

January 11, 2011

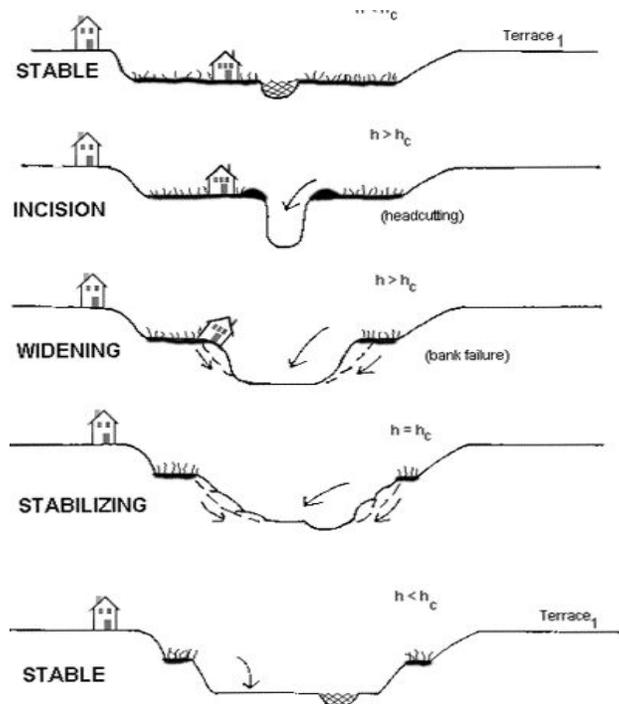
RE: Charlotte Park and Wildlife Refuge – head cut concern on Holmes Brook

Dear Sue Smith and other park committee and community members,

This letter is a summary of our site visit together on January 10<sup>th</sup>, 2011 to discuss various management options for the section of Holmes Brook that flows through agricultural fields in the southeastern portion of the park.

**Head cut management options:**

While snow cover conditions did not allow us to observe the precise location or the condition of the head cut, the condition of the channel downstream of the head cut is indicative of an active incision process. We were able to observe raw, high banks and evidence of channel enlargement that suggest that a head cut has likely been migrating upstream through the forested section of the brook. The head cut is presently located at a transitional area where the slope of the channel becomes less steep and riparian vegetation has been removed due to agricultural land use. As we discussed on site, head cuts can originate for several reasons. This particular head cut may have started downstream decades ago due to changes in land management practices and slowly made its way upstream, but it is also possible that more recent changes in hydrology due to agricultural land management practices or road maintenance/construction (concentration of flows that were once dissipated) in the upper part of the watershed have also played a role. The diagram below portrays the expected changes in channel shape and floodplain connection that are expected in a channel that has experienced incision due to the influence of a head cut.



As noted above, once a channel has incised, the channel would be expected to widen (through erosional processes) before developing a new floodplain at a lower elevation that the channel is able to access every year or so in high water events. In the specific case of the upper section of Holmes Brook, an argument for arresting the head cut is to prevent the incision of the channel that would set off channel adjustment processes that contribute a large amount of sediment to the stream (and eventually Lake Champlain). This is typically accomplished by placing a grade control within the stream channel that the force of a high flow event is unable to erode – typically accomplished by burying large rocky material in the channel at the location of the head cut.

Keep in mind that arresting of a head cut is an active management strategy that comes with expense and some level of risk. The greatest costs would likely come from purchase of rocky material and hiring an excavator to place the material. This is a small enough stream that I wouldn't anticipate the need to hire an engineer to design the project, but this is not my expertise. The risk is that the rocky material placed in the stream represents an artificial stabilizing structure that may not last over time – thus not a sustainable fix. For example, the stream may naturally change its location over time (as streams tend to do), outflank the rocky material, and then no longer function as a grade control. Before undertaking a project to arrest the head cut, it may be advisable to monitor the location of the head cut over time to see if it is actively moving upstream. Depending on the underlying substrate of the channel, the head cut may be moving so slow as to not warrant immediate action, or may have encountered a naturally occurring substrate (such as a cohesive clay layer) that would greatly inhibit progress of the cut from moving upstream any further and unraveling upper portions of the stream. It is also advisable that actions outlined in the riparian buffer and land management considerations noted below be carried out prior to or at least simultaneously with head cut arrest so as to minimize the possibility that other existing stressors do not override the success of the project.

If after some monitoring and implementation of other water quantity/quality management activities you decide to move forward with arresting the head cut, be advised that you will likely require a Stream Alteration Permit for in-stream work. Your regional stream alteration engineer can provide you with this permit as well as give you engineering advice on materials needed to conduct the project. Depending on the complexity of the project, he may advise that you hire an engineer to develop project plans. Below is contact information for the appropriate stream alteration engineer that covers this region:

Christopher Brunelle  
Office: [Essex 802.879.5631](tel:802.879.5631)  
[chris.brunelle@state.vt.us](mailto:chris.brunelle@state.vt.us)

[http://www.anr.state.vt.us/dec/waterq/permits/htm/pm\\_streamalt.htm](http://www.anr.state.vt.us/dec/waterq/permits/htm/pm_streamalt.htm)

### **Buffer planting considerations:**

Planting and maintenance of a riparian buffer is greatly encouraged on the section of stream that is currently used for agriculture. Woody riparian vegetation provides many benefits to the stability of the channel and the quality of the water flowing through it. For example, woody riparian buffers help filter sediment out of overland runoff, thus decreasing phosphorous and sediment pollution to the Lake. The root structure of woody vegetation provides boundary resistance to the erosive power of floodwaters to help maintain more stable bank conditions. And, woody vegetation provides important habitat for the myriad of creatures that live both in (fish, insects, frogs, turtles, etc.) and around (birds, muskrat, raccoons, bobcat, etc.) the stream environment. This habitat is essential not only for the direct cover it provides to wildlife, but also in acting as a contiguous corridor to facilitate movement of wildlife in the landscape.

Your committee has expressed interest in planting of a riparian buffer, but also maintaining a view of Lake Champlain. Recognize that a healthy buffer would ideally contain an over story (large woody trees), mid story (shorter shrubby material), and understory (herbaceous vegetation). There are currently some larger trees planted on site, and to the extent it is possible to keep these trees while still maintaining a view shed, I would greatly encourage their continued existence. I would also suggest the active planting of lower growing shrubs such as

alder, willow, and dogwood, which will provide many of the benefits outlined above but likely be low enough in stature so as not to inhibit views of the lake. A buffer width of a minimum of 50 ft. is encouraged.

When establishing a riparian buffer, it is important to keep in mind that active management of the buffer while the buffer is becoming established greatly enhances the likelihood of success. Practices such as monitoring survival of planted stems, placing protective guards on plantings (blue tubes), and curbing the growth and colonization of invasive species (reed canary grass, buckthorn, and honey suckle are all a concern at this site) are essential to ensuring a healthy buffer is established. Other measures, such as putting up a fence or staking out the boundary of the buffer, may be necessary to ensure that agricultural lessees of the land do not inadvertently mow down the buffer.

There are a few government programs available to either fully or partially cover the planting of a riparian buffer. The following contacts can provide more information on these programs:

**Conservation Reserve Enhancement Program (CREP)**

Danny Peet

Danny.Peet@vt.usda.gov

865-7895 ext. 202

Natural Resources Conservation Service

**Partners for Fish and Wildlife**

Chris Smith (Frank Pendleton recently left and his position has not been filled – Chris was his supervisor)

Chris\_E\_Smith@fws.gov

802-872-0629 (x20)

U.S. Fish and Wildlife Service

**Field management considerations:**

Concerns:

Although not my expertise, we did generally discuss some field management strategies that would help improve infiltration of water into the field – thus improving water quality and reducing the flashiness of the stream by reducing the peak flow of high water events. One concern that we discussed was that cropping the fields in corn is potentially leading to more overland runoff (due to bare soils), thus reducing water quality (overland runoff carries sediment, nutrients, and agricultural pesticides/herbicides) and increasing water quantity. Spreading of manure on bare soils can also lead to excessive nutrients entering the stream through overland runoff. Soils that remain bare over the winter and into the spring also run the risk of developing gullies, which you noted were forming in some locations, although we did not observe them due to snow cover. Gully formation carries the same concern as head cuts in streams. They lead to the concentration of flows, and as the gully deepens, the gully migrates further into the field, carrying soil and more water with it.

Potential solutions:

Maintaining a vegetated cover on the fields at all times would help reduce some of the concerns noted above. If the field is in corn, planting of a cover crop to carry it through the winter months would help facilitate infiltration of spring runoff. If the field is transitioned to a hay crop or pasture, this would also help with regard to maintaining soil stability. Some areas of the fields are excessively wet and should not be cropped at any time due to their sensitive nature.

Once a gully has formed, it can be arrested in much the same way as a head cut (described above). There may be funds available through the Natural Resources Conservation Service (NRCS) to help arrest gully formation on the property.

Timing of manure spreading to avoid wettest times of the year where excess runoff would be expected, and spreading when nutrient uptake can be maximized by plant growth (through a cover crop or hay/pasture), can help reduce nutrient loading concerns associated with manure.

These and other management strategies should be discussed with your agricultural lessee and your local NRCS representative (Danny Peet). It is recognized that agricultural use of this land is an important asset to the park board and community, and it is important to consider the needs of your farmers when crafting management strategies. However, as landowners, there are potentially management actions you could stipulate in your lease agreement that would promote greater water quality and overall ecological health of the land.

Please feel free to contact me if you have questions about any of the information contained within this letter. As I noted earlier, I will be on maternity leave from approximately February – May 2011, but will be available to provide further assistance later in the spring if needed.

Sincerely,

A handwritten signature in cursive script, appearing to read "Gretchen G. Alexander".

Gretchen G. Alexander