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ASA Makes an Impact on the Gold Coast, Australia

WQMAP will be a useful tool in decision support for future land use consideration within the Nerang River region and for planning and monitoring the health of the Gold Coast waterways.

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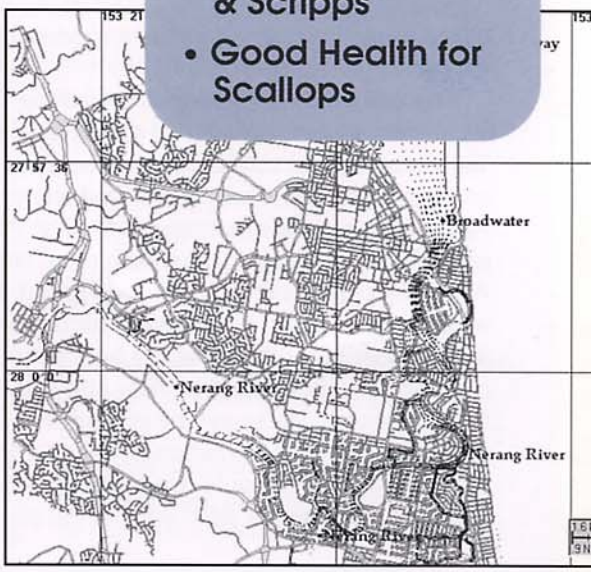
The Gold Coast, just south of Brisbane on the east coast of Australia, is home to a perfect climate, picturesque beaches, and the famous Surfer's Paradise. Winding its way through the Gold Coast is the Nerang River, with beautiful homes nestled against the riverbanks. The Nerang River is the largest and most significant river system on the Gold Coast, consisting of numerous canal and freshwater lake environments. The river provides the Gold Coast's drinking water and plays a significant role in recreation and tourism. Hence, the Nerang River not only requires a standard of water quality capable of supporting aquatic/marine life and meeting appropriate environmental health standards for primary contact, but must also maintain the high aesthetic standard expected by both residents and visitors to the region.

Asia-Pacific ASA successfully secured a contract for water quality modelling with the Gold Coast City Council (GCCC), making it the first Australian Local Government to incorporate ASA's water quality model, WQMAP. The GCCC will use WQMAP to assist with decision support in determining potential impacts caused by new developments to the Nerang River system.

A field program was established as part of the project to measure water quality parameters within the water column. Two forms of field data were used to determine the acute and chronic impacts on the river from local land use and runoff. The field program particularly focused on monitoring significant rainfall events, with more frequent sampling undertaken at these times. The second set of data consists of ten years worth of water quality measurements collected in the Nerang River system by the GCCC as part of their commitment to creating sustainable development in the Gold Coast region. The combination of the datasets and external forcing (i.e., wind, rainfall, freshwater inflow and water elevation) enabled a comprehensive understanding of the time-varying two-dimensional structure of these parameters within the Nerang River system.

Brian King and Sasha Zigic of Asia-Pacific ASA trained members of the GCCC to use WQMAP and worked actively with them to ensure that WQMAP meets all of their water quality management requirements. The GCCC currently uses WQMAP to analyse system dynamics and to predict the impacts of actual events or potential river design and management alternatives. They anticipate that the WQMAP system will be a useful tool in decision support for future land use consideration within the Nerang River region and for planning and monitoring the health of the Gold Coast waterways.



ASA's Water Quality Modelling Analysis Package (WQMAP) displaying the extents of the Nerang River study area, Gold Coast Australia.

Insuring Good Habitat for Scallops

Nantucket Bay Scallops are famous the world over for their sweet taste, tenderness and size. Thus the island is very sensitive to any degradation of water quality in Nantucket Harbor, where the scallops are fished. In order to evaluate impacts of harbor watershed development and to assess engineering alternatives to preserve and improve water quality, the town contracted with a team headed by ASA to study these issues. One of the concerns that the team addressed was elevated nutrient levels resulting from increased development on the island, which causes eutrophic conditions and thus low dissolved oxygen in harbor waters. To assess the potential sources of this problem and to develop management options, ASA provided a WQMAP application consisting of a hydrodynamic model, a flushing model, a nutrient loading model and a total nitrogen model.

Matt Ward (2nd from left) together with the Nantucket Harbor Model training class.

The calibrated circulation and flushing models were the basis for evaluating effects of several harbor modifications. These conceptual configurations focused on changes to the entrance channel, creating dredged channels to connect the Harbor basins, and creating a cut to the Atlantic Ocean at the east end of the harbor. According to Craig Swanson, the ASA project manager, the analysis found that little change would result from modifying the harbor entrance, that dredging the channel connecting the basins would actually decrease flushing by directing flow into the channels and away from the broad shallower areas, and that the largest impact would be due to the creation of a cut to the Atlantic Ocean. This configuration would dramatically reduce flushing times due to the significant difference in the phase of the tides between the ocean and the Harbor. Such a major change could also have unintended environmental consequences and would need to be studied in much greater detail before proceeding.

Nitrogen loading to the harbor was also studied. WQMAP calculates nitrogen loads from land to shallow estuaries and is based on land use in the watershed. Estimates of total nitrogen concentrations in the harbor were modeled and found to be not significantly above background levels because the loads are relatively small. Comparisons of nitrogen measurements taken in the Harbor during 1997 through 1999 with model predictions were found to be consistent.

An application of ASA's WQMAP model system was installed that allows town personnel to track and predict flushing and water quality changes. Matthew Ward, who performed the project modeling, conducted a training session on the island. WQMAP was very well received by town personnel. The ease of data entry and visual display of model results makes this application very useful to them and should prove a valuable tool for water quality management.

OILMAP used by MMS and Scripps for Southern California

The Minerals Management Service (MMS) and the Scripps Institution of Oceanography, University of California, San Diego entered into a series of Cooperative Agreements, the first beginning in July 1991, in order to determine and describe the oceanic circulation in the Santa Barbara Channel-Santa Maria Basin area. The information coming out of this research is being used in support of decision-making concerning OCS oil and gas activities in this area.
As part of this program, ASA's OILMAP system has been incorporated into the project by MMS. OILMAP has been customized to integrate the oceanographic data developed by Dr. Ed Dever at Scripps and time varying gridded wind fields. OILMAP's GIS will also be used to store and view results from the extensive set of moored current and free-floating drifter studies that have been performed. Integration of this data with OILMAP's visualization and trajectory models will help researchers study the performance of the model using synoptic current fields developed by Scripps (see figure on back page). Eoin Howlett from ASA recently met with David Browne and Lu Tan from MMS and Ed Dever and Jerry Wanetick from Scripps for the incorporation of OILMAP into the project. Dave Browne, project manager for the study was very positive, "ASA has been very cooperative in customizing their product to fit our needs in the Pacific Region. Their latest modeling product, OILMAP, coupled with one of the best oceanographic data sets ever acquired, will serve as an accurate planning and response tool for MMS's oil spill risk assessment efforts."

Jerry Wanetic, Lu Tan, Ed Dever, Eoin Howlett, and David Browne at the Scripps Institution of Oceanography, San Diego, California.

Personnel

On 13 November, **Deborah French** presented her research on oil toxicity modeling at the 21st Annual Meeting of the Society of Toxicology and Chemistry (SETAC). She has just completed preparation of a manuscript for submission to the journal, entitled: "Development and Application of an Oil Toxicity and Exposure Model, OilToxEx".

Craig Swanson was invited to speak at the Biology at Noon Seminar Series at the University of Rhode Island's Graduate School of Oceanography on 29 November. He spoke on *Modeling the Four Dimensional Structure of Mt. Hope Bay* using ASA's WQMAP boundary fitted hydrodynamic modeling system. A major focus of the modeling in Mt. Hope Bay is to understand the thermal effects of the cooling water discharge from an electrical generating facility located on the bay.

In December 2000 **Chris Galagan** was appointed by the Rhode Island State Planning Council to serve on the Rhode Island Geographic Information System Executive Committee. The committee is tasked with coordinating and guiding the use of geographic information technology in Rhode Island, supporting initiatives for the use and implementation of GIS technology, and managing the database of spatial information within the state.

Bill Saunders is a native Rhode Islander who we are very pleased to welcome back to the Ocean State. Bill joined ASA in January as a Total Maximum Daily Load (TMDL) modeling specialist. Bill holds a Master of Science in Civil Engineering from the University of Texas at Austin. Bill has extensive experience with GIS hydrologic modeling applications, specializing in watershed modeling and the quantification of non-point source pollution. He comes to ASA from the Texas Natural Resource Conservation Commission, where he managed TMDL programs throughout the state. Bill continues his TMDL focus at ASA and is currently applying hydrodynamic models for assessments of dam breach flooding and near-field discharge mixing zones.

Deb French and **Eric Anderson** were invited speakers at the U.S. Minerals Management Service (MMS) information transfer meeting in New Orleans, December 5-6. Deb spoke about ASA's oil and chemical spill analysis systems, now in use in the Gulf of Mexico to analyze potential releases of chemicals used in deep water oil production. Eric spoke about the oil and gas bubble plume dynamics simulation work that ASA has completed for the oil industry in locations around the world. There was good interaction with other modelers from MMS and other contractors.

Daniel Mendelsohn trained members of the City and County of Honolulu, Division of Environmental Quality in the use of ASA's hydrodynamics and water quality model system, WQMAP. ASA's WQMAP model system is being used to evaluate the distribution and fate of the effluent plumes from two of the City's waste water treatment facility offshore outfalls. The training took place at the City and County offices in Honolulu, HI on 15-17 November, 2000.

Eoin Howlett and **Roddy Thomas** visited with the Maritime and Port Authority (MPA) of Singapore in November to deliver SARMAP, ASA's Search & Rescue model system. SARMAP is now operational for a large region around Singapore and is integrated with hydrodynamic model predictions performed by MPA. SARMAP allows the user to quickly predict search areas for missing objects at sea and allocate search & rescue resources to the area.

ASA exhibited at Brasil's International Oil & Gas Show, 16-19 October. **Eduardo Yassuda** and **Roddy Thomas** attended the show. Eduardo is ASA's manager of their newly formed joint venture company ASATM, which will directly support their clients in Brasil and other South American countries.

Eoin Howlett and **Roddy Thomas** attended the Interspill Conference and Exhibition at Brighton, UK, 28-30 November. This is the first dedicated international oil spill conference in Europe, and the next Interspill will be hosted in France in 2003.

Sasha Zigic from Asia-Pacific ASA spent the month of January in Rhode Island working with us on various projects. Sasha also performed research for his PhD studies; the integration of culvert and lock structures into a hydrodynamic and water quality model. By incorporating the culvert and lock routines within WQMAP, researchers can examine the influence lock structures have on water quality.

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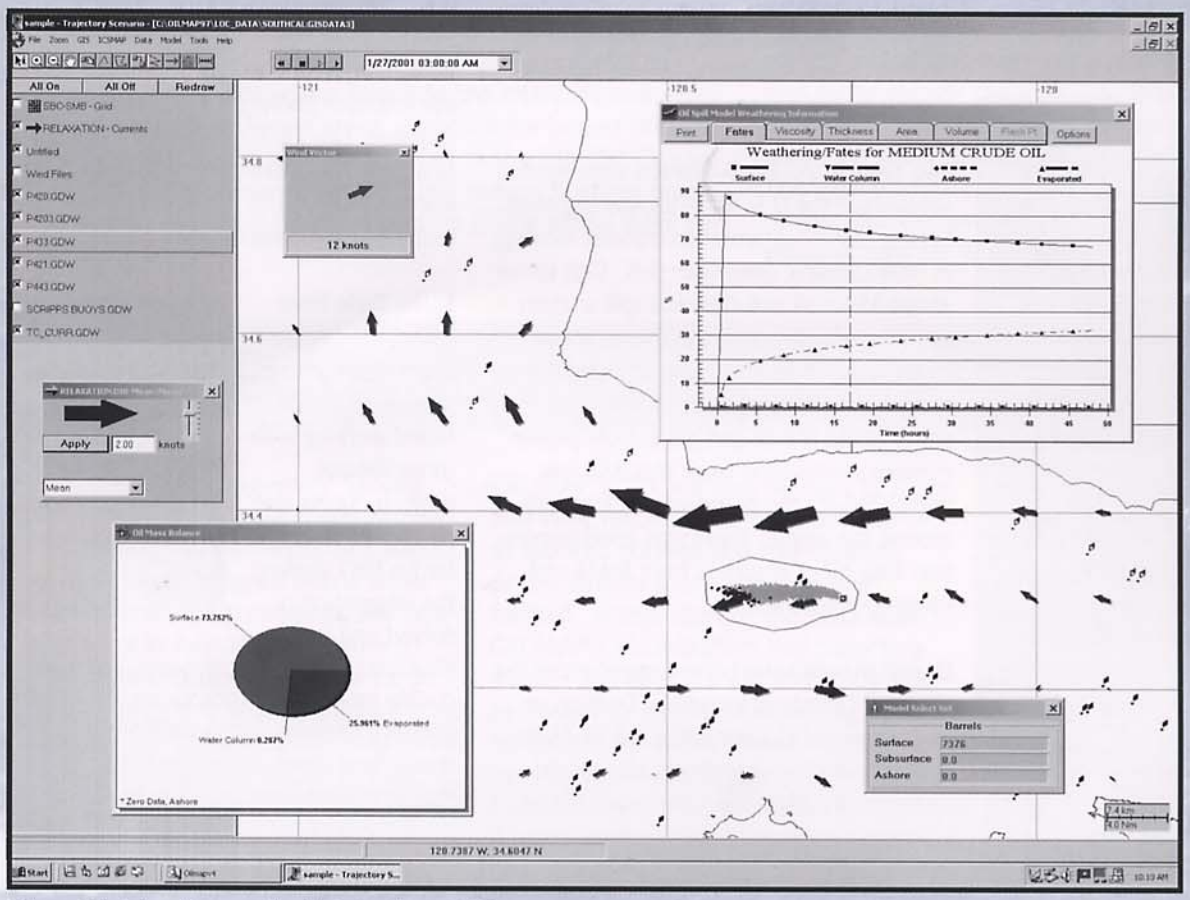
OILMAP used by MMS and Scripps for Southern California



Oilmap V4.0 simulates an oil spill in Southern California using current data generated by the Scripps Institute of Oceanography.

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A dolphin at San Diego's Seaworld