

# COASTAL SERVICES

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LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

**WAVE POWER:  
Looking to the Ocean for  
Electricity in Oregon**

**Conserving Working  
Waterfronts in Maine**

**Developing Guidelines for  
Green Growth in Georgia**



## FROM THE DIRECTOR

As I write this, California is experiencing triple-digit temperatures and is bracing for possible blackouts, about 158,000 homes and businesses in the St. Louis area are still without electricity nearly a week after storms knocked out power, and in New York, thousands of residents entered their ninth day without electricity.

And there is still another month of summer to go.

Many communities and utilities are looking to add alternative power sources to our nation's electrical grid. Most think automatically of solar and wind when alternative power is mentioned, but many see a new source of renewable energy—the ocean.

Researchers say one of the most promising sources of ocean energy appears to be wave power. It's consistent, 1,000 times denser than wind, and can be predicted hours ahead of its arrival by our ocean observing systems.

Currently, an area with good potential for wave energy development in the U.S. is in the Pacific Northwest. A preliminary permit for a commercial wave energy facility in Oregon—

the first in the U.S.—has already been filed, and Oregon State University is working to develop a national wave research and development park.

You can read about Oregon's experience with wave energy and what this burgeoning technology might mean to coastal resource managers in the cover story of this edition of *Coastal Services*.

Also in this edition, our writers look at the efforts of coastal resource managers in Maine to conserve their state's working waterfronts. Georgia's Green Growth Guidelines and a California research project that may help coastal managers decide "if" and "where" a marine protected area might be sited also are featured.

We have now closed our survey soliciting your thoughts and ideas about *Coastal Services* and its sister publication, *Coastal Connections*. We hope to implement what you told us as we continually strive to improve these periodicals. I want to thank everyone who took the time to fill out a survey and send it in. ❖



Margaret A. Davidson

The mission of the NOAA Coastal Services Center is to support the environmental, social, and economic well being of the coast by linking people, information, and technology.



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## NEWS AND NOTES

### Must-Have Information Regarding Legal Marine Boundaries

*"As far as the cannonball flies."*

Many legal documents once used phrases such as this to describe marine boundaries. While this type of description was adequate in colonial times, more precise measurements are required today. But even with modern technology, setting a marine boundary is not an easy task. One must consider legal precedents, and there are disagreements about the proper use of modern marine mapping techniques.

The National Oceanic and Atmospheric Administration (NOAA) has taken a lead role in addressing these issues. The two publications mentioned here are the results of this effort, which is changing and improving the way marine boundaries are set.

#### Marine Managed Areas: Best Practices for Boundary Making

Before this publication could be written, experts in the field had to come together to reach understandings and agreements about the use of technology, terms, and the resolutions of various common boundary issues. The result of this effort is an easy-to-use best practices

manual that helps those who write and map boundaries for marine managed areas.

A law or regulation for a marine area cannot have its fully intended effect if the boundary description is vague, inaccurate, or incorrectly represented on a map. The manual, currently at the publisher, provides guidelines intended to reduce boundary misunderstandings and litigation and helps users transition to modern mapping techniques that focus on digital data.

The guidelines were written by the Federal Geographic Data Committee's Marine Boundary Working Group and sponsored by the National Marine Protected Areas Center. A field of experts, including cartographers, lawyers, regulators, spatial data analysts, surveyors, and other professionals with an interest in marine management, participated in this effort, which was led by the NOAA Coastal Services Center.

#### Shore and Sea Boundaries Series

The Shore and Sea Boundaries series, which was begun 45 years ago, is an invaluable resource for attorneys,

judges, and all those concerned with defining the maritime boundaries of the U.S. The three-book series documents the legal and technical principles of U.S. boundary delineation.

Volumes one and two, by Aaron Shalowitz, were published in 1962 and 1964. Volume three was written in 2000 by Michael Reed, an attorney and expert involved in maritime boundary issues for almost four decades.

In this book, Reed not only documents the legal principles derived from the many tidelands decisions that have occurred over the past four decades, but also places those decisions in historical context.

Volume three was written under the auspices of the NOAA Coastal Services Center and Office of Coast Survey, and the U.S. Department of the Interior's Minerals Management Service. ❖

To get a copy of *Marine Managed Areas: Best Practices for Boundary Making*, please contact [David.Stein@noaa.gov](mailto:David.Stein@noaa.gov). A copy of *Shore and Sea Boundaries* is available on the Internet at <http://chartmaker.ncd.noaa.gov/hsd/shallow.htm/>.



# CONSERVING WORKING WATERFRONTS IN MAINE

**T**raditional fishing villages are at risk.

Along our nation's shorelines, fishing trawlers are often competing for dock space with leisure boats. Dockside businesses that support fishermen are being turned into restaurants and shops catering to tourists. Increasing property values are forcing those who have worked the water for generations to sell because they can't afford the property taxes. Long-established access to docks and water is often lost when private property changes hands.

Coastal resource managers in Maine are working hard to conserve their state's working waterfronts. One of the primary mechanisms for doing this, says Jim Connors, senior planner at the Maine Coastal Program, is the Maine Working Waterfront Coalition, "a very broad-based consortium of folks working together" to protect the last of the state's working waterfront.

Over the past three years, the coalition has successfully shepherded two policy initiatives

creating tax breaks for waterfront property owners and a bond-issue-supported acquisition program.

## Big Benefits

Of Maine's 5,300-mile coastline, only 175 miles is sufficiently deep and sheltered to support water-dependent uses, according to a 2002 study by the Maine Land and Water Resources Council. Residential, commercial, and industrial structures that may benefit from but are not dependent on a waterfront location already occupy more than half the ideal shorefront. Only 25 miles of Maine's coast is considered "working waterfront."

"That's relatively small when you think about the entire state coastline and the economic impact of all the jobs associated with what's landed out there," says Hugh Cowperthwaite, fisheries project coordinator for Coastal Enterprises Inc. (CEI), a community development nonprofit corporation and a member of the Working Waterfront Coalition.

Maine's working waterfronts are estimated to have an annual economic impact of \$740 million.

## Taking the Initiative

A legislative task force in 2002 directed the coastal program to document the loss of working

waterfront and "get a handle on the statistics and facts of what was transpiring," Connors says. The coastal program hired CEI to conduct the initial survey, which showed that working access was slowly being lost.

In 2003, the coastal program and CEI held an initial meeting of people representing various organizations and industries involved in and concerned about working waterfronts.

"The initial idea," says Cowperthwaite, "was to get together and talk about what all we were doing and how things overlap. Out of that came the idea that we should form some sort of coalition."

## Policy Needs

The group became the Maine Working Waterfront Coalition, and its membership grew from 12 to 140 people, including political leaders and representatives of commercial fishing interests, municipalities, and others concerned with helping preserve working waterfronts, including the Maine Sea Grant Program.

During the coalition's monthly meetings, two problems that required policy solutions rose to the top of the group's agenda—the issue of rising property taxes that make it financially difficult for fisheries-

*Maine's working waterfronts are estimated to have an annual economic impact of \$740 million.*

related businesses to retain working waterfront, and the loss of access for commercial fishermen resulting from competition for prime waterfront property.

"Basically, we had two initiatives that we ended up working on side-by-side all the way through the legislature," says Cowperthwaite.

## Getting Political

Raising public awareness about the need for the initiatives was a primary goal of the coalition, Connors says. This included hosting public educational forums and conducting additional research into the economic importance of working waterfronts.

The coalition also formed a political action committee (PAC) to support the ballot initiatives during the election, and then to monitor their progress through the legislature.

"That was an issue for some folks," notes Connors. "Those of us that cannot lobby—Sea Grant and people like myself—did not participate in the formation of the PAC, or the campaign."

Connors adds, "One of the principles established in forming the coalition was that not every member would support every action, proposal, or idea."

## Tax Program

The first successful initiative was for a current-use taxation

program providing tax breaks to property owners based on the land's use as working waterfront.

"It wasn't a new idea," Connors says. The state has already provided similar programs to help protect farm- and forestland, and open space.

A referendum to change the state's constitution to allow the legislature to create a preferential tax category for commercial fishing activities made it onto the ballot in November 2005 and passed 73 to 27 percent. A similar initiative had been tried five years earlier and had been narrowly defeated.

Connors notes that the actual program is being created by the state legislature, and it will be a year before landowners are able to apply for the current-use tax.

## Securing Access

The second initiative provides \$2 million in public funds for a pilot program to preserve and secure working access, Connors says. The funds were part of a \$12 million referendum on the November ballot for a land conservation, and farm and recreational boating access program.

The pilot program is "out on the street," Connors says, with the application period ending November 1. The state Department of Marine Resources will evaluate the proposals and select those to receive grant funding.



*To help protect a working waterfront, two fishermen partnered with the York Land Trust to purchase the "development rights" of a commercial waterfront property.*

Everyone, from municipalities to private businesses to fishing co-ops, is eligible to apply, Cowperthwaite says. "Part of the grant agreement is that the property stays in commercial use in perpetuity. If the use is changed for whatever reason, the Department of Marine Resources would have first right of refusal if it's ever put on the market."

## Defining Success

Persistence and working together were the keys to the group's success, says Cowperthwaite. Acquiring political support for the initiatives also was important.

He adds, "It hasn't been easy, but we have been successful to a point. We'll have to wait and see how these programs are utilized before we're able to claim success. That's the real test." ❖

*For more information, point your browser to [www.state.me.us/spo/mcp/wwi/index/php/](http://www.state.me.us/spo/mcp/wwi/index/php/). You may also contact Jim Connors at (207) 287-8938, or [jim.connors@maine.gov](mailto:jim.connors@maine.gov), or Hugh Cowperthwaite at (207) 772-5356, ext. 120, or [hsc@ceimaine.org](mailto:hsc@ceimaine.org).*

# Wave Power:

## Looking to the Ocean for Electricity in Oregon

With the U.S. breaking record highs for power use this summer and the price of natural gas continuing to rise, many researchers and utilities are looking to alternative power sources to add to the nation's electrical grid, and possibly even help replace some resource-intensive energy sources. In addition to solar and wind, some are eyeing the ocean as a new, potent source of renewable energy.

Potentially, there are many ways to tap the ocean for energy, including tides, currents, salinity, and even its thermal features. But waves may be the most promising source of ocean energy for the U.S. coastline, particularly in the Pacific Northwest.

While wave energy may sound futuristic, pilot projects are in the water in Europe, Australia, Asia, and Hawaii, and a commercial project is close to going on-line in Portugal. Ocean Power Technologies Inc., of New Jersey recently announced it is pursuing permitting for the first U.S. commercial site in Oregon. Oregon

State University is working to develop a national wave research park to study wave technology its researchers are developing, as well as many other existing and potential wave technologies.

"It's real," Roger Bedard, ocean energy leader for the nonprofit Electric Power Research Institute (EPRI), says of wave power, noting that a full-scale prototype has survived for two years in the Atlantic Ocean north of Scotland. "Given proper siting, it probably will turn out, in my opinion, to be one of the more environmentally benign electricity generation [technologies] known to humankind."

Potential environmental impacts and user conflicts are the key concerns for coastal resource managers in Oregon, who for the past several years have been working with utilities, researchers, fishermen, state and federal agencies, and numerous other stakeholders to identify and address any areas of concern with wave energy, and map the potential regulatory process.

### Being Dense a Good Thing

One only needs to watch the rhythmic rolling of ocean waves to see their potential as an energy source. The density of ocean water—about 1,000 times that of wind—also is significant in its potential for generating electricity, as is the ability to predict waves hours before they hit shore using existing ocean buoys.

Wave power devices extract energy directly from surface waves or from pressure fluctuations below the surface and are typically located two to three miles offshore. Waves off the coasts of Oregon, California, Washington, Alaska, and Hawaii have been identified as good sites for the development of wave energy.

"Ocean wave electricity generation is about where wind generation was 15 to 20 years ago, but it's catching up faster than expected and is much closer than we initially thought," notes Bob Malouf, director of Oregon Sea Grant.

### Electricity in Oregon

As wave technology improves, it is believed that less ideal wave environments might become more accessible as an energy source and that wave energy facilities could be sited further offshore.

### Wave Is Enough?

Ultimately, Bedard believes wave power could provide about 10 percent of the country's electricity needs.

While this may not sound like much, Bedard argues, "If we had 10 percent of our energy from waves, 10 percent from solar, 10 percent from wind, 10 percent from hydropower—that would be great. As natural gas becomes more and more expensive, we will see renewable resources like these come more into play as economically viable."

### On the Wrong Side of the Grid

West of the Cascade Mountains, Oregon consumes about 1,000 megawatts of electricity more than it generates. "Our coastline is very dependent on power from elsewhere," notes Malouf.

Kay Moxness, government relations manager for Central Lincoln People's Utility District, a publicly owned utility, says that in 10 years, it is forecast that the utility will begin to experience its "first window of deficit. At that point, we will not have a choice but to go out and find other resources."

Wave energy could make up the difference, she says, and no new transmission lines would be needed.

### Researching the Way

For the past eight years, researchers at Oregon State University have been developing prototypes of new wave energy technology and have pursued the creation of a national wave research and development park.

In the search for research funds, they turned to Oregon Sea Grant.

"When their first proposal came to us, we weren't interested. I frankly thought they were naive," Malouf recalls. Sea Grant's citizen advisory board, however, overwhelmingly supported the project.

One of Sea Grant's requirements for the funding was that the researchers participate in their Port Liaison Project to develop a collaborative partnership with fishermen and crabbers who ply

*Continued*

Careful site selection is the key to keeping the environmental impacts of wave power systems to a minimum.

## Additional Resources

Oregon Department of Energy,  
[www.oregon.gov/energy/](http://www.oregon.gov/energy/)

Oregon State University publication, *Terra*,  
<http://oregonstate.edu/terra/2006spring/features/seapower.html>

Oregon Sea Grant video clips from *Wave Power* DVD,  
[http://seagrant.oregonstate.edu/video/wave\\_energy/index.html](http://seagrant.oregonstate.edu/video/wave_energy/index.html)

Electric Power Research Institute (EPRI),  
[www.epri.com/oceanenergy/](http://www.epri.com/oceanenergy/)

U.S. Department of Energy,  
[www.eere.energy.gov](http://www.eere.energy.gov)

Outer Continental Shelf Renewable Energy and Alternate Use Programmatic Environmental Impact Statement Information Center,  
<http://ocsenergy.anl.gov/>

Minerals Management Service,  
[www.mms.gov/offshore/RenewableEnergy/RenewableEnergyMain.htm](http://www.mms.gov/offshore/RenewableEnergy/RenewableEnergyMain.htm)

Ocean Power Technologies Inc.,  
[www.oceanpowertechnologies.com](http://www.oceanpowertechnologies.com)

# Wave Power Technology

There are three approaches to capturing wave energy:

## Floats or Pitching Devices

These devices generate electricity from the bobbing or pitching action of a floating object. The object can be mounted to a floating raft or to a device fixed on the ocean floor.

## Oscillating Water Columns

These devices generate electricity from the wave-driven rise and fall of water in a cylindrical shaft. The rising and falling water column drives air into and out of the top of the shaft, powering an air-driven turbine.

## Wave Surge or Focusing Devices

These shoreline devices, also called "tapered channel" or "tapchan" systems, rely on a shore-mounted structure to channel and concentrate the waves, driving them into an elevated reservoir. Water flowing out of this reservoir is used to generate electricity using standard hydropower technologies.

Source: U.S. Department of Energy

Continued from Page 5

Oregon's coastal waters. The fishermen provide ocean technical expertise and input on wave-park siting issues.

### No-Take Zone

The primary concern of most fishermen, says Al Pazar, chair of the Oregon Dungeness Crab Commission, and the owner-operator of two fishing vessels, is that the area around any wave park would be off limits to all uses, including fishing.

In 2004, EPRI did a feasibility study funded by Bonneville Power and Central Lincoln People's Utility District to identify sites in Oregon that would be good for either a wave research park or commercial wave energy facility. The site that rose to the top also happens to be a prime Dungeness crab fishery.

"To the credit of the researchers and state folks, they've included the public every step along the way," says Pazar. While not all fishermen support the research and commercial projects, he says most are "not throwing up many walls. We're working with them to try to minimize the impacts as much as possible."

### State Interest

With Oregon State University blazing the research trail, state agencies began to pay attention to wave energy, says Greg McMurray, marine affairs coordinator for the Oregon Ocean and Coastal Management Program.

Wave energy development, says Justin Klure, senior policy analyst with the Oregon Department of Energy, was a natural fit with the governor's Renewable Energy Action Plan, which establishes the goal that renewable resources will meet 25 percent of Oregon's energy needs by 2025. Oregon has a range of incentives to encourage development of renewable energy.

Oregon's Department of Energy began organizing state and federal agencies, local officials, utilities, fishermen, and other stakeholders to look at wave energy and

how the state might address any problems when siting a wave energy project. The group became People of Oregon for Wave Energy Resources, or POWER.

### Answering the Unknown

While pilot projects around the world have reported little to no environmental impacts, the greatest unknown about wave energy is how a commercial facility will affect the ocean environment.

Potential environmental impacts include withdrawal of wave energy from the ecological system, interactions with marine life, such as migrating gray whales, any atmospheric and oceanic emissions, noise, bottom impacts from anchors, and visual appearances. Environmental impacts from cable landings are a concern, as are electrical and magnetic energy imparted into seawater. A wave energy facility also could pose a threat to navigation.

Bedard notes that since wave energy facilities are located several miles offshore and have a relatively low profile, facilities will probably have little visual impact. Wave energy produces no air emissions and would have little to no ocean emissions, depending on the technology and antifouling measures used.

Careful site selection, he says, is the key to keeping the environmental impacts of wave power systems to a minimum. For instance, sites can be chosen outside whale migratory routes and can avoid areas where sediment flow patterns on the ocean floor would be significantly altered.

It also may be that wave energy facilities could have environmental benefits, such as acting as artificial reefs.

For Oregon, other benefits include economic development and diversification in coastal communities, adds Klure.

### Regulatory Routes

Aside from looking at the potential environmental issues, the POWER group is working to map local, state, and federal permitting and regulatory issues that will

Continued on Page 9

# DEVELOPING GUIDELINES FOR GREEN GROWTH IN GEORGIA

Development and conservation don't have to be mutually exclusive. Georgia coastal resource managers have created a manual to help illustrate this point and provide guidance to developers and others on designing with the coastal landscape in mind.

*"The results show an increase in sales and prices for the lots and houses in a conservation community."*

Jeannie Butler,  
Georgia Department of  
Natural Resources

The Green Growth Guidelines help local governments, developers, engineers and land planners, landscape architects, and natural resource managers compare the environmental, social, and economic benefits of using sustainable development strategies with conventional development approaches.

"It's intended as a one-stop shop that provides a hypothetical case study, best management practices, and innovative approaches," says Jill Andrews, acting operations program manager for the Georgia Coastal Program. Techniques such as site fingerprinting, low impact development practices, and alternative stormwater and bank stabilization techniques are detailed. The economic benefits of conservation development also are analyzed.

"The results show an increase in sales and prices for the lots and houses in a conservation community, and lower costs for the developer and the local government," says Jeannie Butler, coastal management nonpoint source coordinator for the Environmental Protection Division of the Georgia Department of Natural Resources. "Benefits include the creation of great spaces for us to live and work, with clean water and abundant and diverse wildlife, plants, and habitats."

The Georgia Coastal Program used funding from the coastal nonpoint program to contract with the Coastal Georgia Regional Development Center and the environmental services firm EMC Engineering Services Inc. to draft the manual.

"It was written and designed by professionals in the field," notes Andrews. "They compiled a tremendous amount of information," including basic information about geographic information systems and the Global Positioning System, that "we wouldn't have thought to include."

"A lot of the information seems basic to resource managers, but that information is really important to provide so that anybody can pick it up and follow the activities step-by-step," Andrews says.

The 179-page manual is published in a three-ring binder so that chapters can be added. A new chapter is currently being written on the impacts and best management practices of recreational uses, and a real-life case study is being developed.



Best management practices for recreational uses will soon be part of Georgia's Green Growth Guidelines.

The guide focuses on the unique environmental needs of coastal Georgia, but Andrews points out that developers and landscape architects from the rest of the state also have been interested in the publication.

"We've had a problem keeping copies in house," she says. "They've been flying out the door."

A companion program, Coastal Green Subdivision, is under development. It will be a one-on-one educational and technical assistance program for engineers, local planners and developers, and others utilizing the Green Growth Guidelines.

"I personally am surprised by how well the Green Growth Guidelines have been received," Andrews says. "It's a great first step. We might tweak a few things, but ultimately, it's a terrific product."

She adds, "It would be a wonderful model for other states." ❖

The Green Growth Guidelines are available on-line at <http://crd.dnr.state.ga.us/content/displaycontent.asp?txtDocument=969>. For additional information, you may contact Jeannie Butler at (912) 554-3494, or Jeannie\_Butler@dnr.state.ga.us.

# Helping Answer Resource Management Questions with Rockfish Research

The State of California is evaluating the need for more marine protected areas as a way to protect fish species in its waters. One researcher is working with volunteer fishermen to collect data on nearshore rockfish species in an effort to provide information that may help answer "if" and "where" a marine protected area might be sited.

***"Resource managers need this information to develop required management plans that ensure conservation of nearshore species."***

***Rick Starr,  
California Sea  
Grant Extension***

"Tagging studies like this are an important method of understanding the health of fish populations in a given area," says Rick Starr, a marine advisor with the California Sea Grant Extension Program. "Resource managers need this information to develop required management plans that ensure conservation of nearshore species."

Researchers participating in the Duxbury Reef Tagging Study also are sharing their data with the volunteer anglers and environmental groups. As a result of the collaborative research project, communication between stakeholders has improved, and education needs have been identified.

The Duxbury Reef area has been fished extensively by commercial and recreational fishermen for many years, Starr says.

In 1999, the state passed legislation requiring the California Department of Fish and Game to evaluate the potential for establishing marine protected areas in state waters. Duxbury Reef was identified by a number of groups as an area that should be considered for a marine protected area.

But there is little information on the fish species in the area, Starr says, and emotions will run high when it comes time for resource managers to make a decision about the reef.

To design and implement the project, Starr collaborated with Roger Thomas, a charter boat captain and president of the Golden Gate Fishermen's Association, which represents commercial passenger fishing vessels and marine recreational anglers along the central coast. Starr and Thomas are conducting the study using volunteer anglers and paid charter boats.

Last year, the volunteer anglers caught about 5,000 rockfish. The fish were tagged with identifying information and a phone number for fishermen to call if the fish were caught a second time.

The study estimates fish movements and documents biological data about fish populations in the area. More than 120 rockfish have been recaptured since the study began.



*Researchers about to release a canary rockfish (Sebastes pinniger) carrying a dart tag with contact information.*

Outings with the volunteer anglers continue this year, with the goal of documenting an additional 3,000 fish, Starr says. At the end of the project, public workshops will be held to share their findings.

Starr notes that he was surprised to discover that many of the anglers, while experts on locating and catching the fish, understand little of fish biology and reproduction, which has alerted the researchers to an educational need.

"This has really been a great project," Starr says. "One important lesson is to go to the people involved and interested early on and discuss the project goals and objectives."

"The result," he says, "is a better science project that meets the needs of resource managers and the needs of the fishing community." ❖

*For more information, point your browser to [www.cscg.ucsd.edu/EXTENSION/StarrFishing/DuxburyReef.html](http://www.cscg.ucsd.edu/EXTENSION/StarrFishing/DuxburyReef.html). You may also contact Rick Starr at (831) 771-4442, or [starr@mml.calstate.edu](mailto:starr@mml.calstate.edu).*

*Continued from Page 6*

be faced, and is providing information to the state's Ocean Policy Advisory Council, which recommends future state policies on a wide variety of ocean management issues in both state and federally governed waters.

John Baylouny, senior vice president of engineering for Ocean Power Technologies, says the company has filed a preliminary permit application with the Federal Energy Regulatory Commission (FERC), which is requiring them to "sit down with FERC and discuss which agencies might be interested parties, talk to them, and find out what their needs might be, so that we can address their issues in our application for license."

"That whole process should take about two years," he says.

George Hagerman, senior research associate at Virginia Tech's Advanced Research Institute in Arlington, Virginia, notes that the Minerals Management Service is currently developing its regulatory policies for alternative energy facilities located outside state waters.

"The rule making for those regulations is happening now," Hagerman says, "and will directly affect coastal resource managers. The only time they will get to comment on these federal regulations is within the next year."

### Going Commercial

Baylouny says that part of the reason his company selected Oregon as the location for its first U.S. commercial wave energy facility is the work the state has already done to engage the community. The ideal wave resources, existing grid connections, and the state's package of incentives were other inducements.

"Oregon has been very progressive in their efforts to develop a new industry in their state," Baylouny says. "It's clear they want to be the leader in wave power in the U.S."


He adds, "From our perspective, they will be a great partner to help build this new industry, and they are approaching it the right way." ❖



## Storm Data Resource Guide

**Providing the Data and Tools You Need Before, During, and After the Storm**

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- WINDS
- STORM SURGE
- HIGH-RESOLUTION TOPOGRAPHY
- FLOOD PREDICTIONS
- TIDE AND WATER LEVELS
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[www.csc.noaa.gov/storm\\_info/](http://www.csc.noaa.gov/storm_info/)

# Deadline for Submitting Abstracts

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