

COASTAL SERVICES

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LINKING PEOPLE, INFORMATION, AND TECHNOLOGY

DAM REMOVAL: Creating a Monitoring Guide for Removing Barriers in the Gulf of Maine

Creating One Coastal Vision in Indiana

Oregon Tsunami Signs Go International



FROM THE DIRECTOR

A confluence of events may be occurring as a number of dams in the U.S. reach the end of their design life and many in the coastal resource management community focus on restoring ecosystem processes.

The result may be that communities are faced with tough decisions of whether to remove or repair dams and other stream barriers.

Removing stream barriers has long been understood to be an effective means to increase available habitat to migratory and resident native fishes, and to improve water quality. While removing stream barriers is becoming more and more common, it is estimated that less than 5 percent of these types of projects have been monitored to determine their success, as well as unintended consequences.

This lack of standardized monitoring data spurred resource managers in the Gulf of Maine to develop a regional guide to monitoring environmental parameters for stream barrier removal projects—a guide that may be useful for coastal managers in other parts of the country.

The cover story of this edition of *Coastal Services* looks at how managers in the Gulf of Maine created the *Stream Barrier Removal Monitoring Guide* and provides information on the eight critical monitoring parameters they selected.

In addition to monitoring the environmental impacts of these types of restoration projects, there is also a need for socioeconomic monitoring, such as impacts on businesses and residents.

Over the past several years, the National Oceanic and Atmospheric Administration's Coastal Services Center has partnered with the Elwha Klallam Tribe in Oregon and the University of Idaho to develop methodology to measure the potential socioeconomic impacts of two dams on the Elwha River before they are removed by the National Park Service in 2009.

This methodology, as well as spatial data, resource management strategies that address watershed resources before, during, and after dam removal, and other information describing the past and current conditions in the Elwha watershed can be found at www.elwhainfo.org.

These are two examples of how coastal managers are working together to sustain and improve coastal and marine habitats and the ecosystem services that they provide.



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

Using Participatory GIS to Get that “Aha!” Moment

GIS is not just for technicians anymore. Any issue that has a spatially based component can benefit from this powerful technology—a technology that merges maps and information.

But can GIS benefit the human component of coastal resource management? Can GIS help a committee reach consensus? Can people use the technology to enhance collaborative efforts and envision the future?

Yes. “Participatory GIS” represents an emerging option that many community organizations are finding useful and easy to use.

With participatory GIS tools, instead of merely talking about development possibilities, users can see various scenarios on a map and change components at will to reflect new ideas and requirements.

“The visual nature of GIS gives people a clear picture of the situation. Combining participatory methods with geospatial technology helps gather local knowledge, increasing the quality of decision-making processes and participant buy-in,” says Chrissa Stroh, environmental planner with the National Oceanic and Atmospheric Administration's Coastal Services Center.

The value of participatory GIS is being examined as Stroh works with citizens in coastal South Carolina who have a vision of preserving their community's rural character. Using participatory GIS methods, the citizens are better able to define and document what is meant by community character, adding churches, local landmarks, and scenic views to the maps they are creating.

“Not only are they gathering information for the decision-making process, but working through the participatory GIS is increasing their knowledge and skill level and legitimizing their work,” says Stroh. “We haven't completed the project yet, but I can already see the power of this technology.” ❖

Examples of Participatory GIS

On-line Mapping Applications – Several on-line mapping applications are free or inexpensive, allowing users to create and share information in a geospatial format. Examples include trail routes created using GPS, photographs of geographic locations, and favorite restaurants or sites.

Google Earth – <http://earth.google.com>

Microsoft Virtual Earth – www.microsoft.com/virtualearth/

Openstreetmap – www.openstreetmap.org

Tools and Methods

Paper Maps – Participants can add information to paper maps (important community features, proposed development boundaries, suggested locations of parks, and so on).

Adobe PDF Maps – These maps allow users to view geospatial data, turn layers on and off, and print without making changes to the data.

Argumaps – Argumaps are useful when there are arguments for or against a specific project in a geographic location, as the tool provides a way to store information about planning discussions that have occurred about a certain location.

Habitat Priority Planner – www.csc.noaa.gov/hpp/

This software helps users prioritize their project goals by packaging ecological and other components in a mapping structure. Users can quickly display criteria on a map to help an audience visualize options.

City Geography Markup Language – www.citygml.org

This is used for 3-D visual planning and can incorporate features such as vegetation, soil, digital terrain models, buildings, water bodies, and infrastructure.

CommunityViz – www.placeways.com

This tool is used to visualize landscape scenarios and communicate ideas and information.

Creating One Coastal Vision in Indiana

Where heavy industry once dominated Indiana's shoreline, there are now plans for parks and trails, setbacks and habitat restoration, and jobs and economic development. These plans are part of a unified long-range vision for the state's 45-mile shoreline developed by coastal resource managers and a plethora of stakeholders.

"This is the poster child of what coastal management is supposed to be about in Indiana."

*Mike Molnar,
Lake Michigan
Coastal Program*

"This is a huge accomplishment to have a comprehensive plan and vision for the entire coastal area," says Mike Molnar, program manager for the Lake Michigan Coastal Program in the Indiana Department of Natural Resources. "This is the poster child of what coastal management is supposed to be about in Indiana."

Completed in two phases over four years, "The Marquette Plan: Indiana's Lakeshore Reinvestment Strategy" outlines a plan for attracting economic opportunities to the state's coastal communities, improving residents' quality of life, and enhancing the region's most valuable natural resource—Lake Michigan.

"This is really the recognition of the value the coastal area might have in our region's future," notes John Swanson, executive director of the Northwestern Indiana Regional Planning Commission, an area-wide planning agency that coordinated the plan's second phase.

While phase two of the Marquette Plan only received final approval in February, the effort has already attracted local, state, and federal resources and has resulted in the development of the city of Portage's new 60-acre, \$6.8 million Lakefront Park complex, due for completion this fall. Restoration projects and trail developments also have been completed, or are in the works.

Industrial History

For most of the past century, Indiana's Lake Michigan shoreline was one of the nation's industrial centers, known predominantly for its steel production. While there is still an industrial presence in the region, it has declined, leaving many coastal communities stained by abandoned industrial sites.

Other coastal areas feature towering sand dunes, known for their recreational opportunities and rich biodiversity.

"Indiana has one of the most diverse shoreline areas that you will find among any coastal program," says Molnar. "We have a national park bordered on either side by steel mills, and there is a huge difference among community needs."



Long in Coming

The concept for the Marquette Plan was conceived in 1985 by U.S. Representative Peter Visclosky as a way to expand public shoreline access through redevelopment of idle industrial land using public-private partnerships.

But it wasn't until shortly after the Lake Michigan Coastal Program received approval in September 2002 that Visclosky's idea found traction, Molnar says.

"We're a nonregulatory program, and we saw this as one way to get all the communities on board with a common vision," Molnar says. "The plan is nonbinding because we're a home rule state, so it will be up to the local governments to take action and move it forward."

Phased In

For many reasons—geography, economics, politics—it made sense to split the coastline into two planning phases, Molnar says.

The key to both phases, he says, was "to see the region as one cohesive region united by a larger vision that leverages the collective strengths of Northwest Indiana's communities."

To accomplish this and still meet all communities' needs, three guiding principles were established. These goals were that 75 percent of the lakeshore should be open

for free public use, new lakefront development projects should have a minimum setback of at least 200 feet, and a continuous biking and walking trail should be developed to connect lakefront communities.

Both phases relied on an extensive stakeholder involvement process that included a working group of community, political, and business leaders, as well as many public meetings and hearings.

One Down

For the first phase, which began in 2004, the coastal program used a \$160,000 coastal grant to support the shore's five largest communities—East Chicago, Gary, Hammond, Portage, and Whiting—in the planning process. The city of Portage took on the project coordination responsibilities.

Completed in 2005, this first phase of the Marquette Plan calls for acquiring land no longer needed by industry and using it for public parkland, including a pedestrian and bicycle trail that will stretch from the Illinois state line to the eastern boundary of the city of Portage.

The state legislature created a Regional Development Authority in 2005 to help leverage and manage funding for the plan's projects.

Different Issues

For phase two of the Marquette Plan, a different set of issues was identified for the much smaller communities along the shoreline from the city of Portage to the Michigan state line, Swanson says. This area is already largely in public ownership through the Indiana Dunes National

Lakeshore and a state park, and there is active heavy industry.

The Port of Indiana is located there, power facilities are there," Swanson says. "There were many concerns about exercising eminent domain and regulations, as well as heavy truck traffic. We had to take these communities' different needs into account from the onset."

On February 28, the Northwestern Indiana Regional Planning Commission unanimously adopted the plan's second phase, which calls for improving existing public access, developing regional water trails, restoring habitat, and encouraging smart growth, such as mixed uses, says Jenny Orsburn, program specialist with the Lake Michigan Coastal Program.

Future Efforts

To further promote these local planning efforts, a poster is being developed that incorporates both phases of the Marquette Plan into a unified vision for the entire 45 miles of shoreline. Swanson says 4,000 posters will be seen in schools, libraries, town halls, and other public places.

Molnar says that although the congressman's support was necessary to get the planning process going, its ultimate success rests with the residents and local civic, government, and business leaders who participated.

"The best thing about this process is it started the conversation between communities that had never talked to each other," says Orsburn. "Now there isn't a meeting where Marquette isn't brought up, mentioned, or discussed."

She adds, "The process combined the principles of natural resource protection, economic development, and a social framework. I believe these planning principles would transfer anywhere." ❖

For more information about Phase II of the Marquette Plan, visit <http://nirpc.org/NEWeconomic%20development/MarquettePlan/MP2PCTP.htm>. You may also contact Mike Molnar at (317) 233-0132, or mmolnar@dnr.in.gov, or Jenny Orsburn at (219) 983-9912, or jorsburn@dnr.in.gov. You may also contact John Swanson at jswanson@nirpc.org.



Indiana's diverse shoreline is known for recreation and industry.



DAM REMOVAL:

Creating a Monitoring Guide for Removing Barriers in the Gulf of Maine

Across the country, resource managers are removing aging dams and replacing culverts to restore stream processes and fish passages. Significant resources are often invested in these stream barrier removal projects, but monitoring the projects' outcomes typically has not been a priority.

This lack of standardized monitoring data spurred resource managers in the Gulf of Maine to develop a regional guide to monitoring parameters for stream barrier removal projects—a guide that may be useful for coastal resource managers throughout the U.S.

“This is a very relevant topic for coastal managers throughout

the country, particularly in regard to restoring ecosystem processes and diadromous fish,” or fish that migrate between salt and fresh waters, says Kevin Lucey, program specialist with the New Hampshire Coastal Program in the Department of Environmental Services.

In December 2007, the Gulf of Maine Council (GOMC) on the Marine Environment, a U.S.–Canadian partnership of government and nongovernment organizations, published the *Stream Barrier Removal Monitoring Guide*.

The guide provides the scientific context of stream barrier removal and information on eight critical monitoring parameters that characterize the

physical, chemical, and biological impacts of a removal project.

More than 70 natural resource scientists, resource managers, and watershed restoration practitioners contributed to the guide's development.

“The monitoring parameters we present and scientific context are relevant no matter where you are in the country,” says Beth Lambert, river restoration scientist for the Riverways Program in the Massachusetts Department of Fish and Game. “We encourage people who are doing any kind of barrier removal to look at this first before they try to go through their own process.”

“We encourage people who are doing any kind of barrier removal to look at this first before they try to go through their own process.”

Beth Lambert,
Massachusetts Riverways Program

Aging Inventory

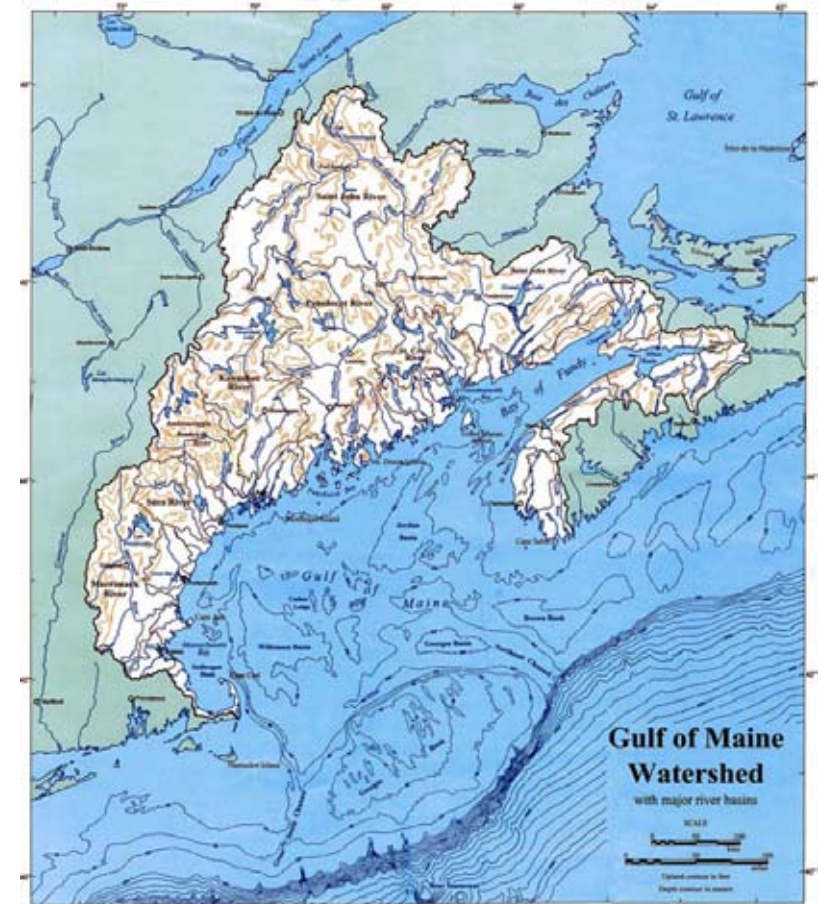
According to the U.S. Army Corps of Engineers' National Inventory of Dams, there are more than 79,000 dams in the U.S., a large percentage of which are older dams that lack the necessary maintenance to guarantee proper dam operation and structural integrity.

The average age for a dam is 40 years, and states and localities are responsible for the maintenance and safety of 95 percent of the nation's dams.

“Construction of dams along coastal rivers is as old as this country,” says Matt Collins, hydrologist with the National Oceanic and Atmospheric Administration's Restoration Center in Massachusetts. “Many dams are derelict and have no owners or useful purpose anymore.”

Most of the dams in the Northeast are smaller structures that are less than 20 feet in height. Many of these dams are not included in the national inventory because of their smaller size.

On the U.S. side of the Gulf of Maine, there are 4,867 state-inventoried dams: 2,506 in New Hampshire, 782 in Maine, and 1,579 in Massachusetts. Because inventory methods and reporting



The white area indicates land that drains into the Gulf of Maine.

GRAPHIC COURTESY OF GULF OF MAINE COUNCIL

standards differ from state to state, the completeness of the inventories varies widely.

Even more prevalent than dams may be other stream barriers, such as culverts and buried streams.

Removing Barriers

Stream barriers are most often removed when they represent a risk to public safety, local and regional economies, and the environment. Environmental impacts include interfering with stream and floodplain processes, habitat, and fish passage, and degrading water quality.

On the U.S. side of the Gulf of Maine, about 20 dams have been removed since 1995, and another 20 dams are now being evaluated for removal.

Of the more than 500 dams that have been removed around the country, it is estimated that less than 5 percent were monitored, notes Lucey.

Measuring Success

Replacing stream barriers has long been understood to be an effective means to increase available habitat to migratory and resident native fishes, and to improve water quality, but Lucey explains, “without monitoring you can't measure success,” or any unintended consequences.

Stream barrier removal was not a common management activity even 10 to 15 years ago, but because of the aging inventory of dams around the country, the pace of potential dam removal will likely be quickening.

Continued

“Dam owners and resources agencies will need the best available science to make decisions on how we are going to proceed with deciding if a dam should be removed,” Lucey says. “Hopefully, these monitoring protocols will provide us with adequate data to help inform those decisions.”

Money Matters

Cost is the primary reason monitoring is not typically done, says Collins. “Monitoring is often the last thing to get funding.”

“Up until this point,” adds Elizabeth Hertz, senior planner with the Maine Coastal Program, “there’s not been a lot of agreement on some of the specific criteria or aspects of a barrier removal project that should be monitored.”

Looking for Solutions

With no nationally standardized protocols that could be adapted or applied to the Gulf of Maine, Jon Kachmar, director of The Nature Conservancy’s Long Island Sound Program and former habitat restoration coordinator for the Maine Coastal Program, says the focus of the GOMC turned to developing regional standards that “could meet everybody’s objectives.”

A model for the project was a GOMC guide to salt marsh restoration monitoring protocols (www.gulfofmaine.org/habitatmonitoring/) that was completed in 2004. “This was already in place and a quite successful model that has allowed

for the collection of data at the regional level,” Kachmar says.

“The idea” for the Stream Barrier Removal Monitoring Guide, notes Collins, “was that if we can monitor many sites over time, the individual results should roll up into a general picture of habitat restoration in the region.”

The 13-member GOMC River Restoration Monitoring Steering Committee worked together to develop the guide. Lucey, Kachmar, Collins, and Lambert were among the guide’s eight authors and also served as editors.

Breakout Sessions

To develop the monitoring protocols, the steering committee held a two-day workshop in June 2006 to gather input from more than 70 natural resource scientists, resource managers, and watershed restoration practitioners.

“We needed to identify the parameters that offer the biggest bang for the buck, so that if you can only monitor a handful of things, what will tell you the most information about stream response,” says Collins.

From the prioritized list of monitoring parameters generated during the workshop, the committee selected eight critical parameters: monumented cross-sections, longitudinal stream profile, stream bed sediment grain size distribution, photo stations, water quality, riparian plant community structure, macroinvertebrates, and fish passage assessment.

Twenty-five reviewers vetted descriptions of each of the monitoring parameters, as well as information on additional monitoring parameters that practitioners may choose to use on a case-by-case basis. The guide was made available on-line at www.gulfofmaine.org/streambarrierremoval/.

The entire process took “1 year, 5 months, and 9 days,” says Lambert.

Trial Run

The editorial team and other partners tested the protocols last summer in New Hampshire.

“We did it to ensure that what we produced could actually be replicated in the field,” says Kachmar. “What we realized is that it takes a lot of time and effort for whoever is doing the restoration to implement all the protocols.”

All the editors emphasized that it is not required to do all the monitoring parameters as a suite.

“We designed the guide to be used by section, so if you were interested in looking at monitoring fish activity you could go and literally download that section on-line,” Kachmar explains. “We want people to monitor whatever is appropriate for monitoring. It will all depend on the scale of the project.”

Getting Used

While use of the protocols is voluntary, the committee has been using press releases, newsletters, e-mails, conference presentations, and other outreach efforts to get the guide distributed to the various

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Oregon Tsunami Signs Go International

All along Oregon’s coast are blue and white signs depicting a series of waves and a stick figure running uphill that alert residents and visitors to the fact that they are in a tsunami-vulnerable area. These tsunami warning signs, which were created as part of an Oregon Sea Grant effort, have spread not only to other U.S. states and territories, but also to other countries.

“This was just a small part of our work on tsunami hazard education, but it’s certainly gratifying how it’s caught on,” says Jim Good, professor emeritus at Oregon State University and former coastal resources specialist with the Oregon Sea Grant Extension. “The signs have been a tremendous educational tool.”

Modeled after hurricane evacuation signs on the East Coast, Good worked with staff members from the Oregon Coastal Management Program and state departments of Geology and Mineral Industries and Transportation to develop the signs. Tom Weeks, graphic design specialist with the university’s College of Agricultural Sciences and Extension, designed the sign’s icon.

“I went to the drawing board—literally—making pencil sketches and developing it on the computer,” Weeks says. The gender-neutral figure is “readily recognized as a person in action.”

“We wanted to have a graphical depiction of the response a person should have in the event of a strong earthquake,” Good explains. Run inland or to high ground as fast as possible.

Good notes that there was “a lot of resistance at first from towns on the coast about using the signs because they were afraid they would scare tourists away. . . They’re everywhere now.”

In addition to the Oregon coast, the signs have been adopted in the states of Hawaii, California, Washington, and Alaska, as well as the territory of Puerto Rico.

Usage of the graphic icon spread to Thailand, Japan, Chile, and Mexico after the December 2004 tsunami in the Indian Ocean.

“As tragic as it was, the Indian Ocean tsunami woke people up here and around the world,” Good says. “It was a teachable moment for tsunami evacuation planning.”

Neither Good nor Weeks is sure how the graphic—which is in the public domain—has spread to international shores, but Good believes it may have started with an Oregon State University graduate student who went to Thailand to serve on a tsunami damage assessment team and took copies of the signs with her.

The signs have been successful, Good says, because

“It was a teachable moment for tsunami evacuation planning.”

*Jim Good,
Oregon State University*



Jim Good examines a tsunami sign in Puerto Rico.

they have a “simple clear message that is tied to the potential for real natural disasters.”

“When I was creating it,” Weeks says, “I had no idea it was going to expand the way it did. What you think is an inconsequential action can lead to the greatest change. This was a simple project that ballooned.”

He adds, “I’m just hoping that it helps somebody down the road.” ❖

For more information on Oregon’s tsunami awareness signs, you may contact Jim Good at jwg4@yahoo.com. You may also contact Tom Weeks at (541) 737-0814, or tom.weeks@oregonstate.edu.

Ocean Awareness Helps Provide Competitive Edge for Tourist Operators in Maui

How do tourists know that the guide they are hiring to take them fishing, scuba diving, snorkeling, kayaking, or surfing is giving them accurate information about the area's cultural and natural resources? If they are on the Hawaiian Island of Maui, they look for a guide who has received C.O.R.A.L. certification.

“So many businesses are doing so many of the same things that this is a good way of setting themselves apart.”

Emily Carlson, Hawaiian Islands Humpback Whale National Marine Sanctuary

C.O.R.A.L. (Care of our Culture, Ocean, Reefs, and Animal Life) certification is earned by attending the Ocean Awareness Training program, a twice-a-year series of educational seminars and field exercises organized by area environmental organizations.

“So many businesses are doing so many of the same things that this is a good way of setting themselves apart,” says Emily Carlson, volunteer programs and outreach coordinator for the Hawaiian Islands Humpback Whale National Marine Sanctuary and a coordinator of the Ocean Awareness Training program.

Carlson adds, “The people who are sharing their knowledge with visitors and the public should be the most knowledgeable about what they are talking about.”

The free program is offered to those who regularly interact with visitors to Maui, such as marine tour operators, hotel concierges, and volunteers with sanctuary partner organizations. Experts from around the state provide the series of six lectures, which students must attend to receive certification. They must also pass an exam.

To ensure that every participant has a core understanding, the same training program is offered every fall, providing basic information on topics such as marine mammals, ocean etiquette and safety, coral reefs, basic Hawaiian culture, and sustainability. The spring seminars present new information and can cover subjects like water quality, watershed ecology, coral reef disease, and herbivorous fish.

The training sessions are offered concurrently in both Kihei and Lahaina. Carlson notes that last fall, 140 people attended the workshops, with about 75 receiving certification.

The program began three years ago, Carlson says, as a volunteer educational series for all the environmental organizations on the island. Since then, it has “grown and gotten so much credibility” that they have had



Lectures, field training, and a test must be completed for certification.

to expand to two locations and offer sessions twice a year.

“What’s so crazy,” she says, “is that we have no budget for this at all. It’s all staff time,” with staff members from the sanctuary, Project S.E.A.-Link, Maui Reef Fund, and Hawaii’s Eco-Nature Society taking the lead organizational roles, and a number of other organizations participating.

Carlson notes that they are working to offer coastal resource managers in other areas a “complete package” of information on how to do the training.

She adds, “I definitely think that other coastal managers could follow suit.” ❖

For more information on the Ocean Awareness Training program, point your browser to www.coralreefalliance.org/index.php?option=com_content&task=view&id=530&Itemid=182. You may also contact Emily Carlson at (808) 879-2818, ext. 102, or Emily.Carlson@noaa.gov.

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agencies, groups, and organizations in the region that do barrier removals.

They are also demonstrating by example.

“Certainly the coastal program is involved in a number of dam removals currently, and as an author of the document, I wouldn’t be able to sleep at night if I didn’t implement the protocols on our dam removals,” says Lucey. General feedback about the guide also indicates others are using the protocols.

“If we can bump the number of people doing monitoring from 5 percent to 15 to 20 percent,” he says, “I think we’ll have a lot more basis to make decisions in the future.”

The greatest benefit of the guide, says Maine’s Elizabeth Hertz, “is that this helps move us towards watershed or ecosystem-based management efforts. Documents like this are a crucial part of that process in terms of creating more understanding and awareness of how the pieces fit together.”

Kachmar adds, “I think we really hit the mark on what we wanted to develop.” ❖

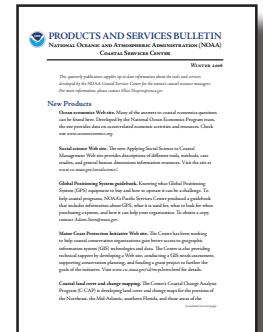
To view the Stream Barrier Removal Monitoring Guide, point your browser to www.gulfofmaine.org/streambarrierremoval/. The National Inventory of Dams is available on the Web at www.tec.army.mil/nid/ for government users and for the public at www.tec.army.mil/nidpublic/. For more information on the Gulf of Maine guide, you may contact Kevin Lucey at (603) 559-0026, or Kevin.Lucey@des.nh.gov, Beth Lambert at (617) 626-1526, or Beth.Lambert@state.ma.us, Matt Collins at (978) 281-9142, or Mathias.Collins@noaa.gov, Jon Kachmar at (207) 773-0047, or jon.kachmar@gmail.com, or Elizabeth Hertz at (207) 287-8935, or elizabeth.hertz@maine.gov.



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Impervious Surface Analysis Tool

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