



Wastewater-based surveillance in the EU

Commision activities and state-of-play

Bernd Manfred GAWLIK (EC.JRC.D.2)

Wastewater and Health

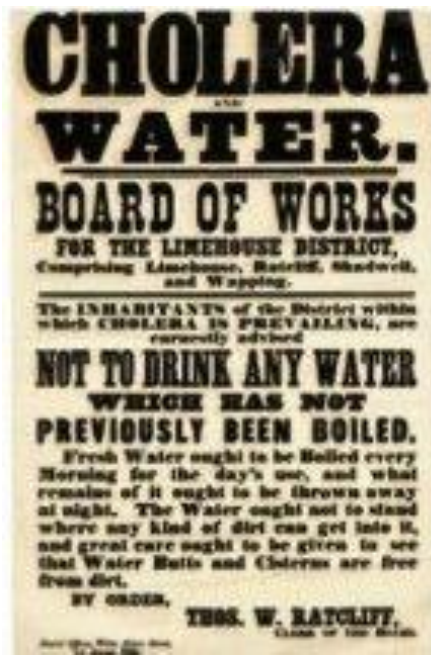
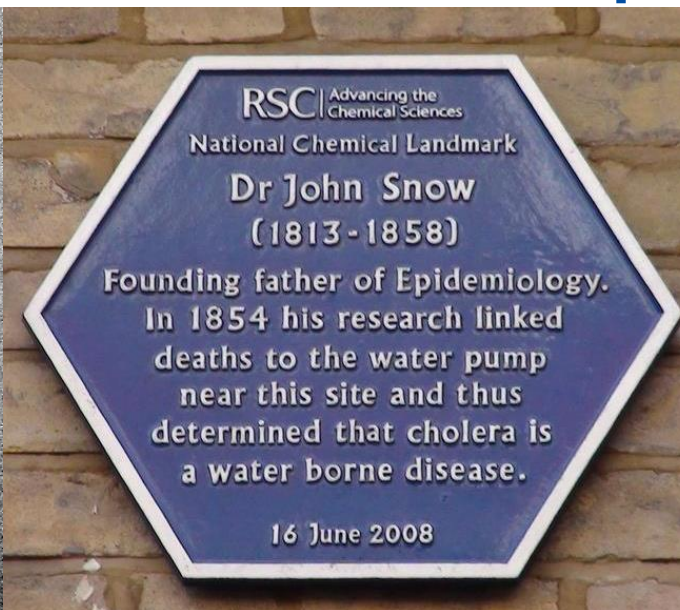
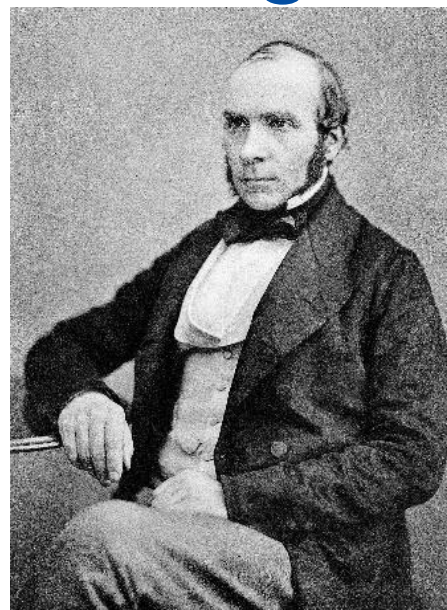


“L'égout, c'est la conscience de la ville. Tout y converge et s'y confronte. Dans ce lieu livide, il y a des ténèbres, mais il n'y a plus de secrets.”

“The sewer is the conscience of the city. Everything there converges and confronts everything else. In that livid spot there are shades, but there are no longer any secrets.”

Victor Hugo, Les Misérables, 1867

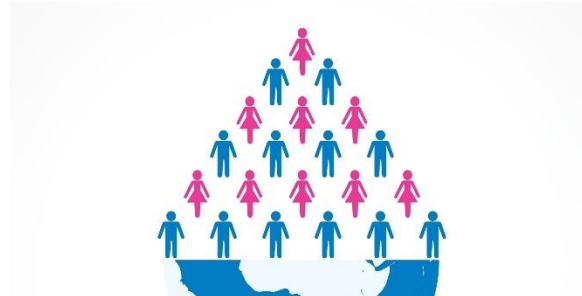
A forgotten relationship



European Commission

The four uses of wastewater surveillance

Early detection
of outbreaks



Population-wide
surveillance

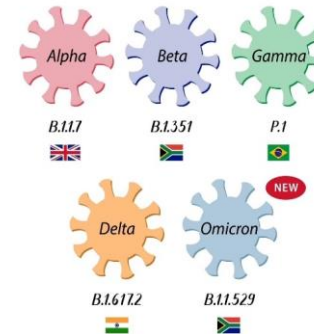


**Interaction with health authorities
and integration with clinical data is of pivotal importance**

Specific
Surveillances



- population parts
- transportation hubs
- transport vessels



Surveillance and
tracking variants of
concern

Boosting EU wastewater-based epidemiology

HERA Incubator

Preparing the creation of a Health Emergency Response Authority:

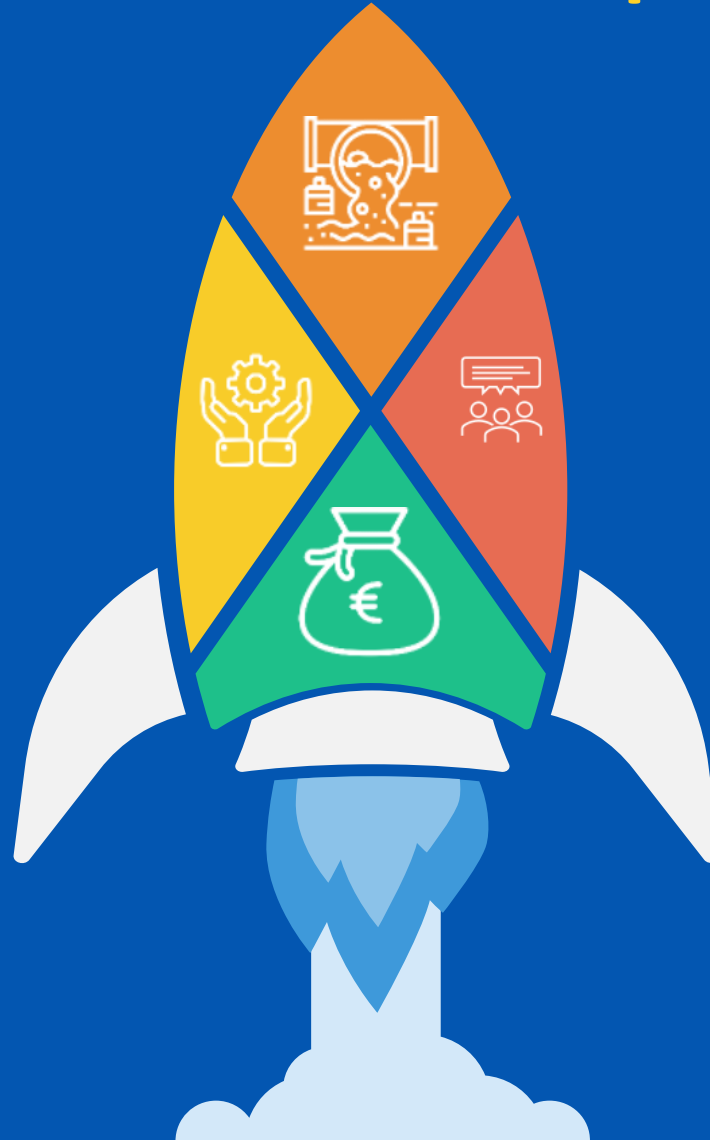
- new variants of the virus
- Development of vaccines against new variants
 - Production at scale and speed

Feb 2021

Emergency Support Instrument

Financial resources for vaccines, treatment, **TESTING**, health related products and services, contact tracing and EU Digital Covid Certificate

April 2020



The EC Recommendation

- Towards a common approach for WBE of SARS-CoV-2
- Alliance between Public Health and Water Sanitation
- Accelerated technology uptake
- Looking beyond SARS-CoV-2

Mar 2021

The Commission's Science Service and its partners

Using the EC's Joint Research Centre as knowledge broker and hub to:

- Proof of concept and knowledge base
- Creation of a European Community of Practice across Public Health, Water Sanitation and Research&Academia
- Develop a Digital and Logistical Data Infrastructure

Mar 2020 - ongoing

WBE – An EU Timeline

Corona outbreak

1

February 2020

Description of the epidemiological and clinical characteristics of novel coronavirus (2019-nCoV)-infected pneumonia (NCIP)

2

2020

Wang et al., doi: 10.1001/jama.2020.1585, JAMA, 2020 Mar 17;323(11):1061-1069; Clinical Characteristics of 138 Hospitalized Patients With 2019 Novel Coronavirus-Infected Pneumonia in Wuhan, China

EU ad hoc exercise

4

Summer 2020

EU Sewage sentinel system campaign

6

April 2021

Establish a systematic surveillance of SARS-CoV-2 and its variants in wastewaters in the EU

Detection Omega variant in Frankfurt

8

February 2022

(Agrawal et al. Water Research 214 (2022) 118162, <https://doi.org/10.1016/j.watres.2022.118162>, February 2022)

Launch of DEEP

10

March 04th, 2022

Proof of concept

1) Italy

(doi: 10.1016/j.scitotenv.2020.141711, Sci Total Environ. 2021 Jan 1; 750: 141711, Published online 2020 Aug 15., SARS-CoV-2 has been circulating in northern Italy since December 2019: Evidence from environmental monitoring)

2) The Netherlands

(<https://doi.org/10.1101/2020.03.29.20045890>, posted July 25, 2020, Presence of SARS-Coronavirus-2 in sewage, Gertjan Medema, Leo Heijnen, Goffe Elsinga, Ronald Italiaander, Anke Brouwer, doi: <https://doi.org/10.1101/2020.03.29.20045890>)

3) Spain

(DOI:10.1101/2020.06.13.20129627, G. Chavarria-Miró et al., "Sentinel surveillance of SARS-CoV-2 in wastewater anticipates the occurrence of COVID-19 cases, and 1st TOWN HALL Meeting (June 08th, 2020)

3

Commission Recommendation

5

17.3.2021

On a common approach to establish a systematic surveillance of SARS-CoV-2 and its variants in wastewaters in the EU

Detection Delta variant in Frankfurt

7

(August 2021)

variants in wastewaters in the EU

G7 Health's Ministers's Communique
May 07th, 2022

9

COVID-19 - Sustaining EU Preparedness and Response: Looking ahead COM(2022) 190 final
April 27th, 2022

Detection Monkey Pox

11

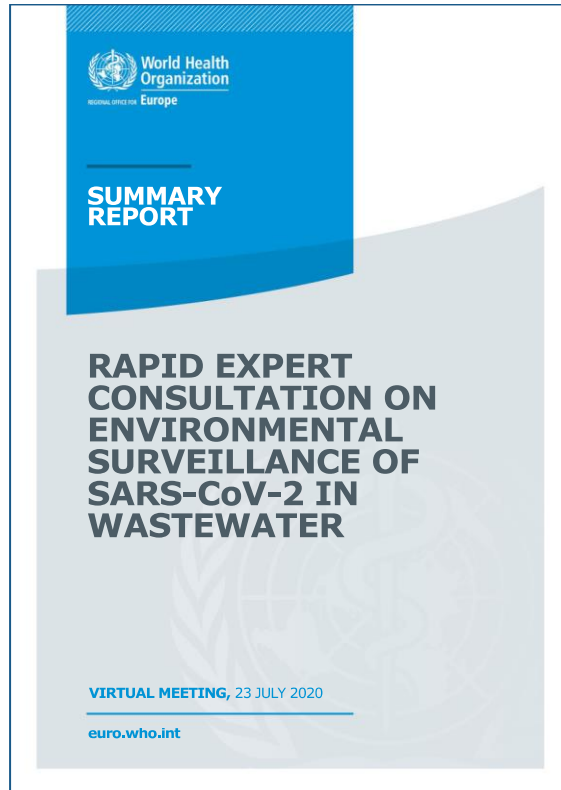
August 2022

Detection of Monkeypox virus DNA in the wastewater of an airport in Rome, Italy: expanding environmental surveillance to emerging threats, DOI:10.1101/2020.06.13.20129627

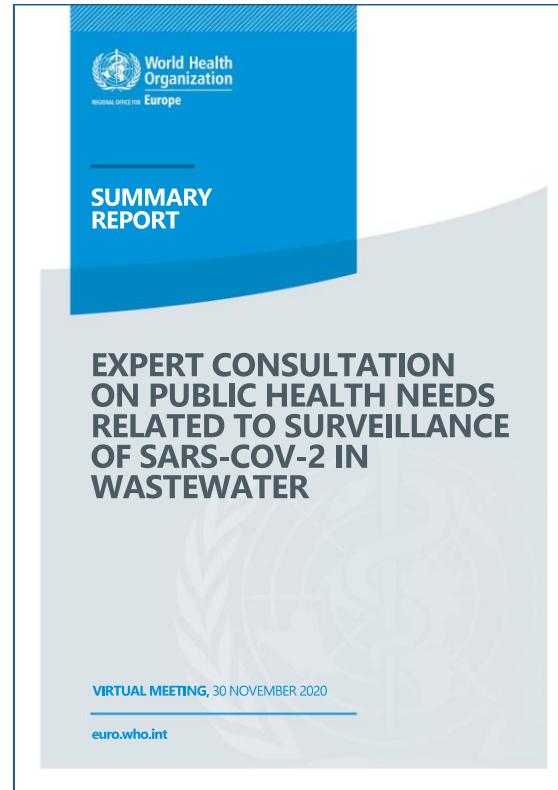


European
Commission

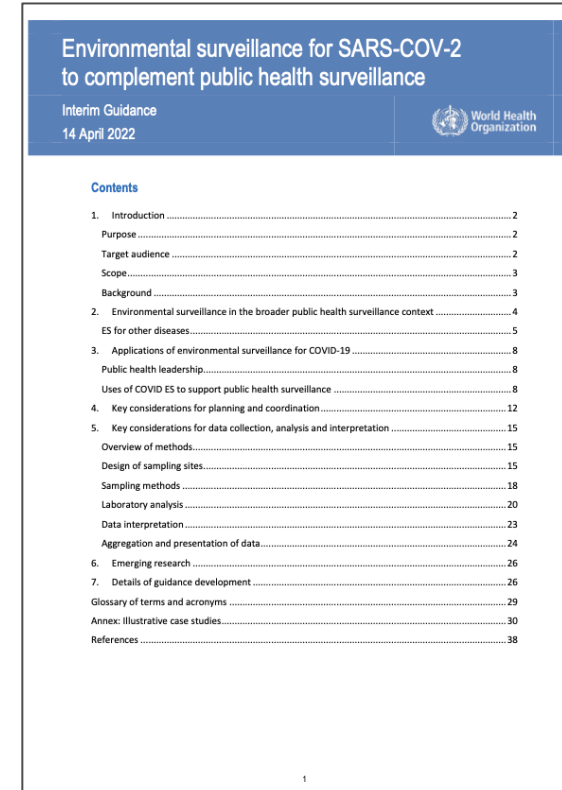
WHO Consultations and Documents



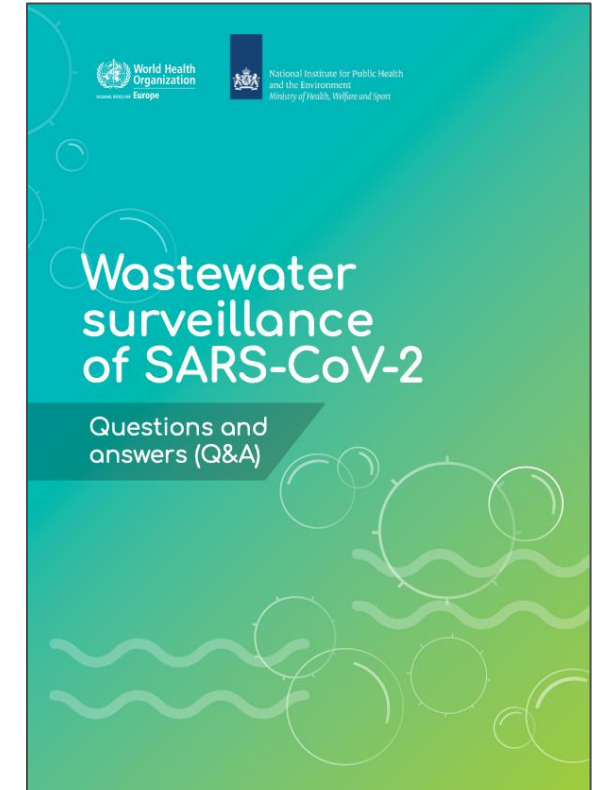
July, 2020



November, 2020



April, 2022



EU Sewage Sentinel System for SARS-CoV-2

Digital European Exchange Platform (EU4S-DEEP)

GIS Area Curated news  About Contact us

Save the Dates

Next InfoPoint meetings

15 September, 2022 (15:30 - 17:30 CEST) | 11 October, 2022 (15:30 - 17:30 CEST)

Next National Contact Points meetings

16 September, 2022 (10:00 - 12:00 CEST) | 14 October, 2022 (10:00 - 12:00 CEST)

EU4S
More than meets the nose

Tools of interest

Dashboards

Guidance

E-exhibition

<https://wastewater-observatory.jrc.ec.europa.eu/>

Open Data
Model

Download
area

Science
advances

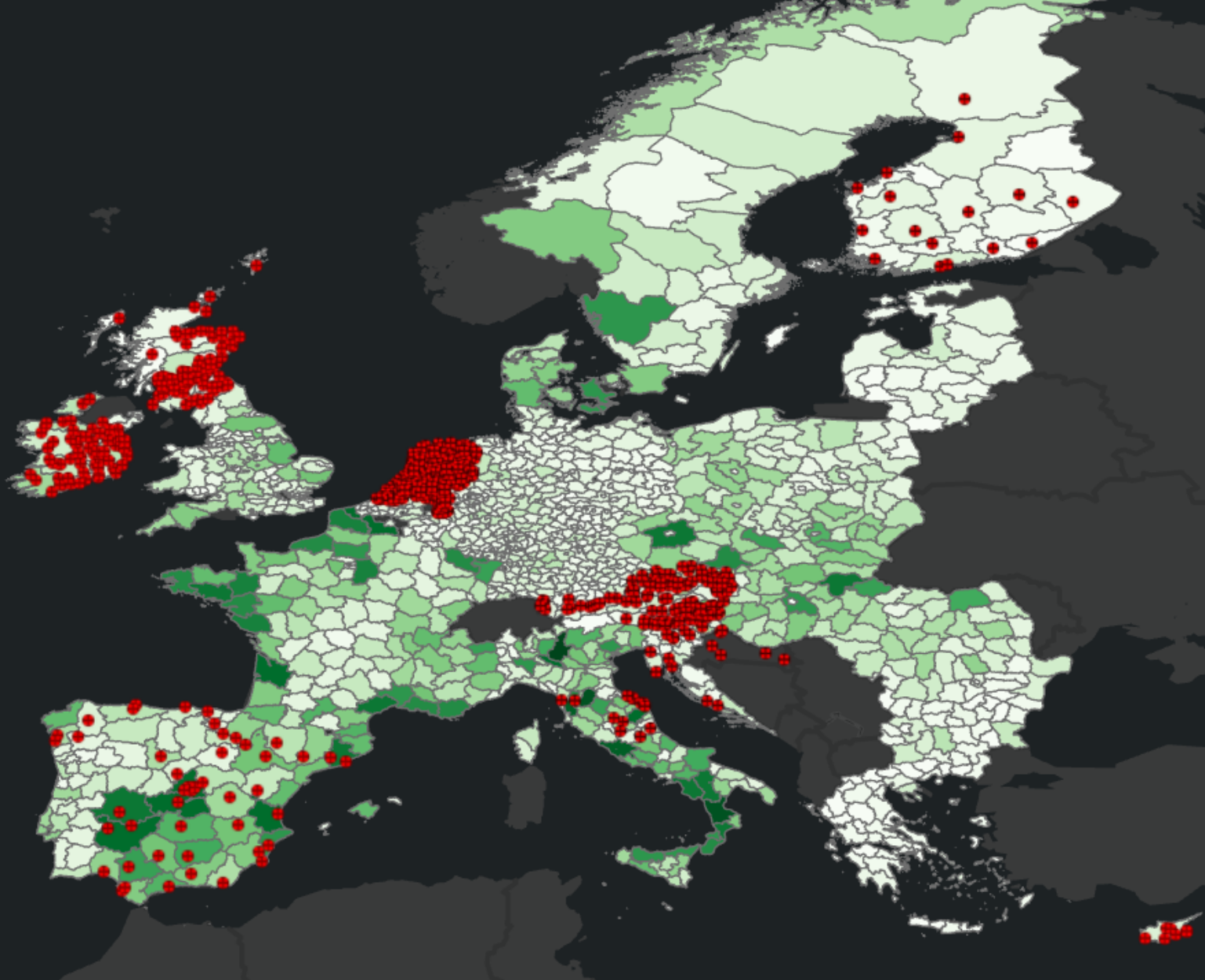
Partners &
Contributors

News &
Social Media

Upcoming
events

The Digital European Exchange Platform (DEEP)

- Developed for SARS-CoV-2 Monitoring in untreated wastewater
- New use cases **HERA**:
 - Influenza
 - **Polio**
 - Human enteric viruses
 - AMR and antibiotics
 - Adenoviruses (Heptatis variant 41)
 - **Monkey Pox**
- New use cases **SANTE**:
 - Pesticide exposure in households
 - Ageing society (anti-depressants, pharmaceuticals)
 - Drugs of abuse



DEEP Enlisted Sites

- Official National Wastewater Treatment Sites measuring SARS-CoV.2 already connected to the EU Digital European Exchange Platform
- Missing, but existing:
 - IT, PT, FR, LU, DE, EE, LT, LV
 - Others: development ongoing
- Status 23/09/2022

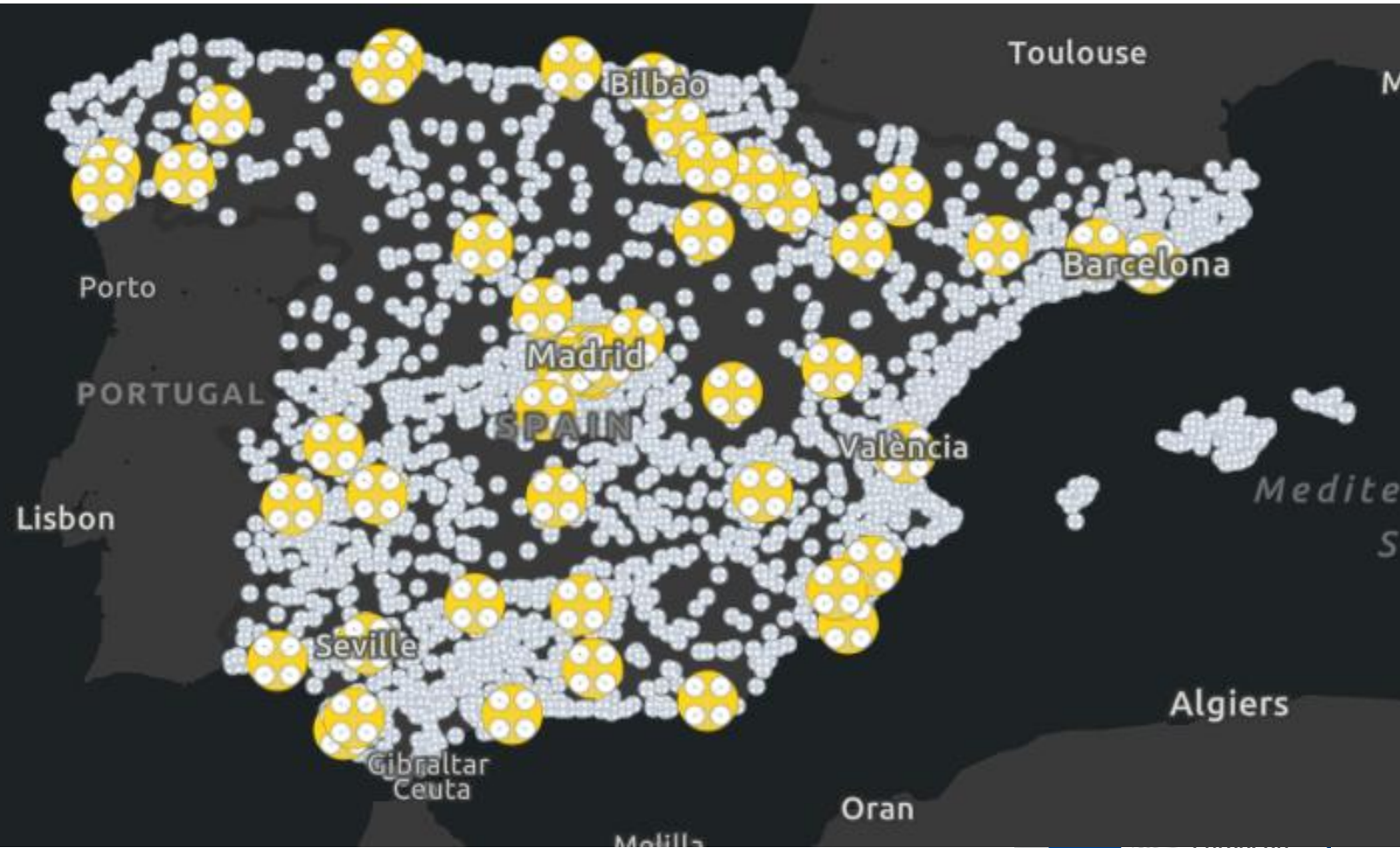


- Countries with dashboards displaying SARS-CoV-2 presence in wastewater
 - Dark Yellow: National Dashboards
 - Light Yellow: Regional Dashboards
 - Grey: Dashboards on project level

Wastewater Dashboards

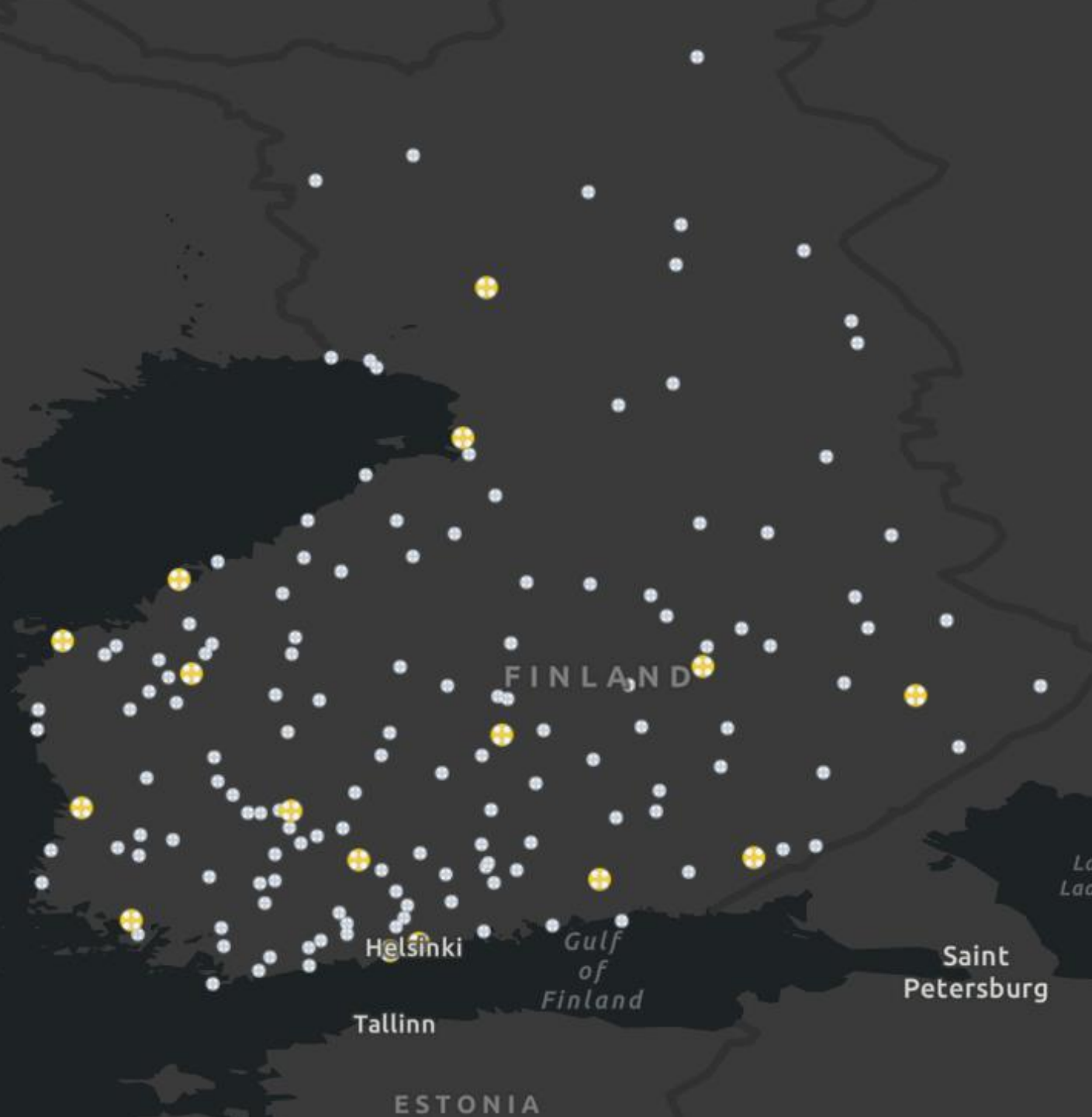
Example 1: Spain

Overview of locations for SARS-CoV-2 Surveillance in SPANISH wastewater treatment vs Total Wastewater Treatment Plants



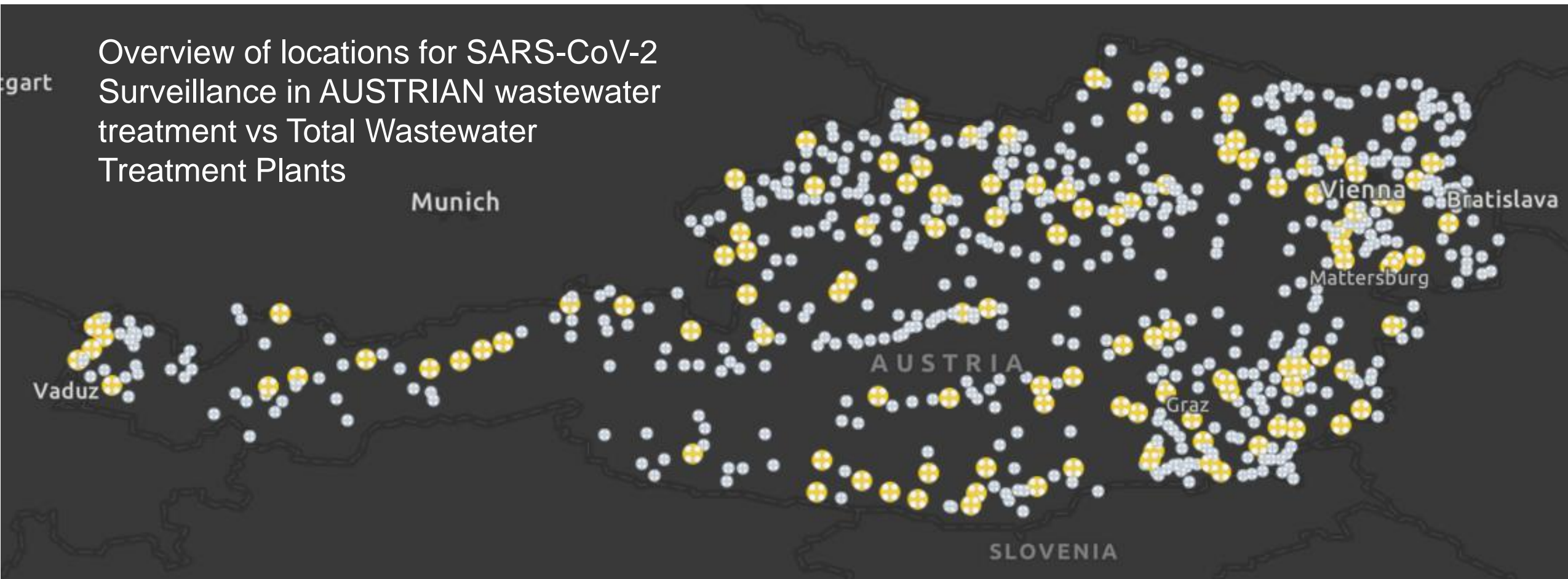
Example 2: Finland

Overview of locations for SARS-CoV-2 Surveillance in FINNISH wastewater treatment vs Total Wastewater Treatment Plants

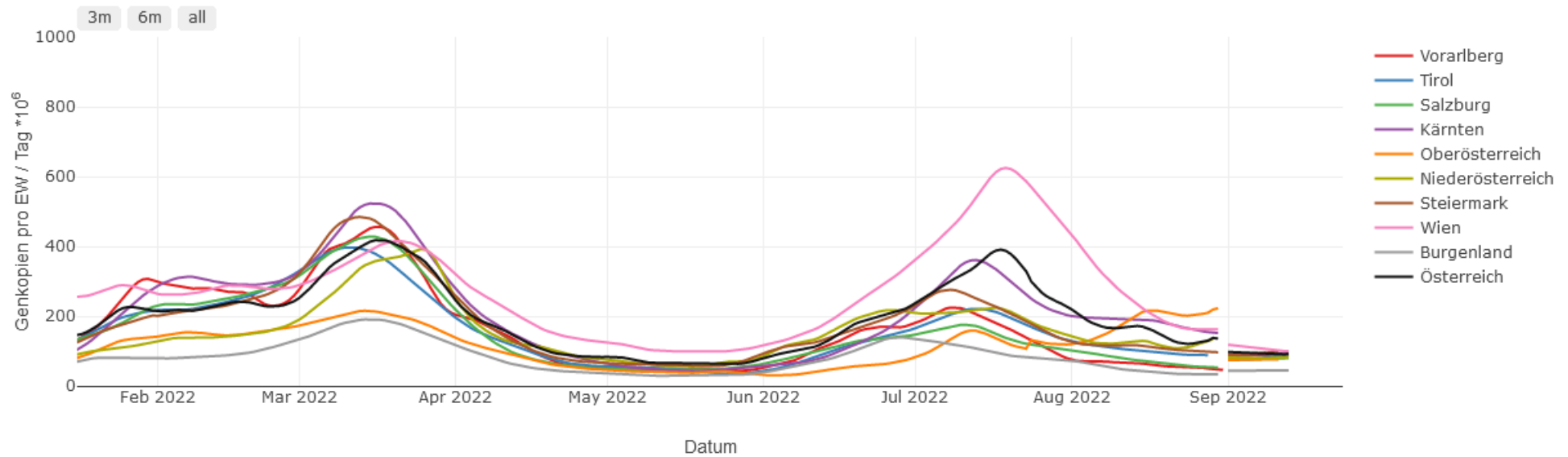


Example 3: Austria

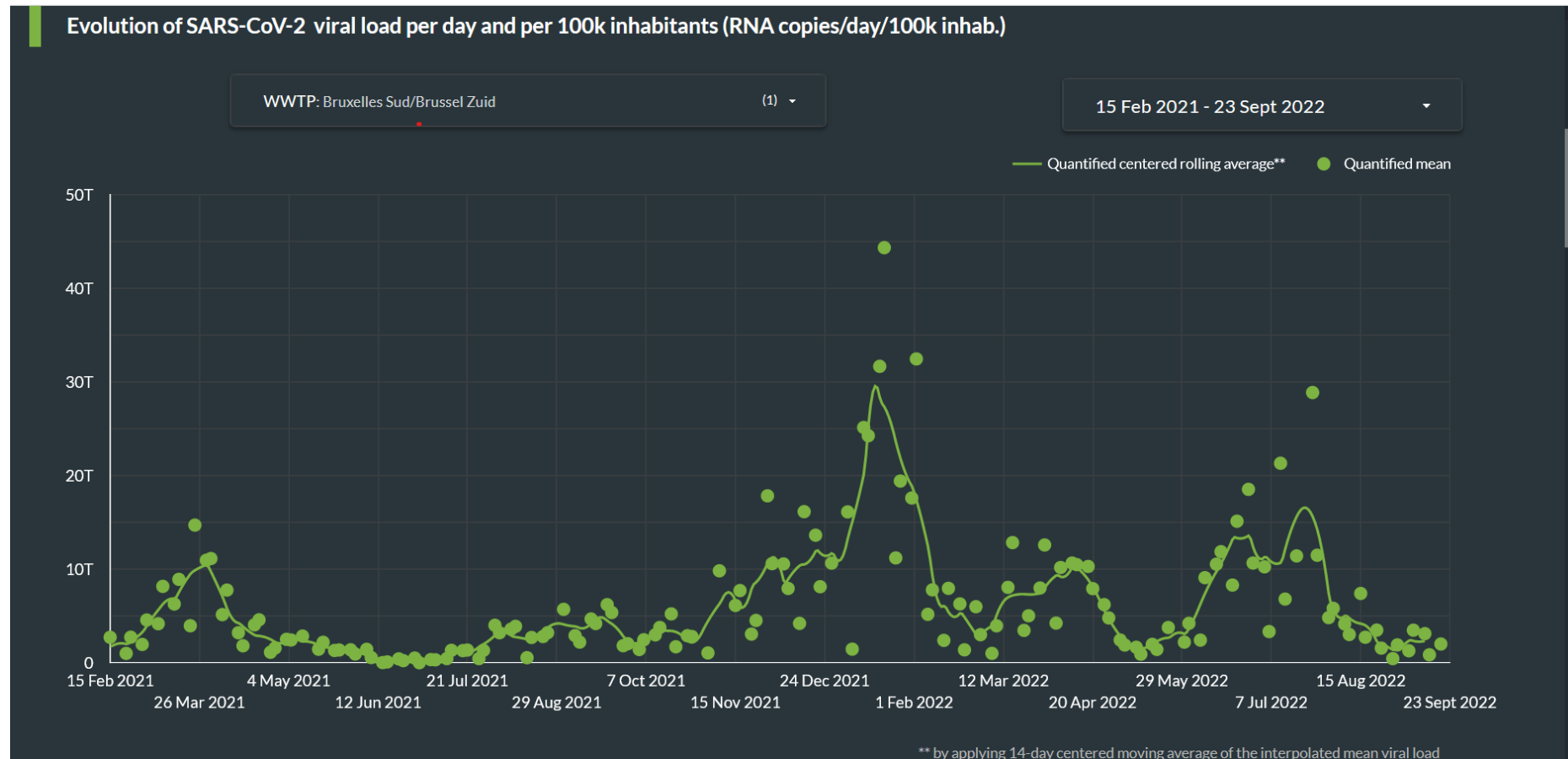
Overview of locations for SARS-CoV-2 Surveillance in AUSTRIAN wastewater treatment vs Total Wastewater Treatment Plants



Viral load in Austria in the last 6 months



Belgium: Wastewater Surveillance Bruxelles Sud: Feb – Sept 2023



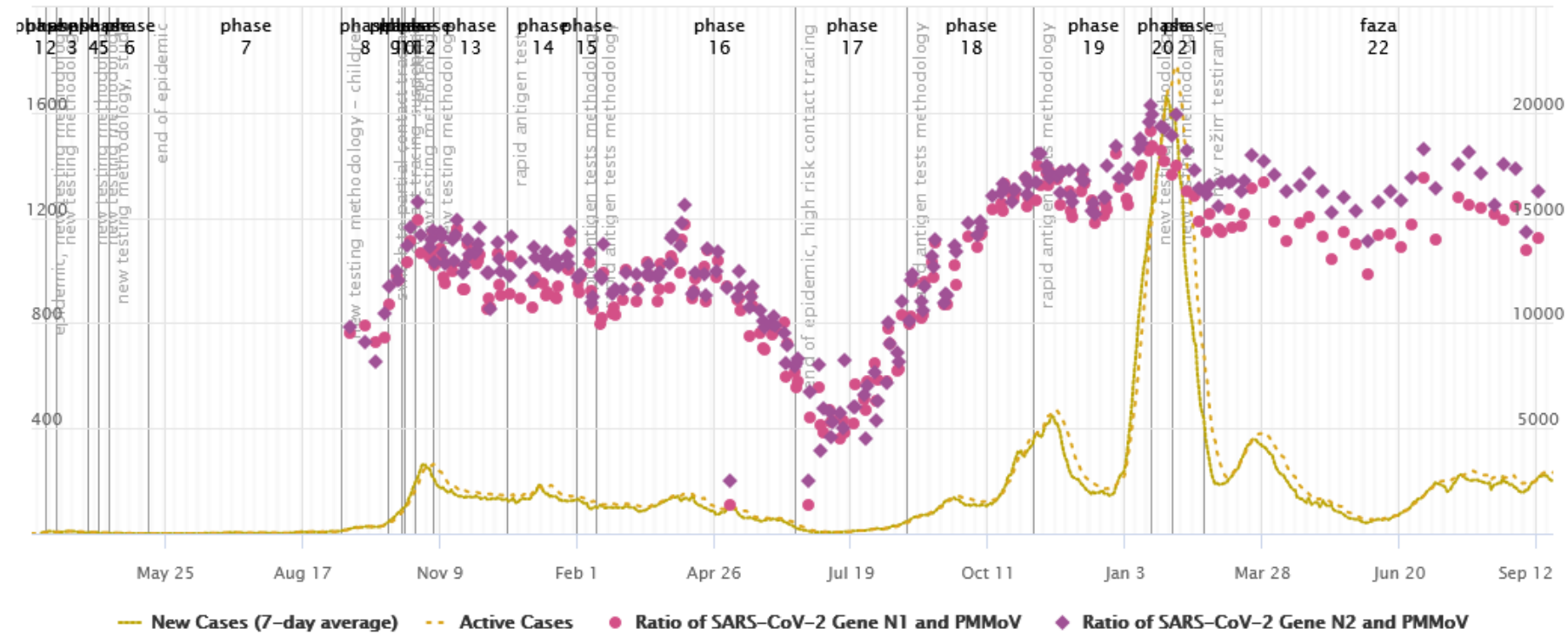
Viral load in Wastewater in Ljubljana

Virus in Sewage

? Share

Zoom 2m 4m All

03/04/2020 - 09/22/2022



data source: National Institute of Biology, NIJZ

ČN Celje ČN Domžale - Kamnik ČN Koper ČN Kranj **ČN Ljubljana** ČN Maribor ČN Šaleške doline

Active and Confirmed cases includes data from municipalities:

- Ljubljana



The Town Hall Community

Water Sector



Public Health Sector



Measurement
&
Testing



R & D



Save-the-date: November 14-15, Town Hall Meeting VIII

Private and Public Sector Engagement e-Exhibition

EU Sewage Sentinel System for SARS-CoV-2
The Town Hall e-Exhibition

Welcome to the Town Hall eExhibition of the EU Sewage Sentinel System for SARS-CoV-2 (EU4S). Organised in five thematic areas (Business Solutions, Science Advances, Case Studies, Decision Support and a Pin Board) this virtual space presents the combined knowledge of our Community of Practices on wastewater-based surveillance of the virus. Thanks to the exhibitors for sharing their wonderful work!

The EU Sewage Sentinel System for SARS-CoV-2
Simona Tavazzi - JRC - WATER
7 Jul 2021
This stack describes and summarizes the work in relationship to the building of the EU Sewage Sentinel System.
Decision Support
<https://api.ltb.io/show/ABCYN>

EU4S
Simona Tavazzi - JRC - WATER
Designing the EU Sewage Sentinel System for SARS-CoV-2 (EU4S).
Business Solution Case Study
Decision Support Pin board
Science Advances covid-19
surgeon-commission
genomic-sequencing pdc qpcr
sars-cov-2 sequencing surveillance
variants-of-concern wastewater
wwbe

Molecular Tools for Sewage Surveillance to Track COVID-19
Brigitta Saul - JRC - WATER
From Sample to results in less than 4 hours using Promega's kits made for SARS-CoV-2 Sewage Surveillance. The Direct RNA capture approach results in high and consistent yield while the procedure takes <2 hours. The RT-qPCR kits designed for wastewater come with inbuilt controls and RNA standards that are in accordance with the EU recommendations.
Business Solution sars-cov-2-rt-qpcr-kit
wastewater-surveillance

Monitoring for SARS-CoV-2 in Wastewater
Dr. James Harbridge - JRC - WATER
Business Solution covid-19
sars-cov-2 surveillance wastewater

Oclair Environnement
Pierre Mongeon - JRC - WATER
CETO is the first and unique cloud-based epidemiological monitoring platform with integrated communication module and mobile version on the App Store and Google Play.
Business Solution application-mobile
communication covid-19 eau
eaux-usees mobile-application
outbreaks pandemic pandémie
sewage wastewater water
éclosions égouts

Quality Control Panel for Coronavirus (SARS-CoV-2) Monitoring in Wastewater (QCWWC)
Sami Oikarinen - JRC - WATER
External quality assessment allows laboratory analysis to be evaluated and harmonized. Wastewater is a matrix with specific requirements for molecular analysis of viruses. The QCWWC panel is designed to meet
GREENSEQ

Rapid on-site SARS-CoV-2 wastewater testing solutions
Almudena Fernandez Ayela - JRC - WATER

Torpedo-based passive sampling of SARS-CoV-2 for protecting environments welcoming ...

TRACKER: an innovative tracking and predictive GIS tool for Environmental Surveillance

Mini-poster
Generate Stack Poster

Event Participation
EU4S Sewage Sentinel System for SARS CoV-2
The EU Sewage Sentinel System for SARS-CoV-2
Unlink
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Your stack has been marked for publication

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JRC-WATERLAB Add author's email or user name

<https://my.ltb.io/#/showcase/jrc-sustainable-resources>

help support assistance guidance

Global Water Research Coalition

European Commission

VEOLIA

Santé publique France

suez environnement

National Institute for Public Health and the Environment
Ministry of Health, Welfare and Sport

KWR

VICTORIA State Government | Department of Health

and contributors from over 60 other organisations

Actors and roles of the Guidance Drafting Process

Steering Group ★

- EC, GWRC
- SUEZ, VEOLIA, KWR
- RIVM, Victoria DoH, Sante Publique

The Crafters ★

- A group of assistance for the layout process, text editing and IT connection to DEEP
- Ricardo SILVA (graphical designer)
- EC JRC service

The Review Board ★

Reviews independently the drafted text and provides feedback.

- WHO
- ECDC
- Others (NCPs). Focus is on the Health Perspective and application for the respective actors

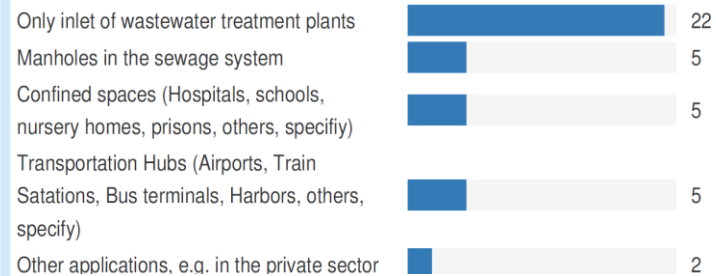
The Drafters ★

- Tasked to draft specific chapters, coordinate the drafting process, assign tasks
- Dan DEERE, Gertjan MEDEMA
- Fee-paid expert pool

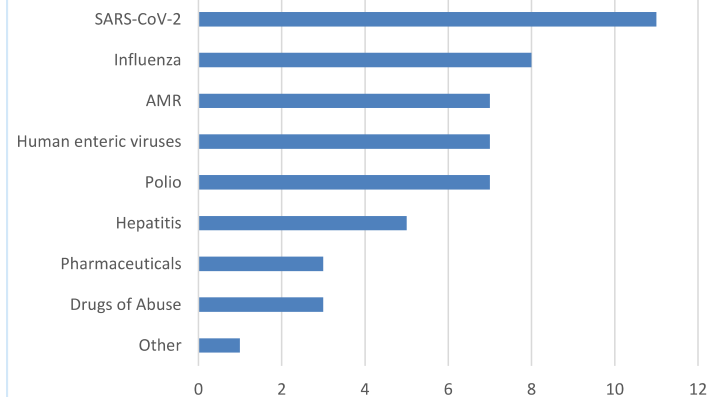
The contributors ★

Assist the drafters in creating the respective chapters. Deliver input and material as well as science

Outcome of an EU Online Survey



Where do you monitor?



What are you plans for the future?

11: International



2: Macro-regional



4: EU only

An Sewage Sentinel System should be:

March 2022: 23 replies

World Bank Group



*“Wastewater testing is part of a **One Health approach** that explicitly integrates human, animal and environment health with an endpoint of improving global health security and achieving gains in development.”*

G7 Health Ministers' Communiqué



Further, **we commit to explore options to support national authorities** in the efforts to implement non-invasive methods such as national wastewater surveillance systems, utilising the rapid improvements in the infrastructure for wastewater screening that has developed during the COVID-19 pandemic:

- **to support the detection of outbreaks as early as possible,**
- **screen for new SARS-CoV-2-variants and**
- **monitor the spread of infectious agents, such as SARS-CoV-2, poliovirus, influenza virus and drug resistant pathogens**

by 2024.

COVID-19 - Sustaining EU Preparedness and Response: Looking ahead (COM(2022) 190 final)

Integrated surveillance systems

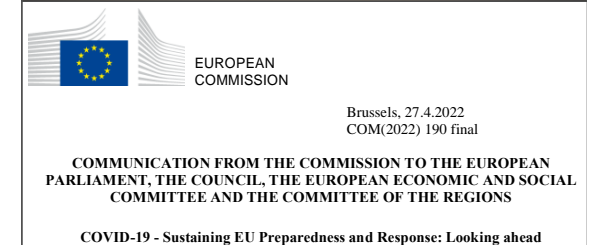
Complementary strengthening of other monitoring systems such as wastewater surveillance of SARS-CoV-2 and beyond (e.g. poliovirus, influenza viruses or antimicrobial resistance).

KEY ACTIONS FOR MEMBER STATES

- Use of complementary surveillance systems, such as wastewater monitoring, to detect COVID-19 surges. Make full use of EU financial support to put in place or reinforce SARS- CoV-2 systematic surveillance in wastewaters.

EU INITIATIVES AND ACTIONS

- The Commission will support Member States, with up to EUR 20 million, through the EU4Health programme in setting up integrated and coordinated surveillance systems under the One Health approach for cross-border pathogens



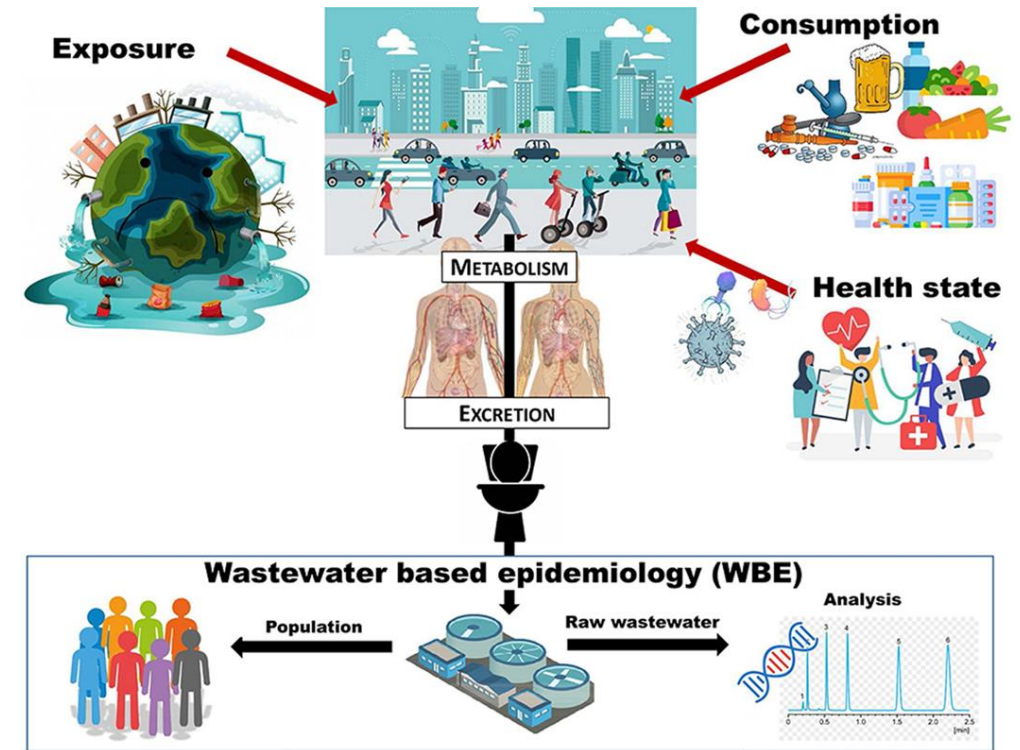
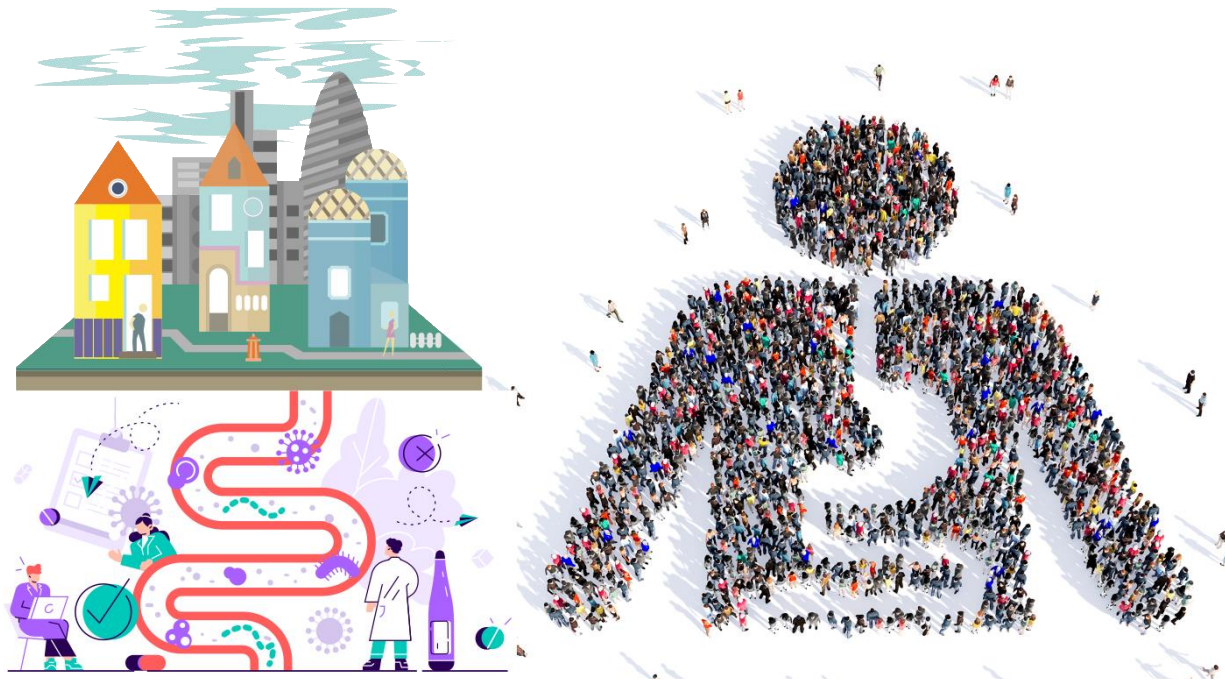
Wastewater Surveillance 2025

- National Wastewater Surveillance System for public health related parameters
- Coordination structure
- Communication structure
- Other applications (AMR, pathogens, chemicals,...)
- International dimension



A smarter
Urban Wastewater Treatment Directive

An “urban gut” feeling ...



Source: Vitale et al. 2021
<https://doi.org/10.1016/j.coesh.2021.100229>

Wastewater as an honest mirror of societal processes

Thank you



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