LA RECARGA DEL RÍO LLOBREGAT CON AGUA REGENERADA: REUTILIZACIÓN POTABLE INDIRECTA EN BARCELONA

ASERSA webinario #19

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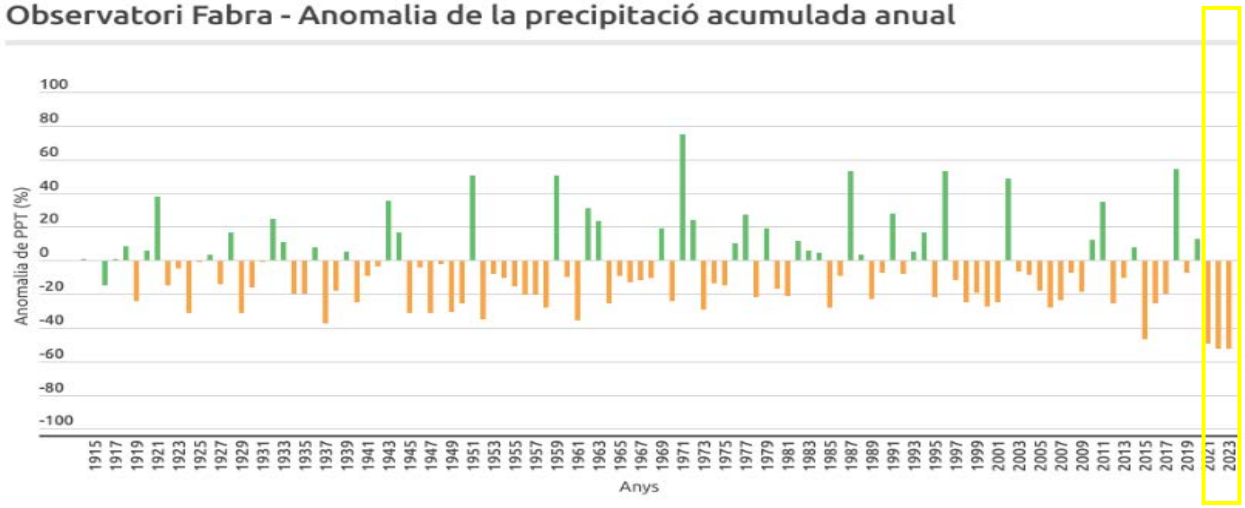
Location

Catalonian river basin district

International and national river basin districts and sea regions

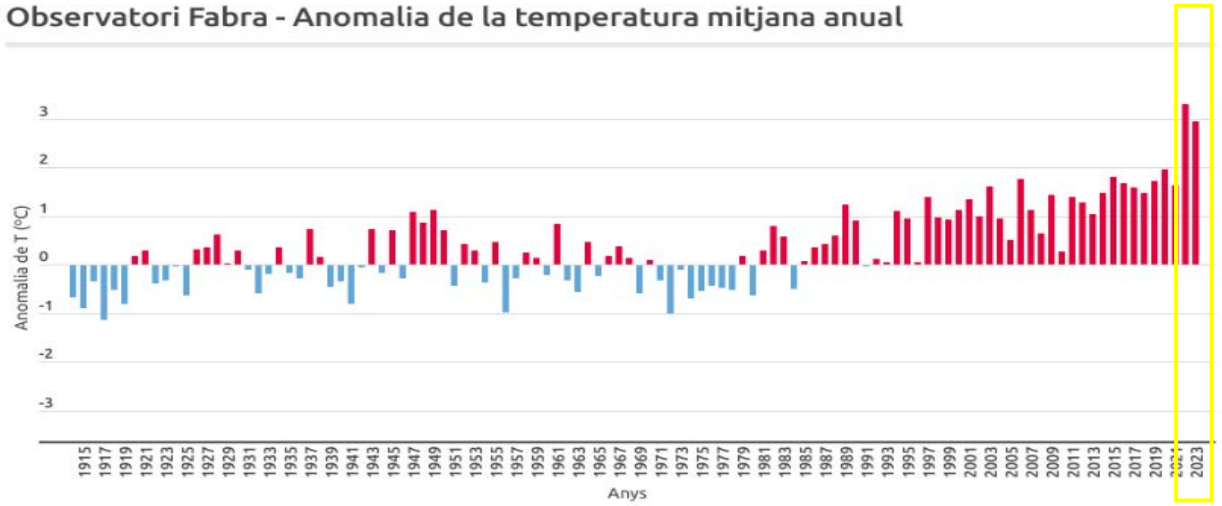
International river basin district	Regional sea coastline
National river basin district	Black Sea
International river basin district outside EU-27	Mediterranean Sea
National river basin district outside EU-27	Celtic Sea, Bay of Biscay and the Iberian Coast
International river basin district boundary	Greather North Sea
Country boundary	Baltic Sea
EU-27 boundary	Outside EU-27

An unprecedented four-year drought (still ongoing)



Rainfall deficit of 50%

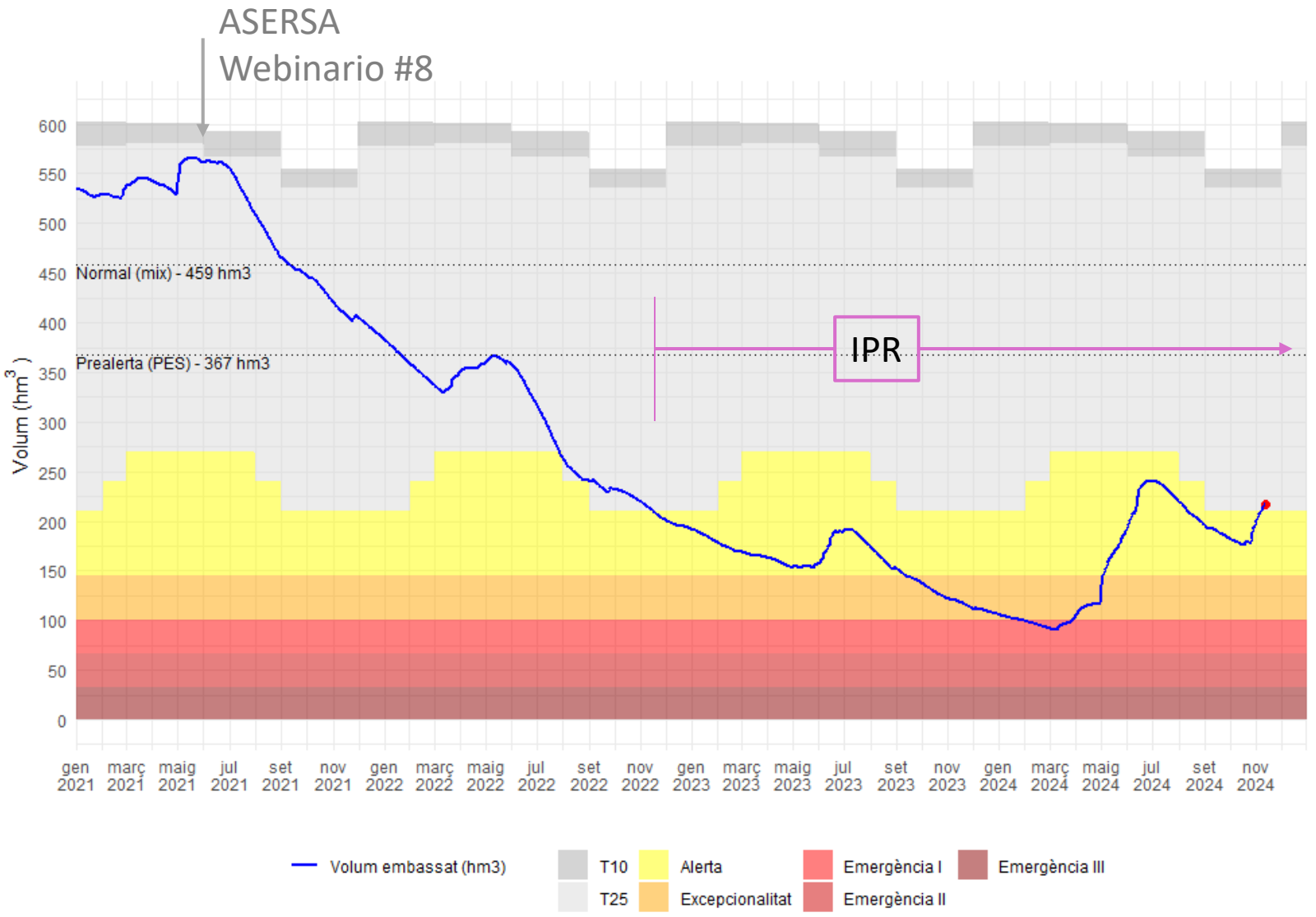
On the graph:
Annual precipitation anomalies (%)



Record temperatures

On the graph:
Annual average temperature anomalies (ºC)

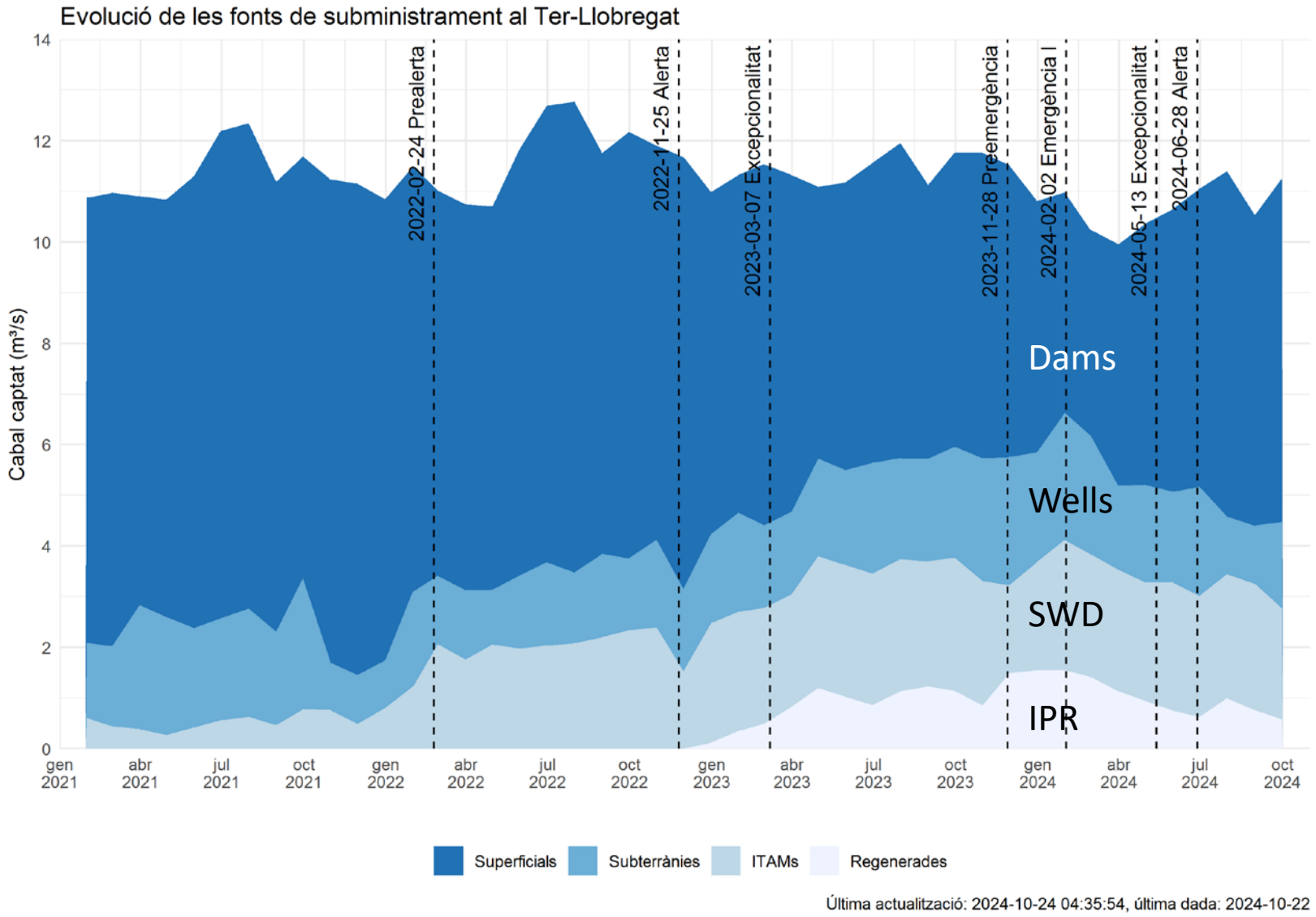
An unprecedented four-year drought (still ongoing)



Sept. 21

March 24

An unprecedented four-year drought (still ongoing)



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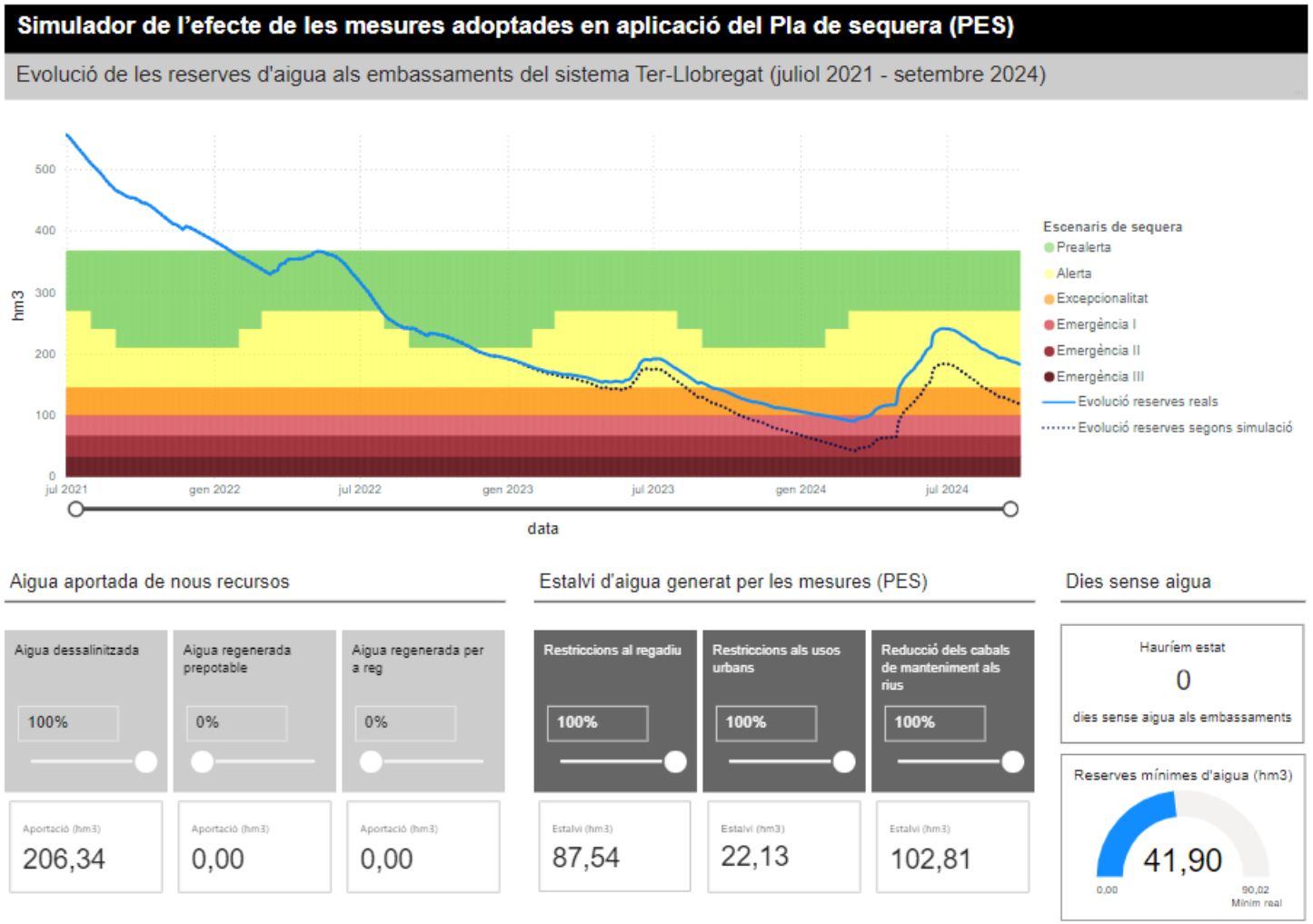


https://sequera.gencat.cat/ca/accions/com-garantim-laigua-durant-la-sequera/evolucio-sequera-amb-pla-sequera/index.html#googtrans(ca|es)

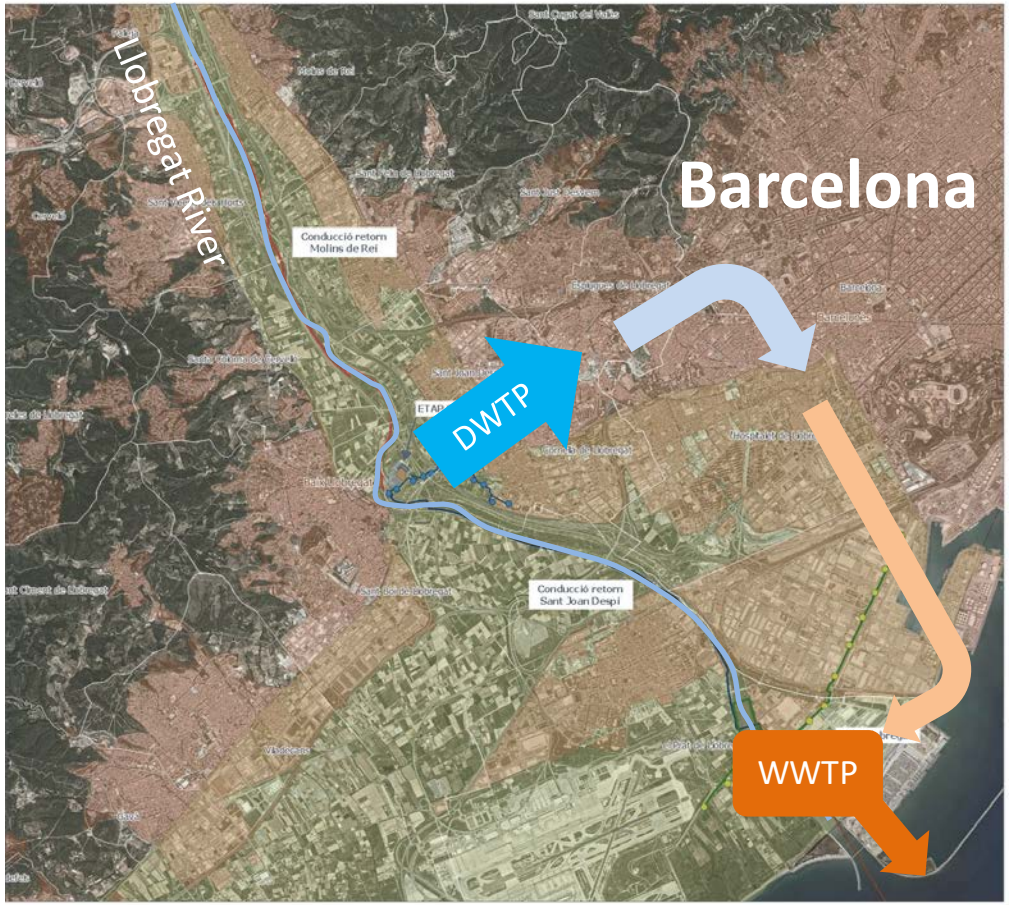
The first steps

2002 | 2006 | 2009 | 2010 | 2018 | 2019 | 2021 | 2022 | 2023 | 2024

WWTP El Prat de Llobregat

The WWTP was built, initially discharging into de Mediterranean Sea

El Prat de Llobregat Wastewater Treatment Plant



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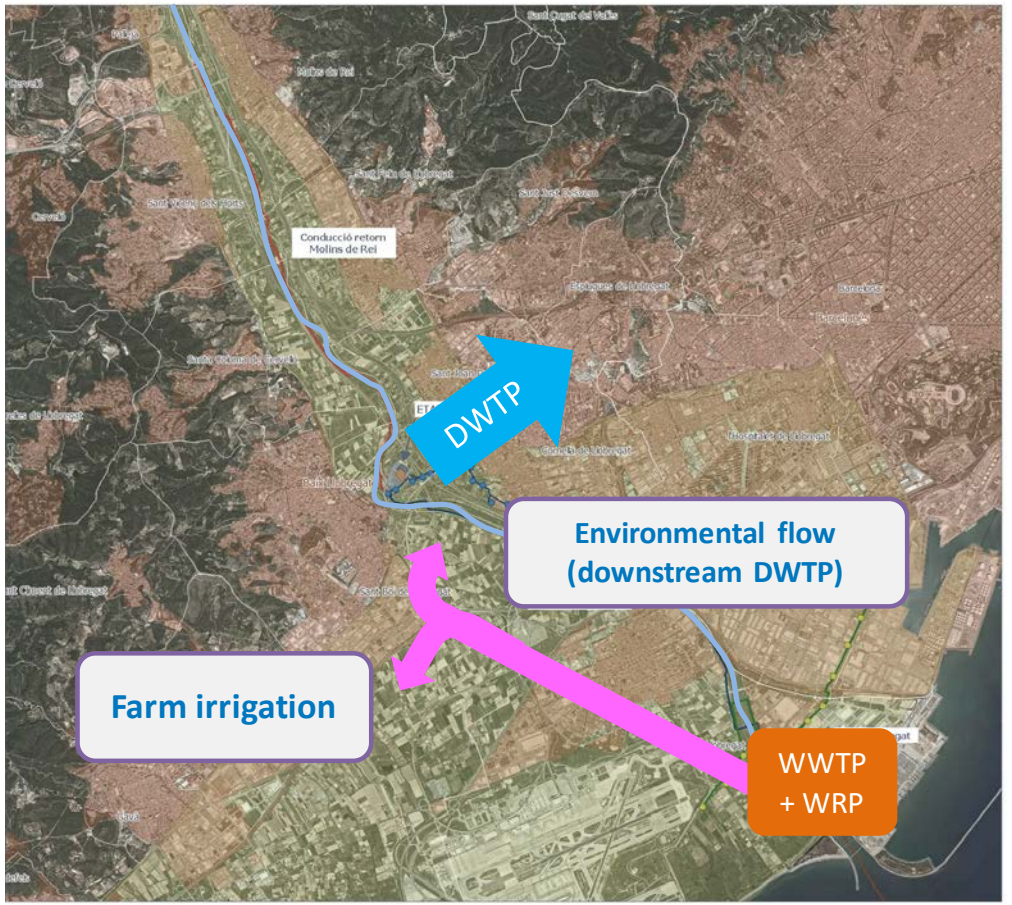
Water Reclamation Treatment Plant

Water reuse scheme

A reclamation plant was built, and water reuse began for farm irrigation and environmental flow



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The IPR pipe

Following the 2008 drought, a pipe to discharge reclaimed water upstream of the DWTP was built as a “safety net”. Some initial trials were performed.

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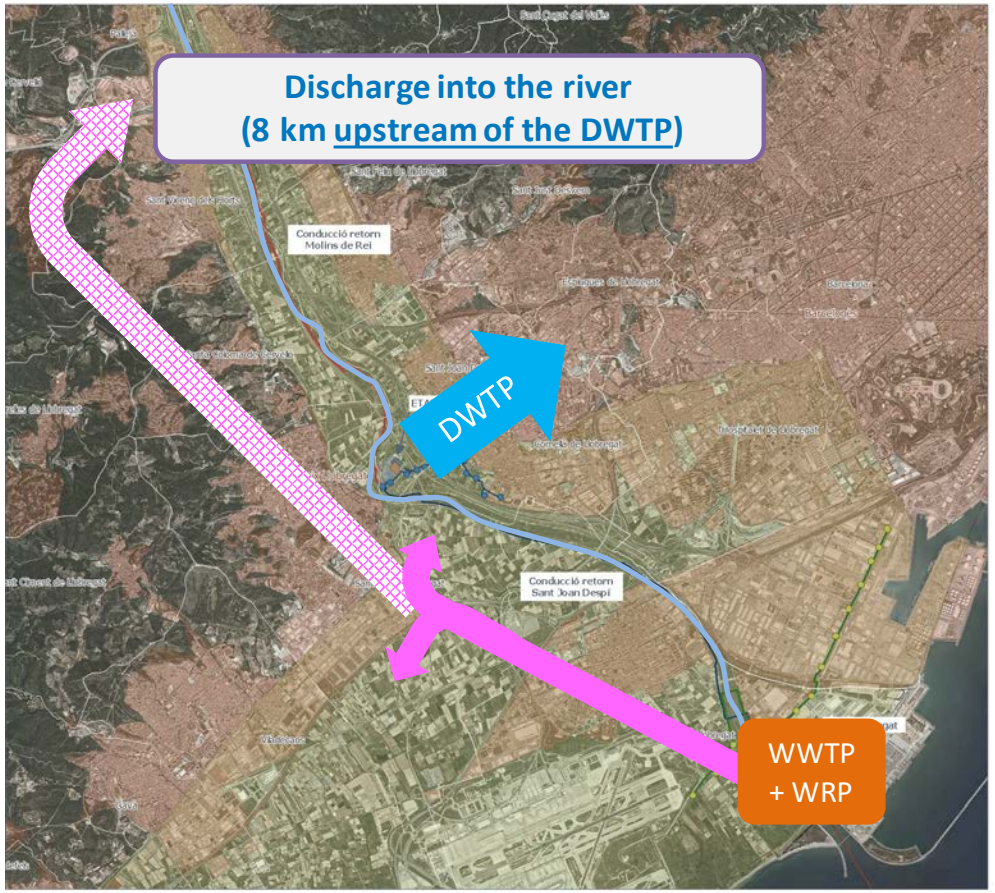

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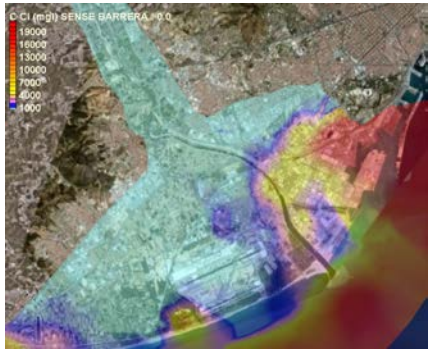


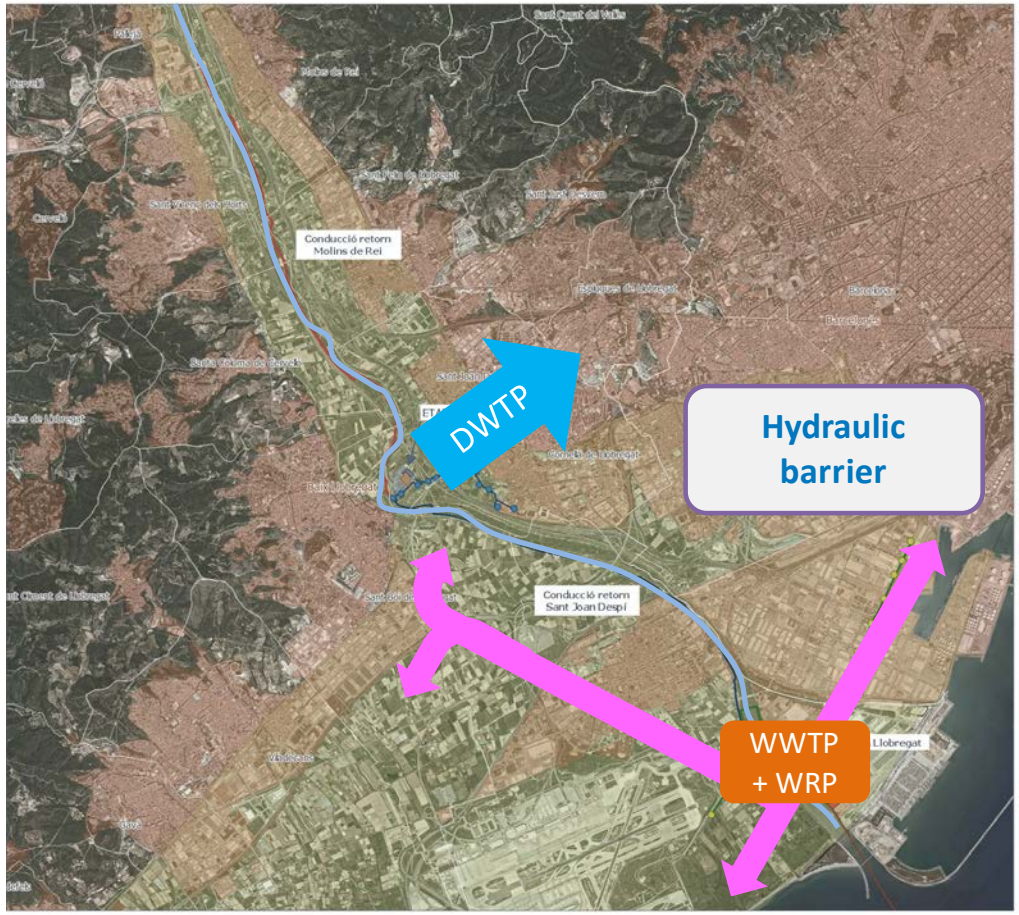
Chloride in the GW

Water reuse scheme

A reclamation plant was built, and water reuse began for farm irrigation and environmental flow

Groundwater replenishment

A hydraulic barrier was built to fight seawater intrusion in the aquifer. It was our first step in IPR.



A new impulse for IPR

… | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024

Design of the Demonstration Trial

During the drafting of the new Drought Plan, the Catalan Water Agency created two working teams to design an exhaustive trial of the IPR facility.

Stakeholders

- Catalan Water Agency
- Catalan Health authority
- Metropolitan Area (local authority)
- ABEMCIA (facilities' operator)

External Expert Panel

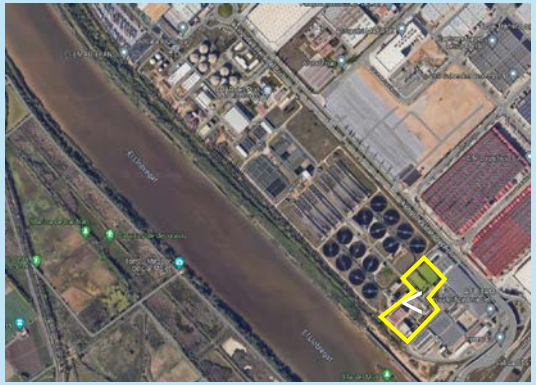
Microbiologists, toxicologists, environmental chemists, science communicators, ecologists, water treatment experts,…

A new impulse for IPR

… | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024

Design of the Demonstration Trial

WATER RECLAMATION TREATMENT PLANT

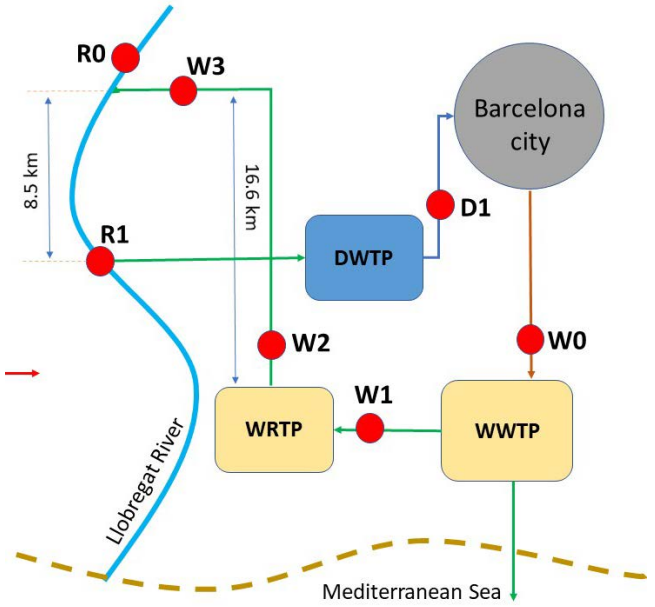


Coagulation-flocculation
Lamellar settling
Microscreens (10 µm)
UV disinfection (50 mJ/cm^2)
Sodium hypochlorite (*opt.*)

DRINKING WATER TREATMENT PLANT

Pre-oxidation (ClO_2)
Flocculation, settling and sand filtration

→ UF + RO
→ O_3 + GAC



Sampling points

A new impulse for IPR

Execution of the demonstration trial

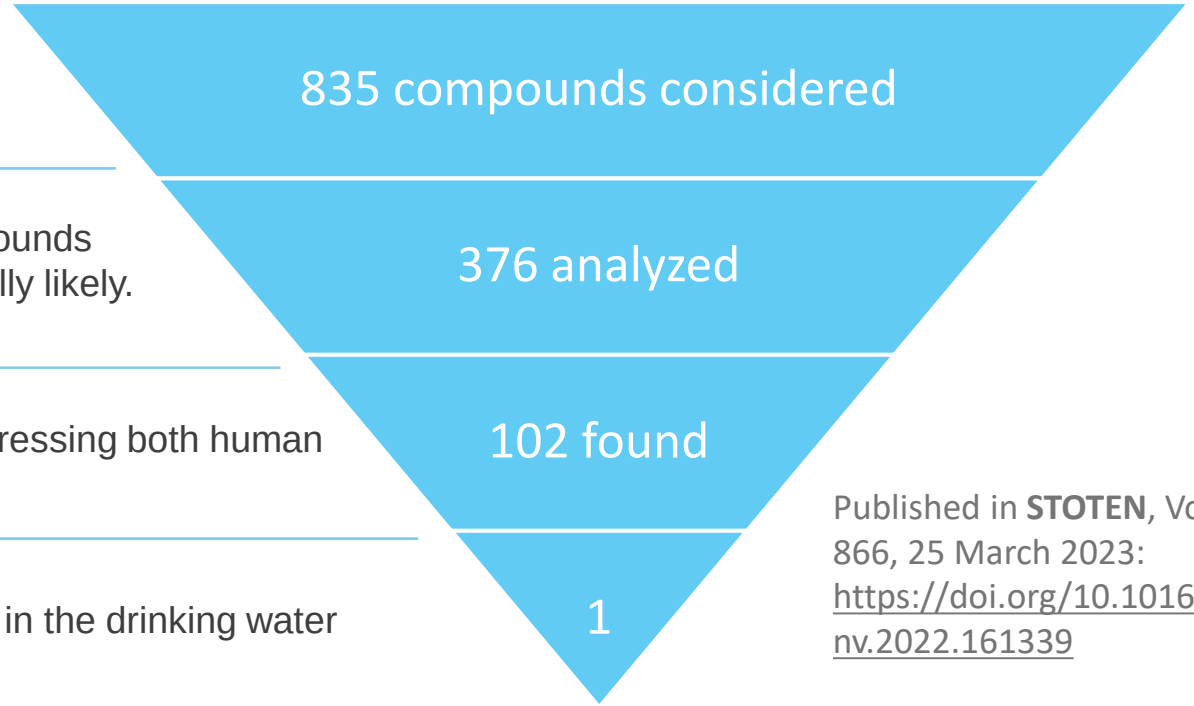
The trial was conducted in June-July of 2019, to assess the efficiency of the entire treatment train (WWTP-WRTP-River buffer- DWTP).

Sources are checked to drafts a **preliminary-list** of 835 compounds for consideration

A **"short-list"** was agreed upon, consisting of those compounds whose presence in treated wastewater was judged minimally likely.

Guide values were established for these compounds, addressing both human health and environmental health concerns.

Only **one compound** (1,4-dioxane) was found near its GV in the drinking water



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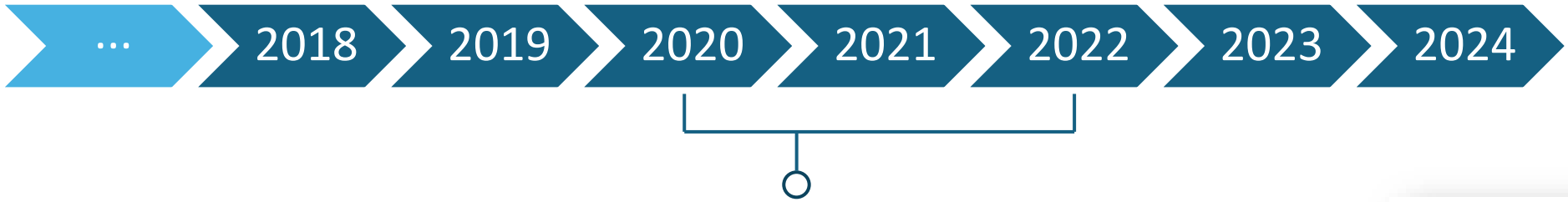
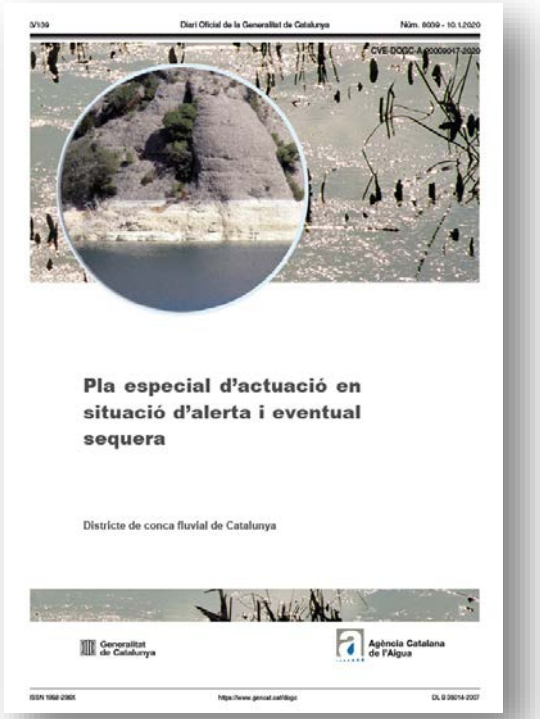
A new impulse for IPR



Pollution source control

Intensified sewage monitoring was set up, identifying three factories as the main source of 1,4-dioxane.

Administrative processes, established under the Drought Plan, were initiated to modify their discharge permits to the sewage.



Drought Plan

IPR in operation

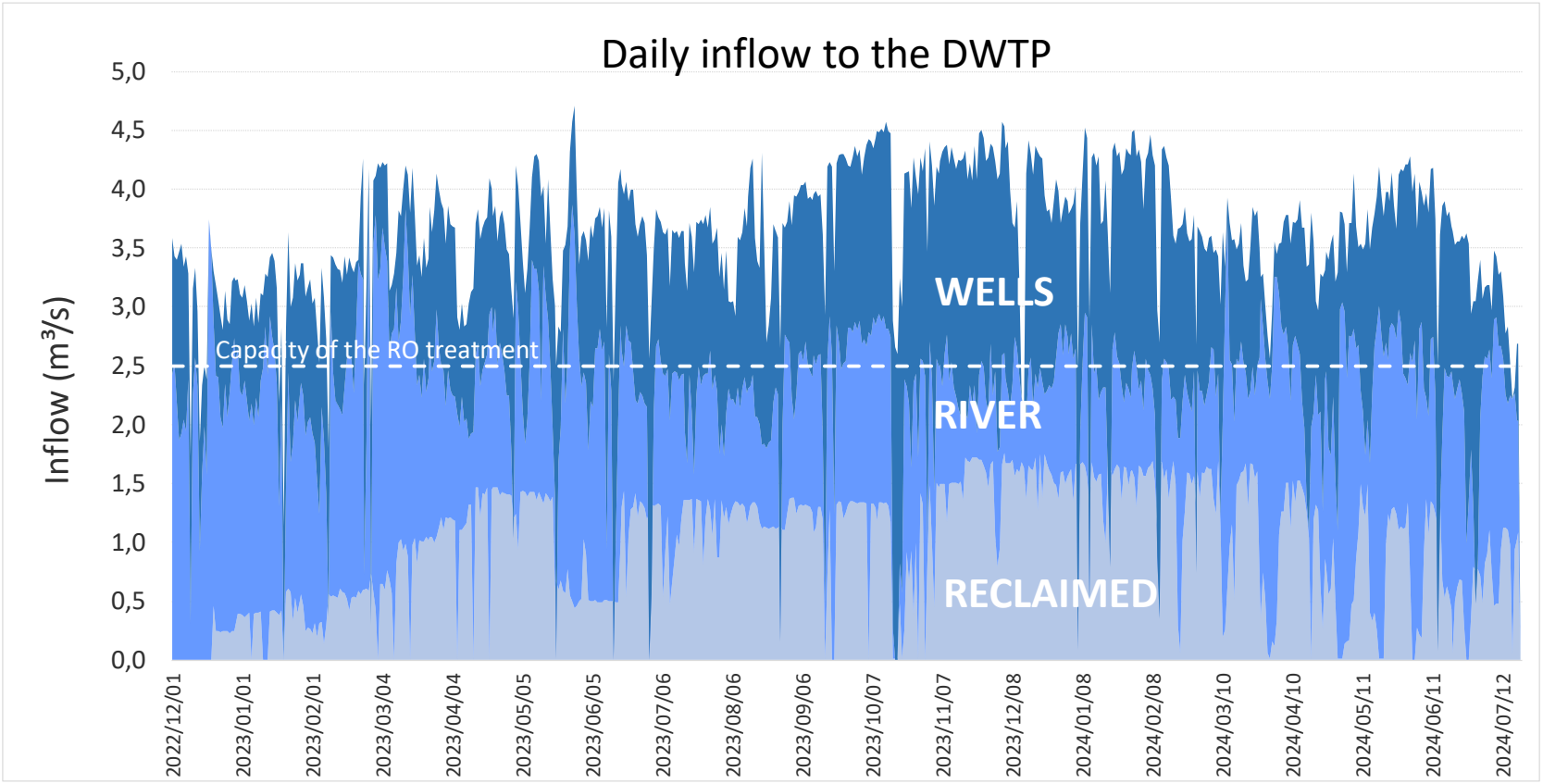
… | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2024

The IPR discharge begins

Following the declaration of the Drought Alert and according to the plan, the IPR discharge began in December 2022. The discharged flow was gradually increased over the following six months.

During operation, no guideline values have been exceeded in the drinking water.

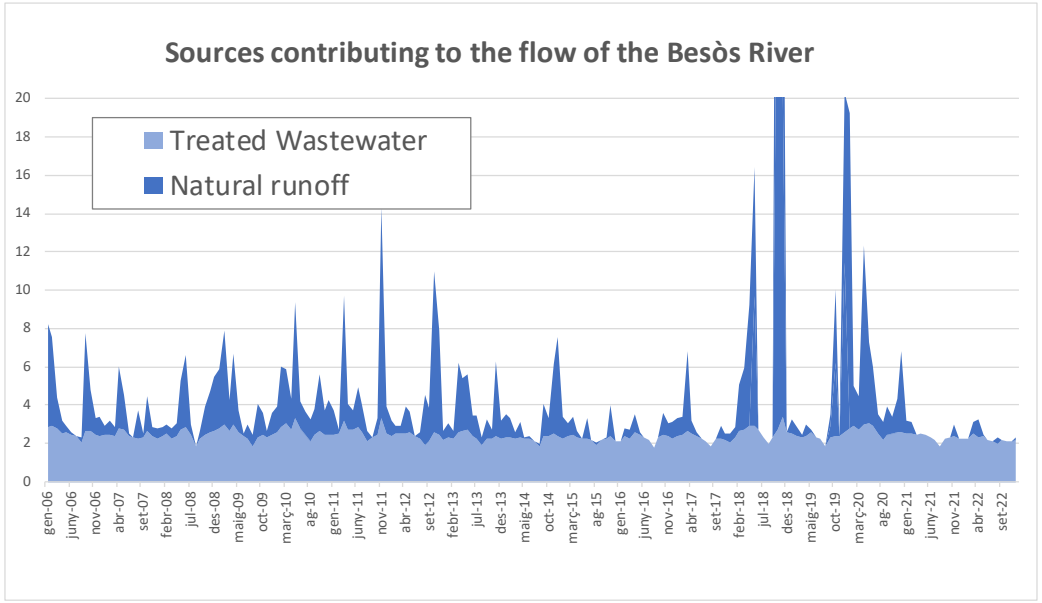
IPR in operation



The IPR becomes a crucial component of the supply mix

To the date, the IPR has been in operation for 23 months, contributing 55 hm^3.

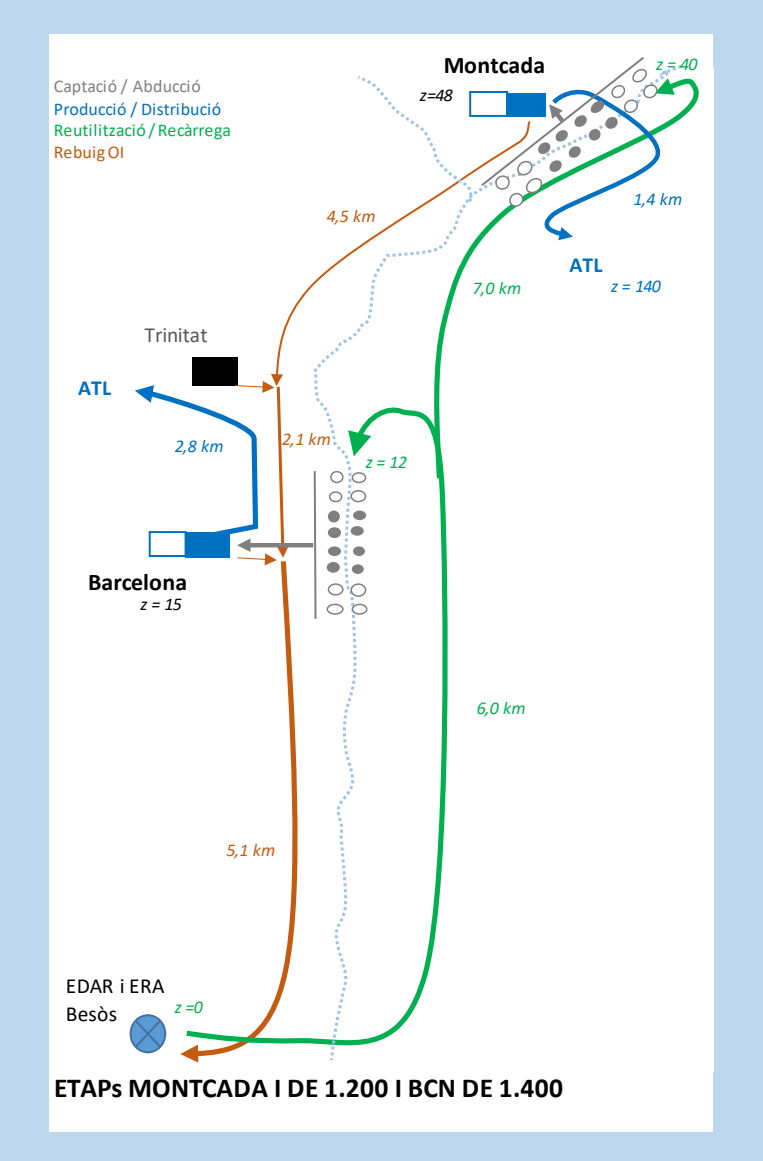
Next project: Indirect Potable Reuse at the Besòs river



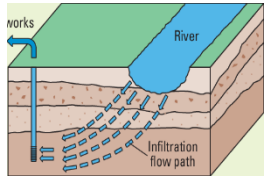
Besòs River

Besòs Wastewater Treatment Plant (Barcelona)

Next project: Indirect Potable Reuse at the Besòs river



Wells for the future Barcelona's Besòs Drinking Water Treatment Plant



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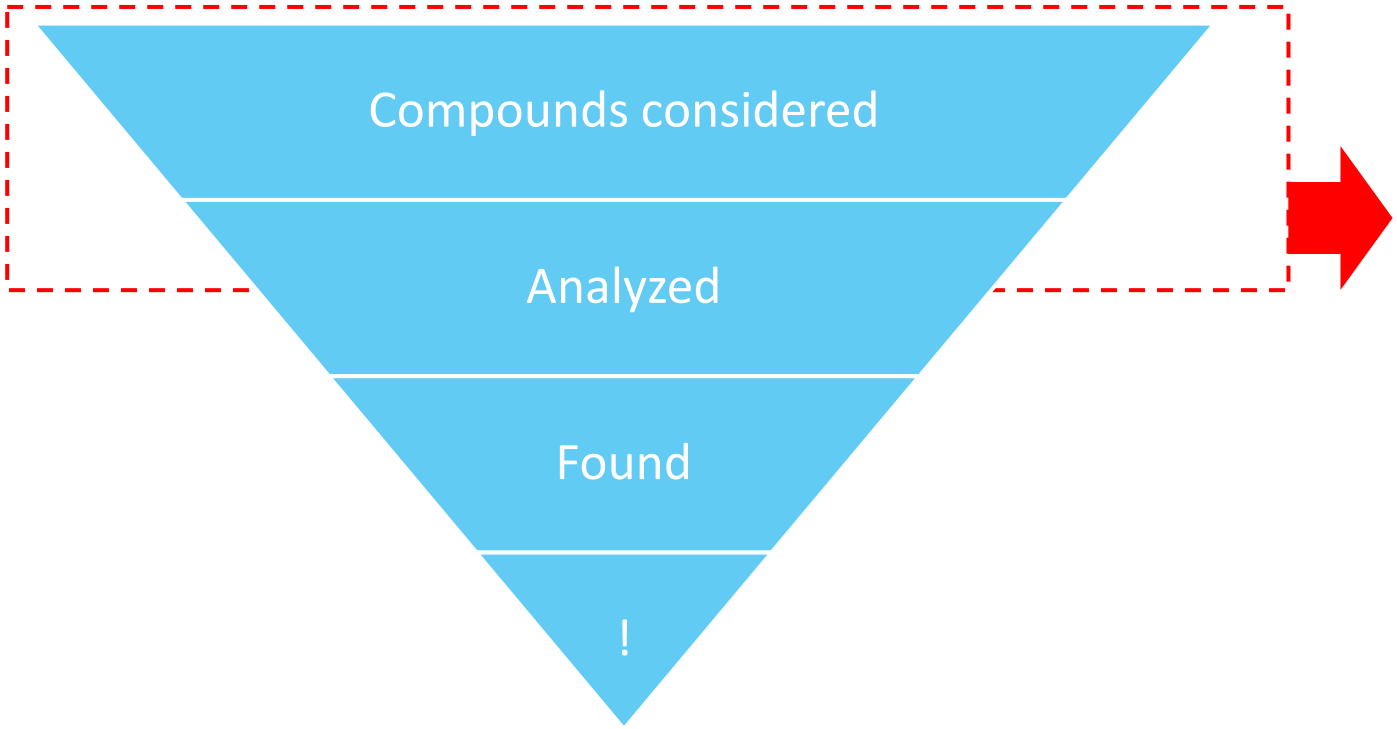


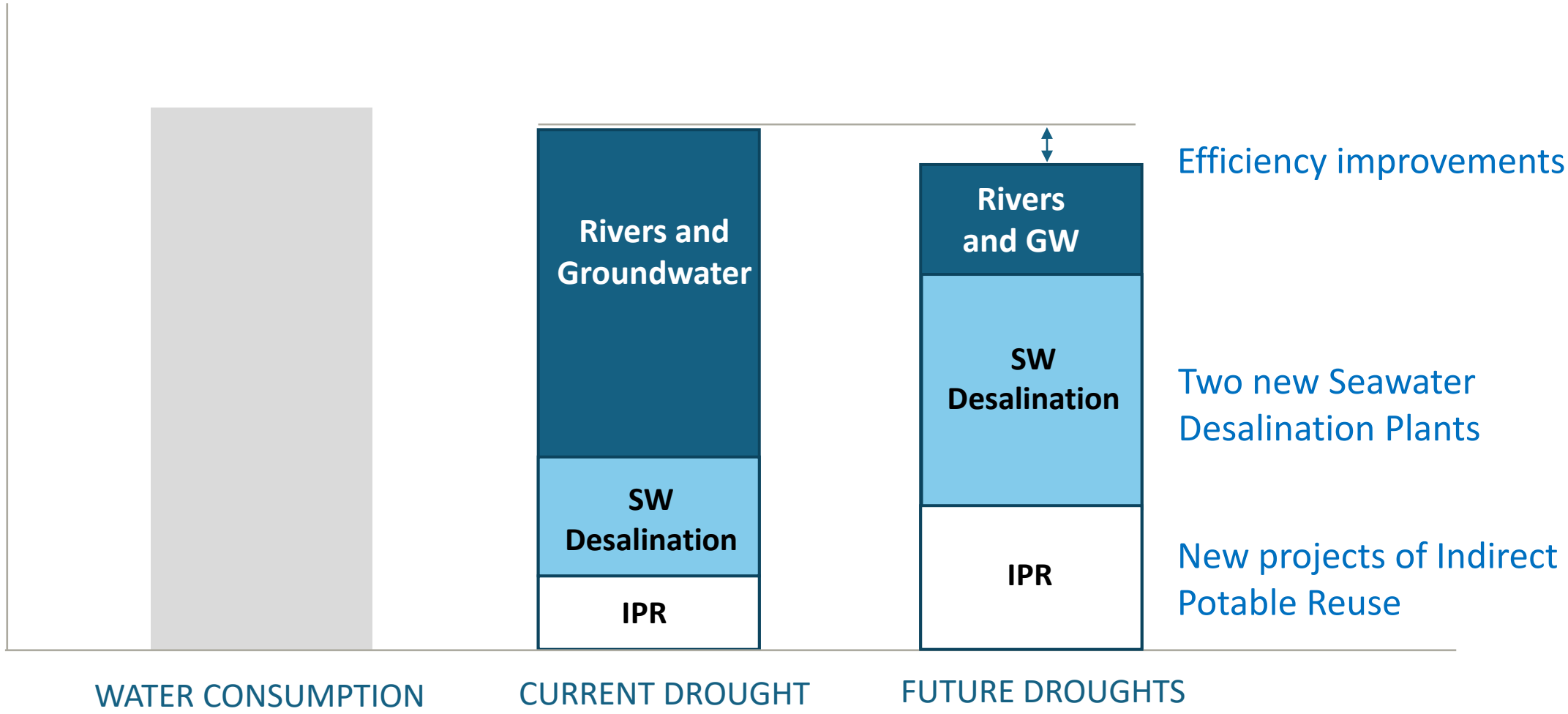
Non-target analysis:

The preliminary list can now be replaced by a NTA, that can provide a comprehensive list of micropollutants detected in wastewater.

Second-round target analyses are still required.

Towards water security

Planned components of the bulk water supplied to the Greater Barcelona Area during droughts



IPR: Indirect Potable Reuse

Conclusiones

Preparación para la sequía:

- Infraestructura de reutilización potable indirecta concebida inicialmente como una “red de seguridad”
- Fue esencial la implicación temprana de todos los actores y de la comunidad científica.
- La investigación previa también fue muy útil.
- La campaña de demostración fue esencial para identificar los problemas a resolver.
- Es fundamental disponer de un marco legal para poder modificar temporalmente los límites de vertido al sistema de saneamiento. El Plan de Sequía puede incluirlo.

Siguientes pasos:

- La RPI parece socialmente aceptada en Cataluña, ofreciendo un una vía prometedora para alcanzar la seguridad hídrica.
- El desarrollo de las técnicas analíticas Non-Target facilitará los nuevos proyectos.

Futura regulación europea de la reutilización potable indirecta?

- Debería considerar la cadena completa de tratamiento (depuración-regeneración-potabilización).
- Podría focalizarse en establecer valores guía adicionales para el agua potable, aplicables en sistemas alimentados con aguas regeneradas.

Muchas gracias por su atención

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