Vermont Dairy and Water Collaborative

March 15, 2019

A CALL TO ACTION

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Vermont Dairy and Water Collaborative Members

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A CALL TO ACTION

The Vermont Dairy and Water Collaborative sounds the following call to action to Vermont's leaders and influencers. We are 22 Vermonters who came together to try to understand the complexities and inter-relatedness of farm viability and water quality. The quality of our water, the viability of our farms and associated businesses, and the fabric of our rural communities are all at stake. Immediate, incisive, effective, and enduring leadership and action are needed!

BACKGROUND

Vermont faces twin crises: our agricultural sector is at a critical juncture and nutrient pollution is seriously affecting water quality, diminishing our role as a national model for environmental health.

Dairy farming continues to be central to our state's identity and culture and is far and away our leading agricultural activity[1]. Dairy farm practices also contribute to water quality degradation in the state.

Our collective understanding of the importance of phosphorus management has evolved and the dairy community has been addressing and improving management practices, but at the same time, the public's tolerance and understanding of the agriculture sector is waning as their desire for water quality improvement grows. Meanwhile, our lakes suffer from annual algae blooms which have profound impacts on the quality of our water for drinking, recreational, and aesthetic purposes.

Vermont's dairy economy is in trouble due to declining milk prices, increasing costs of production, and an over-arching consumer expectation that food should be cheap. In recent years these factors have been compounded by an increasingly competitive and complex worldwide marketplace for commodity dairy[2] that has caused unsustainable, generally downward price swings. Cash-poor farmers are now required to implement on-farm nutrient management practices that even with public cost-sharing are both costly and resource- and capital-intensive. Farmers often do not have access to a coordinated "suite" of research, equity, and technical assistance that could help ensure both profitability and reduced nutrient loading. The traditional approach of regulatory oversight often focuses on practices instead of outcomes, and regulations are also often viewed with distrust and skepticism by those being regulated. While recent efforts to reduce farm-based phosphorus loss through regulation are showing early signs of progress, they have not yet yielded the improvement to water quality that many had hoped for. However, there are no quick fixes; long-term, measurable improvement will

[1] Roughly 80% of Vermont farmland is dairy-based.

[2] By "commodity dairy" we mean the system in which fluid bulk milk is sold into national and international markets. Typically, commodity pricing does not factor in the cost of production, and leaves farmers and farmer cooperatives with little control over the price for their product. As well, it does not trade on the unique characteristics of milk produced by individual farmers, nor on the distinctiveness of Vermont milk in general.

likely take decades and will require an integrated and comprehensive solutions-based strategy.

An estimated 40% of the phosphorus entering Lake Champlain is from agriculture, and 60% comes from other sources. All Vermonters have a stake in the future of agriculture, water quality, and our rural communities. We must work cooperatively to forge solutions that lead to an economically healthy agricultural sector, including dairy, and lakes, rivers and water sources that are clean, inviting, and pollution-free. An integrated approach to achieving the above objectives must include:

- Environmentally sustainable land management systems that improve and maintain soil health and fertility while decreasing nutrient loading to aquatic ecosystems and creating resilient landscapes that are able to withstand climate disruption,
- Public and private investment in water quality improvements, and
- Broad public support for a viable and vibrant farm sector.

OUR PERSPECTIVE

Because excellent water quality is a critical part of Vermont's quality of life and farming plays a major role in Vermont's economy and a healthy working landscape, linking the two will lead to positive futures for both. Farming is such an important land use activity in Vermont that it makes sense to view farm stewardship practices as a critical pathway to improving water quality. From this perspective, farm viability is essential. Because this area is so multifaceted, coordinated public engagement strategies will be critical, and committed leadership sharing common interests will need to come from a variety of sources, including farmers, other associated businesses, farm cooperatives, government, non-profits, researchers, and higher education.

We understand that change is coming. Two relevant questions are: What kind of change do we want? And, what is our level of involvement and commitment? There are factors beyond our ability as a state to easily affect (such as the dairy pricing system and a national cheap food policy), but we may be able to influence other areas, such as: debt restructuring, new product and market opportunities, research efforts, and incentive programs that will positively affect stewardship practices and water quality outcomes.

Within the context of a national "cheap food" policy, farmers find themselves squeezed by the inability of the commodity marketplace to adequately compensate them for the food they produce. The result is a race to the bottom: a dysfunctional system wherein the public's expectation of cheap food outweighs the farmer's interest in making a living and providing a reasonable standard of living for their family. And although farmers are paid (not enough) for food, they also produce other important public benefits, among them, a variety of "ecosystem services" for which they are rarely compensated. Many of the current problems dairy farmers face are rooted in the fact that the true costs of production are externalized by market-driven forces of scale and efficiency. Farmers

often cannot absorb the costs of environmental remediation without significant public commitment and assistance.

National milk pricing policies have a huge effect on Vermont dairy farms. Milk prices often do not cover the cost of production. This pricing system is driving farmers to either expand to take advantage of economies of scale, or go out of business. The result is farm consolidation and ever-larger ever-more-intensive farms. We are losing the social capital that comes from smaller farms, which diminishes the health of our rural communities. And because farmers are so strapped for cash, it is extremely difficult for them to keep farming, much less invest in water quality improvement efforts.

Regulatory goals are often at odds with the financial capacity of those being regulated. This market and regulatory dichotomy does not serve to support Vermont farms and farmers in the long run. Payment for ecosystem services is an area of rich potential that should be carefully considered. Payments for services support the dual purposes of improving water quality (through the restoration of degraded landscapes) and farm viability.

We also believe that the following concepts can point the way to increased farm viability and improved water quality:

- Policies that reduce a farmer's debt burden and increase profitability will allow for creative approaches to farming
- Aligning market-side and regulation-side approaches will create positive synergies
- Farmers are pragmatic opportunists who will positively respond to economic incentives that promote enhanced water quality,
- Farmers today strive to become good stewards of their resources including land, livestock, and practices.

All Vermonters have a stake in both an economically sustainable agricultural community and excellent water quality. We are at a critical juncture: we should face the future with a common sense of purpose and shared responsibility that reflects our traditional strengths, rather than resorting to blame. The VDWC supports this approach, because it is the "Vermont way" to put our collective shoulders to the wheel and get things done. We do not intend to lead this effort but we do offer the following set of recommendations with the hope that interested stakeholders, policy officials, and leaders will take them up (as appropriate) as part of an integrated, inclusive effort.

OUR PROCESS

In the spring of 2018, a group of Vermonters came together to consider the twin goals of improving Vermont's water quality and enhancing our agricultural future. We called ourselves the Vermont Dairy and Water Collaborative (VDWC). We chose to start with a

fairly small group of 22, with the humble understanding that there are many, many people who will be a critical part of this conversation as it moves forward.[3]

Beginning in May, and for the next four months, we listened and learned from front line experts about the causes, realities, and potential responses to the difficult situation we currently find ourselves in. We heard from a panel of young dairy farmers, learned about the complexity of dairy pricing and economics, got new perspectives on the state of water quality in Vermont, explored new thinking about farmland stewardship, and discussed incentive programs across the country and around the world designed to improve water quality and farm viability through whole-farm nutrient balancing[4].

We discussed what we had learned and crafted a common vision[5]. Next, we formed working groups that focused on articulating approaches to the issues of: Agricultural Economic Viability, Soil Health and Nutrient Management, and Financial Incentives for Water Quality Improvements. Please see the appendices for the reports summarizing the work of each of these groups.

RECOMMENDATIONS[6]

These recommendations integrate the various elements of the water quality and farm viability issues in a way that can provide benefits for both. While the implementation of any single recommendation will have a positive result, ***a deliberate, comprehensive, systems approach that incorporates most or all of these elements is needed to ensure long-term success in improving water quality and increasing the viability of Vermont farms.***

1. Build public support, leadership and cross-sector coalitions. We must Increase public understanding of how important clean water and a viable agricultural community are to us all, and identify citizen leaders, change agents, and diverse coalitions as essential first steps.

2. Use Tactical Basin Plans[7] to prioritize water quality investments.

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[3] Other important conversations are underway. For example, see "A 2018 Exploration of the Future of Vermont Agriculture," October 2018 prepared by Chuck Ross, Vern Grubinger, and Alison Nihart (UVM Extension); Ela Chapin, Nancy Everhart, and Liz Gleason (VHCB); Nick Richardson (VLT); Paul Costello (VCRD); Ellen Kahler (VSJF); and Andrea Asch.

[4] Please see the appendices for more information about our learning sessions.

[5] Our vision statement is included in the appendices.

[6] For more detailed discussion of these recommendations, please see "Recommendations: A Detailed Description," attached.

[7] "Tactical Basin Planning" is conducted iteratively by the Vermont Department of Environmental Conservation to identify the projects or actions needed to protect or restore specific waters and identify appropriate funding sources to complete the work, based on monitoring and assessment data. Tactical Basin Plans integrate priority items from complementary plans, including River Corridor Plans, Stormwater Master Plans, Backroads Inventories, and Agricultural Environmental Assessments.

3. Provide farmers with enhanced, coordinated technical assistance and investments in water quality and nutrient management improvement.

4. Compensate farmers for enacting best practices for nutrient management (short-term).

5. Restructure Vermont's regulatory framework to achieve watershed nutrient balance and meet water quality goals. Focus on outcomes rather than on mandates that require specific practices.

6. Compensate farmers for the water quality improvement and other ecosystem services they provide (long-term).

7. Institute a transition program for land with high water quality impacts.

8. Develop institutional capacity and invest in transitioning to a thriving, diverse and sustainable farm economy that is less dependent on commodity dairy.

CONCLUSION

We came together in order to shine a light on the economic crisis in Vermont agriculture and especially its dairy sector, the unacceptability of continued degradation of some of Vermont's major bodies of water, and to seek common ground. The health of Vermont farming and the quality of our waters are inextricably linked, and the value of this linkage will become evident as efforts to mitigate extreme weather events through better land stewardship practices begin to bear fruit.

We can effect real change by using a solutions-based approach to complex systems that draws on the perspectives and involvement of economic, environmental, community, and regulatory stakeholders.

Farming can help us adapt to this change through improvements to soil health, water-retention capacity and flood control, and through carbon sequestration. Our recommended actions (below) can begin to move the needle in a positive direction. Given the magnitude of the challenges Vermont faces, we must act; doing nothing is an unacceptable option. Let's demonstrate what is possible when we work together for the common good and restore a sense of "Vermont Proud."

RECOMMENDATIONS: A Detailed Description

1. Build Public Support, Leadership and Cross-Sector Coalitions

We Vermonters need to understand that the health of agriculture and the health of Vermont's waters are inextricably linked and that both are essential to our quality of life. We need to better understand that our tourism, recreation, food, and even tech economies rely on functioning communities, open space and a healthy natural environment. Public understanding and support are critical to effectuating change.

We all must be part of the solution. We need a stakeholder process that invites, encourages, and supports involvement from all sectors and perspectives of these twin issues.

Coalitions that include farmers, conservationists, environmentalists, residents, policy officials, and ag development and business leaders must all take an active role in developing solutions. Leadership at many levels and from a variety of sectors is sorely needed to foster these coalitions and ensure that all sectors are well represented.

2. Use Tactical Basin Plans to Prioritize Water Quality Investments

Concentrate public investment and other water quality improvement efforts on farms located within the watersheds of impaired sub-basins as identified in Vermont's Tactical Basin Plans. Investment should be prioritized based on water quality impact, farm and watershed nutrient balances, urgency, cost-effectiveness, durability, etc.

3. Provide Farmers with Enhanced, Coordinated Technical Assistance and Investments in Water Quality and Nutrient Management Improvement

Vermont has a number of programs that offer farmers excellent, but limited, technical services to improve water quality. The effectiveness of these programs can be significantly increased through a coordinated approach that acknowledges that farmers cannot adopt management practices that improve water quality unless the farms themselves are economically viable. Our water quality and the health or our farms are inextricably linked. We see two options for enhancing these services; both are dependent on close coordination and collaboration with all the entities that currently provide services to farmers, including farmer-led watershed improvement groups, Natural Resource Conservation Districts (NRCD's), The Natural Resources Conservation Service (NRCS), UVM Extension, the Vermont Agency of Agriculture, and the Vermont Department of Environmental Conservation.

Preferred Option: A strong majority of our group endorses the idea of creating and supporting a stand-alone entity (such as a utility) dedicated to the future of environmentally sustainable agriculture. To be most effective, this entity should be independent of regulatory and compliance programs. Like Efficiency Vermont and

the Vermont Farm and Forest Viability Program, the utility would include practices and policies that flow from a clearly articulated mission, and that are administratively separate from, but aligned with regulatory goals. It would have a service relationship to farmers and the general public and would have a dedicated funding source. The work of the utility would be rigorously and publicly reported. Formal accountability would be provided by a multi-constituency governing board and legislative reporting and accountability.[8]

Alternative: If our preferred option is not feasible and if a coordinated, farmer-focused, efficient and non-regulatory service delivery can be assured, an alternative approach is to significantly expand and better coordinate existing programs in a manner that respects and is in service to farmers. A key issue is the current lack of clear responsibility for coordinating the programs, incentives, regulations, etc. For this alternative approach to be effective, strong coordinating responsibility must be established and articulated broadly.

4. Compensate Farmers for Enacting Best Practices for Nutrient Management (Short-Term)

Many Vermont farms face dire financial conditions, with little reason for optimism that the near-term situation will improve. Funds are sorely needed to help farms make investments that will support Nutrient Management Best Practices. These "transition payments," when tied to specific practices, would accomplish four things: 1) They would support farms during a transition period while the longer-term solutions proposed above are being developed, 2) give an economic shot in the arm for farms that are willing to play a role in Vermont's environmental and economic future, 3) signal a shift toward public acknowledgement for some of the uncompensated benefits that farmers currently provide, and 4) provide the agricultural community with an opportunity to demonstrate and for the public to learn about positive environmental benefits. It is reasonable for the public to expect that in order for a farmer to receive a payment, they must demonstrate a commitment to comply with specified actions that are compatible with Recommendations 3, 5, & 6.

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[8] Key functions of the utility might include:

- Technical assistance for farm-specific stewardship practices and whole farm nutrient management planning and budgeting
- Technical and financial support for the design and implementation of improvements and infrastructure – livestock management, watering systems, surface and tile drainage remediation, manure management, etc.
- Assistance in managing a statewide farmland transition system (see below)
- Overseeing a state ecosystem services payment or nutrient trading system
- Coordinating capital investments: Beyond dedicated state funding, the entity would leverage private and foundation capital, and coordinate other public funding (including the NRCS-funded Lake Champlain Regional Conservation Partnership, VHCB, Vermont Clean Water Fund, FSA programs such as EQIP and WRE, and VEDA/VACC)

5. Restructure Regulations

Vermont should develop and implement a results-oriented regulatory system that uses measurable water quality outcomes to achieve the degree of farm and watershed nutrient balance required to meet water quality goals. The current regulatory system mandates practices that may not achieve the water quality improvement we need, and mandating specific practices often stifles innovation.

The method for measuring results needs to be carefully considered and requires further work. On-the-ground monitoring is prohibitively expensive, and models are limited by their base assumptions. We suggest a balance of monitoring and modeling, similar to what is being done in New Zealand.[9]

We also suggest adopting a system similar to that used in the Netherlands that assures meeting targets for whole farm nutrient balances by establishing a phosphorus and nitrogen accounting system for farms. Such a system would require that phosphorus and nitrogen inputs and outputs be in balance (as measured at the farm gate) to the degree required to meet water quality goals over a specified time period, with an allowance for temporary fluctuations.

The Dutch system requires farms to use certified procedures to account for all nutrient inputs (animal manure, compost and sludge, fertilizers, animal feed, and animals) and all outputs (animal products including sold animals, animal manure, and sold crops at farm level). The required farm nutrient balance plans serve both as a land management tool and a regulatory tool. The Dutch program of technical assistance and farmer-to-farmer coaching helped many farmers achieved a 50% reduction in excess phosphorus within the first two years.

Vermont should consider implementing such a system. Doing so would require building on our current ability to measure suitable outcomes. Please see the Soils and Nutrient Work Group Report for further discussion.

6. Compensate Farmers for the Water Quality Improvement and Other Ecosystem Services They Provide (Long-Term)

Farmers can and regularly do provide a wide range of public benefits including:

- nutrient and water cycling,
- soil structure, formation and fertility,
- storm water attenuation and flood mitigation.
- carbon sequestration and climate regulation,
- pest control and pollination services,

[9] The FARM-PREP modeling framework in development under a grant from the Lake Champlain Basin Program is a promising farm-scale model that should be applicable to nearly all Vermont farms.

- wildlife habitats and biodiversity conservation,
- recreation, tourism, scenic beauty and open space, and
- production of food, fiber and fuel.

We recommend carefully considering and, if feasible, implementing a payment system to compensate farmers for the public benefits they provide. The first three "ecosystem services" listed above should be of primary focus initially, because they represent the strongest links between farms and water quality. Such payments would reward farmers for increasing the supply of these services, and therefore would present opportunities to broaden their businesses and diversify their incomes. As such, it is a mechanism to align the interests of farmers with water quality. Farm eligibility could be based on Tactical Basin Plan criteria and would give priority to farms within impaired watersheds.

Significant research, scenario testing, data measurement and analysis, financing, and program design will be required before a "payment for ecosystem services" (PES) system can be implemented. Additional work is needed to establish measurable goals and quantify the value of these services, and to consider whether compensation for ecosystem services might be offered to forest owners as well as farmers. Please see Compensation Models and Soils and Nutrient Work Group Reports for further discussion.

7. Institute a Transition Program for Land with High Water Quality Impacts

Vermont should consider a voluntary farmland transition program similar to that used in the Lake Taupo, New Zealand watershed[10] that brought the public and the farm community together to address nutrient pollution problems

Not all land used for agriculture is created equal when it comes to its potential impact on water quality. We now have the technology to assess a given parcel's impact on water quality and its suitability for various farm practices. For some farm parcels with high water quality impacts, a shift in management practices will likely result in significant improvements in water quality. For other parcels, permanent protection is needed to ensure that riparian and wetland buffers are maintained. In some extreme cases whole farms should be taken out of production because they have high phosphorus and nitrogen impacts and water quality goals can't be met by changing management practices.

[10] Lake Taupo is about one-half the size of Lake Champlain, its shore length is one-fifth as long, and there are 100 farms in the watershed. The Lake Taupo program invested capital to reduce nitrogen in the watershed. Buy-outs were based on basin-wide priorities. The Lake Taupo Trust purchased land and took it out of production, instituted a nitrogen cap and trade program for the watershed, and purchased nitrogen permits requiring less-intensive farm production. The total investment was $81.5 M in national, regional and local funding over 15 years.

We propose building upon the existing work of VAAFM/VANR, VHCB, conservation organizations like the Vermont Land Trust, NRCS, VACD, and others, with much-enhanced coordination and financing.

8. Develop Institutional Capacity and Invest in Transitioning to a Thriving, Diverse and Sustainable Farm Economy that is Less Dependent on Commodity Dairy

The state must support Vermont agriculture as farmers transition to new markets and new products that reflect good land stewardship and sustainable production practices. We suggest a comprehensive and independent assessment of the needs and values of consumers in nearby markets for new value-added Vermont dairy products, and an assessment of the value of the Vermont Brand.

Vermont must commit significant resources to:

- support farm diversification,
- develop and market value-added products,
- help build associated infrastructure,
- assist in developing and marketing value-added products, and
- foster and promote the distinctiveness and value of the "Vermont brand,"[11] and
- establish a "clearing house" of information for regulatory requirements, funding opportunities, support providers, etc.

One model to consider is the creation of a Vermont version of the Southern Maryland Agricultural Development Commission, http://www.smadc.com/

[11] We cannot assume that "Vermont distinctiveness" improves the pricing or marketability of milk or other commodity products. This distinctiveness could be expanded and enhanced if measurable attributes such as product quality, environmental stewardship and farm worker fairness were assured. Independent, market-based research is required before advancing these ideas. Further, Vermont might do well to collaborate with New England producers in developing strategies around regional distinctiveness.

VERMONT DAIRY & WATER COLLABORATIVE MEMBERS

Farmers:

Mark Magnan - Magnan Brothers Farm, a dairy in East Fairfield.
Bob Foster – Foster Brothers Farm, a diversified dairy in Middlebury
Jack Lazor – Butterworks Farm, an organic dairy in Westfield
Becky Maden – Singing Cedars Farm, a diversified, organic farm in Orwell.
Brian Kemp – President of the Champlain Valley Farmers Coalition, and manager of Mountain Meadows Farm, a large organic beef operation in Orwell.

Dairy Processing and Distribution:

Cheryl Pinto – Global Values Led Sourcing Manager for Ben & Jerry's

Research and Education:

Heather Darby – UVM Extension Agronomic and Soils Specialist, and a farmer.
Eric Roy – UVM Rubenstein School professor focused on ecological design in the contexts of water quality, waste management, and food systems.
Taylor Ricketts, Director of UVM's Gund Institute
David Mears – Executive Director of Audubon Vermont and Vice President of the National Audubon Society

Lake Stewardship & Science Education:

Phelan Fretz - Executive Director, ECHO Lake Aquarium and Science Center at the Leahy Center for Lake Champlain

Farm Lending, Finance & Technical Assistance and Private and Philanthropic Capital

Tom Bellavance – Principal, Ag Venture Financial Services, and a farmer
Ela Chapin – Director of VHCB's Vermont Farm & Forest Viability Program
Peter Stein – Managing Director, Lyme Timber Company
Gaye Symington - President of the High Meadows Fund

State Agency Experts:

John Roberts – VT Agency of Agriculture, Small Farm Water Quality Specialist and former organic dairy farmer
Neil Kamman – VT Department of Environmental Conservation, Senior Policy Advisor

Organizers & Facilitators:

Roger Allbee – Former Vermont Agency of Agriculture Secretary
Will Raap – Founder, Gardener's Supply
Gil Livingston – Former President, Vermont Land Trust
Will Stevens – Golden Russett Farm, organic fruit and vegetable farm in Shoreham,VCF board member, and former Independent legislator
Cindy Cook – Adamant Accord, environmental and policy facilitator

STATEMENT OF VISION and OBJECTIVES

VISION STATEMENT:

- Excellent water quality in Vermont's lakes, rivers and streams is essential to our health, our economy and our identity.
- Farming is central to a vibrant, interconnected Vermont economy, our well-being and our state's culture.
- Improving water quality cannot succeed without an economically viable farming sector accompanied by high-quality land stewardship.
- Collectively, strategies to improve water quality must be mindful of farming as a critical land use; strategies to improve Vermont's farm economy must also substantially improve water quality.
- Vermonters understand that improving water quality and the farm economy are essential. All Vermonters embrace their shared reasonability for both, resulting in a high level of public support and mutual respect.
- Farmers will be paid for the products they produce, but also other important community benefits including soil health, carbon sequestration, clean water, and increased biodiversity.

This vision leads to the following objectives:

Vermont will reach agricultural "phosphorus balance," while also improving the efficiency of nitrogen use, maintaining and enhancing soil health, and reducing negative environmental impacts. "Phosphorus balance" means that imports from feed, fertilizer and other sources will not exceed phosphorus necessary for agricultural purposes including crop production, and accounting for product exports. Farm-specific whole farm nutrient management contributes to on-going reductions in phosphorus, other excess nutrients, and other farm-related pollutants in Vermont's surface waters – especially Lake Champlain, Lake Memphremagog and major river systems.

Vermont farmers see themselves as interdependent and complementary, focused on a vibrant future for Vermont agriculture. Vermont's agricultural future will be more diversified in terms of products, processing, landscape use, markets, scale and creativity. Marketing efforts that focus on locally processed value-added products and regional fluid milk differentiation that include authentic stories of quality and farmstead management may provide some value for Vermont's dairies. Vermont's focus on farm-driven ecosystem services and excellent land stewardship creates a national standard and makes Vermont an attractive source for regional, national and global dairy brands.

"Stewardship" defines dairy farming's role in Vermont's environmental, economic, and social sectors: it is practiced to high environmental standards, it values animal welfare, employees are treated well and fairly compensated, farm enterprises are financially viable, farmers play active roles in their communities, and farming in Vermont is an attractive, well-compensated profession.

VDWC VISION, OBJECTIVES, IMPLEMENTTION & STRATEGIES

VISION SUMMARY

Both excellent water quality and a healthy farm sector are central to Vermont's economy and well-being. Water quality and farm viability are deeply interconnected and must be integrated. Vermonters embrace these goals and their shared responsibility for them. Farmers are respected and compensated for both products and services.

OBJECTIVES SUMMARY

Phosphorus balance, efficient Nitrogen use, enhanced soil health, clean environment.
Farmer interdependence, diversification, value-adding, quality-and-place differentiation.
High quality stewardship of land, animals and people.

IMPLEMENTATION

1. Generate public support and build partner coalition(s) [see E1, E2, E3 below]
2. Plan and prioritize through Tactical Basin Plans [N1]
3. Provide farmers with enhanced, coordinated technical assistance and investments in water quality, soil improvement actions [C2, C3, C4, E4, N3]
4. Compensate farmers for enacting best practices for nutrient management (short-term) [C2, E4]
5. Develop outcomes-based regulations requiring whole farm nutrient plans & farm gate nutrient balance [N2]
6. Compensate farmers for the water quality improvement & other ecosystem services they provide (long-term). [C2 - C5, N3]
7. Institute a transition program for land with high water quality impacts. [E5]
8. Develop institutional capacity and invest in transitioning to a thriving, diverse and sustainable farm economy that is less dependent on commodity dairy. [E4]

STRATEGIES

<u>COMPENSATION MODELS</u>

C1 - Milk Market Order Reform

C2 - Milk Buyer-Processor Models

C3 - Purchases of Ecosystem Services

C4 - Phosphorus Market & Trading Systems

C5 - Debt-for-Stewardship

<u>ECONOMIC VIABILITY</u>

E1 - Share an understanding of the context of the current crisis in dairy

E2 - Create a "broad tent" of Vermonters that understand why a vibrant, diversified agricultural economy is critical to Vermont's identity

E3 – Develop a common understanding of agriculture's role in improving water quality and climate change impacts

E4 - Identify pathways for economic and environmental sustainability for Vermont's dairies, and associated necessary infrastructure

E5 – Research and develop alternative land use options that support vibrant rural economies and a culture of water and soil stewardship

<u>NUTRIENT MANAGEMENT & SOIL HEALTH</u>

N1 Develop mechanisms for watershed nutrient balances

N2 Develop mechanisms for whole farm nutrient balances

N3 Research, refine and implement farm- level and watershed-level goals and metrics

VDWC SOILS & NUTRIENTS WORKING GROUP – FINAL REPORT

The VDWC Soils & Nutrients working group agreed that **watershed-scale nutrient mass balance** is an important tool in the pursuit of improved nutrient use efficiency and reduced phosphorus (P) loading to aquatic ecosystems in Vermont. Additionally, the working group identified the **farm-level goals and metrics** below that could potentially be monitored and linked to incentives programs for ecosystem services. Emphasis was placed on engaging farmers in the process and developing a tool (e.g., smart phone app) that provides farmers with relevant information on their property. Any monitoring program should: (1) provide useful, reliable information about the primary intended outcome (i.e., reduced P loading to aquatic ecosystems), (2) help quantify ecosystem services in a reliable manner to inform compensation models, and (3) provide timely information for farm management, avoiding potential pitfalls (e.g., data are available too slowly to inform decision-making, decision-makers are misled by the "noise" of transient peaks and valleys of real-time data). Furthermore, intensive pilot-testing of these goals and metrics at a smaller number of farms would be needed to determine an efficient, cost-effective, and scientifically robust approach to monitoring a larger number of farms across the state. The metrics below are largely related to P transport risk. However, changing P transport risk in itself does not reduce P loss – it depends on the source of P at risk of being transported. Any transport metric will need to be combined with established metrics such as **soil test P** and the **Vermont P-Index** to better estimate actual P loss to water.

Farm-level goals & metrics	**Can be measured?**	**Can be modeled?**	**Comments**
Whole-farm nutrient mass balance & nutrient management planning	Yes, quantified based on data for material inputs to and exports from a farm.	Yes	[*from Cornell Nutrient Management Spear Program*] Knowing a farm's nutrient mass balance (NMB) is one step towards improving our understanding of nutrient movement onto, within, and away from the farm. Achievable nutrient mass balance metrics can be developed that consider soil test P and the Vermont P-Index. We recommend a metric based on balances over multiple years at a time due to the potential effects of factors including weather, input costs, etc. Nutrient mass balance metrics should be used to inform modifications in soil management and feeding practices through a farm's nutrient management plan (NMP) and precision feed management (PFM). These actions can help improve the balance between farm nutrient inputs and outputs.

Farm-level goals & metrics	**Can be measured?**	**Can be modeled?**	**Comments**
Maintain or improve soil infiltration	Yes. Discrete measurements can be made to estimate soil infiltration [*see e.g., USDA NRCS Soil Infiltration pdf*]. Involving farmers in measurement should be considered. However, measurement is more difficult on clay soils, which may limit efficient use of this metric in portions of Vermont. An alternative metric that is simpler to measure is soil bulk density.	Yes	[*from USDA NRCS Soil Infiltration pdf*] Soil infiltration refers to the soil's ability to allow water movement into and through the soil profile. Water entering too slowly may lead to ponding on level fields, erosion from surface runoff on sloping fields, or inadequate moisture for crop production. An infiltration rate that is too high can lead to nutrient or pesticide leaching, if they are not managed correctly. Inherent factors affecting soil infiltration, such as soil texture (sand:silt:clay), cannot be changed. Long-term solutions for maintaining or improving soil infiltration include practices that increase organic matter content and aggregation and minimize runoff, soil disturbance, and compaction. However, there is one important caveat: increasing infiltration may not actually lead to an ecosystem service in certain situations, including 1) when soils are frozen in winter when there can be substantial P loss, 2) when soils (e.g., Cabot, Peru, etc.) with a shallow restrictive layer have high infiltration rates, but still produce a significant amount of surface runoff through interflow/variable source area hydrology, and 3) where there is evidence linking increased infiltration, in combination with tile drainage, to increased loss of soluble reactive P (e.g., this has been observed in the Lake Erie watershed).

Farm-level goals & metrics	Can be measured?	Can be modeled?	Comments
Landscape storage capacity	Not entirely – continuous or discrete measurements of water movement in different locations can be used to inform models (e.g., APEX) that estimate overall water and P losses from a field.	Yes	Improved soil health and infiltration can decrease flooding and thereby reduce overland runoff and erosion. This can in turn help increase P retention in some cases. Methods for sensing water movement (e.g., water level in agricultural ditch/stream within/at edge of a farm property) should be reviewed to identify the best metric(s). Measuring water flow and P load in the field is the holy grail but can be very difficult to achieve, especially in winter when potentially a significant amount of P loss can occur, and therefore directly linking a water movement metric to an ecosystem service payment will likely be problematic. Simpler metrics (e.g., water level) could be explored for use in a smart phone app that gives farmers a real-time sense of water loss after rain events or snow melts. However, any such program would need to avoid the potential pitfall of farmers being misled by the "noise" of transient peaks and valleys of real-time data. APEX model can be used on less frequent (e.g., annual) basis to assess water & P losses – and examined in combination with source metrics (e.g., soil test P, Vermont P-Index).
Reduce turbidity of water lost	Yes, can be measured using a sensor and electronic data logger.	Yes	Previous researchers have observed a strong correlation between turbidity and total phosphorus in streams. This relationship could be evaluated for farm runoff/ditches in Vermont. Turbidity measurements (combined with water level measurements) could be linked to smart phone app, providing farmer with a real-time (or near real-time) metric related to soil erosion and P loss. An important caveat: turbidity does not necessarily have a relationship with soluble

			reactive P. There have been observations in other locations (e.g., Lake Erie) where loads of particulate P and suspended solids have both declined, but soluble reactive P loads have increased. Therefore, any use of turbidity measurements will need to be complemented by other metrics that are linked to loss of soluble reactive P.
Farm-level goals & metrics	**Can be measured?**	**Can be modeled?**	**Comments**
Soil health indicator(s)	Yes. Soil sampling is far easier than tracking the movement and properties of water. Ease of use and cost are dependent upon the indicator(s) chosen. One challenge is selecting an indicator (or set of indicators) that best captures incremental change in soil health as influenced by management over relevant time periods. Some indicators may be too slow to change, others may be too variable.	Maybe. Depends on indicator.	[*from USDA NRCS 2018-19985 pdf*] Soil health is defined as the capacity of the soil to function as a vital living ecosystem to sustain plants, animals, and humans. Six key soil physical and biological processes have been identified that must function well in a healthy soil, and therefore would especially benefit from measurement methods standardization: (1) Organic matter dynamics and carbon sequestration, (2) soil structural stability, (3) general microbial activity, (4) C food source, (5) bioavailable N, and (6) microbial community diversity. Indicators currently being explored by NRCS include soil organic carbon; water-stable aggregation; short-term mineralizable carbon; four enzymes: β-glucosidase, N-acetyl-β-D-glucosaminidase, acid or alkaline phosphatase, and arylsulfatase; permanganate oxidizable carbon; autoclaved citrate extractable (ACE) protein; and phospholipid fatty acid analysis. More work is needed to determine which soil health indicator(s) can be used most effectively to monitor ecosystem services on Vermont farms. Importantly, soil health itself is not an ecosystem service – specific soil health indicators will need to be closely linked to ecosystem services. Furthermore, similar to other metrics

			discussed above, soil health indicators may not be a good indicator of P loss (or water loss) when soils are frozen, and therefore, the soil health indicators should probably also be considered in conjunction with sources of P/management on the field with a tool like the Vermont P-Index or something else equally simple.

Note: The work group expresses its appreciation to Joshua Faulkner of UVM Extension for his advice and contributions to this report.

VDWC ECONOMIC VIABILITY WORKING GROUP – FINAL REPORT

The Economic Viability Working Group (EVWG) had an enormous charge – identifying ways to ensure the future economic viability of Vermont's dairy sector that addresses pricing, water quality, and soil health issues. Policy makers, dairy cooperatives, processers, feed dealers, regulators, individual farmers, and other interested parties do not find themselves able to rally around the goal of economic viability, and given that there are so many factors beyond any one entity's ability to meaningfully influence or control such a goal, we are left to explore unfulfilled opportunities (if and where they exist) in the system. The problem with this approach is that because of the lack of a unified vision for the entire dairy sector, there is no guarantee that any proposed solution will generate enough of the necessary buy-in to result in meaningful change. Proposals that pit farmer against farmer, environmentalists against agriculture, and/or region against region are not likely to accrue much overall benefit to Vermont's dairy community, water quality, and land stewardship goals. Even within the state political establishment there appears to be a lack of engagement around what could be the most pivotal point in Vermont agriculture in over a century, and this feeds into the perception that we not only lack a unified vision, but a process to arrive at one as well. Leadership, awareness, and emotional investment are all needed to move the dial.

Much of what the EVWG discussed came together in the form of a "Request for Proposals" for a White Paper that would provide a general context overview, suggested research topics, and possible implementation strategies. It was big, bold, and unlikely to ever happen.

That said, the EVWG has taken the essential elements of the RFP and reworked them into the following proposal, which includes: 1) an articulation of the current situation, 2) identification of areas where further analysis is needed and/or could be helpful, and 3) suggestions for potential desired outcomes that would support the future economic viability of Vermont's dairy farms. We believe that this approach will help to highlight areas that must or should be addressed and serve as a "Call to Action" for future stakeholder involvement.

Where We Are

Dairy is the largest component of Vermont's agricultural sector, contributing $2.2 billion in economic activity annually, and representing 80 % of land used for agricultural production. Roughly 60% of the milk produced in Vermont is actually consumed and/or processed in-state; the rest is exported out of state for processing.

Since milk is a commodity, individual farmers have little if any control over the price they receive for their product and are left with cost-cutting strategies and economies of scale as some of the only ways to positively influence their margins. Farmer owned dairy co-operatives were formed years ago to help address the pricing situation. Over the years economic efficiency has pushed farms to "get big or get out," driven by a national pricing model that encourages economics of scale (more than 50% of U.S. dairy production now comes from farms of 1,000 cows or more) in favor of rural economic health or environmental stewardship. One result is that milk production is concentrated in areas of the U.S. that both has the land base and is close to feed production. Under an antiquated pricing system for dairy, farmgate prices have eroded as fluid milk consumption has declined. New processing technologies, and a variety of technological innovations have placed further pressure on pricing in recent years.

It can be argued that today, international trade in dairy products have more impact on Vermont dairy pricing than any other factor. Since the U.S. dairy market is saturated, any surplus

production must be exported, and because of that the international market for dairy products ultimately determines the farmgate pricing for U.S dairies. Vermont's dairy industry is at a competitive disadvantage because those markets require low-cost production, and Vermont dairies, no matter how efficient they might be, are not "low-cost" when compared to other regions of the country. In spite of that, our proximity to Northeast markets could be advantageous in the future due to lower transportation costs and relatively reliable access to water.

With the above in mind, it can be argued that the success or failure of Vermont's dairy industry has significant implications for the state's future in terms of economic activity, environmental health, and its rural heritage image, and character.

What to Do

Review of Ag-Friendly State Programs

- Determine what (if any) changes are needed to existing state programs that can better assure sustainability for active farms (e.g. current use, PDR's, RAPs, etc.). (Note that many of these programs were put in place as methods to ensure a margin in farm pricing (by cutting costs), and not to deal with pricing itself.)

Develop New Approaches to Best Practices

- An integrated approach to soil health and water quality that combines technical assistance and financial services with required whole farm nutrient management and/or nutrient balancing practices will be needed. Regulations alone will not be enough to ensure either improved water quality or economic viability. Other regions of the world, such as the Netherlands and Lake Taupo in New Zealand, appear to have developed approaches that use water quality objectives to aggressively address nutrient use by establishing appropriate numbers of animals per land area. These efforts need to be evaluated in the design and determination of approaches suitable for use in Vermont.

Research Market-Driven Incentives

- Examine existing and potential market-driven incentive programs that can be adopted either in-state or regionally. Identify what specific criteria or factors would be relevant and/or could be used, and where the money to support such efforts could come from. Ideally incentives can be developed that will reward farmers not only for implementing certain practices, but more importantly for achieving specific outcomes.

Explore Alternative Agricultural Land Uses

- Explore alternative uses of dairy land and how such changes might impact future dairy sector viability. Perform market research into viable non-dairy agricultural activities that make use of land currently used for dairy production, and/or other activities that would ensure the continued use of land for agricultural purposes. The extent to which dairy-specific infrastructure can be utilized should be part of that analysis.

Protect Vermont's Rural Future

- The impact of the loss of productive farmland to the health and economic well-being of our rural communities will be real and profound, with potentially serious negative implications for other aspects of Vermont's economy, such as tourism and recreation. The potential implications of this scenario should be quantified, in order to qualitatively inform future economic and policy decisions and investments.

Appreciate the Risks of Centralization

- A very real but under-appreciated aspect of the regional and national food supply situation is the matter of "homeland security." Specifically, greater reliance on centralized food production makes the food supply more vulnerable to economic, health, and safety risk, while simultaneously fragmenting "social capital," one of the hallmarks of rural community resilience. A dispassionate and integrated assessment of what this could mean for Vermont should be undertaken.

Shine a Light on Dairy Cooperatives

- Examine the future role(s) and relevance of dairy co-ops from the lens of sustainable pricing for farmers. What should Co-ops do? There is a perception gap between farmer-members and Co-op management about the value Co-ops bring to their members; what steps are needed to address it? Since 2009, dairy cooperatives have been unable to provide a sustainable price for a majority of their member owners during downward pricing cycles. Going forward, does the cooperative structure need to change, in order to remain relevant?

Direct Forward Contracting Between Farms and Processors

- Individual farms and/or processors may soon explore the possibility of entering into agreements for the direct delivery of milk; it is already happening in certain dairy regions today and has potential to occur in Vermont with farms of a certain size. Research is needed to determine how likely this might be, and what the implications of such "go-it-alone" efforts might be relative to the overall future of dairies and their cooperatives.

Taking Marginal Land Out of Production

- Explore the idea of possible "alternative" funding mechanisms, including Performance Bonds (Bruce Lisman's low cost financing model) and other national and international approaches that are designed to reduce the amount of acreage devoted to dairy in order to improve water quality. Farmland owners would be compensated for taking Phosphorus-laden land out of production as a strategy for meeting TMDL targets. This approach requires the ability to quantify and verify water degradation potential and water quality outcomes. More research needs to happen in this area to determine whether or not the idea is actually viable.

Stranded Costs

- Something will happen to the stranded costs of the dairy sector if current trends continue. Debt load, debt forgiveness for conservation easements, sunk costs of dairy-specific facilities, and equity positions in Co-ops are a few examples, and the question of how to effectively deal with them will need to be addressed.

Economic Co-Benefits of Dairy

- Vermont dairies have traditionally provided contributions to other sectors of our economy such as: capital and infrastructure investments, workforce policies and employment opportunities in related businesses, attractive working landscapes, etc., and an assessment of how that might change would be in order.

What We Would Like to See

We believe that economically viable dairy farms can provide a variety of economic and environmental benefits, including:

- Clean water & air

- Land Stewardship, healthy soil
- Flood resilience, water infiltration
- Carbon sequestration
- Pollination
- Biodiversity
- Aesthetic value – a diverse landscape
- Positive contributions to the Vermont brand

There are also multiple aspects to the path forward that will require close analysis as to their ability to deliver real (versus perceived) long-term economic benefits to Vermont's dairy sector, such as:

- Alternative land use options for current dairy land that would contribute to vibrant rural economies and a culture of stewardship of water and soil health
- Market-based evidence that there are production, branding, and market opportunities for regional, value-added products that can fetch a premium price that would ideally go directly to the farmer. It will have to be determined whether regional consumers would be willing to pay more for products that reflect their values (such as quality, environmental stewardship, animal welfare, terroir, etc.), and if so, how much?

The challenge we face is how to create a policy, regulatory, and economic environment in which the twin focuses of water quality and viable dairies can be united as one. While regulations and mandated best practices may be part of the effort going forward, they are not sufficient on their own to replace an integrated solutions-based design. Adopting the triple-bottom-line approach of "People, Planet and Profit" will help incorporate the human, economic, and environmental aspects of farm viability and water quality.

It will also be necessary to bridge the "empathy gap" between the ag- and non-agricultural communities in order to create a shared understanding of the context of the current crisis in dairy agriculture. A "broad tent" of Vermonters, including political leaders, academics, philanthropists and consumers, who understand why a vibrant agricultural sector is critical to Vermont's identity and economy, and how dependent that economy currently is on a single commodity (dairy), will be critical to creatively and inclusively craft solutions to the dairy economics and water quality situations we find ourselves in.

VDWC COMPENSATION MODELS WORKING GROUP – FINAL REPORT
Five Proposed Strategies

Purchase of Ecosystem Services

While there are numerous examples of PES efforts across the globe, we are going to focus our research/piloting efforts on the ability to reduce non-point runoff from ag lands and accompanying nutrients via the installation of enhanced stewardship/best management practices.

The PES scheme that we think may have traction in Vermont would be to create a Pay For Success model whereby the successful implementation of such practices would be measured and if the anticipated reduction in nutrient pollution was achieved then the ag landowner would be paid for the implementation of the enhanced BMPs. However, ag owners may not be willing to take on the time and monetary risk of this effort and here is where some of the PFS third party investment models might prove critical to intermediate such transactions.

Fundamentally, Pay for Success (PFS) is an approach to contracting that ties payment for service delivery to the achievement of measurable outcomes. ... PFS contracting has been used to scale up effective programs and interventions, as well as test innovative models of service delivery. There are emerging pilots in various parts of the US that are applying the PFS model to water quality issues. But all PFS projects require that a local government be both the beneficiary of the project outcomes and be the payer. In the instance of water quality improvements, a "payer" such as a municipality is buying the ecosystem "performance" that is implemented utilizing private or philanthropic capital to create the practices that yield water quality or water management improvements. One of the leaders in the design and implementation of such initiatives in Quantified Ventures (QV) based in Washington. What QV has been able to do, usually in partnership with other entities, is to create the independent investment vehicle that secures commercial or philanthropic capital (or a blend) to make the 'upfront' investment in the practices that will hopefully deliver the ecological uplift. If these practices deliver the anticipate ecosystem service benefits or ecological uplift, then the payer repays the investment entity for the use of their capital plus a return on that investment. This mechanism removes financial risk (and reward) from the ag landowner but does require an agreement to allow the practices to be implemented, monitored and maintained. Much will need to be explored with respect to the details of such arrangements including but not limited to: ground rent to the ag landowners, monitoring of ecosystem services, capturing future ecosystem service benefits when markets create monetization schemes such as soil carbon, long term maintenance of the practices and lastly identification of and commitment from one or more "payers".

It is possible that the new "Sponsorship Program" for SRFs at VT DEC might be the "payer" for certain compromised or impacted watersheds. Next steps would be to meet and explore with DEC staff a list of such watersheds/sub-watersheds and see what density of ag owners would need to be involved to begin the pilot design efforts. [Perhaps also NRCS and other public funding as the “security” for lending – see Brandywine example with William Penn match.]

[We need detail for underlying PES: Who is paying? What is the source of funding? What farmers are beneficiaries/payees?]

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Basin-Wide Phosphorous Market

Basic Concept: This mechanism envisions a basin-wide "cap and trade" system for phosphorus (P) pollution. It builds from several existing and successful cap-and-trade systems for air pollutants, as well as a few nascent models applied to water pollutants. The basic idea is that an overall basin-wide cap is established on annual P pollution, based on the levels of P loading to Lake Champlain that are estimated to be sustainable. This total allowed P pollution is divided among all potential polluters in the form of tradable pollution "permits". (The rules by which these initial permits should be allocated are hotly debated.) Permit holders can then either exercise their permitted right to pollute or, if they pollute less than their share, they can sell their permits to others who choose to exceed their permitted limits.

It is helpful to think of this process in two steps. First, a cap would be established that lowers the overall level of P pollution in the basin. There are two potential ways to lower current basin-wide P pollution levels: 1) a mandatory reduction of P pollution from polluters across the basin, in either a one-time reduction or a ratcheting down of the cap over time, or 2) a funding mechanism to purchase P permits from voluntary sellers and retire them, thereby reducing the overall amount of allowable pollution. Second, with the cap in place, potential polluters can trade permits amongst themselves to make the best use of allowable P pollution. The total amount of P pollution across the basin remains equal to the cap, but polluters will have the flexibility to change individual levels of pollution by buying or selling P permits.

The policy requires five things: 1) a scientific basis for the P pollution cap, 2) a law establishing that cap, 3) a mechanism to reduce basin-wide pollution to the cap, 4) a mechanism to allow trading within the cap, and 5) monitoring to enforce permits. Cap and trade mechanisms are most straightforward with "point-source" (PS) polluters (i.e., a few clear sources like sewage facilities that can be easily monitored and held accountable). Monitoring and enforcing permits for "non-point sources" (NPS) like agricultural landscapes are more difficult, but recent innovations in that regard are making it more hopeful. The P cap can either apply to all sectors of the VT economy, such that agricultural, municipal, and other sources participate together, or to just one sector. [Cross-sector P trading may be a political/policy challenge.]

Comparable Example:
An informative case of a cap and trade for reducing nutrient pollution is the Lake Taupo, Waikato, New Zealand cap and trade for nitrogen (N). The Lake Taupo policy became operative in 2011 and has since been functioning as the only known case of a farmer (NPS) to farmer (NPS) cap and trade for nutrients in the world. Similar to the Lake Champlain Basin, Lake Taupo has seen declines in water quality in the last few decades due in part to increasing agriculture in the watershed. The Lake Taupo cap and trade policy is just for farmers, although the full policy to address N pollution in the watershed is broader and includes infrastructure projects and wastewater upgrades. We describe the policy below through the five policy requirements for the cap and trade described in the previous section.

> First, to scientifically determine the scale of the cap, the Waikato Regional Council modeled the current annual level of N pollution in the watershed and compared this with the amount of N pollution the lake could assimilate and maintain good water quality. It was determined that a 20% reduction in nitrogen pollution from farm land was required to meet the community's water quality goals. Second, to establish the cap, the Regional Council legally defined the watershed N cap at current N use levels (20% above the target level). The Council decided upon a "grandfathering" N permit allocation approach

which allowed farms to continue to operate at their current N pollution levels, but no higher. In this way, farms were limited in their future production potential, but were not required to make mandatory nutrient reductions. The watershed N cap and individual farm-scale permits were both modeled using a farm nutrient model called Overseer. Overseer takes farm characteristics and management action inputs and then outputs nutrient pollution levels. Third, the Lake Taupo Protection Trust was created and charged with achieving the 20% reduction in N pollution across the watershed. To achieve this goal, the trust used a pool of $80 million of government funds to make deals with individual farms to purchase and retire N permits. Farms voluntarily lowered their farm permit allocations, in exchange for money from the trust, and the trust then removed these N permits from the watershed by retiring them. Fourth, the Regional Council wrote a trading mechanism into the policy that allows farms to trade N permits between each other. The trading mechanism gives land owners the opportunity to buy, sell, lease or rent N to pursue their business and land management goals, all within the overall constraints of the watershed cap. Fifth, to monitor and enforce permits, the Regional Council monitors farm N permit compliance on an annual basis with Overseer.

The policy appears to be functioning well, with ongoing trades and leases of N between farms. In terms of water quality changes, it will be decades before improvements are expected due to the long time lag in the movement of N from the landscape to the lake.

[NOTE: Also consider cap-and-trade on P importers.]

<u>Who/What/How:</u>

1. *Who is buyer*: Entities (e.g., farms, municipalities, water treatment facilities) that would like to exceed of their pollution permits must buy permits to cover the excess.
2. *Where is money coming from*: private sources (regulated entities themselves, as a cost of doing business), and government if permits are bought and retired to lower cap, as in Lake Taupo.
3. *Who is seller*: Entities (e.g., farms, municipalities, water treatment facilities) that pollute less than their permits allow, and have the excess available to sell.
4. *How do we link buyer and seller*: Permit trading market system created for this policy, adapted from those developed under other cap-and-trade policies. Markets could be created among NPS polluters (e.g. farmer to farmer), or among PS and NPS polluters (e.g. wastewater treatment plant to farmer).

<u>Initial/proposed ranking/evaluation of the mechanism:</u>

(a) Control: High degree of control. Provides a high level of assurance that the many private business/farms across the watershed/basin are managing nutrient use in line with watershed-level nutrient goals.
(b) Timing of impact: Long-term (more than 10 years)
(c) Readiness: Unformed. The TMDL provides the cap, but none of the other 4 elements are in place. We would need to legally establish the cap at the appropriate scale (basin-wide perhaps too difficult), allocate cap to entities, establish a market to ease trading, and monitor compliance.

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Debt for Stewardship

Basic Concept: Exchanging Debt Modification for Land Stewardship

Many dairy farms carry high levels of debt, the reduction or restructuring of which can improve profitability and in some cases end severe financial distress. Modeled on the little-used USDA "debt-for-nature" program, we propose that highly leveraged farms situated in impaired watersheds be eligible for debt cancellation and/or debt restructuring in exchange for rigorous, permanent, enforceable land management prescriptions. For example: Dairy Y situated on the Mississquoi River permanently removes 25 acres from production and allows The Nature Conservancy to restore the land as wetland. In exchange, Dairy Y's mortgage lender writes off $X thousand in debt. TNC holds a conservation and restoration easement to secure the permanent land obligation.

Key Needs and Questions:

- ◊ Farm eligibility would be determined based on each farm's potential to host high-impact nutrient reduction practices/actions, as determined through a comprehensive impaired waters ranking and measurement system.
- ◊ Bank cooperation would be essential. However, we assume that in many cases dairies are in such distress that banks' loan security has eroded and/or loans have gone delinquent. Faced with initiating/continuing foreclosure or losing more security, debt reduction could be attractive.
- ◊ VEDA is a state instrumentality and a major farm lender (through the Vermont Agricultural Credit Corporation), so it is perhaps the best Vermont lender with which to explore debt-for-stewardship.
- ◊ USDA/FSA is also a major dairy lender in Vermont. It appears that the "Debt for Nature Program" – renamed "Debt Cancellation Conservation Contract" and/or "Conservation Contract Program" – is still in existence but little used. See 7 CFR 776.110
- ◊ Financial restructuring could take several forms: debt cancellation, debt reduction, improvement of terms (term, interest rate, security), or even additional debt.

Comparable Example:

In 1995 the Sparrow Farm in Montpelier was in financial distress. As one major part of a larger, community-driven effort to save the farm from residential development the Farmer's Home Administration cancelled its mortgage on the farm. In exchange, the Sparrow family conveyed to the US Fish & Wildlife Service and the Vermont Land Trust a permanent conservation easement protecting important wildlife habitat, and greatly reducing agricultural and forestry activity on a portion of the farm. The remainder of the farm was conserved simultaneously through a working farm easement held by VHCB, VAAFM and VLT.

Who/What/How:

Who is the P/compliance/eco-service buyer? The secured lender (perhaps FSA or VEDA).

Where is the money coming from? "Money" would take the form of debt reduction/cancellation – a lender asset would be "converted" to a conservation easement.

Who is the farmer/seller? High-debt dairy farms situated within impaired watersheds with site-specific potential to change land management/use in a manner that would yield measurable nutrient discharge reduction.

How do we link buyer with seller? The farmer and the lender are already "linked" in a loan relationship. A conservation intermediary – like the Vermont Land Trust or the Nature Conservancy – would facilitate the farmland remediation design and help negotiate the eligibility, and the terms and conditions of both the debt modification and the permanent land stewardship.

Initial/proposed ranking/evaluation of the mechanism:

(a) Control: Moderate - we have some influence or control. VEDA is a state agency lender with a "public benefit" focus that would be subject to legislative/administrative direction. FSA has a "Conservation Contract" program that could be adapted to our specific design needs.

(b) Timing of impact: Near-term. There is an abundance of design-implementation work required but a 5 year target is reasonable.

(c) Readiness: Are systems, policies, and other implementation components already well-developed? Farm selection/prioritization criteria/measures based on remediation impact do not exist but must be developed for a variety of purposes. Implementation components exist where FSA is the lender, but the system is little used, under-staffed and complicated. We would start from scratch with VEDA (and other lenders). The systems/expertise to evaluate farms, and to design/implement remediation actions exist but may lack capacity.

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Dairy Marketing and Economics

Historical Context:

Since the demise of the merino sheep industry in the mid-1800's Vermont has become primarily a dairy state. There have been many challenges from the over the years as farmers responded to economic signals. In the beginning it was as a butter producing state, world renowned for the quality of the product (St. Albans was the butter capital of the world in the late 1800's and many support industries existed). The increasing demand for fluid milk from the growing cities and competition from Western producers of butter, led to the conversion to fluid milk production and shipment via rail beginning in 1890 to Boston.

This export of fluid milk to the So. New England market has shaped the Vermont dairy industry and the landscape in the state since the early 20th Century. Unfortunately, a major configuration of that market is taking place to include the decline in consumption of fluid milk, the historic mainstay for Vermont's dairy industry. At the same time, Vermont dairy farmers are tied to an outdated classified pricing system as well as a model that depends upon strong international

product demand for higher farmgate pricing. Compared to major dairy producing states, Vermont is a higher cost milk producing area. Thus, Vermont dairy farms continue to struggle to survive in this highly volatile market environment. Over the past twenty years, for example, almost two-thirds of the State's farms have ceased operation or have consolidated into larger units. In a recent report by Ben Laine, senior dairy economist with CoBank (a major agricultural lender), he states that "smaller dairy operators and cooperatives need to position themselves to take advantage of higher value opportunities" as "most of the U.S. milk supply is driven by these large, efficient farms that are much less responsive to near-term price changes."

Market Order Reform:

Federal Market Orders are voted in and supported by the dairy cooperatives and their member owners. It might be argued that these Federal Orders, enabled by the Agricultural Adjustment Act of 1937, could be used to help stabilize supply and demand within the Orders as a way to stabilize pricing during periods of excess production. Dairy Cooperatives have standing under the law and can petition for changes to the Orders. There has been a reluctance over time to push for major changes, but several options seem to be warranted. 1) challenge the market order, through a petition, to impose supply and demand balancing during times of excess milk production, and 2) petition to achieve a new pricing system under the classified pricing system that would reward a higher value to a certain volume of a farmer's production dedicated to fluid use. It should be noted that any change to the market order system would require agreement within the cooperative establishment to pursue changes to the Order.

Initial/proposed ranking/evaluation of the mechanism:

(a) Control: Perhaps low/little – requires strong support and advocacy by Vermont milk coops, as well as at least regional producer support, combined with political advocacy.

(b) Timing of impact: Possibly near-term – if coops, producers, policy leaders mobilize.

(c) Readiness: Implementation systems are substantially in place.

Economic Sustainability and a Carrying Dairy Type of Approach:

Sainsbury's, a major retail outlet in the UK reportedly (John Roberts is trying to obtain details) provides a sustainable pricing system based upon some criteria (to be determined) for those farmers that supply milk. In the same vain, it is said that in the Netherlands farmers are paid incentives (Carrying Dairy) for achieving established targets (developed by the industry). Other market incentives could be linked to this approach, such as lower interest rates on loans (VIDA, FSA, Farm Credit) for those farmers that meet certain established standards or criteria related to water quality, nutrient management, soil health, and other factors deemed to be critical. At the same time all state or federal entities supplying any financial support to farmers shall abide by standards for achieving the industry established targets.

Who/What/How:

1. *Who is buyer*: Major buyers and processors of Vermont milk.
2. *Where is money coming from*: Presumably, enhanced pricing and product sales.
3. *Who is seller*: Farmer/producers that sell to buyers/processors.

4. *How do we link buyer and seller*: Buyers and sellers are already linked in a milk supply system.

   Initial/proposed ranking/evaluation of the mechanism:

   (a) Control: Medium – Requires processor/buyers to commit effort and resources to building systems and compensating farmers.

   (b) Timing of impact: Possibly near-term – If key Vermont processors/buyers mobilize.

   (c) Readiness: Water quality, nutrient management and soil health criteria must be developed; measurement/accounting systems must be created; and product pricing/marketing may need work.

BRIEFING SESSION TOPICS:
VDWC's First Phase – Developing Shared Understanding

May Organizing Meeting: This initial meeting of VDWC was focused on group formation, including:

Why did we come together to organize this group?

What Inspired Each Collaborative Member to Be a Part of This Discussion?

Group Formation: Purpose, Group Membership/Composition, Review and Revise Work Plan, Decision Making, External Communication, Role of UVM's Gund Institute

Young Farmer "Fishbowl" and Discussion: Lance Wood, Woodnotch Farm in Shoreham (450 head conventional); Abbie Corse, Corse Family Dairy in Whitingham (50 head organic/grass); Andy Birch, Maple Grove Farm in Derby (45 head conventional; Amy Huyffer, Rock Bottom Farm/ Strafford Organic Creamery in Strafford (small organic herd, bottling and distribution). These four dairy farmers – of different scales and business models, discussed the questions: What does success look like? Would you advise a young person enter dairy farming? What can you control and not control? What will your business look like in 5 years? What are your recommendations to VDWC - what should the public know?

June Briefing Session - The State of Dairy. An in-depth discussion of the national and state dairy sector:

Public Policy and Public Investment History and Trends - Roger Allbee (former Vermont Secretary of Agriculture)

The State of Dairy in Vermont Today - Diane Bothfeld (Vermont Agency of Agriculture Food and Markets)

Milk Co-ops: The what and why, and Vermont's farmer coops - Bob Foster (Foster Brothers Farm)

Milk Supply, Farm Scale, and Pricing and Supply Options (For both organic and conventional milk production) - Tom Bellavance (Ag Venture Financial Services), Bob Wellington (AgriMark Cooperative)

Markets & Consumer Trends in Milk Product Consumption - Ken Jones (Vermont Agency of Commerce and Community Development)

Access to Capital and Financing - Morgan Rilling (Yankee Farm Credit)

July Briefing Session – the State of Vermont Water Quality. A broad examination of Vermont Water quality, including trends, measurement and pending research:

Federal and State Policy on Water Quality - David Mears (former VT Commission of Water Resources)

Water Quality Practices for Agriculture - John Roberts (VT Agency of Agriculture Small Farm Water Quality Specialist)

Vermont Monitoring, Planning, and Implementation - Neil Kamman (VT Department of Environmental Conservation, Senior Policy Advisor), and Marli Rupe (Assistant Manager, VT ANR Clean Water Initiative Program, and Agricultural Water Quality Specialist)

Impaired Waters Data/Mapping - Ethan Swift (Manager, ANR Water Quality Monitoring Assessment and Planning Program)

Lightning Round of brief "slam talks":

- Hydrology and changing land use / International Joint Commissions Study - Blaine Hastings (Hydrologist, VT Department of Environmental Conservation)
- Edge of Field monitoring studies - Dave Braun (Scientist, Stone Environmental)
- The WQ value of ag floodplains - Eric Roy (UVM Rubenstein School of Environment and Natural Resource (RSENR)/Gund Institute)
- Legacy watershed P storage - Jon Erickson (UVM RSENR)
- Managing internal P loading in lakes - Perry Thomas (VT Department of Environmental Conservation, Lakes and Ponds Protection Program)
- Climate and Water Quality in Missisquoi Bay - Chris Koliba (UVM Established Program to Stimulate Competitive Research - EPSCOR)

August Briefing Session – Land Stewardship and Conservation Practices. A scan of farm land and soil stewardship practices and approaches.

Whole Farm Nutrient Management: Looking at the Whole System - Heather Darby (UVM Extension Service)

Managing and Measuring Nutrient Flows to Produce Clean Water - Abe Collins (farmer, grazing consultant, soil health innovator)

Short, focused segments designed to give the group a basic understanding of specific existing, "alternative" and potential stewardship practices:

- Opportunities in Feed Management, Bill Kipp (Private Dairy Nutrition consultant, Middlebury, VT)
- Growing Grains On-Farm, Joe Hescock (Elysian Fields Farm, Shoreham, VT)
- Conservation Tillage/Practices, Jeff Carter (UVM Extension Service)
- No Grain Feeding and Milk Production, Jack Lazor (Butterworks Farm)
- Opportunities in Pasture Management, Cheryl Cesario (UVM Extension Service)
- Diversification & Dairy - Trying to Make it All Work, Rob Hunt (Addison Dairy Farmer)

September Briefing Session – Solutions, Markets and Financial Incentives. A discussion of processor incentives, ecosystem services, market approaches and models from other countries.

New Zealand Case Study: Taupo Watershed, Courtney Hammond Wagner (UVM PhD Candidate, Gund Institute) and Suzie Greenhalgh (Manaaki Whenua –

Landcare Research, New Zealand)

Ben & Jerry's "Caring Dairy" and other processor incentive models – Cheryl Pinto (Global Values Led Sourcing Manager for Ben & Jerry's)

Netherlands Nutrient Management System - Klaas-Jan vanKalqur (Unilever Europe)

Ecosystem services 101: Theory, practice and Vermont opportunities – Taylor Ricketts (Director of UVM's Gund Institute)

Using innovative finance to secure permanent BMPs and water quality improvements plus conservation agreements on productive farmland and forestland – Peter Stein (Lyme Timber Company)