EST TICINO VILLORESI
CONSORZIO DI BONIFICA

Climate change adaptation measures to improve resilience of water networks in ETV district after 2022-23 drought

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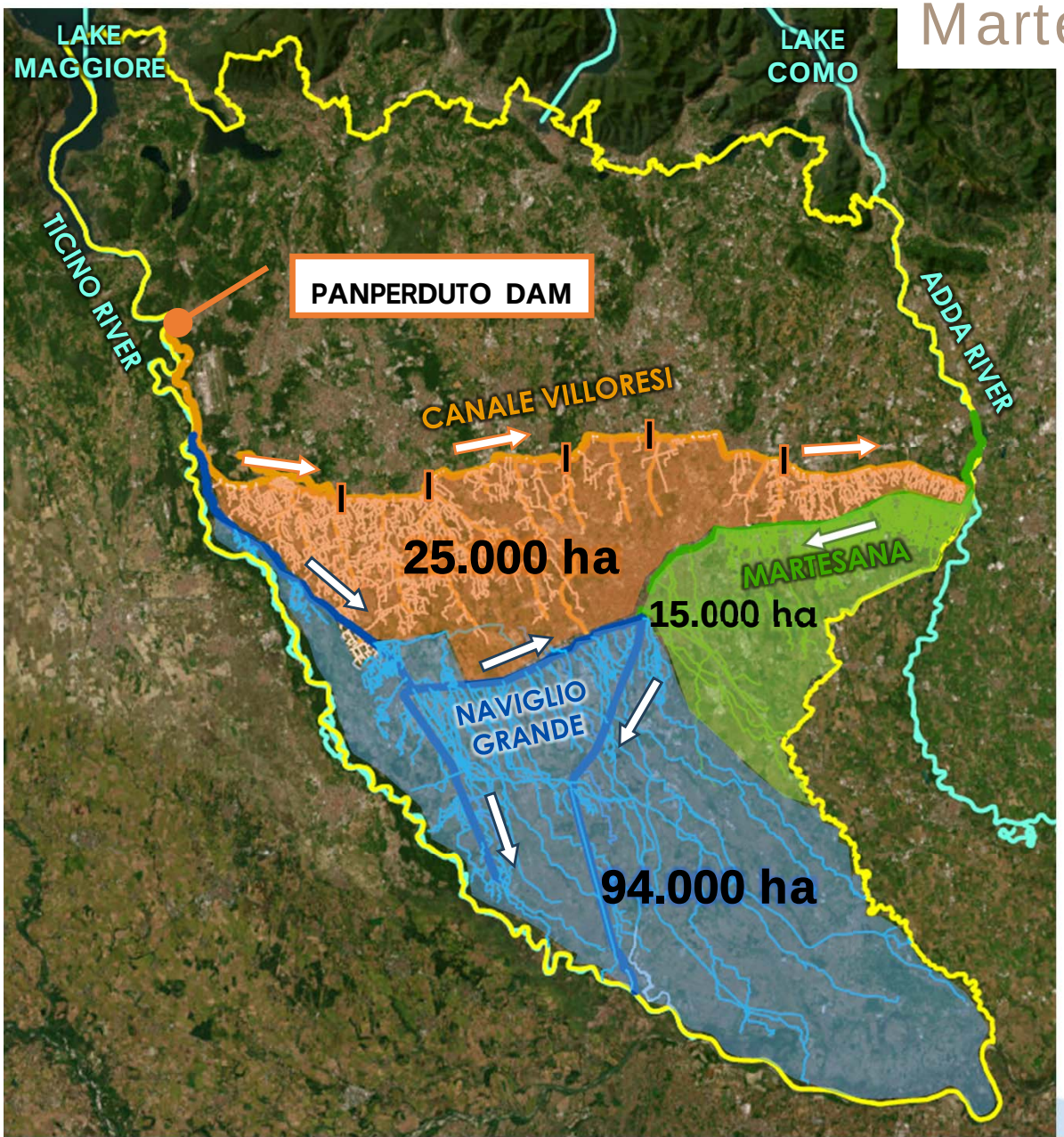
Panperduto dam
Somma Lombardo (VA), Italy – 25/03/2025

Panperduto dam

ETV water network overview

Canale Villoresi and Naviglio Grande from Ticino River
Martesana from Adda River



CANALE VILLORESI
86 km
concrete coating
55 m³/s max discharge
95 irrigation outlets
5 gated inline weirs

NAVIGLIO GRANDE
92 km
uncoated bottom
64 m³/s max discharge
180 irrigation outlets
navigable channel

MARTESANA
from Adda River
32 m³/s max discharge

Multi-functionality of irrigation network

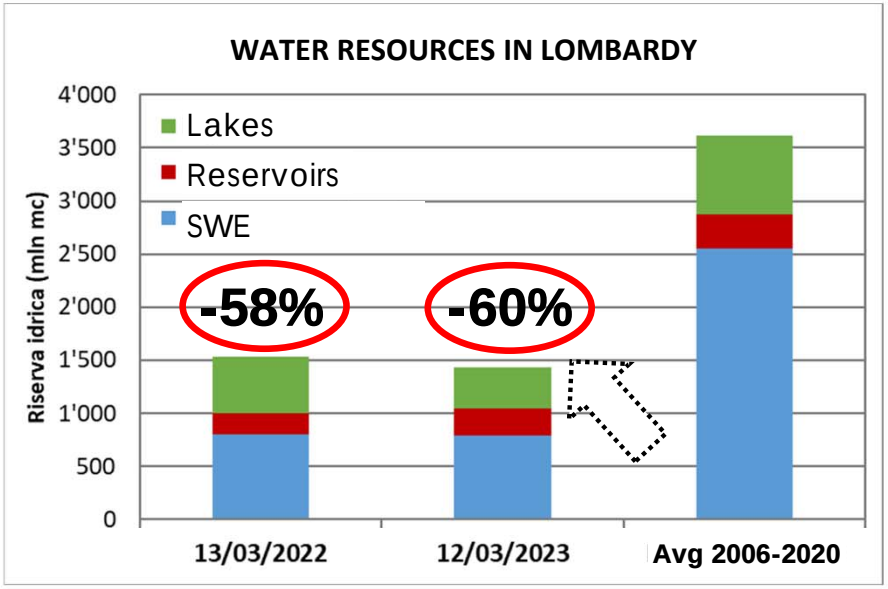
Slowmove and clean energy

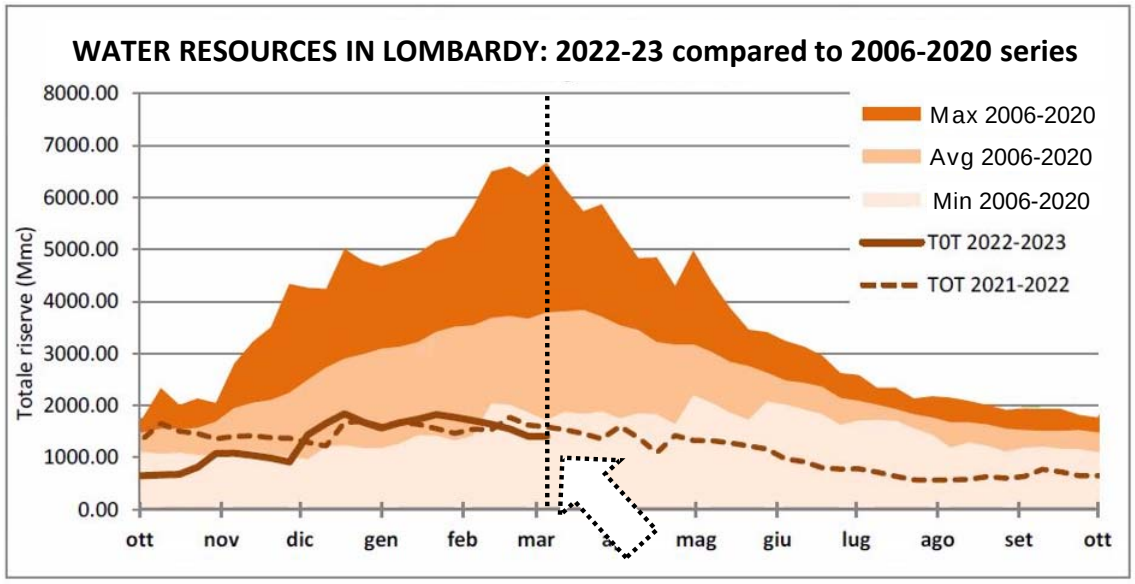
- **76 MW hydropower**
  - o 4 hydropower plants ETV C. Villoresi (**0,6 MW**)
  - o 1 hydropower plant EGPV Panperduto (**1,2 MW**)
  - o 4 hydropower plants EGP (**52,8 MW**)
  - o 1 hydropower plants A2A (**0,3 MW**)
  - o 1 hydropower plants ITALGEN (**20,9 MW**)
  - o 1 thermoelectric plants IREN (**1280 MW**)

- **4.300 km channel network**
  (main, secondary and tertiary)
- **137 km navigable channels**
  - o **80 km** for motor and rowing boats
  - o **57 km** for rowing boats only
- **360 km cycle and pedestrian paths**
  along maintenaince roads

2022-23 Drought - Lombardy region
(ARPA reports 09/03/2023, 13/03/2022 and 12/03/2023)

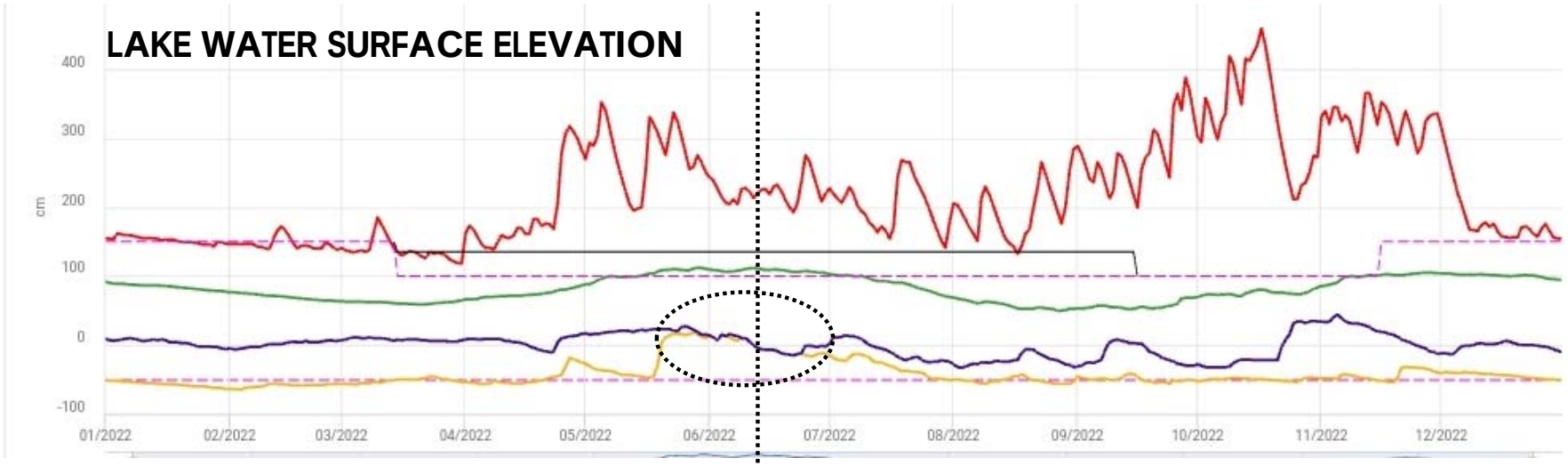
WATER RESOURCES	Average 2006-2020	13/03/2022	2022 compared to average	12/03/2023	2023 compared to average
Lakes	739.6	534.5	-28%	392.5	-47%
Reservoirs	318.3	193.0	-39%	254.2	-20%
Snow Water Equivalent (SWE)	2552.8	803.8	-69%	789.5	-69%
Total	**3610.7**	**1531.3**	**-58%**	**1436.2**	**-60%**



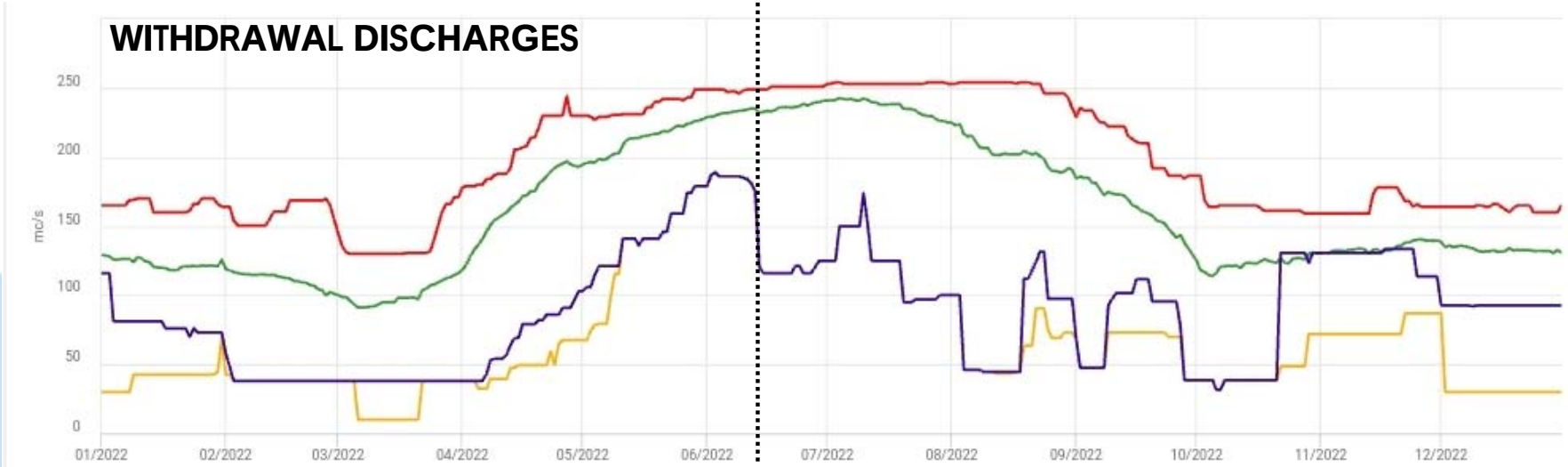


2022-23 Drought - Lake Maggiore

LAKE MAGGIORE
2022 compared to 1942-2023 serie @Sesto Calende (www.laghi.net)



MAX
AVG
2022
MIN



MAX
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2022
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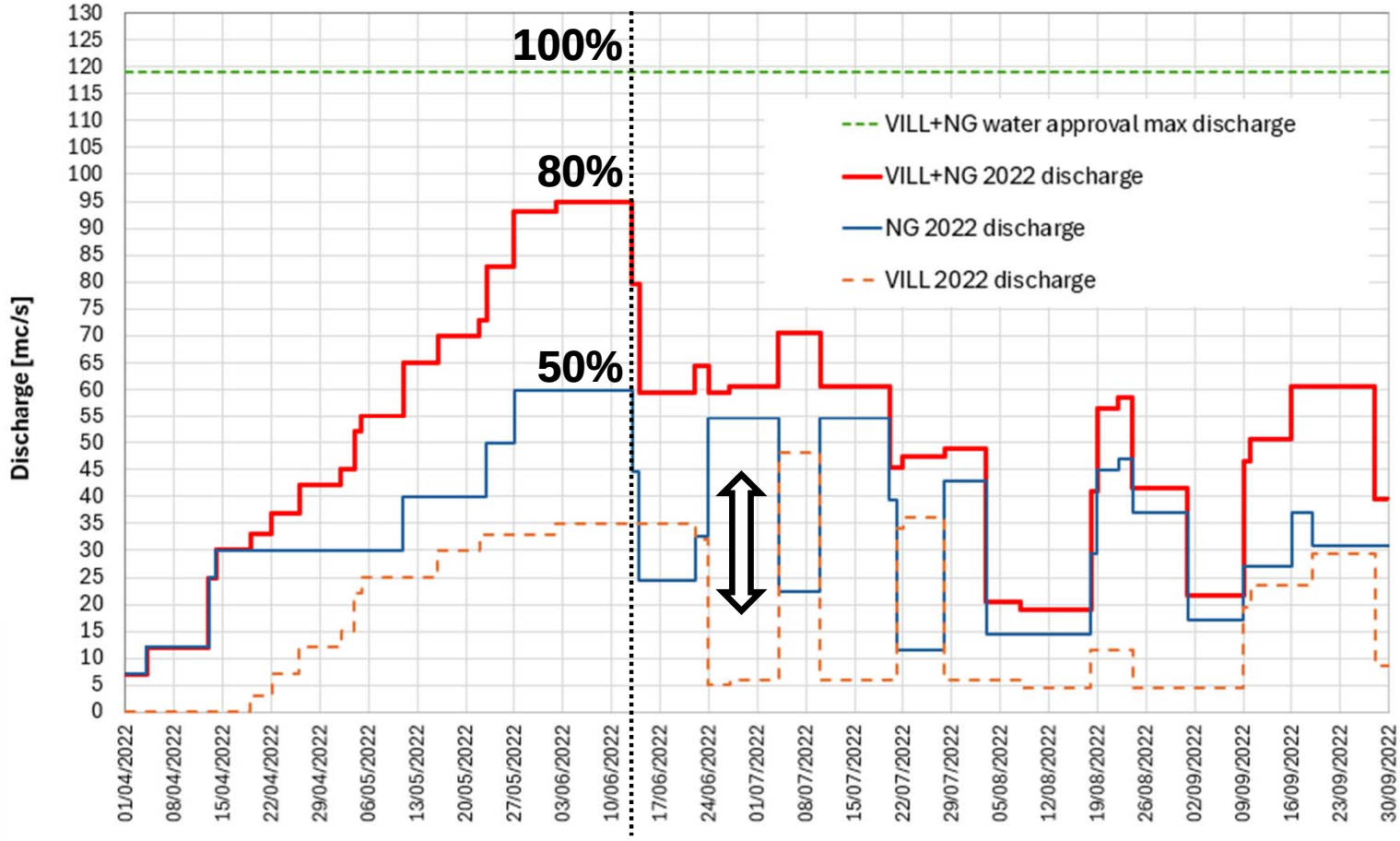
2022-23 Drought – ETV management

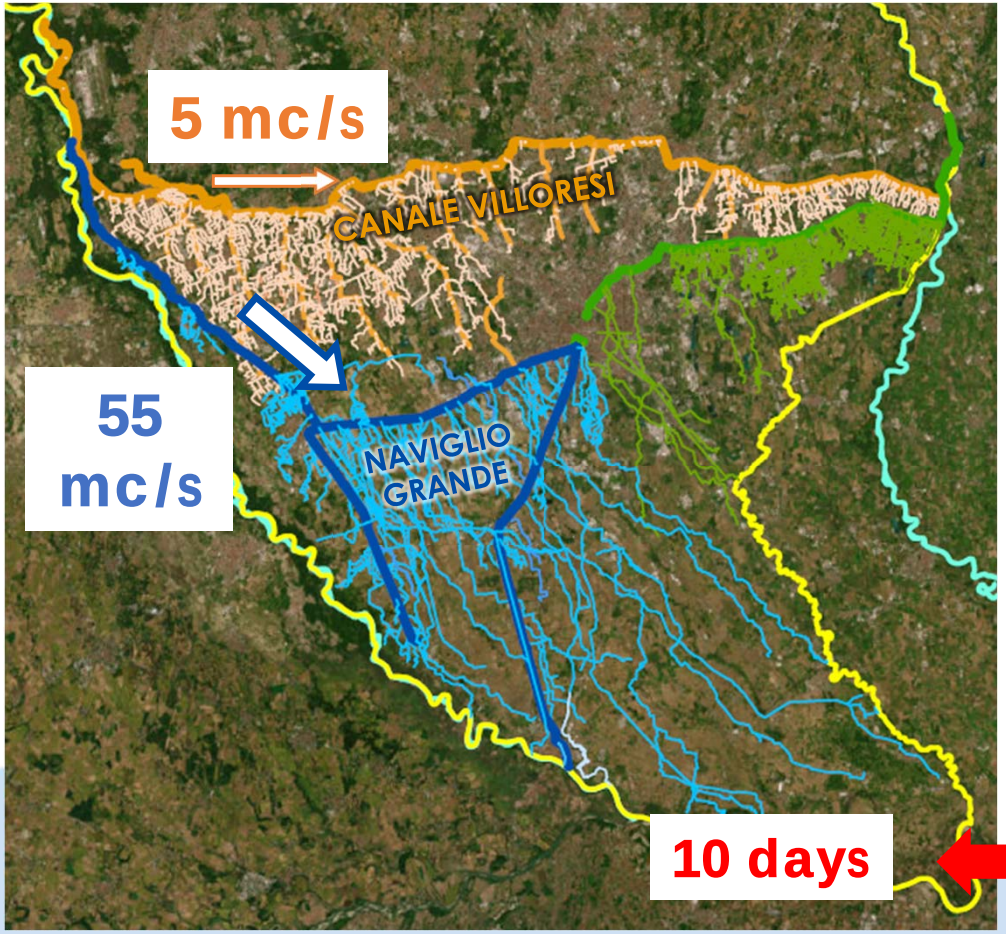
- from 14/06/2022 **50%** or less than the total usual discharge available
- **alternated water withdrawal** between Canale Villoresi and Naviglio Grande

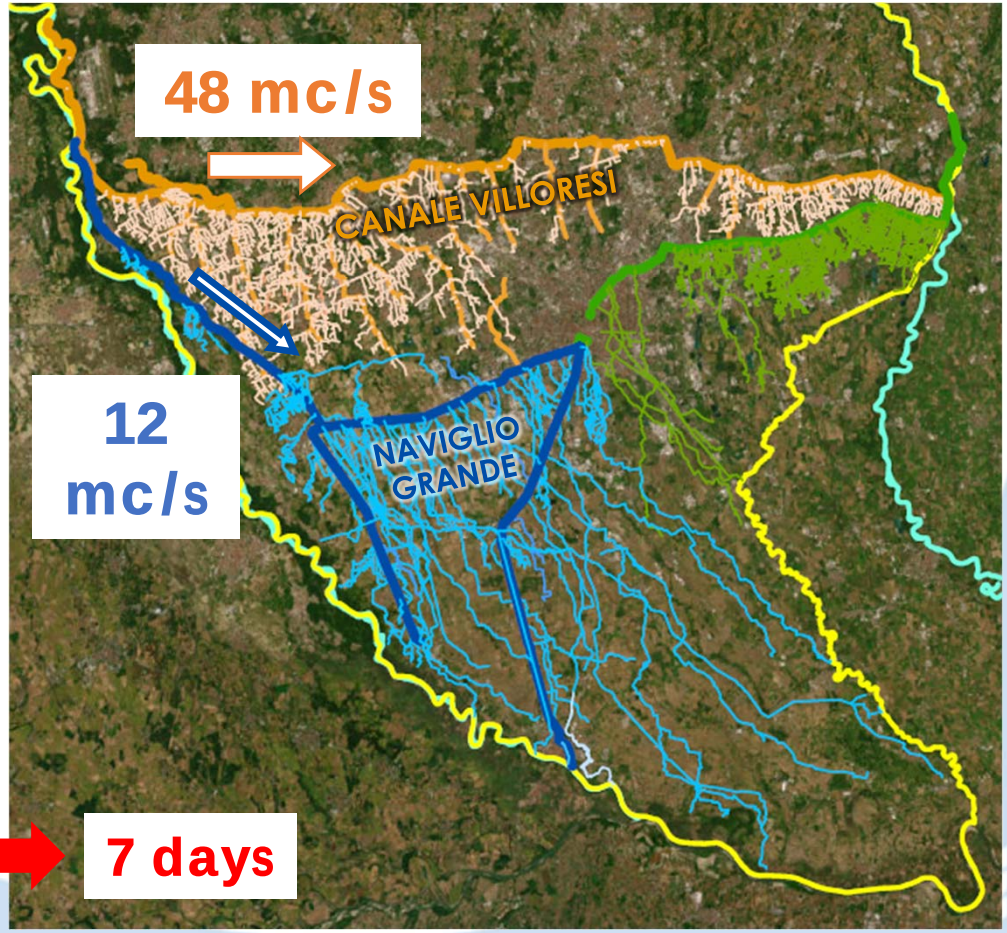


2022-23 Drought – ETV management

- from 14/06/2022 **50%** or less than the total usual discharge available
- **alternated water withdrawal** between Canale Villoresi and Naviglio Grande

⇨ **minimized crop failures**: damage <30% (elsewhere >60%)





Naviglio Grande: new inline structures

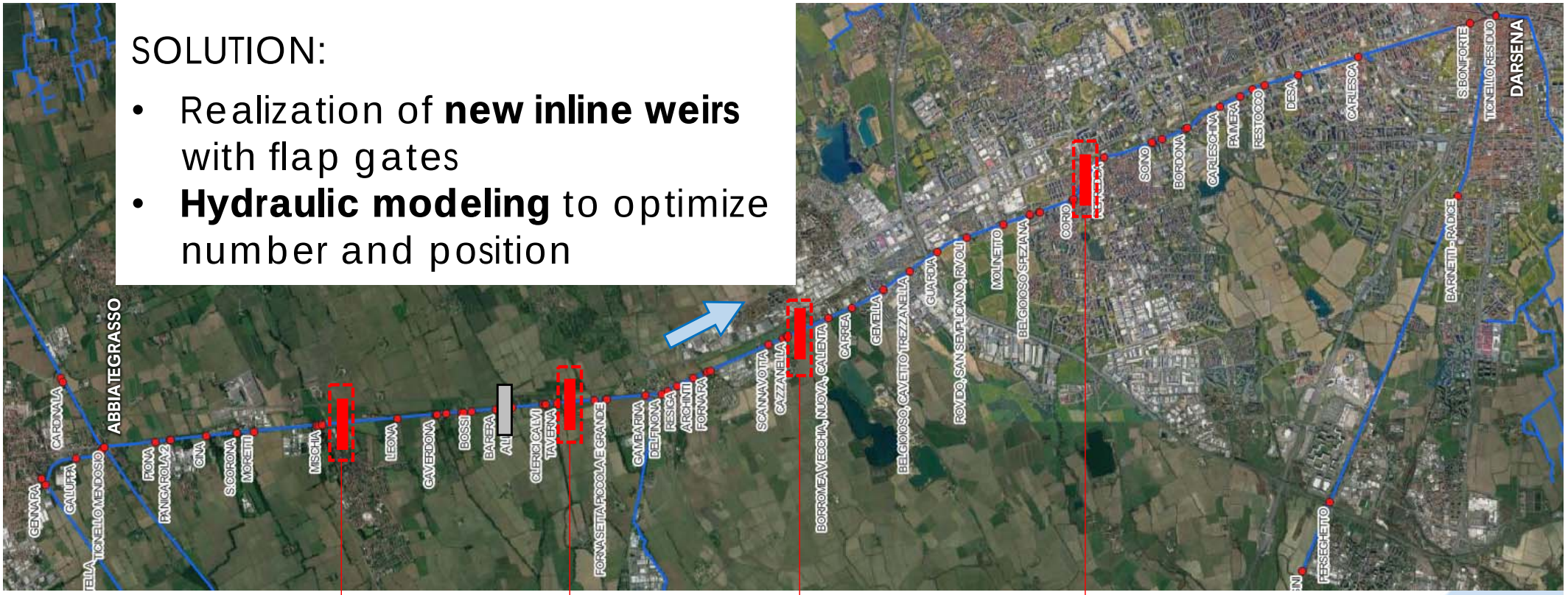
PROBLEMS:

- socalled «high outlets»
- insufficient water levels with low flows

4 NEW INLINE WEIRS

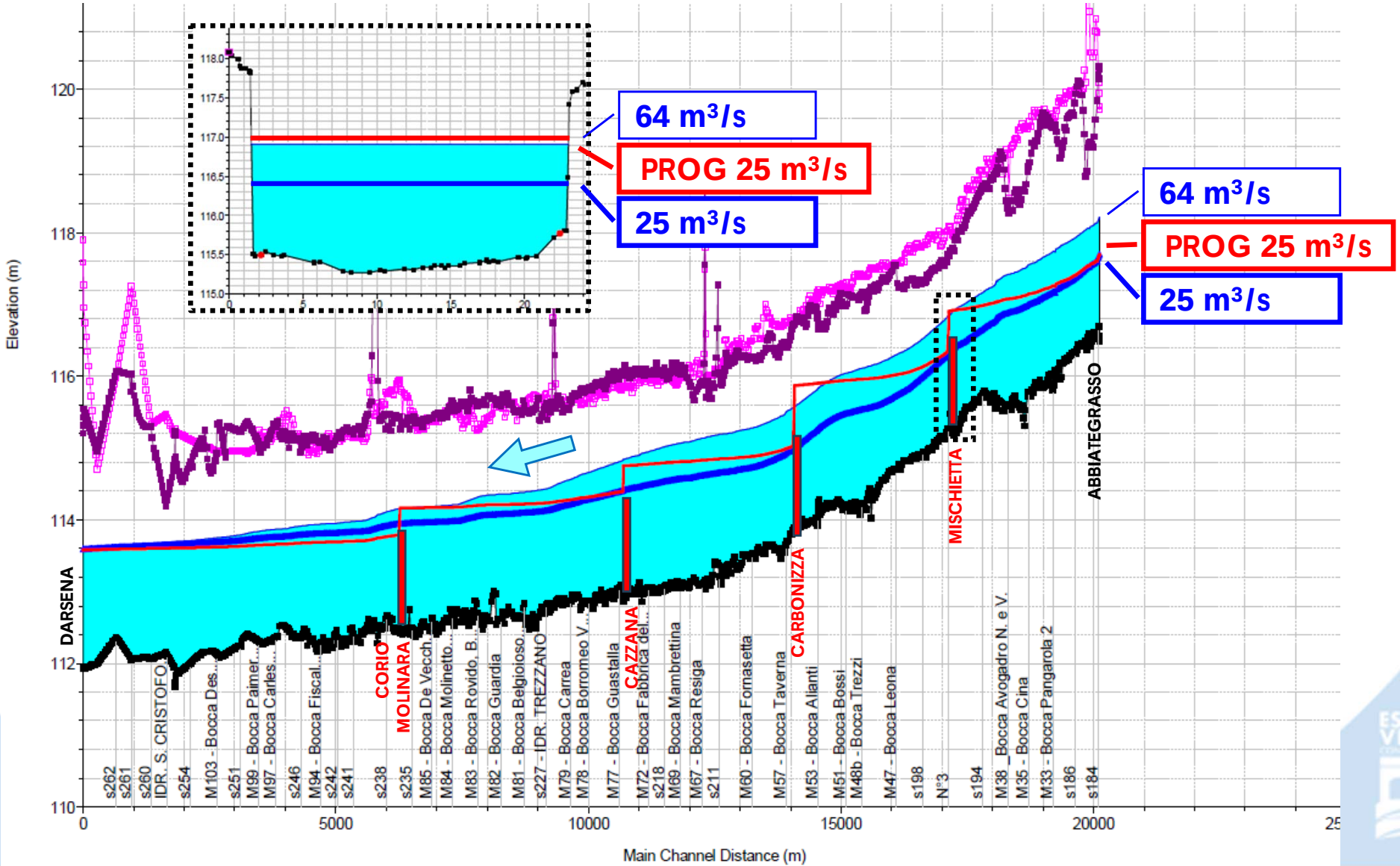
SOLUTION:

- Realization of **new inline weirs** with flap gates
- **Hydraulic modeling** to optimize number and position



Naviglio Grande: new inline structures

Project for **4 new inline weirs** with flap gates
based on hydraulic modeling of Naviglio Grande



Naviglio Grande: new inline structures

Project for **4 new inline weirs** with flap gates
based on hydraulic modeling of Naviglio Grande

PROJECT OUTCOMES:

- **increasing water levels** in the main channel with very low discharge
- **optimizing water supply** to irrigation outlets located at different elevation
- **improving equity** in water distribution
- allowing **navigation** in ordinary conditions

=> Similar project for **new inline weirs** with flap gates also in Martesana

Thanks for your attention

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