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## Gooseneck Cove

Gooseneck Cove is a small (~65 acres), shallow (maximum depth of ~2 m) estuary located along the southern shore of Aquidneck Island in Newport, RI. Tidal flow in the cove has been inhibited by several man-made constrictions. This diminished flow has negatively impacted the water quality of the cove, leading to the loss of salt marsh habitat and creating conditions in which the invasive plant *Phragmites australis* (common reed) can outcompete native salt marsh plants. NOAA and the Natural Resources Conservation Service are working to restore Gooseneck Cove. In support of these efforts, ASA worked with Save The Bay, an independent, not-for-profit organization dedicated to protecting the Narragansett Bay Watershed, to evaluate restoration alternatives which will ameliorate the effects of the man made constrictions, enhancing tidal flow and returning the marsh to its natural state. ASA performed this study as a partner in the Rhode Island Corporate Wetlands Restoration Partnership (RI-CWRP), a joint effort between corporations, government agencies and non-profit environmental groups, to restore degraded wetlands, rivers and fish and wildlife habitat in Rhode Island.

Gooseneck Cove extends approximately 1400 m from its mouth at Cherry Creek, which is the principal source of surface freshwater for the cove, to its mouth at Narragansett Bay. Tidal flow in the cove is inhibited by several artificial constrictions, including a pair of culverts running beneath Ocean Drive at the mouth of the cove (see figure), a small, debilitated dam upstream of the Ocean Drive culverts, and a small culvert near the head of the cove. Two alternative restoration plans have been proposed for Gooseneck Cove. These restoration plans involve replacing or removing each of the various constrictions in the cove. ASA combined a field program with numerical modeling to evaluate the effectiveness of each of the proposed restoration alternatives.

Working with volunteers from Save The Bay, ASA conducted an intensive field survey to characterize variations in salinity, temperature, dissolved oxygen (DO) and tide height along the length of the cove. ASA used the surface elevation data to calibrate a flow model for the system, using a 1-dimensional numerical model of flow in a multi-inlet, multi-basin system with complex channel geometry. Once the model was calibrated, the effect of each of the proposed restoration alternatives on the flow was evaluated by adjusting the size of the constrictions in the model. These changes in flow result in increased tidal ranges within the cove, leading to an increase in the area of salt marsh habitat.

Changes in salinity in the cove associated with each of the proposed restoration alternatives were modeled using a numerical model for salt transport. Output from the flow model was combined with data from the

### THE INSIDE STORY

- Oil Spill Risk Assessment Contours added to OSRA
- Personnel News
- Met Ocean Web Services
- Upcoming Conferences

field program to calibrate the salinity model. The restoration alternatives were then evaluated by using the corresponding results from the flow modeling. The increased tidal flows resulting from restoration alternatives lead to higher salinities in the cove, thereby reducing the area in which *Phragmites* will grow.

For more information on this project contact Paul Hall, [phall@appsci.com](mailto:phall@appsci.com).



Above photo: A pair of 1.2 m diameter culverts, located beneath Ocean Drive at the mouth of Gooseneck Cove. Aerial photograph courtesy of Save the Bay.

# Oil Spill Risk Assessment Contours added to OSRA

Western Australia has 12,500km of coastline, hosting more than twenty ports that are managed by port authorities and the state government. The Department for Planning and Infrastructure (DPI) facilitate the protection of Western Australia's marine environment by policing pollution laws and providing an emergency response service. The DPI also trains the users of WA waterways to improve local response to pollution events such as oil spills, and provides tools to assist in that response. One such tool is the Oil Spill Response Atlas (OSRA), which is a Geographic Information System (GIS) containing a state-wide database of coastal and marine information to aid contingency planning and decision making during marine pollution incidents. Asia-Pacific ASA has been commissioned to add another element to the OSRA: Oil Spill Risk Assessment contours for the state's ports. This will be achieved using ASA's HYDROMAP and SIMAP systems. The project has begun with a pilot study focusing on one of the state-managed ports, Port Walcott, at Cape Lambert in WA's northwest.

The contours will depict the probability of oil coming into contact with a shoreline or other socioeconomic or environmental features. This will enable the DPI and local authorities to see in advance the possible environmental risks to sensitive areas should a spill occur in a location of potential risk. Time contours will assist in depicting the rate of oil dispersion. This information will help in the response decision process, assuring cleanup procedures can be deployed within the given predicted time frame.

The spill probability contours will be included as layers in the OSRA GIS, and can be used to test the potential impacts of different spill scenarios. The inclusion of the spill probability contours in the OSRA GIS layers will enable the user to:

- Determine which sensitive features are at risk of contaminant exposure given current locations of ports, shipping channels and discharge outlets
- Determine the risk to those sensitive features not visible to the naked eye, such as marine park boundaries, animal nesting/feeding sites and fishing zones
- Include the position and availability of access roads, air strips, shipping channels and support vessels
- Determine in advance the equipment that each facility would require in order to effectively respond to a spill in their locality
- Locate nearest response resources relevant to the feature at risk

The various outcomes of "what if" queries will enable the port authorities to make advanced predictions of the impact of potential spills, and can assist in decision making processes such as locating future shipping routes, infrastructure and industry, and allocation of equipment.

The detailed model input grids, currents and winds will be made available to AMSA (Australian Maritime Safety Authority) to utilize in their real time oil spill response modeling, which currently uses ASA's OILMAP system.

For more information contact, Kathy Sheridan, ksheridan@apasa.com.au.



The Ore Wharf at Port Walcott stands 20m above sea level to avoid inundation during cyclonic events. Visiting vessels are laden with diesel fuel and heavy fuel oils.



Port Walcott  
(photo courtesy  
of Robe Mining)

## PERSONNEL.....

**Craig Swanson** and **Matt Ward** presented *Application of a Monitoring and Modeling System to Narragansett Bay and Rhode Island Waters* at a poster session at the EMAP 2004 Symposium held 3-7 May in Newport, RI. Co-authored with **Eoin Howlett** and **Malcolm Spaulding**, the poster described ASA's COASTMAP application to Narragansett Bay.

At the invitation of ConocoPhillips Indonesia, **Scott Langtry** of Asia Pacific ASA gave a presentation on 5 May, in Jakarta, to the company's Crisis Management team on the behaviour of oil on the sea, which was followed by a demonstration of how the OILMAP and SARMAP software can greatly assist with forecasting this behavior for effective emergency response. The presentation formed part of a three-day training program that involved response exercises to a range of marine emergencies, which made use of the HYDROMAP, OILMAP and SARMAP models as well as automatic data links to weather forecasts through COASTMAP.

**Nicole Whittier** and **Roddy Thomas** attended the OCEAN OPS workshop, 10-15 May in Toulouse, France. The workshop was an informative international consortium to discuss met ocean data in support of maritime safety and environmental management. Nicole presented a paper "Chemical Spill Modeling and Spill Hazard Evaluation of the Most Frequently Spilled Chemicals", coauthored by **Deborah French McCay** and **Matt Ward**.



OceanOps 2004 attendees during a tour of Toulouse.

**Craig Swanson** attended the ACCORD (Advice and Consultation Committee on Re-Suspension by Dredging) meeting at the USACE Engineer Research and Development Center in Vicksburg, MS on 20-21 May. The purpose of the meeting was to discuss recent developments including results of recent monitoring efforts of dredging activities in both the United States and Europe.

**Craig Swanson** presented a paper titled *Circulation and Water Quality Assessment at Quonset-Davisville, Rhode Island* at the Coastal Society conference held 23-26 May in Newport, RI. The presentation, coauthored with **Malcolm Spaulding**, Bernward Hay (The Louis Berger Group) and David Tremblay (Governor's Office, Rhode Island) focused on the field and modeling studies recently conducted to assess the effects of potential channel deepening as part of proposed improvements to the port at Quonset-Davisville.

Oil spill fate and effects modeling and analysis is being performed to evaluate the implications of oil spill response options being considered by the Washington State Department of Ecology (WDOE) in their rulemaking related to oil spill preparedness (WA State Contingency Plan Rule). **Deborah French McCay** presented modeling results to WDOE in Olympia, WA during the week of 25 May. The modeling, which was carried out by Debbie, **Jill Rowe**, **Nicole Whittier**, **Subbaya Sankaranarayanan**, and **Claudia Suárez**, compares the fate, effects and NRDA costs using various response methods for spills in Washington waters. The results are being incorporated into a cost-benefit analysis by WDOE.

On 8-10 June **Deborah French McCay** attended the 27<sup>th</sup> annual Arctic and Marine Oilspill Program (AMOP) Technical Seminar in Edmonton, AL. Debbie presented the results of bird impact validation studies using the SIMAP oil spill model, entitled: "Evaluation of Bird Impacts in Historical Oil Spill Cases Using the SIMAP Oil Spill Model" co-authored by **Jill Rowe**.

Results of modeling for a proposed major port facility in Cockburn Sound, Western Australia, were presented to the Fremantle Port Authority by **Scott Langtry** on 10th June. The modeling, which was carried out by Scott Langtry, **Sasha Zigic** and **Kathy Sheridan** of Asia Pacific ASA using WQMAP, compared local and regional-scale impacts of 5 conceptual designs for an artificial island in terms of circulation and flushing.

**Craig Swanson** was invited to participate in a NOAA NOS Workshop on Flushing / Residence Times in Bays and Estuaries held 8-9 June in Silver Spring, MD. Discussion among the 35 participants centered on the current state of the art, appropriate applications, measurement techniques and numerical algorithms. A publication is planned to document the results of the workshop.

On 14-17 June, **Roddy Thomas**, **Eduardo Yassuda** and **Jiganesh Patel** attended Europe's bi-annual International Oil Spill Conference and Exhibition at Trondheim, Norway, Interspill 2004. ASA exhibited and met with a number of international clients. Eduardo presented a paper titled "Computational Tools for Contingency Planning in Brazil," co-authored by **Jose Edson Pereira** along with Renato P. Martins, José Antonio M. Lima, Angelo Sartori Neto from Petrobras and Edmo Campos from Labmon.



From left to right, **Eduardo Yassuda**, **Vincent Gouriou** (CEDRE – France), **Thais Mendes da Silva** (CENPES – PETROBRAS), **Pedro Penido** (CENPES – PETROBRAS), **Fatima Meniconi** (CENPES – PETROBRAS), and **Ricardo Moura** (E&P/SERV – PETROBRAS).

**Jim Clark**, **Tom Parkerton**, **Wolfgang Konkell** and **Anita George-Ares** of ExxonMobil attended a training/workshop at ASA 23-24 June, given by **Deborah French McCay**, **Jill Rowe** and **Nicole Whittier**. The training and discussion included: technical description of the SIMAP oil fates and effects model developed by ASA; oil toxicity studies and modeling; potential development and validation research and potential applications.



From left to right, **Tom Parkerton**, **Wolfgang Konkell**, **Anita George-Ares**, **Debbie**, and **Jim Clark**.

**Rafael Bonanata** is taking a year leave from the Brazilian office to enroll in a Master degree program in Science and Technology to Coastal Management with Ocean & Coastal Research Group (G.I.O.C), University of Cantabria, Santander, Spain. Mr. Bonanata will participate in research and applied projects such as port engineering, shore protection, water quality and numerical & physical modeling.

**Kelly Knee** and **Tim Giguere** attended a three-day ESRI training course in Washington DC. The course reviewed the use of Visual Basic, Component Object Model, and ArcObjects to build custom components to extend the functionality of ArcGIS®. The course assists ASA in the integration of ASA's numerical models with ESRI GIS.

**Eoin Howlett**, **Malcolm Spaulding**, and **Paul Hall** attended meetings at the United States Coast Guard Research & Development Center to coordinate the project plan for integrating CODAR current data with the new SAROPS search & rescue system. ASA is working with Anteon, UCONN, and URI to integrate sea surface radar data from CODAR. The project includes drifter deployments this summer to assist in the analysis of this current data and optimize its use during search and rescue planning operations.

As part of the Argentinean Coast Guard (Prefectura Naval Argentina, PNA) and the Argentinean Navy's (Servicio de Hidrografía Naval, SHN) oil response preparedness and hydrodynamics development, **Eduardo Yassuda**, **José Edson** (ASA South America) and **Claudia Suárez** (ASA Inc) trained the oil response team in the use of OILMAP and CMSMAP and the hydrodynamic modeling team in the use of WQMAP and COASTMAP in Buenos Aires, Argentina, 19-23 April 2004.



Applied Science Associates Inc.  
70 Dean Knauss Drive  
Narragansett, Rhode Island 02882-1143  
Phone: +1-401-789-6224  
Fax: +1-401-789-1932  
Email: asa@appsci.com  
www.appsci.com  
ADDRESS SERVICE REQUESTED

ASA Aquitaine  
Castetbon, France  
+33 (0)5 59 66 2378

ASA Limited  
St. Andrews, Scotland  
+44 (0)1334 478354

Applied Science Associates – South America  
São Paulo, Brazil  
+55 11 3444-3748  
Rio de Janeiro  
+55 21 2532 4626

Asia-Pacific Applied Science Associates  
Gold Coast, Australia  
+61 (0)7 5574-1112  
Perth, Australia  
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## Met Ocean Web Services

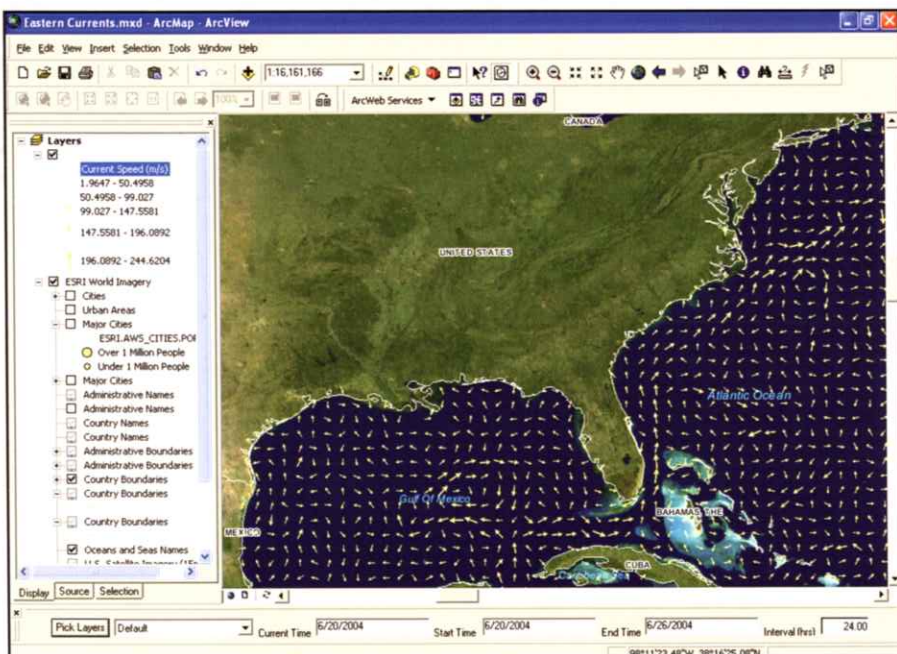


Figure shows connection to ASA's met ocean web service using ArcGIS®. The display is of surface current data derived from NOAA's Global Ocean Observing System (GOOS) satellite altimeter data for the Gulf of Mexico and the U.S. East Coast. ASA's web services enables users to connect automatically to ASA's met ocean data servers, providing them with the best available wind and current forecasts for their region of interest. This data can then be used directly in ASA's models with no manual data entry.

## Upcoming Conferences:

Craig Swanson and Tatsu Isaji, along with Douglas Clarke and Charles Dickerson of the USACE Engineer Research and Development Center, are co-authors of a paper *Simulations of Dredging and Dredged Material Disposal Operations in Chesapeake Bay, Maryland and Saint Andrew Bay, Florida* to be presented at the upcoming WEDA XXIV / 36th TAMU Dredging Seminar on 7-9 July in Orlando, FL. The paper will focus on calibration of the SSFATE model with field measurements.

Craig Swanson is lead author on a poster session presentation at the upcoming 2<sup>nd</sup> National Conference on Coastal and Estuarine Habitat Restoration (Restore America's Estuaries 2004) in Seattle, WA on 12-15 September. The poster is entitled *Advanced Source Identification Tool for Estuary Restoration: Integrated Hydrodynamic and Pollutant Transport Model System for Bacteria in Southport Harbor, Connecticut*. Other authors include Mary E. Garren (US Environmental Protection Agency), Harry X. Zhang (Parsons Corporation) and Kelly L. Streich (CT Department of Environmental Protection).

Eduardo Yassuda, Jose Edson Pereira, and Marco Antonio Correa will be conducting a mini-course at the next Brazilian Oceanography Congress, 10-15 October 2004 in Itajai (SC), Brazil. The topic is Application of Computational Modeling in Environmental Impact Studies.

Craig Swanson, Mary E. Garren (US Environmental Protection Agency), Harry X. Zhang (Parsons Corporation) and Kelly L. Streich (CT Department of Environmental Protection) are authors of *Computer Modeling-Based Source Identification Tool for Pathogenic Pollution*, to be presented at the American Water Resources Association annual conference in Orlando, FL 1-4 November.



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