Vernacular Educational Opportunities near AISD High Schools

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II. Executive summary

According to the Texas Education Agency (TEA), Texas high school science students are required to spend 40% of their time in field or lab experiences. In Austin, an often-perceived sustainable city, several environmental stewardship field programs attempt to provide a service to this demand. Unfortunately, achieving this goal is limited. Qualitative research of several of the Austin programs, such as COA Hydrofiles, Aquifer Watch, and Westcave Preserve are available for Austin high schools to utilize but seldom get used. This is associated with reasons such as, proximity to the school, maintaining school accountability standards of achievement (primarily based on testing scores), and the teacher to student ratio.

The purpose of this project is to provide a potential solution. One way to approach this is to introduce a vernacular learning model that is focused on the issues of proximity. The term Vernacular utilized in this paper means identifying the local opportunities near each school and building upon what is there. Utilizing Geographic Information System, this project is proposing an initial analysis of local environmental field opportunities near each high school within the Austin Independent School District (AISD) in order to determine schools to present such a model. First, a one-mile radius was chosen as an appropriate distance for individuals to walk to a point of study near their school. This radius was chosen to leave time for travel both ways as well as to provide time for field investigation. The geographical environmental field opportunities (EFO) identified are both of a natural as well as a social nature -- using these terms in their broadest and most generalized way. The EFOs chosen were: waterways (creeks), green-spaces, recycling centers, landfills, farmer’s markets, wastewater and water treatment centers, electric generating plants, and community programs. Knowingly, this list is limited, but it broadly attempts to encompass hydrology, agriculture, energy, waste, and ecology, which are specific disciplines related to the science curriculum. Second, the context of each school was considered based off the factors of their current accountability standard and the teacher to student ratio. These two factors were weighed together to determine the likelihood of each school participating in such a program.

It is of no surprise that each school has several different opportunities presented to them based off where they are geographically situated. Ultimately, I concluded that all schools have access to some type of EFO. However, the type of park and the level of creek distributaries should be taken into consideration. When assessing the context of the school, the accountability rating had a higher weight. Thus, any school with an assigned unacceptable rating prescribe by the AEIS reports, did not qualify as a school to implement such an educational model and several were eliminated because of high teacher student ratio. Only four out of the twelve schools qualified for further research after this initial qualifier was measured. Relying primarily on GIS as a mode for this type of analysis is limited since defining factors such as the qualities of place and the context of this school cannot be addressed using this tool. However, it has provided an informative visual and analytical representation of information that can be utilized in further investigations of each school.

1 Texas Knowledge and Skills, 19 TAC, Chapter 74, Subchapter A, 74.3. Description of a Required Secondary Curriculum, http://www.tea.state.tx.us/rules/tac/chapter074/ch074a.html#74.3 (last visited: October 15, 2007)
III. Introduction

This report is concerned with educational opportunities available for AISD high schools to actively participate within their local communities. Often Austin is published as a sustainable place to live. Yet, education quality and opportunities for environmental field investigations are not taken into consideration. This is important, not only because there is a state policy that supports this logic, but also because it fosters a deeper understanding of a place for these citizens. Several local organizations have attempted to provide innovative programs to engage students about the places in which they live. However, what they offer versus what is employed is largely contingent upon several factors. Place-Based educational literature offers solutions to some of these factors. Focusing on what may exist in one’s “backyard” may help with issues of proximity to environmental field opportunities related near schools and identify those opportunities. Just identifying these features is not enough; the context of the school needs to be taken into consideration as well.

Sustainability and Education

According to The National Geographic’s online source, The Green Guide; Austin, TX in 2006 made their top ten lists as one of the Green Cities in the U.S. The indicators used for this analysis were: air quality, electric use and production, environmental perspective, environmental policy, green design, green spaces, public health, recycling, socio-economic factors, transportation and water quality. Weights were applied to each factor and drew from quantitative and qualitative data from institutional organizations. Austin scored 8.5325 out of ten, ranking second to Eugene, Oregon.

In contrast, an analysis of Austin by a peer reviewed media organization, SustainLane, tells another story. Austin is largely recognized as serving as a pioneer of sustainable principles like agriculture, green buildings, and air quality, but has fallen short on issues such as affordable housing and transportation. Their methodology drew from qualitative data such as surveys and interviews from the period of 2005-2006 and publications about each city from the time period of 2002-2006. Fifteen categories were chosen and weighted as indicators of a sustainable city. These are listed in figure 1, and further definition of each can be found at http://www.sustainlane.com/us-city-rankings/methodology.jsp.

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Whatever the disparity might be between how Austin ranks as a sustainable place is only a secondary concern in this study, but what is of concern is the fact that educational quality was not considered as an element of sustainability in neither of these. It should be noted that not all analysis of a city disregards education as a measurement of sustainability. However, ratings are primarily interested in standardized requirements as a form of approval and or disapproval, instead of how and what is being taught.

In the book, *The Sustainability Revolution: Portrait of a paradigm shift*, Andres R. Edwards posits that education is a vital factor in pursuing a healthy place. He states: “Education is the catalyst for helping everyone understand the dynamic nature of the interrelationship of the Three Es. Through education we gain knowledge with which to overcome the cognitive and normative- and hence emotional – obstacles to understanding our global dilemma.”  

The “Three Es” he speaks of is the interrelationships between economy/employment, ecology/environment, and equity/equality. These indicators have principally been used as meta-categories to define sustainability and following the logic of Edwards, none of them are independent of the need for education. Thus, there is a need for education that is focused on developing an active relationship between building knowledge and how we relate to our communities.

**Local response to education**

Education devoted to understanding the local conditions of our environment have often been implemented through the field of science. According to the Texas Education Agency (TEA), high school science students are required to spend 40% of their time in

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Community programs have attempted to satisfy this need. My initial analysis identified five programs that made this their goal. Two examples of these are the City of Austin (COA), Hydrofiles program, and Lower Colorado River Association programs at McKinney Roughs and Westcave Preserve. Both programs provided curriculum that is complimentary to the Texas Essential Knowledge and Skills standards for science curriculum. They vary from each other based on their subject focus, mission, how they are implemented, locality, and period of implementation.

Hydrofiles is a high school program that was developed by the COA Watershed Department in 2002. Focusing primarily on water conditions within the local context, it also introduces social and policy issues that are related. Its mission is to provide a hands-on, inquiry-based investigation of Austin's watersheds. Students monitor Austin water resources, evaluate and analyze water quality trends, and increase their awareness of Austin's water resources.6 The program is structured and implemented in a collaborative manner. Program leaders and teachers educate the high school students about localized water conditions and help students perform field investigations where, ultimately, the students adopt a creek. The locality of the creek is usually near the school, but sometimes requires travel time. Schools can actively participate in the program as long as they want and it is not restricted to a one-time event.

The LCRA programs at McKinney Roughs and Westcave Preserve is to provide a hands-on inquiry-based investigation of natural areas. The subject focus is broad and takes into consideration topics such as geography, hydrology, biology, and geology. Their mission states that they “offer dynamic interactive natural science, water conservation and natural history education.”7 Teachers and students travel to these locations and spend 2-3 hours participating in the activity lead by the LCRA experts. The program is open to all school levels.

These two programs and the other three are further described in Appendix A. Unfortunately, when performing research methods like interviews and email correspondence, it was discovered that only one program out of five -- Hydrofiles -- truly work for the high school demographic while also satisfying this state policy. Proximity, the pressure of accountability standards, and class size were some of the factors identified that limited participation.

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5 Texas Knowledge and Skills, 19 TAC, Chapter 74, Subchapter A, 74.3. Description of a Required Secondary Curriculum, http://www.tea.state.tx.us/rules/tac/chapter074/ch074a.html#74.3 (last visited: October 15, 2007)


Proximity to an environmental field opportunity was the initial focus of this study. It is inextricably related to time, which is difficult to acquire when trying to achieve educational standards enforced by the state. In innovative educational models, such as place-based, often the intent of the school and the immediate community is to actively recognize and participate in providing ways in which students can learn within their immediate environments. These opportunities are related to not only what is conventionally considered environmental science issues, but also social and economic concerns -- much like the Three E’s model previously mentioned. However, being located to an identified environmental field opportunity doesn’t guarantee participation. The context of a school needs to be taken into consideration such as the pressure of maintaining accountability ratings and the demands of large class sizes.

In Austin, schools and state agencies are invested in accountability standards based primarily on testing as a means to qualify a school and its legitimacy in receiving funding from taxpayers. The Texas Education Agency issues these accountability ratings that are based on the percentage of students passing the Texas Assessment of Knowledge and Skills (TAKS) test and the percentage of students who graduate. This quantifiable methodology is implemented in order to justify that academic performance is linked to future and educational attainment and, therefore, to employment and income potential. However, it is arguable that accountability testing and standardization are detrimental to the overall quality of education. David Gruenewald argues, “The ritual of testing and of comparing test results locally, regionally, nationally and internationally has become a dominant feature of public school education. It has now become a commonplace in schools that teachers take significant instructional time to prepare students specifically for their standardized test.” Thus, the ritual receives precedence over innovative ways of education.

A local example of a school that is experiencing the negative aspects of how accountability ratings are affecting the environment of education is Johnston High School. After three years of not maintaining an acceptable standard, Johnston High School may inevitably close down. In a recently publish article, The Austin Chronicle reports that “state's accountability system, once merely onerous, now carries serious consequences for schools that don't meet minimum expectations.” Inherently, there is nothing wrong with having schools being accountable. However, the use of testing as the dominant instrument of measurement inevitably forces students, teachers, administrators, the community, and families to focus only on this indicator of quality education.

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Another factor affecting the ability for a class to participate in environmental field experience is the ratio between teacher and students. In Jennifer King Rice’s article, “The Impact of Class Size on Instructional Strategies and the Use of Time in High School Mathematics and Science Course” she indicates how all participants invested in education are favorable of smaller class sizes:

Parents tend to view smaller classes as an indication that their children are receiving more attention from teachers than they might in larger classes. Teachers tend to prefer smaller classes for workload reasons: Smaller classes are perceived as easier to manage and as involving fewer disruptions and behavior problems, as well as less paperwork and grading responsibility. School administrators favor small classes because they presumably improve school climate and make parents and teachers happy. Policymakers argue for smaller classes on the grounds that they have the potential to improve student achievement.\(^{11}\)

Her study was focused on the relationship between the use of class time and reduced class time and broken into two broad categories of (a) time spent on instruction and (b) time spent on non-instructional activities. In conclusion, “interaction between class size and the amount of time teachers spend planning for class reveals that teachers who spend more time planning are more likely to work with small groups, to use innovative instructional methods.”\(^{12}\) It should be noted that this article did not focus specifically on “field experience” education, but based off this research it can be assumed that the ability for teacher to plan, manage, and implement such an experience is linked to class size.

IV: Research Questions

The central question to this research is predominantly concerned with providing a potential solution to the issue of proximity and participation in the local programs. By focusing on each specific school and there situated conditions, this analysis hopes to provide a potential solution. Three questions will be taken into consideration by employing the capabilities of ArcGIS as a means of analysis.

First, an analysis will identify what environmental field opportunities are near each high school. This is based on a one mile walking distance from each high school. Second, based of what exist near each school, are these EFOs a rich experience? Criteria that will establish this are: the areas and types of green-spaces, the levels of distributaries that a waterway is defined in GIS, and accessibility to points of analysis. The final question is: are the current conditions of each school conducive to this type of informal education? This includes both factors of the 2005-2006 State rating for accountability

and the teacher to student ratio. Weighted together, this will determine the likelihood of each school participating in such a program at the current time.

V. Methodology

In order to establish which Austin environmental field programs were targeting the high school demographic, I utilized the Internet and local publications such as “Austin Science fun guide.”\textsuperscript{13} A framework of factors for programs that would qualify was established. These were: (1) literature states that they attend to the high school demographic; (2) the program is aligned with the Texas Essential Knowledge and Skills curricular requirements, and (3) a field investigation involving student participation as part of the program. This original investigation presented five programs that qualified. Further qualitative analyses of each of these programs led me to the discovery that the Hydrofiles program is the only program that satisfies and has maintained the original three factors stated before. Appendix A has a list of programs, the review of each factor, and the methods utilized to come to this conclusion.

Several programs have found it difficult to recruit and work within high schools due to internal factors, such as time, proximity, and other objectives. The report’s attention was switched to identifying local opportunities near each school to accomplish the same objective. Literature suggests that it takes approximately 15-17 minutes to walk 1 mile easily and the majority of AISD high schools class periods are 1.5 hours. The process for gathering the necessary data first focused on the context of the city, then on identifying identified potential environmental field opportunities (EFOs), and thirdly on gathering factors pertaining to each school.

\textit{Data acquisition:}

Before beginning the analysis, the context of the city needed to be established. I decided to use a base map of the Travis county region and locations of major and minor roads in order to establish this. Both data sets were obtained from the City of Austin website. School locations and the AISD school district boundaries were also downloaded from this site.

It was decided that the broad range of potential EFOs would be looked at in this assessment. Since this analysis is hypothetical in nature, I tried to integrate several types of EFOs that would satisfy the TEKS Science requirements based on the summary science classes available to high school students in AISD. These classes are: Integrated Physics and Chemistry (IPC), Biology, Environmental Systems, Chemistry, Aquatic Science, Physics, Astronomy, Geology, Meteorology, Oceanography, Scientific Research and Design, Anatomy and Physiology of Human Systems, Medical Microbiology, Pathophysiology, Principles of Technology (PT1) and Principles of technology (PT2).

\textsuperscript{13} Austin Science fun guide, 2004, \url{www.austinsciencefunguide.org} (Last visited, September 12, 2007).
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The seven EFOs chosen for this analysis were parks, creeks, recycling plants, electric generating plants, landfills, waste water recycling plant, and farmer’s markets. The number of EFOs is limited based off on my ability to do an extensive analysis of all contextual educational opportunities within the city. However, each one is applicable to the science curriculum as defined by the Texas Education Agency (Appendix B). Examples are waterways being utilized in Aquatic science classes, farmer markets as a place to learn about Biology, and wastewater treatment facilities as a place to investigate environmental systems.

Data for green-spaces, creeks, water treatment facilities, wastewater treatment facilities, and electric generating plants data was downloaded from the city of Austin website. These were chosen due to the fact that they could easily be integrated in the science requirements. Landfills were chosen because of the opportunity for action to take place for students who want clean environments as well as a place where soil can be tested for chemicals. The landfill data was obtained from the Capital Area Council of Government.

Farmer’s markets qualified because they can potentially introduce the principles behind agriculture and local food production. Data for the time and location of farmer’s markets was obtained from the Sustainable Food Center website. They have an extensive list of local farmer’s markets and their time of operation, as well as their own initiative focused on community and youth gardening. Finally, recycling centers were chosen because of the knowledge of how waste can be recycled, the energy that is embodied in recycling, and the overall process of materials being reused. The Austin Guide to Recycling Centers was utilized as a data source that provided an extensive list of local recycling centers.

Data related to each high school: accountability standards, economically disadvantaged, and the teacher to student ratio were obtained through the 2005 annual reports developed by the Texas Education Agency. The reports, termed Academic Excellence Indicators System (AEIS), are easily obtained from the TEA website. The Public Education Information Management System (PEIMS) serves as a database that these reports are developed from. Central factors of the reports are focused on conditions and performance of Texas schools as well as school districts.

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14 Sustainable Food Center: http://www.sustainablefoodcenter.org/
Application of Data

- **Data Clean up**

The first step taken in this analysis was to clean up the data sets downloaded from the City of Austin and CAPGO. I was only concerned with data that was related to the Austin Independent School District area. Therefore, several of the data sets needed to be clipped to this boundary. An initial map was developed in order to display the context of the area where AISD High schools reside in Travis (Figure 1).

- **Environmental Field Opportunities and Georeferencing**

Both the creek line file and the parks polygon files where downloaded to ArcGIS. A substantial number of points of reference for the EFOs needed to be georeferenced; a method in which to create a new point files with the related locations. This was accomplished by creating an Excel file then converting it to a vDBF file to make it compatible with ArcGIS. By downloading the Travis County street file I established an address locator. By batch geocoding, a new layer was added with all the EFOs point locations (Appendix C).

- **Buffer and Development of Descriptive Maps**

In order to analyze which EFOs existed for each school within a one-mile walking distance, I created a buffer for the High School layer. This buffer was used to clip all the EFOs to each specific high school in order to calculate the number of EFO near each one. Using the attribute table for each school’s park layer I was able to create categories about the type of green spaces and the area of each park type for each school (Appendix D). In addition, by using the attribute table of the creek layer I was able to identify how many distributaries that a waterway passed through. I assumed that the more distributaries in which it passes the less likely there is water at a constant flow and less accessible (Appendix E). The measurement of the creeks was calculated in linear feet. Figure 2 is a map displaying all the high school, the buffers, and EFOs. Figures 3-5 displays the high schools with facilities, parks, and creeks near each school.

- **School conditions**

After gathering the data related to each school, I created a new field in each school’s attribute table for the following: accountability rating and teacher student ratio. The accountability rating was given the following numbers in order to rank each school and I employed the terminology assigned by these reports in order to maintain cohesion in this analysis.
Appendix F has a detail description of what each of the following terms mean according the Texas Education Agency and the Texas State Board of Education.

Data for the teacher student ratio was added to new fields in each high school attribute tables. A range for the student teacher ratio was based off the lowest ratio, 12.1, and then equally divided by 3. Thus, <12.1 was the exemplary range and 16-17.1 was an unacceptable range. A map was then created displaying the disparity of the ratio by using natural breaks to classify that was displayed in 5 classes. Figure 6 displays the conditions of the schools. The same terminology was also used in order to provide cohesiveness.

- **Weighting of school factors**

  I weighted the two indicators of accountability rating and teacher student ratio in order to establish the likelihood of a school participating at this time. A range was selected for each indicator. Since the accountability rating range was already established as 1-4 -- 1 being exemplary and 4 as unacceptable -- this was used. For each indicator a range and a weight were applied. Since, this was broken into four categories, 100 was applied to Exemplary, 75 to Recognized, 50 to Acceptable, and 25 was given to Unacceptable. Based off the literature applicable to the effects of accountability ratings and class sizes on schools, I applied a weight of 75% to the accountability rating and a weight of 25% to the teacher to student ratio. An example is as follows:

<table>
<thead>
<tr>
<th>school</th>
<th>Account rating</th>
<th>Teacher:student ratio</th>
<th>rating</th>
<th>ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td>Akins</td>
<td>3</td>
<td>15.9</td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>Akins</td>
<td>3 = (50*75)</td>
<td>15.9 (50*25)</td>
<td>5000</td>
<td>Acceptable</td>
</tr>
</tbody>
</table>

  A detail spreadsheet of how each school was weighted and ranked is attached in Appendix G. Maps that display this information are in Figure 7.

- **Individual school maps**

  Detail maps were made of each specific school with descriptive information about the types of EFO near each location and the weighted school indicators. Appendix F has details about each school used for analysis and these maps are represented in Figures 8-19.
VII: Findings

Figure 1: This descriptive map shows the High Schools located within the Austin Independent School District.

Figure 2: This map displays the identified EFOs and the one mile radius for each high school in AISD. The EFOs displayed are parks, creeks, waste water treatment centers, water treatment plants, landfills (permitted and un-permitted), electrical generating plants, recycling centers, farmer’s markets and community centers.

Figure 3: This map displays the identified EFOs that are point data, such as landfills, waste water treatment centers, electrical generating plants, recycling centers, and farmer’s markets. All these EFOs were clipped to the school buffer layer with the exception of electrical generating plants because a particular point landed on the radius boundary of Austin high school but did not display when clipped.

Figure 4: This map displays the parks clipped to each high school buffer. The chart on the right of the layout is an excel chart displaying the acres of parks near each school and the type of park indicated by the attribute table within the downloaded data.

Figure 5: This map displays the creeks clipped to each high school buffer. The chart on the right of the layout is an excel chart displaying the linear feet of creeks near each school and the level of distributaries. Distributary levels were determined by the attribute tables downloaded from the City of Austin GIS site.

Figure 6: This map displays the both the teacher to student ratio and the accountability ratings of each school. The accountability ratings are ranked from 1-4. The teacher to student ratio was divided equally into 4 ranges as well.

Figure 7: This map displays the weighted results of the two identified indicators of the schools analysis. The rankings were divided into 4 intervals to maintain consistency with the 4 intervals of the accountability rating and teacher to student ratios.

Figure 8 – 19: These maps display each high school, the one mile radius, all the EFOs contained in each one, an excel chart of both the parks (acres and types) and creeks (linear feet and distributary level) and point EFOs. An analysis is also added to each layout identifying the results from the school conditions, the EFOs present, and the likelihood of pursuing each specific school for further analysis.
Creeks and larger bodies of water near AISD High Schools

Data Source
GIS/Data/Regional/coa_gis.html

Map author: Stephanie Ferrone, Date Created November 29, 2007
Projection: Texas State Plane Central, NAD Survey Feet FIPS 4203
2005-2006 Accountability Rating and Teacher/Student Ratio (T:S)

Definition of Rating:
1 for Accountability rating and 12.1 T:S = Exemplary
2 for Accountability rating and 12.2-14.10 T:S = Recognized
3 for Accountability rating and 14.20-16.00 T:S = Academically Acceptable
4 for Accountability rating and 16.10-17.70 T:S = Academically Unacceptable

Map author: Stephanie Perrone, Date Created: November 29, 2007

Data Source
COA FTP site: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html,
2005-0 AEIS reports
http://www.tea.state.tx.us/cgi/sas/broker

Projection: Texas State Plane Central, NAD Survey Feet FIPS 4203
Likelihood of School Participating: Weighted Indicators

Weighted Indicators
- n/a
- 3 = Acceptable
- 4 = Unacceptable

Major Roads
Travis County

0 = N/A
1 = Exemplary
2 = Recognized
3 = Acceptable
4 = Unacceptable

In order to determine the likelihood of a school participating in such a program, the two indicators of teacher to student ratio and accountability ratings were weighted together.

Data Source
COA FTP site: ftp://ftp.ci.austin.tx.us/GIS-Data/Regional/coa_gis.html,
2005-6 AEIS Reports
http://www.tea.state.tx.us/qpl/aeis/broker

Map author: Stephanie Ferrone, Date Created: November 29, 2007
Projection: Texas State Plane Central, NAD Survey Feet FIPS 4203
Akins High School is located in the south central area of Austin, TX. There is a large Metropolitan park near the high school that can be utilized for field studies. However, this park type is highly urban in design. Akins has an average amount of exposure to creeks within the one mile radius. A large amount of this water is from smaller creeks that flow into larger creeks. Thus, there potentially could be less water flow during dry seasons. Akins accountability rating was 3 (Academically Acceptable) in 2005-2006 school year and the teacher to student ratio was 15.9 (Acceptable). Thus, based of the weighting it is likely that Akins could participate. However, there are not many diverse opportunities as in other schools.
Anderson High School is located in the northwest area of Austin, TX. The school has an average exposure to greenspaces. There is a diversity of preserve and greenbelts near the school which would potentially be beneficial learning opportunities. Anderson has the least exposure to water and is located in an area geographically difficult to access. The Accountability rating was 3 (Academically Acceptable) in 2005-2006 and the teacher to student ratio was 17.5 (Unacceptable). Thus, the conditions of the schools weighted together ultimately determined a ranking of an unlikely school that would participate. In addition, there is not a lot of diversity in EFOs and has only an average exposure to parks and creeks.

Data Source
Sustainable Food Center:http://www.sustainablefoodcenter.org/
Austin Guide to Recycling Centers:

Map created by: Stephanie L. Perrone-Freeborg
Date created: December 6, 2007
Austin High School is located in the central area of Austin, TX. This high school ranked highest in comparison to all other high schools in acres of green space and linear feet of waterways. Austin High is in an ideal location for environmental field studies, especially because there is also exposure to landfills and an electric generating plant. For 2005-2006 the accountability rating was 3 (Academically Acceptable) and the teacher to student ratio was 16.3 (Unacceptable). This was one of the higher teachers to student ratio in comparisons to the other schools. Therefore, Austin High weighted as a school that is unlikely to participate. However, due to the large and diverse amount of EFOs near this school and level of accessibility, it is still a school to consider for further research.
Bowie High School is located in the southwest area of Austin, TX. There are several different types of parks near the high school that can be utilized for field studies such as Karst Preserve. Bowie has an average amount of exposure to creeks within the one mile radius. A large amount of this water is from smaller creeks that flow into larger creeks. Thus, there potentially could be less water flow during dry seasons. For 2005-2006 the accountability rating was 3 (Academically Acceptable) and the teacher to student ratio was 17.7 (Unacceptable). With such a high teacher to student ratio, Bowie weighted as a school not likely to participate in such a program. However, it is still being considered because of the large amount of green spaces and how closely it is to the preserve.

Data Source
GIS-Data/Regional/koa_gis
CAPC00G website:http://www.capc00g.org/Information_
Clearinghouse/geospatial_main.asp
Sustainable Food Center:
http://www.sustainablefoodcenter.org/
Austin Guide to Recycling Centers:

Map created by: Stephanie L. Perrone-Freeborg
Date created: December 6, 2006
Crockett High School is located in the south central area of Austin, TX. There are several different types of parks near the high school that can be utilized for field studies. But most of these parks area highly urban thus may not provide as many unique opportunities. Crockett has an average amount of exposure to creeks within the one mile radius. A large amount of this water is from larger creeks. For 2005-2006 the accountability rating was 4 (Academically Unacceptable) and the teacher to student ratio was 14.4 (Acceptable). Hence, with the two indicators weighted together it is that this school would participate in this type of program. Therefore, this school will not be considered for further analysis at this time.

Data Source
CAPCOG website:http://www.capcog.org/Information_Clearinghouse/geospatial_main.asp
Sustainable Food Center:
http://www.sustainablefoodcenter.org/
Austin Guide to Recycling Centers:
Garza Independence High School is located in the east central area of Austin, TX. This high school has an average exposure to green-space and waterways. The Rosewood Park area would be an ideal place of study. For 2005-2006 the accountability rating was 3 ( Academically Acceptable) and the teacher to student ratio was 15.9 (Acceptable). Therefore, Garza Independence ranked as a school that would participate. Due to the central locality and the exposure to parks and larger creeks, Garza will be considered for future research.
Johnston High School is located in the east area of Austin, TX. This high school has low exposure to green-space and high exposure to waterways. The waterways are larger distributaries. Recycling plants, landfills, and a wastewater treatment plant are unique other learning opportunities near this school. Thus, creates a diverse location for study. For 2005-2006 the accountability rating was 4(Academically Unacceptable) and the teacher to student ratio was the best of the twelve schools at 12.1 (Exemplary). With the indicators weighted together, this school ranked as a school unlikely to participate. This school still is potentially considered for further research, but the conditions of the school need to be further assessed.

Data Source
- GIS-Data/Regional/coa_gis.
- CAPCOG website:http://www.capcog.org/Information_Clearinghouse/geospatial_main.asp
- Sustainable Food Center: http://www.sustainablefoodcenter.org/

Map created by: Stephanie L. Perrone
Date created: December 6, 2007
Lanier High School is located in the north area of Austin, TX. The school has a limited exposure to green-spaces and half of the exposure is two school parks located near by. Lanier has a limited amount of creeks located near by and because they are categorized as 2 and 3 Distributaries they could be more difficult to access. Accountability rating was 3 (Academically Acceptable) in 2005-2006 and the teacher student ratio data was 14.5 (Acceptable). Thus, the conditions of the schools weighted together ultimately determined a ranking of an acceptable school. This combined with the limited amount of EFOs, Lanier is considered a school to pursue for further research.

Data Source
CAPCOG website:http://www.capcog.org/Information_Clearinghouse/geospatial_main.asp
Sustainable Food Center:http://www.sustainablefoodcenter.org/

Map created by: Stephanie L. Perrone-Freeborg
Date created: December 6, 2007
Lyndon Baines Johnson (LBJ) High School is located in the northeast area of Austin, TX. The school is second to Austin High to the most exposure to green-spaces. A large greenbelt with Walnut Creek passing through it could potentially provide a nice opportunity for learning. There are also three landfills that could be integrated in an educational field experience. LBJ’s Accountability rating was 3 ( Academically Acceptable) in 2005-2006 and the teacher student ratio data was not available. Thus, the conditions of the schools could not be determined. However, based of the number of EFOs identified, LBJ would be a good school to pursue for future research.

Data Source
Sustainable Food Center:http://www.sustainablefoodcenter.org/
Austin Guide to Recycling Centers:

Map created by: Stephanie L. Perrone-Freeborg
Date created: December 6, 2007
McCallum High School is located in the north central area of Austin, TX. The school has a limited exposure to green-spaces. However, due to being centrally located McCallum has two large creeks located near it. A Farmer’s Market is also near the school, providing additional education opportunities. The accountability rating was 3 (Academically Acceptable) in 2005-2006 and the teacher student ratio data was 16.9 (Unacceptable). However, due to the fact that the accountability rating had a weight of 75% and teacher student ratio 25%, McCallum qualified as a school unlikely to participate. Therefore, at this time McCallum will not be considered for future research.

Data Source:
CAPCOG website: http://www.capcog.org/Information_Clearinghouse/geospatial_main.asp
Sustainable Food Center: http://www.sustainablefoodcenter.org/

Map created by: Stephanie L. Perrone-Freeborg
Date created: December 6, 2007
Reagan High School is located in the north central area of Austin, TX. The school has a least amount of exposure to green-spaces in comparison to the other 11 schools and an average amount of exposure to creeks within the area. Two Farmer’s Markets and one landfill were identified near the location that could provide additional educational opportunities. Accountability rating was 4 (Academically Acceptable) in 2005-2006 and the teacher student ratio data was 13.6 (Recognized). These indicators weighted together, concluded that Reagan would be an unlikely school to participate. Thus, it will not be considered for future research at this time.

Data Source
CAPCOG website:http://www.capcog.org/Information_Clearinghouse/geospatial_main.asp
Sustainable Food Center:http://www.sustainablefoodcenter.org/

Map created by: Stephanie L. Perrone
Date created: December 6, 2007
Travis High School is located in the central area of Austin, TX. There are several different types of parks near the high school that can be utilized for field studies. Especially Blunn Creek Preserve south of the school. However, the actual acres of green-space are average in comparison to the other schools. Because of being located near Town Lake most of the creeks near Travis are accessible and larger waterways. For 2005-2006 the accountability rating was 3 (Academically Acceptable) and the teacher to student ratio was 14.3 (Acceptable). With both indicators ranking as acceptable, Travis High School ranked as a school likely to participate. Travis with the large volume of parks and accessible creeks is a school to analyze in future research.

Data Source
- GIS-Data/Regional/coa_gis
- CAPCOG website: http://www.capcog.org/Information_Cleaninghouse/geospatial_main.asp
- Sustainable Food Center: http://www.sustainablefoodcenter.org/

Map created by: Stephanie L. Perrone
Date created: December 6, 2007
VIII. Analysis:

Three questions:

*Are there EFOs near each high school within the Austin Independent School District?*

By utilizing the systems of GIS, descriptive maps concluded that there are EFOs near each school which could potentially be considered for field investigation. What is most difficult about assessing this is choosing what qualifies as an EFO. This is a large caveat of my analysis. How does one say what qualifies and what does not? Either way, the ones chosen for this analysis took a broad approach to what could potentially qualify the existing curriculum.

*What types of field experiences are these?*

Based on the chosen EFO it was revealed that although all schools are located near a park or waterway doesn’t necessarily mean that the parks are all the same or the waterway is potentially flowing or easy to access. In addition, not all school are exposed to ‘social’ EFOs, and the ones that are, accessibility needs to be considered. For example, a farmer’s market is more accessible and would be willing for students to learn from versus a recycling plant.

*What is the likelihood of a school to participate in a place-based approach?*

By merging together the accountability ratings and the teacher to student ratio, I was able to assess the likelihood of a school to participate at this time. I believe that both of these indicators are of major importance. However, if we look at the lowest teacher to student ratio schools; Reagan, Johnston, and Crockett, they are also the same three schools that have an unacceptable 2005-2006 Accountability Rating. Thus, we could assume two things; these schools may have fewer teachers because it promotes better learning and want to motivate the students to learn and increase their testing scores or they have a lower ratio because they have less funding for teachers at these schools.

The schools that are more likely to participate; Lanier, Garza, Travis, and Akins all reside on the north to south corridor of Austin. All of these schools are near green spaces and also have a type of creek near by. However, only Travis has 2 un-permitted landfills that could potentially be used as a service project.
Analysis of each school

Austin High School is located in the central area of Austin, TX. This high school ranked highest in comparison to all other high schools in acres of green-space and linear feet of waterways. Austin High is in an ideal location for environmental field studies, especially because there is also exposure to landfills and an electric generating plant. For 2005-2006 the accountability rating was 3 (Academically Acceptable) and the teacher to student ratio was 16.3 (Unacceptable). This was one of the higher teachers to student ratio in comparisons to the other schools. Therefore, Austin High weighted as a school that is unlikely to participate. However, due to the large and diverse amount of EFOs near this school and level of accessibility, it is still a school to consider for further research.

Akins High School is located in the south central area of Austin, TX. There is a large Metropolitan park near the high school that can be utilized for field studies. However, this park type is highly urban in design. Akins has an average amount of exposure to creeks within the one mile radius. A large amount of this water is from smaller creeks that flow into larger creeks. Thus, there potentially could be less water flow during dry seasons and difficult to determine access points. Akins accountability rating was 3 (Academically Acceptable) in 2005-2006 school year and the teacher to student ratio was 15.9 (Acceptable). Thus, based of the weighting it is likely that Akins could participate. However, there are not many diverse opportunities as in other schools.

Anderson High School is located in the northwest area of Austin, TX. The school has an average exposure to green-spaces. There is a diversity of preserve and greenbelts near the school which would potentially be beneficial learning opportunities. Anderson has the least exposure to water and is located in an area geographically difficult to access. The Accountability rating was 3 (Academically Acceptable) in 2005-2006 and the teacher to student ratio was 17.5 (Unacceptable). Thus, the conditions of the schools weighted together ultimately determined a ranking of an unlikely school that would participate. In addition, there is not a lot of diversity in EFOs and has only an average exposure to parks and creeks.

Bowie High School is located in the southwest area of Austin, TX. There are several different types of parks near the high school that can be utilized for field studies such as Karst Preserve. Bowie has an average amount of exposure to creeks within the one mile radius. A large amount of this water is from smaller creeks that flow into larger creeks. Thus, potentially there could be less water flow during dry seasons. For 2005-2006 the accountability rating was 3 (Academically Acceptable) and the teacher to student ratio was 17.7 (Unacceptable). With such a high teacher to student ratio, Bowie weighted as a school not likely to participate in such a program. However, it is still being considered because of the large amount of green spaces and how closely it is to the preserve.
Crockett High School is located in the south central area of Austin, TX. There are several different types of parks near the high school that can be utilized for field studies. But most of these parks area highly urban thus may not provide as many unique opportunities. Crockett has an average amount of exposure to creeks within the one mile radius. A large amount of this water is from larger creeks. For 2005-2006 the accountability rating was 4 (Academically Unacceptable) and the teacher to student ratio was 14.4 (Acceptable). Hence, with the two indicators weighted together it is unlikely that this school would participate in this type of program at this time. Therefore, this school will not be considered for further analysis at this time.

Garza Independence High School is located in the east central area of Austin, TX. This high school has an average exposure to green-space and waterways. The Rosewood Park area would be an ideal place of study. For 2005-2006 the accountability rating was 3 (Academically Acceptable) and the teacher to student ratio was 15.9 (Acceptable). Therefore, Garza Independence ranked as a school that would participate. Due to the central locality and the exposure to parks and larger creeks, Garza will be considered for future research.

Johnston High School is located in the east area of Austin, TX. This high school has low exposure to green-space and high exposure to waterways. The waterways are larger distributaries. Recycling plants, landfills, and a wastewater treatment plant are unique other learning opportunities near this school. Thus, creates a diverse location for study. For 2005-2006 the accountability rating was 4 (Academically Unacceptable) and the teacher to student ratio was the best of the twelve schools at 12.1 (Exemplary). With the indicators weighted together, this school ranked as a school unlikely to participate. This school still is potentially considered for further research, but the conditions of the school need to be further assessed.

Lanier High School is located in the north area of Austin, TX. The school has a limited exposure to green-spaces and half of the exposure is two school parks located near by. Lanier has a limited amount of creeks located near by and because they are categorized as 2 and 3 Distributaries they could be more difficult to access. Accountability rating was 3 (Academically Acceptable) in 2005-2006 and the teacher student ratio data was 14.5 (Acceptable). Thus, the conditions of the schools weighted together ultimately determined a ranking of an acceptable school. This combined with the limited amount of EFOs, Lanier is considered a school to pursue for further research.

Lyndon Baines Johnson (LBJ) High School is located in the northeast area of Austin, TX. The school is second to Austin High to the most exposure to green-spaces. A large greenbelt with Walnut Creek passing through it could potentially provide a nice opportunity for learning. There are also three landfills that could be integrated in an educational field experience. LBJ’s Accountability rating was 3 (Academically Acceptable) in 2005-2006 and the teacher student ratio data was not available. Thus, the conditions of the schools could not be determined. However, based of the number of EFOs identified, LBJ would be a good school to pursue for future research.
McCallum High School is located in the north central area of Austin, TX. The school has a limited exposure to green-spaces. However, due to being centrally located McCallum has two large creeks located near it. A Farmer's Market is also near the school, providing additional education opportunities. The accountability rating was 3 (Academically Acceptable) in 2005-2006 and the teacher student ratio data was 16.9 (Unacceptable). However, due to the fact that the accountability rating had a weight of 75% and teacher student ratio 25%, McCallum qualified as a school unlikely to participate. Therefore, at this time McCallum would not be approached for future research.

Reagan High School is located in the north central area of Austin, TX. The school has a least amount of exposure to green-spaces in comparison to the other 11 schools and an average amount of exposure to creeks within the area. Two Farmer's Markets and one landfill were identified near the location that could provide additional educational opportunities. Accountability rating was 4 (Academically Acceptable) in 2005-2006 and the teacher student ratio data was 13.6 (Recognized). These indicators weighted together, concluded that Reagan would be an unlikely school to participate. Thus, it will not be considered for future research.

Travis High School is located in the central area of Austin, TX. There are several different types of parks near the high school that can be utilized for field studies. Especially Blunn Creek Preserve south of the school. However, the actual acres of green-space are average in comparison to the other schools. Because of being located near Town Lake most of the creeks near Travis are accessible and larger waterways. For 2005-2006 the accountability rating was 3 (Academically Acceptable) and the teacher to student ratio was 14.3 (Acceptable). With both indicators ranking as acceptable, Travis High School ranked as a school likely to participate. Travis, with the large volume of parks and accessible creeks is a school to analyze in future research.

Caveats:

- As mentioned before, there are several features in a geographical landscape that could potentially serve as a learning experience. Not all could be considered.

- This analysis did not take into consideration the actual elevations between the point of a school and the point of destination. This could only be assessed by physically going to the place and timing the walk.

- Missing data from LBJ was unfortunate.

- This is only an initial study, but the desire of a school to want to adopt such a program would be necessary further research.

- There could potentially be a program that already fosters this type of educational model at these schools already.
Funding and budget was not considered when weighting the likelihood if a school would support such a program.

Qualitative measurements were not taken into consideration for this analysis, but ultimately would weigh the most in future research.

**IX: Additional Research**

If one was to employ this analysis as a point of departure for further investigation, I would suggest the following steps and answer the following questions:

- Contact Lanier High School, Travis High School, Garza High School, and McCallum High School and identify if there is such a program in place.
- Collaborate with a teacher and group of students to assess other potential EFOs near the campus.
- Perform a series of mental maps of the walk to the each point and back. Is the walk safe? Where are there interferences?
- Identify additional EFOs.
- Mental map the EFOs. Do they feel safe, dirty, and or accessible?
- What would educational requirements would this EFO satisfy?
- What is the likelihood that the EFO contact would be interested in participating?
- How motivated are the students to learn outside the classroom?
- Are teachers interested in an informal educational approach?
- How much time would a teacher have to dedicate themselves to in order to participate?
- How do administrators feel about such a program?
X: References


Gruenewald, David A. “Accountability and Collaboration: Institutional Barriers and Strategic Pathways for Place-based Education,” Ethics, Place and Environment, Vol. 8, No. 3 (October 2005): pp.261-283


Sustainable Food Center: http://www.sustainablefoodcenter.org/

Texas Knowledge and Skills, 19 TAC, Chapter 74, Subchapter A, 74.3. Description of a Required Secondary Curriculum, http://www.tea.state.tx.us/rules/tac/chapter074/ch074a.html#74.3 (last visited: October 15, 2007)
Vernacular Educational Opportunities near AISD High Schools
CRP 386, Fall 2007
Stephanie L. Perrone

Texas Education Agency: “Texas Knowledge and Skills, 19 TAC, Chapter 74, Subchapter A, 74.3. Description of a Required Secondary Curriculum”
http://www.tea.state.tx.us/rules/tac/chapter074/ch074a.html#74.3 (last visited: October 15, 2007)

Texas Education Agency: Academic Excellence Indicator System:
http://www.tea.state.tx.us/perfreport/aeis/
APPENDIXIES

Appendix A: Environmental Science Program Descriptions
Appendix B: Summary of Science Texas Essential Knowledge and Skills (TEKS)
Appendix C: Environmental Field Opportunities: Spreadsheet of addresses
Appendix D: Green-space: Description of types and Area per High School
Appendix E: Creeks: Description of tributaries and Liner feet per High School
Appendix F: State Ratings for High Schools Descriptions
Appendix G: Detail of Ranking and Weighting of School Conditions
Appendix H: Details about all High Schools (spreadsheets)
Appendix I: Data
Appendix J: Methods of Analysis
Appendix A: Environmental Science Program Descriptions

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<th>Name of Program</th>
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Educational Mission statement:

- **Austin Nature and Science Center**: Dedicated to the exploration of the natural world.
- **Aquifer Watch**: Learn about water quality, quantity, and develop an appreciation for water issues within our community.
- **HydroFiles**: To protect water quality is through pollution prevention
- **LCRA- McKinney Roughs**: The parks’ natural science center offers quality science-based education programs led by trained educators and professional staff.
- **LCRA- Westcave Preserve**: A natural treasure of the Texas Hill Country combines opportunities to observe plants, animals, and geology of the Edwards Plateau.

Empirical Research: Determining if AISD high schools participate in each program

- **Austin Nature and Science Center**: Phone conversation with director, Wednesday, October 10, 2007: “We rarely have High School students/teachers use our program”
- **Aquifer Watch**: Email correspondence with Jeanne Galland, Tuesday, October 9th, 2007: “Middle school and high school teachers seem to be less receptive to working with their classes away from the classrooms. There are issues with buses, time, and permissions.”
- **HydroFiles**: Email correspondence with Sara Heilman, Friday, October 5th, 2007: “I have found it quite difficult to recruit teachers for our middle school and high school programs unless they are after school.”
- **LCRA- McKinney Roughs**: Email correspondence with Joannie Stienhaus, Thursday, October 4th, 2007: “Although we do serve high school, the majority of our students are elementary and middle school age.”
- **LCRA- WestCave Preserve**: Email correspondence with John Arnes, Friday, October 5, 2007: “We have no high schools attending our programs.”
Appendix B: Summary of Science Texas Essential Knowledge and Skills (TEKS)
(Taken from TEA website: www.tea.org)

High School Courses:
All students in high school science courses conduct field and laboratory investigations, use scientific methods during investigations, and make informed decisions using critical-thinking and scientific problem-solving. All High School Science courses include a 40% laboratory and field requirement.

Integrated Physics and Chemistry (IPC):
IPC integrates the disciplines of physics and chemistry in the following topics: motion, waves, energy transformations, properties of matter, changes in matter, and solution chemistry. Students use mathematical formulas to calculate work, momentum, acceleration, density, and speed. Students use the Periodic Table as a tool to predict patterns in chemical bonding and balance simple chemical equations. They become familiar with factors that affect the rate of solution. Students understand the movement of heat energy through materials, and know the concept of specific heat. They understand the characteristics of waves and identify the relationships between wavelength, frequency, and amplitude.

Biology:
In the Biology course students study a variety of topics that include: structures and functions of cells and viruses; growth and development of organisms; cells, tissues, and organs; nucleic acids and genetics; biological evolution; taxonomy; metabolism and energy transfers in living organisms; living systems; homeostasis; ecosystems; and plants and the environment. Students learn how nucleic acids are involved in the formation of an organism and the inheritance of traits. Students learn to use Punnett squares and probability to find possible genotypes and phenotypes. Students understand the relationship between ecology, evolution and genetic principles. They understand differences between bacteria and viruses. Food webs and the cycling of nutrients in ecosystems are learned as well as the significance of structures and adaptations of both animals and plants.

Environmental Systems:
In the Environmental Systems course students study a variety of topics that include: biotic and abiotic factors in habitats; ecosystems and biomes; interrelationships among resources and an environmental system; sources and flow of energy though an environmental system; relationship between carrying capacity and changes in populations and ecosystems; and changes in environments.

Chemistry:
In the Chemistry course students will investigate how chemistry is an integral part of our daily lives. By studying a variety of topics that include: characteristics of matter; energy transformations during physical and chemical changes; atomic structure; the periodic table of elements; behavior of gases; bonding; nuclear fusion and nuclear fission; oxidation-reduction reactions; chemical equations; solutes; properties of solutions; acids and bases; and chemical reactions.

Aquatic Science:
In the Aquatic Science course students will investigate a variety of topics that include: components of an aquatic ecosystem; relationships among aquatic habitats and ecosystems; roles of cycles within an aquatic environment; adaptations of aquatic organisms; changes within aquatic environments; geological phenomena and fluid dynamics effects; and origin and use of water in a watershed.

**Physics:**
The Physics course provides students with conceptual frameworks, factual knowledge, and analytical and scientific skills. Students study a variety of topics that include laws of motion; changes within physical systems and conservation of energy and momentum; forces; thermodynamics; characteristics and behavior of waves; and quantum physics.

**Astronomy:**
The Astronomy course includes an in-depth study of the role of the Sun in our solar system; planets; and the orientation and placement of the Earth as well as a thorough exploration of the universe, scientific theories of the evolution of the universe; and characteristics and the life cycle of stars.

**Geology, Meteorology, Oceanography (GMO):**
In the GMO course students study a variety of topics that include formation, characteristics, conditions and history of the Earth. Students also learn about plate tectonics; origin and composition of minerals and rocks and the rock cycle; processes and products of weathering; natural energy resources; interactions in a watershed; characteristics of oceans and of the atmosphere; and the role of energy in weather and global climate.

**Scientific Research and Design:**
The Scientific Research and Design course includes the processes of science that can include content that is innovative and detailed. Students conduct in-depth guided or independent research in any of the science disciplines. Their research must be presented to an appropriate audience. This course can satisfy one of the Advanced Measures under the Distinguished Graduation Plan.

**Anatomy and Physiology of Human Systems:**
In the Anatomy and Physiology of Human Systems course students conduct in-depth investigations of anatomy and physiology of human systems including circulatory, nervous, endocrine, and respiratory systems. They learn environmental factors that affect the body and how the body maintains homeostasis.

**Medical Microbiology:**
The Medical Microbiology course allows students to learn the relationship between microbes and health, including an in-depth understanding of the role of microbes in maintaining health and in causing disease. They learn microbiology laboratory techniques and explore health careers.

**Pathophysiology:**
The Pathophysiology course allows students to learn in depth the processes of pathogenesis and learn about specific human diseases. Students also understand a variety of disease control techniques.

**Principles of Technology I (PT1):**
The PT1 course allows students to learn applied physics concepts and use a systems approach to investigate mechanical, fluid, electrical, and thermal systems. Students'
understand concepts of force, motion, and work. This course may be substituted for Physics on the Recommended High School Plan (RHSP).

**Principles of Technology II (PT2):**

In PT2 students will understand waves, vibrations and linear and angular momentum and the graphical representations of these phenomena. They also explore in-depth concepts of light and optics.
### Appendix C: Environmental Field Opportunities: Spreadsheet of addresses

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<td>78745</td>
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<td>4917 S CONGRESS AVE</td>
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Appendix D: Green-space: Description of types and Area per High School

The attribute table from the COA_Parks shapefile downloaded from the City of Austin website had the following names for types of parks (Name_2). Using common definitions of each I created separate categories for the park areas in order to consider generalized qualitative factors for each. Any field of a green-space that was not designated a second name was put into the general category of park. The City of Austin Parks and Recreation Department has an extensive website with a list of all the parks, the size, an inventory of facilities, and location at http://www.ci.austin.tx.us/parks/default.htm.

Recreation Center: A public center located in communities along with green-scape.

School Park: A school park is a school that is designated as a park as well.

Neighborhood Park: Parks that provide easily accessible, primarily passive, low intensity recreational facilities in residential areas.17

Park: A park is a bounded area of land, usually in its natural or semi-natural (landscaped) state and set aside for some purpose, usually to do with recreation.18

District: A large park area that has a vast range of facilities to accommodate it.

Metropolitan Park: A large urban park area that has a vast range of facilities.

Greenbelt: These parks serve neighborhoods generally within a 1 mile radius of the park. Most sites have basic features, play-scape, picnic area and play field.19

Preserve: The Preserves are sanctuaries for native plants, native animals and unique natural features. They provide educational and scientific opportunities for the people of Austin.20

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The chart above is a data table with each high school, the acres of parks located within the one mile radius, and the types of parks they are.
Appendix E: Creeks: Description of tributaries and Linear feet per High School

The attribute table for Travis county creeks contains 1-4 attributes fields that designated to how many tributaries in which a waterway passes through: FIRST_DIS, SECOND_DIS, THIRD_DIS, FOURTH_DIS (Screen shot)

In my analysis, I divided the linear feet how many levels of a distributaries each creek passed through with the intent to draw the distinction between each type. This employed the information present in the attribute table that makes the distinctions between the number of channels a creek builds runs through (FIRST_DIS, SECOND_DIS, etc.) A distributary, is a stream that branches off and flows away from a main stream channel. Thus, a distributary is the beginning of the main source of water and then moves into a larger body. By doing this we can evaluate the levels of distributaries each creek flows through and what can be studied. It can be concluded that if a creek is identified as a 3 or 4 distributary then it will be more difficult to access.

For example, studying the Colorado River may be completely different and much more accessible than studying Danz Creek which may be harder to access and have little water flow at times because there are less creeks flowing into it.
Creeks near AISD High Schools: 1 mile buffer

The data chart above is a list of all the high schools and the linear feet of creeks within the one mile radius. This is categorized by the level of distributaries.
NOTICE OF 2006 STATE RATING FOR AKINS HIGH SCHOOL: ACCEPTABLE

The Austin Independent School District is required by state law to notify parents of the accountability ratings assigned by the state, along with an explanation of the ratings, with the first report card of the year. AKINS HIGH SCHOOL received a rating of ACCEPTABLE for 2006. If you have any questions about your school’s rating or current performance data, please contact the principal at 841-9900. You can also find additional information about state accountability ratings on the Texas Education Agency web site at http://www.tea.state.tx.us/perfreport/account/2006/manual/index.html. The requirements for each accountability rating are shown below. Updated information about the school’s rating will be sent to you in winter 2007, when released by the Texas Education Agency to the district. State ratings for all schools this year are assigned based on student passing rates on state tests. All students in the school must pass at the rates shown in the chart to achieve the given rating. Also, if enough African American, Hispanic, White or economically disadvantaged students were enrolled and tested at the school, then the students in each of those four groups also must pass at the same rates, as shown in the chart. Performance on all requirements will be discussed in detail at the school’s Campus Advisory Council meeting.

TEST SCORE REQUIREMENTS FOR HIGH SCHOOLS*

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<th>School Rating Requirements to Earn This Rating</th>
<th>Additional Ways to Meet Requirements</th>
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<tr>
<td><strong>Exemplary</strong> 90% of all students, and 90% of students in each group (if enough tested), passed Spring 2006 TAKS; AND, 90% of students in Special Education who took Spring 2006 SDAA II tests performed to expected levels</td>
<td>None.</td>
</tr>
<tr>
<td><strong>Recognized</strong> 70% of all students, and 70% of students in each group (if enough tested), passed Spring 2006 TAKS; AND, 70% of students in Special Education who took Spring 2006 SDAA II tests performed to expected levels. If at least 65% of all students passed Spring 2006 TAKS, or at least 65% of all SDAA II scores were at expected levels, AND if the school demonstrated enough improvement on the specific test to reach the 70% cutoff within 2 years, then the requirements are met.</td>
<td></td>
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<tr>
<td><strong>Academically Acceptable</strong> Student passing rates on Spring 2006 tests met or exceeded these levels: Reading / English Language Arts – 60%; Writing – 60%; Social Studies – 60%, SDAA II (as applicable) – 50%; Mathematics – 40%; Science – 35%. School passing rates showed enough improvement on the specific test(s) to reach the Academically Acceptable levels within two years, OR, the state allowed a one-time exception for a specific area.</td>
<td></td>
</tr>
</tbody>
</table>

**ADDITIONAL REQUIREMENTS FOR HIGH SCHOOLS**

| Exemplary At least 95.0% of students (all and each group with enough members) graduated or were still finishing diplomas in 4 years. None. |
Recognized  At least 85.0% of students (all and each group with enough members) graduated or were still finishing diplomas in 4 years. At least 80% completed in 4 years and the rate improved enough to reach the cutoff within 2 years.

Academically Acceptable
At least 75.0% of students (all and each group with enough members) graduated or were still finishing diplomas in 4 years. Completion rates showed enough improvement to reach the cutoff within 2 years.

*Note: If both the test score and additional requirements were not met by the school, then the school received a state rating of Academically Unacceptable.

Please note that federal ratings, per the No Child Left Behind act, for all schools are separate and apart from the state ratings issued by the Texas Education Agency.

Explanation for Abbreviations: 1. TAKS – This is the Texas Assessment of Knowledge and Skills. Students in grades 3 through 11 take Reading / English Language Arts and Mathematics; students in grades 5, 8, 10, and 11 take Science; students in grades 8, 10, and 11 take Social Studies; and students in grades 4 and 7 take Writing. 2. SDAA II – This is the State Developed Alternative Assessment for students who are receiving special education services, and it is taken only when placement committees determine that this test is the most appropriate way to assess the students’ learning.
### Appendix G: Detail of Ranking and Weighting of School Conditions

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#### Teacher Student Ratio
- **Exemplary**: <12.10
- **Recognized**: 12.2 - 14.1
- **Acceptable**: 14.2 - 16.0
- **Unacceptable**: 16.1 - 17.7

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## Details for Each School

### EFOs and School Conditions

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| Greenspaces in Acres   |       |       |          |        |        |       |          |     |          |        |          |        |
| Preserves              | Akins | Bowie | Crockett | Travis | Austin | Garza | Johnston | LBJ | Anderson | Lanier | McCallum | Reagan |
|                        | 8.63  | 38.66 |          |        |        |       |          |     |          |        |          |        |
| Greenbelts             |       |       |          |        |        |       |          |     |          |        |          |        |
| Metropolitan Park      | 343.63 | 572.89 |          |        |        |       |          |     |          |        |          |        |
| Districts              |       |       |          |        |        |       |          |     |          |        |          |        |
| Parks                  | 168.65 | 87.51 | 31.43    | 1274.66 | 107.98 | 26.70 | 221.47   | 20.31 | 24.86    | 81.47  | 0.86     |        |
| Neighborhoods          |       |       |          |        |        |       |          |     |          |        |          |        |
| School Parks           | 4.16  | 3.96  | 4.80     | 17.51  | 9.83   | 3.95  |          |     |          |        |          |        |
| Recreation Centers     |       |       |          |        |        |       |          |     |          |        |          |        |

### Facilities: number

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### School (ranking of 1-4)

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<th>Austin</th>
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Appendix I: Data

Layers:
County Boundary (polygon)
Major/Minor Roads (line)
Travis County School Districts (polygon)
Travis County Schools (points)
COA parks (polygon)
COA facilities (point)
Creeks (line)
Lakes (polygon)
Waste Water Treatment Facilities (point)
Water Treatment Facilities (point)
State Parks (polygon)

a. Source: City of Austin:
b. Projected Coordinate System: Texas State Plane Central, NAD 83 survey feet FIPS 4203
d. Geographic Coordinate System: Lambert Conformal Conic Layer

Landfills (point)

b. Projected Coordinate System: Texas State Plane Central, NAD 83 survey feet FIPS 4203
d. Geographic Coordinate System: Lambert Conformal Conic Layer

Community Center (point)

b. PODER: http://www.poder-texas.org/

Layer
Recycling Centers

Layer
Farmer Markets

a. Source: Sustainable Food Center: A local non-profit committed to providing healthy community through food. http://www.sustainablefoodcenter.org/

Data for High Schools (2005-2006)
Accountability Rating
Student Teacher Ratio

Appendix J:
B. Methods:

Descriptive Maps

Travis county Base Map

- Add the following data to a map
  - County Boundary
  - Major and minor arterial
- Define the projection of both shape-files: Texas State Plane Central, NAD 83 survey feet FIPS 4203
- Select by attribute “Travis County” in the counties layer
- Create new layer from selection and export data- name the new layer, “travis_county”
- Clip Major and Minor arterials” shapefiles to the new Travis county layer
- Select by attribute “major” road type
- Name the newly clipped files: Major_roads.
- Remove the county layer and the cenart layer from your map

School Districts and Schools

- Create a new data frame
- Add the following to the data sets to the map:
  - School districts (polygon)
  - Schools (schools)
- Select by attribute, “Austin Independent School District” from school district layer.
- Create a new layer from selection: “AISD”
- Create a new layer from selection: “AISD_final”
- Define projection as Texas State Plane Central, NAD 83 Survey Feet FIPS 4203
- Remove the school district data set
- Select District = AISD, create a new layer, Name AISD_schools and remove the school shapefile.
- Select by attributes “High Schools” from AISDschools layer
- Create new layer from selection: AISDhigh_schools
- Remove AISDschools from layer.
- Add Maj_Min_final and Travis_county
- Create a layout with the following map.
  - Inset map with Travis County, Major roads, AISD and all the High schools (labeled)
Environmental Field Opportunities (EFO)

- Add the following data sets to the map:
  - COA Facilities
- Clip this layer to the AISD boundary layer
- Name the new layer “COAfacilities_clp”
- Using ‘select by attributes’ select the following types of facilities:
  - Electric Generating Plant
  - Wastewater Treatment Plant
  - Water treatment plant
- Name the new layers:
  - AISD_Elect_gen_plant
  - AISD_Wastewater_treatment
  - AISD_Water_treatment
- Remove the COA facilities layer
- Add the following data sets to the map:
  - COA Parks_Inventory.shp.
  - Creeks
  - Hydrology
  - Landfills
- Clip each data file to the AISD layer
- For the Landfill layer select by attributes ‘permitted’ and ‘unpermitted’
- Name the new layers:
  - AISD_COAParks
  - AISD_Creeks
  - AISD_Lakes
  - AISD_Landfills Permitted
  - AISD_Landfills_Unpermitted
- Create a DBF 4 (dBaseIV) excel file for:
  - Environmental Community Programs
  - Farmer’s Markets
  - Recycling Centers
- Add the following data set to the map:
  - TRA_road.shp file
  - The EFO_dbf file to map
- Create an address locator for TRA_roads.shp file
- Add address locator to the map
- Perform batch geocoding
- Rename new shapefile: EFO.shp
- There were three addresses that didn’t match:
  - 13263 Research Blvd, 78750: Chadwick’s Top Dollar Recycling
1114 East Cesar Chavez Street, 78702: All American Recycling
1648 East Reynolds, 78734: Aluminum Recycling Center

- Matched interactively:
  East Cesar Chavez was missing a PRE_DIR, it was 100% matched when this was discovered.
  The other two addresses existed outside AISD boundaries and were ultimately removed in the next step.
  - Clip EFO.shp to AISD.shp and rename new layer as AISD_EFO.shp
- Create the following maps with the base consisting of AISD, Travis County Boarder and Major Roads
  AISD_Waste_treatment
  AISD_Electrical_plant
  AISD_Water_treatment
  AISD_COAParks
  AISD_Creeks
  AISD_Lakes
  AISD_Landfills Permitted
  AISD_Landfills_Unpermitted
  AISD_EFO

Analysis Maps:

1.) Providing an opportunity for AISD High Schools to participate in environmental field experiences is a difficult endeavor; what place-based opportunities are near each High School serve this need better?

Proximity
- Open ArcToolbox and use the analysis tool “buffer” to create the one mile radius around the AISD High Schools
  1 mile buffer (a proximity based off a reasonable walking distance)
- Create a new layer for each school with the buffer
- Name the layers: ‘School Name’ _ buffer
- Create the following maps:
  A map with AISD, streets, the EFOs and the AISD_hs_buffer
  Schools, buffer, EFOs
  Schools, buffers, creeks
  Schools, buffers, parks
2). If there are EFO available near each high school, then what types of environmental field educational opportunities are these? Maps created to answer this question will highlight the type of park, the amount of linear feet for creeks and the level of distributaries, and the number of ‘social’ EFOs. (This will be analyzed through both use of GIS and Excel)

1. Type of experience
   - Clip all EFOs (social and geographical) to each high school buffer layer
   - The categories for each feature is as follows:

   Parks categorize and create new layers based on types of park and then calculate area for each. Translate data into Excel spreadsheet
   - Recreation Center
   - School Park
   - Neighborhood Park
   - Park
   - District Park
   - Metropolitan Park
   - Greenbelt
   - Preserve

   Distinguish if the waterway in each school buffer comes from a 1, 2, 3, 4, distributary and calculate the linear feet of creeks per each school

   Facilities (calculate number)
   - Landfill
   - Farmer’s Market
   - Electric Generating Plant
   - Recycling Center
   - Wastewater Treatment Center

   - Create an Excel chart for each schools EFOs
3. What is the likelihood of each school participating in this type of educational program based on the conditions of the school? The indicators used in this analysis were:

Accountability Rating
Teacher: Student Ratio

*Teacher: Student Ratio*
- Open the attribute table for High Schools, add a field titled `stud_teach`
- Enter the ratio number for each high school
- In the symbology tab, choose Quantities, Value `stud_teach`, 5 Classes, Classified Manually
- Create a map displaying all schools teacher/student ratio

*Accountability:*
- Open the attribute table for AISD_Highschools and add a field titled `ACCOUNT`
- For each school input the following data obtained from AIES reports:
  - Exemplary: 1
  - Recognized: 2
  - Academically Acceptable: 3
  - Academically Unacceptable: 4
- In the symbology tab, chose Quantities, Value `ACCOUNT`, 2 classes
- Create a map displaying all schools and their accountability rating

*Weighted Indicators*
- In Excel I created a formula to weight the two indicators together. The weighted value given to the accountability rating was 75% and the weighted value to the teacher:student indicator was 25%.
- Schools were ranked the same as the accountability rankings for consistency.
- Open up the attribute table
- Add a field named `WEIGHT`
- Enter all numbers for likelihood of the school participating in such a program
- Go to Symbology, choose quantities, Value equals `WEIGHT`, 2 classes
- Create a map with this information
- Create a layout for each school with the following:
School with EFOs and buffer
Excel graph with waterways and green-spaces
List of additional EFOs
Analysis comments