Microplastics Workshop and Method Evaluation Study

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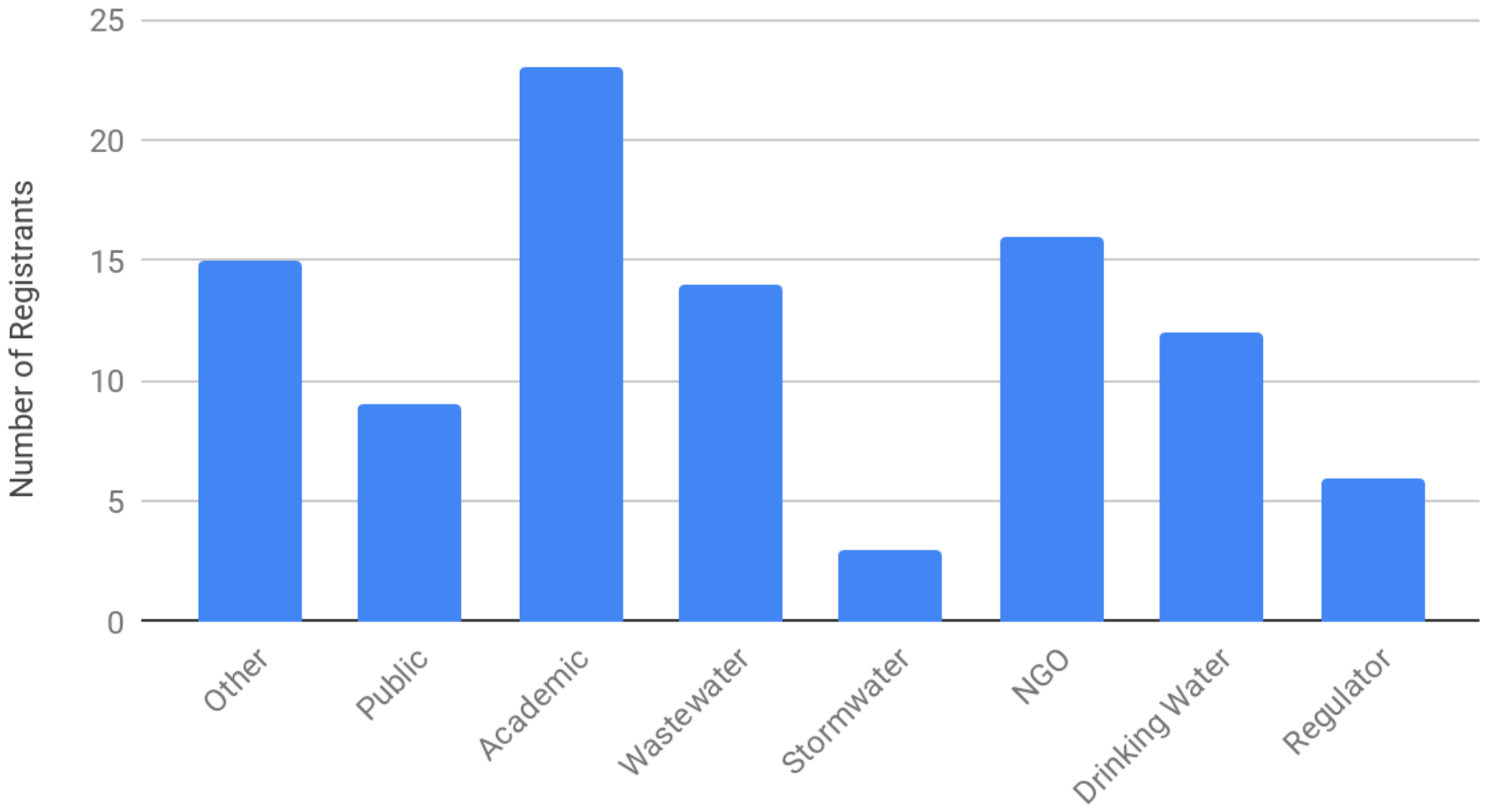
BACKGROUND

- Microplastics methods are in disarray
  - Many different methods are used by researchers
  - This prevents comparisons among studies
  - It even prevented us from including microplastics in Bight'18
- California must select a method(s) for quantifying microplastics
  - They have a mandate to do so for drinking water within two years
  - Needs methods for other matrices as part of developing an ocean microplastics strategy
- Microplastics workshop held in April 2019
  - Gain a better understanding of the current progress around measuring microplastics
  - Conceptualize a study plan to evaluate methods to help with method selection

PARTICIPANT SECTOR



FOUNDATION FOR THE CORE STUDY

- Create known blind samples that are processed by multiple groups
- Quantify bias as the difference from the known sample
- Quantify method repeatability in several ways
  - Repeatability by the same researcher
  - Repeatability across laboratories
    - Among experienced laboratories
    - Across labs with different levels of experience
- Quantify cost by tracking resources expended
  - People time to implement
  - Cost of expendable supplies

METHOD/MATRIX COMBINATIONS

- Four matrices/extraction methods
  - Clean water
  - Dirty water
  - Sediment
  - Fish tissue
- Five identification methods
  - Stereoscope
  - Stereoscope with Nile red staining
  - Fourier-transform infrared spectroscopy (FTIR)
  - Raman spectroscopy
  - Pyrolysis gas chromatography
- At least three laboratories processing three replicates for each method/matrix
  - 27 Labs
  - 5 Countries

MICROPLASTIC SAMPLE DETAILS

- Each blind sample will be created individually with a known amount of plastic
- Four types of plastic (PET, PVC, PS and PE)
- Four sizes for each plastic type
  - 1-10 microns
  - 10-100 microns
  - 100-300 microns
  - 300-1000 microns
- Two shapes
  - Fragments and fibers (three lengths for fiber: 20-100, 100-300, and 300-1000 microns)
- Will also include false positive material
  - Cotton and cellulose at one-fourth of the plastics density

STUDY AUGMENTATIONS

- The core study design was based on five prominent methods
  - However there are many permutations used at various labs
- The core study provides a great leveraging opportunity to evaluate how those permutations affect results
  - Results can be compared both within and among labs
- The study plan has five augmentations called out
  - Extraction
  - Matrix
  - Measurement

TRAINING OPPORTUNITIES

- Several laboratories have indicated that they would like to use FTIR and Raman, but don't have the equipment
  - We want to encourage participation of less experienced labs
  - A large part of the State's method selection process includes method transferability

- SCCWRP will provide access to machines for study participants
  - Raman spectroscope and Fourier-Transform Infrared spectroscope (FTIR)

- We will also provide training for each instrument
  - Training will be done by the manufacturer assisted by University of Toronto team
  - Training will include both classroom theory and laboratory implementation

STUDY SCHEDULE

- Finalize the study plan: July
- Prepare the blind samples: July-September
- Hold training session for local less experienced labs: October
- Distribute samples for processing: October
- Laboratories complete sample processing: February 2020
- Collaborative workshop to interpret results: April 2020
  - Provide recommendations to California at the workshop
  - Follow with journal publications