

## Scrutinizing surficial sediment along a 600-km-long urban coastal zone: Occurrence and risk assessment of fipronil and its three degradates

Bowen Du<sup>1</sup>, Wenjian Lao<sup>1</sup>, Charles S. Wong<sup>1</sup>, Karen McLaughlin<sup>1</sup>, Kenneth Schiff<sup>1</sup>

<sup>1</sup>*Southern California Coastal Water Research Project, Costa Mesa, CA*

### ABSTRACT

Contamination in the coastal zone is closely linked to urbanization and has become a global issue. The coastal aquatic environment is the terminal sink for many chemicals; however, little is known about the occurrence and variation among habitats as well as integrative toxicity for pesticides, i.e., fipronil, and its three major degradates (-desulfinyl, -sulfide, and -sulfone, fiproles hereafter) in sediments in urban coastlines. In the present study, we report results of a random stratified survey for fiproles in surficial sediments in five embayment habitats (strata) along the Southern California Bight (SCB), USA coastline. Fiproles were present in a small areal extent (6.8%) of the SCB embayment, and detected in 14 out of 174 stations with a total concentration of the four analytes ranging from 0.50 to 17.5 µg/kg dry weight. The area-weighted mean concentrations were  $3.16 \pm 3.37$ ,  $0.584 \pm 0.558$ ,  $0.071 \pm 0.103$ , and  $0.005 \pm 0.009$  µg/kg in brackish estuaries, estuaries, bays, and marinas, respectively, with the results below the detection limits in ports. Fipronil sulfone had the greatest detection frequency (8.05%) and highest mean concentration ( $3.24 \pm 3.36$  µg/kg) among the four compounds. A screening-level deterministic risk assessment for invertebrates found that, region-wide, fiproles generally posed an insignificant to low acute risk to the amphipod *Eohaustorius estuarius* in 7.36% of the SCB embayment area. In addition, high risk to the midge *Chironomus dilutus* was found in 77.5% of the fiproles-detectable area in the brackish estuary stratum that is a part of the Los Angeles River. Fipronil sulfone was identified as the major contributor of these effects. The results of this study establish a baseline of occurrence and toxicity potential for fiproles in coastal sediments of southern California.

**Due to distribution restrictions, the full-text version of this article is available by request only.**

Please contact [pubrequest@sccwrp.org](mailto:pubrequest@sccwrp.org) to request a copy.