How Does Distance from School Location to Field Trip Study Site Effect Research Opportunities for a Middle School Science Class

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Abstract

Stream health monitoring surveys are an important part of a middle school science curriculum. In the coming year students at Dzantik'i Heeni Middle School will look at several watersheds of the Lemon Creek Valley in Juneau, Alaska to answer the question, *do human developments have an impact on stream health down stream?* With the time constraints of a that most science classes face, organizing a walking field trip can be difficult. A pilot study was organized to answer the question, *how does distance from school effect research opportunities for a middle school science class?* Data collected will be analyzed to determine the optimum locations for stream health surveys based upon the time it will take to walk to the site from school.

Fig. 1. Image from http://www.nrc.govt.nz/environmental.education showing students collecting stream health data during a stream survey.

Introduction

How does distance from school affect research opportunities for a middle school science class? This question is important so that as instructors are planning the stream health survey project they can make informed decisions about blocking class periods which will allow for students to travel to and from study sites that are at a greater distance from the middle school location. For our classes, this pilot study will help us determine exact study site locations and time needed to complete the survey for each stream site.

Fig. 2 ARC MAP image of Dzantik'i Heeni School site and nearby watershed's potential study sites.

Methods & Materials

- ARC MAP GIS software
- Known value for student walking speed on a "walking field trip"
- IKONOS satellite image of Juneau area
- 1:63,360 USGS topo map B-3 of Juneau area
- Geospacially referenced map of middle school location and location of nearby watersheds of the Lemon Creek Valley

1. For this study the researcher uploaded maps of the Juneau area into ARC Map software and then added shapefile layers for local hydrology and stream study site locations.
2. Stream site locations were digitized into a new shape file and spread apart at increments of 100 meters.
3. Given previously collected data that the average student can walk at a speed of 1 meter per second when on a walking field trip, intervals of 600 meters were established to give an estimate of the distance covered in 10 minutes of walking.
4. Analysis tools in Arc Map were then employed to identify potential study sites within defined distances (walking times) of the Dzantik'i Heeni school site.

Results

Possible error in these values can be attributed to variation in student walking speeds, lack of direct route to sites, and traffic conditions which may hinder large class movement across major/semi-major thorough fares.

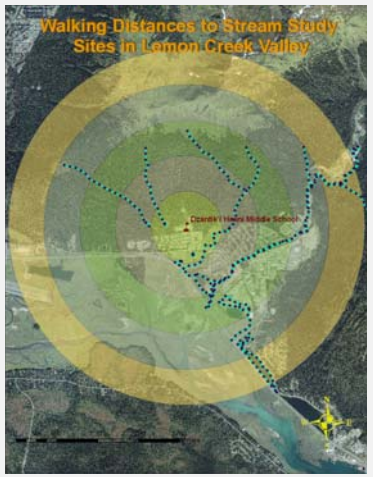

Fig. 3 ARC MAP image of Dzantik'i Heeni School site and nearby watershed's potential study sites within 600 meter buffers of the school's location.

Data Analysis

Time *(min.)*	Distance *(meters)*	# of Sites	%
10	600	18	6.1%
20	1200	95	32.0%
30	1800	161	54.2%
40	2400	222	74.7%
50	3000	258	86.9%

Fig 4 Excel Table showing data analysis results

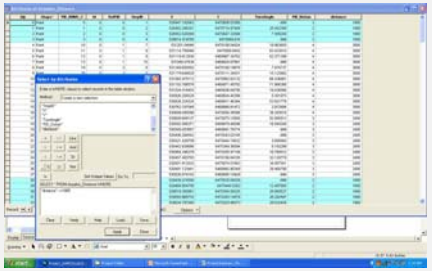

Fig. 5 Screen shot of Query completed in Arc Map of Stream site data points based upon distance from Dzantik'i Heeni Middle School

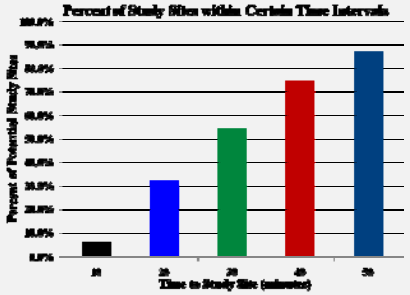

Fig 6 Excel Charts showing data analysis results

Discussion

- In a standard science class there is one hour to complete any walking field trip lab. Using conservative estimates the time required for a group of students to collect data on stream health characteristics (pH, temperature, D.O., stream substrate, stream-side vegetation, and observations) would be 40 minutes.
- The data suggests that only 6.1 % (18 sites) of the total stream study sites are accessible by walking from the school within 10 minutes. This results in only 18 sites possible for stream health monitoring using a one hour class period.
- A two hour block of time is possible with advanced planning. To achieve the goals of data collection students would need to be at the study site within 40 minutes of walking.
- There are a total of 222 study sites (74% of the total) available within 40 minutes of walking.

Conclusions

Based upon the results of this study, the data supports the conclusion that the success of a broad survey of all watersheds in the Lemon Creek area is dependent upon having blocks of time of at least 2 hours. This limits the sampling of 26% of the watershed study sites, including many sites along the Pioneer Pond and Lemon Creek (upstream of the prison). Having access to parent volunteers to drive small groups to these sites may make it possible to include them in the Lemon Creek valley watershed survey.

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For further information

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