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Active biomonitoring for assessment of chemical contamination and toxicity of aquatic environments

Presentation of *in situ* bioassays by caging gammarids

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CONTEXT & CHALLENGE

Standard approaches used to monitor the quality of continental surface water

- ❖ Chemical analysis of water → Toxicity? Bioavailability of chemical substances? ...
- ❖ Ecological indicators → Sources of pollution? (habitat, chemicals, ...), ...

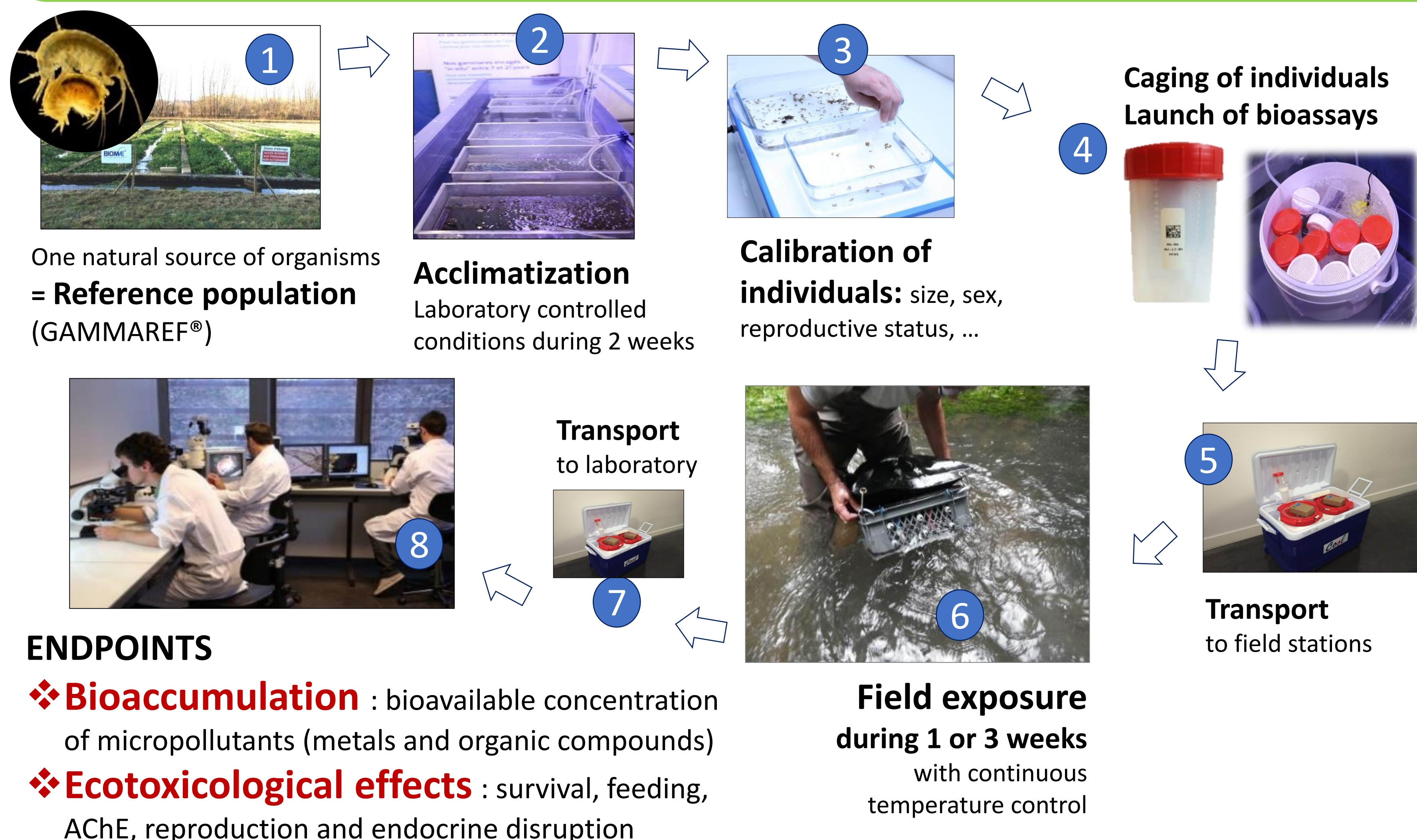
Need of complementary approaches like ecotoxicological assays to monitor contamination and toxicity of aquatic environments

OBJECTIVES

Development of ACTIVE BIOMONITORING with a freshwater crustacean

1. Method for *in situ* bioassays with *Gammarus fossarum*
2. Method for endpoints interpretation
3. Applications for field monitoring

1. METHOD for *IN SITU* BIOASSAYS with *Gammarus fossarum*



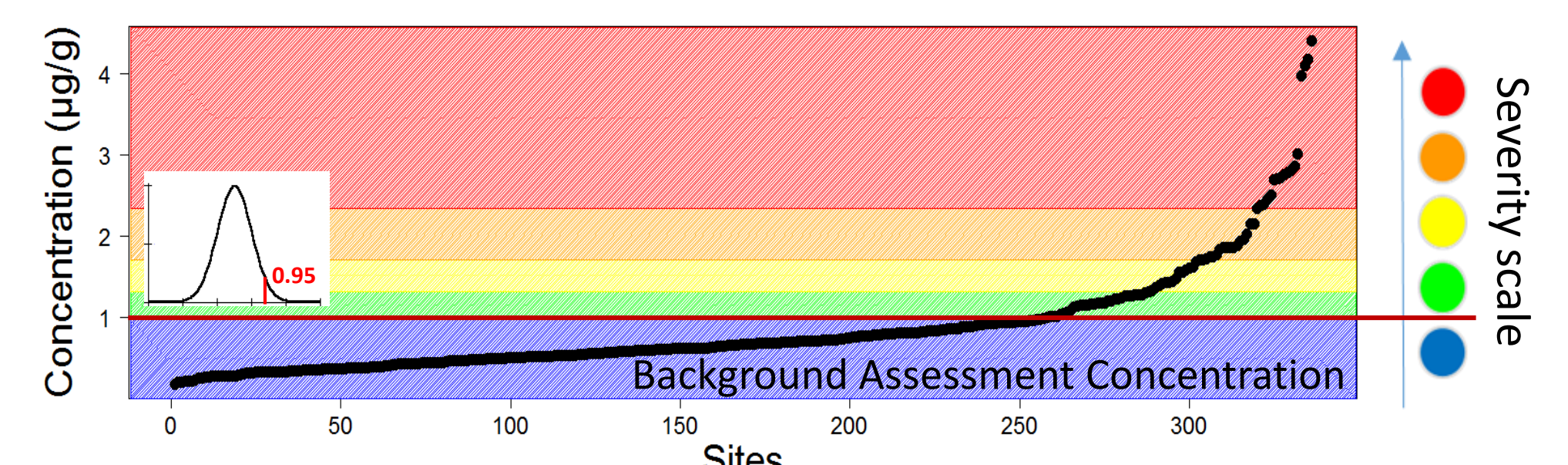
2. METHOD for ENDPOINTS INTERPRETATION

a. Bioaccumulation **BIOTA EQS CONFORMITY** tracking of 15 substances for conformity to the WFD

b. Bioaccumulation **THRESHOLDS**

defined from a large scale field experiments (database)

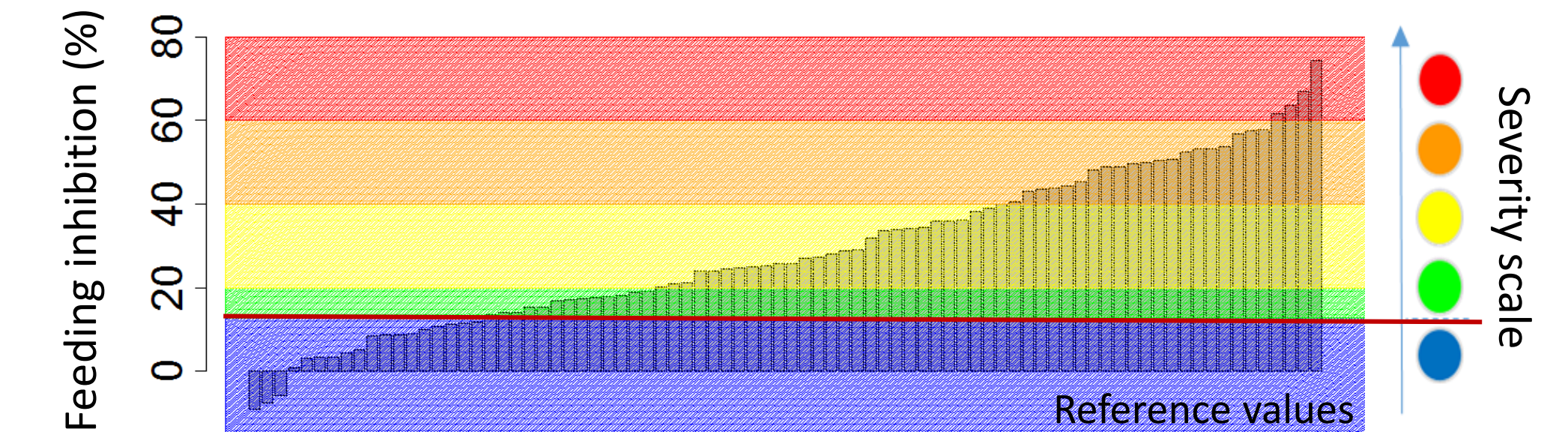
→ Example for bioaccumulation of **nickel**



c. Ecotoxicological effects **THRESHOLDS**

defined from both laboratory and field experiments (database)

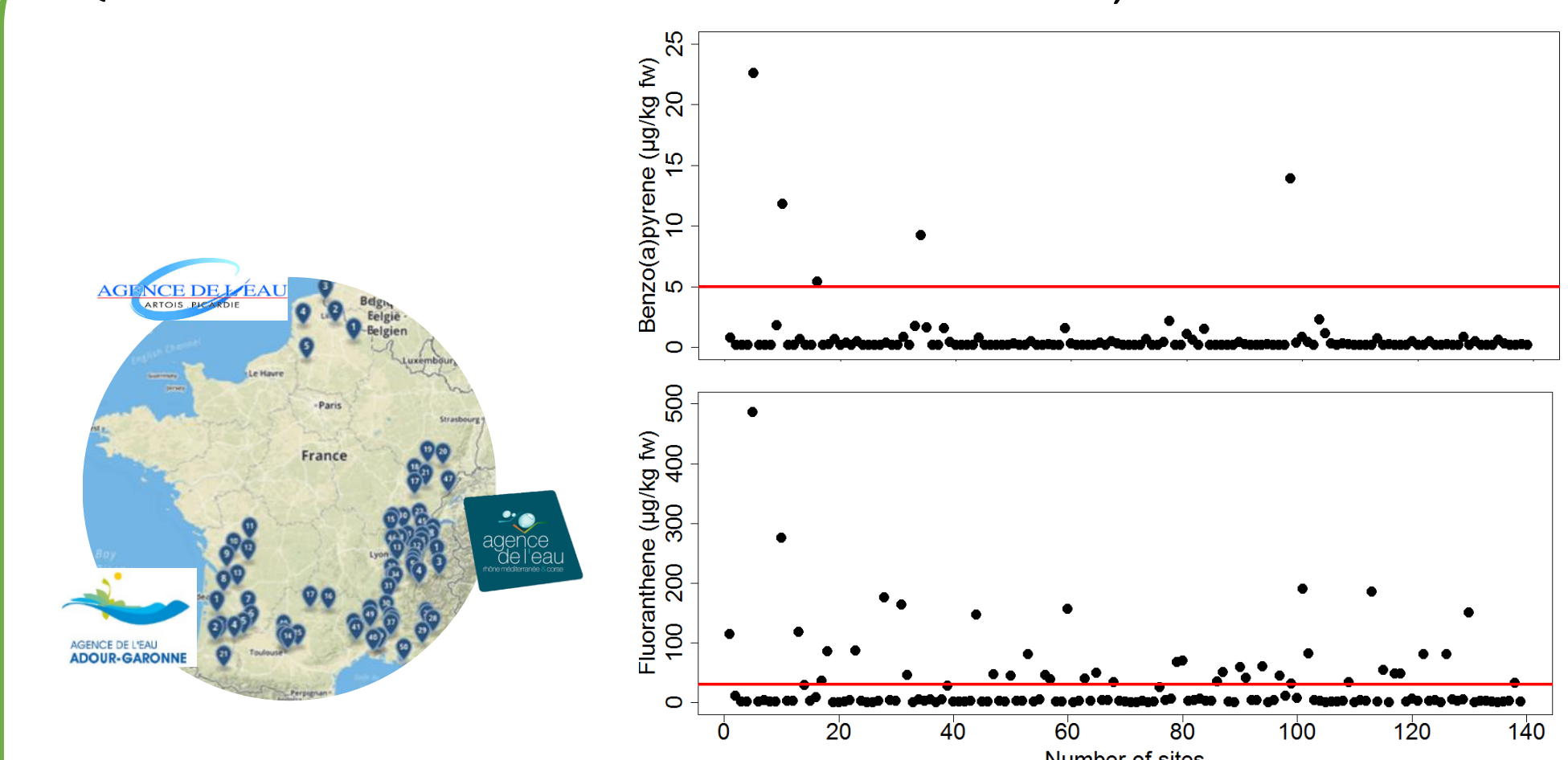
→ Example for **feeding inhibition**



3. APPLICATIONS for FIELD MONITORING

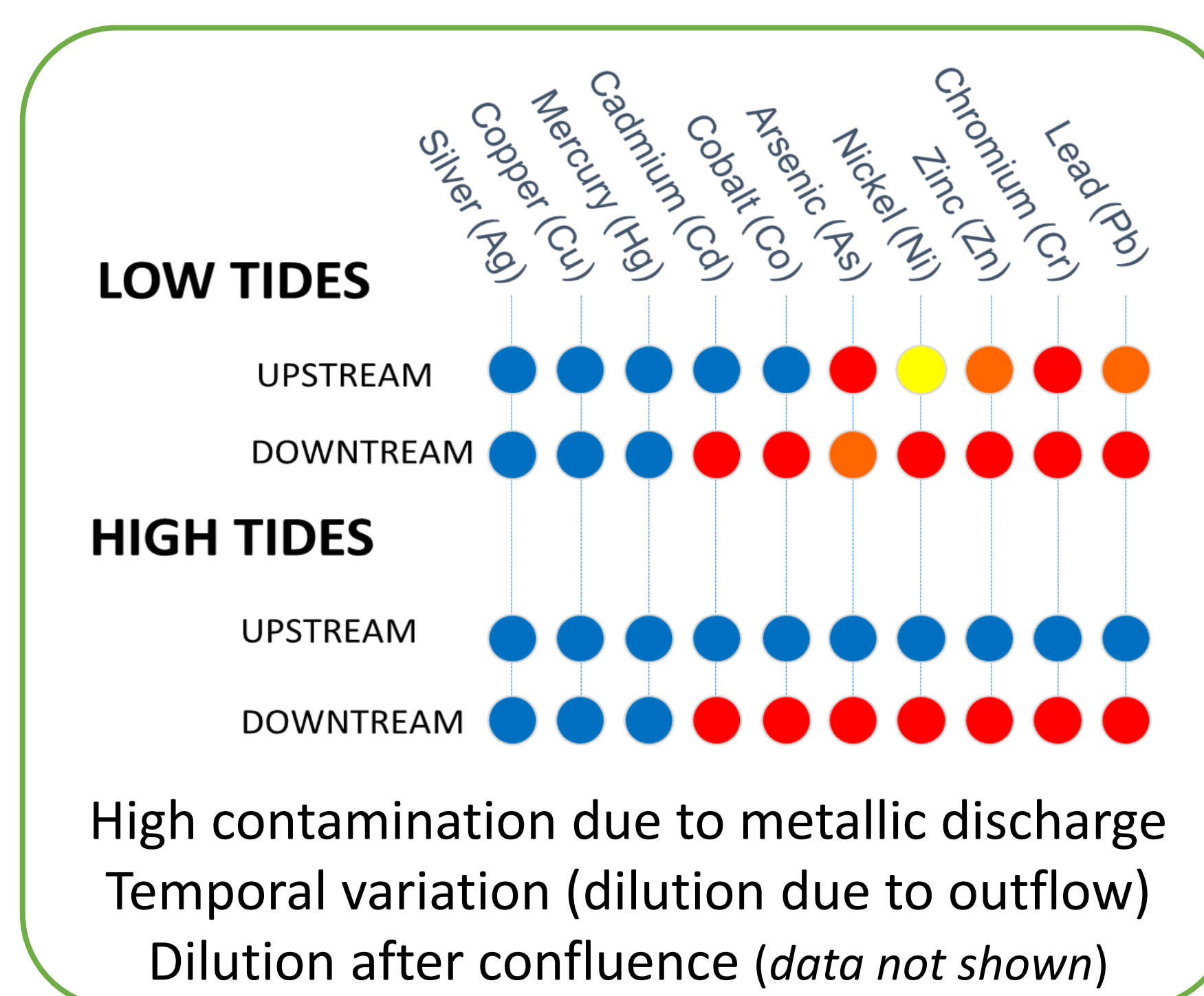
a. LARGE SCALE DEPLOYMENT IN WATER AGENCIES

EQS for crustacean and molluscs → PAH, DEHP and dioxins

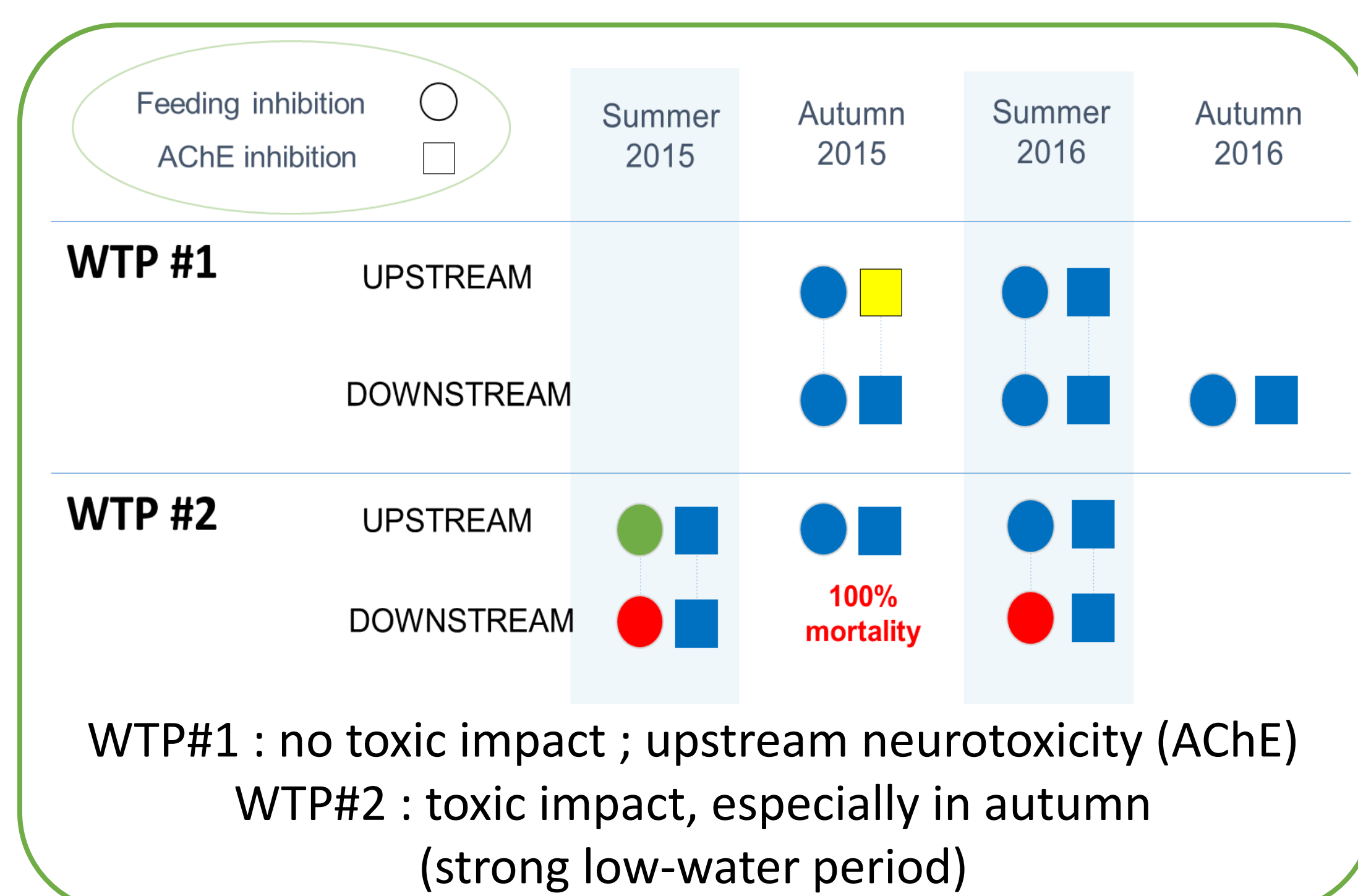


Comparison of measured concentration to EQS
Ranking and prioritization of sites according to contamination

b. INDUSTRIAL DISCHARGE



c. WASTEWATER TREATMENT PLANTS



CONCLUSION

***In situ* bioassays: relevant and complementary approach for biomonitoring**

*** Selected organisms (versus passive monitoring) to control biological confounding factors

Realistic and integrative exposure (versus laboratory exposure)

Proposition of reference values integrating effects of environmental confounding factors

Spatial and/or Temporal gradients with a « one-week » resolution scale

Operational for large scale deployment



For more information

Wide range of applications for public managers and industrials

REGULATION → Compliance to EQS in biota (WFD, 2013)

Spatial and temporal comparison of stations into monitoring networks

Impact studies of industrials and hydraulic structures

Assessment of WTP treatment efficiency

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