

# COASTAL SERVICES

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LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

## **LIQUEFIED NATURAL GAS: Rising Demand Heats Up Coastal Management Role**

## **Volunteering to Do Ecosystem Management in Washington State**

## **Keeping Oil and Water from Mixing in Texas**



# From the Director

**W**inter is here and millions of Americans will be firing up their natural gas burning furnaces and cooking stoves, and using natural gas generated electricity. Natural gas is the chosen energy source of many because it is relatively economical and is much cleaner burning than coal or other fossil fuels.

Over the past several years, the demand for natural gas in the U.S. has outstripped domestic supplies, causing the price to nearly double.

Federal officials, such as U.S. Federal Reserve Board Chairman Alan Greenspan, are calling for more imported natural gas to meet the nation's growing demand. When shipped from other countries, natural gas is super-chilled to turn it into a liquid that takes up 600 times less space than its vapor form.

While there hasn't been a new Liquefied Natural Gas (LNG) import facility built in the U.S. since the 1970s, in the past few years more than 40 proposals have been drawn up to build new coastal LNG facilities in California, the Gulf of Mexico, and New England.

Siting LNG import facilities is a complex process, typically requiring

numerous permits from federal, state, and local authorities. Federal agencies are under presidential and legislative directives to quickly approve applications for LNG facilities, which must be consistent with state coastal zone management programs.

The projects also tend to generate much public controversy because of their potential vulnerability to terrorist attack.

All of this can make coastal resource managers want to reach for the aspirin bottle.

The cover story of this edition of *Coastal Services* looks at how the issue is playing out for coastal managers in Massachusetts, where the oldest LNG terminal in the country is located, and two more LNG terminals—one onshore, one offshore—are being proposed.

We hope the information in the article and the additional resources listed will be useful if you are addressing an LNG proposal now or in the future.



Margaret A. Davidson

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# The Global Positioning System

## A Coastal Resource Manager's New Best Friend

**W**hen it comes to technology, no star is shining as bright as the Global Positioning System (GPS). GPS has been around since 1978, but it is only in the past several years that prices have come down enough to make this technology attainable for most state coastal programs.

### What Is GPS?

GPS is a satellite-based radio navigation system that was first developed and operated by the U.S. Department of Defense. The system uses a series of satellites positioned around the Earth in such a way that usually five to eight satellites are accessible at any time of the day from anywhere in the world.

GPS receivers obtain the latitude, longitude, and altitude of their position by determining the length of time it takes for radio signals from orbiting satellites to reach the receivers. The resultant accuracy is generally very high for latitude and longitude, on the order of several meters, and somewhat less so for altitude.

For coastal resource managers, this information is used for any task where location information is important, including marking boundaries and mapping shorelines, monitoring erosion, assisting with dock permitting and other management plans, and tracking endangered animals.

### Some Purchasing Considerations

As expected, there are a wide variety of options and costs associated with GPS. The following lists some of the points you might want to consider before making this purchase.

- Number of channels: The number of channels in a receiver determines how many satellites

a receiver can read at once. Six-channel receivers usually get 10- to 15-meter accuracy in the field, while 12-channel receivers can get 5- to 10-meter accuracy.

- Data processing: Is it important to get accurate data while in the field? Or will taking the data back to the office to process suffice? In-the-field processing units can cost up to three times more.
- Data-logging capabilities: If you are going to use the data in a geographic information system (GIS), you will need the ability to log descriptive information. New field-based GIS packages allow you to directly integrate GPS data into your GIS.

Other considerations include power source options, antennae configuration, software compatibility, memory capabilities, and the ability of the unit to

weather various natural elements (rain, saltwater, dust, sand, etc.).

### To Get More Information

The National Oceanic and Atmospheric Administration (NOAA) Coastal Services Center offers GPS training in conjunction with several of its technology courses. Furthermore, the NOAA Pacific Services Center is writing a guidebook for GPS users in the Pacific Islands. While the guidebook includes information about special considerations for GPS users in the Pacific, the general information about prepurchasing decision making is applicable to those on the mainland as well. ❖

*Please e-mail [Adam.Stein@noaa.gov](mailto:Adam.Stein@noaa.gov) if you would like to reserve a copy, or visit [www.csc.noaa.gov](http://www.csc.noaa.gov) to get information about the training courses.*

### Comparison of GPS Receiver Options

	Recreational Grade	Navigational Grade	Mapping Grade	Surveying Grade
<b>Cost</b>	\$	\$\$	\$\$\$	\$\$\$\$
<b>No. of Channels</b>	6-12	9-12	6-12	9-12
<b>Accuracy</b>	3-10 meters	1-3 meters	1-10 meters	~ centimeters
<b>Real-Time Capability</b>	Yes	Yes	Yes	Yes
<b>Post-Processing</b>	No	No	Yes	Yes
<b>Data Logging</b>	Simple	No	Yes	Yes
<b>Complex Data Logging</b>	No	No	Yes	Yes
<b>Display Capability</b>	Limited selection of maps	Navigational charts	Can import own data sets and maps	Can import own data sets and maps
<b>Data Streaming</b>	Yes	No (usually)	Yes	Yes
<b>External Processing Software</b>	No (limited, if so)	No	Yes	Yes



A lighthouse serves as Beach Watchers' center of operations.

# Volunteering to Do Ecosystem Management in Washington State

**M**ore and more national attention is being put on managing entire coastal ecosystems instead of individual environmental components. For the past 15 years, a volunteer program in the State of Washington has successfully taken this kind of holistic approach to understanding and preserving the fragile environment along Island County's 212 miles of shoreline on Puget Sound.

Beach Watchers began in 1989 with 10 volunteers. Today, the Washington State University Extension Program trains and leads more than 250 volunteers, who do everything from monitoring beaches and water quality to leading educational tours and removing invasive weeds.

"It covers the entire watershed, from the top of the freshwater systems to the depths of the saltwater systems," says Don Meehan, director of the university's extension program and the creator of Beach Watchers.

In addition to educating the public and helping to protect the area's resources, the group provides important data to area coastal resource managers, assists researchers, and has "changed" how local shoreline planners do their jobs.

## Take and Give Back

Volunteers who participate in the program are heavily screened, notes Beach Watchers' coordinator, Dot Irvin. They undergo 100 hours of intensive training and are expected to give back 100 volunteer hours.

In reality, Irvin says, they typically give even more, annually donating over 17,000 hours of in-kind service. The retention rate of the volunteers also is very high.

About 35 instructors who are coastal resource managers, researchers, and other experts provide the rigorous eight-week classroom and field training that the volunteers undergo. The training covers such topics as beaches, environmental processes, forests, septic systems, geology, and marine life.

One of the trainers is Glen Alexander, education coordinator at Padilla Bay National Estuarine Research Reserve in Mount Vernon, Washington. He notes that the program produces a "really fantastic group of citizen volunteers."

"I don't know what makes them so special, but these citizens do an incredible job," says Alexander. "The amount of work they accomplish each year is unbelievable. Their newsletter is the best one I receive, and their annual festival is the best one I attend."

## They Probably Do That, Too

As extensive as the training is, the number and types of activities Beach Watchers is involved in is sweeping. A list of 30 activities listed on the program's Web site—itsself maintained by the volunteers—demonstrates the group's diversity.

The list includes monitoring 37 beaches and two watershed streams, collecting shoreline and coastal data, evaluating water quality, and performing geospatial

mapping to determine the extent of artificial shoreline hardening, such as bulkheads.

The volunteers develop community education programs, publicize environmental information, speak to community and school groups, and organize events, such as a one-day "community university" on the environment. They conduct public tours of the resources, promote beach etiquette and stewardship, and publish everything from teacher handbooks to marine environmental guides.

As if that weren't enough, they work with researchers to reintroduce salmon, investigate stranded marine mammals, and help prepare deceased marine specimens for study and display.

## Masters of Their Domain

The format of Beach Watchers is "identical" to Washington State University's pioneering Master Gardener Program, which originated in 1973 with the concept of providing university training to volunteers, who in exchange serve their communities through horticulture. The Master Gardener Program has now been implemented nationwide.

"We started Beach Watchers because there was an awful lot of interest in Puget Sound," Meehan says. "We needed to try to begin to get a handle on what the impacts of growth were in the area."

Up until that point, Meehan had been conducting "fairly traditional" extension programming, primarily



Jan Holmes, leader of the Beach Watchers' monitoring program, gives an intertidal tour.

dealing with agriculture. But with the extensive shoreline in the county, the interconnectivity of the ecosystems—and the impact of development—could not be ignored.

"This program was designed to get the community to respond to the natural systems, understand them, and help to protect them," Meehan says.

### It's All in a Name

To create the program, Meehan established an advisory group, made up of experts from the university, relevant state and local agencies, and community leaders. One of the first things they wanted to do, he says, was come up with a catchy name. Watershed Masters just didn't fit the bill.

While many were concerned that Beach Watchers might be perceived as "police on the beach," the name stuck. "Everybody loves beaches," Meehan says. "People get interested in the program just from the title."

The advisory committee also helped put together the curriculum and established who the instructors were going to be. The equivalent of

**"This program was designed to get the community to respond to the natural systems, understand them, and help to protect them."**

**Don Meehan,  
Washington State University  
Extension Program**

one-and-a-half full-time employees are paid to administer the program.

Beach Watchers is primarily grant funded and for 10 years received grants from the Washington Department of Ecology's Coastal Zone Management Program. Grant funding is currently being received from Washington Sea Grant.

### Quality and Quantity

The intensity of training that volunteers undergo is necessary because "we accept responsibility for the scientific rigor of our data collection," Meehan says. "This is no casual little monitoring thing we have going on here. We have a very sophisticated monitoring protocol" that is critical to make the data useful for local, county, and state coastal managers.

Meehan admits that some agencies were reluctant to accept data from a volunteer organization at first but have since come around. Part of the reason for the turnaround is Beach Watchers' demonstrated commitment to collecting high-quality data, and the rest boils down to cost.

"State agencies could not afford to do" the monitoring and data collection that Beach Watchers undertakes, Meehan says. "It would cost millions of dollars to pay for what our volunteers are doing."

Not only are the group's efforts cost-effective, they also are making a difference.

Meehan notes that one local shoreline planner told him that Beach Watchers had "changed his job completely" from one of a hand-slapping regulator to more of an educator.

"Before, the planner was regularly slapping people's hands for messing things up," Meehan says. Now, property owners are calling regulators before they start a project to ask questions about what is allowable.

### The Long Haul

Ultimately, it is the quality of work that Beach Watchers is able to achieve that inspires volunteers to give so much of themselves, Irvin says. "When volunteers feel that they are doing important work, it makes a big difference. They want to keep giving."

Meehan believes that, like the Master Gardener program, the Beach Watchers formula could be used in all the nation's marine areas.

He adds, "If you bring in quality people, expect quality output, and give quality support, you can make a difference in any community." ❖

*For more information on Beach Watchers, point your browser to [www.beachwatchers.wsu.edu](http://www.beachwatchers.wsu.edu). You may contact Dot Irvin at (360) 679-7391, or [doti@wsu.edu](mailto:doti@wsu.edu). Contact Don Meehan at (360) 679-7327, or [meehan@wsu.edu](mailto:meehan@wsu.edu).*

# LIQUEFIED NATURAL GAS:

## RISING DEMAND HEATS UP COASTAL MANAGEMENT ROLE

**S**ince the 1970s, the U.S. has had four liquefied natural gas (LNG) import terminals. Rising demand for natural gas in the past few years has resulted in the submission of more than 40 proposals to build new coastal LNG facilities around the country.

With federal regulatory agencies working under a presidential directive and legislation to expedite the approval of energy projects, coastal resource managers have been scrambling to determine potential environmental impacts and what their own role in the siting of these facilities should be.

The fact that since September 11, 2001, LNG tankers and facilities are considered by many to be potential terrorist targets only adds to the issue's complexity and controversy.

"We need enough natural gas to run our power plants, heat our houses, and cook our food," says Seth Kaplan, senior attorney with the Conservation Law Foundation, a New England environmental advocacy organization. "We need to site these facilities in a calm and deliberate manner that is sensitive to the natural environment and the concern about safety."

He adds, "Striking that balance is the job of federal regulators, coastal zone managers, state energy offices—all the different public officials whose job it is to watch out for the public interest."

Issues that LNG proposals may raise for coastal managers include dredging, impacts to wetlands and habitat, conflicting user groups, and ocean management questions.

Federal consistency increases the chances that coastal programs may play a key role in addressing LNG proposals in their states, and many suggest coastal managers can be a communication bridge between local and state officials and federal regulatory programs to help ensure local and state concerns are addressed.

### Cooking with Gas

LNG is simply the natural gas that 60 million U.S. households use for heating and cooking that has been chilled to minus 260 degrees Fahrenheit to condense it into a liquid.

Changing the vapor into a liquid dramatically reduces its volume, making it economical to ship from sources around the globe. LNG

import terminals turn the liquid back into vapor so that it can be piped into homes, factories, and power plants.

The country's rising demand for natural gas, which is clean-burning and relatively economical, is being met with limited domestic supplies, leading to soaring prices and the growing risk of heating-fuel shortages. Among those calling for more LNG import terminals to meet the country's energy and economic needs is U.S. Federal Reserve Board Chairman Alan Greenspan.

President George W. Bush signed an executive order in 2001 directing federal agencies to expedite their reviews of energy-related projects and to take other actions necessary to "accelerate the completion of such projects, while maintaining safety, public health, and environmental protections."

New England, which uses more LNG than any other part of the country, is particularly at risk. During a record cold snap in January, the region came close to exhausting its gas pipeline supply.

The country's oldest existing LNG import terminal is in Everett, Massachusetts, and the state is

looking at proposals for two more LNG terminals—one onshore, one offshore.

### Fear Factor

The Everett facility, built in 1971, operated with little notice until September 11, 2001, when safety concerns led the Coast Guard and industry to take new initiatives to secure LNG infrastructure.

Michael Shanahan, spokesperson for the American Petroleum Institute, points out that LNG has been delivered across the oceans for about 45 years without major accidents or safety problems and there has not been a serious accident at a U.S. onshore facility in 25 years.

Nonetheless, industry and academic experts have engaged in a very public disagreement over the potential threats to communities should there be an accident or attack. Government tests, so far, tend to back up industry claims that LNG risks are relatively small.

“What motivates people’s concerns about LNG,” Kaplan says, “is that the potential impact of an accident could be very, very bad. Our bottom line take on it is that the safety issue is credible enough to play a major role in determining the siting of these facilities.”

While safety concerns are the number one issue with LNG proposals, Deerin Babb-Brott, assistant director of the Massachusetts Office of Coastal Zone Management (CZM), says it’s not something the state’s coastal program can directly address. “We’re an environmental agency, but our enforceable policy does require that safety information be presented for others to assess.”

Kaplan says that “safety is clearly the mandate of federal agencies, but considering that CZM conformity is a major tool states have in effectively permitting these projects, I think the folks who wield those tools need to include safety as part of what they look at.”

### One if by Land

The LNG proposal in Massachusetts that is furthest along in the regulatory process is an onshore

facility in Fall River, located about 50 miles from Boston.

The proposal calls for turning a former oil-tank farm on the Taunton River into an LNG terminal. The site was one of nine identified a number of years ago by the state’s designated ports program as appropriate for marine industrial use.

In July, the Federal Energy Regulatory Commission (FERC) issued its draft environmental impact statement (DEIS), which suggests “approval of the proposed project with appropriate mitigation measures as recommended would have limited adverse environmental impact.”

The DEIS also serves as the draft environmental impact report required under the Massachusetts Environmental Policy Act (MEPA), which is the “mechanism by which we develop the necessary information to demonstrate consistency,” says Babb-Brott.

The City of Fall River has hired two consultants, who after reviewing the DEIS disagree with its environmental and safety findings.

The city argues that the facility puts the thousands of residents living near the site at risk, would cause significant environmental damage, and does not fit into its current economic development plans. Officials complain that the terminal also would be an eyesore.

Carol Wasserman, director of regulatory strategies for the ESS Group, the city’s environmental consulting firm, says the most significant environmental impact from constructing the Fall River facility would come from dredging.

Wasserman says that to remove the necessary 2 to 3 million cubic yards of sediment, dredging operations are proposed to function 7 days a week, 365 days a year, for three years.

The proposal also calls for using all the dredged material on the site, including filling several small salt marshes. She notes the Taunton River has been designated as essential fish habitat for 14 federally managed species and 4 endangered or threatened species.

“The designated ports program still has standards that have to be considered. It does not give license to fill salt marsh or do whatever you want to the environment,” notes Wasserman.

### In the Fast Lane

In addition to having environmental and safety concerns, Eric Poulin, project manager for the City of Fall River, says the city feels “steamrolled” by the expedited federal permitting process.

FERC, the lead federal agency in charge of onshore LNG projects, is working hard to quickly review proposals and still address all questions and concerns raised during the permitting process, says Mark Robinson, director of FERC’s Office of Energy Projects.

“We try to as efficiently as possible make the judgment that is in the public interest,” Robinson says. FERC tries to do its environmental impact statements in less than a year, but it solicits comments and recommendations at several points in the review process from federal, state, and local authorities, and members of the public, to get the broadest possible range of information and opinion.

Under the National Environmental Policy Act (NEPA), “every issue that is raised has to be addressed,” Robinson says. “It doesn’t mean that people always get what they want, but they are guaranteed that their issues will be addressed once, if not twice, formally by the commission.”

While FERC and the U.S. Coast Guard are ultimately responsible for siting LNG import facilities, applicants typically anticipate getting at least 100 permits from many federal, state, and local authorities.

Siting of LNG import terminals must be consistent with the coastal zone management programs of the applicable states.

### Two if by Sea

Public opposition to onshore LNG facilities has led some to argue that new import terminals should be built in the ocean.



Images courtesy of Excelerate Energy, LLC

The proposed offshore LNG terminal in Massachusetts will be equipped with a 35-foot-high undersea buoy (Left). The buoy will serve as the anchor system for specially modified LNG tankers that incorporate onboard equipment to vaporize the liquid, which is piped to shore.

*Continued from Page 5*

Excelerate Energy, LLC, is building the first offshore LNG terminal in the world 116 miles off the coast of Louisiana. In January 2005, the same company is planning to officially submit a proposal for an offshore terminal 10 miles from the shoreline of Gloucester, Massachusetts.

While the Louisiana project generated little public debate, the Massachusetts proposal has already created controversy.

"I get the feeling that if it's offshore, everyone's a lot more relaxed," says Dale Brown the City of Gloucester's community development director. "We don't feel more relaxed."

The company combines LNG shipping and regasification on a single oceangoing vessel. A submerged mooring buoy system anchored to the seafloor would allow LNG vessels to dock and connect to an existing pipeline in Massachusetts Bay.

Kathleen Eisbrenner, president of Excelerate Energy, says the offshore terminal will require little offshore development and is minimally intrusive to the environment. Placing the project miles away from neighborhoods and out of high-vessel-traffic areas ensures that risks are kept to a minimum.

The location they have chosen is out of state waters in a small triangle bordered by Stellwagen Bank National Marine Sanctuary, two state sanctuaries, and a dredge disposal site.

It also "happens to be a really good habitat for commercial fishing and is a traditionally heavily fished area," says Brown. "Our single biggest concern is how it's going to impact the fishing industry."

A major environmental concern with some offshore proposals is "open-loop" systems. These systems could impact fish populations by sucking in millions of gallons of relatively warm ocean water to regasify the LNG and then discharging cold water back into the ocean. The Gloucester facility would be a "closed-loop" system, thus avoiding this issue, Eisbrenner says.

### **Taking Sanctuary**

The potential impacts of the proposed facility to Stellwagen Bank are unknown at this point but have raised some questions from the sanctuary's advisory council, says Craig MacDonald, sanctuary superintendent.

One concern is the required security exclusion zone around the LNG facility, which could potentially overlap the sanctuary, keeping out researchers, recreational

and commercial fishermen, and commercial whale-watching vessels.

Eisbrenner says the company will include all stakeholders in determining "the right balance of safety, the environment, and business to ensure mutual satisfaction. If we can't come up with that, we won't build it."

### **Similar but Different**

When the Deepwater Port Act was amended in 2002 to include offshore natural gas facilities, the primary responsibility for regulating offshore LNG facilities fell to the Coast Guard. The act establishes a specific time frame of 330 days after the application is deemed complete for the Coast Guard to approve or deny an LNG project.

The Coast Guard must comply with NEPA requirements within that time, notes Mark Prescott, chief of the Coast Guard's Deepwater Ports Standards Division.

Prescott says the Deepwater Port Act has two major provisions that deal with state involvement. "One is that it has to demonstrate consistency with the CZM plan for the state, and two is that the governor of the adjacent coastal state has outright authority to deny a project, or require that it meet certain conditions to

*Continued on Page 9*



# Keeping Oil and Water from Mixing in Texas

**O**il, gasoline, and diesel fuel can collect in a boat's bilge, and there are few inexpensive and easy ways for commercial or recreational fishermen to dispose of this contaminated bilge water. Coastal resource managers in Texas are working hard to keep this oily water from going overboard.

"There are thousands of commercial fishing and recreational vessel owners along the Texas gulf coast who must deal with the disposal of their contaminated bilge water," says Dale Smith, program manager for the Texas General Land Office's Bilge Water Reclamation Program. "Our main goal is to prevent the oily discharge or contaminated water from entering coastal waters, which not only hurts us ecologically, but also costs us money to clean up the spill."

One of the solutions, Smith says, has been to build six bilge reclamation facilities at marinas along the Texas gulf coast. Two more facilities are under construction in the state.

Commercial and recreational fishermen can use these facilities, usually sited conveniently alongside areas where boat operators take aboard fuel and ice, to pump the oily bilge water from their vessels.

There is no cost to fishermen to use the facilities, which separate the water and oil so that the oil can be recycled and the water properly treated.

Information on the facilities is communicated through brochures, which are written in English, Spanish, and Vietnamese.

Smith notes that in a typical year, the Texas Oil Spill Prevention and Response Program responds to between 1,200 and 1,300 reported oil spills. In 1997, 34 percent of the oil spill responses along the Texas coast were attributed to "mystery spills" that could be coming from fishing vessels.

A survey of stakeholders confirmed that many of these mystery spills were "intentional improper disposal of oil, mostly oily bilge water, due to the inconvenience and high cost of proper disposal

**In 1997, 34 percent of the oil spill responses along the Texas coast were attributed to "mystery spills" that could be coming from fishing vessels.**

options." It also confirmed, Smith says, that vessel owners and operators would gladly use bilge pumping facilities if they were less expensive than the alternative.

The state has paid to build five of the six facilities, and partners with the relevant navigation district, city or county, and others to manage and maintain them, Smith says.

The program is funded by a two-cent-per-barrel fee on crude oil that is transported into and out of Texas ports. Each reclamation facility is site-specific and has cost anywhere from \$80,000 to \$250,000 to construct, depending on the size of the vessel population, tank and pump size, and other factors.

Since the first facility was constructed in 1996, the bilge water facilities have collected more than 650,000 gallons of oil and 700,000 gallons of contaminated water, and local officials in areas with the facilities report dramatically improved water quality and less oil washing up on nearby beaches.

Interest in the facilities has come from as far away as the Middle East, and Smith believes similar facilities would be just as successful elsewhere along the U.S. coastline.

"It's not rocket science," Smith says. "It should be pretty simple to make them work anywhere." ❖

*For more information, point your browser to [www.glo.state.tx.us/oilspill/](http://www.glo.state.tx.us/oilspill/). You also may contact Dale Smith at (512) 475-1513, or [dale.smith@glo.state.tx.us](mailto:dale.smith@glo.state.tx.us).*



Photo courtesy of Texas General Land Office

Six bilge reclamation facilities that are improving water quality have been built at marinas along the Texas gulf coast.

# Playing Games with the Environment in Minnesota

If people could immediately see the impact their everyday choices have on the environment, would it change how they live their lives? What if this experience was fun and everything bad that happened to the environment during this educational encounter could be taken back?

Educators with the University of Minnesota Sea Grant are giving students and many adults the chance to see how their daily decisions might impact Lake Superior, or other lakes in the region, through playing the Lake Superior Game.

"Whatever their choices are, they come to recognize that there are a lot of small actions that have cumulative effects on the lake," says Barbara Liukkonen, Minnesota Sea Grant's water resources education coordinator.

When playing the game, a bucket that is three-quarters full of clean, clear water represents the lake and is placed in the center of a 15-foot by 20-foot tarp with a map of the lake printed on it. There also are some plastic fish and a sign at the bottom of the bucket representing a shipwreck.

Players sit around the bucket and take on one of 35 roles, which will put them into potentially real-life situations and force them to make decisions.

For instance, Liukkonen says, one of the roles is for a homeowner who wants to have a weed-free lawn. The player must choose either to use herbicide or pull the weeds by hand.

If the weed killer is used, the player must add red food coloring, which represents pollution, to the bucket. If pulling weeds by hand is chosen, the player must do five jumping jacks to represent the effort of weeding.



Photo courtesy of Chisago County, Make a Splash Water Festival

Lake Superior Game players add pollution to a bucket of water, helping them see how the environment is impacted by their decisions.

## "It's something I think marine resource educators anywhere can use and adapt."

**Barbara Liukkonen,  
Minnesota Sea Grant**

Other pollutants include yellow food coloring for septic system failures; dirt, sand, and grass to represent erosion, drained wetlands, or other runoff; trash, such as candy wrappers or a crumpled napkin; cooked spaghetti to represent fish guts; and cooking oil or molasses to represent motor oil.

Liukkonen created the original version of the Lake Superior Game in 1987 for students in the fifth and sixth grades. Since then, it has been played in classrooms, educational events, and festivals, and even by lake associations and community groups.

In 1991, Sea Grant published the basics of the game so that it could be used by other marine

educators. Since 1994, the game has been requested and sent to every province in Canada and to every state in the U.S. except Hawaii and Wyoming. The game was updated and reprinted in 2003.

"It's something I think marine resource educators anywhere can use and adapt," Liukkonen says, noting that it could easily be customized for other lakes, rivers, and even the ocean or an estuary.

She adds, "Really, it's something that's easy to do, it's engaging, and it compels people to look at their own beliefs and values." ❖

*To order the Lake Superior Game, call (218) 726-6191, or e-mail [seagr@d.umn.edu](mailto:seagr@d.umn.edu). You can order it on-line by pointing your browser to [www.seagrant.umn.edu/pubs/mailorder.html](http://www.seagrant.umn.edu/pubs/mailorder.html), going to the education category, and selecting item S3. Each game costs \$2.50, with 10 or more copies costing \$1 each. For more information, contact Barbara Liukkonen at (612) 625-9256, or [liukk001@umn.edu](mailto:liukk001@umn.edu).*

Continued from Page 6

make it in compliance with the state's environmental plan."

As a result, cooperation in the permitting process between local, state, and federal authorities is essential. As early in the project as possible, coastal managers should help coordinate efforts to develop information for the public and decision makers on various LNG issues and help coordinate a state's review of LNG terminal applications.

### Finding the Energy

Although LNG is not new, it is a new issue on the plates of many of the country's coastal resource managers.

"Natural gas will remain the economic and environmental fuel of choice for this country," says FERC's Robinson. "A number of federal and state agencies all have a strong role to play in ultimately deciding if permitting a project is in the public's best interest." ❖

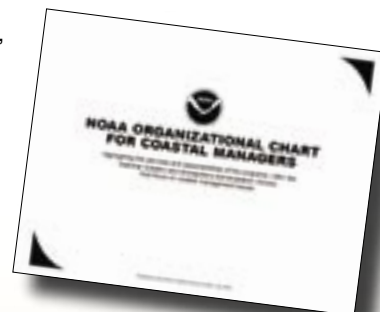
For more information on LNG proposals in Massachusetts, contact Deerin Babb-Brott at (617) 626-1207, or [deerin.babb-brott@state.ma.us](mailto:deerin.babb-brott@state.ma.us). To receive a copy of FERC's DEIS about Fall River, call (202) 502-8371. To review the docket, go to [http://elibrary.ferc.gov/idmws/docket\\_search.asp](http://elibrary.ferc.gov/idmws/docket_search.asp) and type "CP04-36" in Docket Number. To learn more about local environmental concerns, contact Carol Wasserman at (781) 489-1124, or [cwasserman@essgroup.com](mailto:cwasserman@essgroup.com). For general information on the LNG industry, go to [www.api.org](http://www.api.org). To view the Congressional Research Service report, "Liquefied Natural Gas (LNG) Infrastructure Security: Background and Issues for Congress" go to [www.energy.ca.gov/lng/documents/CRS\\_RPT\\_LNG\\_INFRA\\_SECURITY.PDF](http://www.energy.ca.gov/lng/documents/CRS_RPT_LNG_INFRA_SECURITY.PDF).

## NOAA is more than just a pretty coastal management program.

Review the NOAA *Organizational Chart for Coastal Managers* to learn about the many facets of this organization, from weather to research to fisheries management.

This reference profiles those National Oceanic and Atmospheric Administration (NOAA) offices of interest to the coastal resource management community.

Visit [www.csc.noaa.gov/noaaorgchart4czm/](http://www.csc.noaa.gov/noaaorgchart4czm/) to see an on-line copy, or e-mail the NOAA Coastal Services Center at [clearinghouse@csc.noaa.gov](mailto:clearinghouse@csc.noaa.gov) to get a hard copy.



**NOAA Coastal Services Center**  
LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

## New for Geographic Information System Users

### Electronic Navigational Chart Data Handler Extension for ArcGIS

This extension was developed to help state coastal programs access the wealth of information found in electronic navigational charts. Visit <http://chartmaker.ncd.noaa.gov> to see available charts. To download the data into your GIS system, use the free data handler extension at [www.csc.noaa.gov/products/enc/](http://www.csc.noaa.gov/products/enc/)

Brought to you by the NOAA Coastal Services Center.

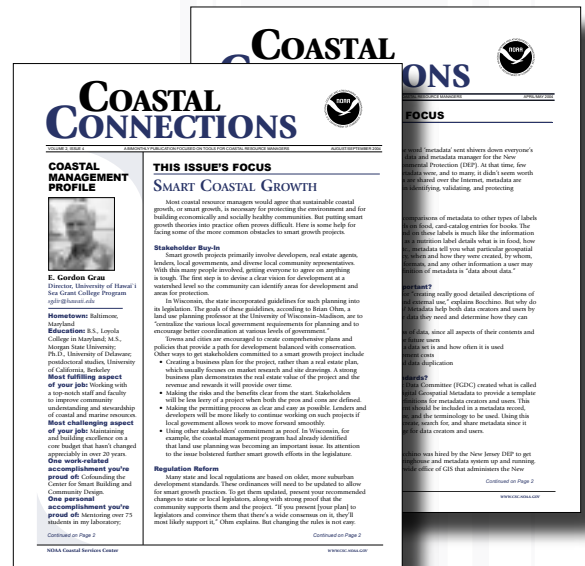
# COASTAL CONNECTIONS

A How-To Guide for Coastal Resource Managers

## Previous topics include

- Smart Growth
- Impervious Surfaces
- Metadata
- Communicating via the Media
- Coastal Observing Systems
- Docks and Piers
- Remote Sensing
- Beach Nourishment
- Needs Assessment
- Effective Web Design

Visit [www.csc.noaa.gov/newsletter/](http://www.csc.noaa.gov/newsletter/) to subscribe and review back issues.



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