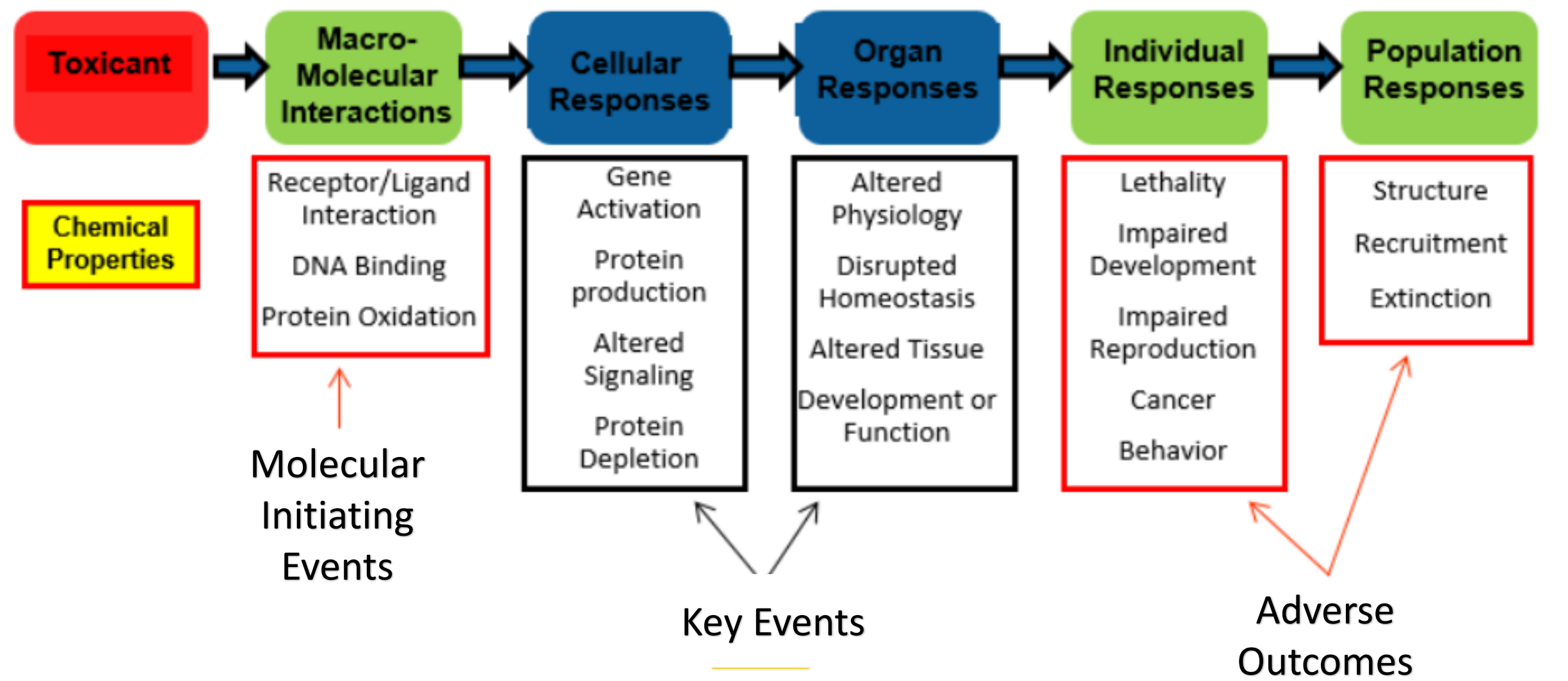


# A NEW TOXICITY TESTING FRAMEWORK



Interpreting complex PFAS mixtures for ecological risk assessment using macromolecular and sub-organismal data.



## Problem Statement

- Aqueous film-forming foams (AFFF) release complex mixtures of PFAS into the environment.
- The toxicity of complex chemical mixtures is difficult to assess in the natural environment.
- Standardized testing for individual compounds is expensive, time-consuming, and limited in application.
- Development of a new testing framework to analyze complex mixtures, specifically PFAS mixtures from AFFF-contaminated environments, is needed.

## Research Objectives

1. Incorporate new approach methodologies (NAM) such as transcriptomics and molecular docking into existing standardized tests to detect mixture signatures within organismal tissues in the natural environment.
2. Methods will link transcriptomic data to physiological modes of action (pMoA) that will inform dynamic energy budget models (DEB).
3. Data across several biological levels of organization will be synthesized to assess complex mixtures and inform ecological risk assessment.

## STANDARDIZED TESTS

PFOS and mixture exposure experiments in *Daphnia magna*

### ALGAE EXPOSURE

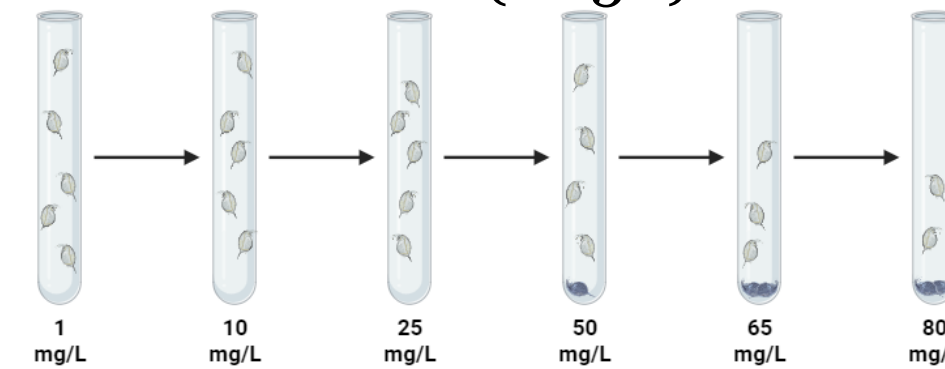


*Chlamydomonas reinhardtii* will be dosed with PFOS and a reconstituted PFAS mixture then fed to *Daphnia magna* for dietary exposures.

### RANGE FINDING

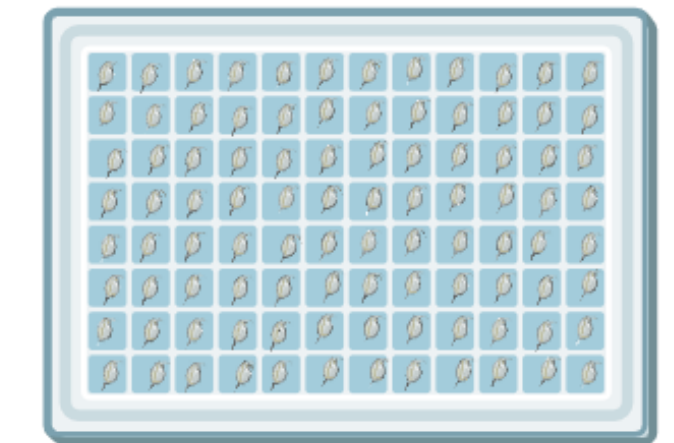
#### 1. Acute toxicity tests

48-hour tests comparing results from aqueous and dietary exposures to determine lethal concentrations (LC<sub>50</sub>).



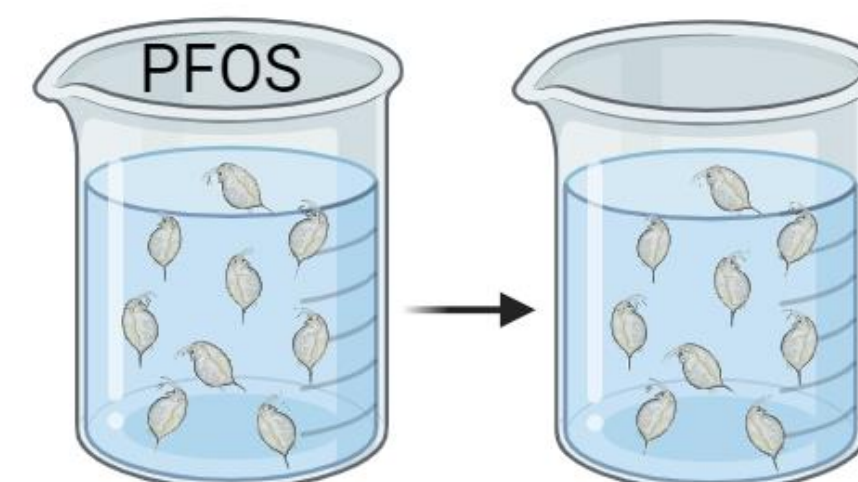
#### 2. Chronic toxicity tests

7-day tests using dietary exposure through algae to determine sublethal concentrations.



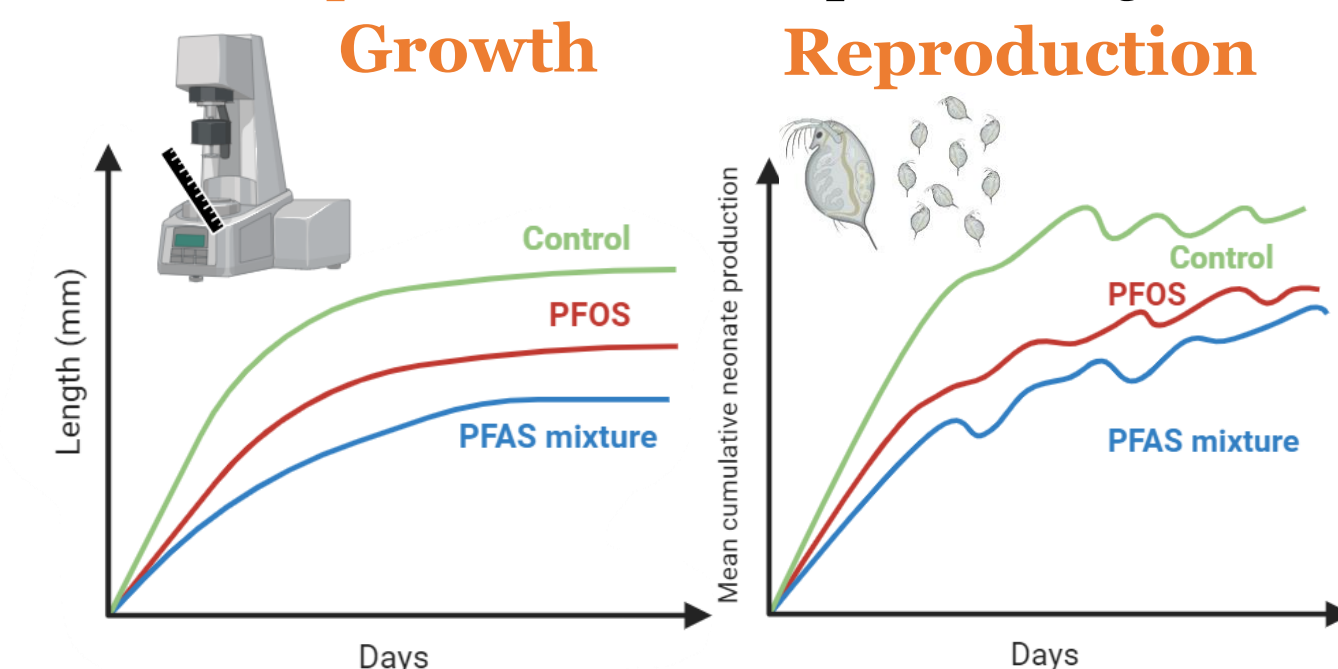
### BIOACCUMULATION

Parameterization of toxicokinetic-toxicodynamic (TKTD) model using accumulation and depuration experiments to measure the uptake rate ( $k_U$ ) and the efflux rate ( $k_E$ ).



### OECD LIFE CYCLE TESTS

31-day dietary exposure to PFOS and the reconstituted PFAS mixture to observe long-term sublethal effects on **growth** and **reproduction** in *Daphnia magna*.



### MODELING

