



# Maine NEMO Newsletter

Spring/Summer 2003

## Visualizing Land Use-Driven Watershed Change

By Jack Kartez, Maine NEMO Partner

One of Project NEMO's original educational tools has been to show how the amount of impervious surfaces in a watershed or set of watersheds will be likely to change from current conditions to new conditions if a community grows according to what is permitted by the local zoning regulations (or some other scenario of future change). Watershed impact analysis of

this kind is based on the widely used argument that the percent of a small watershed in impervious surfaces is a key environmental indicator of stress on water quality and other aspects of stream, river, pond and lake function. Over a decade ago the Center for Watershed Protection and the original CT NEMO Program began popularizing a set of general impact thresholds based on existing research: A watershed with no more than an average of 10% impervi-

ous surfaces over its total area is still "Protected." Watersheds with 10% to 25% average impervious surfaces are "Impacted" and at risk of significant water quality impairment (depending on how high in that range the imperviousness conditions have reached). Impervious surfaces averaging over 25% in small watersheds indicates that water quality is "Degraded," and that restoration may be difficult, expensive or infeasible. The purpose *continued page 2...*

I hope you enjoy the "first" Maine NEMO Newsletter. I welcome all and any comments or suggestions. I especially welcome any ideas for upcoming issues. The newsletter will be put out twice a year— a spring/summer issue and a fall/winter issue. I hope you find the articles informative and interesting.

Jodi Castallo,  
Maine NEMO  
Coordinator



Community

## Impacts of Urbanization on Two Streams in Southern Maine

By Jeff Varricchione, Maine DEP

Yes, urbanization is taking its toll on a number of streams in Maine. It's hard to believe that streams in parts of the beautiful State of Maine are becoming stressed and degraded as a result of urban development, but recent research suggests that this trend is indeed occurring. The Maine Department of

Environmental Protection (DEP) recently completed a study of two streams that are in the Casco Bay watershed: Long Creek and Red Brook. These two adjacent streams, which are connected to each other via Clark's Pond, flow through a variety of different land uses in parts of South Portland, Westbrook, Scarborough, and Portland. The biological signals of degradation in

the study stream segments flowing through urbanized areas included degradation of both the fish and macroinvertebrate (e.g., aquatic insects, crustaceans, etc.) communities. Although brook trout were found to be fairly abundant at sites located in the upper 2/3rds of Red Brook, an area which was relatively undeveloped and forested, *continued page 3....*

## Visualizing Land-Use Continued....

of this “big picture” look at watershed conditions is to make long-range plans to keep impacts from going “over the top” of thresholds from which recovery may not be possible. Keep in mind that these are general thresholds. In Maine, new at-risk watershed characterization studies are looking at 7% average impervious surface as the initial threshold of concern for impairment.

### A New Tool

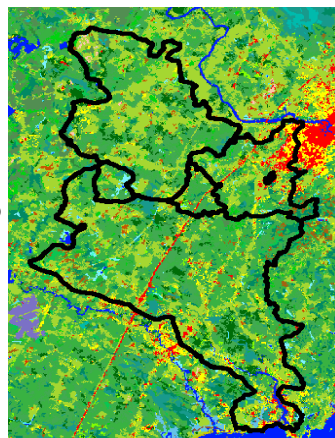
Over recent years, Connecticut NEMO’s geospatial science specialists have been investigating how to best estimate the relationship between current and future land uses and the degree of impervious surface that should be expected with such uses to form these big pictures of small watersheds. In 2002 NOAA’s Coastal Services Center, in collaboration with Connecticut NEMO, wrote an “extension” (a set of programmed routines) for use with the Arcview geographic information system software. This “Impervious Surface Analysis Tool” or “ISAT,” uses the power of GIS to automate the analysis and display of the land use—impervious surfaces connection in watersheds. To use ISAT requires having a satellite remote-sensing land cover dataset for which the expected average impervious surface conditions for each land cover category have been ground-truthed in sample areas. Detailed estimates of this type have been developed for Connecticut.

Maine NEMO is currently evaluating whether the ISAT tool can be used in Maine with a land cover dataset for which the state DEP has developed selected impervious surface data. While evaluation is still underway, here is an example of what ISAT does, using the

DEP land cover data with other data available for a southern Maine coastal community.

### An Example

Figure 1 shows five watersheds that are wholly or partly in an example community, along with the remote sensing-based land cover theme from DEP’s data. Each of these watersheds has less than 10%

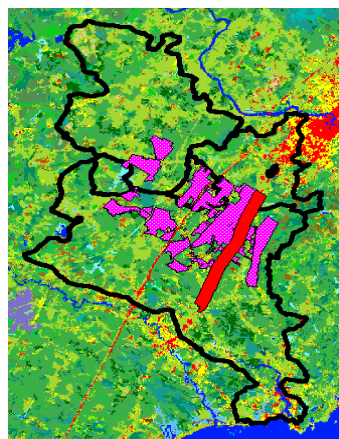


impervious surface under existing conditions, indicating only minimal watershed-level impacts of current urban uses. Note that the red land cover indicates

intensive commercial, industrial and high-density residential use

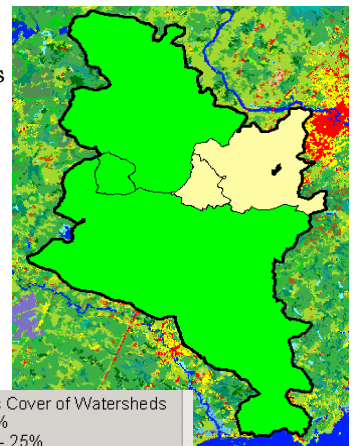
while yellow is lower-density residential coverage. Green areas are generally different forms of forest cover and other assigned colors denote grasslands, croplands, wetland areas of several types and so on.

Figure 2 shows some areas defined by local data which are used here to model hypothetical change—for illustration only and



**Figure 2** The northeast-pointing elongated red corridor represents a generalized highway-commercial zoning district

in the area. Figure 3 is a thematic map visualizing the results of one “future growth” scenario, based on the change areas in Figure 2. A scenario was run in ISAT using the Maine DEP land cover data I in which all of the area in the vacant parcels shown was “built out” as low density residential land cover (with corresponding impervious surface characteristics) and all of the area in the highway commercial zone was similarly converted to commercial-industrial land cover characteristics. The results of this scenario (Figure 3) show that two of the smaller watersheds (shown in light brown) will cross into the middle



**Figure 3** Impervious Cover of Watersheds  
 < 10%  
 10% - 25%  
 > 25%

“Impaired” category of 10–25% average imperviousness. The effects are however modest as the estimated imperviousness is only a little over 10% for the larger of the two and a little over 11% for the smaller of the two watersheds.

Many such “what if” scenarios can be readily executed, visualized and compared with the ISAT tool to learn about the sensitivity of an area’s watersheds to long-term land use change. The tool is available for download from NOAA’s web site ([www.csc.noaa.gov/crs/is/](http://www.csc.noaa.gov/crs/is/)). Work on this project will be completed by the end of the summer.

## Urbanization of Streams Continued...

they were not found at any of the sampling sites located throughout the much more urbanized watershed of Long Creek nor the lower 1/3rd of Red Brook, a more urbanized region. Other signals of urban impacts included:

- Degraded water quality resulting from increased stormwater pollution (e.g., increased concentrations of metals, chloride, suspended solids, polycyclic aromatic hydrocarbons [PAHs], phosphorous, and nitrogen) and reduced dissolved oxygen concentrations

**“Yes, urbanization is taking a toll on a number of streams in Maine.”**

- Altered patterns of stormflow and baseflow (stormflows were more flashy and baseflows appeared to be reduced in urban stream segments)
- Reduced/degraded streamside forest habitat and in-stream habitat quality and diversity including characteristics such as sparse streamside vegetation (trees, etc.), shading

in certain areas, and apparently reduced amounts of large in-stream woody debris

- Increased water temperatures
- Destabilized stream geomorphology (stream-channel and bank form), especially in the more urbanized areas of the studies watersheds.

The report (Varricchione 2002) included some preliminary recommendations. Now Maine DEP is working with the U. S. Environmental Protection Agency to prioritize

which of the many urban stressors are having the greatest impact and influence of the integrity of these streams. It is anticipated that this effort will result in a more finalized set of recommendations. Also, it is anticipated that local stakeholders in the watersheds will be brought together to learn about the current situations and recommendations,

and hopefully move toward the development of a watershed management plan and restoration strategy. Long Creek will probably be the watershed that is addressed first. Given the high costs and complexity associated with trying to restore degraded urban streams, the main lesson gleaned from this study was that protection of stream and riparian ecosystem resources, through appropriate planning, including the use of adequate buffers/setbacks and newly-emerging, innovative best management practices and low-impact development designs throughout the watershed, likely is much more cost-effective and protective of natural resources than attempts to repair urban streams after the damage has been done. For more information or a copy of a CD with a .pdf version of the report, contact Jeff Varricchione, Maine DEP, at 207-822-6317 or [jeffrey.t.varricchione@maine.gov](mailto:jeffrey.t.varricchione@maine.gov).

## Beginning with Habitat Program

### What Do You Want Your Community to Look Like 50 Years from Now?

By Colleen Ryan

The Beginning with Habitat (BwH) program is helping towns and land trusts to answer this question by providing them with quality information about local plant and wildlife habitat. As increased development pressure forces more communities to think about their natural resources and quality of life, BwH is providing data and assistance to local land use planning and conservation efforts. An innovative public-private partnership, the program uses a habitat-based landscape approach to assessing natural resource conservation needs and opportunities.

"Beginning with Habitat can

help communities make informed decisions about their future," said Molly Docherty, Director of the Maine Natural Areas Program, a sponsor of the program. "The goal here is to balance growth with the protection of natural resources for wildlife, recreation and sustainable forestry and agriculture."

BwH uses Geographic Information Systems (GIS) computer mapping to identify key natural areas, such as riparian habitat and large unfragmented blocks of forest or agricultural lands. The maps and digital data are provided to municipal officials and land trusts to assist in the planning purposes and are not regulatory in nature. To date, 69 towns have received presenta-

tions and technical assistance from BwH.

Beginning with Habitat is an effort that includes the Maine Department of Inland Fisheries and Wildlife, the Maine Natural Areas Program, the State Planning Office, U.S. Fish and Wildlife Service, Maine Audubon Society, Southern Maine Regional Planning Commission, and the Wells National Estuarine Research Reserve. It was formed in the spring of 2001 with the Town of Kennebunk serving as the pilot community. For more information, or to schedule a Beginning with Habitat presentation, contact Project Coordinator Colleen Ryan at (207) 287-8042, or [colleen.ryan@maine.gov](mailto:colleen.ryan@maine.gov).

# GrowSmart Maine– Responding to the Challenge of Sprawl

By Lisa Fahay



Over the last few decades, Maine has been undergoing a profound, slow-motion change from a state noted for its small towns, close neighborhoods and an active rural life, to one which increasingly looks like our congested and sprawling neighbors to the south. Farms are converting to subdivisions. Once rural roads increasingly resemble thoroughfares. Vital town centers are being abandoned while walkable, friendly neighborhoods for growing families are harder and harder to find.

These changes, by eroding our quality of life, not only endanger much of what we cherish about this state, but also represent a serious threat to our natural resource-based industries and to tourism.

These changes are not happening because our economy or our population are growing, but because of *how* we are growing. We are sprawling, spreading outward from our towns and cities, and consequently using up forest and farm land, while increasing our dependence on automobiles. That sprawl not only weakens our towns and diminishes our rural environment, it also requires new roads, new schools and other infrastructure, all of which are inefficient and costly to taxpayers.

Some of these changes are the result of individual decisions and the marketplace, but many are the product of government decisions at all levels, including regulatory

barriers to rebuilding towns and cities and a tax structure that either forces or encourages people to move to rural and suburban areas.

## A TIME TO ACT

These challenges are why many people throughout Maine -- community, business and government leaders, visionaries and practitioners -- are joining together to create GrowSmart Maine, a state-wide organization that is leading the effort to protect the Maine we cherish and to promote new ways of thinking and acting, at both the personal and government level, that will ensure that Maine continues to be an attractive and healthy place to live, work and visit in the future.

Tackling the problem of sprawl won't be easy and there are no simple answers to a problem that has been decades in the making. What is needed is an integrated, long-term approach at all levels to:

1. Help Maine people understand sprawl and its consequences, so that they can join in the effort to reverse it.
2. Promote new models of development that encourage closer-knit neighborhoods and less auto dependency.
3. Work with towns and planners around the state to learn from others and explore new approaches to development where

they live and work

4. Help protect critical forests, farms and open spaces
5. Redirect government subsidies that promote sprawl.
6. Work to revitalize and reduce the costs of living in Maine's towns and cities, so they will be more attractive and more affordable places to live.

GrowSmart Maine has been fortunate to receive early support from the Davis Conservation Fund in Falmouth, and from many individuals and organizations around the state who want to set a new direction for this state, when it comes to how we grow. We are committed to creating an independent base of citizen and foundation support as we grow, so that we can continue to speak freely and without restriction.

Whether we will ultimately succeed or not is up to such individuals and organizations. We can change our state's course and have a profound effect on Maine's future, but only if many get involved now as members, volunteers, leaders, speakers, thinkers or contributors.

We hope you will join us.

For more information about how to join GrowSmart Maine, contact Lisa at 847-9275 x 2, email - lfahay@growsmartmaine.org, or website- www.growsmartmaine.org.

**"These changes are not happening because our economy or our population are growing, but because of how we are growing."**



# Stormwater Phase II Update

By David Ladd, Maine DEP

Maine DEP issued three general permits on June 3, 2003, for the discharge of stormwater from regulated small Municipal Separate Storm Sewer Systems ("MS4s"). The permits apply to the Urbanized Area of 28 municipalities as well as federal, state, and county entities, Maine Department of Transportation and Maine Turnpike Authority which are "nested" within the Urbanized Area of the affected municipalities.

The permits authorize certain stormwater discharges and require each permittee to develop, implement, and enforce a stormwater program management plan implementing six minimum control measures. The control measures are designed to reduce the discharge of pollutants to the maximum extent practicable to protect water quality, and to satisfy the appropriate water quality requirements of the Clean Water Act. The Notice of Intent ("NOI") to comply with this general permit must be

submitted by September 3, 2003. The plan must be completed and all minimum control measures fully implemented by June 2, 2008.

More information is available at DEP's website at: <http://www.mainedep.com> (enter keyword "stormwater").

Maine DEP has purchased a software program for the 28 MS4 municipalities. This is an NPDES software product, called ASIST ([www.asist.net](http://www.asist.net)), which manages every aspect of a Phase II program. It comes with a template stormwater management plan that can be used by municipalities to jumpstart their programs. Maine has just finished its second ASIST software training session for the 28 municipalities. The Department has received favorable feedback from many municipalities. This software will not only help municipalities and other regulated entities manage their stormwater program, but it will also help me administer the program. I have heard some of the NPDES Phase I horror stories of how municipalities have spent hundreds of thousands of dollars trying

to build database and GIS systems to manage their stormwater programs, and I did not want to see that happening to Maine's municipalities. In my opinion, the less municipalities spend on developing their stormwater plans the more money they will have for addressing stormwater problems that can improve water quality.

This was a win-win solution for Maine's regulated small MS4s, and the DEP, and is a good example of how a permitting authority can do more than just regulate. Partnering with municipalities makes my job as the Stormwater Coordinator a lot easier and is a sure ingredient for program success.

List of regulated Small MS4 Municipalities: Eliot, South Berwick, Berwick, Kittery, Scarborough, Falmouth, Saco, Yarmouth, Old Orchard Beach, Freeport, South Portland, Biddeford, Gorham, Portland, Westbrook, Cape Elizabeth, Windham, Cumberland, Sabattus, Auburn, Lewiston, Bangor, Orono, Veazie, Old Town, Brewer, Hampden, Milford.

## Stormwater Management in Cold Climates

### Planning, Design and Implementation

The first North American conference focused specifically on the challenge of managing stormwater in cold climates is set in the



charming and eclectic coastal city of Portland, Maine. We will bring together engineers, planners, municipal, state and federal government personnel, stormwater managers, natural resource professionals, contractors and developers to share

approaches and experiences with the effective management of stormwater in cold climates. Special attention will be given to the NPDES Phase II stormwater regulations and the challenges that communities face in implementing them.

Exhibitors and vendors offering stormwater-related products and services will be featured in an exhibit area.

The conference will include two days of plenary and concurrent breakout sessions for moderated presentations and panel discussions, field trips, preconference training, and ample time for exhibitor interaction and networking.

A registration brochure will be mailed in August, 2003. For more information— [www.cascobay.usm.maine.edu/coldsw.html](http://www.cascobay.usm.maine.edu/coldsw.html) or Karen Young, 207-780-4820, [kyoung@usm.maine.edu](mailto:kyoung@usm.maine.edu) or Todd Janeski, 207-287-1482, [Todd.Janeski@maine.gov](mailto:Todd.Janeski@maine.gov)

## Maine NEMO

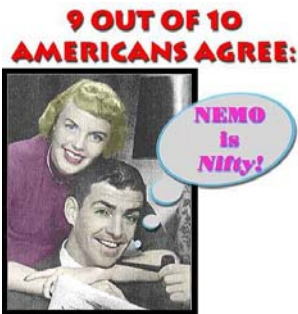
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## What is Maine NEMO?

- Maine NEMO (Nonpoint Education for Municipal Officials) is an educational program for land use decision makers that addresses the relationship between land use and natural resource protection, with a focus on water resources.
- Maine NEMO starts with the basic presentation that explains the links between land use, water quality, and community character. The program then offers follow-up presentations and materials to help communities get started on natural resource-based planning.
- These programs assist communities in moving forward on two major aspects of natural-resource based planning: planning for areas to be preserved, and those suitable for development. The type of information that these programs can include are: basic principals of nonpoint source pollution and increased flows due to stormwater; the relationship between land use, natural resource protection, and water quality; and planning and site design options to reduce the impacts from development.
- Specialized presentations include: Lakes NEMO, Coastal NEMO, and Planning for Open Space.

## NEMO U3– National NEMO Network Conference

By Jodi Castallo

As you might suspect, NEMO U3 was both informative and a heck of a lot of fun. It was a three and a half day conference held in Groton, CT on the University of Connecticut's Avery Point Campus. The first day consisted of optional workshops, one of which was Lakes NEMO where I was a presenter/facilitator. Maine and Minnesota both presented versions of Lakes NEMO followed by discussion, questions, and suggestions.

The first "official" day of NEMO U3 concentrated on how the network functions. There were two keynote speakers- Ron Baird, National Sea Grant Program Director who spoke about Sea Grant, NEMO and working with communities; and Dwight Merriam of Robinson & Cole, LLP who spoke about water protection through land use regulation. The rest of

the day was used to address issues and future directions of the National NEMO Network.

Day two looked at the larger national programs involved with both the national and state NEMO programs. Jim Murray, NOAA Sea Grant and John Kuriawa, NOAA Coastal Programs Division spoke about the Coastal Enhancement Grant Program. Then, the NEMO programs that received one of these grants gave an update about their grant projects. Maine was one of these programs. In the second session, Geoff Anderson, Development, Community, and Environment Division - US EPA talked about smart growth through open space planning, followed by updates from a few state programs, including Maine, that are moving forward on open space planning efforts. In the last session the topics focused on the land grant side of things with the following speakers: Mike O'Neill, USDA talking

about CREES water quality program; Art Gold, University of Rhode Island talking about watershed nitrate sources and sinks; and Greg Jennings, North Carolina State University talking about stream restoration. We then moved outdoors and took a tour of two subdivisions that have used low-impact designs- Jordon Cove, Waterford and another subdivision in a neighboring town.

The last day explored the connection between NEMO and EPA programs. Mel Cote, EPA New England and Dov Wheatman, EPA OWOW/NPS Branch spoke about 319 programs and NEMO, once again followed by some states' experiences; including Maine. The last presentation was on NEMO and Stormwater Phase II, our own Don Witherill discussed Stormwater Phase II and how it is working in Maine.

If you would like more information please contact me.