Town of Rockport
Watershed Approach to Managing Land Use Impacts to Coastal Waters

"This type of analysis could help determine where future sewer extensions are needed."
Ken McKinley, Rockport Select Board

PARTNERS

A Stakeholders Advisory Group (SAG) composed of project area residents, business persons, members of civic groups, met on three occasions and provided useful comments and suggestions to the project team. The SAG included Lynn Bannister, Jim Chalfant, Chris Holden, Ron Howard, Doug Posson, Ann Robison, Ian Stewart, Bruce Kapp, Mario Turi, and others.

Rockport Conservation Commission volunteers include Dr. Robert Kennedy, a retired senior water quality researcher. Without Bob's skill and passion for watershed and water quality management, this project would not have been possible. Terrance Sobecki, PhD, who, like Bob, retired from the US Army Engineer Research and Development Center, also contributed extensive volunteer work to this project.

Other Commission members include Kim Kimball, Lynn Bannister, George Forristall and Jim Chalfant, who assisted with the collection of field observations and water samples for both stream and harbor sampling locations. Harbor sampling locations were accessed using the Town of Rockport's Harbor Master's boat, operated by Harbor Master Abbie Leonard and her assistant Caleb Lincoln. Town Planner and Community Development Director James P. Francomano participated in project administration. The Knox County Emergency Management Agency provided computer resources and GIS expertise as part of its ongoing support to Knox County municipalities.

The Maine Water Company provided access to their Mirror Lake Water Quality Laboratory in West Rockport, ME for sample preparation. The laboratory also performed bacterial analyses. Nutrient and pigment analyses were performed by the Chesapeake Biological Laboratory, University of Maryland, Solomons, MD.

ISSUE AREA

Although initially focused on the Goose River Watershed, the project area ultimately included the whole of the Town of Rockport, Maine and upstream watershed areas located in neighboring Camden, Maine.

PROJECT DESCRIPTION (completed December 2016)

Elevated levels of enterococcus at Goodie's Beach in Rockport Harbor resulted in 42 beach closures during a 122-day period in 2014. This project provided funding to support additional water quality testing and analysis in the watershed of the Goose River, which empties into the harbor.

Non-point source (NPS) pollutant exports from watersheds adversely affect coastal waters and are difficult to quantify and manage. Coastal communities have limited resources and expertise, and need decision-making tools that are relatively easy for non-technical municipal staff to apply, require a minimal amount of input data, and produce results that are easily understood by local officials and the public. This project consists of interrelated tasks designed to:

- Create and test such decision-making tools in the Goose River watershed
- Characterize NPS and impacts on the water quality of Rockport Harbor;
- Provide actionable management information to local officials and the public; and
- Provide a model approach that other groups with similar concerns might follow.

THE CHALLENGE & APPROACH TAKEN

Three essential challenges are presented when small municipalities seek to learn more about and to some degree manage Non-point Source (NPS) pollution in a highly cost-effective way. First, it must be possible to acquire samples and conduct testing for water quality indicators. Funding provided by the grant award allowed the Conservation Commission to procure new equipment for retrieving samples, limited testing on site as well as laboratory testing. Extensive water quality data were generated at several long-established stations along the Goose River, which was divided into sub-watersheds for analysis.

Second, a trusted and relatively easy-to-use models must be found to factor the empirical test sample numbers into localized estimates for nutrient loading. This, in turn, can be used to identify critical watershed areas that are statistically likely "sources" of NPS.

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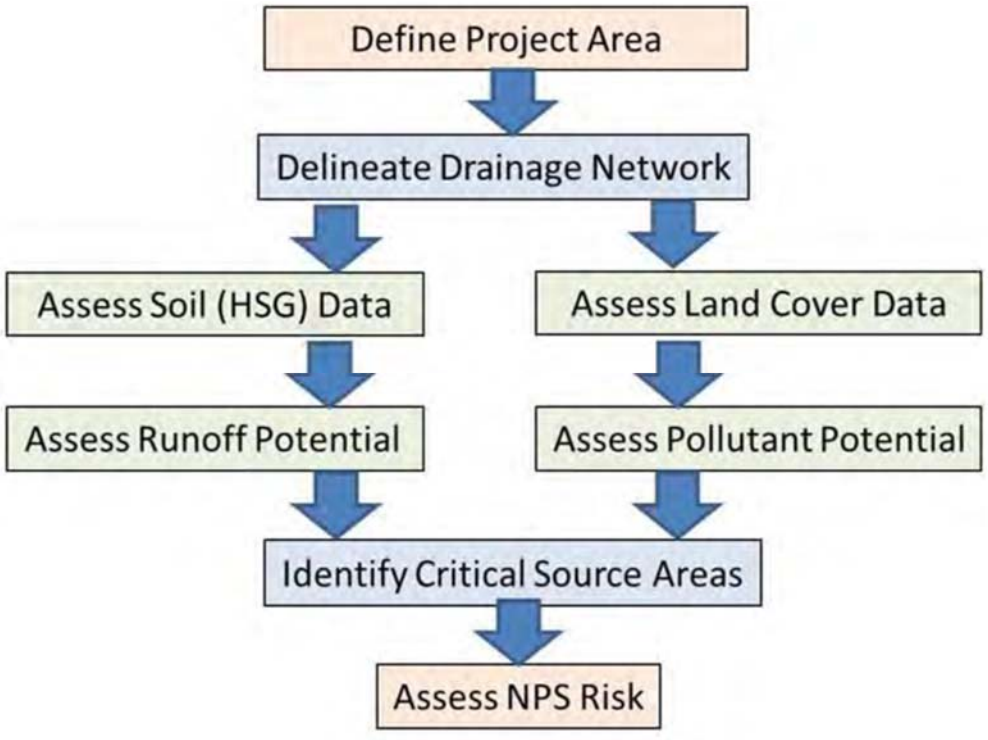
Finally a dialogue between officials and stakeholders must be initiated and maintained to determine what regulatory response on the local level, if any, is supported by the findings. The following is excerpted from a full technical report by Dr. Robert Kennedy, PhD, Rockport Conservation Commission member, entitled: *A Watershed Approach to Managing Land Use Impacts to Coastal Waters*. A link is provided on the Conservation Commission's page at: http://www.town.rockport.me.us/index.asp?Type=B_BASIC&SEC=%7B94BDBDD5-3805-4512-9A39-2C8091A8C2E7%7D

Objectives and Approach

The approach followed is based on current understanding of hydrologic processes involved in the generation of runoff from land surfaces coupled with knowledge of relationships between runoff, soils, land use and land cover that lead to the export of contaminants (nutrients, sediment and organic matter in this case) from watersheds. Watershed characteristics are first evaluated using existing geospatial data and GIS tools as a means to assess, rank and map the potential for selected watershed areas to generate NPS loadings. Much of these data are then employed in the application and evaluation of a spreadsheet tool for quantifying runoff-related exports and potential reductions associated with the application of Best Management Practices . […]



Assessing the Potential for NPS Pollution – Low, Medium and High

The potential for landscape areas to export pollutants (pollutant potential) was based on an interpretation of land cover data contained in the 2011 National Land Cover Database (NLCD) available from the US Geologic Survey (Homer et al. 2015) The NLCD provides national coverage of Landsat-based, 30-m resolution, georeferenced land cover data. Land cover classes for the project area are displayed in Figure 5.6. […] of the Final Report.

The 14 NLCD land cover classes identified in the project area were reclassified as low, medium or high pollutant potential based on best professional judgement are presented in Table 5.3 of the Final Report.

Estimating Non-Point Source Loads and Evaluating Best Management Practices (BMPs)

The Spreadsheet Tool for Estimation of Pollutant Loads (STEPL; Tetra Tech 2006), which was developed for the US Environmental Protection Agency for reporting and tracking State and Tribal efforts under the Section 319 Nonpoint Source Management Program, is a spreadsheet-based, user-friendly calculator that incorporates simple algorithms to estimate annual loads of nutrients, sediment and biological oxygen demand (BOD). […] Load reductions due to the implementation of BMPs are estimated based on known BMP efficiencies. Basic STEPL components, including required user inputs, processes employed and outputs, are presented in Figure 6.1. […] of the Final Report.

THE RESULTS

Critical areas based on topography, geology, hydrology, land cover and land use are presented as shown here to identify watershed areas that are most likely (statistically speaking) to export NPS materials to a nearby watercourse. Unlike quantitative assessment of hazard or risk, this is a qualitative assessment based on weight of evidence derived using GIS techniques, and best professional judgement.

NEXT STEPS AND OPPORTUNITIES

The identified statistical critical source areas can be used to support a wide range of planning initiatives. Ongoing efforts to address frequent closures of Goodies Beach could benefit from targeting stormwater and other infrastructure maintenance and repair work most likely to influence nutrient loading and transport of bacteria to the beach.

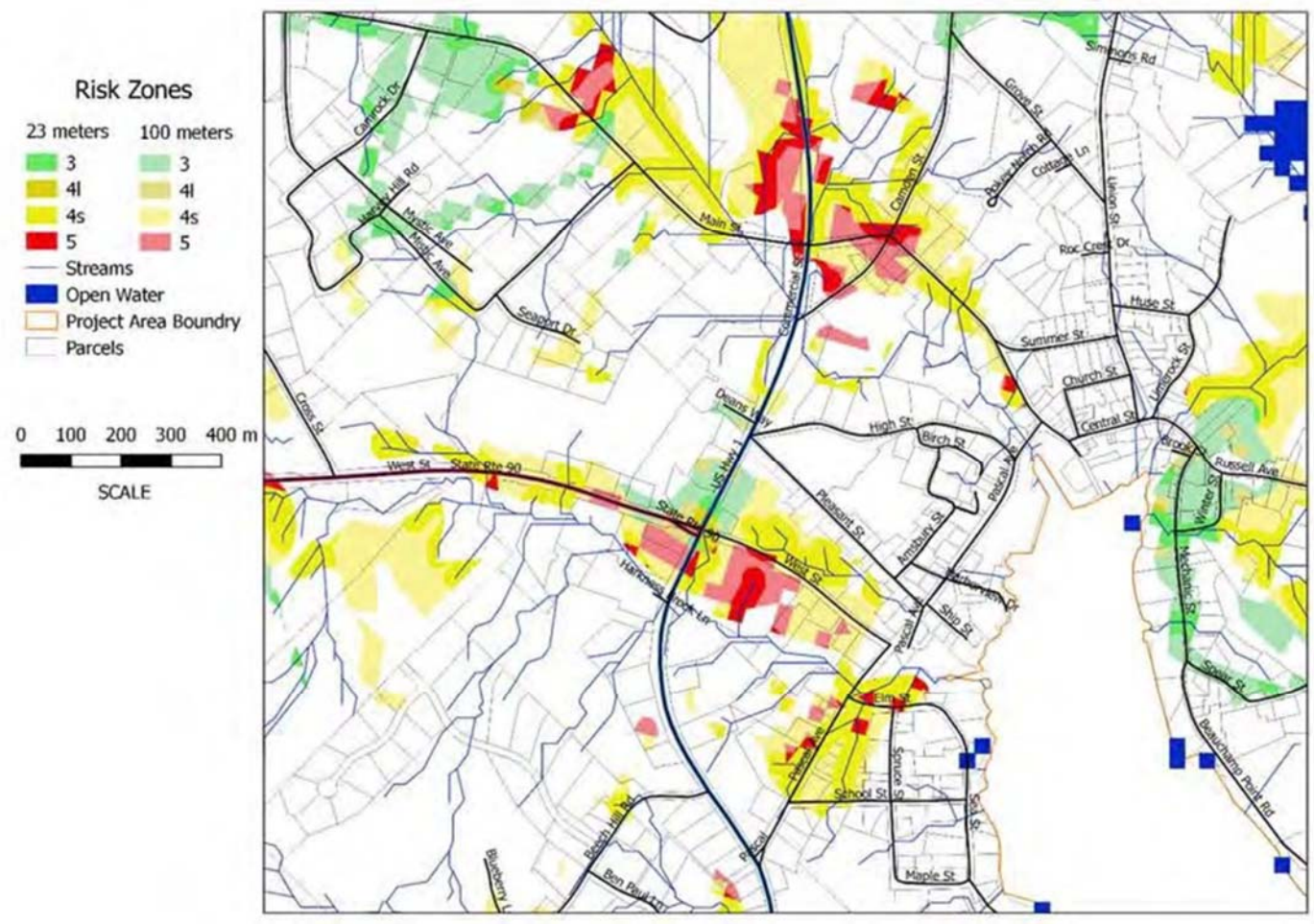


Figure 7.2 *Risk scores for the 23-m and 100-m buffers projected on parcel data for a portion of the project area.*

Another next step could be to create a "How to" manual better suited than the Final Report or this Case Study to serve other communities actually looking to implement this kind of analysis. This could include identifying appropriate stopping places where a non-technical volunteer group might need to hand off some of the work to consultant professionals.

NEEDS

The Select Board expressed concern about using the data for regulation – or even for targeting of advice on BMP's – on anything resembling a neighborhood scale. Upon its initial review, the consensus of the Board appeared to be that extensive ground truthing is needed to inspire greater confidence in the data (or resolve weaknesses, if any). The Board appeared to be comfortable using the data as presented to justify targeting of BMP's on a watershed basis. This could be tailored to each of the 6 sub-watersheds identified in the report.

LESSONS LEARNED

Apart from the need for more ground truthing to support use of this type of data, lessons learned have mostly to do with the challenge presented by the technical nature of the approach used for modeling.

APPLICABILITY TO OTHER MUNICIPALITIES

As noted above, distilling from the Final Report what could be used in a “How to” manual could be the key to sharing our methodology with other communities.

RECOMMENDATIONS TO THE MAINE COASTAL PROGRAM

Consider retaining a watershed planning consultant to help smaller municipalities work through the process. There is a great deal of “sweat equity” to capitalize on in a DIY project like ours. However, volunteer skill sets likely will vary greatly from town to town. It would be practical to offer examples of cost-effective teamwork between professionals and volunteers.

FOR MORE INFORMATION

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