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Are Double-Crested Cormorants Affecting Fish Populations?

The double-crested cormorant, a goose-sized, web-footed water bird, has been creating conflicts regarding the use of various biological and socioeconomic resources. Populations of this species are found throughout North America, and have been increasing rapidly. In the Narragansett Bay system of Rhode Island and Massachusetts, the cormorant population exponentially increased from a negligible breeding population in 1980 to an apparent carrying capacity in the late 1990s. During the time the population of cormorants increased, the abundance of fish, such as winter flounder, declined. Because over fishing is a major factor causing decline in fish abundance, pressure was put on commercial and recreational fishing interests to decrease the rate of fishing. The success of this strategy is unclear as, unfortunately, abundance of many fish species continues to decline. Could cormorant fish consumption be partially to blame for these declines?

To answer this question, ASA modeled the annual fish consumption by cormorants, based on the amount and size range of fish consumed per bird, foraging areas, and the number of birds feeding in each portion of Narragansett Bay. Cormorants are opportunist predators of all types of fish, but target small slower-moving animals such as juvenile winter flounder. The losses from cormorant fish consumption were compared to trends in fish populations and, specifically for winter flounder, fishing mortality from commercial and recreational fishing.

The analysis showed that during the 1980s, fishing mortality was high and cormorant fish consumption was low. In the 1990s, fishing mortality had decreased, but the average rate of juvenile winter flounder consumption by cormorants

increased. This analysis suggests that cormorant fish consumption contributes to the continual decline in winter flounder populations.

The model results from this study support previous analyses, which suggest that juvenile survival could be the limiting factor in the Narragansett Bay population size of winter flounder. The impact of cormorant consumption on other prey species in Narragansett Bay may be significant as well, and should be considered in evaluating the impacts of fishing rates on fish populations. For more information on these results, please contact Deborah French McCay at dfrench@appsci.com.

THE INSIDE STORY

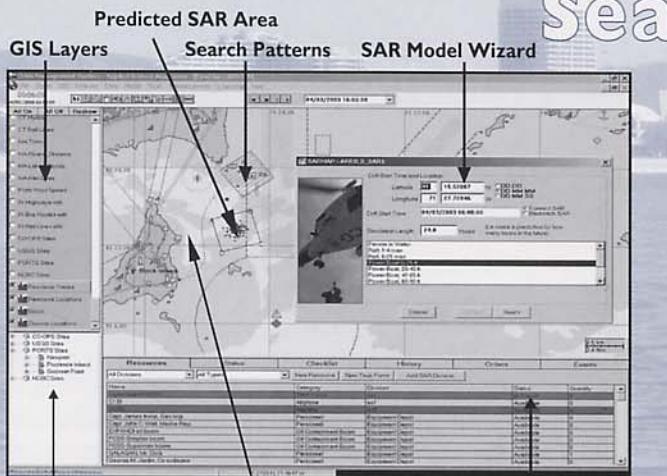
- Search & Rescue News
- Land Spill Modeling at ASA
- Asia-Pacific ASA Assists AMSA
- Personnel News
- Upcoming Events



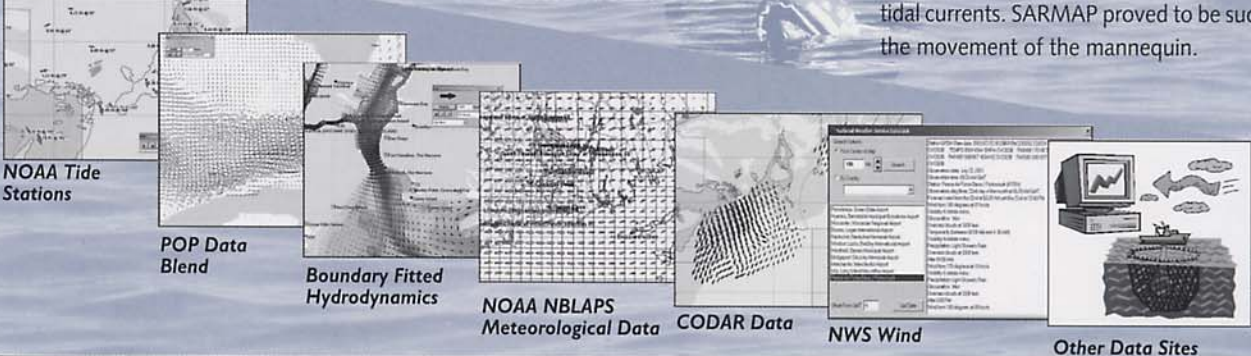
*Cormorants could be to blame
because they are opportunist
predators of all types
of fish.*

*Photo courtesy of
Don Chalfant*

Search & Rescue News



Real-Time Data Links
NOAA S57 Vector Charts
SRU & Resource Status



NOAA Tide Stations
POP Data Blend
Boundary Fitted Hydrodynamics
NOAA NBLAPS Meteorological Data
CODAR Data
NWS Wind
Other Data Sites

ASA has continued to improve SARMAP, ASA's search & rescue tool, to include real-time data links through COASTMAP and new lagrangian based search area solutions.

In Australia, Sasha Zigic from Asia Pacific ASA and Nathan Benfer, a fourth-year coastal engineering student at Griffith University, used SARMAP to evaluate its accuracy in finding objects lost at sea in Gold Coast waters, Queensland. The validation took place off the popular Gold Coast fishing spot, Mermaid Reef, where the mannequin was used to simulate a fisherman lost at sea. The movements of the mannequin were tracked using satellite positioning, covering 233m every 30 minutes. The floating object drifted in an S-bend path displaying the complexity of wind-driven flows and the changes in tidal currents. SARMAP proved to be successful in simulating the movement of the mannequin.

Asia-Pacific ASA Assisting AMSA as Part of the National Plan to Combat Oil Spilled at Sea

The Australian Maritime Safety Authority (AMSA) co-ordinates Australia's international responsibilities in the area of marine environment protection and oil spill response for 18,000,000 square miles of ocean (approx 1/9th of the globe's surface area). Since October 1999, AMSA have been using ASA's oil spill model, OILMAP to combat and predict the movement of oil spilled at sea. During this time Asia-Pacific ASA have assisted AMSA staff with technical support in respect to software related issues and/or methodology issues, as part of their daily operations.

As of the 1 July 2003, Asia-Pacific ASA have been assisting AMSA to expand and improve on the bathymetry and tidal database for a number of Australia's known high-risk area's, including the Great Barrier Reef Marine Park and Sydney Harbour. Also as part of the improvement process, HYDROMAP (ASA's ocean/coastal hydrodynamic model) had recently been tested and validated for an oil spill ground validation exercise undertaken by AMSA, in Moreton Bay, Brisbane during the 17-18 June 2003. For more information please contact Sasha Zigic at szigic@appsci.com.

Photo courtesy of Trevor Gilbert from AMSA

Land Spill Modeling at ASA

ASA is modeling the movement of oil over land and in stream and river networks in support of pipeline companies that need to meet federal hazardous pipeline safety regulations. As of September 2004, owners and operators of pipeline systems are required to assess and evaluate potential affects to High Consequence Areas from segments that leak or fail for 50% of their total pipeline miles (DOT OPS 49 CFR 195.452).

OILMAPLAND, ASA's new addition to their extensive suite of models, is being used to assist in meeting these regulations. The model is built as an ArcView8[®] extension and links to existing pipeline network and sensitivity data. Results show the oil footprint over land from multiple potential release sites along a pipeline. Oil that reaches a river or stream is modeled to follow the stream network. Both the land and water feature areas impacted by a spill can then be spatially overlaid onto data depicting sensitive areas for impact analysis.

The OILMAPLAND model has successfully been used to meet the DOT regulation requirements for a number of pipeline companies.

The land spill model builds on ASA's expertise in oil spill modeling and expands the modeling services we are able to offer our clients into the land environment. For more information on land spill modeling please contact Chris Galagan at chris@appsci.com.



Example of pipeline leaks every 500 feet. (blue = pipeline, black = oil, white = streams)

Personnel

On the 7 May, **Sasha Zigic** attended the National Marine Chemical Workshop in Melbourne Australia. During the workshop, Sasha provided the chemical trajectory & fate modeling support during the recent training program exercise. It was very well received and many of the key stakeholders (fire authorities, environmental & maritime agencies) in attendance were impressed by the capabilities of the system.

Deborah French McCay and **Craig Swanson** presented papers at the Mount Hope Bay Symposium on 10 May, which was part of the NEERS/SNECAFS Joint Meeting at the University of Massachusetts Dartmouth. Debbie, as lead author with **Jill Rowe** who also attended, presented: *Estimated Impacts of Cormorants on Fish Populations in the Narragansett Bay Estuary*. Craig, as lead author with **Hyun-Sook Kim** who attended as well, summarized the extensive hydrothermal modeling ASA has conducted over the last six years in *Simulated Thermal Variations in Mount Hope Bay and Application to Assessing Ecosystem Effects*.

Claudia Santos Suárez and **Eric Anderson** delivered and provided training for SIMAP to PEMEX on marine modeling in support to exploration and production activities in the Bahía de Campeche. The workshop was held at the GDS office in Ciudad del Carmen, Campeche on 15-16 May 2003, where representatives from Pemex learned about the use of ASA's latest version of SIMAP, as well as new tools for oil spill modeling and impact assessment.

On 10-12 June **Deborah French McCay** attended the 26th annual Arctic and Marine Oilspill Program (AMOP) Technical Seminar in Victoria, BC. Debbie presented the results of an oil spill modeling study to assess the potential consequences of hypothetical oil spills from the National Defense Reserve Fleet located in the James River, Virginia, entitled *Assessment of the Potential Impacts of Oil Spills in the James River, Virginia* coauthored with **Nicole Whittier**, **Tatsu Isaji**, and **William Saunders**. The paper is available in the AMOP proceedings, or from our website

ASA, in conjunction with the Naval Undersea Warfare Center and SubChem Systems, participated in a mine warfare exercise to detect TNT from submerged mines. ASA's COASTMAP was used to visualize the AUV data in 3D. The successful exercise was conducted at Duck, NC the beginning of June.

Roddy Thomas attended the MARE-DASM Conference in Ghent, Belgium on 12-13 June. The conference's focus was on marine resource damage assessment, liability and compensation. A series of papers and workshops considered the growing debate in Europe on a suitable methodology for assessing damages in the event of the release of oil or hazardous substance into the marine environment. The challenges are a trade off between the legal rights of the general public, the interests of the polluter and insurance industry, and how best to assess the impacts of such incidents. The conference coincided with the promulgation of a new EEC Environmental Directive: Standing and Assessment of Damages, which is being submitted to Parliament for approval this summer.

Sankaranarayanan Subbaya attended the 2003 Gordon Research Conference on Coastal Ocean Modeling held at Colby Sawyer College, New London, NH during 22-27 June. Some recent advances in operational coastal ocean modeling, data assimilation, physical-biological coupling and Lagrangian descriptions were presented by experts in the field.

Craig Swanson presented COASTMAP, a Nowcast/Forecast System at the Coastal Zone 02 conference held in Baltimore 13-17 July. The presentation, coauthored with **Matthew Ward**, **Eoin Howlett** and **Malcolm Spaulding**, described the major features of COASTMAP and how the software can be an effective tool to provide environmental monitoring and modeling information to a variety of users in coastal areas.



NOAA and the State of Louisiana personnel attended a training/workshop at ASA 7-9 July, given by **Deborah French McCay**, **Jill Rowe** and **Nicole Whittier**. The training and discussion included: technical description of the "Type A" natural resource damage assessment model developed by ASA and included in US (CERCLA) regulations; updates to the model system now included in SIMAP (oil spill analysis) and CHEMMAP (chemical spill analysis); and potential applications to injury quantification and compensatory restoration scaling.

Chris Galagan and **Matthew Ward** attended the Northeast Maritime Security Conference & Workshop on 23-24 July, held at the UCONN Avery Point facility. The conference discussed maritime threats and the ability to use technology in responding to such threats to reduce security risks.

Eduardo Yassuda provided technical training for Petrobras about "Computational Modeling Applied to Environmental Impact Studies" in August at the research center (CENPES) in Rio de Janeiro.

Matt Ward delivered and provided training for WQMAP v5.0 to the Naval Oceanographic Office (NAVO) at the Stennis Space Center in Mississippi on 11-15 August. NAVO is also using COASTMAP to develop the initial conditions and environmental forcing for WQMAP.

Deborah French McCay and **Eduardo Yassuda** visited Petrobras' research offices (CENPES) in Rio de Janeiro the week of 18 August, where they discussed the use of SIMAP. Debbie presented two seminars on 19-20 August to Petrobras scientists and engineers, summarizing the technical capabilities of SIMAP, its use in spill assessments such as for the January 2000 spill in Guanabara Bay, ecological risk assessment applications, and usefulness for training and education. Petrobras has been using SIMAP for two years, developing data for assessing the January 2000 spill, and evaluating SIMAP's potential role in their research program.

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PERSONNEL Continued

Eoin Howlett presented *Developing Technologies - Crisis Management System Overview* at the September Rhode Island Port Safety & Security Committee Meeting. The presentation focused on the use of ASA's Crisis Management System as a tool for security exercises.

In the beginning of September, **Jose Edson** delivered the hydrodynamic, OILMAP, and MUDMAP simulations to BMA/Petrobras. The model includes local and remote forcing in a highly baroclinic system, coupling continental shelf and deep ocean dynamics in one of the most environmentally sensitive areas in the northeast coast of Brazil.

Modelling of Moreton Bay Using an Ocean/Coastal Circulation Mode, authored by **Sasha Zigic, Marc Zapata, Tatsu Isaji** and **Brian King** was in the Coasts and Ports conference proceedings. The conference was held in Auckland, New Zealand on 9-12 September.

Alvin Goh from Control IT in Singapore presented a paper on behalf of **Eoin Howlett** at the 2nd International Conference on Port & Maritime R&D and Technology in Singapore. The paper was titled *Real-Time Marine Emergency Response Tools*.

Craig Swanson attended the Estuarine Research Federation conference, Estuaries on the Edge, in Seattle on 14-18 September. He presented COASTMAP: *A Globally Relocatable Nowcast / Forecast System* in session CS-4, New Technologies and Observations for Monitoring and Studying Coastal Systems, on the afternoon of the 16th. Coauthors included **Matthew Ward** and **Malcolm Spaulding**.

NEW FACES

Maria Regina Fonseca Guimaraes has joined the ASA South America team. Maria has a MS and PhD in Physical Oceanography from the Oceanographic Institute of University of S.Paulo, where she was working as a pos-doc with GCM - Global Circulation Models - Isopicaln.



UPCOMING EVENTS

On 16-19 September, **Roddy Thomas** will be attending the COPEDEC Conference in Colombo, Sri Lanka. This environmental conference includes a strong focus on a wide range of modeling applications in the Middle East, India and SE Asia.

Roddy Thomas and **Eduardo Yassuda** will be attending the Argentina Oil & Gas Expo in Buenos Aires on 6-10 October. The latest technology applied in the energy industry will be displayed and discussed at the expo.

ASA South America is one of the sponsors of the "National Oceanographic Week" that takes place the 27-30 October in São Paulo. At this meeting, **Eduardo Yassuda** will be presenting *Applications of Oceanography in Environmental Studies in South America*, and **Jose Edson** will teach a course in numerical modeling.

Christopher Galagan, Sankaranarayanan Subbaya, Malcolm Spaulding, Craig Swanson, Matthew Ward and **Eduardo Yassuda** will be presenting papers at ECM8, the 8th International Conference on Estuarine and Coastal Modeling to be held in Monterey, CA on 3-5 November. Additional ASA coauthors include **Deborah French McCay, Tatsu Isaji** and **Paul Hall**. ASA papers will cover such topics as sediment transport modeling, oil spill modeling, hydrodynamic modeling, integrated monitoring and forecasting systems and flushing models.

WQMAP Version 5.0

The new WQMAP 5.0 is now available, which includes updated gridding, open boundary database, bathymetry database, and easier to use tools. A demo and student version is available at www.wqmap.com.

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