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As a Rappaport Public Policy Fellow at the Massachusetts Department of Agricultural Resources (DAR), Anne Herbst's work focused on farm impacts on water quality. Farm runoff can be a source of pollution of surface and groundwater resources. Farms have thus been subject to an increasing number of federal and state regulatory initiatives designed to protect water quality. Her work responded to the growing need for education, technical assistance, and financial support for farms to improve their environmental practices. She evaluated the current environmental programming of the Department of Agricultural Resources and proposed the launch of a systematic effort to: (1) Identify farms that may impact sensitive water resources, and (2) Provide education about best management practices, and compliance assistance to farmers. The proposed "Environmental Policy and Compliance Assistance Program" would utilize the expertise of the many DAR staff that visit Massachusetts farms on a regular basis. It offers a comprehensive and cost-effective approach to assessing and addressing farm impacts on water resources. With fully ten percent of Massachusetts land engaged in agricultural pursuits, such a program has the potential to deliver significant dividends in water-resource protection and improved environmental stewardship.

FINAL REPORT

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Executive Summary

The myriad of federal, state and local initiatives focused on agricultural contributions to non-point source pollution highlight the need for an effective response. The Massachusetts Department of Agricultural Resources (DAR) should establish the Environmental Policy and Compliance Assistance Program to fill gaps in the Commonwealth's current capacity to: (1) consider improvements to the environmental regulation of agriculture, and (2) assist agricultural operations to institute best environmental practices. The program will also aid DAR in its efforts to advance the Sustainable Development principles that guide the Commonwealth's Smart Growth initiative. The Department of Agricultural Resources, with its current programming, agricultural expertise, and extensive contact with the agricultural industry, is uniquely qualified to provide a comprehensive and cost-effective program to assure the superior environmental performance of the agricultural industry. With fully ten percent of Massachusetts land engaged in agricultural pursuits, a comprehensive program of environmental policy analysis and compliance assistance can deliver significant dividends in water resource protection and improved environmental stewardship.

Policy Analysis

Environmental regulation and best management practices must evolve in response to new technologies and insight from the environmental sciences. In particular, nutrient management initiatives in other states may hold promise for Massachusetts. With analysis, these programs can be adapted to the realities of Massachusetts agriculture. Recent requests for comment on the Department of Envi-

ronmental Protection's draft revisions to regulations, as well as the draft Report of the Water Policy Task Force, also point up the need for an enhanced capacity to provide timely analysis.

Compliance Assistance

Increasingly the Department of Agricultural Resources (DAR) is challenged to keep pace with the need to provide compliance assistance to Massachusetts farms. DAR environmental assistance programs regularly receive double the number of applicants they are able to fund. As a result of federal and state regulations designed to improve water quality and protect drinking water supplies, agricultural sources in hundreds of locations have been identified as known or suspected causes of water impairments, and the list continues to grow. A comprehensive outreach program will meet the need to assess and address potential impacts. Key components of the compliance assistance effort include:

Creation of a Massachusetts Agriculture Database. Utilizing the combined information available in MassGIS datalayers and DAR databases, the department can identify farms that may impact sensitive environmental areas.
Development of educational materials. Targeted to farmers, the materials will explain environmental regulations and available resources.
Systematic outreach. DAR inspectors and other personnel regularly visit Massachusetts farms. Serving as a front-line resource, they can identify environmental issues and connect farmers to outreach staff who will coordinate compliance assistance.

Benefits of the Environmental Policy and Compliance Assistance Program

*Improved environmental performance***.** With support from DAR, Massachusetts farms will be able to redress negative impacts on water and other natural resources.
*Support for Sustainable Development***.** The program will specifically address the Commonwealth's Sustainable Development Principles to "Restore and Enhance the Environment" and "Foster Sustainable Businesses". Superior environmental performance will ensure the protection of valuable working landscapes and strengthen an important sector of sustainable natural resource-based businesses.
Enhanced assistance to Massachusetts agriculture. With an expanded outreach program, DAR will be able to meet the demand for information and assistance.
Cost–effective approach. By leveraging its resources, DAR can develop a comprehensive program with a limited infusion of funds. A focus on pro-active compliance assistance will minimize the need for complex and costly enforcement actions.
Improved capacity for policy analysis. Program staff will meet the need for timely and in-depth analysis of regulatory initiatives.
Strengthened interagency relationships. DAR will have an improved capacity to: (1) investigate and address environmental issues identified by federal and state agencies, and (2) support state initiatives including Smart Growth and Climate Protection. Program staff will facilitate improved communications.

Introduction

Since passage of the Clean Water Act in 1972, United States waters are significantly cleaner. This is due chiefly to the regulation of point sources of pollution. Yet a substantial portion of water bodies

still do not meet the water quality standards of the Clean Water Act. Nonpoint sources, including agriculture and urban runoff, are the leading remaining cause of water quality impairments. With fully ten percent of Massachusetts land engaged in agricultural pursuits, a comprehensive program of environmental education and compliance assistance targeted to Massachusetts farms could deliver significant dividends in water resource protection and improved environmental stewardship.

Environmental regulation and best management practices must evolve in response to new technologies and increasing insight from the environmental sciences. In the past decade, the Department of Agricultural Resources (DAR) has developed a variety of initiatives to provide education and fund implementation of best environmental practices. Increasingly however, DAR is challenged to keep pace with the need to respond to regulatory initiatives, provide information about best practices and resources for compliance assistance, and aid farm operations in response to regulatory enforcement actions and local complaints. The Department of Agricultural Resources should establish the Environmental Policy and Compliance Assistance Program to fill gaps in the Commonwealth's current capacity to: (1) consider improvements to the environmental regulation of agriculture, and (2) assist agricultural operations to institute best environmental practices.

The Department of Agricultural Resources, with its current programming, agricultural expertise, and extensive contact with farm operations, industry organizations and other agricultural agencies, is uniquely qualified to provide a systematic, cost-effective program to assure the superior environmental performance of the agricultural industry. Although this proposal focuses primarily on farm impacts on water resources, the creation of an Environmental Policy and Compliance Assistance Program will enhance DAR's capacity to advance key elements of the Commonwealth's Smart Growth agenda, and to respond effectively to other environmental issues as they arise.

Spotlight on Agriculture

The agricultural industry is experiencing increasing scrutiny of its impacts on natural resources. Federal and state regulatory initiatives designed to improve water quality, protect public water supplies and assure the availability of adequate supplies of water all have implications for agriculture. At the local level, encroaching development places increasing focus on agricultural impacts on water quality and quantity. Noted below are highlights of the myriad of government regulations, initiatives and local pressures that: (1) strain the capacity of individual farms, and DAR, to provide an appropriate response, and (2) suggest the need for a comprehensive approach.

- **Concentrated Animal Feeding Operations (CAFOs):** Adopted in 2003, amendments to the Clean Water Act require large livestock operations that qualify as CAFOs to obtain National Pollutant Discharge Elimination System (NPDES) permits by February 2006. CAFOs must also implement a Comprehensive Nutrient Management Plan that meets Natural Resource Conservation Service guidelines. There may be as many as 50-100 farms in Massachusetts with enough livestock to potentially qualify as large or medium CAFOs.[1] Small livestock operations also have the potential to qualify as CAFOs. Medium and small livestock operations (which constitute the vast majority of possible CAFOs in Massachusetts) may be able to avoid CAFO designation with installation of best management practices.
- **Total Maximum Daily Loads (TMDLs):** Under the Clean Water Act, the Department of Environmental Protection (DEP) is required to identify the cause, source and maximum allowable load of pollutants for water bodies designated as impaired. DEP must also determine the maximum allowable pollutant load for each pollutant source. DEP has identified agricultural sources of pollution and/or recommended agricultural best management practices

in 28 of the 79 water bodies analyzed to date. DEP will be required to complete TMDLs for over 1,500 water bodies in the next ten to fifteen years.

- **Massachusetts Nonpoint Source Management Plan**: The Nonpoint Source Management Plan, developed by DEP, serves as the guiding document for the Commonwealth's efforts to address nonpoint pollution. The plan has extensive benchmarks for agriculture and DAR. The plan commits DEP and DAR to evaluate all known farms near water resources by 2005 and calls for all farms causing water quality impairments to have Conservation Farm Plans by 2005. By 2010 a majority of farms are to have voluntary Conservation Farm plans. As part of the Nonpoint Source Management Plan, the 2001 Nonpoint Source Action Strategy identifies more than 75 locations where agriculture is a known or suspected surface water pollutant.
- **Source Water Assessment and Protection Program (SWAP):** The 1996 amendments to the federal Safe Drinking Water Act required DEP to inventory land uses that may constitute a threat to ground and surface drinking water sources. The draft Land Use/Associated Contaminants Matrix identifies the following as potential threats: the livestock, dairy, forestry, nursery and slaughterhouse sectors, and fertilizer, pesticide, herbicide and manure storage or use. Specific potential threats including, in many cases, agriculture have been identified for each public water supply.
- **DEP Wetlands, Surface Water and Groundwater draft revised regulations**: The draft groundwater regulations propose that farm discharges performed in accordance with a DAR approved plan be exempt from regulation and that farms with point source discharges will be required to obtain a general NPDES permit.[2] Further, there has been an apparent change in the internal DEP definition of manure containment structures from a nonpoint source of pollution to a point source. If implemented, these changes will affect more than 2,000 farms. The draft wetlands and surface water regulations do not have new provisions that address agriculture specifically; however current and proposed language may leave farmers vulnerable to conflicting interpretations of the regulations.[3]
- **Smart Growth**: Many of the Sustainable Development Principles advanced by the Office for Commonwealth Development in support of Smart Growth have implications for agriculture. In particular, "Principle 4: Restore and Enhance the Environment" and "Principle 9: Foster Sustainable Businesses" include mandates to protect and restore environmentally sensitive lands, natural resources and cultural landscapes; to increase the quality and quantity of open space; and to strengthen sustainable natural resource-based businesses, including agriculture.
- **Water Policy Task Force**: The draft recommendations in the Report of the Water Policy Task Force, released on July 2, 2004 focus on the need to conserve and protect water resources in the face of increasing development. As a water dependent industry, agriculture affects, and will be affected by, plans to assure adequate water resources.
- **Encroaching development**: The increasing proximity of homes and businesses to farm operations has, in some cases, engendered conflict. Observed consequences include: (1) complaints because residents misunderstand farm practices or object to standard farm operations, (2) identification of problematic environmental practices that previously went unobserved, (3) greater scrutiny of farm water usage due to increasing competition for water sources, and (4) increasing pesticide regulation due to installation of new wells near farm lands.

Current Programs

The Department of Agricultural Resources has championed a wide range of efforts designed to address farm impacts on natural resources. DAR works with government and private agencies to de-

velop and identify needed resources and to link farmers with appropriate programs. In addition, DAR has developed its own programming to protect natural resources and provide education and compliance assistance. Highlights include:

- The Agricultural Environmental Enhancement Program (AEEP), and the Farm and Cranberry Viability programs fund farm projects that address water quality and other environmental impacts.
- The Agricultural Preservation Restriction (APR) program preserves open space by ensuring that land continues in agricultural use in perpetuity.
- The Water Well-Being project, developed with grant funding from the SWAP program, provides education about potential agricultural impacts on public water supplies.
- As part of its administration of the Commonwealth's pesticide regulations, DAR provides regular outreach and education to agricultural operations.
- DAR developed and promotes the use of education manuals including: "On-Farm Strategies to Protect Water Quality," "Farming in Wetland Resource Areas: A Guide to Agriculture and the Massachusetts Wetlands Protection Act," "Recommended Practices for the Mixing, Loading and Storage of Pesticides," as well as numerous brochures on specific environmental topics.
- DAR, in cooperation with the Environmental Protection Agency, is providing outreach and education to livestock farmers on the new federal CAFO regulations.
- With a grant from Coastal Zone Management, DAR is conducting outreach to agricultural operations located in coastal watersheds and identified as potential sources of pollution in the Nonpoint Source Management Plan.
- Although not funded in fiscal year 2004, the Agro-Environmental Technology program has, in the past, funded projects featuring new or alternative technologies used to address environmental issues.

Resources Fall Short of Needs

DAR's programs, and its work to link farmers with external resources, provide an important and needed service. Yet the demand for assistance far outpaces the supply. Each year the Agricultural Environmental Enhancement and Farm Viability programs receive double the number of applicants they can fund. DAR does not have the capacity to respond to the growing number of instances where agriculture has been identified by the SWAP, Nonpoint Source and TMDL initiatives, or by local entities, as a known or suspected source of water quality impairments. Further investigation into the source of water impairments is often warranted. Where agricultural sources are confirmed, farms may need technical assistance and resources to install best management practices. Similarly, DAR does not have the resources to meet the expectation expressed in the Nonpoint Source Management Plan that it will, by 2005, evaluate all known farms near water resources. With resources stretched thin, the department's ability to respond to proposed regulatory changes, let alone consider new approaches, is limited at best.

Most importantly, current efforts fall short of a coordinated and comprehensive program capable of assisting the agricultural industry to meet the highest standards of environmental stewardship. With 6,000 farms and ten percent of Massachusetts land in agricultural production, a coordinated effort is needed to assure the strong environmental performance of all agricultural operations. A successful program will protect water resources and advance the Commonwealth's commitment to sustainable development.

Capitalize on DAR's Expertise

The Department of Agricultural Resources is uniquely qualified to develop a comprehensive and cost-effective program to assure that the environmental performance of the agricultural industry meets the needs and goals of the Commonwealth. The Massachusetts agricultural industry is highly diverse. Its 6,000 farms include nursery, cranberry, dairy, livestock, vegetable, maple sugar, Christmas tree, and aquaculture operations, among many others. This diversity serves as a distinct challenge to efforts to improve the environmental performance of the industry as a whole. Each sector is unique in its use of materials and natural resources. Further, each sector has its own organization and network of contacts. With its many programs, DAR has extensive contact with all of the commodity groups. DAR staff has expertise in farm-related environmental science and technology and knowledge of the wide array of public and private resources available to agriculture.

Through years of service DAR has earned the trust and confidence of the agricultural community. DAR personnel visit agricultural operations on a daily basis, reaching a majority of Massachusetts farms annually. In particular, the plant, animal and pesticide inspectors have regular contact with more than one-third of the Commonwealth's farms; they visit an even larger number of farms on an as-needed basis. Their relationships with individual farmers and familiarity with farm operations constitute an important base of knowledge of Massachusetts agriculture. Although developing a comprehensive effort to improve environmental performance will certainly require additional resources, DAR is well-placed to accomplish the task with a limited infusion of new funding by building on its current programming and strong relationships with the agricultural community, and utilizing the knowledge and skills of current staff.

A Comprehensive and Cost-Effective Approach

DAR should create the "Environmental Policy and Compliance Assistance Program" to oversee: (1) policy analysis and development, and (2) outreach, education and compliance assistance for individual agricultural operations.

Policy Analysis and Development

Knowledge of environmental impacts and best management practices is constantly evolving. There is a need to consider new regulatory initiatives, or adapt the successful efforts of other states to the profile of Massachusetts agriculture. Nutrient management is one area of pressing concern. Improved nutrient management can have beneficial effects even beyond protecting water resources. The Massachusetts Climate Protection Plan calls for reduced use of nitrogen fertilizers and better manure management to reduce emissions of greenhouse gases**.** In Massachusetts, evaluation of a pilot project between UMass-Amherst and dairy farms showed that implementation of nutrient management plans resulted in reduced application of nitrogen and phosphorous and financial savings due to decreased purchases of commercial fertilizers.[4] Increasingly, regulation requires nutrient management or conservation plans. CAFOs will be required to implement nutrient management plans, the Massachusetts Nonpoint Source Management Plan sets targets for implementation of farm plans and the DEP draft groundwater regulations propose exemptions based on DAR approval of plans. Agriculture Departments in other states, including Maine and Vermont, guided efforts to improve nutrient management practices through implementation of nutrient management programs and regulations. Analysis is needed to determine the applicability of these and other initiatives to Massachusetts agriculture. Recent requests for comment on DEP draft revisions to the Wetlands, Surface Wa-

ter and Groundwater regulations and the draft Report of the Water Policy Task Force also point up the need for an enhanced capacity to provide timely analysis and recommendations.

Outreach, Education and Compliance Assistance

An outreach program will allow DAR to significantly expand its capacity to assist agricultural operations in efforts to mitigate negative impacts on water resources. DAR can take advantage of its extensive and intimate knowledge of Massachusetts agricultural operations to develop a systematic program to identify farms that may need support to address water resource impacts. The program will respond to a critical need to assess and address the growing list of agricultural operations that have been identified by TMDLs, Nonpoint Source Action Strategies, SWAP analyses and other sources, as a known or suspected source of water impairments. Components of the outreach program include:

- **Creation of a Massachusetts Agriculture Database.** Given the large number of farms, their relatively small size[5] and highly diverse nature, there is a need for better information in order to target services and identify farms that may impact sensitive areas. Combining information from MassGIS datalayers and DAR databases would yield a complete and highly useful picture of Massachusetts agriculture. DAR has, in various locations and stages of development, databases or lists of farms subject to inspection, program participants, members of over twenty different commodity organizations and livestock owners identified by local Animal Inspectors. Some of this information is not available to the public for biosecurity reasons. MassGIS datalayers include all relevant environmental resources (including Zone II, surface waters, aquifers, wetlands, and elevation) and identify agricultural land use based on analysis of aerial photos. The land use datalayer is limited in that it does not identify the street address or owner of land parcels. In addition, some forested and other farmlands are not recognized using aerial analysis. Nevertheless, the agriculture land use layers capture 70% of the total farm acreage identified in the 2002 Census of Agriculture. Cross-referencing with DAR data may improve the accuracy and increase the usefulness of the land use datalayer. More importantly, combining the information available to DAR with MassGIS datalayers will create the capacity to:

    - Systematically identify agricultural operations that may impact surface waters, Zone II groundwater, wetlands and other environmentally sensitive areas.
    - Indicate potential environmental impacts for individual agricultural operations.
    - Locate possible sources of pollution where agricultural land use has been identified as a potential cause of impairments to water bodies.
    - Map agricultural operations by potential environmental impact, commodity group, geographic area, type of DAR funding, or other categories of interest.
    - Target programming to specific types of farms or regions.

- **Development of educational materials.** There is currently no single source of information targeted to farm owners that highlights all environmental regulation relevant to Massachusetts agriculture. DAR should develop materials that describe water quality and quantity regulations and identify programs that provide information and resources to address impacts that may trigger regulation.

- **Farm Outreach.** Using the newly developed database and educational materials, current DAR staff can implement a systematic outreach program to educate farmers about environmental regulation and available resources. Inspectors will serve as a front-line resource. Aided by maps indicating nearby environmentally sensitive areas they can provide targeted information. Where environmental concerns or questions are identified, they will connect farmers to program staff. Inspectors will need to develop a basic familiarity with environmental regulation and best practices. As appropriate, other DAR personnel with on-farm contact may also perform this function. Outreach staff will be needed to provide follow-up assistance to operations identified by DAR inspectors, or other sources including local complaints, DEP and Environmental Protection Agency (EPA) referrals and DAR analysis of the Massachusetts Agriculture Database. Outreach workers will make an initial assessment of environmental impacts, devise plans to connect individual farm operations with appropriate technical and financial assistance and oversee implementation of needed environmental improvements. Outreach workers should have technical assistance skills, and be knowledgeable of environmental regulation, best management practices and available resources.

In addition to policy analysis and farm outreach, staff from the Environmental Policy and Compliance Assistance Program should:

- Serve as liaisons to regional DEP counterparts, the EPA, local Conservation Commissions and other relevant agencies or industry groups.
- Participate in appropriate interagency committees and commissions.
- Seek new sources of funding to support the work of the program.

Program Benefits

- **Improved environmental performance.** With support from DAR in the form of education, technical assistance and resources to implement farm plans and best management practices, agricultural operations will be able to redress potential negative impacts on water and other natural resources.
- **Support Sustainable Development.** The program will specifically address the Commonwealth's Sustainable Development Principles to "Restore and Enhance the Environment" and "Foster Sustainable Businesses**".** Superior environmental performance on the part of Massachusetts farms will ensure protection of valuable working landscapes comprising ten percent of Massachusetts land. Improved assistance to agriculture will strengthen an important sector of sustainable natural resource-based businesses.
- **Enhanced assistance to Massachusetts agriculture.** With an expanded outreach program, DAR will be able to meet the demand for information, support and compliance assistance. In addition, anecdotal information suggests that a comprehensive and effective program to address instances of agricultural pollution will lessen incentives to impose more stringent regulation on the industry as a whole.
- **Cost–effective approach.** By leveraging its agricultural expertise, DAR can advance the environmental performance of the entire agricultural industry with a limited infusion of new resources. A focus on pro-active compliance assistance will limit the need for regulatory agencies to initiate complex and costly enforcement actions.
- **Improved capacity for policy analysis.** Program staff will meet the need for timely and in-depth analysis of regulatory initiatives. DAR will be able to consider and promote new initia-

tives designed to improve environmental performance, and tailored to the realities of Massachusetts agriculture.

- **Strengthened interagency relationships.** DAR will have an improved capacity to fulfill expectations in the Nonpoint Source Plan and respond to environmental issues identified by outside agencies, as well as support state initiatives including Smart Growth and Climate Protection**.** A specific focus on interagency coordination will facilitate improved communication and the effective functioning of agreements establishing DAR as the "first responder" when potential concerns about agricultural pollution are identified.

Implementation

Start up needs:

- GIS/Database: One full-time person for 6 months. DAR already has staff working on database and GIS projects. Temporary support and technical expertise is needed for initial development of the Massachusetts Agriculture database
- Materials development: One full-time person for 6 months. Researcher/Writer to develop outreach materials.
- Legal support: as needed. Legal assistance may be required for review of outreach materials.

Potential Fiscal Year 2005 initiatives utilizing current staff:

- Apply for a "319" grant to fund best management practices on farms identified by DEP as causing water quality problems. The application is due in April 2005, funding starts in June 2005.
- Investigate grant opportunities for the Environmental Policy and Compliance Assistance Program.
- Consider targeting some AEEP funds to farms that have been identified by DEP as causing water quality problems and/or that may need funding to avoid CAFO designation. Consider requiring that farms receiving APR or Farm Viability funds implement conservation plans.
- Encourage voluntary implementation of farm conservation plans. Promote the use of the free resources offered by the On Farm Assessment and Environmental Review Program.
- Provide support for materials development and GIS/database work.

Resource needs starting Fiscal Year 2006:

- Program Coordinator: Full-time. The coordinator will oversee policy initiatives and analysis, coordination with other agencies, farm outreach efforts and the training of inspectors and outreach staff.
- Outreach Worker(s): Full-time. Outreach staff will work with farm owners identified by DAR, other agencies, or local complaints to develop a plan to address water resource impacts.
- Technical Assistance: As needed. Depending on the skills of program staff, technical assistance may be required in specific instances.
- Inspector(s): This proposal envisions an expanded role for DAR animal, plant and pesticide inspectors. Additional inspectors will be needed due to their increased workload.

- Increased funding for AEEP. Additional funds will be needed to address the expected increase in requests for assistance resulting from stepped up outreach efforts.

1. Estimates are based on review of data from the 2002 Census of Agriculture conducted by the United States Department of Agriculture and research conducted by students in the Tufts University Friedman School of Nutrition Science and Policy.
2. Department of Environmental Protection 5/14/04 draft revision of 314 CMR 5.00: Ground-water Discharge Permit Program
3. Department of Environmental Protection 3/2004 draft revision of 314 CMR 4.00: Massachusetts Surface Water Quality Standards. Department of Environmental Protection 2/2004 draft revision of 310 CMR 10.00: Wetlands Protection.
4. Herbert, Stephen J., Management Strategies for Massachusetts Dairy Farms to Reduce the Risk of Nonpoint Source Pollution. Funded by the Department of Environmental Protection. Project Number 00-06/319.
5. According to the 2002 Census of Agriculture, the median size of Massachusetts farms is 37 acres. In the United States, median farm size is 120 acres.