

## Chemical Discharge Model System

**CHEMmap** is a chemical discharge model designed to predict the trajectory, fate, impacts and biological effects of a wide variety of chemical substances three-dimensionally.

### Applications for CHEMmap

- Impact Assessment
- Hindcast/forecast of spill response
- Natural resource damage assessment
- Contingency planning - including worst-case scenario
- Evaluation of point source discharges
- Cost-benefit analysis
- Drills and education

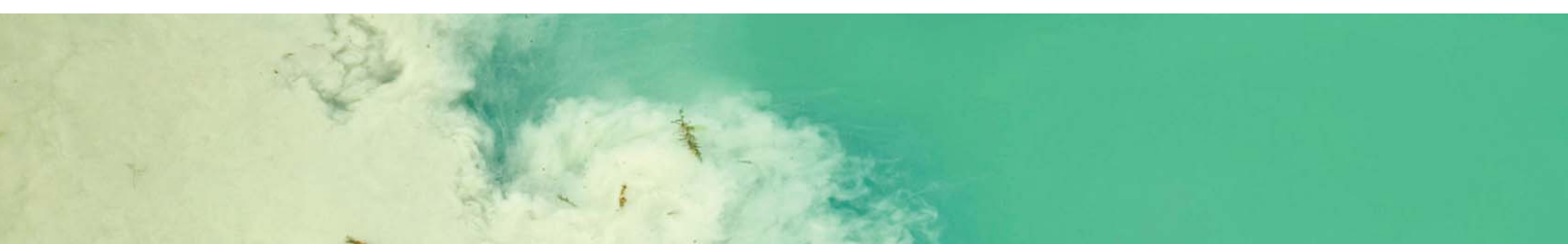
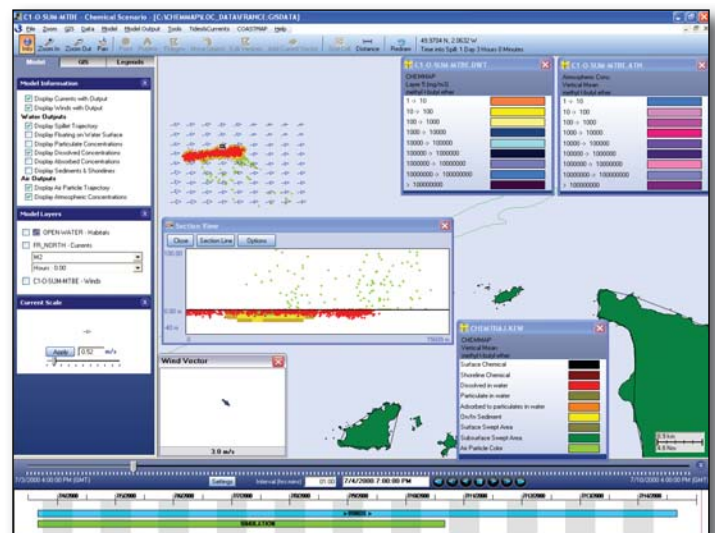
### Features

- Contains ASA's own GIS or can be used in other GIS software such as ArcView®
- Location specific environmental/ biological data applied to any fresh or salt aquatic environment in the world
- Can utilize a variety of hydrodynamic file formats
- Easily interpreted visual displays of concentrations over time
- 3D Viewer capabilities
- Biological exposure model to predict exposed fish and wildlife impacts
- MSDS database linked to the physical-chemical database
- Extensive chemical database providing physical-chemical data



### CHEMmap Highlights

- Chemical Fates Model
- Biological Exposure and Effects Model
- Stochastic Model
- Hazard Quotient Calculations
- Interactive GIS
- Environmental, Chemical & Biological Databases



## Model Modules

### Chemical Fates Model

CHEMMAP simulates the following processes:

- Initial plume dynamics
- Slick spreading, transport, and entrainment of floating materials
- Evaporation and volatilization (to atmosphere)
- Transport and dispersion of dissolved and particulate materials in the water column and in the atmosphere
- Dissolution and adsorption to suspended sediments
- Sedimentation and resuspension
- Natural degradation
- Shoreline entrainment
- Boom and dispersant effectiveness

### CHEMMAP Hazard Quotient

For all CHEMMAP model options the Hazard Quotients also known as Predicted Effects Concentrations divided by Predicted No Effects Concentration (PEC/PNEC) can be readily calculated.

### Biological Exposure and Effects Model

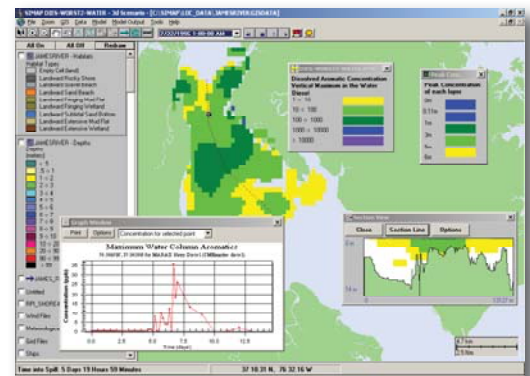
The biological exposure model evaluates:

- Area or water volume exposed above a selected threshold (i.e. a toxicological endpoint in US EPA ecological risk assessment terminology)
- Dose (sum of concentration times time of exposure) aquatic biota are exposed to and the expected percent mortality from acute toxic effects
- Direct-contact impacts to birds, mammals, and other wildlife

### Stochastic Model

The stochastic model predicts:

- Range of expected contamination and the probability of exceeding thresholds of concern from a chemical discharge
- Frequency distribution of model results, for which statistics are calculated and plotted



## Environmental, Chemical and Biological Databases

- **Environmental database** - includes coastline, bathymetry, shoreline type, ecological habitat type, and temporally varying ice coverage, temperature, and salinity
- **Chemical database** - includes physical-chemical parameters that allow the user to add new chemicals, duplicate chemicals already in the database and make changes to chemical data while preserving the original values. There is a link to ChemWatch Chemical Management System's comprehensive Health and Safety information
- **Biological databases** - can be set up for any area of the world. For the US, ASA has developed a biological database containing seasonal or monthly mean abundance by species and habitat type for each biogeographic region of the US

ASA has built a wide range of computer modeling applications to solve various environmental problems. ASAMAP™, ASA's suite of environmental modeling tools, are available for licensed use and customization and include: AIRMAP, CHEMMAP, CMSMAP, COASTMAP, HYDROMAP, OILMAP, SARMAP, SIMAP, MUDMAP and WQMAP. For more information visit our website at [www.asascience.com](http://www.asascience.com).

