EPA United States Environmental Protection Agency

ECOTOXicology Knowledgebase

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Carlie LaLone
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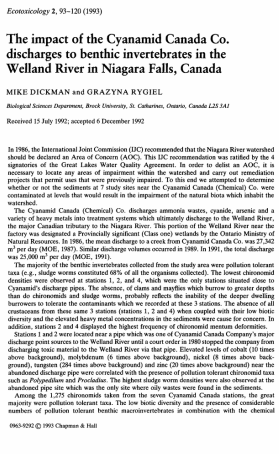
SEE staff

www.epa.gov/ecotox

What is the ECOTOX Knowledgebase?

Publicly available, curated database providing toxicity data from single-chemical exposure studies to aquatic life, terrestrial plants, and wildlife

- Curated data from >49,000 publications
- From comprehensive search and review of open and grey literature
  - Data extracted from acceptable studies, with up to 250 fields
  - Updated quarterly



Ecotoxicology 2, 93–120 (1993)

The impact of the Cyanamid Canada Co. discharges to benthic invertebrates in the Welland River in Niagara Falls, Canada

MIKE DICKMAN and GRAZYNA RYGIEL

Biological Sciences Department, Brock University, St. Catharines, Ontario, Canada L2S 3A1

Received 15 July 1992; accepted 6 December 1992

In 1986, the International Joint Commission (IJC) recommended that the Niagara River watershed should be declared an Area of Concern (AOC). This IJC recommendation was ratified by the 4 signatories of the Great Lakes Water Quality Agreement. In order to delist an AOC, it is necessary to locate any areas of impairment within the watershed and carry out remediation projects that permit uses that were previously impaired. To this end we attempted to determine whether or not the sediments at 7 study sites near the Cyanamid Canada (Chemical) Co. were contaminated at levels that would result in the impairment of the natural biota which inhabit the watershed.

The Cyanamid Canada (Chemical) Co. discharges ammonia wastes, cyanide, arsenic and a variety of heavy metals into treatment systems which ultimately discharge to the Welland River, the major Canadian tributary to the Niagara River. This portion of the Welland River near the factory was designated a Provincially significant (Class one) wetlands by the Ontario Ministry of Natural Resources. In 1986, the mean discharge to a creek from Cyanamid Canada Co. was 27,342 m^3 per day (MOE, 1987). Similar discharge volumes occurred in 1989. In 1991, the total discharge was 25,000 m^3 per day (MOE, 1991).

The majority of the benthic invertebrates collected from the study area were pollution tolerant taxa (*e.g.*, sludge worms constituted 68% of all the organisms collected). The lowest chironomid densities were observed at stations 1, 2, and 4, which were the only stations situated close to Cyanamid's discharge pipes. The absence, of clams and mayflies which burrow to greater depths than do chironomids and sludge worms, probably reflects the inability of the deeper dwelling burrowers to tolerate the contaminants which we recorded at these 3 stations. The absence of all crustaceans from these same 3 stations (stations 1, 2 and 4) when coupled with their low biotic diversity and the elevated heavy metal concentrations in the sediments were cause for concern. In addition, stations 2 and 4 displayed the highest frequency of chironomid mentum deformities.

Stations 1 and 2 were located near a pipe which was one of Cynamid Canada Company's major discharge point sources to the Welland River until a court order in 1980 stopped the company from discharging toxic material to the Welland River via that pipe. Elevated levels of cobalt (10 times above background), molybdenum (6 times above background), nickel (8 times above background), tungsten (284 times above background) and zinc (20 times above background) near the abandoned discharge pipe were correlated with the presence of pollution tolerant chironomid taxa such as *Polypedilum* and *Psectrocladius*. The highest sludge worm densities were also observed at the abandoned pipe site which was the only site where oily wastes were found in the sediments.

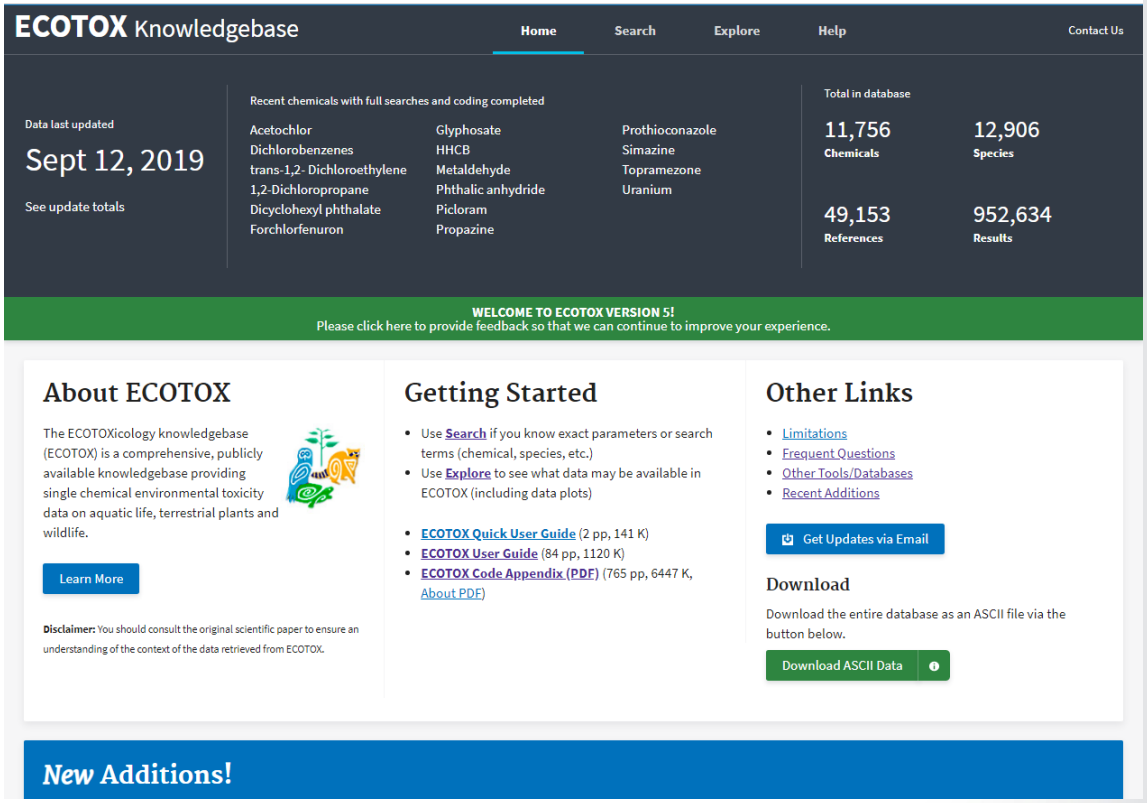
Among the 1,275 chironomids taken from the seven Cynamid Canada stations, the great majority were pollution tolerant taxa. The low biotic diversity and the presence of considerable numbers of pollution tolerant benthic macroinvertebrates in combination with the chemical

0963-9292 © 1993 Chapman & Hall

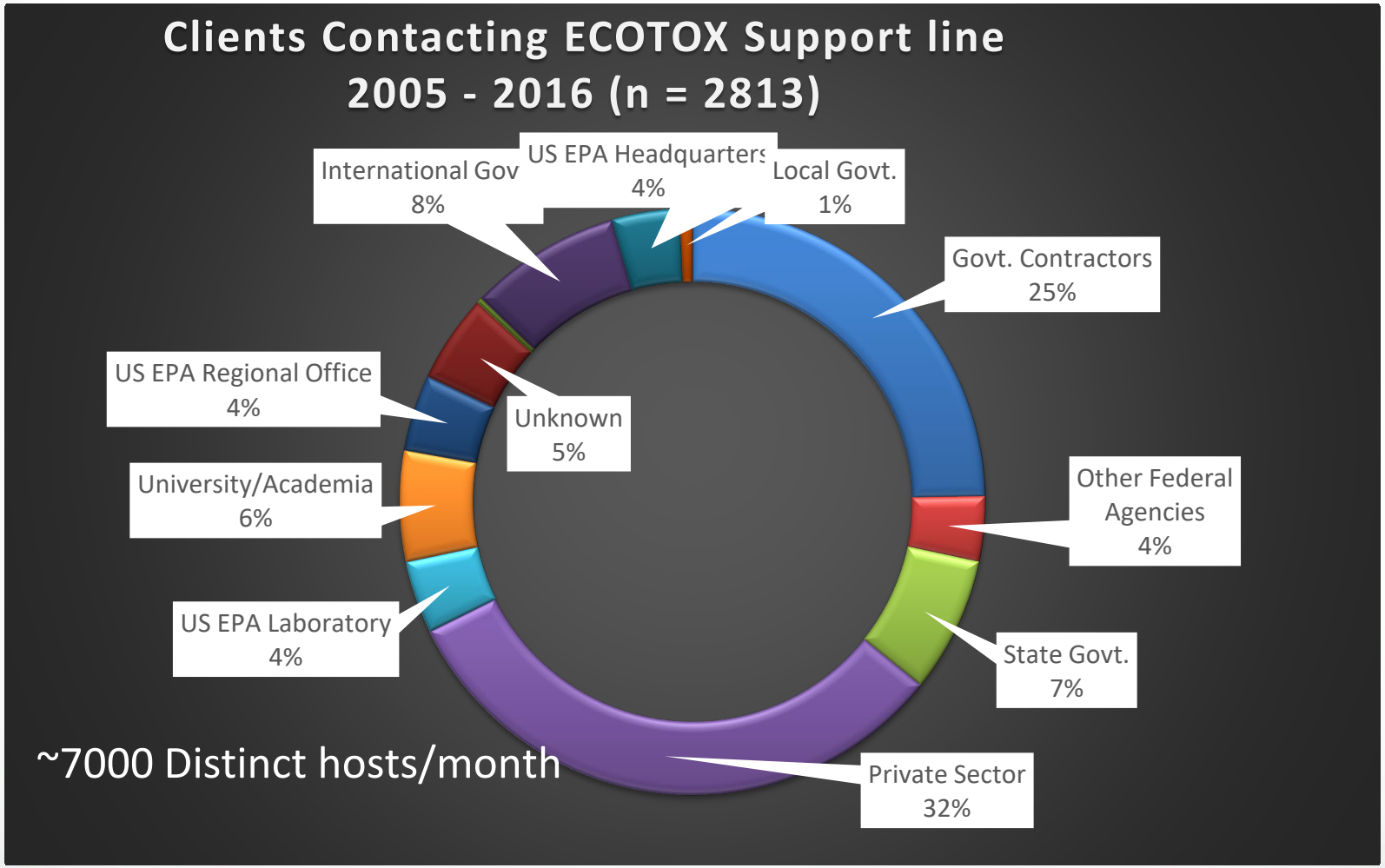
- 30+ year history: originated in the early 1980s, maintained by EPA ORD
- Supported by ORD's **Chemical Safety for Sustainability** (CSS) and **Safe and Healthy Communities** (SHC) research action plans

What is the ECOTOX Knowledgebase?

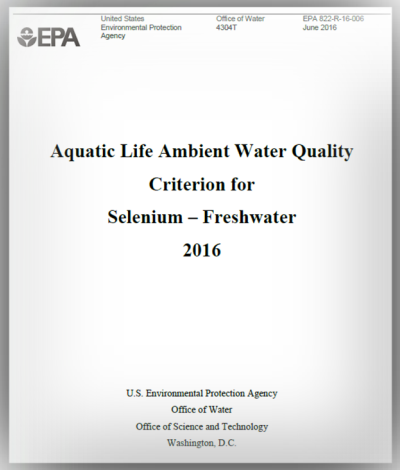
- Publicly available at www.epa.gov/ecotox
  - Interactive queries by chemical, species, effect or endpoint
  - Updated quarterly
- Major updates 2018-2019
  - New User Interface
  - New functionality
  - Interoperability with other databases and tools



Who uses the ECOTOX Knowledgebase?



Program Offices & Regions Applications: use in environmental decision making


United States Environmental Protection Agency | Office of Water 4304T | EPA 822-R-16-006 June 2016

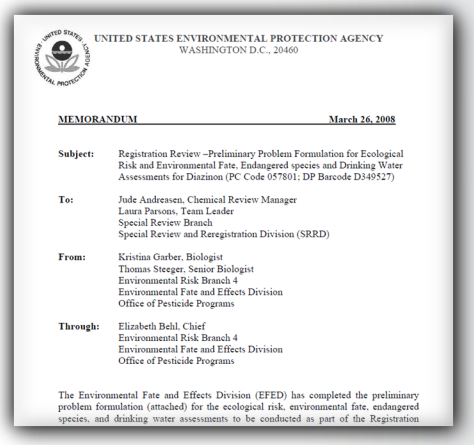
EPA

Aquatic Life Ambient Water Quality Criterion for Selenium – Freshwater 2016

U.S. Environmental Protection Agency
Office of Water
Office of Science and Technology
Washington, D.C.

Used for every Ambient Water Quality Criteria for Aquatic Life since 1985.

Used for every Ecological Risk Assessment for Office of Pesticides for chemical registration and re-registration (FY19 – 30 chemicals).


UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON D.C., 20460

MEMORANDUM March 26, 2008

Subject: Registration Review –Preliminary Problem Formulation for Ecological Risk and Environmental Fate, Endangered species and Drinking Water Assessments for Diazinon (PC Code 057801; DP Barcode D349527)

To: Jude Andreasen, Chemical Review Manager
Laura Parsons, Team Leader
Special Review Branch
Special Review and Reregistration Division (SRRD)

From: Kristina Garber, Biologist
Thomas Steeger, Senior Biologist
Environmental Risk Branch 4
Environmental Fate and Effects Division
Office of Pesticide Programs

Through: Elizabeth Behl, Chief
Environmental Risk Branch 4
Environmental Fate and Effects Division
Office of Pesticide Programs

The Environmental Fate and Effects Division (EFED) has completed the preliminary problem formulation (attached) for the ecological risk, environmental fate, endangered species, and drinking water assessments to be conducted as part of the Registration


TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

Home Air Land Water Licenses Permits Reporting

Useful Links for Developing Ecological Risk Assessments

Links to pages on this and other sites that have useful information for developing ecological risk

U.S. EPA

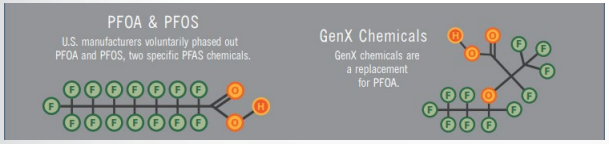
- Integrated Risk Information System (IRIS)
- ECOTOX Database (aquatic and terrestrial toxicological data)
- EPA Office of Water (links to sediment guidance, water quality standards, and other useful topics)
- EPA People Locator
- EPA Region 4 Ecological Screening Values
- Combustion Guidance for Human Health (some defaults in here used at times)
- Superfund Risk Assessment (variety of links)
- Superfund: Natural Resource Damages and Ecological Risk Assessments

Used by OLEM (Superfund and RCRA), HQ, Regions and States for site assessments and in emergency response

Providing ecological hazard data for the prioritization and assessment of chemicals for TSCA/Lautenberg Act


Overview of TSCA Work Plan Methodology

Maria Doa
U.S. EPA, Office of Pollution Prevention and Toxics
December 11, 2017

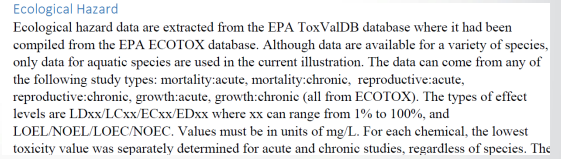

PFOA & PFOS

U.S. manufacturers voluntarily phased out PFOA and PFOS, two specific PFAS chemicals.

GenX Chemicals

GenX chemicals are a replacement for PFOA.

Providing ecological toxicity data for PFAS to researchers, EPA ERA Forum, DoD Tri-Services ERA Work Group, and others


Ecological Hazard

Ecological hazard data are extracted from the EPA ToxValDB database where it had been compiled from the EPA ECOTOX database. Although data are available for a variety of species, only data for aquatic species are used in the current illustration. The data can come from any of the following study types: mortality:acute, mortality:chronic, reproductive:acute, reproductive:chronic, growth:acute, growth:chronic (all from ECOTOX). The types of effect levels are LDxx/LCxx/ECxx/EDxx where xx can range from 1% to 100%, and LOEL/NOEL/LOEC/NOEC. Values must be in units of mg/L. For each chemical, the lowest toxicity value was separately determined for acute and chronic studies, regardless of species. The

Applications of ECOTOX

ECOTOX Knowledgebase

Chemical environmental toxicity data for aquatic life, terrestrial plants and wildlife

Interoperability with databases/tools

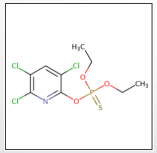
DTXSID/CASRN

Species ID; Protein ID

Integrated ontology

Reference ID

Chemicals Dashboard



SeqAPASS

Adverse Outcome Pathway WIKI

HERO (Health & Environmental Research Online)

EPA Program Offices and Regions, States, Tribes, Other Federal Agencies and International Entities

Ecological Risk Assessments
Ambient Water Quality Criteria
Ecological Screening Values
Chemical Prioritization
Emergency Response

Tools and Applications

Species Sensitivity Distributions (e.g., US EPA's WebICE, NOAA's CAFÉ)
PNECs and threshold values (e.g., EcoTTC)
QSAR (e.g., ECOSAR, TEST, OECD QSAR Toolbox)
BCF modeling and validation
Adverse Outcome Pathway (AOP) development

ECOTOX Pipeline: Systematic Review/Data Curation

Identification

Chemical verification and development of search terms

Conduct literature searches

Screening

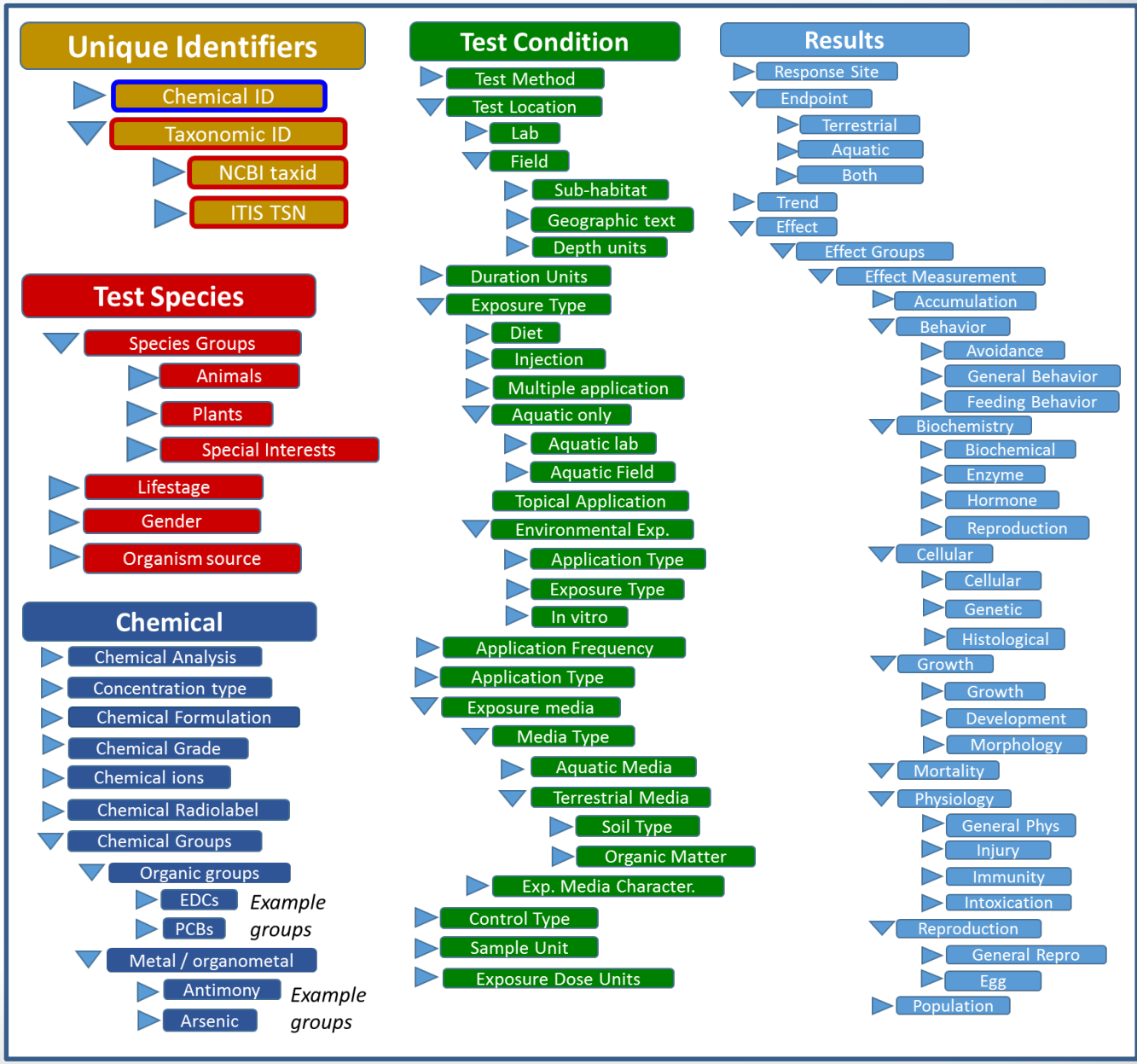
Identify and acquire potentially applicable studies

Eligibility

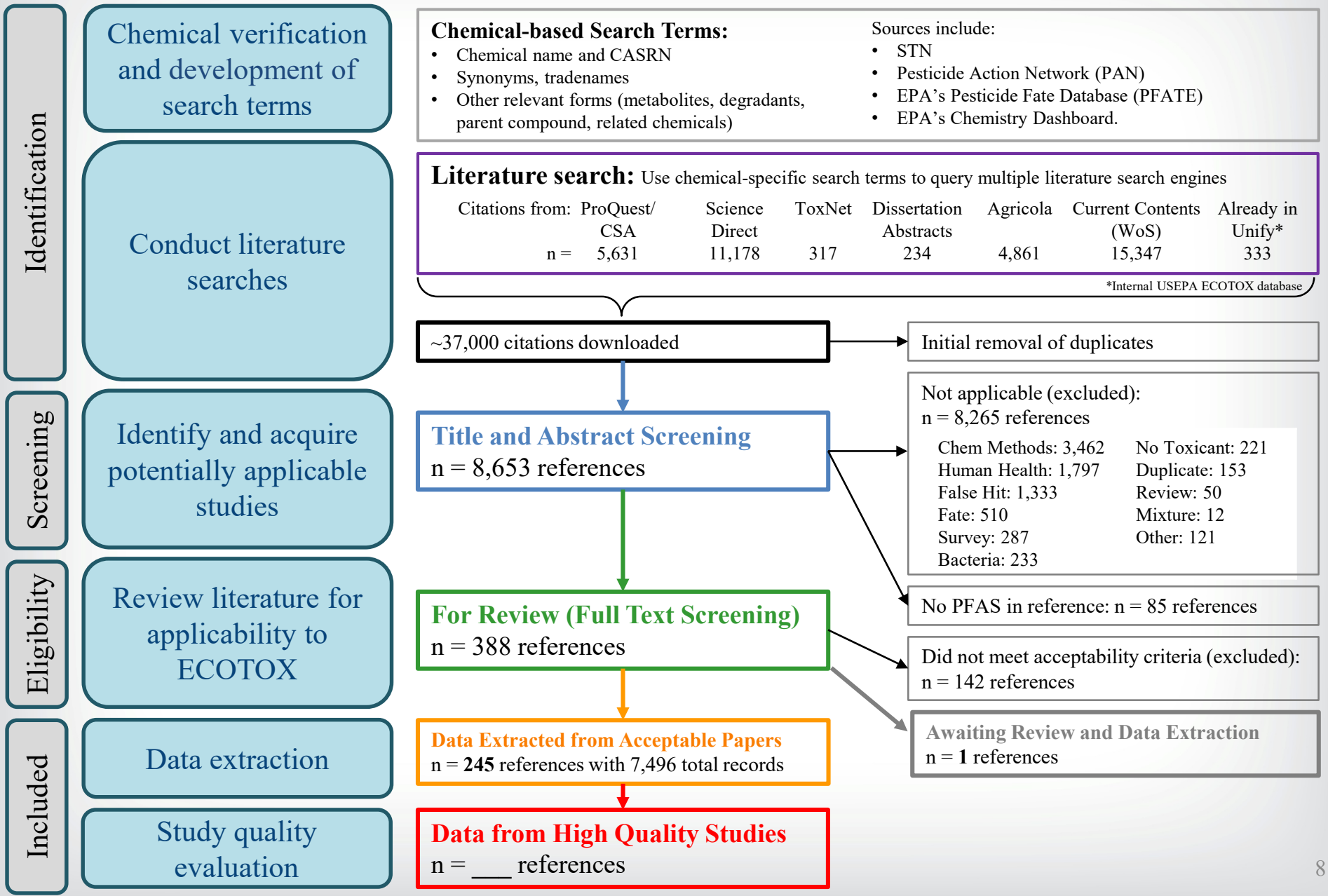
Review literature for applicability to ECOTOX

Included

Extract data and code into ECOTOX Knowledgebase



ECOTOX Pipeline: Systematic Review/Data Curation



Identify, Test, and QA Search Terms

Identification

Chemical verification and development of search terms

Conduct literature searches

Screening

Identify and acquire potentially applicable studies

Eligibility

Review literature for applicability to ECOTOX

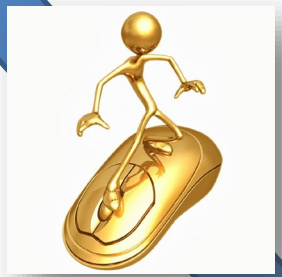
Included

Data extraction

Study quality evaluation

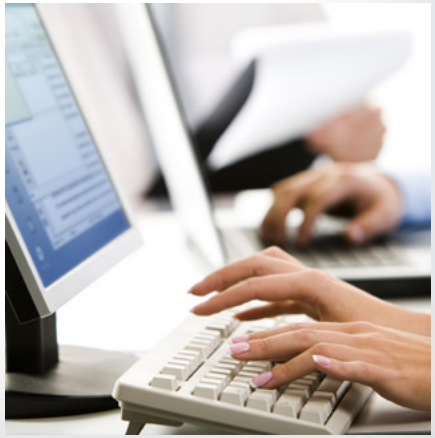
Search various sources for chemical terms,
Synonyms, verify CAS, eliminate poor search terms

Tak(Acilid OR Albrass OR Bexton OR "CP 31393" OR "Kartex A" OR Muharicid OR Niticid OR Propachlor OR Propachlore OR Ramrod OR Satecid OR "US EPA PC Code 019101") AND NOT key(human* or chil[illegible]upat* OR infant* OR homind* OR woman OR [illegible] OR patient* OR OSHA OR chromatograph* OR Spec[illegible] OR pediatric*)



Couple hour process

Enter chemical terms
into template for abstracting databases



ECOTOX Literature Searches

Identification

Chemical verification and development of search terms

Conduct literature searches

Screening

Identify and acquire potentially applicable studies

Eligibility

Review literature for applicability to ECOTOX

Included

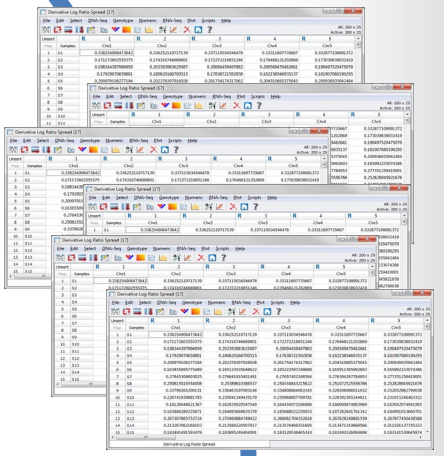
Data extraction

Study quality evaluation

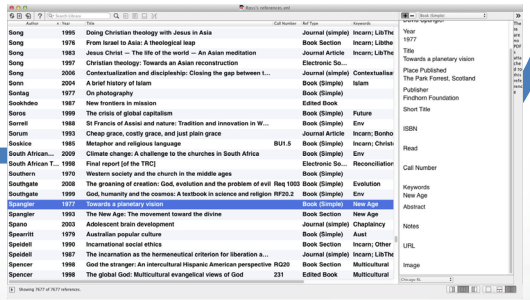
Chemical specific searches
(using terms from chemical verification step)
OR
Monthly electronic searches
of 11 highly relevant journals

Search Engines

1. Science Direct
2. AGRICOLA
3. TOXNET
4. ProQuest ESPM
5. ProQuest Dissertation Abstracts
6. Web of Science/ Current Contents



In 2018: ~ 88,565 references manually skimmed for applicability



Collate data and remove duplicates

Skimming for Applicability: Title and Abstract

Identification

Chemical verification and development of search terms

Conduct literature searches

Screening

Identify and acquire potentially applicable studies

Eligibility

Review literature for applicability to ECOTOX

Included

Data extraction

Study quality evaluation

Skim titles and abstracts, use exclusion criteria to eliminate non-applicable

4. J Econ Entomol. 2016 Jul 18. pii: tow146. [Epub ahead of print]

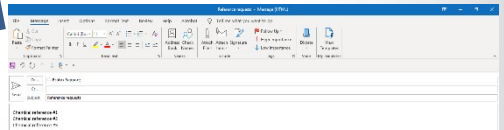
Sulfur Dust Bag: A Novel Technique for Ectoparasite Control in Poultry Systems.

Murillo AC(1), Mullens BA(2).

Author information:
(1)Department of Entomology, University of California, Riverside, CA 92521 (alock001@ucr.edu; bradley.mullens@ucr.edu) alock001@ucr.edu. (2)Department of Entomology, University of California, Riverside, CA 92521 (alock001@ucr.edu; bradley.mullens@ucr.edu).

Animal welfare-driven legislation and consumer demand are changing how laying chickens are housed, thus creating challenges for ectoparasite control. Hens housed in suspended wire cages (battery cages) are usually treated with high-pressure pesticides. This application type is difficult in enriched-cage or cage-free production. Alternatives to pesticide sprays are needed in enriched-cage or cage-free systems. In this study, we tested the efficacy of sulfur dust deployed in "dust bags" for control against the northern fowl mite (Ornithonyssus sylviarum), which causes host stress, decreased egg production, and reduced feed conversion efficiency. Dust bags were hung from the tops of cages or were clipped to the inside front of cages. We also tested permethrin-impregnated plastic strips, marketed for ectoparasite control in caged or cage-free commercial and backyard flocks. Previous work has shown sulfur to be very active against poultry ectoparasites; however, we found that the placement of bags was important for mite control. Sulfur in hanging bags reduced mites on treatment birds by 95 or 97% (depending on trial) within one week of being deployed, and mite counts on these birds were zero after 2 wk. Clipped sulfur bags acted more slowly and did not significantly reduce mites in one trial, but reduced mite counts to zero after 4 wk in trial 2. Permethrin strips had no effect on mite populations. This may have been due to mite resistance, even though this mite population had not been exposed to pyrethroids for several years. Sulfur bags should be effective in caged or cage-free systems.

DOI: 10.1093/jee/tow146



Send applicable reference list for acquisition

Skimming for Applicability: Full text

Identification

Chemical verification and development of search terms

Conduct literature searches

Screening

Identify and acquire potentially applicable studies

Eligibility

Review literature for applicability to ECOTOX

Included

Data extraction

Study quality evaluation

Ecotoxicology **2**, 93–120 (1993)

The impact of the Cyanamid Canada Co. discharges to benthic invertebrates in the Welland River in Niagara Falls, Canada

MIKE DICKMAN and GRAZYNA RYGIEL

Biological Sciences Department, Brock University, St. Catharines, Ontario, Canada L2S 3A1

Received 15 July 1992; accepted 6 December 1992

In 1986, the International Joint Commission (IJC) recommended that the Niagara River watershed should be declared an Area of Concern (AOC). This IJC recommendation was ratified by the 4 signatories of the Great Lakes Water Quality Agreement. In order to delist an AOC, it is necessary to locate any areas of impairment within the watershed and carry out remediation projects that permit uses that were previously impaired. To this end we attempted to determine whether or not the sediments at 7 study sites near the Cyanamid Canada (Chemical) Co. were contaminated at levels that would result in the impairment of the natural biota which inhabit the watershed.

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Stations 1 and 2 were located near a pipe which was one of Cyanamid Canada Company's major discharge point sources to the Welland River until a court order in 1980 stopped the company from discharging toxic material to the Welland River via that pipe. Elevated levels of cobalt (10 times above background), molybdenum (6 times above background), nickel (8 times above background), tungsten (284 times above background) and zinc (20 times above background) near the abandoned discharge pipe were correlated with the presence of pollution tolerant chironomid taxa such as *Polypedilum* and *Procladius*. The highest sludge worm densities were also observed at the abandoned pipe site which was the only site where oily wastes were found in the sediments.

Among the 1,275 chironomids taken from the seven Cyanamid Canada stations, the great majority were pollution tolerant taxa. The low biotic diversity and the presence of considerable numbers of pollution tolerant benthic macroinvertebrates in combination with the chemical

Moves on to be curated into ECOTOX.

Sept 2018 – Sept 2019
~1,089 References added to the public website

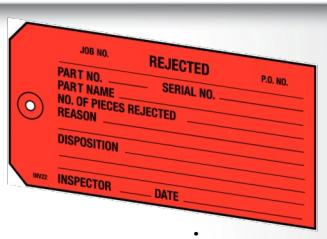
ECOTOX Applicability Criteria

- Paper must meet these criteria
  - Single chemical exposure
  - Ecologically-relevant species
  - Must be able to verify CAS registry numbers
  - Must be able to verify taxonomic information for test species
  - Exposure to live organism, viable tissue or cells
  - Report concurrent exposure concentration, dose or application rate
  - Report duration of exposure
  - Must have a control treatment
  - Primary source of the data
  - Study must be a full article in English
- The following studies are excluded
  - Air pollution studies related to CO2 and ozone
  - Studies on humans, monkeys, bacteria, viruses and yeast
  - Review and summary articles
  - Terrestrial studies with an inhalation route of exposure
  - Non-English publications and abstracts

Review literature for applicability to ECOTOX

ECOTOX Applicability Criteria

All Excluded and Non-Applicable studies are Tagged with the reason for rejection



- Abstract – Published as an abstract
- Bacteria – only test organism is a Bacteria
- CAS # Unavailable – could not verify/locate chemical CAS Registry number
- Chemical method – description of chemical analysis procedures
- Fate – only report chemical distribution in media
- Human Health – data on human subjects of surrogate animal subjects for human health risk assessment
- Incident – reports death of animal by poison, but does not provide concentration/duration of exposure
- Method – paper only reports methods for conducting a toxicity test or other aspect of an experiment
- Mixture – paper reports results from mixture of chemicals; no single chemical exposure results
- Modeling – results of the development of a model; no primary data available
- No Conc – the authors report a response in an organism but do not provide conc/dose/app rate
- No Duration – duration of exposure is not presented
- No Effect – paper does not report observed responses adverse of otherwise
- No Toxicant (ozone, CO2)
- Non-English
- Nutrient – in situ chemical tested as nutrient
- PUBL AS – duplicate data published elsewhere
- Retracted – paper retracted by Journal
- Review – primary data published elsewhere
- Sediment – only sediment concentration presented
- Survey – chemical measured in organism, but lack quantification of exposure (dose/duration)
- Virus – virus is only test organism
- Yeast – yeast is only test organism

ECOTOX Data Extraction

Identification

Chemical verification and development of search terms

Conduct literature searches

Screening

Identify and acquire potentially applicable studies

Eligibility

Review literature for applicability to ECOTOX

Included

Data extraction

Study quality evaluation

Unique Identifiers

- Chemical ID
- Taxonomic ID
  - NCBI taxid
  - ITIS TSN

Test Species

- Species Groups
  - Animals
  - Plants
  - Special Interests
- Lifestage
- Gender
- Organism source

Chemical

- Chemical Analysis
- Concentration type
- Chemical Formulation
- Chemical Grade
- Chemical ions
- Chemical Radiolabel
- Chemical Groups
  - Organic groups
    - EDCs
    - PCBs

  Example groups
  - Metal / organometal
    - Antimony
    - Arsenic

  Example groups

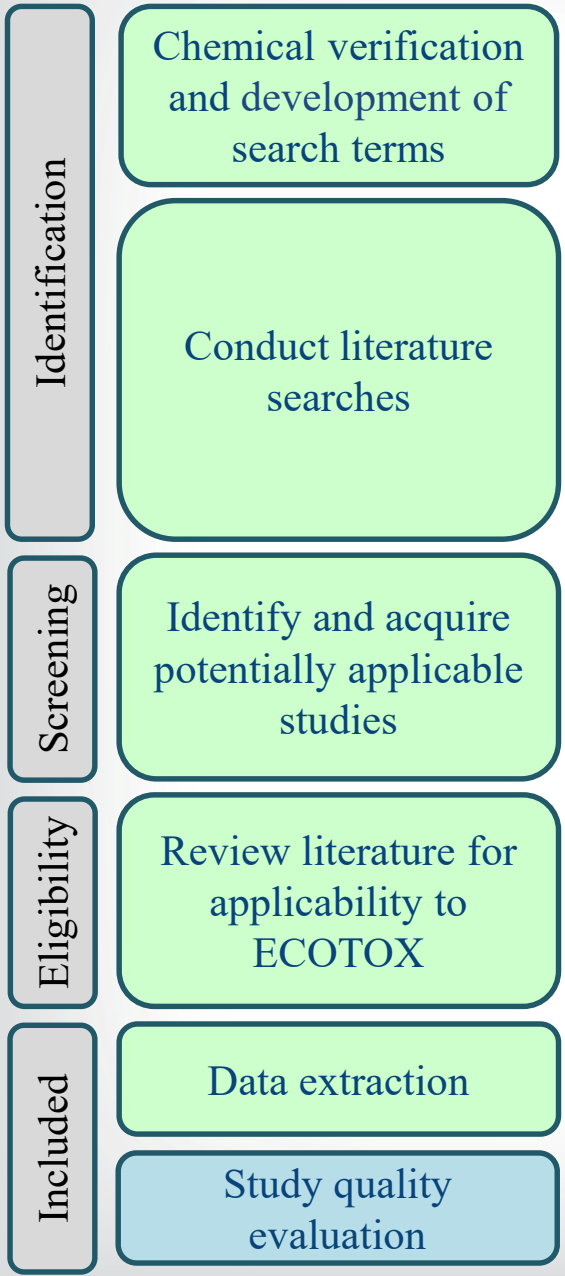
Test Condition

- Test Method
- Test Location
  - Lab
  - Field
    - Sub-habitat
    - Geographic text
    - Depth units
- Duration Units
- Exposure Type
  - Diet
  - Injection
  - Multiple application
  - Aquatic only
    - Aquatic lab
    - Aquatic Field
  - Topical Application
  - Environmental Exp.
    - Application Type
    - Exposure Type
    - In vitro
- Application Frequency
- Application Type
- Exposure media
  - Media Type
    - Aquatic Media
    - Terrestrial Media
      - Soil Type
      - Organic Matter
  - Exp. Media Character.
- Control Type
- Sample Unit
- Exposure Dose Units

Results

- Response Site
- Endpoint
  - Terrestrial
  - Aquatic
  - Both
- Trend
- Effect
  - Effect Groups
    - Effect Measurement
      - Accumulation
      - Behavior
        - Avoidance
        - General Behavior
        - Feeding Behavior
      - Biochemistry
        - Biochemical
        - Enzyme
        - Hormone
        - Reproduction
      - Cellular
        - Cellular
        - Genetic
        - Histological
      - Growth
        - Growth
        - Development
        - Morphology
      - Mortality
      - Physiology
        - General Phys
        - Injury
        - Immunity
        - Intoxication
      - Reproduction
        - General Repro
        - Egg
      - Population

Study Quality Evaluation



- Many fields in ECOTOX can inform study evaluation

Category	Select study evaluation questions with relevant ECOTOX field(s)
Chemical	Is test substance identified? **Required for inclusion in ECOTOX inclusion** Is the purity of test substance reported? **Chemical Purity** Were chemical concentrations verified? **Chemical Analysis** (e.g., nominal versus measured concentrations)
Species	Is the species given? **Verifiable species (Scientific Name, etc.) required for inclusion in ECOTOX** Are the organisms well described? **Organism Source**, **Lifestage**, **Age**, **Gender**, **Initial** and **Final Weight**
Test Conditions	Are appropriate controls performed? **A control is required for inclusion in ECOTOX**, type described in **Control** Is a guideline method (e.g., OECD) used? **Test Method** Are the experimental conditions appropriate and acceptable for the test substance and organism? **Test Method**, **Media Type**, **Test Location**, **Experimental Design**, Physical and Chemical Soil and Water Parameters (e.g., **pH**, **Temperature**, **Dissolved Oxygen**)
Test Results	Are the reported effects and endpoints appropriate for the purpose, test substance and organism? **Effect Measurement**, **Endpoint** Is the response/effect statistically significant? **Statistical Significance**, **Significance Level**

Study Quality Evaluation

Identification

Chemical verification and development of search terms

Conduct literature searches

Screening

Identify and acquire potentially applicable studies

Eligibility

Review literature for applicability to ECOTOX

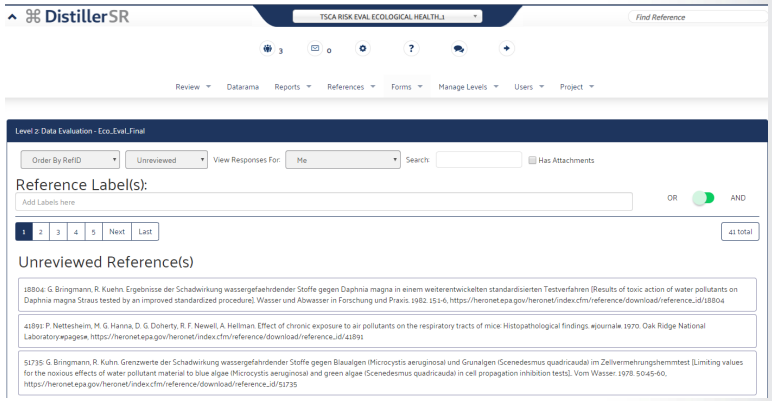
Included

Data extraction

Study quality evaluation

- Identification of studies vetted for regulatory use
- Working towards a unified method for study quality evaluation
  - Pilot data quality evaluation with TSCA (environmental data for first 10 priority chemicals)

Criteria Domains:
- Test Substance
- Test Design
- Exposure Characterization
- Test Organisms
- Outcome Assessment
- Confounding/ Variable Control
- Data Presentation and Analysis

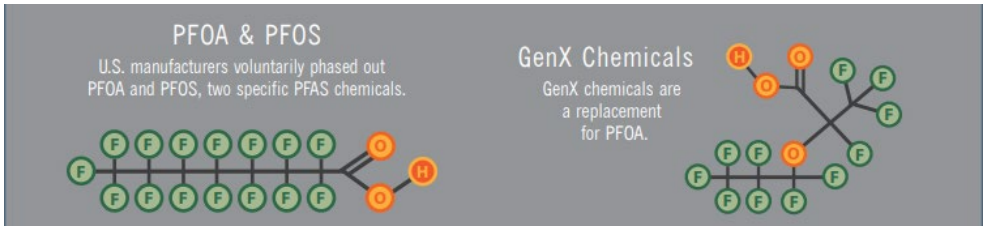


- Initial discussions with Office of Water on Data Evaluation Reports (DERs)

DERs Include:
- Test Substance
- Exposure Pathway
- Protocols Followed
- Study Design and Methods
- Test Organism
- Study Parameters
- Test Conditions
- Acceptable Control
- Observations
- Statistical Verification

Application of ECOTOX:
PFAS toxicity data for ecological risk assessment and management

Per- and polyfluoroalkyl substances (PFAS)



There are no ecological receptor-based benchmarks or criteria.

Numerous PFAS

- Environmental occurrence
- In active commerce (602 in TSCA Inventory)
- Recently 'discovered' or synthesized
- Manufacturing process data

- ECOTOX comprehensive literature search and systematic review process for **>300 chemicals** (April 2018 – August 2019)

Terms for Literature Search

List	# of Chemicals (August 2019)
PFAS list internal to ECOTOX	69
EPA Cross-Agency List – *Chemistry Dashboard*	199
EPA Set 1 List of 75 Test Samples – *Chemistry Dashboard*	74
Additional chemicals found in literature from 1st search	7
EPA Research List – *Chemistry Dashboard*	165
EPA Set 2 List of 75 Test Samples – *Chemistry Dashboard*	75

<u>April – Nov 2018</u>

- 254 chemical names with associated CASRNs (if applicable)
- General PFAS search terms (e.g., Dodecafluoro, Fluorotelomer, Nonafluoro, Pentafluoropropanoic, Perfluorobutanesulfon, Perfluoroheptanoate, Perfluorohexanoate, Perfluoropentyl)

<u>July – August 2019</u>

- 322 chemical names with associated CASRNs (if applicable)
- General PFAS search terms

Literature Search and Study Selection (2018-2019)

Search for 322 chemical names with CASRNs, synonyms, tradenames, etc. with 6 literature search engines:

Citations from:	ProQuest/CSA	Science Direct	ToxNet	Dissertation Abstracts	Agricola	Current Contents (WoS)	Already in Unify*
n =	37,760	25,473	11,158	619	14,107	37,971	1,128

*Internal USEPA ECOTOX database

~130,000 citations downloaded

→ Initial removal of duplicates

Title and Abstract Screening
n = 15,339 references

→ Not applicable (excluded): n = 14,693 references

Chem Methods: 6,958	No Toxicant: 322
Human Health: 3,755	Duplicate: 181
False Hit: 1,915	Review: 67
Fate: 670	Mixture: 15
Survey: 379	Other: 151
Bacteria: 280	

For Review (Full Text Screening)
n = 544 references

→ No PFAS chemical of interest: n = 112 references

→ Did not meet acceptability criteria (excluded): n = 142 references

Data Extracted from Acceptable Papers
n = **252** references with 7,978 total records

→ **Awaiting Review and Data Extraction**
n = **151** references

192 PFAS references already included in ECOTOX

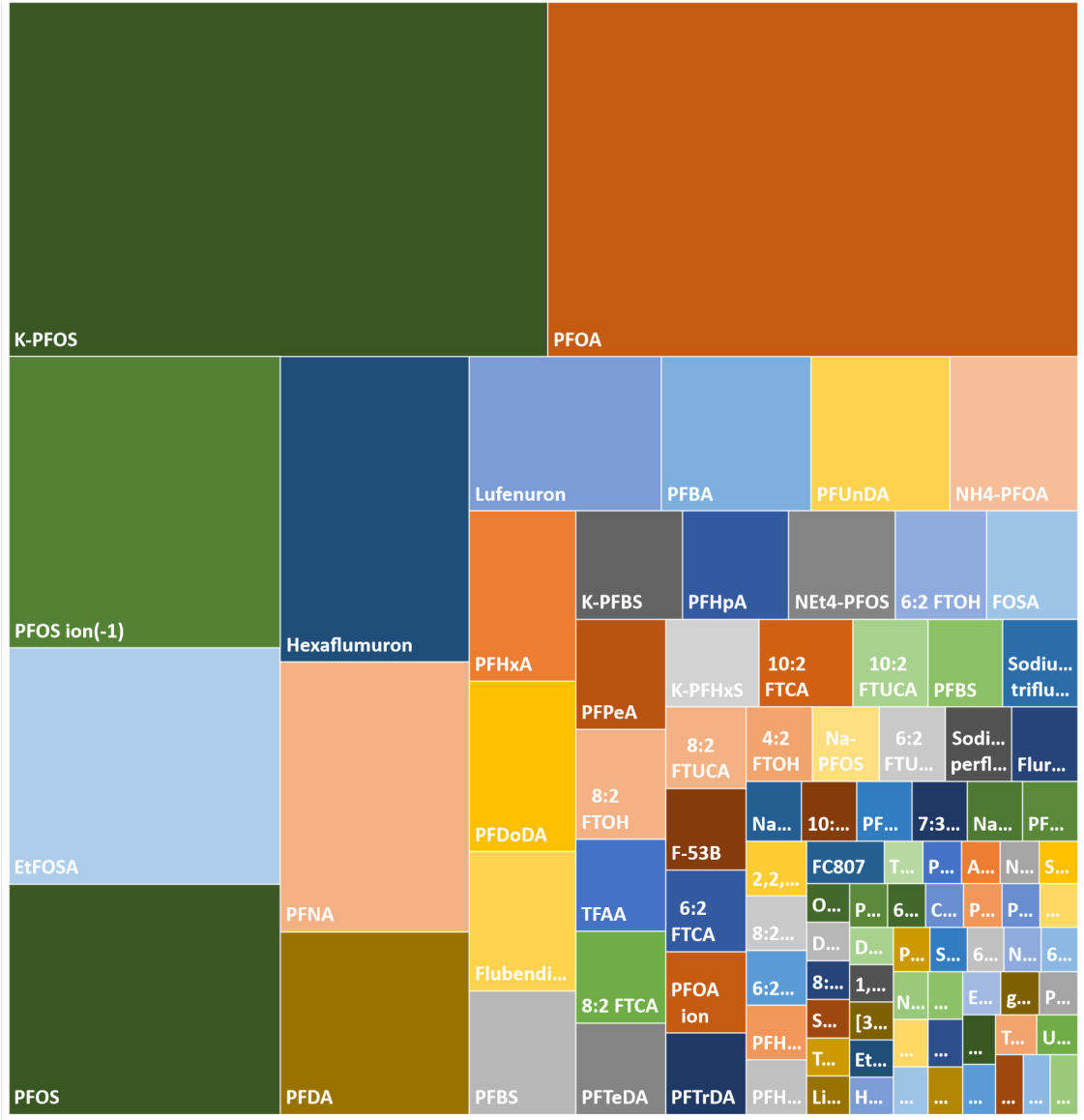
Data Records for 92 PFAS
n = **437** references with 13,208 total records

PFOS and PFOA with Most References

As of September 2019 update, curated data from 437 publications for:

- 96 fluorinated chemicals
- 264 species
- 889 effect measurements

With a total of 13,208 records



Box size represents # references that include relevant and acceptable ecological toxicity data

Diversity in Types of Effects Measured

Distribution of data records in ECOTOX for PFAS, by species and general type of effect.

Contact Us About the ECOTOX Knowledgebase

Get Updates via Email

EPA welcomes your comments on this version of ECOTOX. We are specifically interested in feedback from users about the new functionality and usability. What, if any, issues did you experience? Please be as specific as possible in your comments

For technical questions about the scientific information and data interpretation, you may use the comment form below, or the contact information in the right-side bar, to contact the ECOTOX Support Staff

Telephone: 218-529-5225
Fax: 218-529-5003
E-mail: ecotox.support@epa.gov

Mailing address:
ECOTOX Support
Mid-Continent Ecology Division
6201 Congdon Boulevard
Duluth, MN 55804

Please help us answer your request by including a correct e-mail address. If you are referring to a specific page within the ECOTOX web site, please include a URL or title for the page.

Your Name

First Last

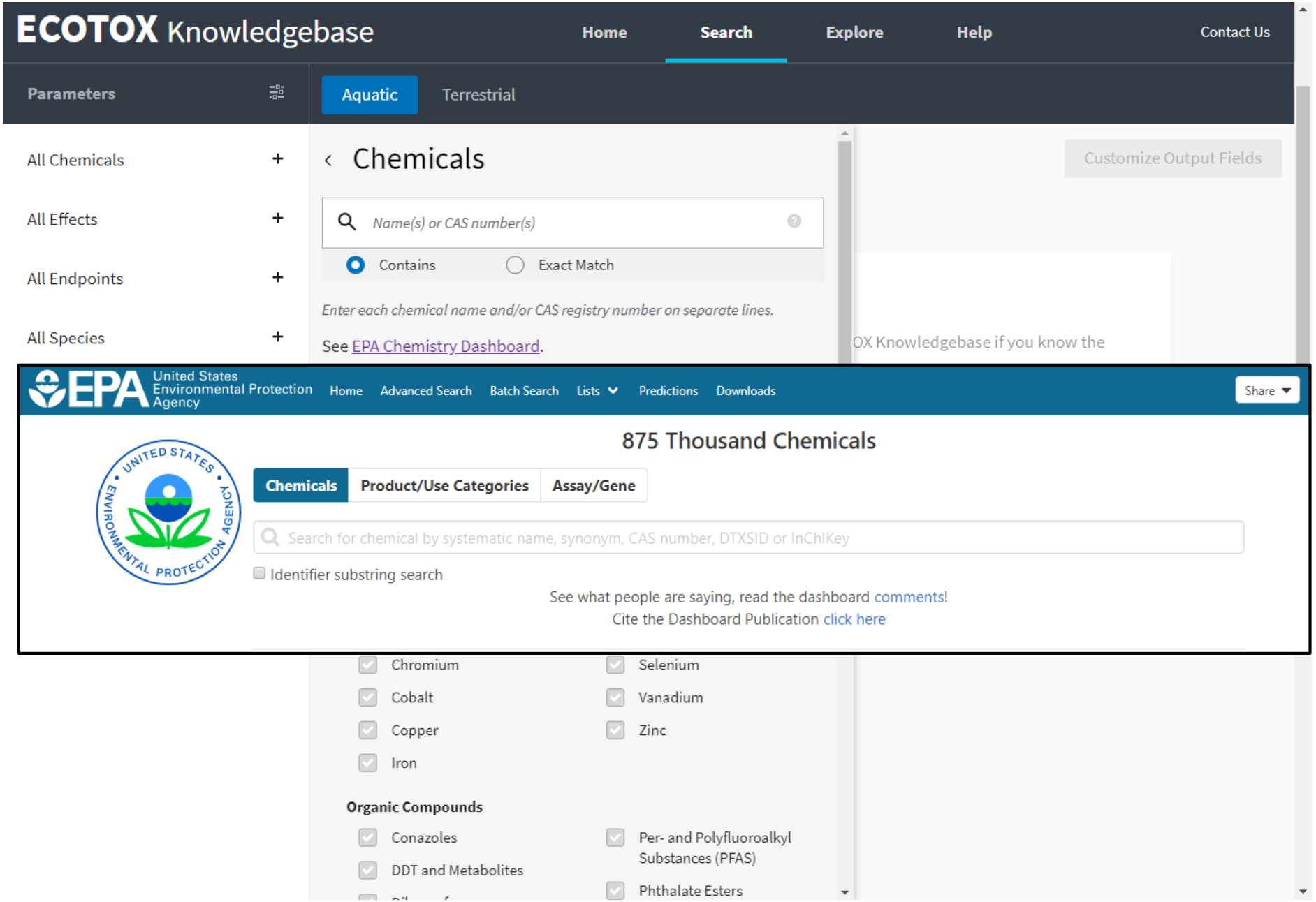
Your Organization *(Optional)*

Select an option

Name of Organization

Your E-mail Address

email@example.com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All Chemicals
All Effects
All Endpoints
All Species
Chemicals
Customize Output Fields
Name(s) or CAS number(s)
Contains
Exact Match
Enter each chemical name and/or CAS registry number on separate lines.
See EPA Chemistry Dashboard.
OX Knowledgebase if you know the
United States Environmental Protection Agency
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Advanced Search
Batch Search
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Share
875 Thousand Chemicals
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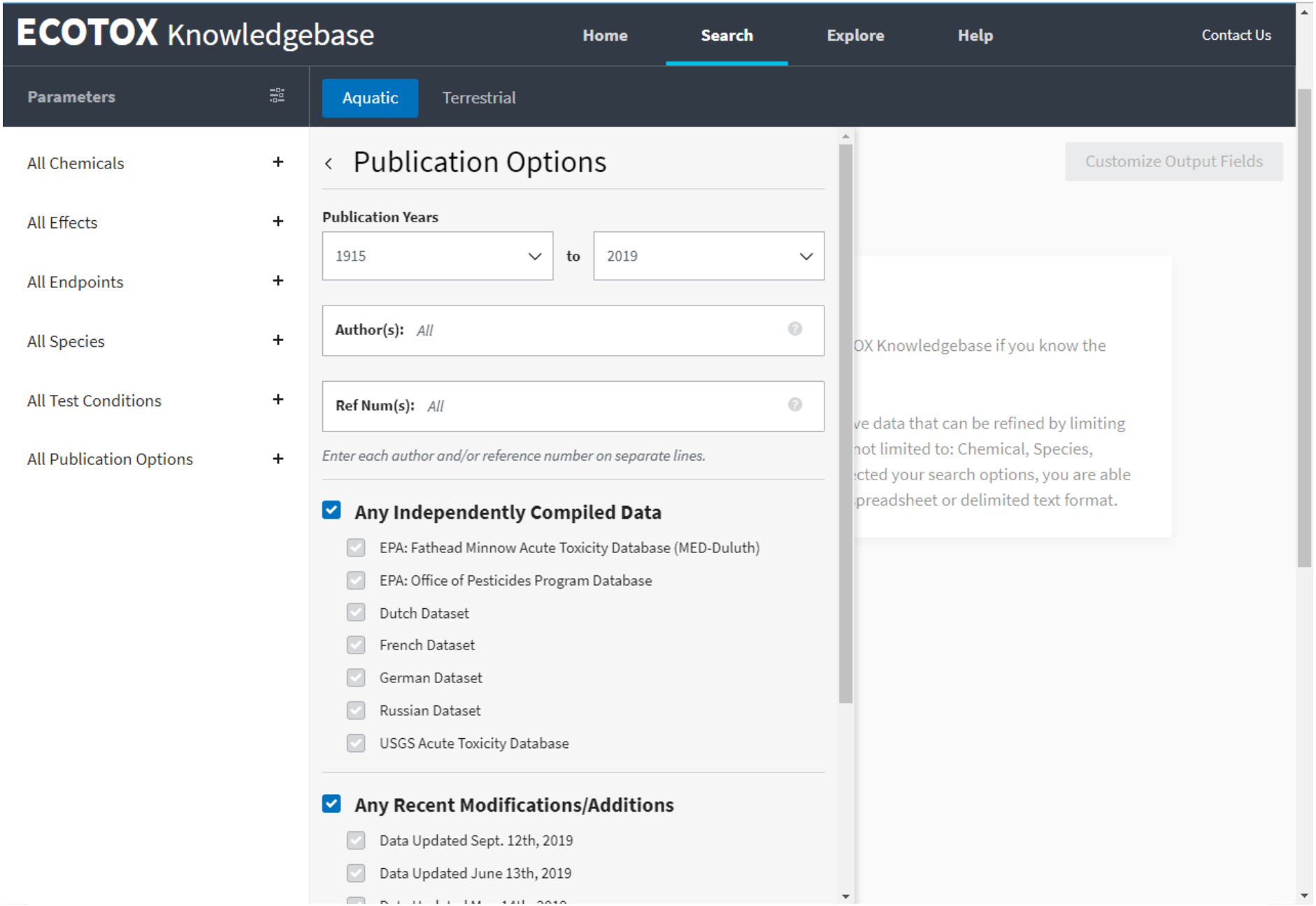
Product/Use Categories
Assay/Gene
Search for chemical by systematic name, synonym, CAS number, DTXSID or InChIKey
Identifier substring search
See what people are saying, read the dashboard comments!
Cite the Dashboard Publication click here
Chromium
Cobalt
Copper
Iron
Selenium
Vanadium
Zinc
Organic Compounds
Conazoles
DDT and Metabolites
Per- and Polyfluoroalkyl Substances (PFAS)
Phthalate Esters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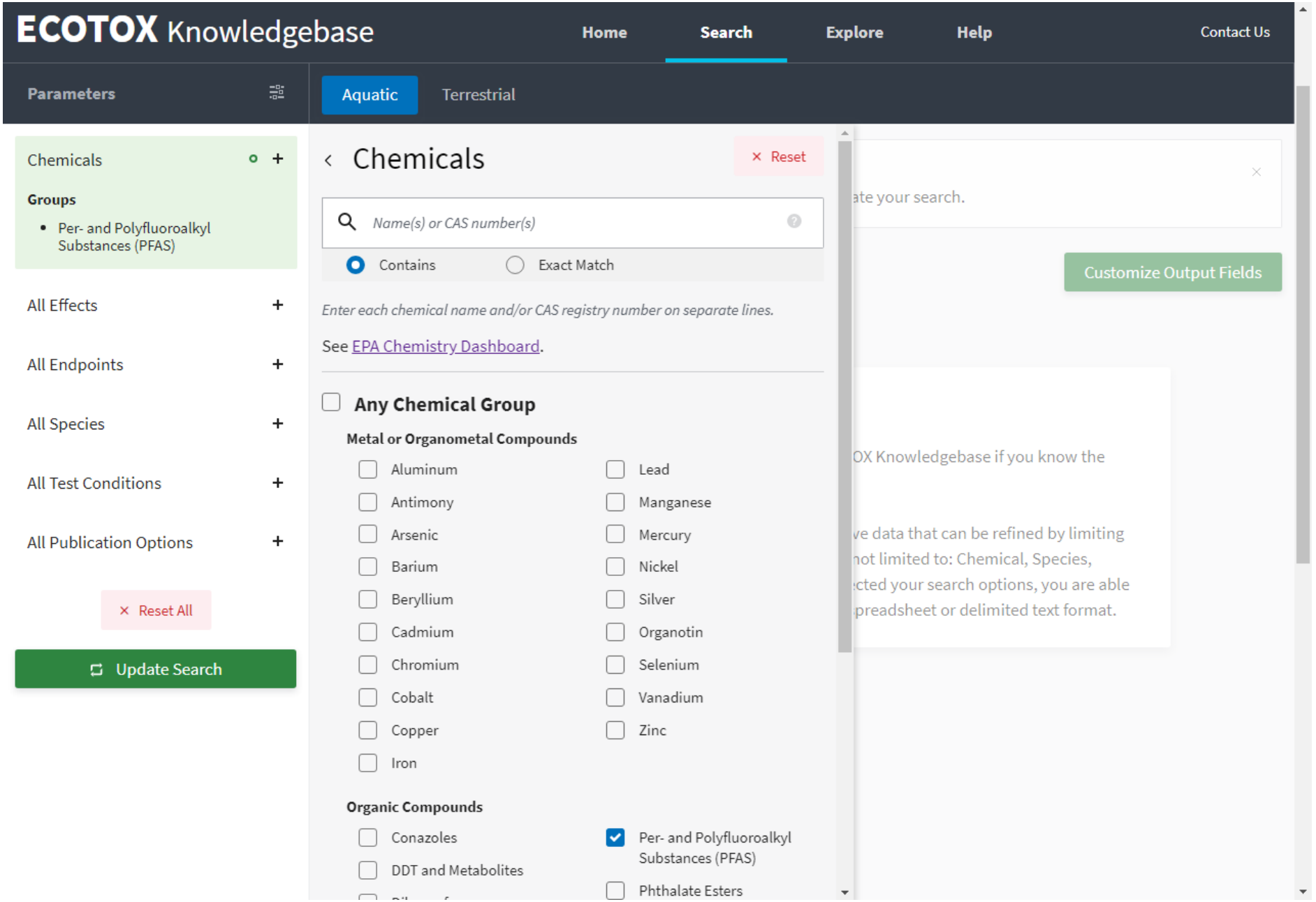
All Effects
All Endpoints
All Species
All Test Conditions
All Publication Options
Publication Options
Customize Output Fields
Publication Years
1915
to
2019
Author(s): All
Ref Num(s): All
Enter each author and/or reference number on separate lines.
Any Independently Compiled Data
EPA: Fathead Minnow Acute Toxicity Database (MED-Duluth)
EPA: Office of Pesticides Program Database
Dutch Dataset
French Dataset
German Dataset
Russian Dataset
USGS Acute Toxicity Database
Any Recent Modifications/Additions
Data Updated Sept. 12th, 2019
Data Updated June 13th, 2019
OX Knowledgebase if you know the
ve data that can be refined by limiting
not limited to: Chemical, Species,
cted your search options, you are able
preadsheet or delimited text format.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All Publication Options
Reset All
Update Search
Chemicals
Reset
Name(s) or CAS number(s)
Contains
Exact Match
Enter each chemical name and/or CAS registry number on separate lines.
See EPA Chemistry Dashboard.
Any Chemical Group
Metal or Organometal Compounds
Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Chromium
Cobalt
Copper
Iron
Lead
Manganese
Mercury
Nickel
Silver
Organotin
Selenium
Vanadium
Zinc
Organic Compounds
Conazoles
DDT and Metabolites
Per- and Polyfluoroalkyl Substances (PFAS)
Phthalate Esters
ate your search.
Customize Output Fields
OX Knowledgebase if you know the
ve data that can be refined by limiting
not limited to: Chemical, Species,
cted your search options, you are able
preadsheet or delimited text format.

Custom Group

Create a custom chemical group by browsing available chemicals or entering a list of CAS numbers.

Create Custom Group...

Defined Groups

Select one or more categories from the graph to filter groups in the table.

- **16** Organic Compounds
- **19** Metals or Organometal Comp...

35 Chemical Groups

Chemical groups are solely intended for the purposes of searching multiple chemicals efficiently and do not reflect the view(s) or the policy(cies) of the U.S. Environmental Protection Agency.
Some of the Chemical groups are currently being re-evaluated. They will be refreshed and restored in future ECOTOX updates.

Select one or more groups then click "Explore Data" to continue.

× Reset All

Export CSV | Explore Data >

	CHEMICAL GROUP	RECORDS	PUBLICATIO...	YEAR MIN	YEAR MAX
☐	Copper	55792	4736	1915	2018
☐	Pharmaceutical Personal Care Products (PPCPs)	34751	2520	1938	2019
☐	Zinc	29407	3131	1915	2019
☐	Cadmium	24554	3200	1915	2018
☑	Perfluorooctane Sulfonates and Acids (PFOS/PFOA)	13208	430	1953	2019
☐	Mercury	11246	1604	1927	2018
☐	Conazoles	10079	541	1977	2019
☐	Selenium	10039	659	1934	2015
☐	Neonicotinoids	9033	709	1980	2018
☐	Lead	8985	1400	1915	2017
☐	Major Ions	8702	712	1927	2017
☐	Polyaromatic Hydrocarbons (PAHs)	8319	944	1917	2016

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Explore | Chemicals | Per- and Polyfluoroalkyl Substances (PFAS)

Aquatic | Terrestrial

Group Summary | Records | Plot View

Send Query Filters to Search

Query Filters

Select one or more of each filter to reduce the records.

Chemicals (96)

All

Effect Groups (21)

5 Selected

- *All*
- ----------
- Accumulation
- Avoidance
- Behavior
- Biochemistry
- Cell(s)
- Development
- Enzyme(s)
- Feeding behavior
- Genetics
- Growth
- Histology
- Hormone(s)

All

9,525 Plottable Records — 13,208 Total Records (showing first 3,000)

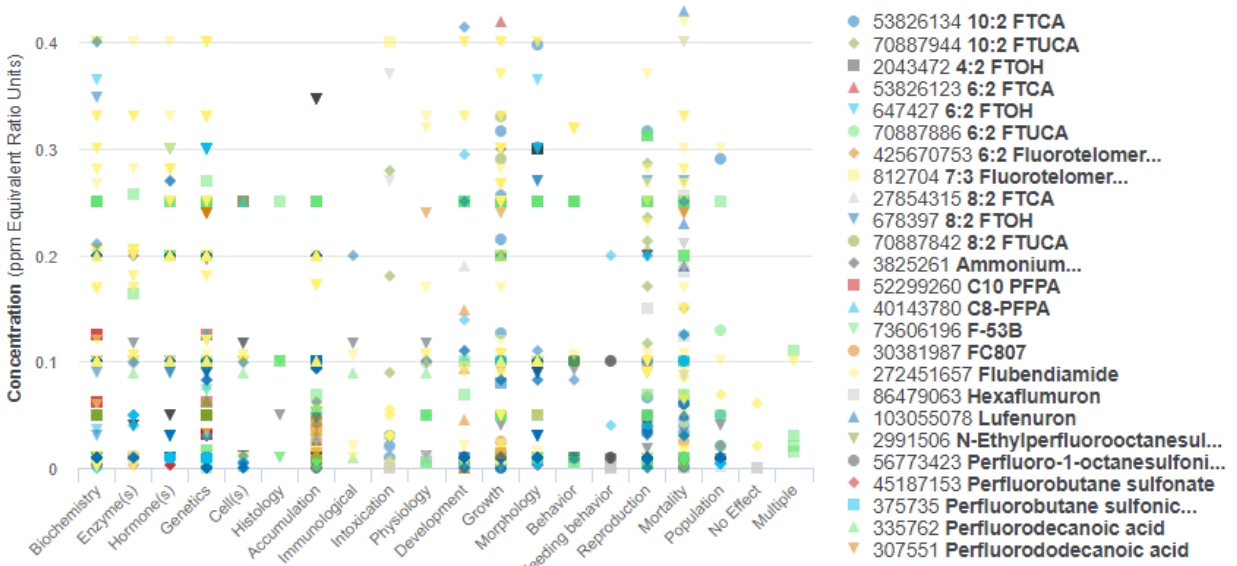
Records are **plotted** if they can be converted to **Standardized Concentration Units** . Ordered by **Concentration (low-high).**

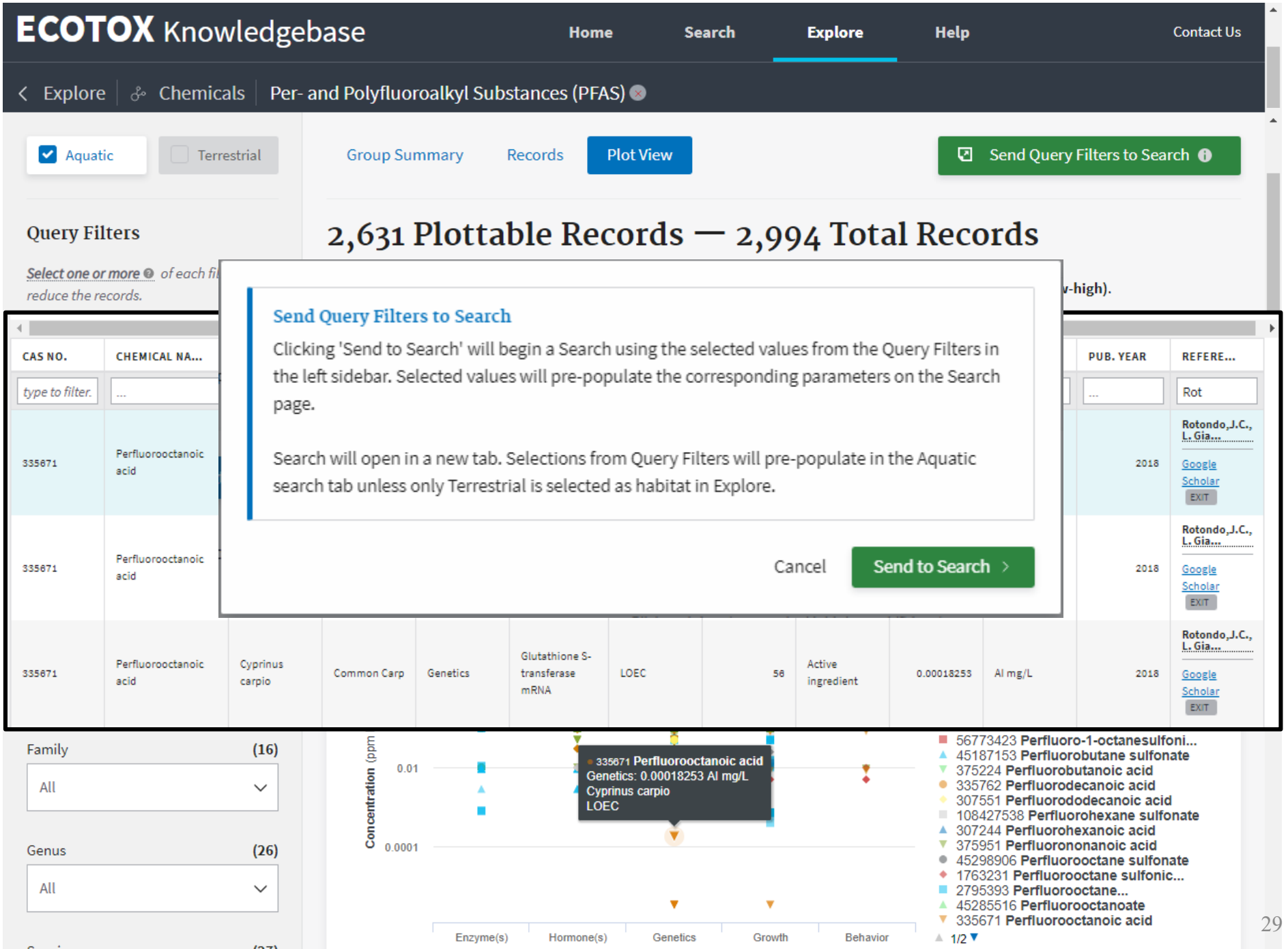
Effect × Chem | Dur × Chem | Dur × Endpt

Export

Y-axis scale: Linear | Logarithmic

Click and drag to zoom in. Hold down shift key to pan.

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Records
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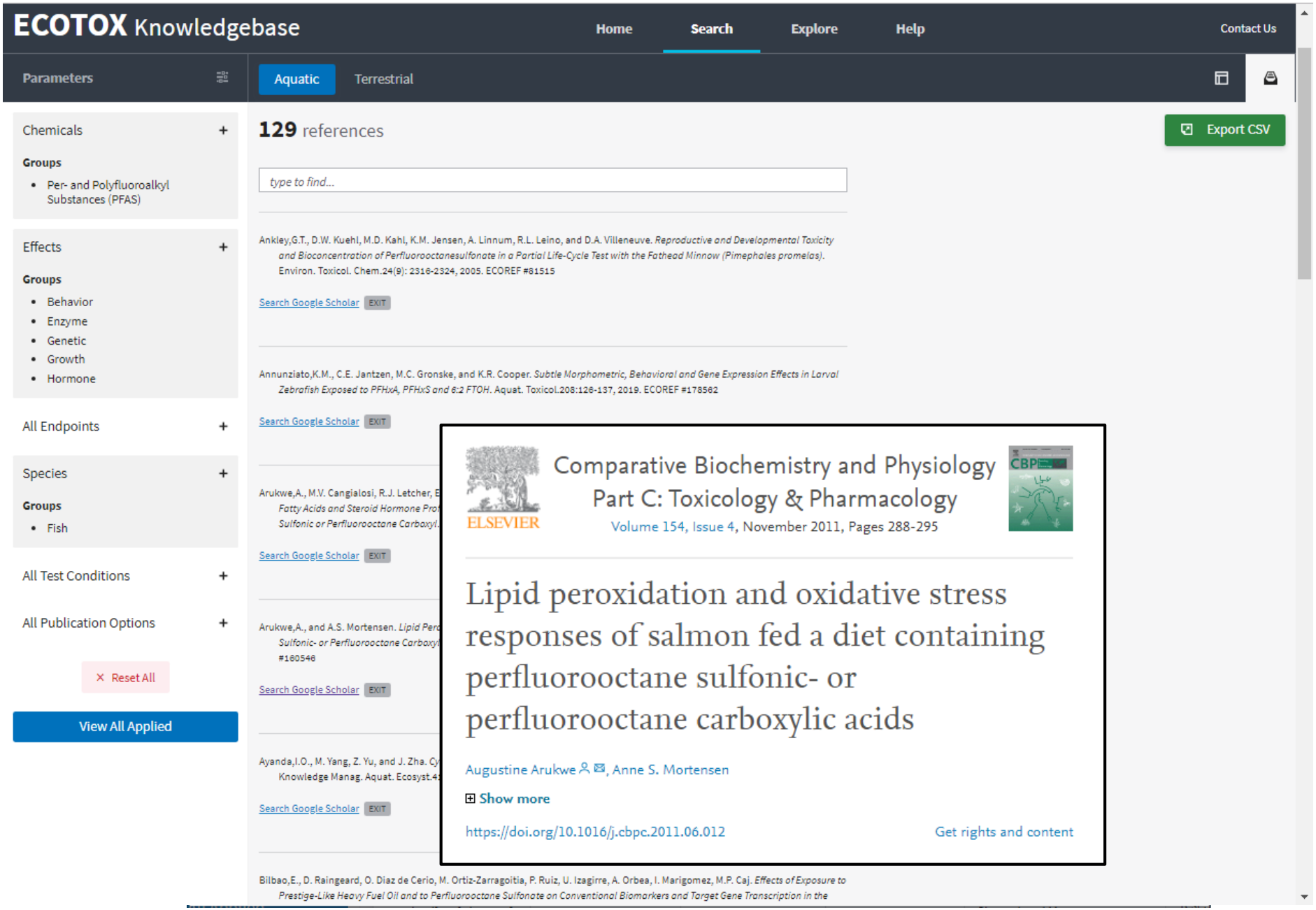
Send Query Filters to Search
Query Filters
2,631 Plottable Records — 2,994 Total Records
Select one or more of each fi
reduce the records.
-high).
Send Query Filters to Search
Clicking 'Send to Search' will begin a Search using the selected values from the Query Filters in the left sidebar. Selected values will pre-populate the corresponding parameters on the Search page.
Search will open in a new tab. Selections from Query Filters will pre-populate in the Aquatic search tab unless only Terrestrial is selected as habitat in Explore.
Cancel
Send to Search
CAS NO.
CHEMICAL NA...
PUB. YEAR
REFERE...
type to filter.
Rot
335671
Perfluorooctanoic acid
Cyprinus carpio
Common Carp
Genetics
Glutathione S-transferase mRNA
LOEC
56
Active ingredient
0.00018253
AI mg/L
2018
Rotondo,J.C., L. Gia...
Google Scholar
EXIT
Family
(16)
All
Genus
(26)
All
Concentration (ppm
0.01
0.0001
335671 Perfluorooctanoic acid
Genetics: 0.00018253 AI mg/L
Cyprinus carpio
LOEC
Enzyme(s)
Hormone(s)
Genetics
Growth
Behavior
56773423 Perfluoro-1-octanesulfoni...
45187153 Perfluorobutane sulfonate
375224 Perfluorobutanoic acid
335762 Perfluorodecanoic acid
307551 Perfluorododecanoic acid
108427538 Perfluorohexane sulfonate
307244 Perfluorohexanoic acid
375951 Perfluorononanoic acid
45298906 Perfluorooctane sulfonate
1763231 Perfluorooctane sulfonic...
2795393 Perfluorooctane...
45285516 Perfluorooctanoate
335671 Perfluorooctanoic acid
1/2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Growth
Hormone
All Endpoints
Species
Groups
Fish
All Test Conditions
All Publication Options
Reset All
View All Applied
129 references
Export CSV
type to find...
Ankley,G.T., D.W. Kuehl, M.D. Kahl, K.M. Jensen, A. Linnum, R.L. Leino, and D.A. Villeneuve. Reproductive and Developmental Toxicity and Bioconcentration of Perfluorooctanesulfonate in a Partial Life-Cycle Test with the Fathead Minnow (Pimephales promelas). Environ. Toxicol. Chem.24(9): 2316-2324, 2005. ECOREF #81515
Search Google Scholar EXIT
Annunziato,K.M., C.E. Jantzen, M.C. Gronske, and K.R. Cooper. Subtle Morphometric, Behavioral and Gene Expression Effects in Larval Zebrafish Exposed to PFHxA, PFHxS and 6:2 FTOH. Aquat. Toxicol.208:126-137, 2019. ECOREF #178562
Search Google Scholar EXIT
Arukwe,A., M.V. Cangialosi, R.J. Letcher, E
Fatty Acids and Steroid Hormone Prof
Sulfonic or Perfluorooctane Carboxyl.
Search Google Scholar EXIT
Arukwe,A., and A.S. Mortensen. Lipid Perc
Sulfonic- or Perfluorooctane Carboxyl
#160546
Search Google Scholar EXIT
Ayanda,I.O., M. Yang, Z. Yu, and J. Zha. Cy
Knowledge Manag. Aquat. Ecosyst.4
Search Google Scholar EXIT
Bilbao,E., D. Raingeard, O. Diaz de Cerio, M. Ortiz-Zarragoitia, P. Ruiz, U. Izagirre, A. Orbea, I. Marigomez, M.P. Caj. Effects of Exposure to Prestige-Like Heavy Fuel Oil and to Perfluorooctane Sulfonate on Conventional Biomarkers and Target Gene Transcription in the
ELSEVIER
Comparative Biochemistry and Physiology
Part C: Toxicology & Pharmacology
Volume 154, Issue 4, November 2011, Pages 288-295
Lipid peroxidation and oxidative stress responses of salmon fed a diet containing perfluorooctane sulfonic- or perfluorooctane carboxylic acids
Augustine Arukwe, Anne S. Mortensen
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https://doi.org/10.1016/j.cbpc.2011.06.012
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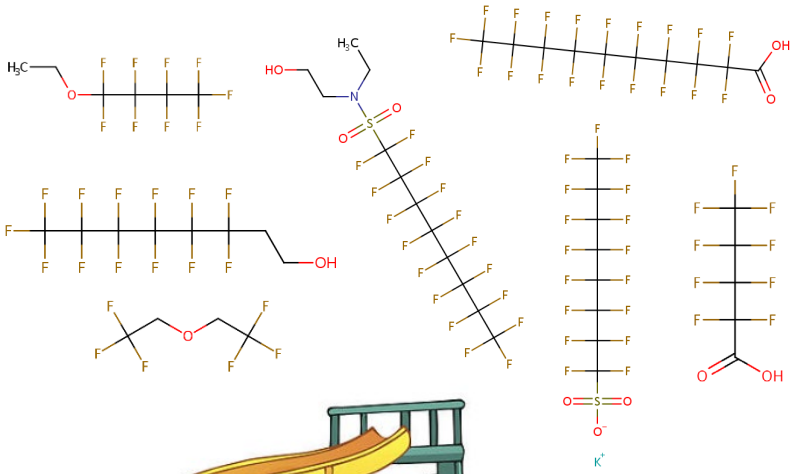
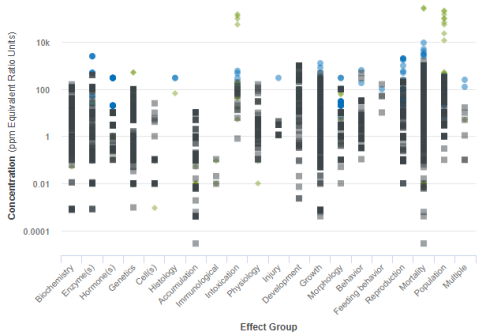
Quarterly Literature Searches for PFAS

- Updated list of >300 unique CASRNs and associated chemical names
- Conduct literature searches
- Identify and acquire potentially applicable studies
- Review literature for applicability to ECOTOX
- Extract data and code into ECOTOX Knowledgebase





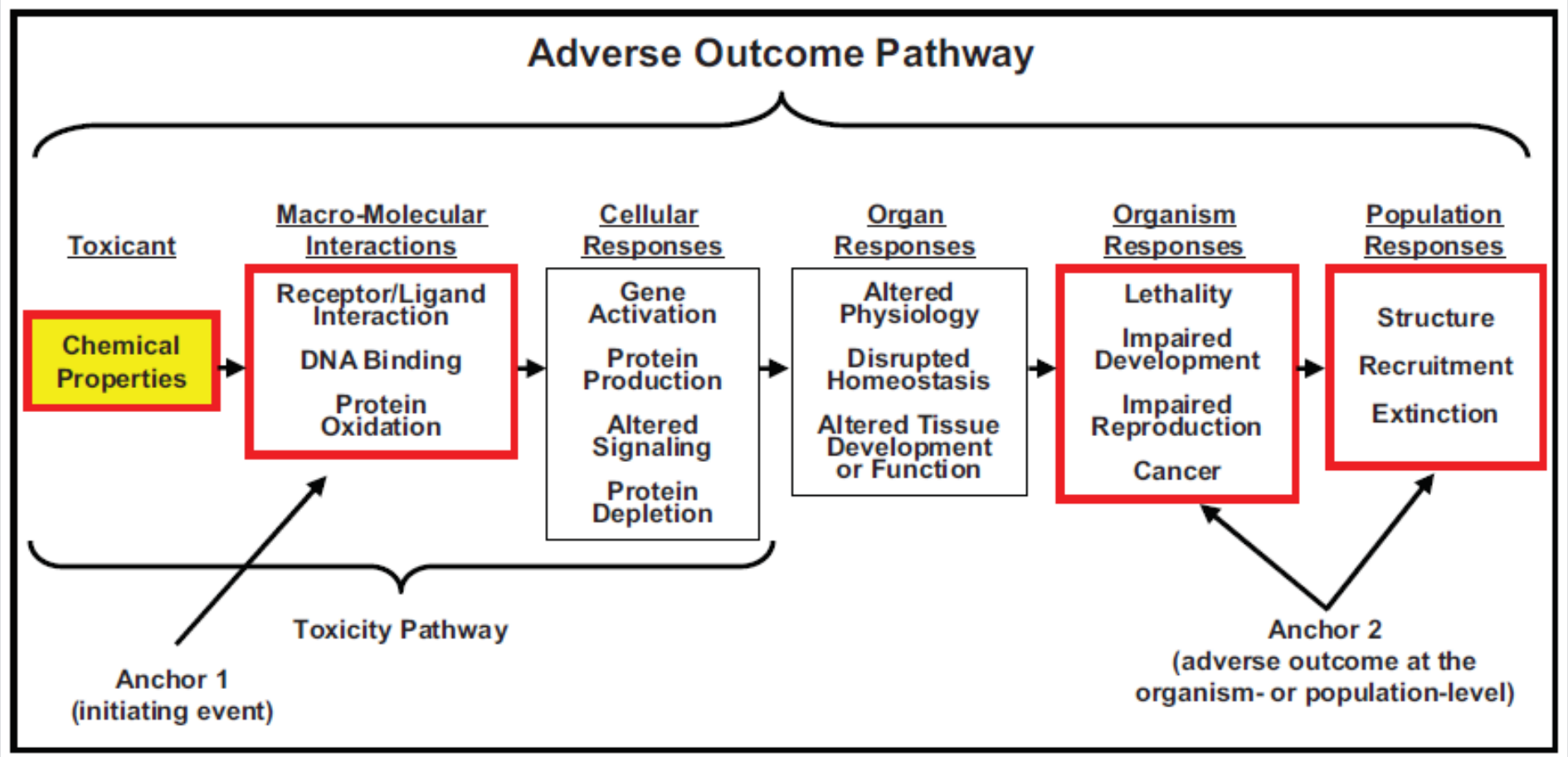
Application of ECOTOX:
Chemicals in Deconstruction Materials*

Chemical	Number of Articles
Arsenic	25
Chromium	24
Copper	24
Lead	20
Zinc	19
Nickel	17
Cadmium	17
Mercury	15
Sulfate	11
Selenium	10
Barium	10
Molybdenum	9
Calcium	9
Antimony	8
Chloride	8
Iron	8
Sodium	7
Aluminium	5
Magnesium	5
Potassium	5
Cobalt	4
Hydrogen sulfide	4
Manganese	3
Silicon	3
Sulfite	2
Phosphorus	2
Vanadium	2
Carbon	2
Sulfur	2
Boron	2
Ammonia	2
Cyanide	2
Thioarsenic	2
Carbon dioxide	1
Dimethoxy chloroamphetamine	1
Lithium	1
Strontium	1
Hydrogen	1
Nitrogen	1
Ethanol	1
Polychlorinated dibenzo-p-dioxins	1
Dibenzofurans	1
Biphenyls	1
Chlorobenzenes	1
Chlorophenols	1
Polycyclic aromatic hydrocarbons	1
Uranium	1
Chlorine	1
Fluorine	1
Titanium	1

Chemical	Number of Articles	ECOTOX Knowledgebase		
		# CASRNs	# of Refs	# of Records
Arsenic	25	24	524	5,025
Chromium	24	17	998	7,956
Copper	24	20	4,736	55,792
Lead	20	13	1,400	8,985
Zinc	19	30	3,131	29,407
Nickel	17	23	598	4,290
Cadmium	17	13	3,200	24,554
Mercury	15	59	1,604	11,246
Sulfate	11			
Selenium	10	35	659	10,039
Barium	10	11	91	409
Polycyclic aromatic hydrocarbons	1	27	944	8,319

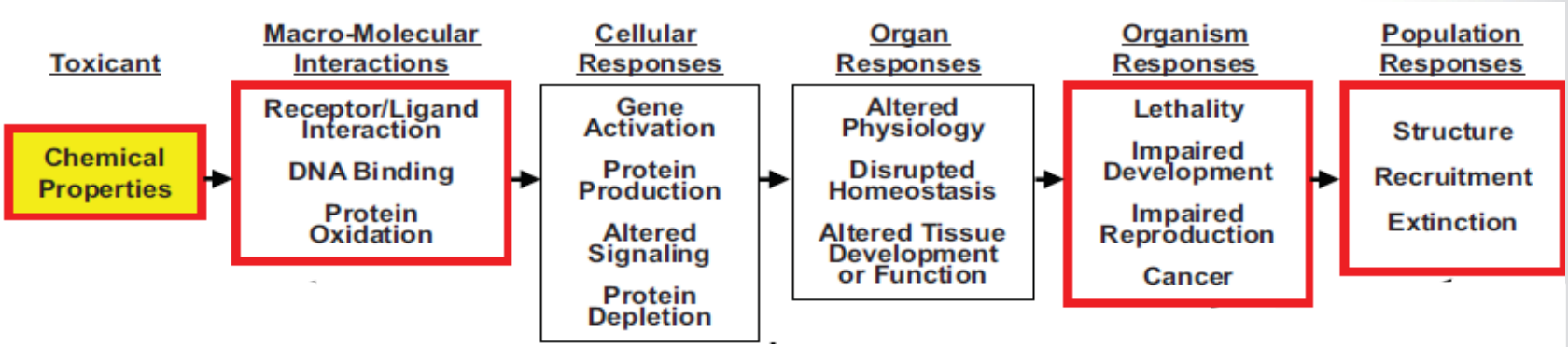
*List from V. Brady

Application of ECOTOX (and other tools/databases): Chemicals in Deconstruction Materials*



Ankley et al. 2010, Environmental Toxicology and Chemistry 29:730-741.

Application of ECOTOX (and other tools/databases): Chemicals in Deconstruction Materials*



Source						
ECOTOX		?	✓	✓	✓	some
Chem Dashboard	✓					
ToxREFDB			?	✓	✓	
HTP data (ToxCast)		✓				
Open Literature	✓	✓	✓	✓	✓	✓

Application of ECOTOX:
Chemicals in Deconstruction Materials*

Chemical	Number of Articles
Arsenic	25
Chromium	24
Copper	24
Lead	20
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Nickel	17
Cadmium	17
Mercury	15
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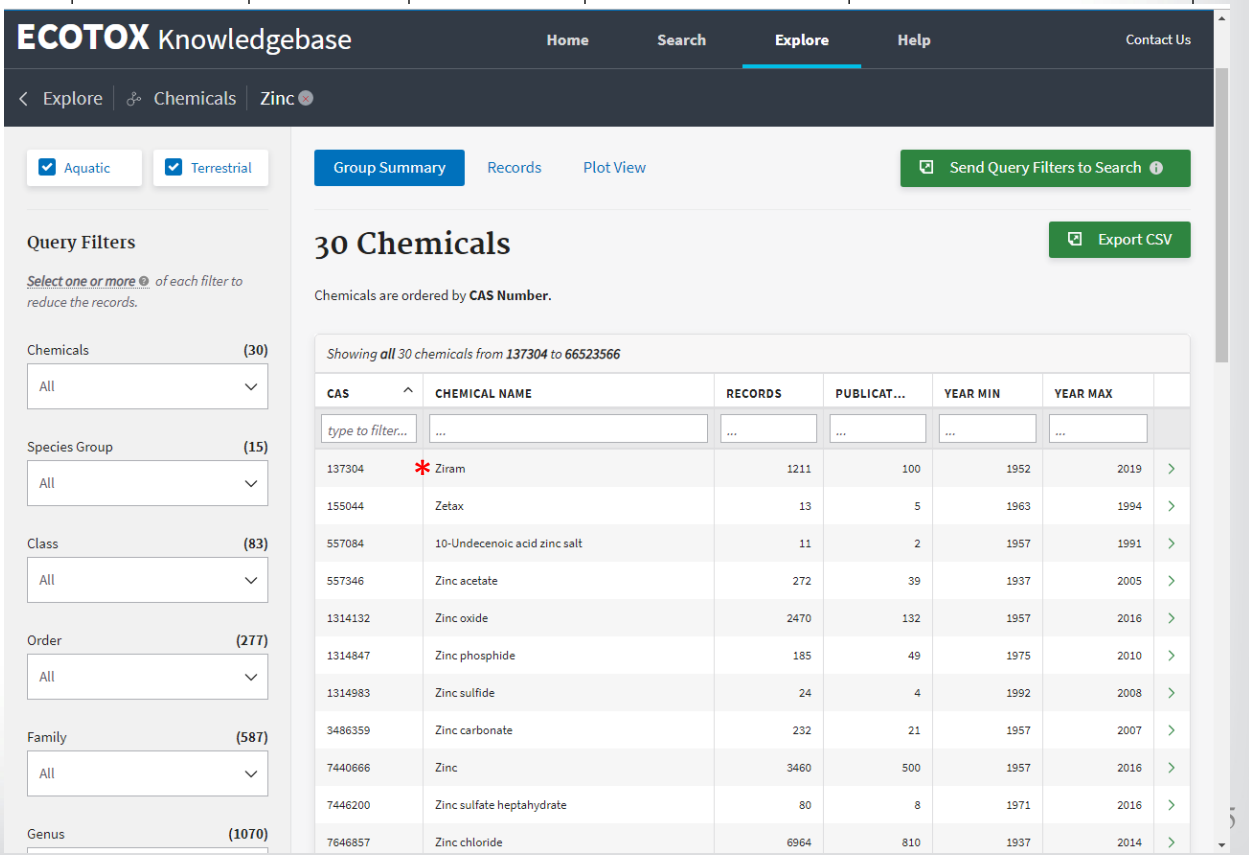
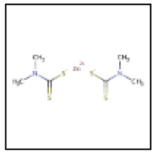
Selenium	10
Barium	10
Molybdenum	9
Calcium	9
Antimony	8
Chloride	8
Iron	8
Sodium	7
Aluminium	5
Magnesium	5
Potassium	5
Cobalt	4
Hydrogen sulfide	4
Manganese	3
Silicon	3
Sulfite	2
Phosphorus	2
Vanadium	2
Carbon	2
Sulfur	2
Boron	2
Ammonia	2
Cyanide	2
Thioarsenic	2
Carbon dioxide	1
Dimethoxy chloroamphetamine	1
Lithium	1
Strontium	1
Hydrogen	1
Nitrogen	1
Ethanol	1
Polychlorinated dibenzo-p-dioxins	1
Dibenzofurans	1
Biphenyls	1
Chlorobenzenes	1
Chlorophenols	1
Polycyclic aromatic hydrocarbons	1
Uranium	1
Chlorine	1
Fluorine	1
Titanium	1

Chemical	Number of Articles	ECOTOX Knowledgebase		
		# CASRNs	# of Refs	# of Records
Arsenic	25	24	524	5,025
Chromium	24	17	998	7,956
Copper	24	20	4,736	55,792
Lead	20	13	1,400	8,985
* Zinc	19	30	3,131	29,407



Chemicals Dashboard

EPA United States Environmental Protection Agency | Home | Advanced Search | Batch Search | Lists | Predictions | Downloads | Copy | Share | Submit Comment | Search all data



Ziram

137-30-4 | DTXSID0021464

Searched by DSSTox Substance Id.

- DETAILS
- EXECUTIVE SUMMARY
- PROPERTIES
- ENV. FATE/TRANSPORT
- **HAZARD**
- ADME
- EXPOSURE
- BIOACTIVITY
- SIMILAR COMPOUNDS
- GENRA (BETA)
- RELATED SUBSTANCES
- SYNONYMS
- LITERATURE
- LINKS
- COMMENTS

Hazard

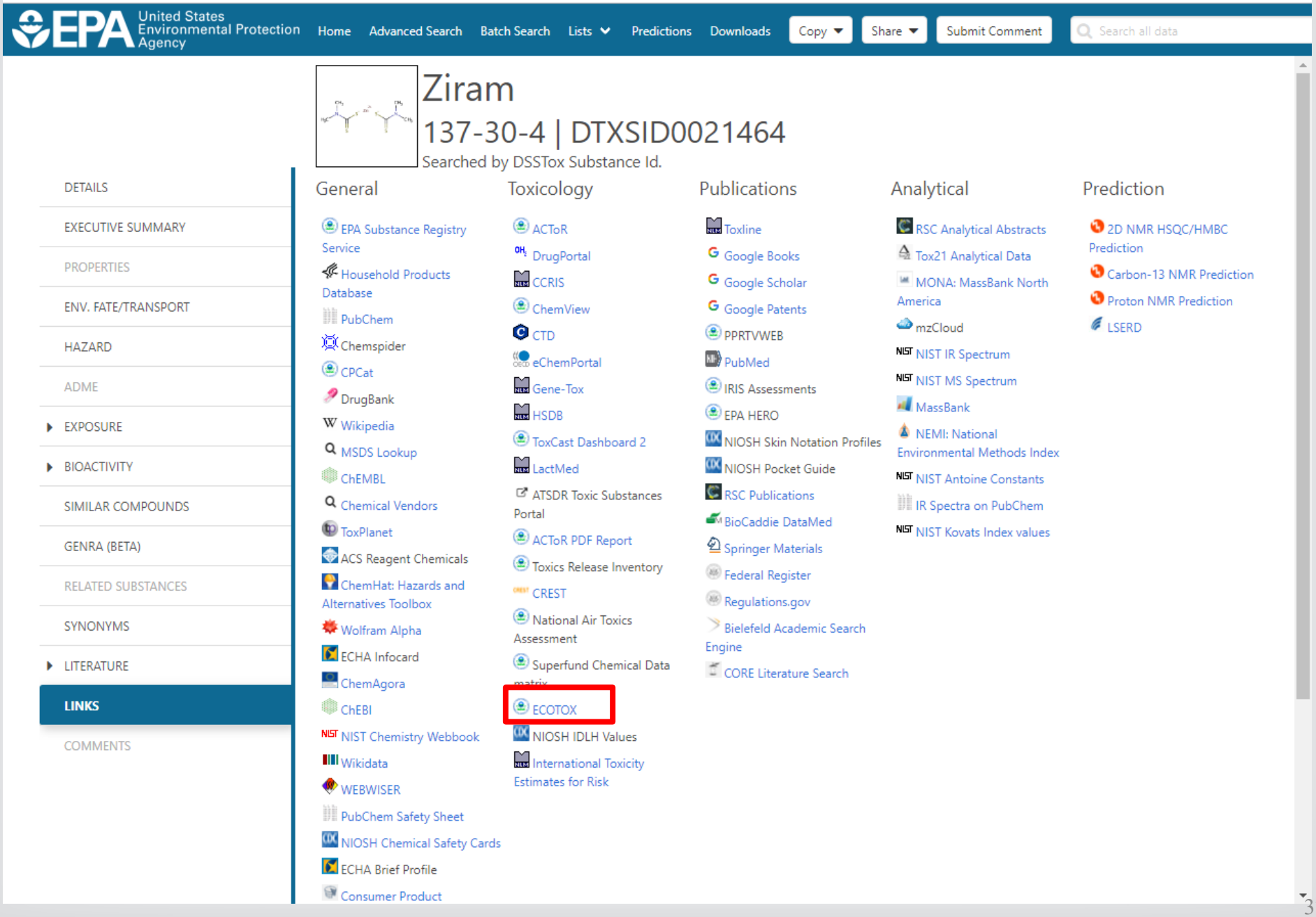
DataType: Lethality Effect Level

Human | Eco

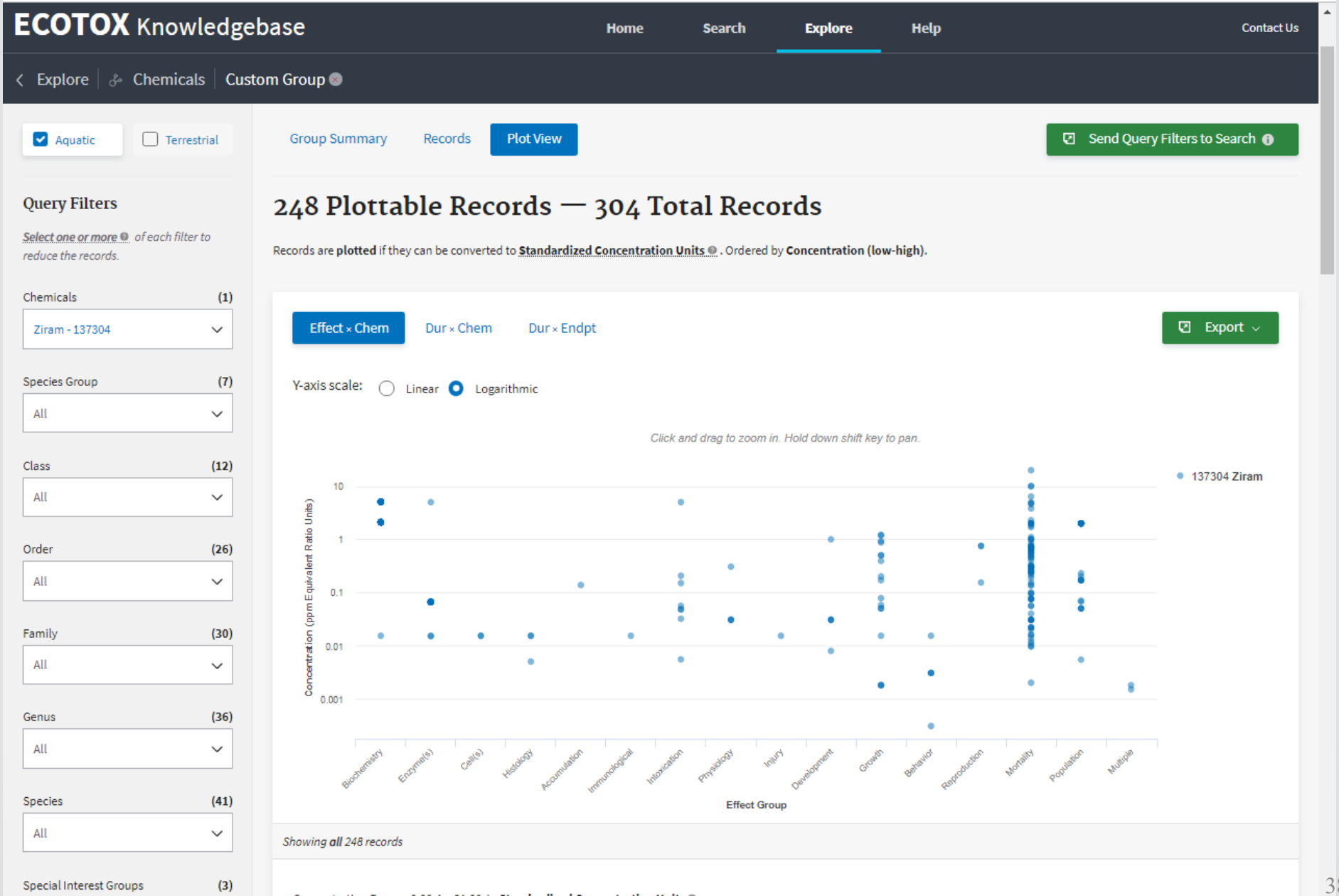
Download | Columns | 10 | Search query

More	Priority	Type	Subtype	Risk assessment class	Value	Units	Study type	Exposure route	Species	Subsource	Source
	3	LC50	-	subacute	5200	mg/kg food	mortality	oral	northern bobwhite quail	EPA ORD	ECOTOX
	3	LD50	-	acute	2000	ug/bee	mortality	oral	carniolan honey bee	EPA ORD	ECOTOX
	3	LC50	-	acute	2	mg/L	mortality	static	channel catfish	EPA ORD	ECOTOX
	3	LC50	-	acute	2	mg/L	mortality	static	channel catfish	EPA ORD	ECOTOX
	3	LC50	-	acute	2	mg/L	mortality	static	channel catfish	EPA ORD	ECOTOX
	3	LD50	-	subacute	100	ug/org	mortality	topical, general	honey bee	EPA ORD	ECOTOX
	3	LD50	-	subacute	10	mg/fish	mortality	oral	common carp	EPA ORD	ECOTOX
	3	LD50	-	subacute	0.1	mg/fish	mortality	topical, general	common carp	EPA ORD	ECOTOX
	3	LD90	-	chronic	2900000000	ug/org	mortality	dermal	honey bee	EPA ORD	ECOTOX
	3	LD90	-	chronic	7600000	ug/org	mortality	dermal	honey bee	EPA ORD	ECOTOX

Chemicals Dashboard



ECOTOX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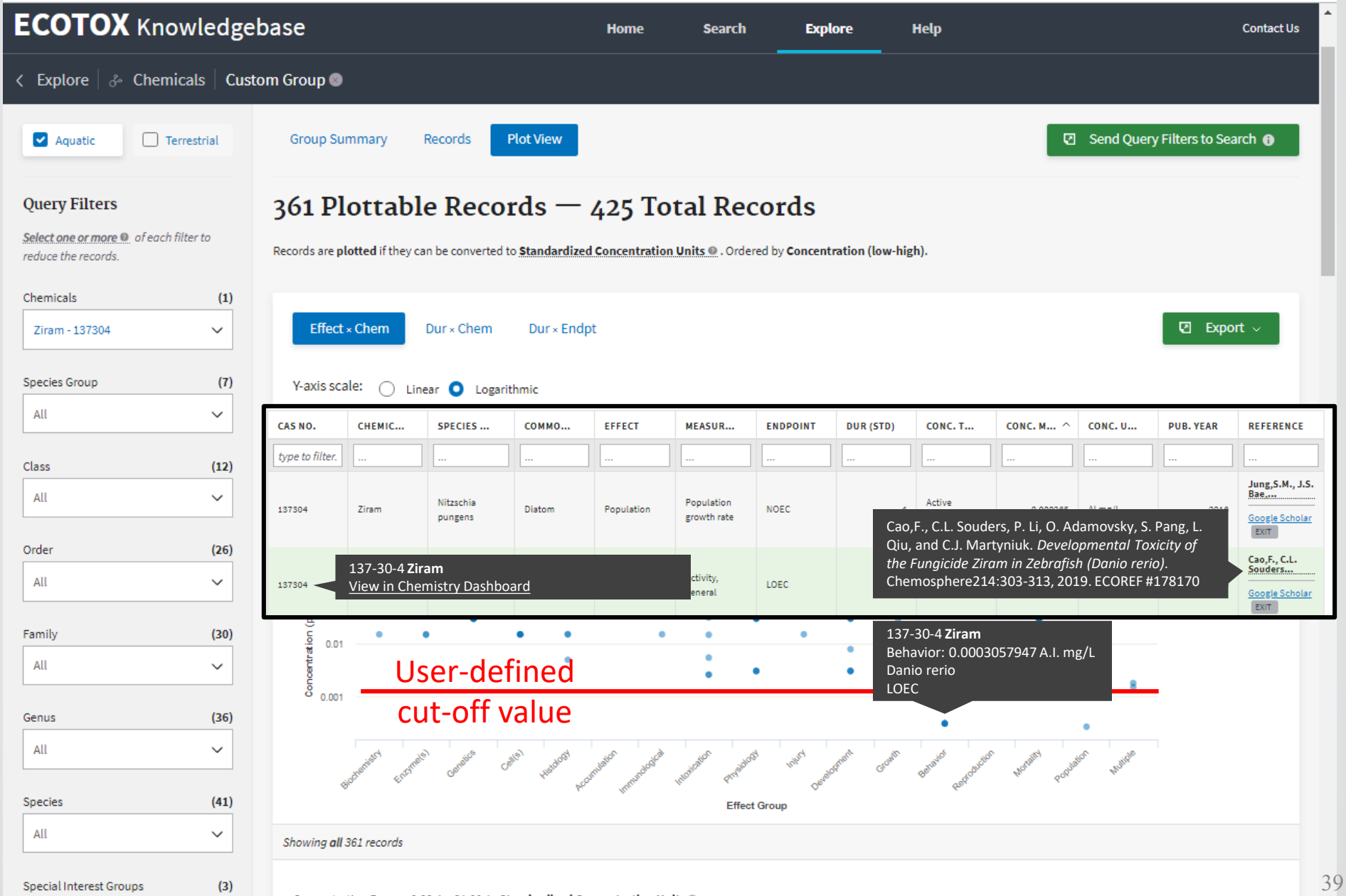
Custom Group
Aquatic
Terrestrial
Group Summary
Records
Plot View
Send Query Filters to Search
Query Filters
Select one or more of each filter to reduce the records.
Chemicals (1)
Ziram - 137304
Species Group (7)
All
Class (12)
All
Order (26)
All
Family (30)
All
Genus (36)
All
Species (41)
All
Special Interest Groups (3)
248 Plottable Records — 304 Total Records
Records are plotted if they can be converted to Standardized Concentration Units. Ordered by Concentration (low-high).
Effect × Chem
Dur × Chem
Dur × Endpt
Export
Y-axis scale:
Linear
Logarithmic
Click and drag to zoom in. Hold down shift key to pan.
137304 Ziram
Concentration (ppm Equivalent Ratio Units)
10
1
0.1
0.01
0.001
Biochemistry
Enzyme(s)
Cell(s)
Histology
Accumulation
Immunological
Intoxication
Physiology
Injury
Development
Growth
Behavior
Reproduction
Mortality
Population
Multiple
Effect Group
Showing all 248 records

ECOTOX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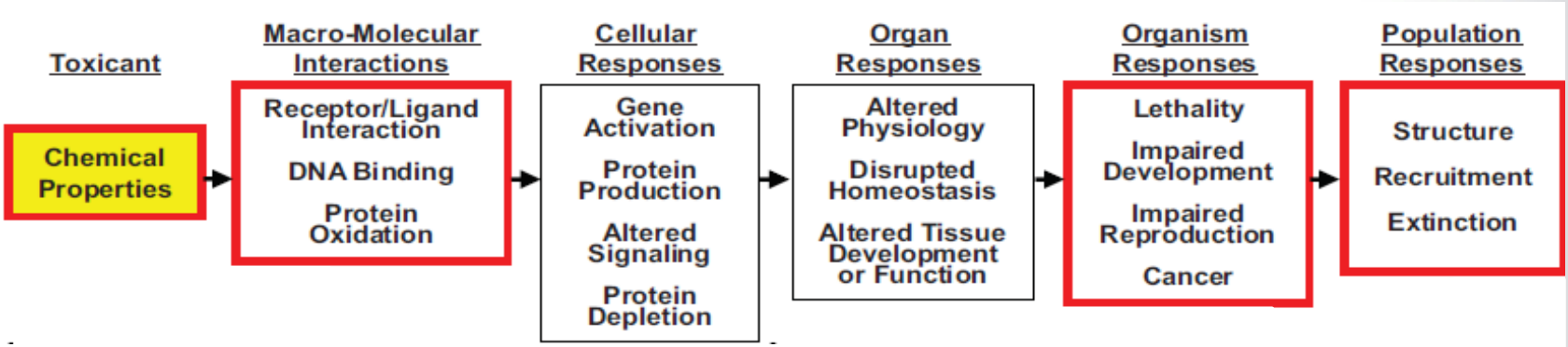
Records
Plot View
Send Query Filters to Search
361 Plottable Records — 425 Total Records
Records are plotted if they can be converted to Standardized Concentration Units . Ordered by Concentration (low-high).
Query Filters
Select one or more of each filter to reduce the records.
Chemicals (1)
Ziram - 137304
Species Group (7)
All
Class (12)
All
Order (26)
All
Family (30)
All
Genus (36)
All
Species (41)
All
Special Interest Groups (3)
Effect × Chem
Dur × Chem
Dur × Endpt
Export
Y-axis scale:
Linear
Logarithmic
CAS NO.
CHEMIC...
SPECIES ...
COMMO...
EFFECT
MEASUR...
ENDPOINT
DUR (STD)
CONC. T...
CONC. M...
CONC. U...
PUB. YEAR
REFERENCE
type to filter.
137304
Ziram
Nitzschia pungens
Diatom
Population
Population growth rate
NOEC
Active
Jung,S.M., J.S. Bae,...
Google Scholar
EXIT
137304
LOEC
Cao,F., C.L. Souders,...
Google Scholar
EXIT
137-30-4 Ziram
View in Chemistry Dashboard
Cao,F., C.L. Souders, P. Li, O. Adamovsky, S. Pang, L. Qiu, and C.J. Martyniuk. Developmental Toxicity of the Fungicide Ziram in Zebrafish (Danio rerio). Chemosphere214:303-313, 2019. ECOREF #178170
137-30-4 Ziram
Behavior: 0.0003057947 A.I. mg/L
Danio rerio
LOEC
User-defined
cut-off value
0.01
0.001
Biochemistry
Enzyme(s)
Genetics
Cell(s)
Histology
Accumulation
Immunological
Intoxication
Physiology
Injury
Development
Growth
Behavior
Reproduction
Mortality
Population
Multiple
Effect Group
Showing all 361 records

Application of ECOTOX (and other tools/databases): Chemicals in Deconstruction Materials*



Source						
ECOTOX		?	✓	✓	✓	some
Chem Dashboard	✓					
ToxREFDB			?	✓	✓	
HTP data (ToxCast)		✓				
Open Literature	✓	✓	✓	✓	✓	✓

Thank you!

Questions?

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