



## CAFE: Chemical Aquatic Fate and Effects Database

**T**he Chemical Aquatic Fate and Effects (CAFE) database is a software program designed to provide time sensitive information that helps spill responders in their assessment of environmental impacts in the event of a chemical or oil spill into salt or fresh waters. Using a series of intuitive steps, CAFE quickly and comprehensively synthesizes information needed based on the specifics of an incident. CAFE can be used to access aquatic fate and effects information for thousands of chemicals, oils, dispersants, and chemically dispersed oils.

Data in CAFE are presented in two modules, which can provide complementary information to responders: the Aquatic Fate module, and the Aquatic Effects module.

The **Aquatic Fate module**, which contains information for more than 30,000 chemicals, is divided into three sub-modules:

- **Structure and Physical Properties:** This sub-module displays basic chemical information used for modeling (e.g., boiling point, water solubility, molecular weight).
- **Environmental Fate:** This sub-module displays detailed environmental explanations on the fate and behavior of individual chemicals in different media (e.g., estimated Koc, biodegradation time, volatilization, partitioning).
- **Analytical Methods:** This sub-module displays methods used in measuring chemical levels in media (such as soil or water) and their uses.

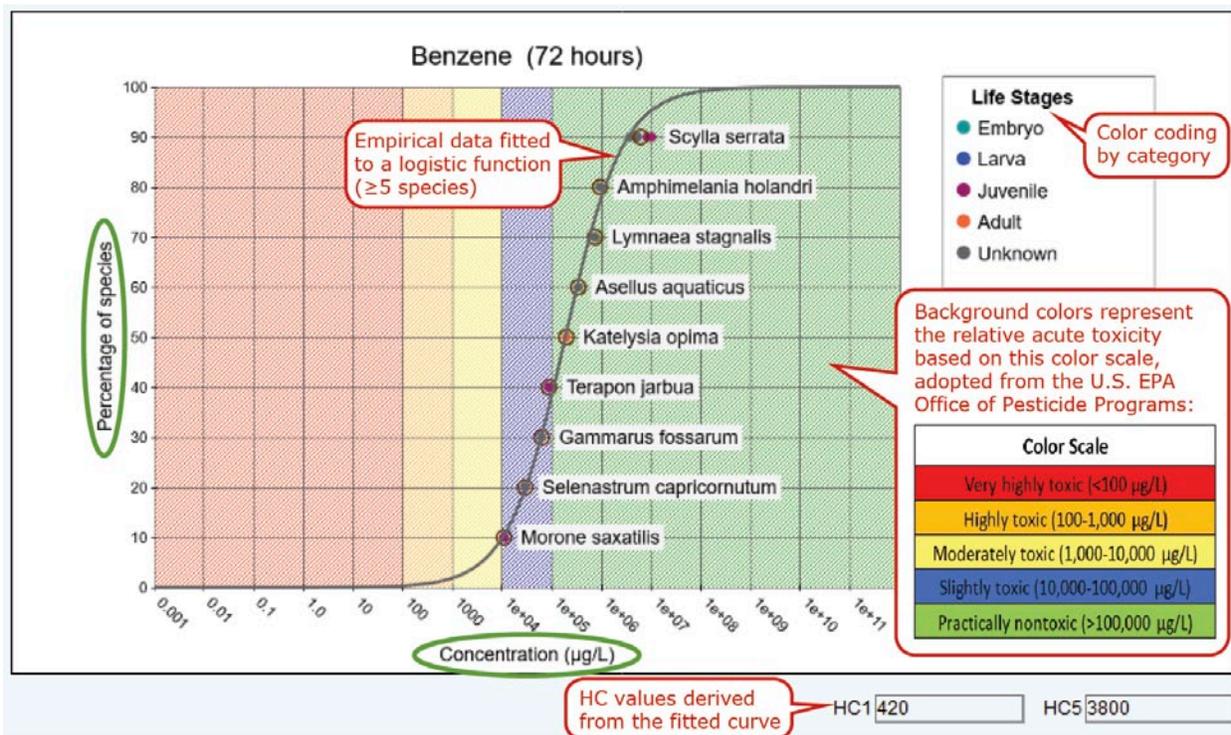
The **Aquatic Effects module**, which contains over 100,000 aquatic toxicity records for more than 3,600 chemicals (mostly from the US EPA ECOTOX database), has the following features:

- **Graphical display of aquatic toxicity data** in the form of Species Sensitivity Distribution (SSD) curves for specific acute exposure durations (24, 48, 72, and 96 hours).



Numerous species can be affected by oils and chemicals spilled into oceans, lakes, and rivers. (Becky Stanton, California Department of Fish and Wildlife)

- **Acute toxicity data for a variety of receptors**, which are easily queried based on specific features (e.g., life stage, water type, endpoint).
- **Short Exposure Risk Reports** for 1, 2, 4, 8, and 24 hour exposures for a select number of priority chemicals.
- **Toxicity data for over 200 oils, dispersants, and chemically dispersed oils** (originally from the DTox database) compiled from peer-reviewed literature, internal government reports, independent consultant and industry reports, and gray literature.
- **User-added toxicity data** allowing users to add their data to see how these compare with CAFE's toxicity data.



### What is a Species Sensitivity Distribution (SSD) Curve?

Species Sensitivity Distributions (SSDs) are models that describe the relative sensitivity of aquatic species to a chemical. SSDs are generated by ranking the relative sensitivity of individual species from the least to the most sensitive, and are used to estimate the proportion of species adversely affected at a given chemical concentration. SSDs can be used to derive a protection threshold or hazard concentrations. Each plot in CAFE includes:

- The **title** of each SSD with the name of the queried chemical, oil, or dispersant and the exposure duration.
- The **x-axis** representing the concentration in µg/L (plotted on a log scale) and the **y-axis** representing the percentage of species.
- **Points** representing data available for each unique species, and color coded by user-selected categories, such as life stage, endpoints, species groups, water type, etc.

- **Open circles** representing the geometric mean of all the toxicity data available for each unique species.
- The **line** representing the curve fitted to all the toxicity data points, with curves fitted to datasets with at least 5 unique species.
- A **background color** representing the relative acute toxicity of chemicals to aquatic organisms based on a color scale adopted from the U.S. EPA Office of Pesticide Programs.
- Estimates of the 1st and 5th percentile **Hazard Concentration (HC)** or HC1 and HC5, respectively, (in µg/L) which are assumed to be protective of 99% and 95%, respectively, of the species on the SSD.

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