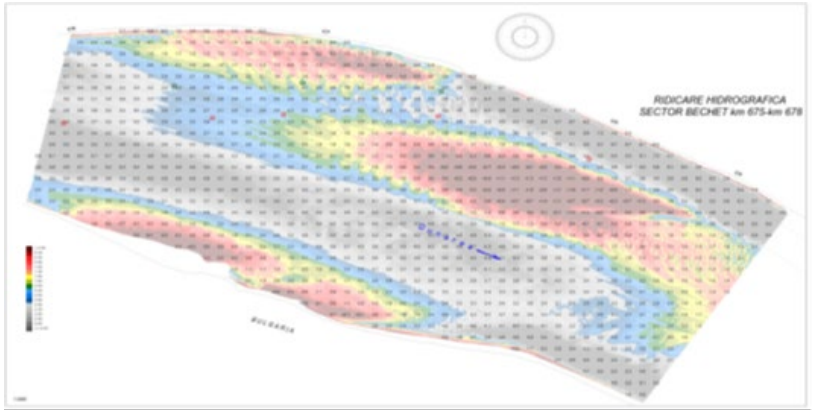
The hydrograhic surveys were made by vessels:

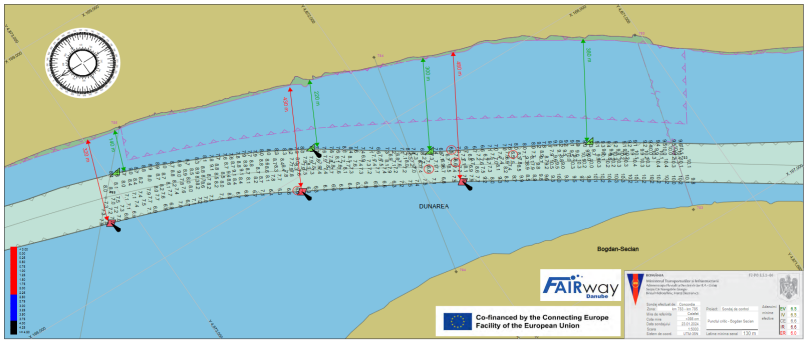
Donaris 3 (MB)

Ares (MB)

Concordia EU 2019 (SB)



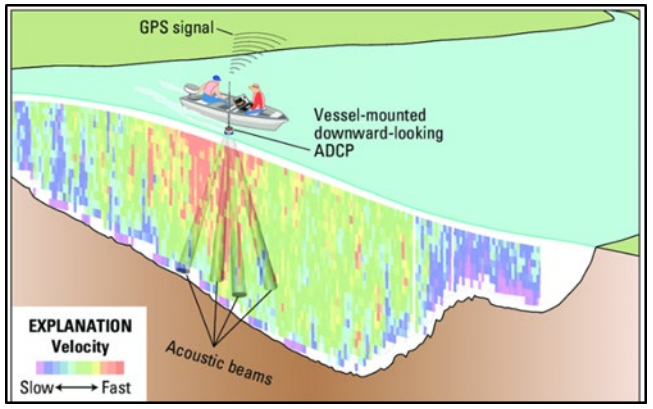


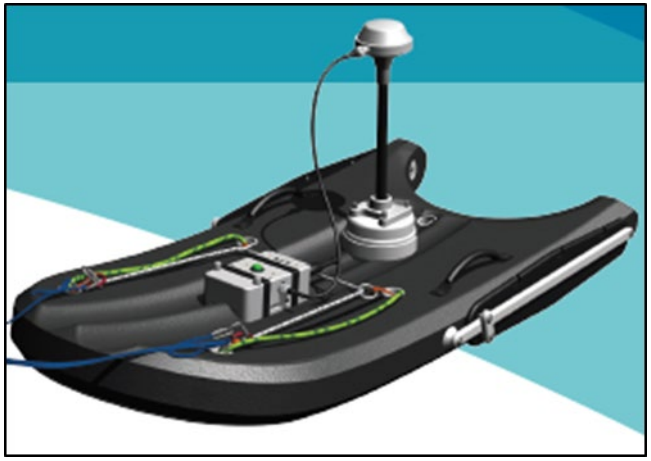


Maintenance activities

Discharge survey (cm/s)

- **Bechet:**
  1. April - 7732;
  2. June - 8674;
- **Corabia:**
  1. June – 9216 (Danube);
  2. June – 2179 (Secondary arm) km 628;
  3. June – 6940 (Danube) km 628;
  4. June – 1327 (Secondary arm) km 630,4;
  5. June – 7753 Danube, km 630,4;
- **Giurgiu:**
  1. April - 8197;
  2. April - 8332.
- **Oltenita:**
  1. April - 8420;
  2. April – 8517;
- **Chiciu:**
  1. April - 8212;
  2. April - 8314.





Maintenance activities

The marking activity was performed by vessels Concordia EU 2019, Semnal 1 and Donaris 3 covering the entire sector.

- 30 marking trips
- signs operated in the field :

buoys	71
electric buoys	68
beacons	16
coastal signs	561
Total	716

- losses of marking materials:

buoys	14
electric lamps	10
coastal signs	27
Total	41

Due to the achievement of the second home port in Bechet, the marking vessel Concordia EU 2019 remained stationary in the port for operative interventions (2 inspections per month).

Especially in the low water period, were made additional interventions (7) , resulting in ensuring a minimum fairway width of 100m.

Maintenance activities

Fairway maintenance in the Bulgarian part of the river is performed by marking vessel “Osam”, surveying vessels “Rs 2070” and “Dunav-1”. While doing so more than 5 000 km were traveled by marking vessel “Osam” with usage of 120 days/year. The fairway optimization was implemented by maintenance of the navigational signals (floating and coastal), exploration and on-time corrections of the fairway. During the year the marking system was secured by (on position) 152 floating signals, out of which 38 illuminated, 734 (incl. kilometric) coastal signals, as well as 15 right river bank beacons.

Fairway corrections were made by:

- Mounting of floating signals 495
- Dismounting of floating signals 496
- Single beam measurements 152

- The information is published on APPD’s web-site https://appd-bg.org

Number of single- and multibeam surveys

2023		
	MB	SB
January	4	10
February	8	17
March	5	12
April	6	11
May	8	8
June	1	10
July	10	17
August	6	21
September	6	13
October	6	21
November	1	13
December	7	12
	68	165

NAVIGATIONAL CONDITIONS

area	kilo-metre	sign	distance from coast [m]		depth [m]	water stage [cm]	observation post	coordinates [°]		date
			left	right				latitude	longitude	
Silistra	375.30									2017-05-21
Silistra	382.00									2017-05-21
Silistra	382.10		240	520	7.5	54	Silistra	44.1217500	27.1822666	2023-09-27
Chaika isl.	385.40		140	1080	2.7	54	Silistra	44.1385833	27.1536000	2023-09-27
Chaika isl.	385.80		130	980	2.6	54	Silistra	44.1401166	27.1487000	2023-09-27
Aidemir ps	386.10		110	900	2.3	54	Silistra	44.1408166	27.1450166	2023-09-27
Aidemir ps	386.60		480	340	5.3	80	Silistra	44.1378333	27.1364333	2023-10-06
Aidemir ps	386.80		340	420	4.8	54	Silistra	44.1390833	26.1349666	2023-09-27
Aidemir ps	388.00									2017-05-21
Aidemir ps	388.00									2017-05-21
Aidemir ps	388.00									2017-05-21
Aidemir ps	388.30							44.1364833	27.1190667	2016-07-14

Coastal beacon	15
Illuminated buoys	38
Non - illuminated buoys	114
Bridge signalization	4
Other coastal signalization	224
Total:	**394**

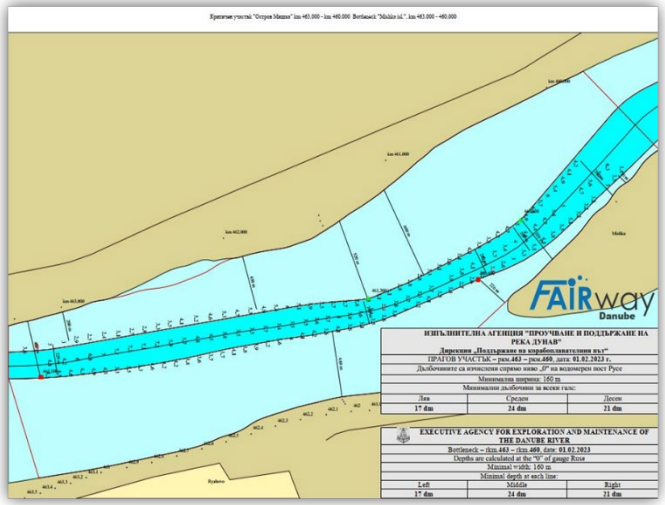
web-site https://appd-bg.org

MAINTENANCE ACTIVITIES

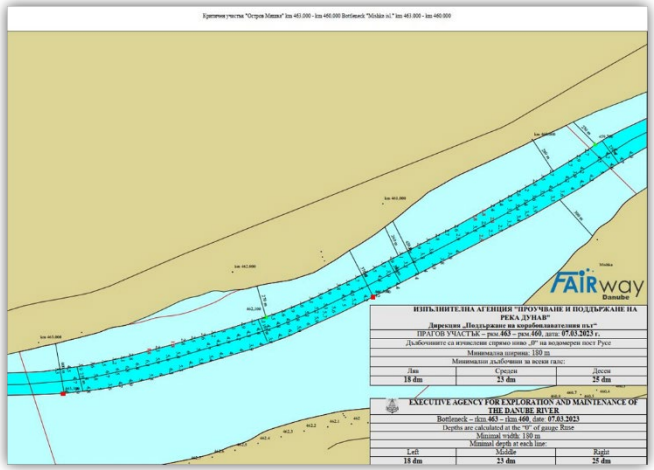
During the period marking vessel “Osam”, surveying vessels “Dunav-1” and “Rs 2070” performed 62 trips in total.

In 2023 the fairway trajectory stably changed on the following bottlenecks:

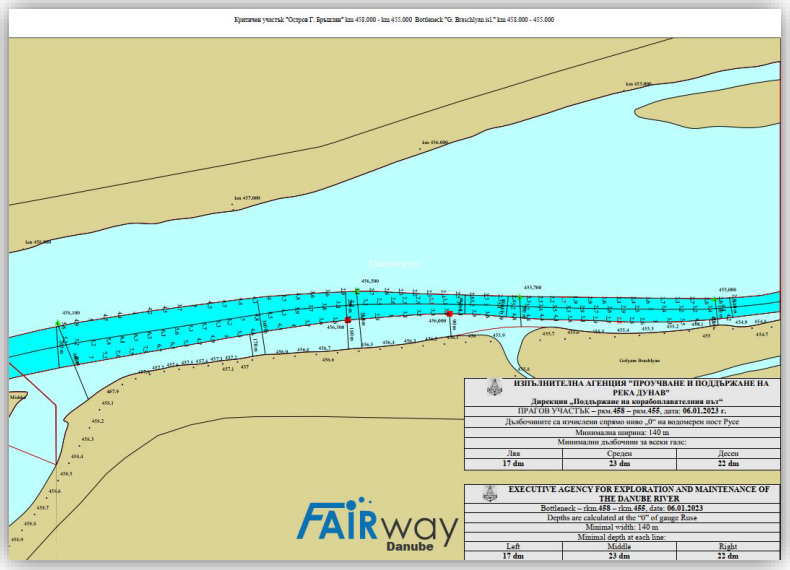
- km 531.000 – km 528.000 as of 24.01.2023;
- km 395.000 – km 392.000 as of 15.02.2023;
- km 463.000 – km 460.000 as of 07.03.2023;
- km 458.000 – km 455.000 as of 07.03.2023;
- km 407.000 – km 404.000 as of 08.03.2023;
- km 530.000 – km 527.000 as of 14.03.2023;
- km 423.000 – km 421.000 as of 21.03.2023;
- km 544.000 – km 542.000 as of 06.04.2023;
- km 423.000 – km 421.000 as of 18.05.2023;
- km 565.000 – km 563.000 as of 31.05.2023;
- km 525.000 – km 522.000 as of 06.07.2023;
- km 547.000 – km 545.000 as of 07.07.2023;
- km 387.000 – km 385.000 as of 27.09.2023.
- km 545.000 – km 543.000 as of 14.12.2023;

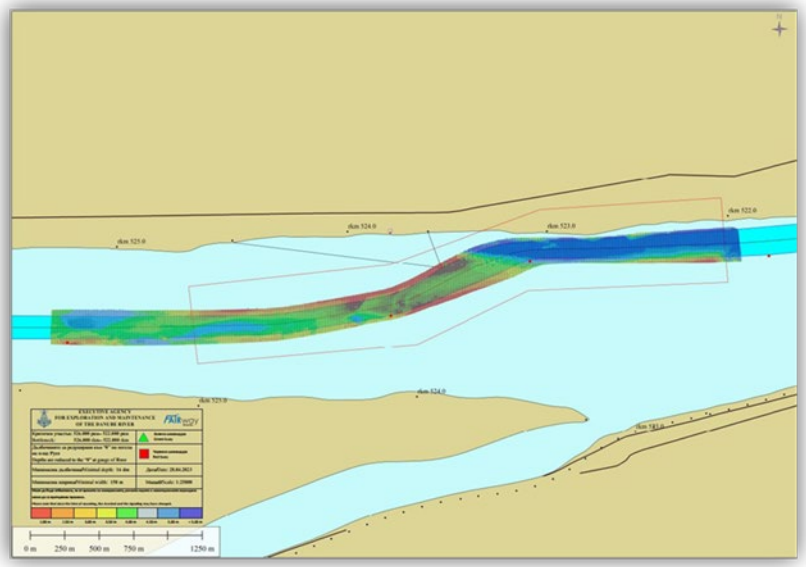


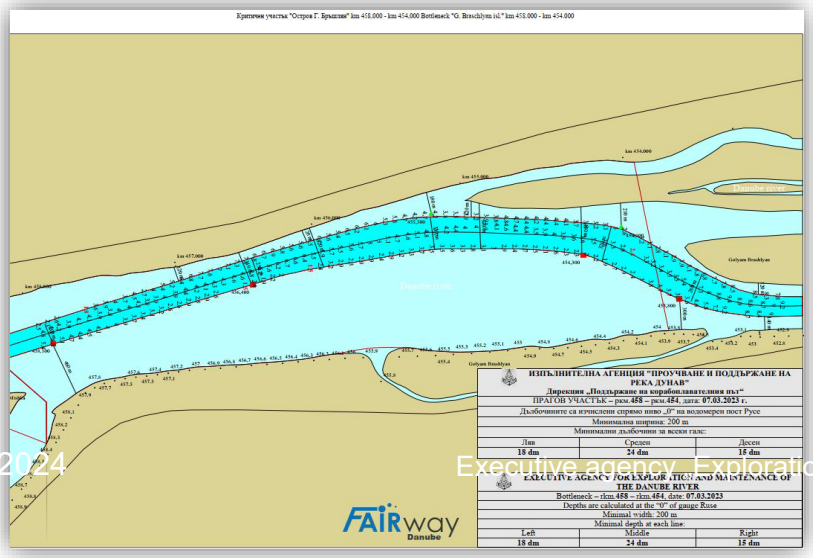
Island Mishka rkm 463.000 – rkm 460.000

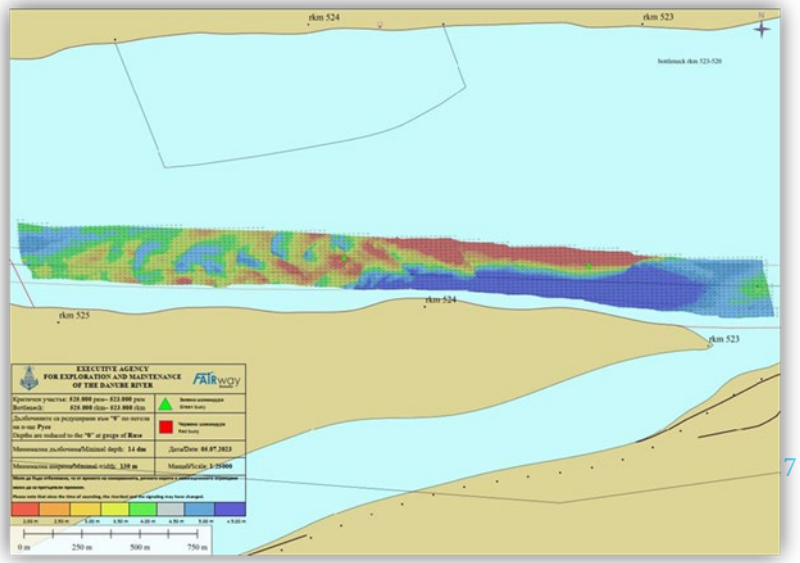


MAINTENANCE ACTIVITIES





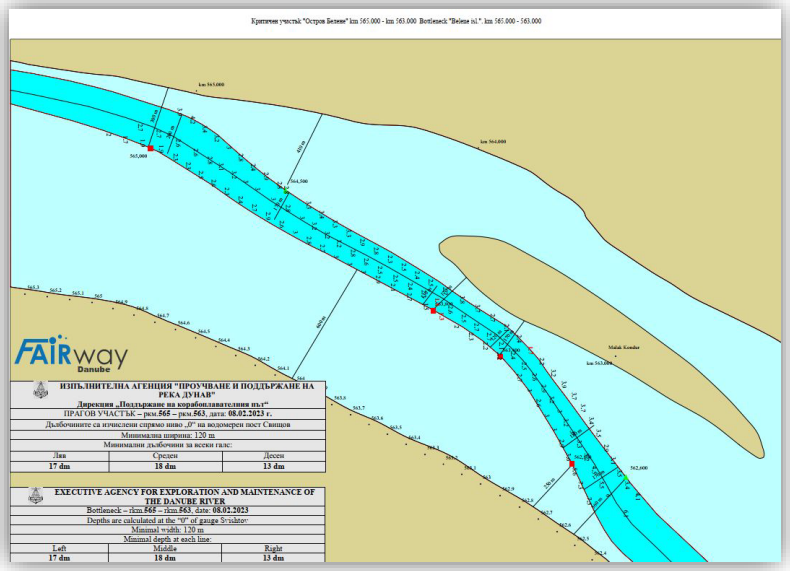


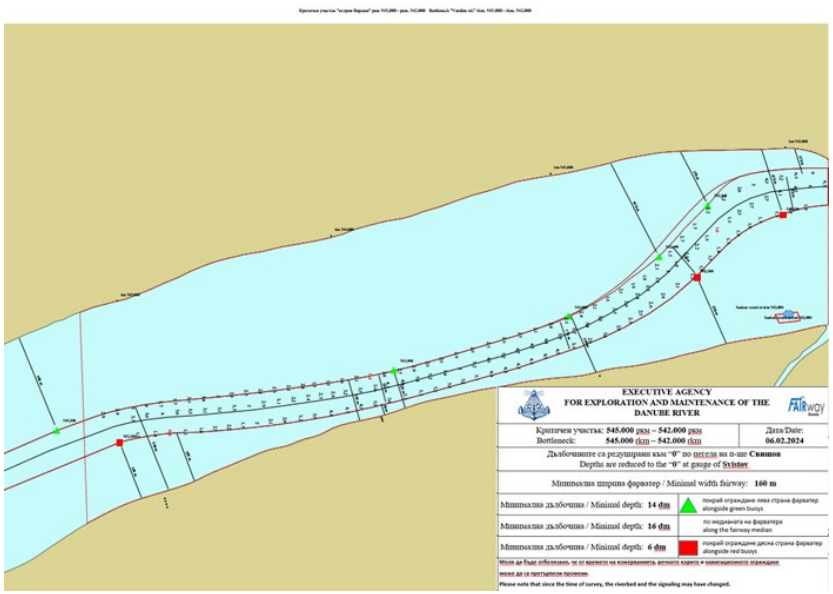


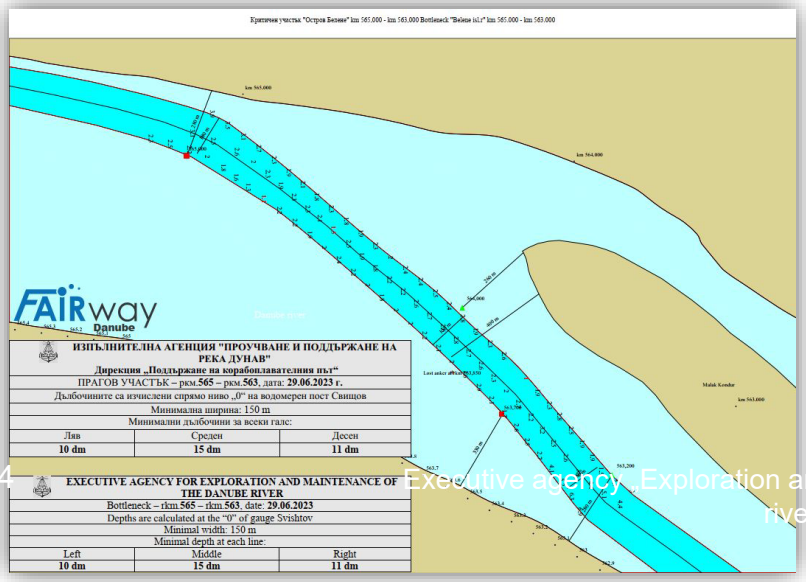
Island Brashlian rkm 458.000 – rkm 454.000

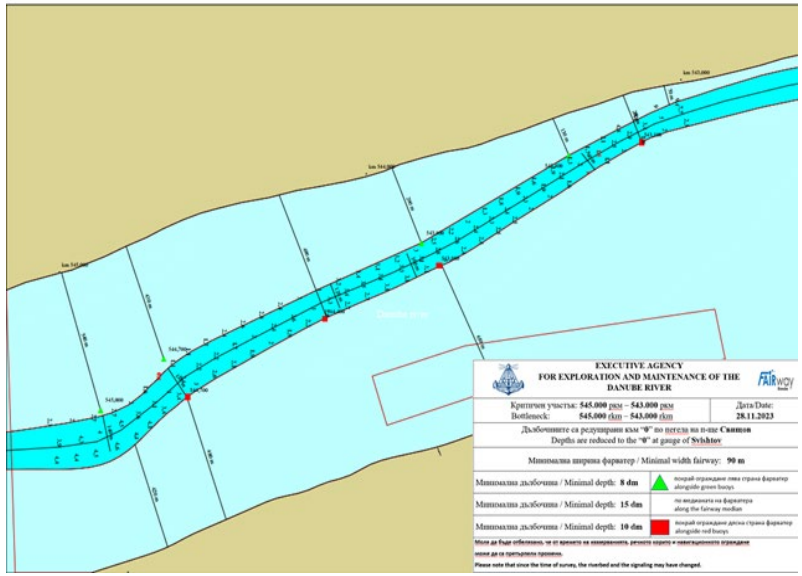
Island Batin rkm 525.000 – rkm 523.000

MAINTENANCE ACTIVITIES









Island Belene rkm 565.000 – rkm 563.000

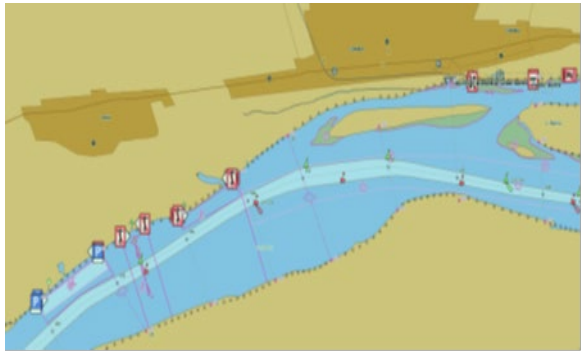
Island Vardim rkm 545.000 – rkm 542.000

MAINTENANCE ACTIVITIES

Maintenance activities

Inland ENCs common stretch Ro-Bg - 2023

- in order to increase traffic safety ,the electronic navigation charts were updated periodically.



Timok (km 845) – Calnovaț (km 610) - 5;

Calnovaț (km 610) – Chiciu (km 375) - 1;

2024

- New edition of Inland ENCs for the common stretch
- Increase number of updates
- New updates of the Romanian RIS Index

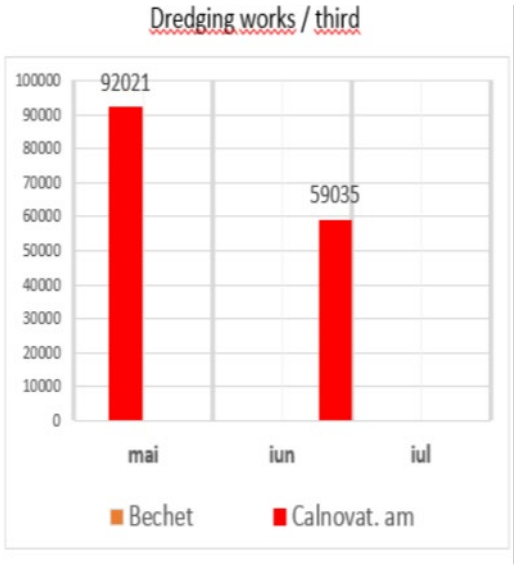
DREDGING WORKS

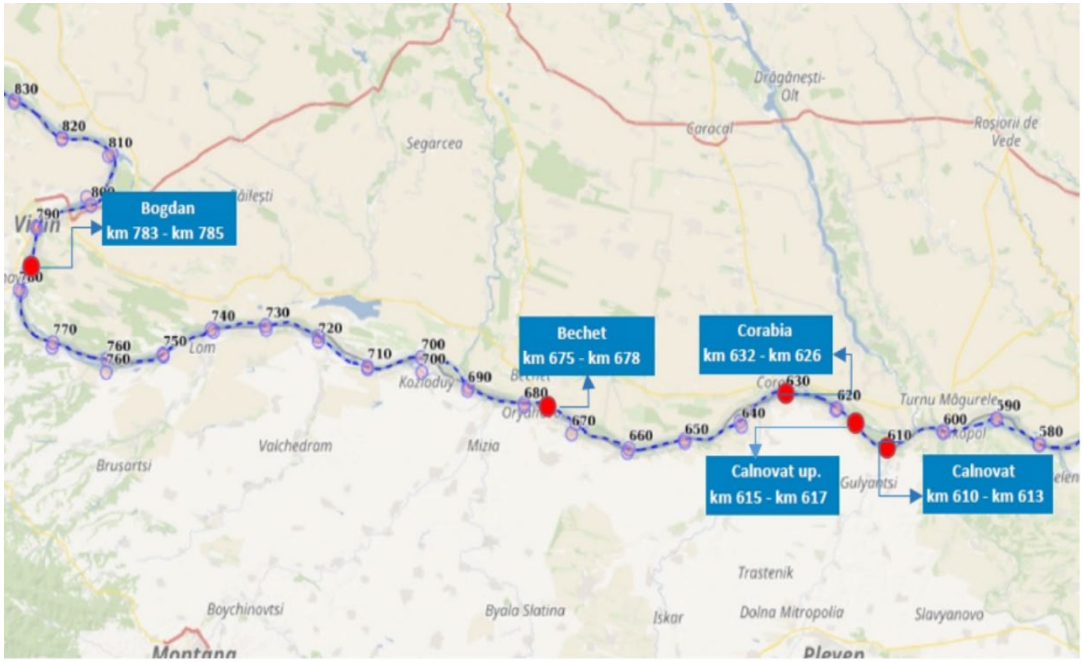
2024

Executive agency „Exploration and maintenance of the Danube river“

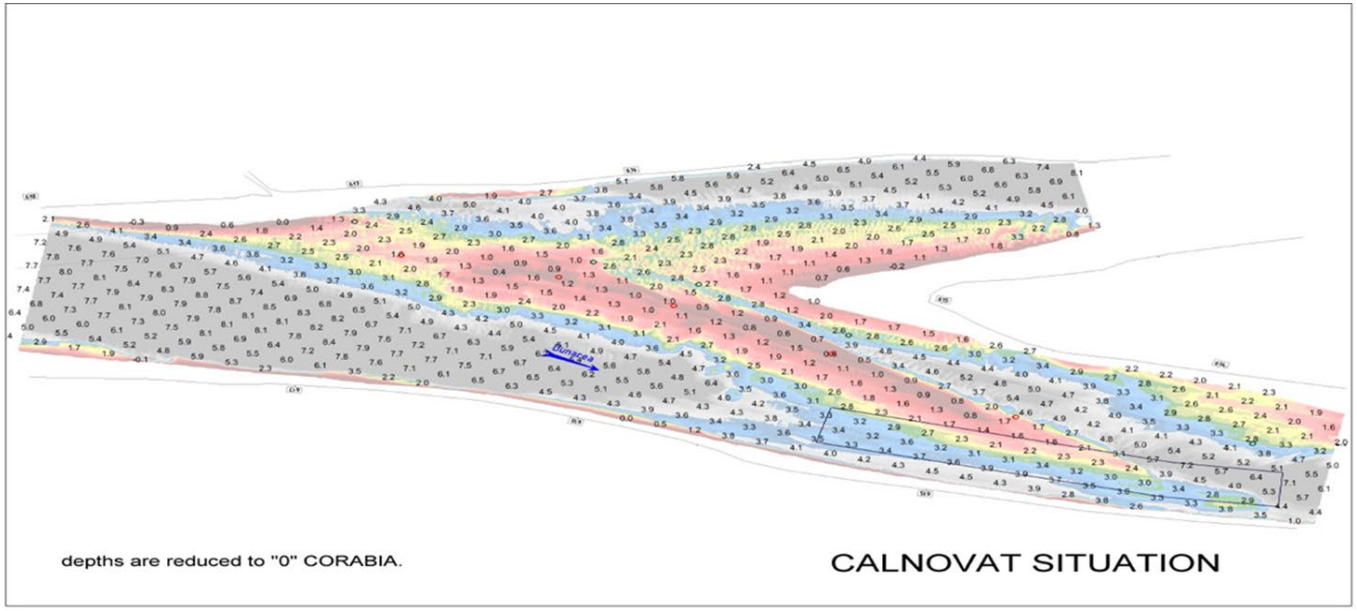
Maintenance activities– dredging works / 610-845.5

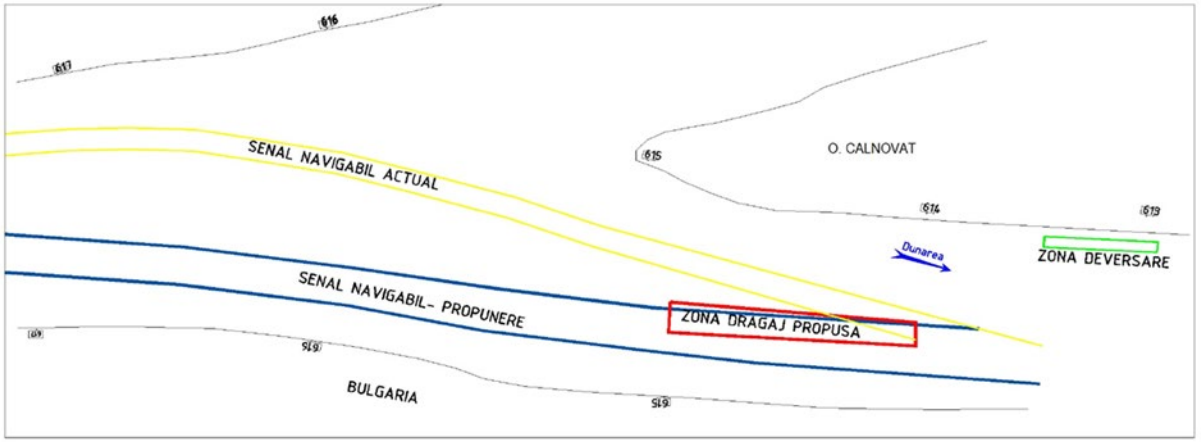
- executed on the basis of a framework contract (third party) and own equipment .
- the actions for concluding the subsequently contract (third) for the dredging works were started in time:
  - *legal forms completed / february*
  - *volume / 150000 m³*
- dredging works / may-june



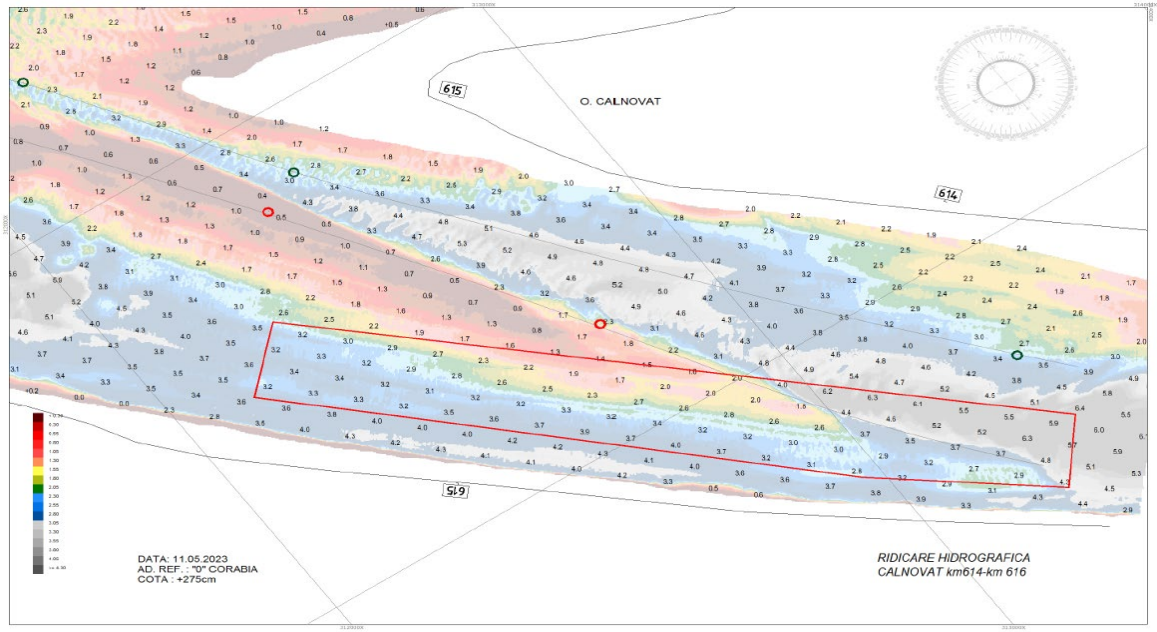


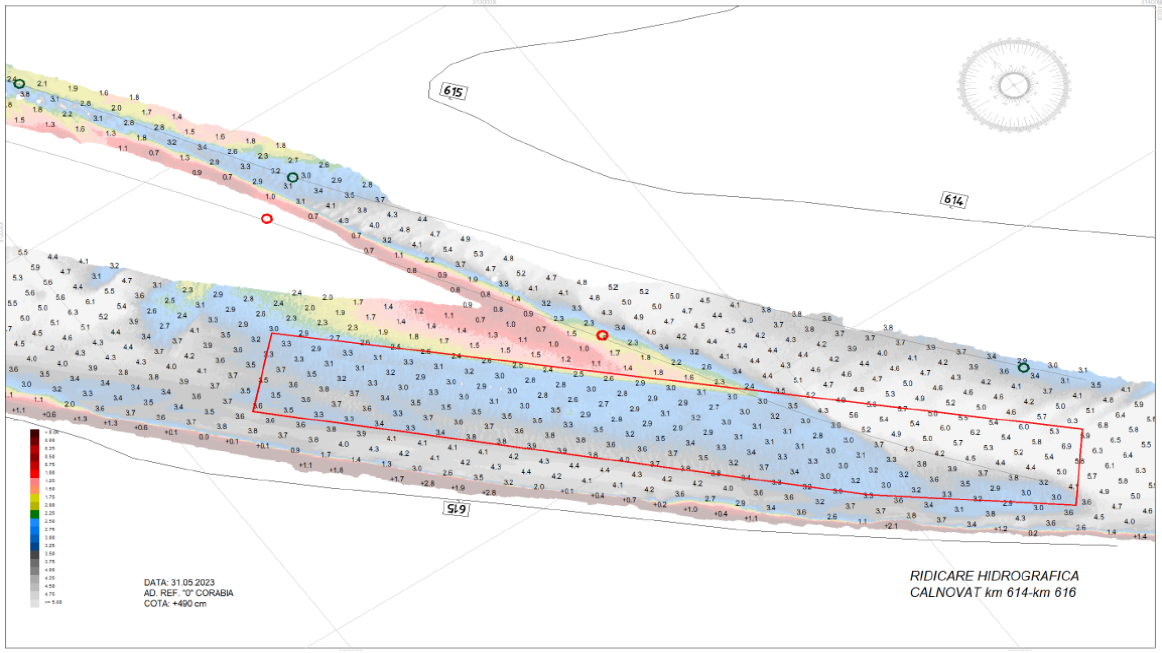
Maintenance activities– dredging works





Calnovat upstream rkm 614-rkm617 -dredging intervention





1.Calnovat upstream rkm 614-rkm617

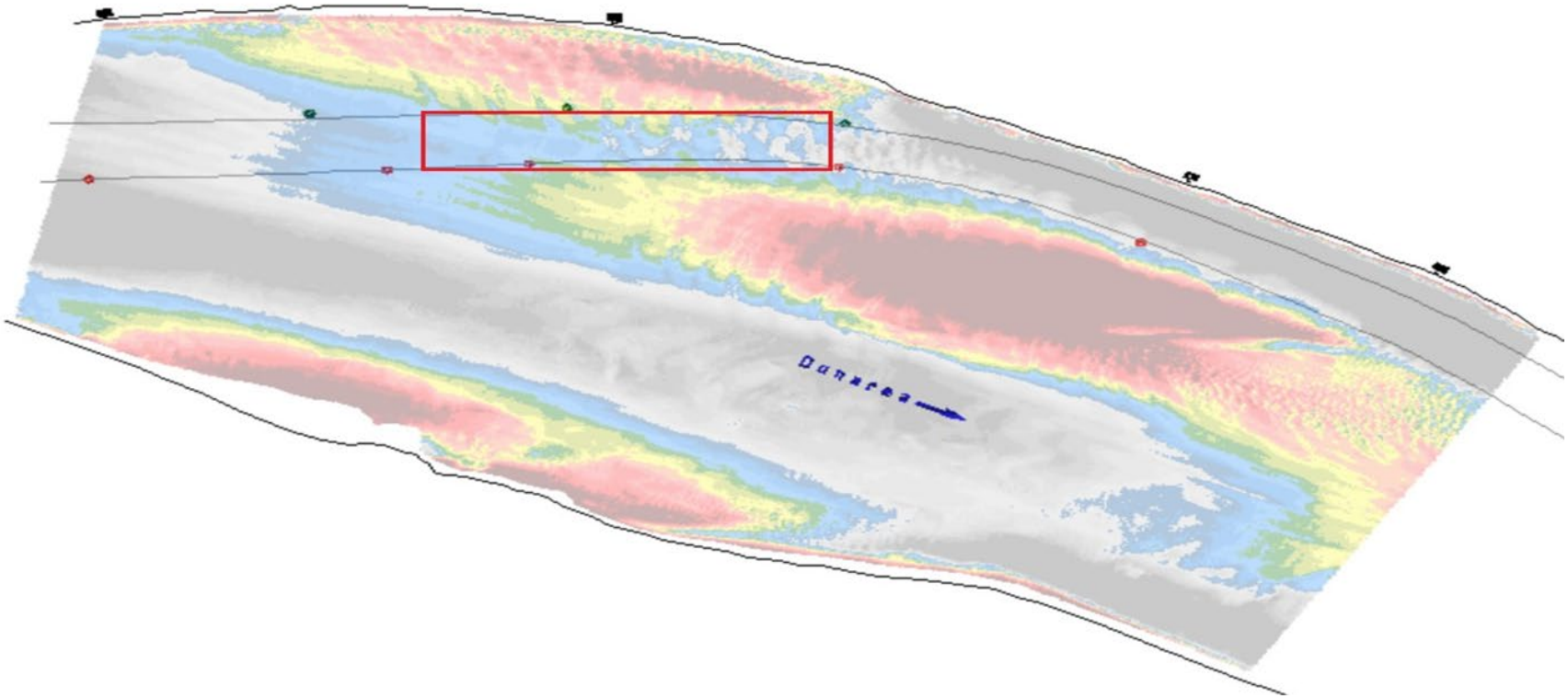
Reference gauge*:* *Corabia*

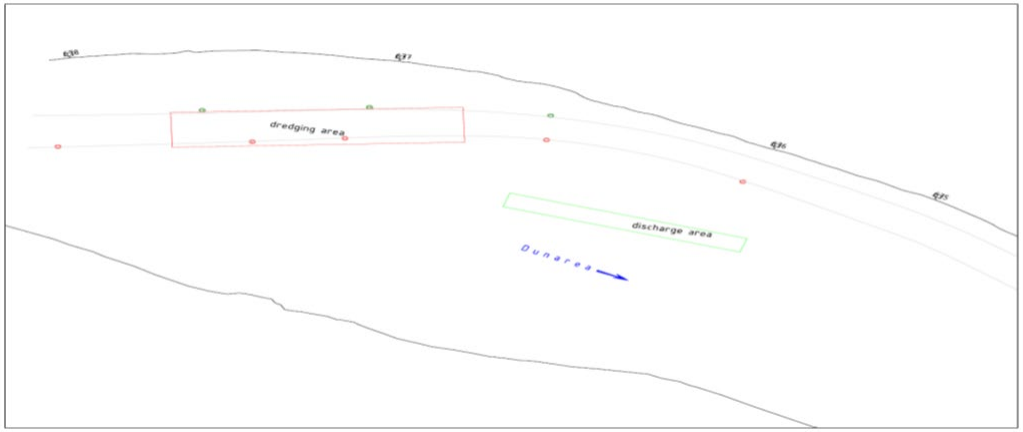
Dredging depth: *3.0m*

Performer: *third party*

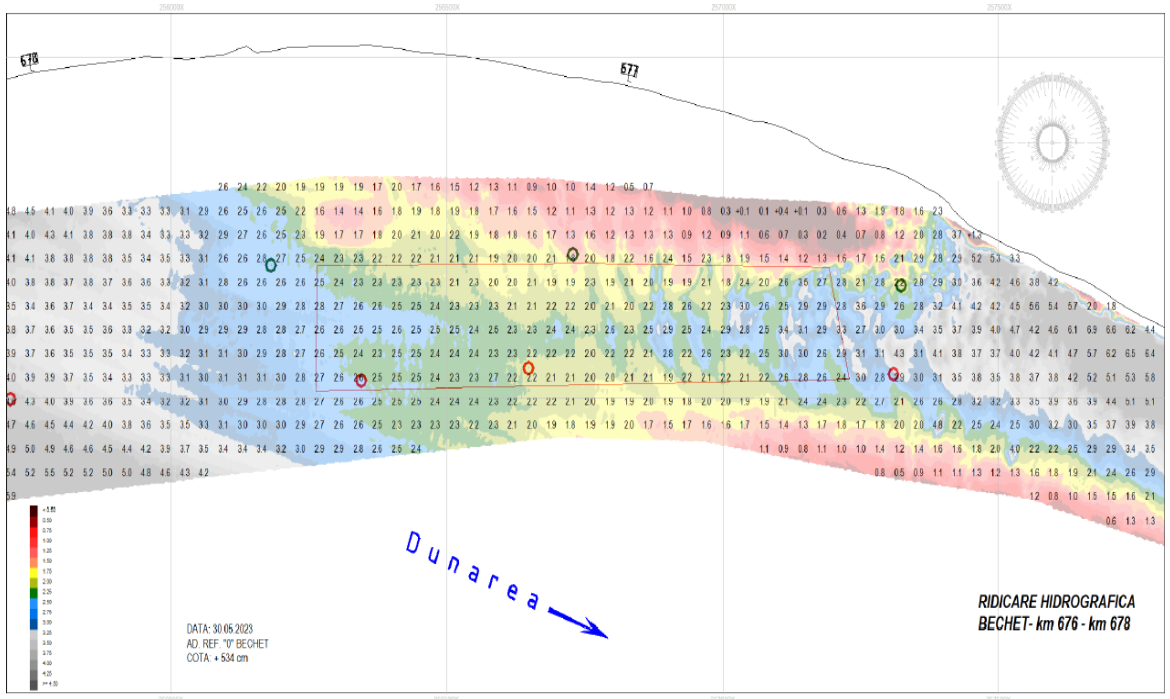
Period: *23.05-30.05*

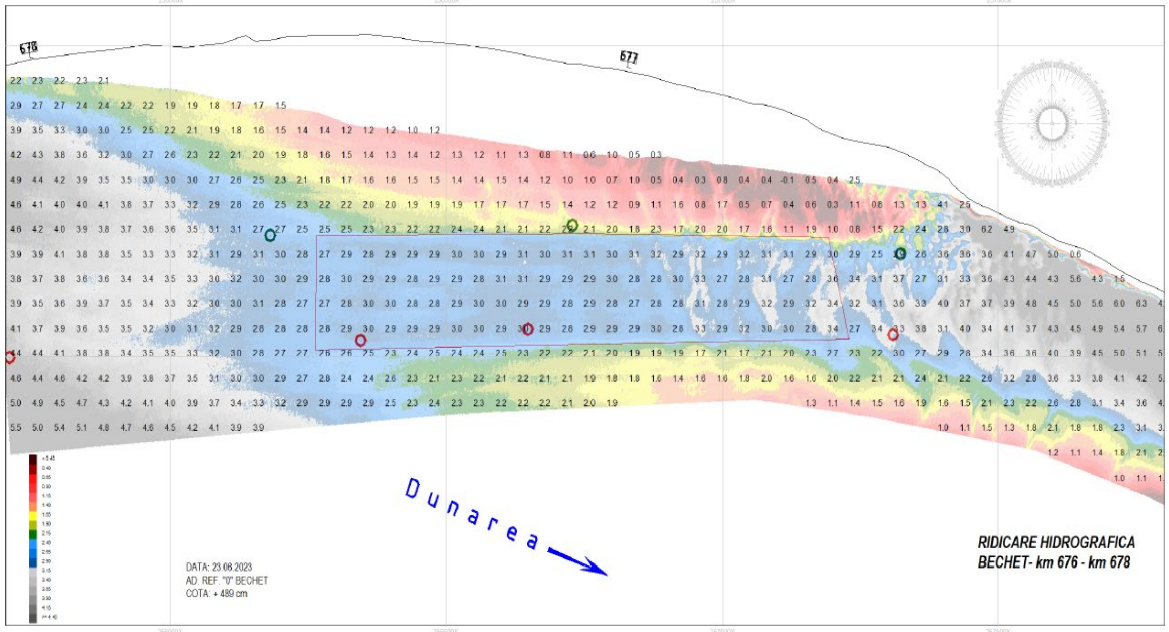
Volume: *59035 m³*





Bechet
rkm 676-rkm678
-dredging intervention





2.Bechet – rkm 676-rkm678

Reference gauge: *Bechet*

Dredging depth: *3.0m*

Performer: *third party*

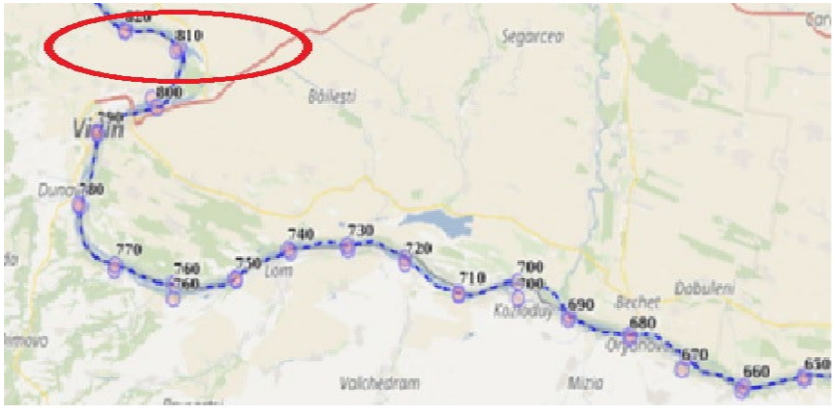
Period: *09.06-22.06*

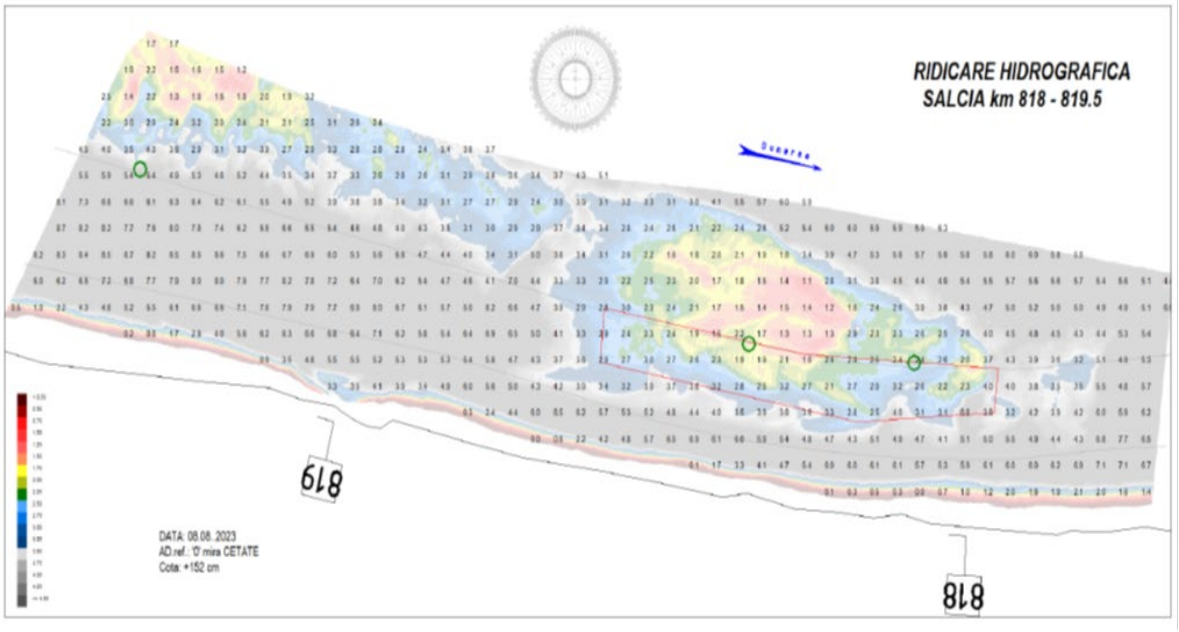
Volume: *92021 m³*

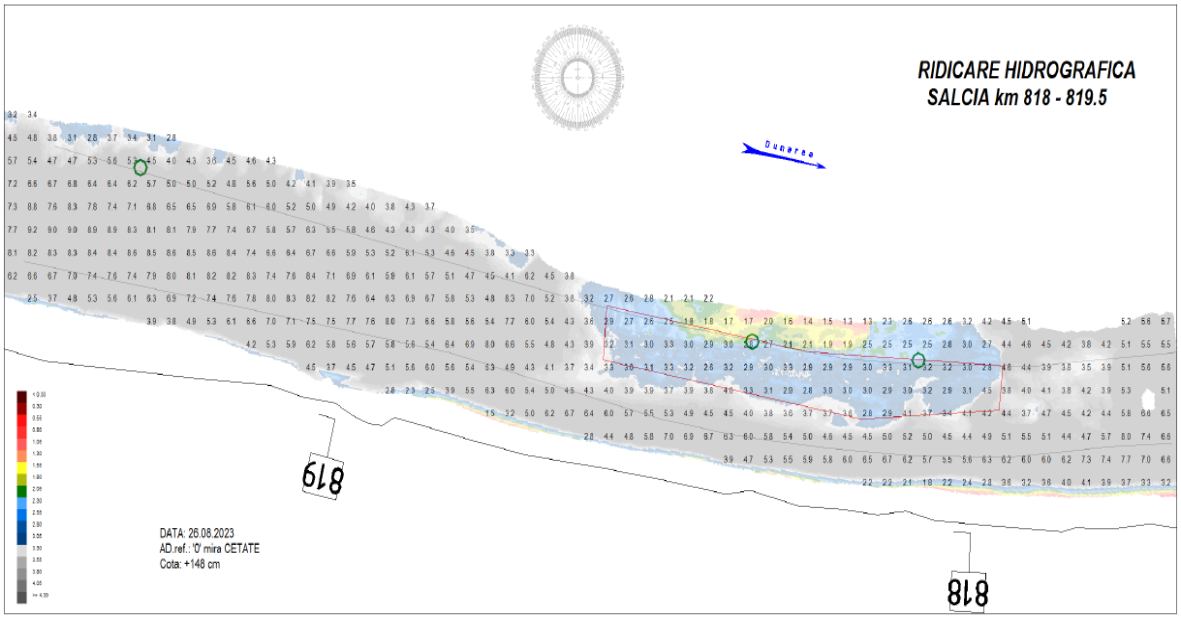
Dredging works

- necessity to resuming dredging works (*because of the occurrence of shallow waters),* by second contract (august)
- volume – 150000m^3
- performing dredging works: *august*

- *Based on last measurement results was decide to start the dredging intervention in Salcia (*reduced navigation parameters).

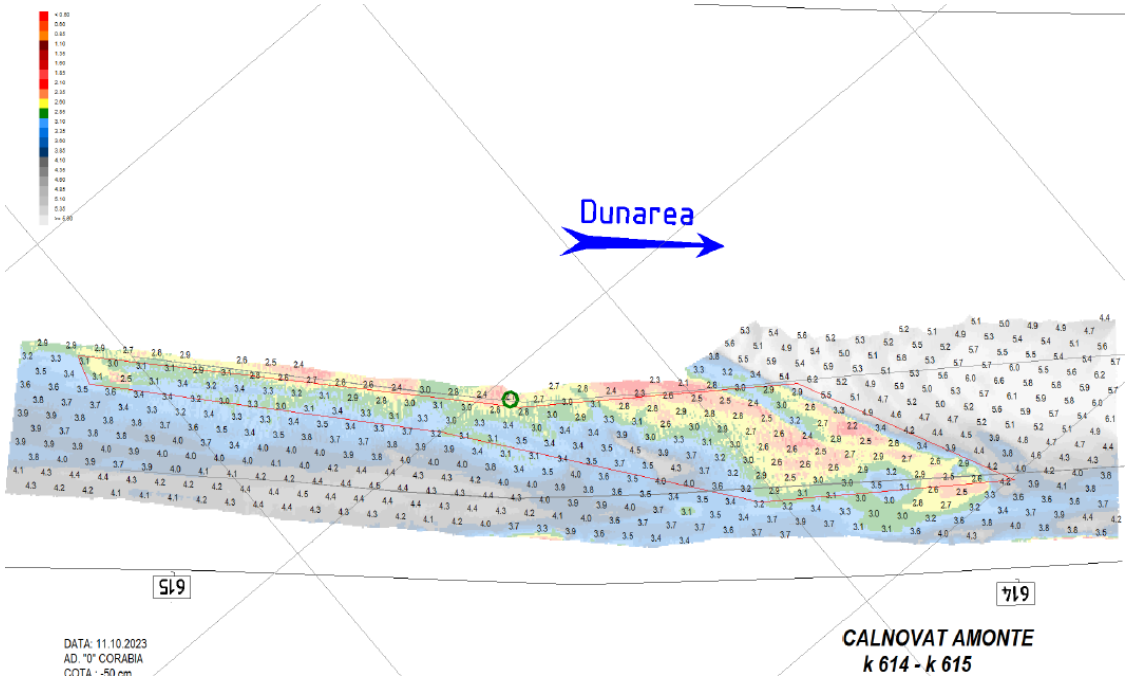


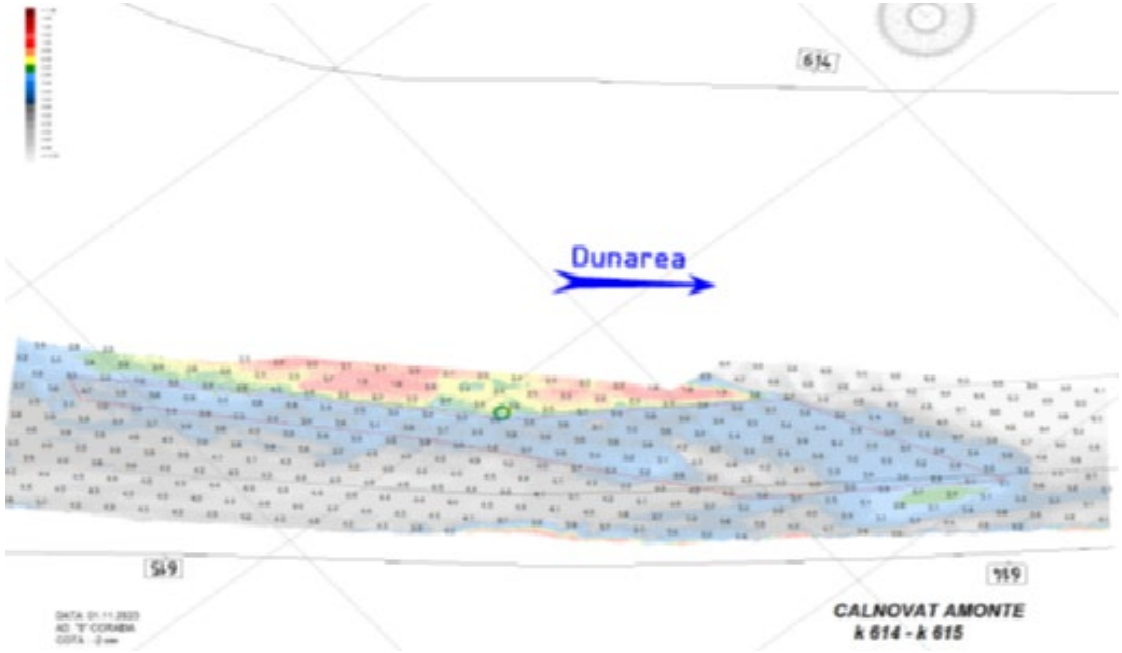




Salcia – rkm 818-rkm819

Reference gauge: *Cetate*
Dredging depth: *3.0m*
Performer: *third party*
Period: *15.08-26.08*
Final surveys : *26.08.2023*
Volume: *26274 m³*





Calnovat - upstream – rkm 614-rkm617

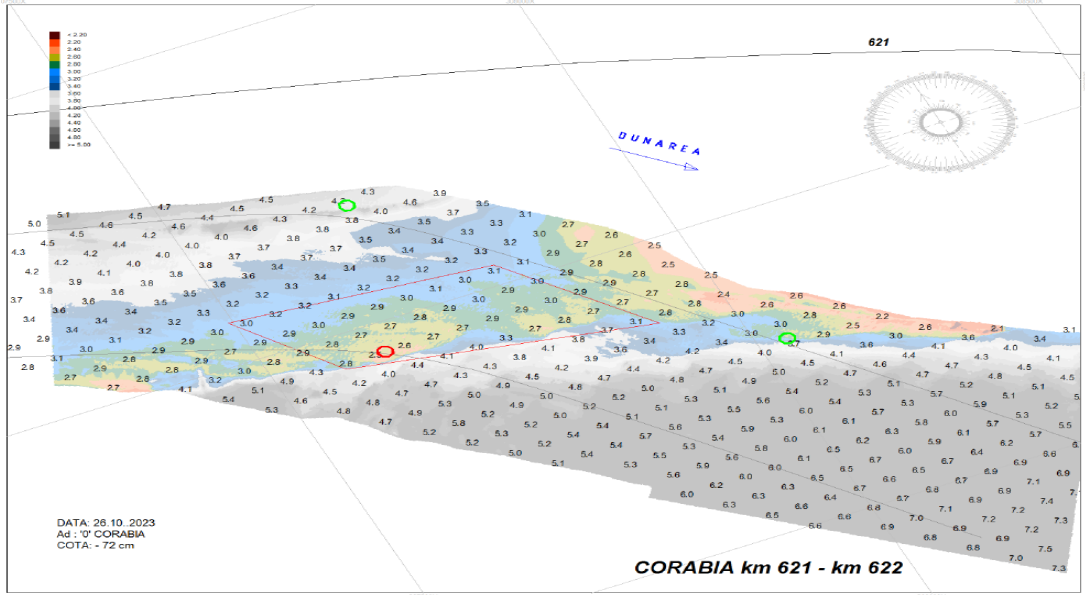
Reference gauge*: Corabia*

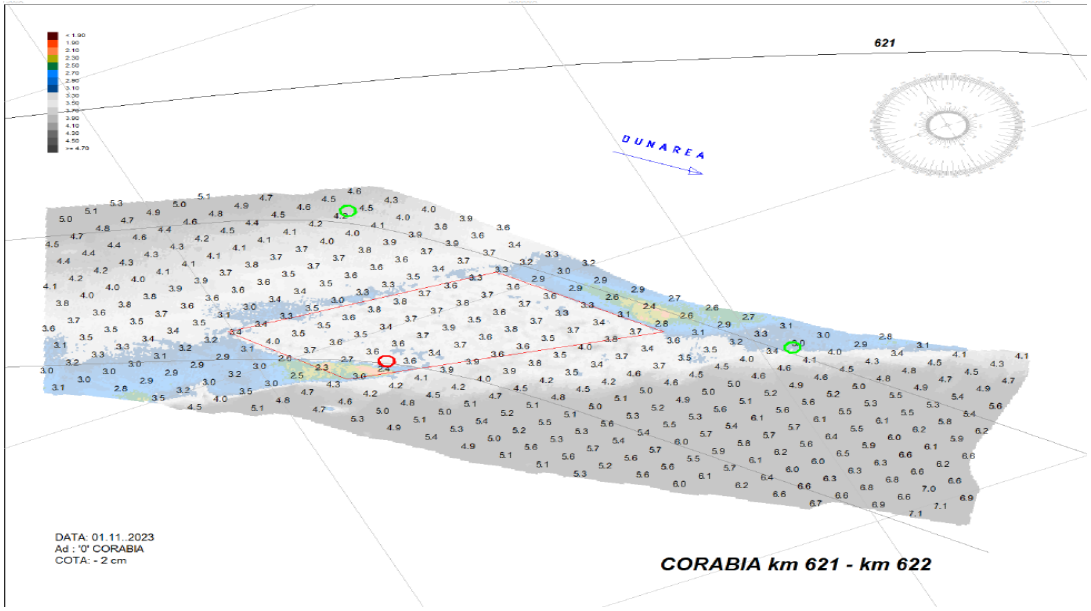
Dredging depth: *3.0m*

Performer: *third party*

Period: *12.10-28.10*

Volume: *40271 m³*





Corabia - downstream – rkm 620-rkm622

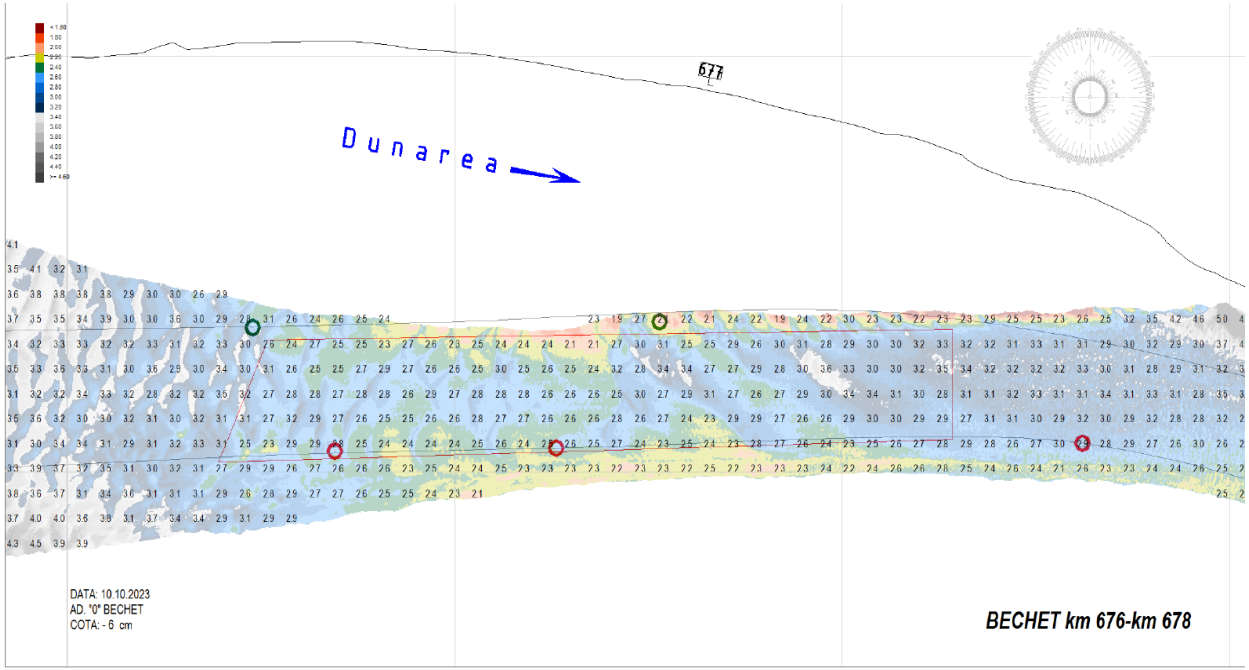
Reference gauge*: Corabia*

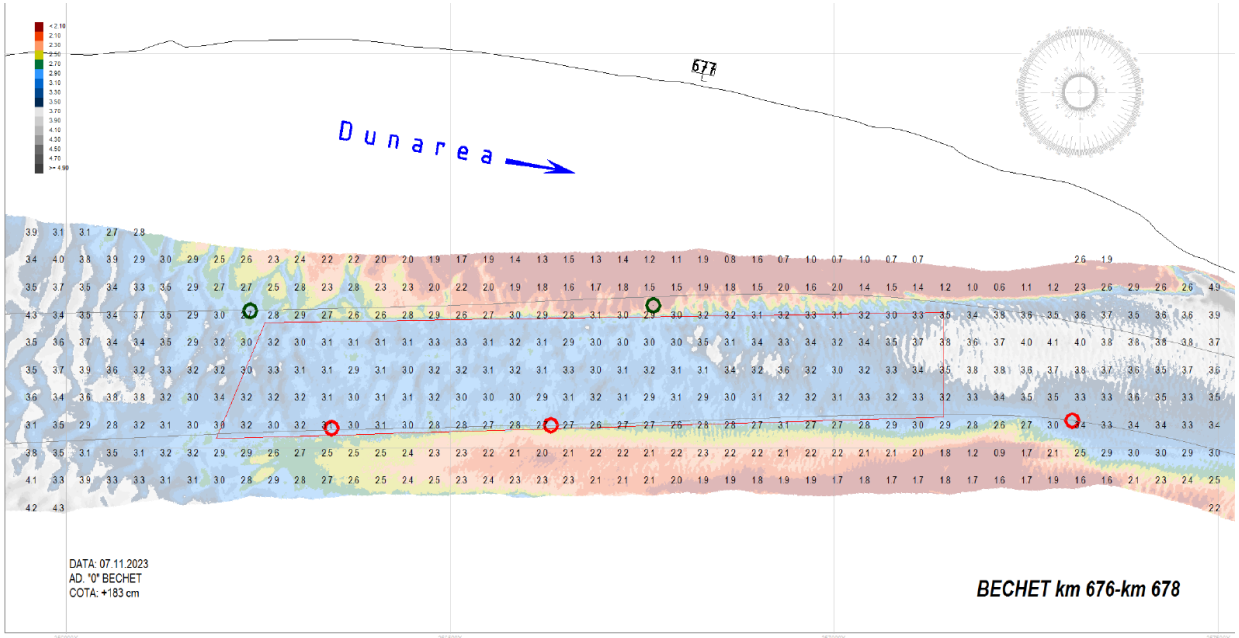
Dredging depth: *3.0m*

Performer: *third party*

Period: *28.10 – 01.11*

Volume: *23819 m³*





Bechet
rkm 675-rkm678

Ref. gauge: *Bechet*
Dredging depth: *3.0m*
Performer: *third party*
Period: *01.11 – 07.11*
Volume: *47683 m³*

Maintenance activities– dredging works AFDJ

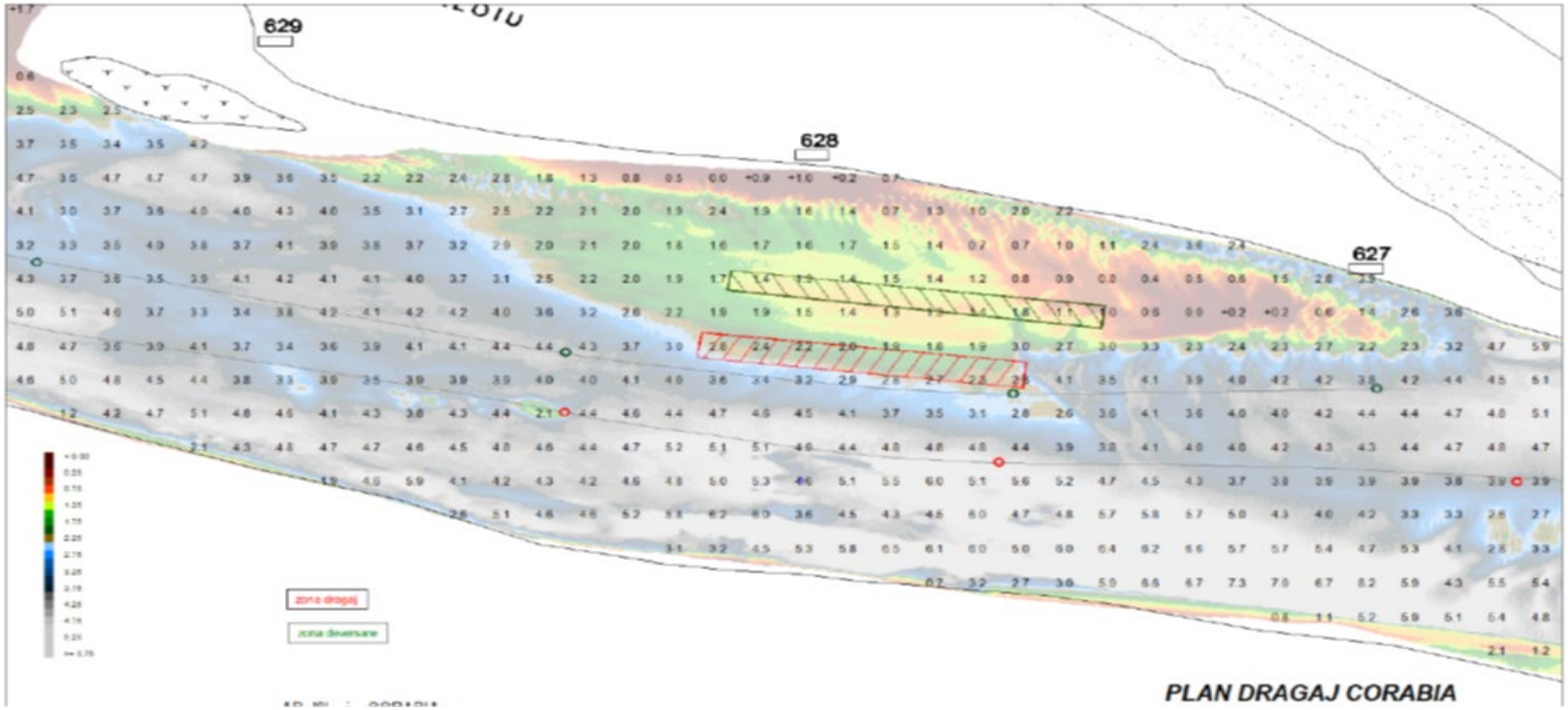
Part of the maintenance works of the fairway, through dredging activities, were made with AFDJ equipment, consisting of the following:

Capital dredging vessel - Comana 1

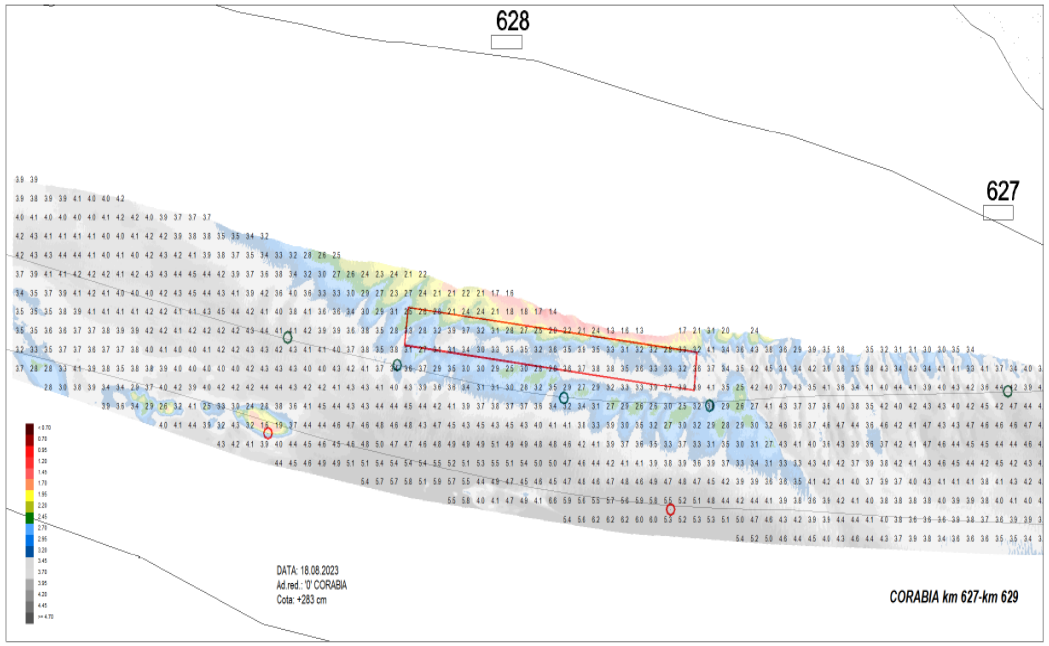
Pontoon barge - N1130

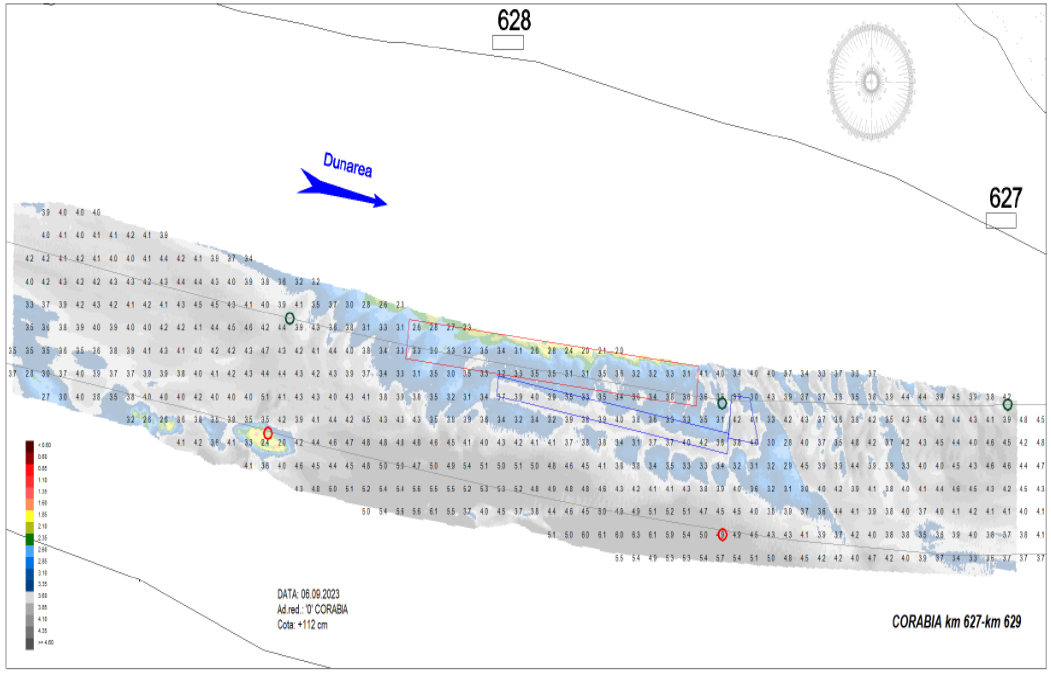
Assistant works vessel – Mihai Bravu

Split hopper barges - SH1 /SH2



Considering the water level forecast , the hydrological situations and ensuring safe working conditions , was taken decision to dredge in Corabia (627.5-628.1).





Corabia– rkm 627-rkm629

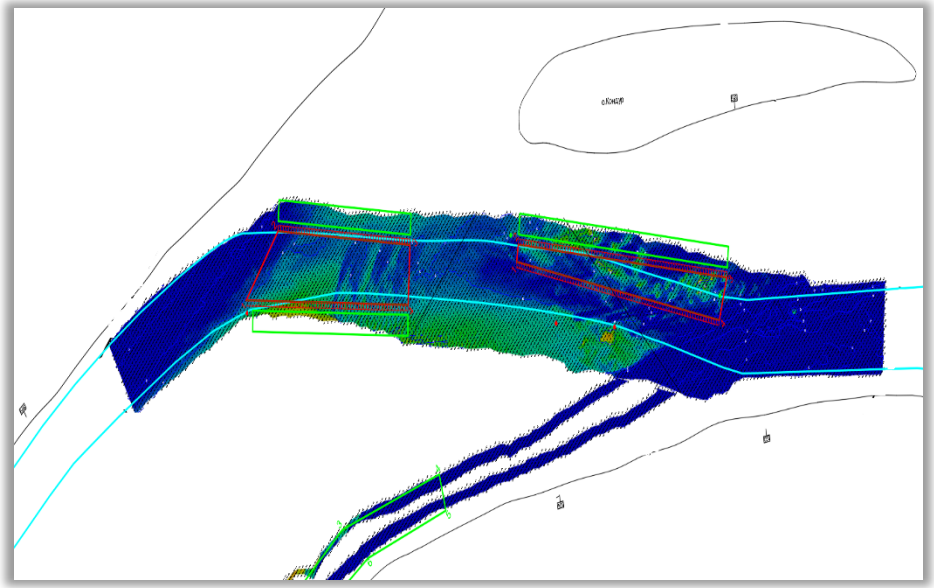
Reference gauge*:* *Corabia*
Dredging depth: *3.5m*
Performer: *AFDJ*
Period: *13.07-05.09*
Volume: *52963 m³*

Dredging works – rkm375 - rkm610

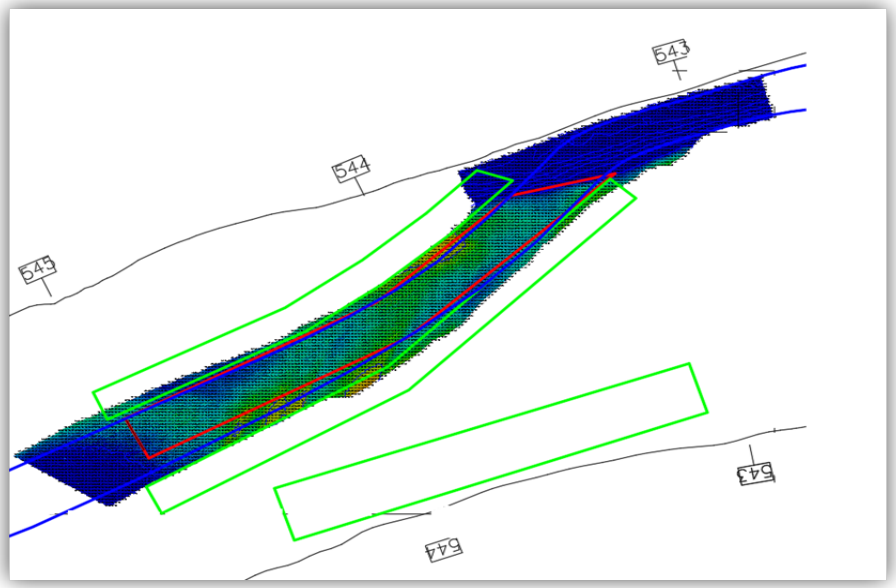
Dredging activities on the fairway in the area rkm 610 – rkm 375				
Year	quantity, m³	location, rkm	Total	Executed by:
2012	45400	562	45400	EAEMDR – AFDJ
2018	101011	546	256650	EAEMDR
2018	155639	565		EAEMDR
2019	69992	565	300220	EAEMDR
2019	116059	545		EAEMDR
2019	114169	521		EAEMDR
2020	71095	564	297289	EAEMDR
2020	138780	545		EAEMDR
2020	47637	575		EAEMDR
2020	39777	545		EAEMDR
2021	94596	455	265841	EAEMDR
2021	92144	537		EAEMDR
2021	57077	545		EAEMDR
2021	22024	564		EAEMDR
2022	50000	564	199453	EAEMDR
2022	20000	524		EAEMDR
2022	92677	545		EAEMDR
2022	36776	524		EAEMDR
2022	117216	564	183254	AFDJ
2022	36988	545		AFDJ
2022	29050	520		AFDJ
2022	106364	553	~200000	R Serbia
2022		575		R Serbia
2022		530		R Serbia
2023	93636	563		R Serbia
2023	16209	524	289349	EAEMDR
2023	65493	565		EAEMDR
2023	77938	544		EAEMDR
2023	4424	531		EAEMDR
2023	59490	543		EAEMDR
2023	40712	564		EAEMDR
2023	25083	393		EAEMDR

In 2023 up to date **289 349 m³** were dredged

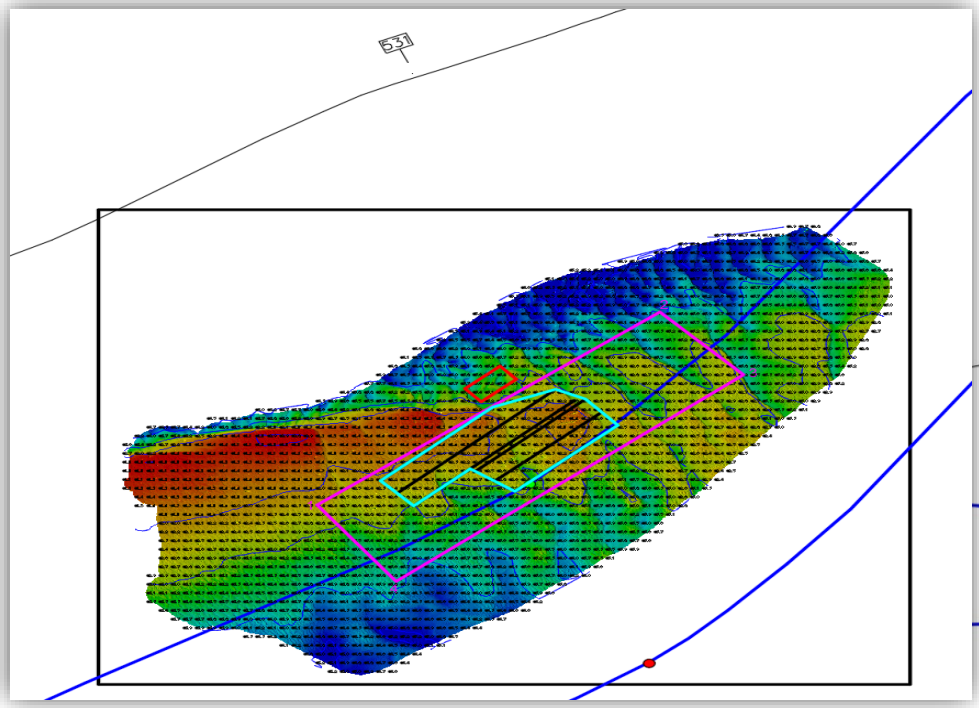
From 21.07.2023 г. till 28.07.2023 г. maintenance dredging works were performed under the framework contract in Belene area rkm 565.000 - rkm 564.500. Total volume of dredged material **65 493 m^3**. Minimal fairway width of 150m and minimal depths on ENR of 3,5 m were achieved.



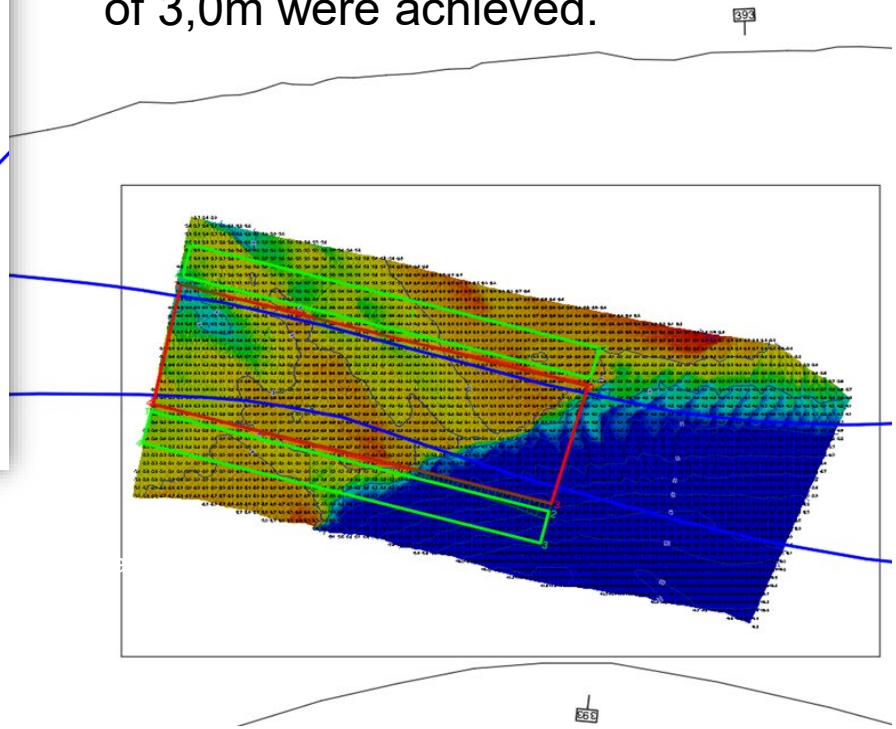
From 01.08.2023 г. till 10.08.2023 г. maintenance dredging works were performed under the framework contract in Vardim area rkm 544.500-rkm 543.200. Total volume of dredged material **77 938 m^3**. Minimal fairway width of 130m and minimal depths on ENR of 2,5 m were achieved.



On 07.09.2023 maintenance dredging with dredger “Yantra” started in Batin area rkm 531. Estimated volume of material to be dredged **7 000 m³**

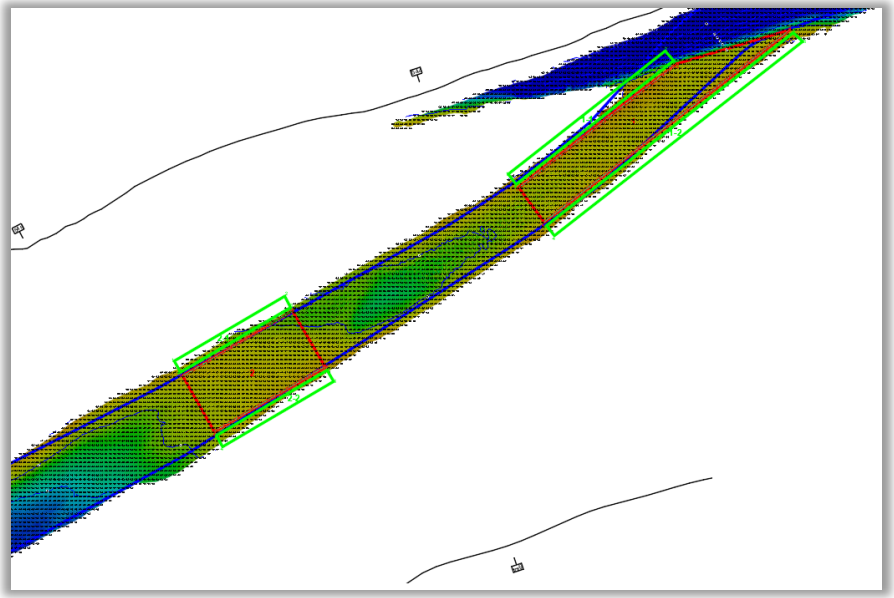


From 16.10.2023 г. till 24.10.2023 г. maintenance dredging works were performed under the framework contract in Vetren area rkm 393.500-rkm 392.800. Total volume of dredged material 25 083m³. Minimal fairway width of 100m and minimal depths on ENR of 3,0m were achieved.



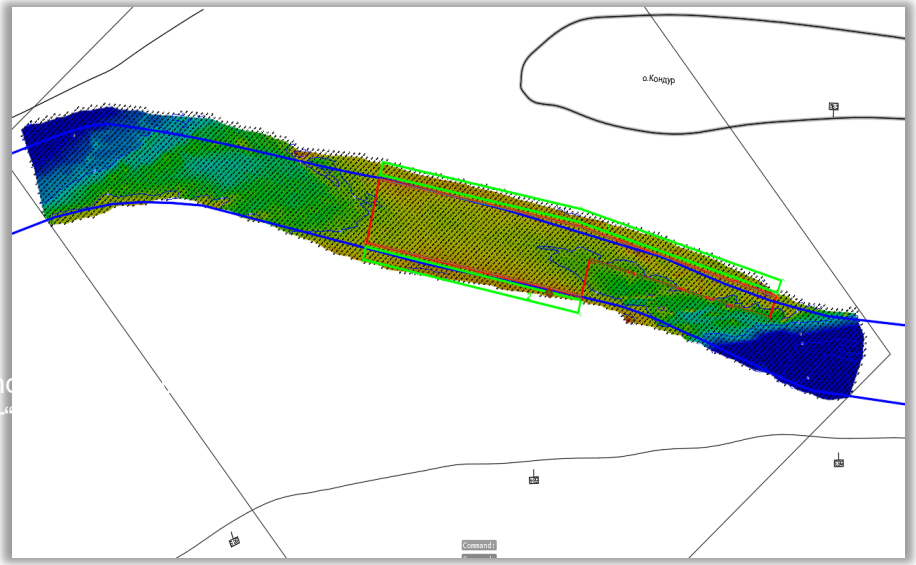
On 26.09.2023 till 02.10.2023 maintenance dredging works are to be performed under the framework contract :

- In Vardim area rkm 543 – 545 – two zones, estimated volumes 29 034m³ and 19 138m³.



On 26.09.2023 till 02.10.2023 maintenance dredging works are to be performed under the framework contract :

- In Belene area rkm 564.500 – 563.100, estimated volume 39 076m³



Necessary measures -2024

In order to ensure the navigation conditions for 2024 year, there are set a series of measures related to maintenance works, (surveys, marking , dredging).

Measurements

- *control surveys in critical areas – monthly;*
- *detailed measurements – 4 / 5 times per year;*
- *Analyze the results and prioritize areas where measures are needed.*
- *Increasing the surveys frequency during the period with low water ;*

Marking activities

- *marking trips – 2 times/month (sector km 610-km 845);*
- *marking trips – quarterly (sector km 493-km375);*
- *install a sufficient number of floating/coastal signs;*
- *supplementing the number of signs during critical periods;*
- *narrowing the fairway to ensure depths over 2.5m;*

buoys	67
electric buoys	76
beacons	16
coastal signs	595
kilometers	470

Necessary measures - 2024

Dredging works

- *Execution of dredging works to improve navigation depth (recourse to framework contracts for rapid interventions);*
- *Starting dredging works early, before the low water period;*
- *Prioritization of the dredging areas ;*

Based on the results of the latest measurements, it was estimated a necessary for dredging works in 2024.

No.	Critical location	Area (rkm-rkm)	Quantity (m^3)	2024 (m^3)
1	Salcia	818 - 819	30.000	300.000
2	Bogdan-Secian	784 - 785	40.000	
3	Bechet	676 - 677	100.000	
4	Corabia	627 - 628	50.000	
5	Calnovat am	614 - 615	50.000	
6	Calnovat	611 - 612	30.000	

Necessary measures for the improvement of the navigation conditions (incl. execution of dredging works) during 2024

In 2024, EAEMDR plans to carry out dredging activities:

under the framework contract ~ 300 000 m³
with own equipment ~ 50 000 - 100 000 m³

Dredging works will be performed only after analysis of bathymetric surveys, water level forecasts, water current data and meteorological forecasts in Upper and Middle Danube.
Following the multiannual data, dredging activities are expected to start in May in the most critical section - Vardim area rkm 546 – 545. Estimated quantity approx. 100 000 m^3.
Another area where dredging works are foreseen in June is Belene rkm 563 – 565 with an estimated volume of about 80 000 m^3.
With our own equipment, dredging activities are planned at the island of Chaika at km 386,000 - 384,000 and Popina at km 406,000 - 404,000 with a total estimated amount of about 100 000 m3.

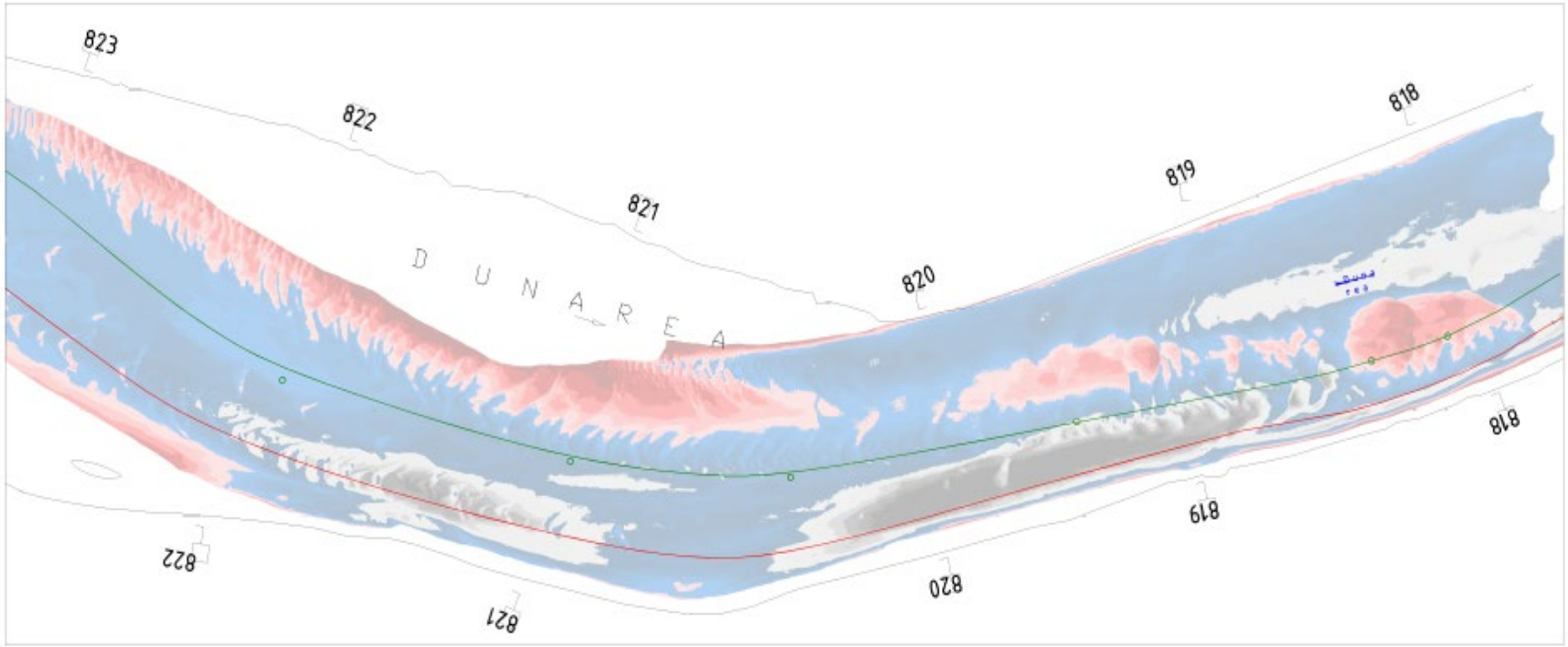
Potential bottlenecks to be dredged in 2024:
Somovit (km610-km609); Belene (km577-km574.800); Belene (km566-km562);
Batin (km531-km529); Batin (km526-km524); Batin (km523-km520); Bryslan (km458-km455); Vardim (km 547-km 546); Vardim (km 545-km 543); Vardim (km 543-km 540); Popina (km407-km404); Yantra (km538-km537); Vetren (km394-km392).

Measures – 2024

- related to the current hydrological situation, the flows discharge are maintained around 7000 m^3/s and a slight decrease is predicted for the next period.
- the morphological situation must be kept permanently under observation

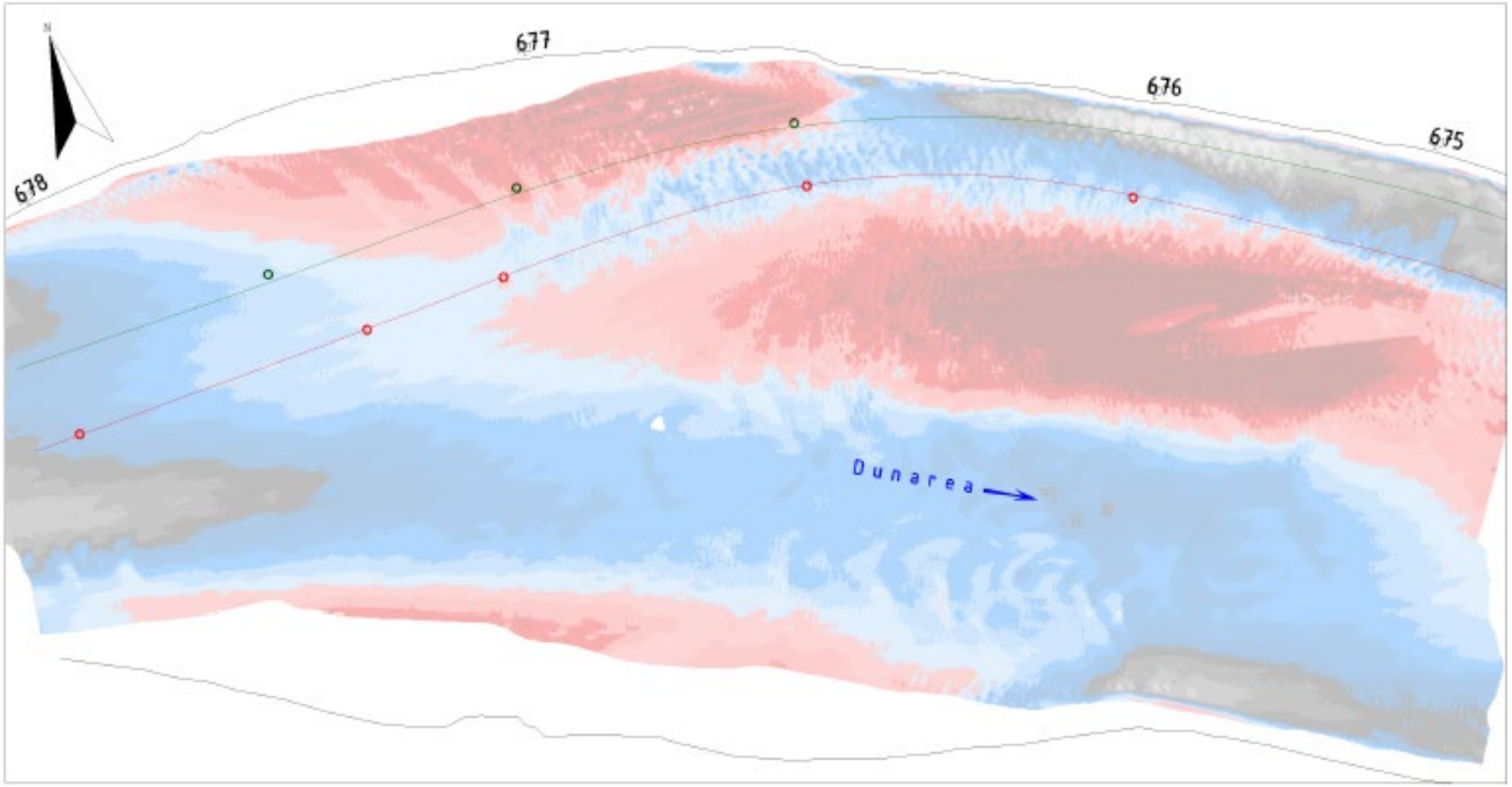
Secţiunea		20.02.2024	21.02.2024	22.02.2024	23.02.2024	24.02.2024	25.02.2024	26.02.2024	27.02.2024
Baziaş	Q(mc/s)	7400	7200	7100	6900	6700	6600	6500	6500
P.D.F. II	Q(mc/s)	7827							
Calafat	H(cm)	366	365	355	344	334	323	313	310
	Q(mc/s)	7100	7080	6940	6790	6650	6500	6360	6320
Faza I = 550	+ΔH(cm)								
Faza II = 600	Gheaţa								
Bechet	H(cm)	381	393	391	384	375	364	355	346
	Q(mc/s)	7160	7330	7300	7200	7070	6910	6780	6650
Faza I = 550	+ΔH(cm)								
Faza II = 600	Gheaţa								
Corabia	H(cm)	324	334	345	343	335	326	315	305
	Q(mc/s)	7240	7391	7559	7529	7406	7270	7105	6957
Faza I = 500	+ΔH(cm)								
Faza II = 550	Gheaţa								
Tr .Măgurele	H(cm)	326	334	343	346	341	333	324	315
	Q(mc/s)	7090	7220	7370	7420	7330	7200	7060	6910
Faza I = 500	+ΔH(cm)								
Faza II = 550	Gheaţa								
Zimnicea	H(cm)	361	368	378	383	382	375	367	357
	Q(mc/s)	7240	7350	7490	7570	7550	7450	7330	7180
Faza I = 530	+ΔH(cm)								
Faza II = 610	Gheaţa								
Giurgiu	H(cm)	323	330	338	346	348	344	336	327
	Q(mc/s)	7230	7330	7440	7550	7580	7520	7410	7280
Faza I = 570	+ΔH(cm)								
Faza II = 640	Gheaţa								
Oltenita	H(cm)	325	333	340	348	354	352	347	338
	Q(mc/s)	7210	7320	7420	7530	7620	7590	7520	7390
Faza I = 550	+ΔH(cm)								
Faza II = 630	Gheaţa								
Călăraşi	H(cm)	293	304	312	320	327	329	325	319
	Q(mc/s)	7100	7260	7390	7520	7630	7660	7600	7500
Faza I = 550	+ΔH(cm)								
Faza II = 620	Gheaţa								

Measures - 2024

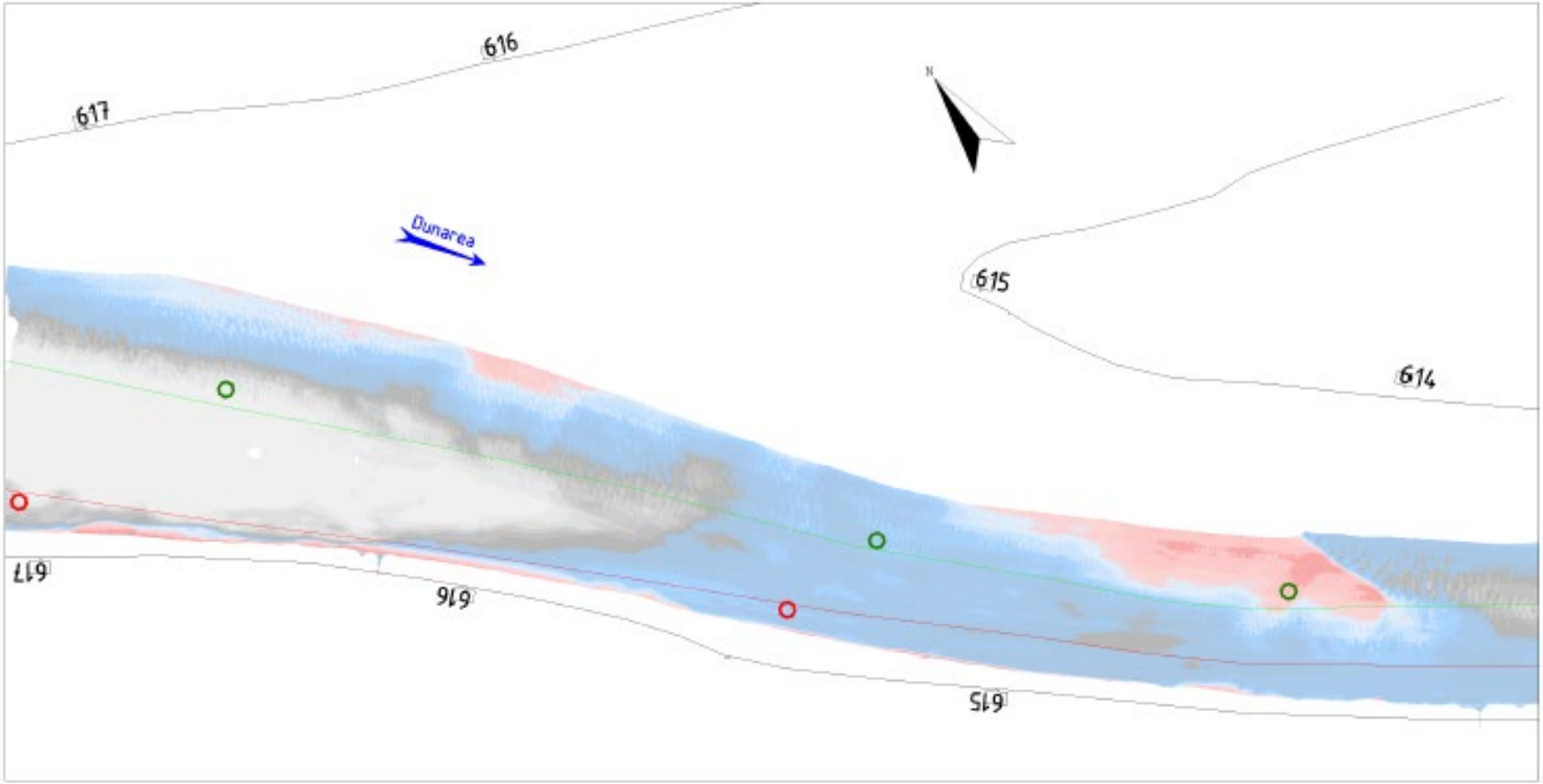


Salcia – bathymetric survey / february 2024

Measures – 2024 / Bechet bathymetric survey – feb.2024

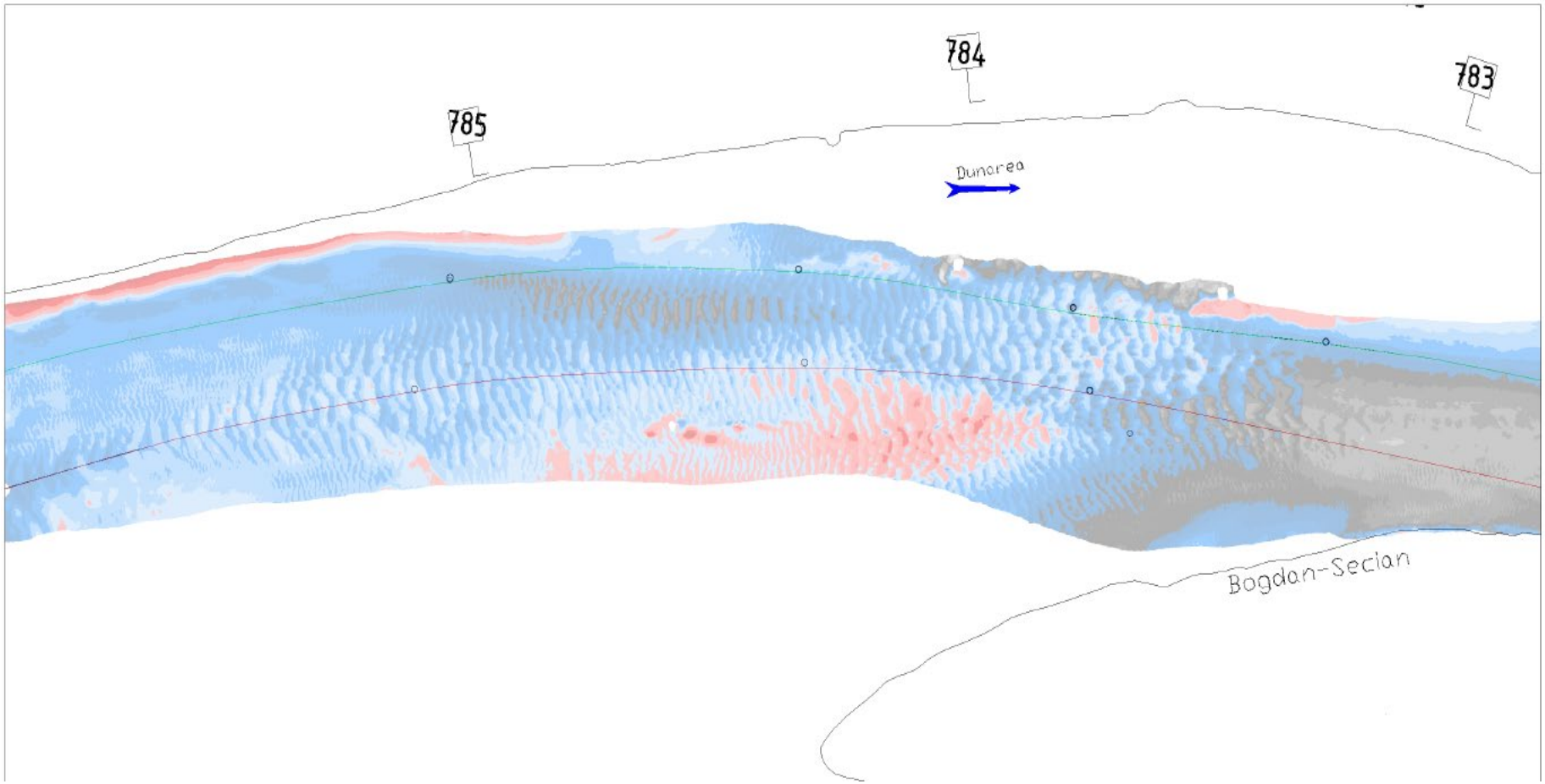


Measures – 2024



Calnovat – bathymetric survey / february 2024

Measures – 2024



Bogdan – bathymetric survey / february 2024

Thank you for your kind attention !