A Report on Livestock Access to Streams

by Vermont Agricultural field staff, farmers and researchers
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A committee comprised of staff from the Vermont Agency of Agriculture, USDA, Northeast Organic Farming Association, UVM Center for Sustainable Agriculture, Livestock Farmers, Farmers' Watershed Alliance, Agency of Natural Resources, and Friends of Northern Lake Champlain reviewed existing programs excluding livestock from surface waters in Vermont. Program gaps were identified and alternative solutions developed in order to expand the use of livestock exclusion practices statewide. The committee estimated the number of farming operations with livestock having access to streams and the costs associated with building the necessary infrastructure to minimize impacts caused when riparian pasture areas are not properly managed to prevent water quality issues. Finally, recommendations have been provided for a new program approach that reduces costs and offers options not presently available to farmers as a means to gaining acceptance and widespread adoption.

Figure 1. Montpelier State House with bare hillside. Courtesy UVM Landscape Change Program. 1870

AGRICULTURAL HERITAGE

Vermont's agricultural heritage is inherently tied to the abundant surface water flowing throughout the landscape. These waters have provided nourishment to livestock including thousands of sheep, beef cattle, dairy cows, and horses which have in part developed the rural appeal that defines Vermont. Many paintings have captured this pastoral nature by showing far reaching hills void of trees to accommodate grazing sheep in the 1800's (Figure 1). Most of these steep hill sides have since become forested to protect soil from erosion losses.

The motto of "farm the best and pasture the rest" can be seen in many areas of Vermont where flat lands are tilled for annual crops and the rolling topography often carved out by nearby streams and bedrock outcrops is pastured (Figure 2). As dairy production moved into confinement operations where livestock are housed in free-stall barns, un-tethered and under roof, the quantity of cattle grazing was significantly reduced. Today however, there are still a number of dairy and beef farms utilizing pasture as a large component of the animal's diet and a statewide surge in equine operations both for profit and hobby has also expanded the use of pasture.

Figure 2. St. Albans John Montage Farm circa 1873-1950. Rocky landscapes used for pasturing, while better soils used for annual crops. Courtesy UVM Landscape Change Program

Having a pasture with flowing water is incredibly valuable, as a field without water nearby is likely incapable of being used to produce livestock for food or fiber. Providing an alternative source of drinking water other than direct access to the stream can be technically challenging and often requires intensive management to assure the water source remains plentiful for grazing livestock. Conversely, a stream provides continuous water and requires significantly less maintenance.

Research shows that livestock exclusion from streams where pasture management to protect the stream is not practiced, will reduce the amount of sediments, nutrients and bacteria entering the water source. The question becomes, how much of a reduction will be achieved and at what costs? The more technically challenging sites to provide alternative watering systems may have low stocking densities (number of livestock per acre) such that the time spent in the water by grazing animals is minimal compared to the size of the pasture, and hence the cost of installing and maintaining a livestock exclusion system may outweigh the benefits to water quality. There are however, plenty of sites where alternative watering systems and fencing can be installed and the costs are absolutely worth the benefit to water quality and animal health. It is worth noting that there are sites where farmers are successfully grazing the riparian area without causing measurable water quality impacts. This level of management can also be a successful way to manage the spread of invasive species if done properly.

REGULATION, TECHNICAL AND FINANCIAL RESOURCES

Vermont has two tiers of regulations depending on the size of a livestock operation. Larger livestock operations generate more manure, and therefore have a higher environmental expectation. All farms meeting the definition of a Medium or Large Farming Operation (MFO, LFO) are required to fence livestock out of streams within the production area and are subject to regular inspections to assure compliance. The remaining farms in the state must comply with the Accepted Agricultural Practice Rules (AAP rules) by managing livestock in and around streams such that adequate vegetation remains on the streambanks, except at defined crossings and watering areas. The AAPs also require animal waste to be managed so as to prevent a discharge to waters of the state, which limits the establishment of holding areas or piling of manure adjacent to surface waters. The existing AAP rules were specifically crafted to protect water resources by minimizing impacts from agricultural uses, while still allowing farmers to exercise their own management techniques.

As mentioned, there are farms that can successfully graze riparian areas. Additionally, Vermonters have a strong sense of pride in their land, and it is human nature that ownership means you have rights especially when income and taxation are dependent on land use. The language in the AAP rules also allow farmers access to financial and technical assistance programs that can provide enhanced benefits to water quality, while offering the necessary incentives to keep land open and wild for all to enjoy the ancillary benefits. The Agency of Agriculture, Food & Markets is tasked with enforcing the AAP, MFO and LFO rules, of which livestock access to streams is only one component. Beyond these rules, there are no other requirements specific to livestock access to streams in Vermont. In a search to review other state regulations, the committee was unable to find any state with rules requiring livestock exclusion. In fact most states followed a similar model as Vermont that allows landowners to make their own management decisions.

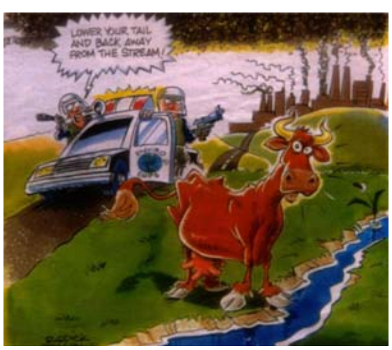

Figure 3. Unknown source. Enforcing livestock access to streams.

There are two parallel tracks that existing financial and technical assistance programs follow in regards to the distance a fence is established from the surface water to be protected. Programs such as the Conservation Reserve Program (CRP/CREP) and Partners for Fish & Wildlife (PFW) require permanent fence installed at least 35 feet back from the top of the streambank. Other programs such as those offered by the USDA Natural Resources Conservation Service (EQIP, WRP, WHIP, AMA, and GRP) offer no minimum distance from the top of the streambank when permanent fencing is planned without a riparian buffer. All USDA programs that include a riparian buffer planting require a minimum of 35 feet from the top of the streambank when installing fencing.

The type of fencing eligible for cost-share incentives typically require at minimum two strands and permanent posts with double H braces in each corner. Some USDA programs will allow the use of single and double strand poly-wire fencing, but only in areas where annual flooding and ice flows limit permanent fencing. No program currently offers single and double strand poly-wire fencing as a universal method of establishing livestock exclusion from surface water (Figure 5). With the expansion of grazing systems in Vermont, the use of electric fencing has become common, especially on dairy farms. When livestock are trained to respect an electric fence at a young age, a single strand will effectively keep them in the desired area. These fences require less maintenance than barbed wire or high-tensile, plus they cost significantly less. Poly wire fences costs around $0.26 per linear foot as compared to $2.00 per linear foot for high-tensile and barbed wire.

Beyond the type of fence provided through assistance programs, these programs often come with other restrictions such as long term contracts, a requirement to plant trees and/or shrubs, and government paperwork and oversight. The committee felt that the farming community should be offered the opportunity to work with simplified financial and technical assistance requirements. The goal of livestock exclusion does not need to be overly complicated as often government programs become. The consensus is that farmers have been building fences for years, and that given the appropriate resources they would be very successful in implementing this goal. Therefore, it is the recommendation of the committee to redefine resources targeted to livestock exclusion and hence the "Flex Fence Initiative" has been developed.

FLEX FENCE INITIATIVE

The Flex Fence Initiative is the recommendation of the committee to legislators, regulators, farmers and the public. In developing this initiative, the committee reviewed several important components to assure the costs and benefits made sense. Of importance are continued farm viability, clean water for all members of the public, creating a program initiative that does not marginalize existing programs, and having a high likelihood of success.

Highlights of the Flex Fence Initiative:

- All livestock types are eligible
- All necessary fencing options appropriate for specific livestock types including single strand poly-wire (the least cost alternative is a priority)
- Minimum buffer width recommendations of 10 feet, however recommendations will be provided based on site conditions and expected water quality improvements.
- Applies primarily to perennial streams, however if someone would like to enroll a ditch or intermittent stream this will not be denied so long as livestock access has been addressed on all perennial streams on the farm
- Farmer must agree to an operation and maintenance agreement of 10 years
- An incentive payment will cover 100% of the costs of the fence materials, farmers will be responsible for fence installation costs
- An incentive payment will cover 100% of the costs of the watering systems and stream crossings using the same cost caps in the CREP program (where costs are higher than the caps, additional assistance can be requested from the Best Management Practices program, only necessary costs will be approved if funding exists)

Figure 5. Unknown source. Example of double strand poly wire fencing.

Several reasons that a 10 foot buffer is recommended include space considerations and vegetation management. Small meandering streams tend to require larger buffer areas when fenced out with permanent fencing as the goal of having a straight line from corner to corner expands the area taken out of production between the fence and the stream. The landscape and traditional buffer programs have 35 foot minimums which are too cumbersome for small pastures. Many farmsteads were also built near streams and some layouts do not allow for 35 foot widths due to physical constraints. Even when enough space permits for a larger buffer, these can become inundated with invasive species and by having smaller buffers the infestation of invasive plants can be minimized and the control management maximized. As trees grow they shade out the understory and can fall causing the streambank to collapse, thereby increasing the risk of erosion. However by managing a smaller area with removable fences farmers can brush hog streambanks to manage vegetation without the use of herbicides. Literature also suggests that fencing 10 feet from the top of the stream bank can significantly reduce nutrient, sediment and bacteria**.** The committee acknowledges that science supports wider riparian buffers for increased efficacy in improving water quality and wildlife habitat. Where landowners wish to make enhancements such as wider buffers, the existing riparian buffer and livestock exclusion programs should be used.

SIZING UP THE ISSUE

There are no assurances when it comes to counting farms and animals. Recently the National Agricultural Statistics Survey published data for 2007, which is the best available data for the State of Vermont. This information was used to attempt to quantify how many farms have livestock and then to determine what portion may have access to surface water, mainly focusing on dairy, beef and equine operations. The assumption was made that small ruminants such as sheep and goats do not like "wet feet" and therefore were not included in the estimations of need and costs. Other livestock types were not included because there are not enough statistics on them and the committee felt the focus should be kept on the dominant livestock types raised on Vermont farms.

Table 1. Estimation of Livestock Exclusion Need Vermont

	Number of Farms (1)	% in Need (2)	Number of Farms in Need
Dairy	1,141	0.75	856
Beef	1,870	0.75	1,403
Equine	580	1.25	725
Total	*3,591*		***2,983***

(1) 2007 Ag Census (North American Industry Classification)

(2) Livestock exclusion committee estimate

The committee reviewed several methods to calculate the amount of need for livestock exclusion from surface water. Keeping in mind the census data does not accurately account for all farms and specifically not for "backyard farms", an area that has certainly increased in Vermont in the last decade, the committee aired on the high side for all estimates. The chosen method was to assume 75% of all farms with dairy and beef animals, and 125% of equine farms have at least some livestock with access to surface water (Table 1). This is not a suggestion that 75% of the dairy and beef animals in Vermont have access to surface water, merely that an estimated 75% of the farms with these livestock types have a portion of the total herd with access to surface water. Furthermore, in an attempt to account for backyard equine operations the census data was increased by a multiplier of 125%, this absolutely does not mean all horses have access to surface water. It is simply an attempt to more accurately account for the estimated quantity of horse farms in Vermont as current data appears to be under estimating the quantity based on observations of the committee and experience from the UVM Center for Sustainable Agriculture.

The high estimates are also meant to include discussions of personal experiences on farms from committee members. These experiences include: 1) many dairy farms house a few horses, perhaps for the children or grandchildren. These hobby or show horses are often found grazing the remaining pasture areas left on a conferment dairy operation which may include sensitive landscapes; 2) the census estimate of 580 equine operations is certainly under estimating the backyard farms with one to four horses. These horses are often kept on acreage that is again sensitive and often not large enough to adequately meet the feed requirements. This lends areas to becoming void of vegetation and more susceptible to erosion. Feed is often brought in creating a concentrated area of nutrient accumulation if not properly managed; 3) although many farms moved animals into confinement as they grew in size, dairy farms in particular keep dry cows and young stock on pasture. The dietary needs of these animals are less than those in the milking herd and therefore can sustain themselves for months on pasture of lesser quality.

THE COSTS OF LIVESTOCK EXCLUSION STATEWIDE

After coming up with an estimation of need for farms in Vermont, the costs were estimated utilizing data from the Conservation Reserve Enhancement Program (CREP) (Figure 4). CREP is currently the most popular livestock exclusion program in Vermont and hence has the most up to date data on costs. In reviewing the costs of current CREP contracts, average costs for providing fencing, alternative water sources and stream crossings were estimated (Table 2). CREP also establishes riparian buffers where livestock are excluded from streams, typically at a cost of $17,775 per contract. These costs for establishing a riparian buffer are not included in Table 2 as the Flex Fence Initiative does not intend to plant buffers. If CREP were the only program to address the estimated need remaining in Vermont, and planting costs were considered, it would cost $130,115,447. To date CREP has spent nearly $17 million since the program's inception 8 years ago. Given the current resources, it will take another sixty one years to meet the target of excluding all livestock causing a water quality issue from streams statewide.

In an effort to meet this goal at a faster pace, the Flex Fence Initiative is aimed at reducing the costs and incorporating farmer's interests in hopes of making the program rapidly successful. The savings in the Flex Fence concept come from using single and double strand poly wire fencing, which costs roughly $0.26 per foot as compared to multi strand high tensile fencing which costs approximately $2.00 per foot installed. Additional savings are achieved by not requiring a forested buffer be planted as part of the project and no incentive or rental payments on the land transformed into a buffer. The Flex Fence will require a 10 foot minimum buffer from the top of a streambank which is proven to reduce nutrient, sediment and bacteria loading to adjacent surface waters

Figure 4. Before and after view of a Vermont CREP project. From 2002-2009, CREP has enrolled more than 2,300 acres of streamside buffers.

Several practices need to be considered when estimating the costs of excluding livestock from surface water. If animals were previously using a stream as a watering source, an alternative source needs to be developed. This includes creating a supply such as a well, spring or pond, and then piping the water to a stock tank or trough. There will be sites were the costs to pipe water long distances uphill or to develop a water supply for a few animals are not worth the water quality benefits received. In these instances providing controlled access to the stream for drinking water may be the most viable option if considering the cost:benefit ratio of improving water quality.

On most sites a compromise can be made to make the operation as efficient as possible while recognizing the fact that installing fencing, piping and stock tanks increases the operation, maintenance and financial responsibilities of the farmer. A farmer needs to be assured that animals that cannot be seen from the farmstead have a reliable water source, so gravity water systems are often the preferred approach if possible. If not possible, a pasture pump might be considered before the last resort of providing controlled access to the stream. A pasture pump can service a maximum of 20 animals and requires a deep clean stream with an adequate volume of water. The animals must be trained to use the pump, and not all animal types will use a pasture pump. If a controlled access is used, other management strategies can be used in combination to encourage the animals from congregating at the watering hole, these include placing a salt block or opportunities for shade away from the stream.

Another component that must be considered when excluding livestock from surface water includes the cost of electric chargers to energize the fences. Today many farmers are using high tensile and poly wire fencing which utilizes an electric charger simply because these fences can be managed more efficiently than other forms and are cost effective. Currently farmers enrolling in CREP who need a fence charger are provided a

Table 2. Estimation of Average Contract Costs in CREP and Flex Fence Initiative

Practice	Avg Extent		CREP Costs (1)	Flex Initiative Costs
Fence (2)	4,608	ft.	$ 9,521	$ 1,177
Pipeline	2,063	ft.	$ 1,673	$ 1,673
Spring Development (3)	1	ct.	$ 3,946	$ 3,946
Trough	3	ct.	$ 982	$ 982
Stream Crossing (4)	2	ct.	$ 9,722	$ 3,000
Fence Charger (5)	1	ct.	300.00	300.00
Average project costs			***$ 26,144***	***$ 11,079***
Cost to address estimated need (6)			**$ 77,995,013**	**$ 33,050,395**

(1) Does not include buffer planting which is an additional $17,775 per contract
(2) NRCS estimates: CREP is 4-strand high tensile, Flex is 2-strand poly wire
(3) Other options include ponds, wells, instream access and pasture pumps
(4) CREP has a $3,000 caps, yet the actual costs have been higher as seen in CREP estimate
(5) Currenly USFWS provides $300 per farm where a charger does not exist
(6) See Table 1. Estimation of Livestock Need in Vermont

maximum of $300 per farm through the US Fish & Wildlife Partners Program. In order to make the Flex Fence Initiative successful, power must be supplied to the poly wire to deter livestock from “testing” the fence.

Once fences are installed, most pastures will require a stream crossing to access both sides of the stream. There are many places in Vermont where bedrock outcrops or stony stream beds provide excellent crossing points reducing the amount of sediment being kicked up as livestock pass by. However, there are also many places where the crossing is comprised of sand, silt and clay materials. These crossings needs to be reinforced by excavating the streambed a few feet and installing geotextile fabric covered with stones large enough not to wash downstream in normal storm flows yet small enough so as not to hurt livestock hooves. Where stream flows cannot accommodate stones small enough to encourage livestock to comfortably cross, culverts or bridges may be required. The goal of any livestock exclusion project is to minimize the costs of stream crossing by reducing the number of planned crossings and designing a pasturing system around them. However, there will be instances where waivers for more expensive infrastructure are proposed and reviewed to assure the benefits outweigh the costs.

Another issue that can arise when fencing is installed on smaller pastures is forming cattle paths adjacent to the water body. In these instances the cattle paths can quickly become void of vegetation and act as flumes during rain events to shuttle a great deal of water to a stream while picking up sediment and nutrient laden excrement on the way. These sites will again need to consider the costs and benefits and assess whether a new management approach can minimize such impacts.

RECOMMENDATIONS OF THE LIVESTOCK EXCLUSION COMMITTEE

The committee discussed several reasons why the existing exclusion programs have not been successful in reaching more farmers and attempted to address those in developing the Flex Fence Initiative. Several deterrents keeping farmers from enrolling in programs range from social/personal concerns to past failed experiences with government programs. To overcome these issues the Flex Fence implementation strategy seeks an alternative approach. This new approach includes a streamlined process of signing up to receive technical and financial assistance. Participating farmers will sign a simplified 10 year operation and maintenance agreement on the installed practices, be paid 100% of the approved material costs, and will be offered technical assistance to develop a buffer width appropriate for the site with a 10 ft. minimum. Where watering systems, stream crossings, electric fence chargers, and laneways are needed, farmers will be paid 100% of all reasonable costs up to specified cost established in the CREP program. Waivers for additional funding where costs have exceeded program limits can be submitted and will be reviewed through the Agency of Agriculture Best Management Practices Program.

Farmers are more experienced at building fences and designing livestock exclusion systems than most resource professionals; they know their farm and management style better than anyone else. The Flex Fence Initiative hopes to capitalize on farmer's knowledge and experience by allowing them to design their project so long as the fence is at least 10 feet from the top of the streambank. Additionally, current contracts that install permanent fencing have very little flexibility to adapt to changing farming operations without contract modifications and in some instances financial penalties. The poly wire fences in the Flex Fence Initiative can be moved to accommodate changes in land use, however the O&M agreement will ensure that fences remain 10 feet from the top of the bank at all times that livestock are present.

Funding the Flex Fence Initiative will begin by utilizing the Agency of Agriculture Best Management Practices Program funds if the legislature authorizes these capital funds to be used for such purposes. Once approved, a formal request for proposals will be released for non-profit organizations to apply. The funds will be dispersed through grants with eligible approved applicants, who will then administer the program by working with farmers to determine the practice needs and then providing the financial awards for the practices. By working with non-profits such as local watershed groups and conservation districts, the program will not be administered directly by governmental agencies, which addresses some of the social constraints affecting the existing programs. The Agency of Agriculture will review all administrative tasks per the grant agreements and will perform annual spot checks to ensure compliance by the farmers with their O&M agreements after the grantees have fulfilled their grant obligations. It is envisioned that grants will be extended annually until satisfactory implementation is achieved within the grants geographical boundaries.

As mentioned the cost for this initiative will be approximately $33 million, therefore all opportunities for additional funding sources will be sought by the Agency of Agriculture. Furthermore, the Agency will encourage grantees to find matching funds as well. Two strategies including implementation grants through the Lake Champlain Basin Program and an application to the NRCS Conservation Cooperative Partnership Initiative (CCPI) will be pursued in the spring of 2010.