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2014

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Andrew McKenna

*University of Massachusetts - Amherst*

Robert F. Smith

*Department of Environmental Conservation, [rsmith@eco.umass.edu](mailto:rsmith@eco.umass.edu)*

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McKenna, Andrew and Smith, Robert F., "Brief analysis of the Tan Brook watershed in Amherst, Massachusetts" (2014). *Research*. 5.  
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# Brief analysis of the Tan Brook watershed in Amherst, Massachusetts

Andrew McKenna  
April 25, 2014

## Introduction

The Tan Brook is a small 3.91 square kilometer watershed than runs through and encompasses the highly urbanized areas of Amherst, MA. It is part of the Connecticut River basin and Mill River sub-basin. In order to meet the demands of the local middle and high school and heavy runoff from the high amounts of impervious cover from downtown Amherst and the University of Massachusetts, the tan brook has been highly culverted.

As shown in **figure 1**, the headwaters of the Tan Brook are located in a small pond at the southwest corner of Wildwood Cemetery which is feed from the runoff from Orchard Hill to the west. It then runs south and is engineered to run with respect to the Wildwood Elementary School and the Amherst Regional Middle School. It opens up for a stretch along the athletic fields of the Amherst Regional High School and the backyards of residents living along the south side of Chestnut St. From there runs underneath the athletic fields, underneath Triangle St., and North Pleasant St. and Kendrick Park. It opens up next to McClellan St. and flows through residential properties, underneath Fearing St., and towards the visitor's parking lots at the south side of the UMass campus. Part of the brook is engineered to act as a drain for the southwest residential area and is actually drained onto the athletic fields. The next open part on the brook is the man made UMass campus pond. The same pond that is a drain for runoff from the highly impervious UMass Campus, and has had major construction around it for many consecutive years. The brook is culverted one last time towards Lorden Field which is about 2,000 ft from drain at the athletic fields and runs open approximately 1000ft into the Mill River.

The Tan Brook heavily polluted and has an overall negative impact towards the residents who live adjacent to the brook, the species that live in the brook, and the overall health of the Mill River sub-basin and Connecticut River basin due to it's small size, 73% alteration, and the high amounts of run-off from the 45.5% impervious cover and 83% developed land from heavily urbanized areas in the

watershed.

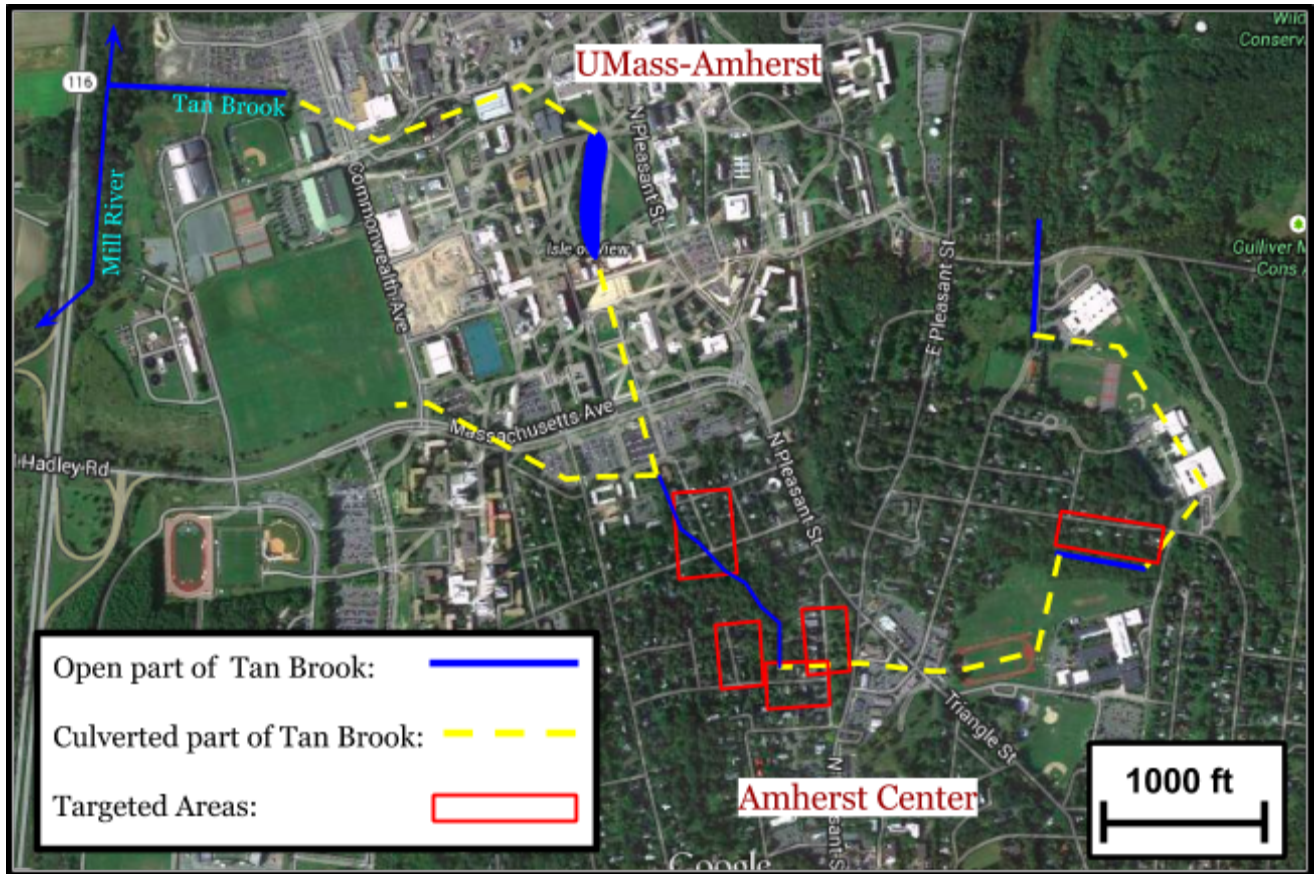


Figure 1 - Satellite view of the Tan Brook running through Amherst.

## Methodology

A survey was created to hand deliver to residents that lie adjacent to the open parts of the Tan Brook. The goal of the survey was see how much the local residents know about the brook and how much do they care about it. Because the open part of the brook is home to a small number of residents, 42 surveys were sent out and there were 9 respondents (21.4% response rate). There was clear bias in those that returned the survey. A few residents felt very attached to the brook and this is probably due to the distance with which the brook lies according to their property. As the surveys were hand delivered to the targeted residents it was clear that some backyards were affected by the brook more than others. Also, some of the targeted residents lived in apartment complexes along North Pleasant street across from Kendrick Park. I can safely assume that some of these residents living in the

apartment building are students that have never thought twice about the brook mainly because they don't have a proper backyard like some of the other residents targeted. These residents were still targeted due to the lack of residential properties along side the brook.

It is important to note that the brook described by the participants has little to do with the portion of the brook that runs through the University of Massachusetts and empties out by the Mill River. However, 8 out of the 9 participants knew where the Tan Brook goes. It is highly assumed that the UMass campus is the biggest contributor to the runoff into the brook and causes the most pollution due to the high volume of students and amount of impervious cover throughout the campus. A proper analysis of the open part of the brook near Lorden Field was not done in this study.

The survey questions were geared towards the physical attributes of the brook, such as color, smell, and flooding and other questions were geared towards how much they care about the brook and the species in it, the quality of water, and if they would mind renovations of the brook. Some participants also provided other useful information. It was clear that these were the people that felt the most connection to the brook and knew the most about it.

## Results

8 of the 9 people have noticed the Tan Brook on their property, including one respondent who said they noticed it only when it flooded. All 9 respondents know where the Tan Brook goes, there was no written in answer to this question, but it is assumed that everyone either knows it flows either into the UMass campus pond or into the Mill River.

Survey Results	
Number of residents who identified Tan Brook on their property	8 of 9*
Number of residents who knows where the Tan Brook goes	9 of 9
Number of residents that have noticed color change to the water	4 of 9
Number of residents who have identified an irregular smell to the brook	6 of 9
Number of residents who have seen foreign substances in the brook	7 of 9
Number of residents who have experienced flooding on their property	6 of 7**

\* 1 resident only identifies the brook when it floods

\*\* 2 residents did not answer & 1 resident claims their lawn is like a sponge all year

4 of 9 people have noticed color changes to the water of the brook. They identified colors such as white, muddy, iridescent film, white suds, brown, silty, and murky. 6 of the 9 have been able to identify foul smells to the brook. Those smells included oil, wet

and/or rotting vegetation, sewage, gas/petroleum and laundry detergent.

7 of 9 have seen foreign substances in the brook. There were a number of identified foreign substances in the brook: 4 residents identified trash in the brook which included plastic bags, soda cans, and garbage. Other identified substances were paint, soap, oil, broken pieces of sidewalk, white suds and a bicycle.

When asked if the brook has flooded on their property, 5 said yes, 1 said yes/no and mentioned that their yard is like a soaked sponge most of the year and they have to run their sump pump constantly, 1 said no, and 2 did not answer. Damage from flooding included eroded banks, moved rock walls, garage flooding (2 people), turned yard into swamp (2 people), driveway flooding.

Further, 8 of 9 people said that the quality of Amherst's water was very important to them. When asked how much of a personal connection they have with the brook, 6 of 9 had at least some connection to the brook.

When asked how polluted the brook is, 4 circled 3(some pollution) and the rest answered either between 3.5 and 5(very polluted). 4 respondents wrote in which part of Amherst caused the most pollution to the brook, their answers were back yard debris and careless disposal from multi-family activity, downtown, upstream businesses, and old oil spills from an old gas station on Triangle st. and the middle school and elementary school. One resident specifically noted that they believed Bertucci's and the Laundromat caused the most pollution.

All participants were concerned about the aquatic species that live in the brook and the same resident as above noted that salamanders and frogs have been seen on her property and that there used to be crayfish when they first moved in in 1999. This resident also noted there is an opossum, fox, deer, and bear living along the brook and regularly sights birds and raccoons. All 9 residents had interest in seeing the Tan Brook restored. The majority said they would be tolerant if there was major construction of the brook on their property.

## **Conclusion/Discussion**

The Tan Brook is so small that it almost seems like it's not even there. The 9 residents that returned the survey is a fair amount based on the little amount of residents that live adjacent to the

brook. These 9 residents are likely to represent a wide span of the brook. As mentioned, about the last half part of the brook which encompasses the UMass campus is not accounted for.

The results from the survey are in line with the initial assumptions. The amount of run-off from the town and the schools has led to some residents' lawns acting like a sponge, and there is no dry season in Amherst and so the lawns are soaked for most of the year. 2 of the 9 respondents said that their garages have been flooded, this is most likely because of heavy stream alteration and heavy street runoff during storms.

There were different respondents that matched up their responses with other respondents' responses describing color, smell, and foreign substances. 4 residents in some way identified oil/gas in the river. 2 residents identified laundry detergent in the river in the form of white suds. 4 residents identified trash, garbage and sewage in the brook. 2 residents identified brown or murky water which could likely be from excessive silt runoff from nearby streets. And 2 residents identified wet and/or rotting vegetation.

Based on the results from the survey, further analysis must be done to estimate the overall ecological health of the Tan Brook. In addition, the results from the survey prove that there is support for conservation/restoration of the brook. While there are no immediate plans under consideration to perform any restoration on the Tan Brook, all of the participants in the survey had interest in seeing the brook restored and 5 of 9 residents would be tolerant if there was restoration on their property. These results should contribute to a larger effort to raise awareness about the Tan Brook on the UMass Campus and in the Town of Amherst.