

**Description:**

COSIM is a fully customizable transport, fate, and effects model. Commonly used by Responsible Parties (RPs) to conduct cooperative and or parallel Natural Resource Damage Assessments (NRDA), COSIM has been used to significantly refine Trustee injury assessments and identify errant and or unjustified NRDA expenditures. COSIM has also been used to assess potential environmental liability associated with planned and ongoing industrial operations.

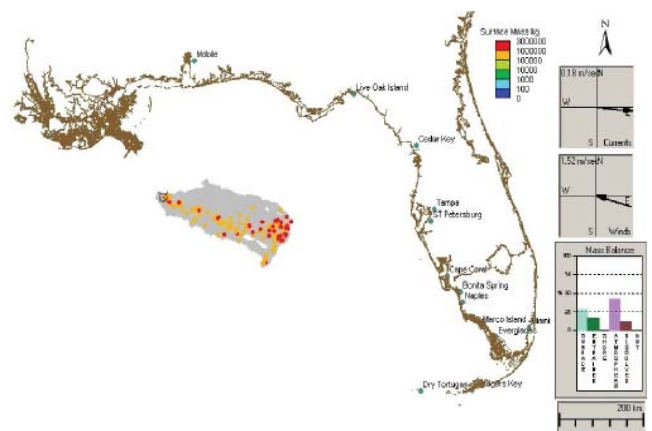
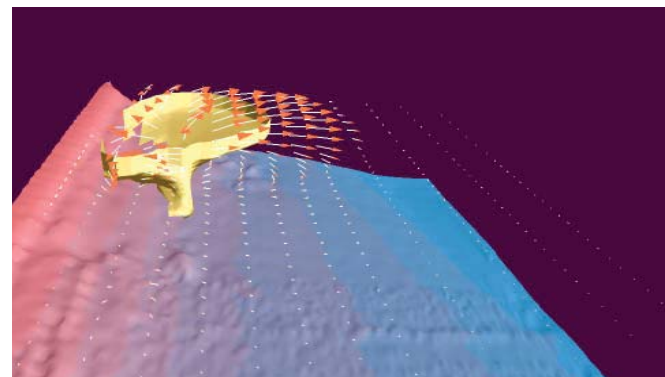
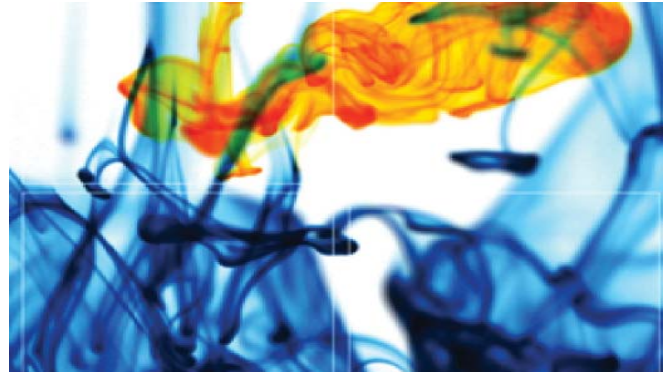
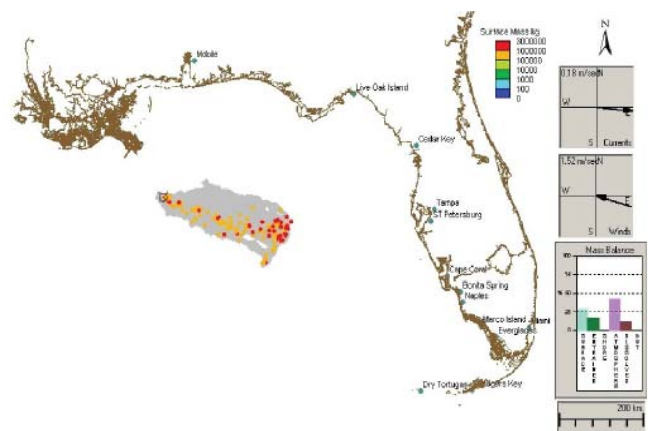
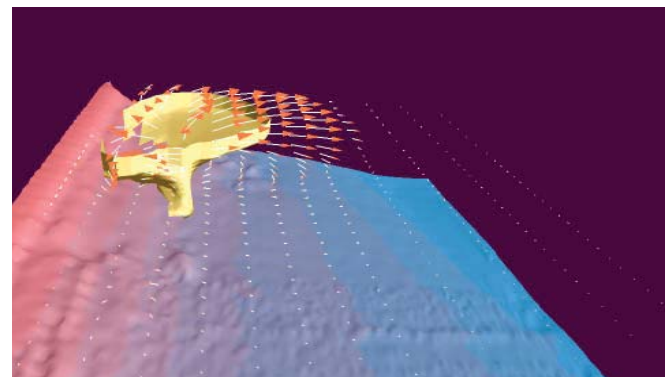
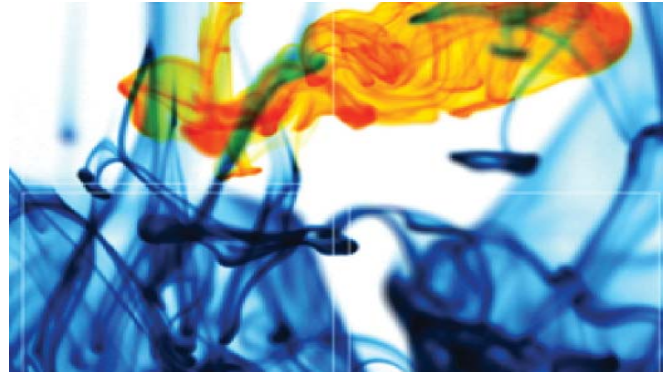
**Technical Underpinnings:**

COSIM uses 3-D flow fields from various hydrodynamic models to compute the distribution of chemical constituents following waterborne releases. Viewers and animation tools allow users to display model results and field data in an easily recognizable format or to be mapped directly to Google™ Earth.

The model tracks the fate of released chemicals into various phases and forms including surface slick, product stranded on shoreline, evaporated into the atmosphere, dissolved and or entrained in the water column, and or deposited on sediments.

Potential toxicological effects can be evaluated using a suite of methods that range from a conservative screening to a fully specified toxicological assessment that simulates *in situ* conditions with a maximum degree of accuracy. The offsetting affects of spill related closures are extrapolated from human use evaluations typically conducted in association with chemical releases, and third-party commercial claims.

The integrated effect of both impacts can be evaluated using a suite of bio-economic models ranging from a very simple and conservative screening analysis intended to be consistent with existing Trustee models to a fully specified ecosystem based analysis.





# Chemical Spill Modeling

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Services

## Applications:

- **Hypothetical Gulf of Mexico Release.** As part of an ongoing case being arbitrated in the United Kingdom, ENTRIX was asked to determine the likely fate and transport of a hypothetical 2 million barrel sub-sea blowout in the offshore waters of the Gulf of Mexico. It was assumed that the release would have continued for 4 weeks during which time three hurricanes would have influenced the system. ENTRIX modeling suggested that the oil was unlikely to have resulted in any meaningful shoreline oiling; a conclusion, which helped our client, reach a mutually agreeable settlement before final arbitration.
- **Confidential Spill.** When more than 100,000 gallons of heavy fuel oil were released into a turbid riverine system, ENTRIX used COSIM's refined toxicological algorithms, which allow for partitioning between organisms and suspended organics, to conclude that quantifiable toxicological impacts were unlikely to have occurred as a result of the spill. After review of the data presented by ENTRIX, the Trustees agreed with this conclusion and have not opted to conduct further toxicological modeling as part of this ongoing assessment.
- **Caleta Cordova Oil Spill.** On Christmas Day 2007, oil began washing on the shores of Caleta Cordova Argentina. The source of this oil was unknown and the chemical fingerprint of the oil was common to many ships in the area. ENTRIX was retained by an insurer to conduct a hydrodynamic hind casting exercise to determine if ships under the insurers coverage likely sources of the oil. The COSIM hind casting analysis was submitted to the Argentinean court for consideration.
- **Lake Calcasieu Aquatic Assessment.** In the summer of 2006 oil and waste water was released into the Louisiana Calcasieu estuary and COSIM was used by the RP to assess potential aquatic injury. Unlike the Trustees assessment model, COSIM integrated both the effect of oil toxicity and the effect of spill related fishing closures. This integrated assessment suggests that, after the public has been compensated for reduced recreational opportunity due to the fisheries closures, there remains no impact to the aquatic community, which will require compensation. This conclusion reduces potential NRDA liability associated with the spill by as much as \$0.35 million.
- **Spill Planning for a Confidential Client.** Nigerian environmental regulations require spill impact assessment prior to the initiation of offshore oil extraction operations. ENTRIX conducted stochastic release modeling to identify the potential impacts of a pressurized sub-sea blow out at an offshore location. This modeling was used to support the clients' 2006 drilling application.
- **Buzzards Bay Oil Spill Avian Assessment.** In the spring of 2005, the Trustees assessing spill-related avian impacts used a hydrodynamic transport model to assert that a large number of oiled bird carcasses sank before being deposited on shorelines. As a result, the Trustees suggested that the avian mortality estimate should be increased by 18 percent. ENTRIX used COSIM to refute the assertion and ultimately help the Trustees identify a programming error embedded in their analysis. The correction of this Trustee mistake, which would not have been possible without COSIM, reduces NRDA liability by approximately \$1.2 million, all else being equal.
- **Buzzards Bay Oil Spill Aquatic Assessment.** In the spring of 2003, Bouchard Barge 120 released number 6 fuel oil in Buzzards Bay Massachusetts. The law firm representing the insurance company requested that ENTRIX use COSIM to conduct a cooperative but parallel assessment of potential aquatic injury associated with the release. ENTRIX worked with a Trustee contractor to jointly develop model inputs, thus reducing assessment costs, and calibrate model predictions are critical junctures such as oil transport, oil stranding, and chemical dissolution rates. The cooperative modeling effort resulted in a joint conclusion that quantifiable injury to aquatic organisms was unlikely.
- **Chalk Point Oil Spill.** In the spring of 2000, 125,000 gallons of fuel oil leaked into a tributary of Chesapeake Bay when a pipeline ruptured. ENTRIX used COSIM to conduct a cooperative but parallel assessment of potential aquatic injury associated with the release. ENTRIX worked with a Trustee contractor to jointly develop model inputs, thus reducing assessment costs, and calibrate model predictions are critical junctures such as oil transport, oil stranding, and chemical dissolution rates. The cooperative modeling effort resulted in a consensus estimate of potential aquatic injury.

*“Our Age of anxiety is, in great part, the result of trying to do today’s jobs with yesterday’s tools”.*

-Marshall McLuhan