Citizen Stewardship and Monitoring for Clean Water in Maine:

A Needs Assessment Report for the Development of a Citizen-Based Maine Volunteer River Monitoring Program

October, 2007

Maine Department of Environmental Protection

"In the long term, we'll have another generation of kids who will care about the stream."
Brian Riley, Middle Branch Pond Stream Team

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I. BACKGROUND AND HISTORY

Section 305 (b) of the Clean Water Act (CWA) requires each state to prepare a water quality inventory of its surface waters every two years. Additionally, section 303 (d) requires states to prepare a list of impaired surface waters for which comprehensive water quality studies should be prepared. (These studies are referred to as Total Maximum Daily Load or TMDL studies.) The State of Maine has a total surface area of over 35,000 square miles and 31,000 miles of rivers and streams. With an estimated population of approximately 1.3 million people, Maine is the largest but least densely populated state in New England. The state increasingly relies on volunteer efforts to assist with water quality monitoring (WQM) to fulfill the CWA requirements, but currently the number of volunteer organizations, specifically those monitoring streams and rivers, is not enough to fill the gap between state agency capacity and programmatic goals.

The purpose of this report is to assess and define the need among volunteer organizations, advocacy organizations, and state agencies for creating a program that would support and standardize volunteer WQM efforts throughout the state. The program would be modeled after the very successful Volunteer Lake Monitoring Program (VLMP) and would be called the Volunteer River Monitoring Program (VRMP). The anticipated benefits of such a program would be enhanced local stewardship of state waters, improved water quality and assistance in the form of volunteer man-power to the state as it fulfills its federal requirements.

Recognizing the value of volunteer man-power, the Maine Department of Environmental Protection (DEP) began work on the development of a VRMP in 2004, and since that time has organized a steering committee, held several brainstorming sessions, developed draft templates of both a Quality Assurance Project Plan (QAPP) and a Sampling and Analysis Plan (SAP), and researched data-storage alternatives. In 2006-2007, the DEP continued to strengthen the VRMP Communications Network, the standardized WQM Protocol Manual, and the training and certification programs. In 2006, the DEP established a partnership with the University of Maine's Senator George Mitchell Center for the Environment (UMGMC) for the purpose of expanding its scope and capabilities. To that end, the DEP and UMGMC jointly submitted a grant to the U. S. Environmental Protection Agency (EPA) in August 2006 and although the proposal was not funded, it received positive feedback from the EPA regarding the program's merit. Furthermore, in an effort to engage volunteer organizations in the process and to gain feedback, the DEP and UMGMC jointly held a well attended and successful VRMP break out session at the 2007 Maine Water Conference.

II. METHODOLOGY

This report:

1. Reviews and documents the current status of volunteer monitoring in the state of Maine;
2. Assesses and defines the need for creating a program that would support and standardize volunteer WQM efforts throughout the state; and
3. Identifies the elements needed to move the VRMP forward as an effective program with skilled leadership, ample funding, sound infrastructure and strong statewide support.

Information for this report was gleaned from several sources:

1. Focus group session minutes:
    a. Watershed Managers Roundtable (2004 and 2005)
    b. Maine Water Conference -- Volunteer River Monitoring Program Break-Out Session (2007)
    c. Maine Rivers Conference (2004)
    d. Maine Stream Summit (2004)
2. Interviews with Key Leaders in WQM
3. Survey responses from 12 volunteer organization members
4. Research into other state programs

III. NEEDS ASSESSMENT:

A. Description of Current Volunteer Water Quality Monitoring Efforts

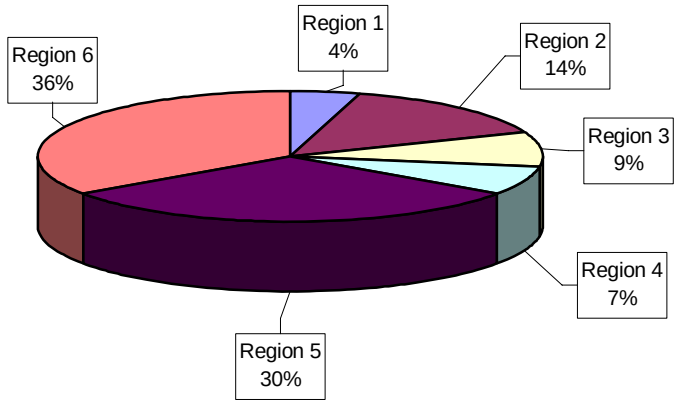
Maine Stream Teams

Most of the volunteer groups conducting stewardship activities in streams and rivers are part of the Maine DEP Stream Team Program (MSTP). At this time, there are approximately 71 groups who have registered with the MSTP since 2000 and who have engaged in some form of stewardship. The Maine Stream Team Program is a network of people concerned about Maine's streams and rivers as well as a clearinghouse of information intended to support stream protection activities. A Stream Team is a group of people who have banded together to promote stewardship of their local stream or river (MDEP 2007). MSTP projects or activities involve education, outreach, habitat/pollution surveys, some monitoring, support for protection and restoration efforts (e.g., land trust activities, streambank tree plantings, innovative stormwater projects, etc.), and support for advocacy efforts. The level of involvement varies among groups, and while some groups conduct beginner-level surveying and outreach, several more-experienced groups collect professional-level water quality data that are used by DEP. (Not all stream teams monitor the water quality of their streams or rivers, but instead focus on other stewardship activities, for a variety of reasons.) The

more experienced water quality monitoring groups are generally conservation organizations that have a broader organizational mission, such as land trust conservation, overall watershed health, or endangered species habitat protection.

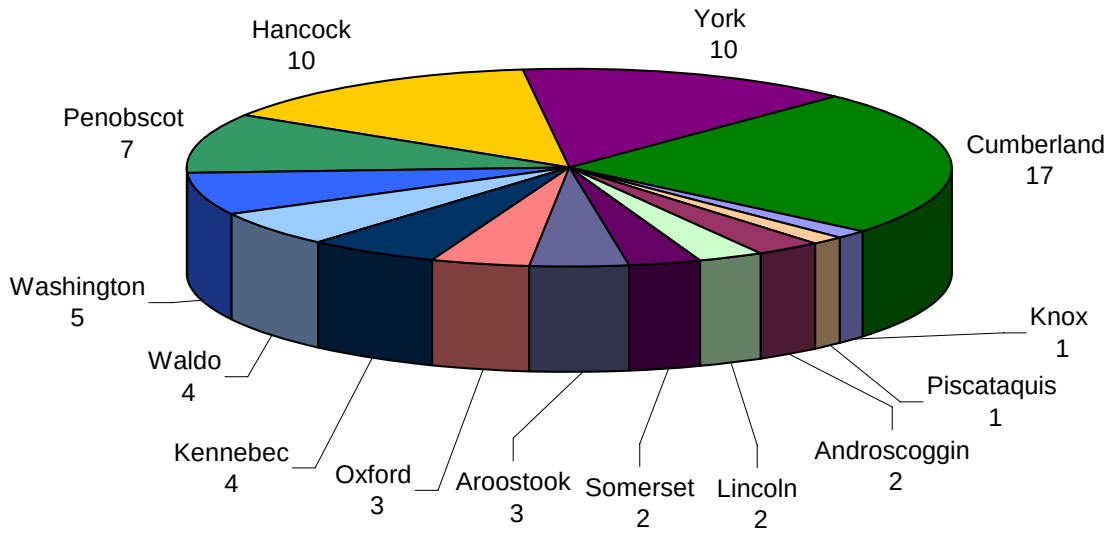
Figure 1 illustrates the number of Stream Teams in the state by geographic region, while Figure 2 illustrates the number of Stream Teams by county. Most teams are located in the southern and coastal regions of the state. There are fewer teams in the northern and interior parts of the state - most likely due to less development, smaller population size, and possibly fewer degraded waters.

Figure 1. Number of Stream Teams in the State by Region (MDEP, 2007).



Region	Description
1	Upper St. John, Allagash, Fish, Aroostook, Meduxnekeag
2	W. Branch Penobscot, E. Branch Penobscot, Mattawamkeag, Piscataquis, Lower Penobscot
3	Lower Kennebec, Dead, Upper Kennebec
4	Lower Androscoggin, Upper Androscoggin
5	St. Croix, Maine Coastal, St. George-Sheepscot
6	Presumpscot, Saco, Piscataqua-Salmon Falls

Figure 2. Number of Stream Teams by Primary County (MDEP, 2007).
(Primary county is the either the county where the stream teams are focusing their work or it is the county containing the most stream or river miles for that particular stream/river of interest [if they didn't specify where they are focusing their work]. Secondary counties are other counties that contain a portion of the stream/river of interest of a given stream team. For the sake of simplicity, secondary counties are not listed here.)



Water Quality Monitoring Groups

Of the 71 registered Stream Teams, 36 are considered active, 7 moderately active, 14 non-active, and 15 are of unknown status. ("Non-active" status indicates that groups are currently not doing stream/river stewardship activities due to lack of time, resources, or leadership. Some of these groups may become active streams teams once time, resources, or leadership become available. Most of these teams still receive the newsletter and stay informed.) Only those groups who are active and who participate in some form of WQM were considered for this report. Of the twelve groups identified and interviewed for this report, 4 consider themselves experienced in terms of WQM, 4 were considered intermediate, and 4 were considered beginner (Table 1). Most groups are made up of one paid coordinator with anywhere from 4-150 citizen and/or student volunteers. All groups conduct some training and most groups have QAPPs. Most groups in the state monitor those parameters important to public health as related to swimming, drinking water, and clam flat sanitation. These monitoring programs focus primarily on bacteria levels but also include DO, temperature, and nutrients. Other groups in the state are concerned with ecosystem health and in addition to DO, temperature, and nutrients; they measure pH, turbidity, streamflow, macroinvertebrates, and conductivity. Furthermore 75% of groups have conducted habitat surveys and some screening-level macroinvertebrate sampling.

The collective efforts of the 12 WQM Groups are summarized in Table 2. The 12 groups currently collect information and data on 292 sites on approximately 468 miles of streams (both mainstem and tributaries) using 311 citizen volunteers. It is estimated that the groups have spent $154,600 for equipment and supplies and volunteers have provided an additional $220,332 as match in the form of volunteer time, mileage, and miscellaneous expenses. These values must be considered conservative since they do not account for the paid staff time nor all of the historic equipment expenses since most groups have not kept strict records.

Table 1. Description of 12 Maine WQM Groups. The right column provides the range of values found amongst the different volunteer groups. Parameter abbreviations: BOD - biological oxygen demand; DO - dissolved oxygen.

Experience Level of Groups	33% Experienced, 33% intermediate, 33% beginner
Reason for Monitoring	Salmon habitat, fish management, NPS pollution, swimming closures, closed clam flats, development pressure, drinking water
Geographic Location	4 south coastal, 2 mid-coastal, 3 east coastal, 3 western (no groups were identified in northern Maine)
QAPP	7 have QAPPs, 5 do not
Training	100%
Number of Volunteers	6 - 150
Years of Monitoring	1 - 18 years
Paid Staff?	8 yes, 4 no
Parameters Monitored	DO, temperature, bacteria, pH, turbidity, nutrients, habitat, screening-level macroinvertebrates, streamflow, salinity, chlorine, BOD, chlorophyll a, conductivity

Table 2. Total Value of Current Volunteer WQM Efforts in the State: Number of sites, stream miles, and volunteers and dollar amount spent both cash and in-kind match.

	# of Sites Currently Monitored	# of Stream Miles Currently Monitored	# of Volunteers Currently Monitoring	Amount Spent by Groups to Date	Total Value of Match to Date (time, mileage, etc)
Total Value for all 12 Groups	292	~468	311	$154,600	$220,332

B. Benefits to WQM

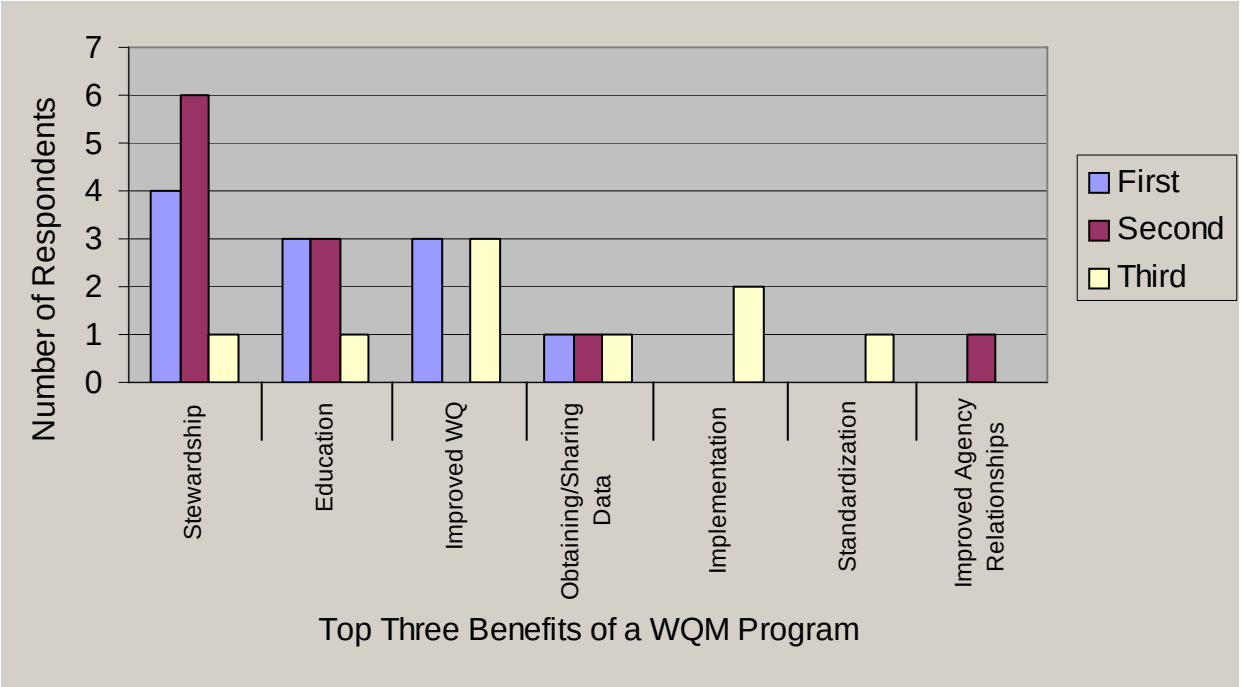
Stewardship, Education, and Improved WQ

All WQM groups interviewed agree that the major benefits to a citizen-based WQM program are stewardship, education, and improved water quality (Figure 3). Additional benefits mentioned include improved data sharing, implementation, standardization, and agency relationships. Many groups report that they are seeing improved community interaction and that citizen volunteers are "ready, willing, and able" to participate. Most groups (especially those in suburban areas) report having few problems getting volunteers. Several groups, including the Spruce Creek Association, Ogunquit Conservation Commission, and Mount Desert Island (MDI) Water Quality Coalition, report improved responses from town government with regard to water quality data and identified problems as a result of having a WQM group in place. Also, many groups distribute their data via newsletters and newspaper articles thereby bringing attention to pollution problems and influencing repair, implementation, and in some cases, policy changes or ordinance development.

"The greatest benefit to our program is educating public officials. We have a new ordinance for mandatory inspection of above ground sewer lines. We believe this was influenced by our WQ data and efforts. Community members are taking ownership as a result of our work and data."

Jane Disney,
Mount Desert Island
Water Quality Coalition

Figure 3. Benefit of a Citizen-Based WQM Program as Ranked by Respondents. (Respondents were asked to rank the top three benefits)



C. Use of the WQ Data

Water quality data collected by citizens in Maine have many uses (Figure 4) and most groups report that the same data sets are used for a variety of purposes. The leading uses of citizen WQ data are as baseline data, land trust decision making, septic/sewer system repair, and advocacy and education.

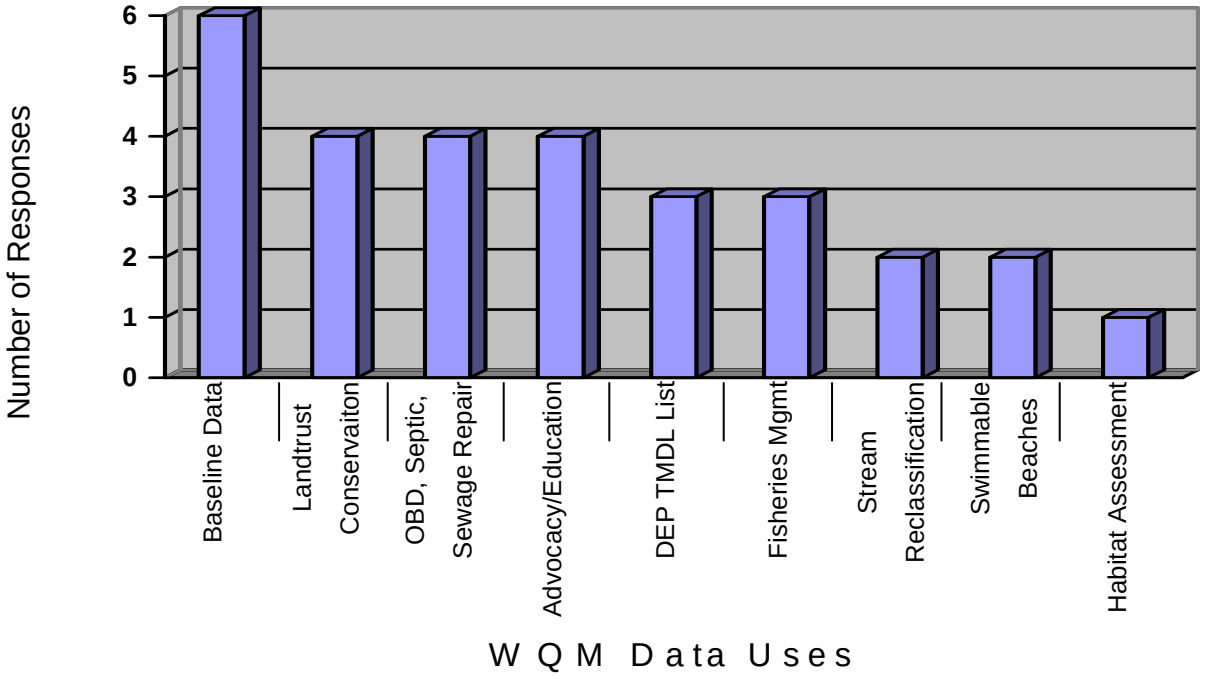
"The fact that we had standardized, long-term, historical data was a major factor in our obtaining an EPA grant. EPA was looking for long-term historical data for state and national comparison."

Forrest Bell, Presumpscot River Watch

Baseline Data

The foremost use of the data is as baseline data, which is defined as an initial set of data used for comparison or as a control or starting point (EPA 2005). A baseline data set is important since it can show long-term trends and can indicate not just where diminished WQ is occurring but also where WQ is good. The more baseline data there are, the more they can be correlated to weather and flow patterns, global and local climate change, acid precipitation, long term fisheries management, as well as pollution reduction and habitat restoration activities. Both EPA and DEP have need for long-term data because it is often difficult to show measurable water quality results in the short term without good historical data. Furthermore, historical data sets are useful for other forms of research. For example, a statewide bacteria TMDL template is being developed based on the Presumpscot River WQ data as a result of their quality-assured historical data set (Forrest Bell, Presumpscot River Watch, personal communication, July 2007).

Figure 4. Use of WQ Data for Various Purposes



Land Trust Conservation

Another important use of the data is by land trust conservation organizations. Most groups report that they have identified at least some waters that are not diminished or are of high quality. These stretches often support native coldwater fisheries and are of high recreational value and traditional hunting and fishing use. Many conservation organizations use the data provided by the WQM groups to make decisions about what lands to protect. In this way, the data are used to further protection efforts of these clean waters, to reduce nonpoint source pollution, and to plan developments so as to minimize pollution problems. Many of the state's most active groups (e.g., Narraguagus, Pleasant, and Bagaduce) operate in some of the state's most pristine watersheds and as such, these groups become the watchdogs of the watershed, protecting it from pollution.

"Water quality has been a priority for me for 20 years and Maine is a great place because it is one of the few areas in the country where you still have an opportunity to prevent the problem instead of trying to fix it."

Dennis Finn,
Saco River Corridor Commission

OBD, Septic, and Sewage Repair

A third important use of the data is for the identification and repair of faulty septic systems and sewer lines and the removal of overboard discharge (OBD) septic systems. High bacterial counts can close beaches and clam flats leading to a great loss of economic value to the local community (see "Economics" section below). Many groups (e.g., Sheepscot, MDI, Ogunquit) are using their data to identify and replace the systems causing the high bacterial counts.

In addition to the above uses, WQ data are also being used for advocacy and education (procuring funds, newsletters), fisheries management (coldwater vs warmwater fisheries decisions), stream reclassification (upgrading from lower to higher stream class), and DEP's list of impaired waters (TMDL). Table 3 lists some specific examples of how citizen-collected data have been used.

Table 3. Specific Examples of How Citizen-Based WQ Data are Used

Group/River	**Use of Data**
Narraguagus and Pleasant River Watershed Councils	Temperature data are used by the Pleasant River (Wash. Co) Hatchery to make salmon smolt stocking decisions and by IF&W to map cold water habitat for brook trout management.
Narraguagus and Pleasant River Watershed Councils	pH data were used in Atlantic salmon water chemistry research to assist in making decisions regarding whether to conduct liming studies.
Bagaduce River Stream Team	Long-term data set enabled group to acquire a grant to conduct an eelgrass study and additionally to initiate a study on the pygmy alewife, which is unique to their watershed.
Sheepscot Valley Conservation Association	Long-term bacteria, DO, and temperature data set enabled group to identify and remove overboard discharge systems at the head of tide. Data were also used by DEP to make TMDL determination.
Ogunquit & Josias Rivers Stream Team	Bacteria data indicated that water in which restaurant lobsters were being held was contaminated and posed a potential public health threat to restaurant workers and customers.
Mount Desert Island Water Quality Coalition	Bacteria data indicated the need for beach closure. Town was able to respond quickly and now posts data and closure listings in real time on line for public use. Data are also part of town managers report.

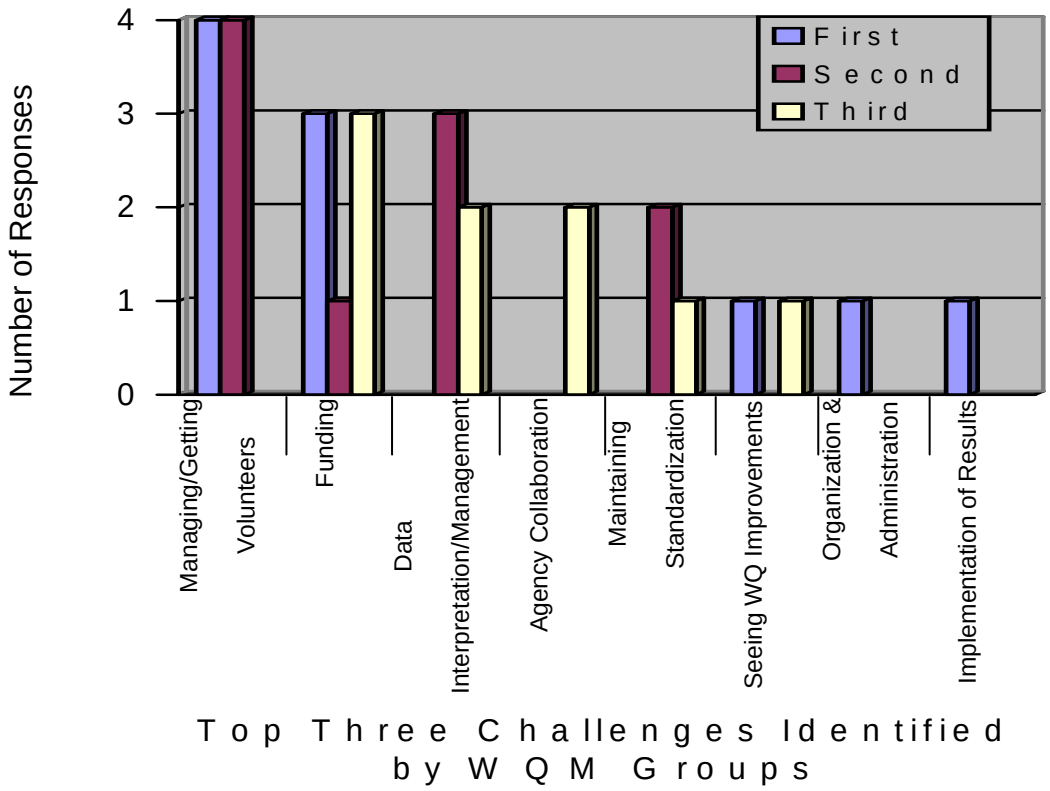
D. Challenges to WQM

Most groups agree that the leading challenges to a citizen-based WQM program are getting and/or managing volunteers, procuring funding, and data management and interpretation (Figure 5). Other challenges include agency coordination, maintaining standardization, and seeing improvements in water quality. Only one group voiced concern regarding overall organizational management and implementation of results.

Volunteer Management

While three groups report that getting volunteers is their biggest challenge, other groups report that managing and coordinating existing volunteers is their biggest challenge. The latter groups state that they have a dedicated core group of citizen volunteers but that the group needs guidance and assistance to organize and manage them. The difference in the groups' abilities to get and keep volunteers is related to population size; areas with large suburban populations have less difficulty getting volunteers than less-populated rural areas. Furthermore, the larger and more active the organization is, the more volunteers they will have and hence the more difficulty in managing the volunteers and their activities.

Figure 5. The Top Three Challenges to a WQM Program as Identified by WQM Groups.



Funding

Most groups have grown in size and activity level over the past 5-10 years and therefore they have greater funding requirements. Funding is required to support organizational administration, monitoring equipment, supplies, and in some cases technical staff to manage and interpret data. Currently there is no regular source of funding to support citizen volunteer monitoring and all groups report that current funding comes from private or government grants that must be applied for annually and which can be an overwhelming and time-consuming task.

"Even though our data is qualified we can only put it on our website and not any of the more technical databases. That makes it difficult for others to use. We need a web interface similar to Healthy Beaches. We need an easy way to keep our data."

Phyllis Ford, Spruce Creek Association

Data Management

Challenges associated with data include interpretation of results and management and sharing of the data. Groups report that they need technical assistance and support in order to interpret their results properly and make appropriate implementation decisions. For example, it can be challenging for groups to determine if low dissolved oxygen or high bacteria levels are naturally occurring or a function of an anthropogenic stressor. Many groups with long-term data sets report that storing and sharing the data without a standardized statewide database makes comparisons

challenging and diminishes their ability to share their data with agencies and other scientists. Many state that the Healthy Beaches database is successful and a similar database should be implemented for VRMP WQ data storage.

E. Identified Needs of WQM Groups

All WQM groups responded affirmatively when asked if they would like to see the state develop a VRMP. When asked what their groups need from a DEP-sponsored VRMP, most groups stated that standardization (of protocol), technical assistance, training and certification, and data management were their primary needs (Figure 6). Other needs include funding, data use, improved collaboration, QAPP development, and getting volunteers.

> *"Currently we do not have the standardization, support, or funding to do long-term monitoring. I would love to be part of a larger program. A VRMP would help me develop a long-term program with better standardization."*
>
> *Peter Reaman, Libby Brook Stream Team (Gray-New Gloucester High School)*

Standardization

Standardization of protocol and training is key to a successful program in which agencies use the citizen-generated data. The lack of standardization may inhibit the development of long-term monitoring, organizational growth, and volunteer involvement. Standardization though the VRMP will aid groups and the state in comparing data sets and trends across regions and will provide the scientific rigor required by other agencies.

> *"If monitoring becomes more standardized, groups will get better funding. They are seeing more support from state agencies as they become more standardized but we still need more collaboration."*
>
> *Tracey Gamache, Narraguagus and Pleasant River Watershed Councils*

Technical Assistance

Technical assistance can range from help with equipment use, repair, and maintenance to helping groups choose monitoring sites within the watershed. However, it may also be in the form of scientific assistance such as water chemistry expertise. A VRMP partnership with the UM Senator George Mitchell Center for the Environment could provide that resource in the form of on-call professional staff available to answer questions and provide assistance.

Training and Certification

Currently most groups conduct their own training using their own staff and there is no official certification program. Standardized professional annual training with certification would strengthen the rigor and quality of the data and therefore potentially increase the use of the data. A VRMP would provide that level of rigorous training.

> *"I think it's really important to get neighborhoods involved in the quality of their watersheds. If you already have interested people then it would be beneficial for the state to have a program to help us make this happen."*
>
> *Susanne Montgomery, Wescot Stream Team*

Data Management

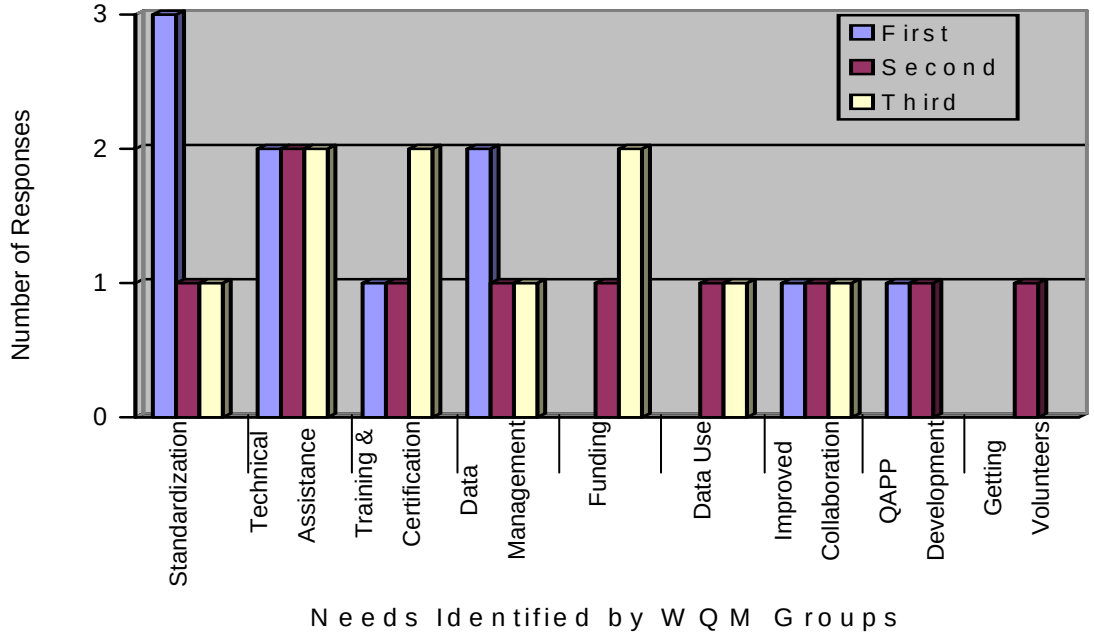
A VRMP could provide the universal database that groups require in order to manage and share their data. The VLMP has developed the highly successful PEARL database to

house their data and the VRMP could partner with PEARL and VLMP to possibly integrate the stream data with the lakes data. Other online databases possibilities could also be explored (e.g., Bowdoin College's "Maine Watershed Web").

Funding, Data Use, Collaboration, QAPPs, and Volunteers

A DEP-sponsored VRMP program could be instrumental in obtaining large funding sources that could then be distributed to local groups. This would reduce the amount of work and paperwork for the small volunteer groups. Groups have requested that their quality-assured data be used by DEP and other agencies, and a VRMP could increase the use of data and interagency collaboration once a program becomes established. Several groups already have QAPPs but those who do not have them report that without support and assistance, they will be unable to develop such a plan. Lastly, a VRMP would be instrumental in motivating volunteers because citizens would feel connected to a statewide network that has state support.

Figure 6. Top Three Needs as Identified by WQM Groups



F. Economics of Good Water Quality

Maine has 31,000 miles of rivers and streams, almost 6,000 lakes and ponds, and over 3,000 miles of coastal waters. Although there have been no formal economic studies placing a value on these resources in Maine, it is widely recognized that the state's

superior water quality support outstanding warm- and coldwater fisheries, exceptional swimming beaches and numerous other recreational activities including boating, canoeing, sailing, tubing, and water skiing. These recreational activities draw millions of visitors each year to the state and generate millions of dollars to local tourism economies.

Maine Tourism Data

Maine Department of Economic and Community Development data (Longwoods International 2006) indicate that out of 9.7 million overnight visits made by visitors to Maine in 2005, 33% listed lakes and rivers as part of their "experience" (Table 4). Other clean water-related experiences included beach/ocean (58%), wilderness areas (37%), and the natural environment (26%). The study also indicates that the leading sports and recreation activities participated in by 2005 visitors are all clean-water dependent and include visiting beaches, swimming, canoeing and fishing (Table 5). The data also show that Maine is above the national average for beach visiting, freshwater swimming, and canoeing.

Table 4. Most Popular Visitor Experiences on Trips to Maine in 2005

Maine Experience	**Percent**
Visiting Small towns/villages	63
Beach/ocean	58
Eating Lobster	37
Wilderness Areas	37
Lakes & Rivers	33
Experiencing the natural environment	26

Table 5. Sports & Recreation Activities Participated in While in Maine vs. US average:

Activity	**% Maine / US average**
Went to the ocean beach	42% / 20%
Went to a lakeside beach	8% / 3%
Swam in a lake or river	8% / 4%
Canoe	5% / 1%
Freshwater fish	4% / 5%
Saltwater fish	3% / 3%
Sea Kayaking	2% / NA
Power boating/sailing	2% / 2%
River rafting	1% / 1%

New Hampshire Case Study

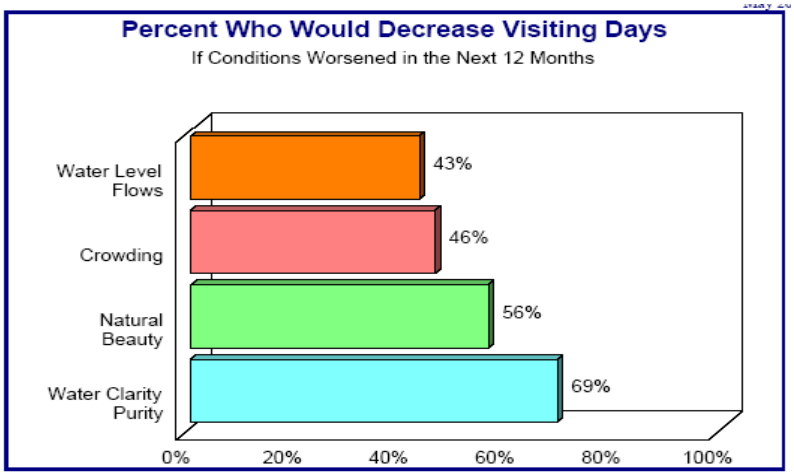
In addition to Maine state tourism data, a recent New Hampshire study (Nordstrom 2007) "confirms that freshwater fishing, boating, and swimming bring significant revenue" to New England economies. The study found that approximately $379 million in total sales is generated by those who are fishing, boating, or swimming in New Hampshire freshwaters (Table 6), or about 26% of all summer spending in New Hampshire. Since New Hampshire has only 1000 lakes and ponds and 12,000 miles of rivers and streams, it is reasonable to assume that Maine's revenue for fishing, boating, and swimming would be 3-5 times greater than New Hampshire or closer to $1-2 billion.

The study also indicates that half to two-thirds of swimmers, boaters, and anglers say they would decrease or cease their visits to a particular freshwater site if they perceived any degradation to the resource (Figure 7). More than two-thirds (69%) responded they would decrease the number of visits to a particular site if they perceived a change in water clarity and purity; 56% would decrease visits if natural beauty and scenery declined; 46% would decrease visits if crowding became an issue; and 43% would decrease visits if water levels or flows became less than adequate.

Table 6. Total Economic Impacts from Freshwater Fishing, Boating, Swimming in New Hampshire (Nordstrom 2007).

	Total Sales	Household Income	Jobs
Fishing	$49,072,267	$17,566,682	791
Boating	$143,211,366	$50,670,624	2,235
Swimming	$186,553,957	$66,013,336	2,965
TOTAL	**$378,837,590**	**$134,250,642**	**5,991**

Figure 7. Percent of New Hampshire Visitors Who Would Decrease Visiting Days (Nordstrom 2007).



Potential Economic Losses:

Ogunquit Beach and Saco River Case Studies

Although it may be difficult to place a value on water of outstanding quality, there are numerous cases of the loss of economic value as a result of diminished water quality. Ogunquit Beach is a popular resort in southern Maine and is the area's most valuable economic resource. Parking for the beach alone generates $1.5 million and that is in addition to the revenue generated by lodgings, restaurants, and amusements. At one point, the beach was threatened with closure due to high fecal coliform levels from faulty septic systems and sewage lines. Local businesses quickly recognized the need to protect the local economy and responded with intensified monitoring and repair of the

faulty systems and lines thereby keeping the beach open and preventing huge economic losses in the local community (Mike Horn, Ogunquit Conservation Commission, Personal Communication, 2007).

A similar situation occurred in the Saco River in 2005. The section of river near the Fryeburg area is a popular canoeing and swimming destination and is estimated to have 100,000 annual user days for canoeists alone. In 2005, this section of river and beach were closed due to high fecal coliform levels. It is estimated that "tens of thousands of dollars" were lost by local grocery stores, gas stations, and canoe rentals as a result of the closure (Dennis Finn, Saco River Corridor Commission, Personal Communication, 2007).

> *"Ogunquit Beach is our area's most important economic resource. Beach parking alone generates $1.5 million. Therefore, we need to protect the beach and estuary in order to protect this economic resource. If a community sees its resource as putting money in their pockets then they will be willing to keep it clean."*
>
> *Mike Horn, Ogunquit Conservation Commission*

Clean Water and Property Value

In addition to recreational value, clean water can enhance the value of shoreline property. Studies by Boyle and Bouchard (2003) found that lakes with clarity greater than one meter have increased property values, in the range of 2.6% ($2,563) to 6.5% ($9,271), depending on the market. Likewise, a one meter decrease in minimum transparencies causes property values to decrease anywhere in the range of 3.1% ($3,084) to 8.5% ($12,050).

Although there are currently no property value studies for rivers, it is well documented that the reason that most of the Presumpscot River shoreline was not developed in the mid-twentieth century was because of industrial and residential pollution (Presumpscot River Plan Steering Committee 2002). "By the 1950s, the condition of the lower river was similar to most rivers in the developed northeast: it was heavily polluted and its primary value was as a conduit for waste." The removal of several mills and the dam at the head-of-tide and the improved treatment of residential waste have started the process of ecological recovery, and communities along the river are now seeing new potential in the river. As a result of improved water quality conditions, the river is now under increased development pressure with higher property values.

Presumpscot River

G. State Agency Needs

Impaired Waters

According to the 2004 Integrated Water Quality Monitoring and Assessment Report (305b), of the 31,000 miles of rivers and streams, 1,177 miles were found to be impaired

or threatened for one or more designated uses. The assessment also indicated a significant increase in the amount of near-shore marine and estuarine waters that were impaired or threatened by the input of impaired rivers and streams (from 20 square miles in 2002 to 149 square miles in 2004).

DEP's Need for Quality Data

Although DEP generates much of the data for the assessment through its own monitoring programs (i.e., Biomonitoring Program, Surface Water Ambient Toxics Monitoring Program, Dioxin Monitoring Program), additional data are provided by a variety of professional and volunteer monitoring groups. It is paramount that the quality of the data generated by these groups be subject to rigorous quality review before they are accepted for regulatory purposes (e.g., screening for and prioritizing waterbodies needing further investigation by DEP, acquiring supplemental data for use in the development of TMDLs, etc.).

VRMP's Role in Data Standardization

The DEP initiated the development of a Maine Volunteer River Monitoring Program (VRMP) in order to achieve the rigorous quality review and standardization of data collection needed for regulatory purposes. The objective of this program will be to foster water quality stewardship, standardize assessment-level water quality data collection, and assist the state in identifying, assessing, and prioritizing water quality problems. The DEP recognizes the need for a program that will provide support and information-sharing tools for volunteer-based watershed associations, environmental and conservation organizations, and student groups. The program will address several environmental concerns that the state has faced in recent years (e.g., impaired streams in urban and agricultural watersheds, nonpoint source pollution, development pressure, and endangered species).

H. Models for Volunteer WQ Monitoring

Maine Volunteer Lake Monitoring Program

The Maine Volunteer Lake Monitoring Program (VLMP) was established in the early 1970s and is one of the largest and oldest citizen-based lake monitoring programs in the country. Their mission is to provide protection for the nearly 6,000 lakes and pond in the state through the acquisition of scientific data and to raise public awareness about the ecological, aesthetic, and economic value of the state's lakes and ponds (VLMP 2007). Although, initially administered by the DEP, the VLMP is now an independent non-profit organization with funding provided by charitable foundations, individual donations, the EPA, and the Maine DEP. A VRMP would function similarly to the lakes program and would provide similar benefits to the state.

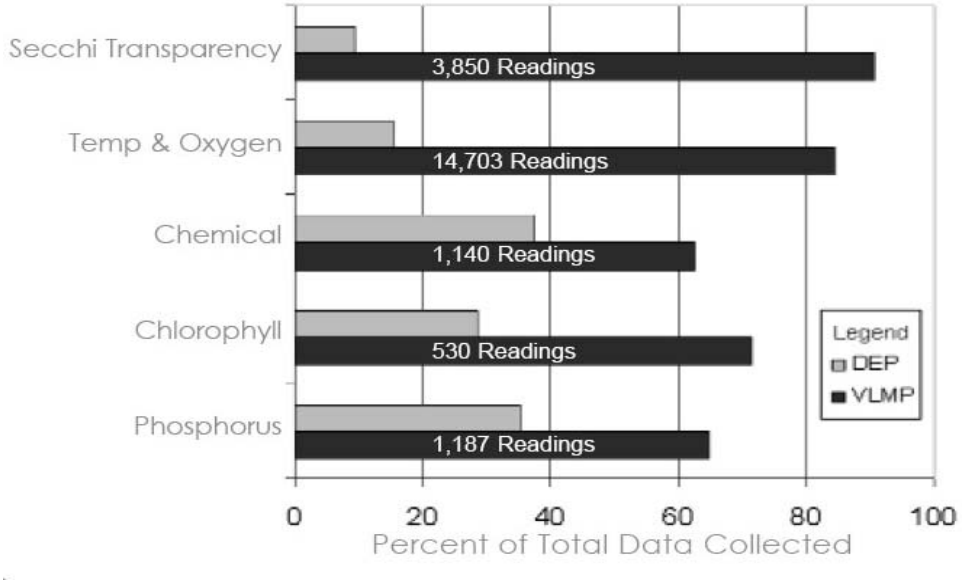
The greatest value of the VLMP to the state of Maine is the effort provided by the hundreds of volunteers who collect the data. For example, in 2004, 90% of all lake transparency readings and 85% of temperature and dissolved oxygen readings were

collected by VLMP volunteers (Figure 8). DEP collected only 10% of the transparency reading and 15% of the temperature and oxygen readings. The value of the volunteer-collected water quality data is estimated at $250,000-350,000 per year – a considerable savings to the Maine taxpayers. It is reasonable to assume the VRMP would eventually provide the same level of effort and cost savings.

"The annual value of volunteer lake monitoring efforts to Maine taxpayers and state government is substantial. If state agencies or professionals were to collect the equivalent annual data provided by volunteer monitors, the cost could exceed a half million dollars per year - especially if the value of public education and stewardship provided to individual communities by volunteers were to be taken into account"

Scott Williams, Executive Director, VLMP

Figure 8. Number of Lake Data Readings Collected by VLMP and Maine DEP in 2004 (VLMP 2007).



"Stream monitoring benefits lake health because in many cases the streams feed into lakes and ponds that have recreational value. So, having clean water is good for Maine's economy."

Brian Riley, Middle Branch Pond Stream Team

Not only are WQM groups interested in modeling the VRMP after the VLMP, they would also like to see the VRMP partner with other WQ leaders in the state, such as VLMP and UMGMC. The public has a strong understanding of the watershed approach and they would like the state to connect WQ information from lakes, streams, wetlands, estuaries, and bays. A well-organized VRMP can be the link in forming partnerships with the VLMP, the UMGMC, the DEP Stream Team Program, and the Healthy Beaches Program. The VRMP can also take the lead in organizing and coordinating data from different sources.

New Hampshire Volunteer River Assessment Program (VRAP)

The state of New Hampshire Department of Environmental Services (NHDES) established their Volunteer River Assessment Program (VRAP) in 1998 to promote awareness and education of the importance of maintaining good water quality in New Hampshire's rivers and streams. Modeled after the NH Volunteer Lake Assessment Program, the primary goal was to improve water quality monitoring coverage of NH rivers and streams. VRAP provides equipment, QA/QC training, and technical, financial, and GIS assistance to VRAP groups and volunteers. It has a statewide Quality Assurance Project Plan (QAPP) that has been approved by NHDES and reviewed by EPA. In 2006, the NH VRAP had 26 groups with 150 trained volunteers generating 80,000 datapoints at 250 river and stream monitoring stations. Over 95% of the VRAP data passed all aspects of the QA/QC requirements and were useable for assessment purposes.

NHDES covers most of the costs associated with the VRAP. For example, the 2006 VRAP annual budget included one and a half full-time staff people, a six-month summer intern, a laboratory budget, water quality monitoring kits, and miscellaneous supplies and standards totaling approximately $115,000. Approximately $62,000 of that budget came from state general funds, with the remaining funds (~ $53,000) obtained from federal sources.

> *"Part of our river is in New Hampshire, so we were able to adopt the New Hampshire Volunteer River Assessment program which has a great QAPP and support staff. If the people of the state of Maine had a program similar to the NH program, there would be far more groups and more stewardship."*
>
> *Barbra Barrett, Androscoggin River Watershed Council*

At least two WQM groups in Maine (Ossipee and Androscoggin rivers) have watersheds that originate in NH. As a result these groups are eligible to participate in the NH VRAP. Both groups report that their programs are greatly improved and enhanced because of their participation in the NH program. Both cite the QAPP, support staff, and the University of New Hampshire website as resources that should be duplicated by the Maine VRMP.

I. Next Steps in Forming a VRMP

> *"The lake program has been very successful and we need to follow that model."*
>
> *Tracey Gamache, Narraguagus and Pleasant River Watershed Councils*

WQM groups were asked how they thought DEP should proceed. In general, all groups agreed that the state has obtained sufficient input from constituents and should therefore move forward in creating a statewide program. Experienced groups would like to see the DEP develop an "ambitious workplan" and begin implementation as soon as possible. Other recommendations include:

- DEP should move from the planning stage and ask the legislature to "write it into the budget, hire staff, and just get it started."
- VRMP should be a nonprofit organization rather than a state agency in order to avoid conflict of interest.
- Provide statewide oversight of and support for existing experienced groups and bring less-experienced groups "up to speed."
- Model the VRMP after other successful programs in the state such as Healthy Beaches and the VLMP.
- Focus on standardizing protocols, training, and certification.
- Encourage groups who are working in a particular stream or river to consider expanding their efforts to other streams/rivers within their watershed, or to the entire watershed itself.
- Encourage groups who are focused on tidal waters to take a watershed approach and monitor upstream.
- Encourage more networking among regional groups.

> *"The need for VRMP has been demonstrated. There is a lot of information already gathered. It seems that DEP just needs to get a program description together, get the funding, and get going. There are no other steps other than just get going.*
>
> *Lili Pugh,*
> *Sheepscot Valley*
> *Conservation Association*

IV. CONCLUSION

Interviews and research for this report clearly demonstrate the need for a standardized, statewide program that provides rigorous quality control, technical assistance, and support to the numerous citizen volunteers already providing valuable data, information, and thousands of dollars in time and in kind match. Economic and tourism data also indicate the need to protect and monitor the state's freshwater and near shore resources for both public health and the health of local economies. Lastly, as development pressure increases in the state, DEP will increasingly depend on volunteer data to meet its EPA reporting requirements.

In addition to the benefits listed above, a well funded, state-supported Maine VRMP will provide numerous far-reaching benefits:

- Since streams and rivers are the conduits between lakes and ponds and estuaries and bays, stream monitoring will benefit all Maine waters and the communities and economies that depend on them.
- A VRMP will assist groups, such as the Ogunquit and Bagaduce, which currently monitor estuaries to move upstream, expand their freshwater efforts, and ultimately identify upstream NPS sources.
- A VRMP will provide program design, QAPP development, and equipment decisions to beginner groups and an advanced data interface and qualified water chemistry assistance to experienced groups.
- A VRMP can establish a mentoring program in which experienced groups work closely with beginner groups to develop their program and assist with organizational challenges.
- Most citizen groups would like to see state agencies use their data. The rigorous standards established by a VRMP can facilitate that use, thereby strengthening citizen-agency trust.

Perhaps the greatest benefits to a VRMP will be improved stewardship and education and eventually fewer waters that require TMDLs. Such a program can strengthen local stewardship, encourage local clean-water ordinances, facilitate nonpoint source pollution (NPS) project implementation, and educate future generations of Mainers who will understand and appreciate the importance of clean water.

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