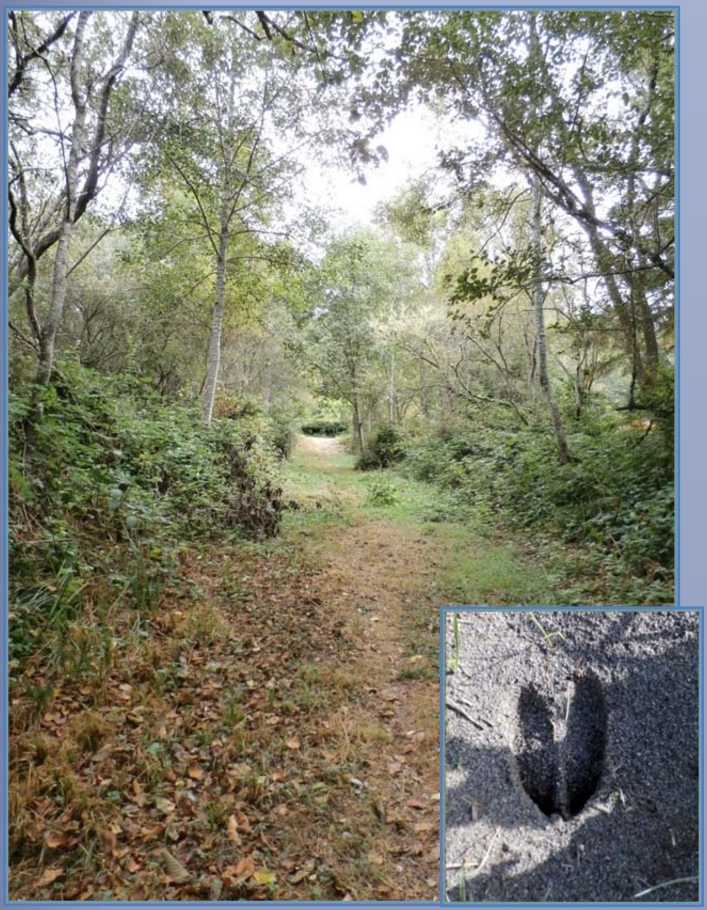

Daylighting McFarlan Creek

Combining Restoration & Education at Catherine B. Zane Middle School

By: Sabrena Ambrezewicz, Shereen Bourne, Kimberlee Tellez, & Adrienne Warmsley

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ABSTRACT

Our project provides a combination of restoration and education by employing research in the science field. Specifically, our project creates a restoration plan that restores hydrologic functions to the historic watershed of McFarlan Creek while creating a functional athletic field and outdoor classroom for Catherine L. Zane Middle School's students. We conducted field and historical research that included biological assessments along with habitat monitoring. During our project we also interviewed key individuals such as historians, engineers, and teachers so we could get a better outlook on the site location. We found that our proposed project is feasible along with the designs suggested for implementation.

PROBLEM STATEMENT

To create a restoration plan that restores hydrologic functions to the historic watershed of McFarlan Creek while creating a functional athletic field and outdoor classroom for Catherine L. Zane Middle School's students.

INTRODUCTION

During the 1950s, California's public schools had a reputation for being the tops schools in the United States. Since the 1970s California public schools have experienced a decline in the quality of education (Fernandez and Rogerson, 1996). One of the main reasons for the decline in the quality of education has been the lack of funding and increase in classroom size (Hanushek, 1986). The California legislature has been unable to keep up with the rising diversity of public schools (Fernandez and Rogerson, 1996). California public schools systems have not been given the attention needed to improve the curriculum. Instead, the funding for public schools have slowly been cut, eliminating qualified teachers and programs to help aid in the success of students in grades K-12 (Hanushek, 1986)

When schools receive budget cuts important subjects such as math, science, and art suffer from the limited resources and supplies available. These three subjects are important to develop many of the basic skills students will need to advance in higher education. In this restoration and feasibility plan Catherine L. Zane Middle School will be encouraged to improve the science and physical education curriculum. Catherine L. Zane Middle School has already taken the next step toward improving math, science, and art courses by developing a program known as STEAM (Science, Technology, Art, and Math) in the Fall of 2013(City of Eureka). If a stream restoration project is implemented at Catherine L. Zane Middle School it can be used as a demonstration of a restoration project for that area and hands-on experience for students. They will learn how ecosystems and other biological processes work, and even participate in developing a healthy stream. Improving the hydrology of the site will also allow the athletics field to be used year-round. In addition, Physical Education classes and sports teams that use the athletic field will improve community connection and keep students healthy. This innovative project can help encourage the community to help fund public schools throughout California.

BACKGROUND

Site Description

Our project site is the Catherine L. Zane Middle School athletic field, located at 2155 'S' Street, Eureka, California near the headwaters of Second Slough(Figure 1). This section of the slough is commonly referred to as McFarlan Creek, because of a public access trail that starts at the intersection of McFarlan and Hillslope. The field itself is located above a portion of McFarlan Creek that has been dramatically altered by urban development. The field was created by infilling the creek area, and rerouting the stream to an underground culvert. We also discovered during our initial site visit evidence of a sanitary/sewer line.

Figure 1: Our Project location in Eureka, CA. Source: GoogleEarth

Historically, the landscape of this area shows channels feeding from the headwaters past Buhne Street down to the mouth of McFarlan Stream at Humboldt Bay (U.S. Geological Survey, 2013). Evidence of these slough channels can still be seen on maps. These three channels are called Martin Slough, Cooper's gulch, and Second Slough (Appendix A). Our proposed site is located near the headwaters of Second Slough. The installation of the culvert disconnected the headwater flow to the remainder of the slough, as well as creating a barrier for migrational fish and other aquatic organisms. Observations downstream of the Zane Middle School athletic field showed multiple stream channels creating a wetland condition. Upstream of the field, no significant cobbles or rocks, fine coarse sediment or defined channels were observed. The area upstream can serve as reference site to a time before the fill of the field, though it may have been altered by the sewage and sanitary lines that were installed.

Through investigation of the site and information obtained from the City of Eureka Engineering and Planning Department, the culvert was placed in McFarlan Creek during the 1950s, and the total length of the culvert is approximately 600 feet. The culvert was placed to create this field which now presents a problem for use. The field is susceptible to flooding as a result it is out of service during the winter months due to high precipitation events and/or possible problems with the culvert. We are determining with our restoration/feasibility plan if the flooding is due to the culvert or natural processes.

Stream Restoration: Case Studies

As the human population continues to grow so has the public's interest for stream restoration (Bernhardt and Palmer 2007). There have been many restoration projects that have taken place in Humboldt County over that last decade due to the public's concern for conserving local resources. The most recent and large scale restoration project in Humboldt County is the Salt River restoration in Ferndale. The goal of the Salt River Ecosystem Restoration Project was to improve water quality, enhance fish passage, and reduce flooding (Humboldt County Resource Conservation District, 2013). Historically, Ferndale has experienced major floods throughout the city. Lowlands of Ferndale still experiences annual flooding during the winter that damages property and open pastureland. The Salt River restoration will help relieve flooding by redirecting water. The water was redirected and controlled by creating a mainstream channel for the Salt River. The original Salt River was filled and used for pasturelands. Although, Zane Middle School is not as large as the Salt River there are many similarities such as the background and goals.

Another local stream restoration project is the Jacoby Creek Riparian Restoration that took place in 2003. The first goal of the Jacoby Creek was to restore the riparian corridor for salmon spawning and rearing. The second goal for Jacoby Creek Land Trust was to include an educational aspect, by coordinating with Jacoby Creek School to develop a curriculum to help monitor the project after implementation (NOAA, 2012). Jacoby Creek restoration is also used by Humboldt State University students for environmental science, biology, and other related majors. There are many other project examples in Humboldt County that combine both stream restoration and education. Zane Middle School would be another piece to the puzzle to restoring streams throughout Humboldt County.

OBJECTIVES

- Acquire baseline data by obtaining information on the site history, specifically, when and where the culvert was installed.
- Determine the feasibility of the project by using the site history, identifying parameters in the physical area concerned, and community support.
- Talk to community members to come up with ideas for a curriculum for science courses at Zane Middle School.
- Create and initial project design to aid in restoring the hydrology of the field, so it can be used all year round for multiple purposes.

CONSTRAINTS

Our main constraints are the perceptions of landowners located downstream from the site, and various other community members. For the property owners, their main concerns would be related to the risk (real or perceived) of potential flooding and erosion from increased water flow. By engaging the property owners in the process (Gobster, 2000; Howell, 2011) through meetings, data collection, and project design, concerns can be addressed through design, engineering and permitting processes.

For the Zane Middle School community and administration, issues of safety, aesthetics, maintenance, and appropriate use of school budget might be of primary concern. A design with appropriate plantings (non-poisonous native species, vegetation that does not block line of sight, etc.), slope grading, and other features would handle safety and aesthetic concerns. A design using native species and allowing for some fluctuation in stream dynamics creates a passive and self-sustaining restoration project not requiring high energy inputs like fertilizer or regular mowing (Howell, 2011; Ward, 2004; Riley, 1998), thereby minimizing maintenance requirements. By removing the culvert and creating an outdoor classroom, opportunities for active and engaged learning in a cross-disciplinary manner can increase academic performance disciplines (Eick 2012; Wirth, 2012; Mayes, 2010; Haines, 2006) as well as meet national and state standards for school curriculum (Mayes, 2010).

Another constraint would be obtaining permits from local, state, and federal authorities. We have determined that a daylighting project would require a number of permits in order to be implemented. Daylighting the creek would involve more than 50 feet of alteration to a stream bed, requiring a notification be sent to Lake and Streambed Alteration Program of the California Department of Fish and Wildlife. The California Department of Fish and Wildlife (CDFW) has guidelines set in place to help manage and conserve natural areas. In order to go forth with the proposed project our team will have to meet all requirements from the CDFW. The land where the proposed project site is located could possibly be altered by the removal of the culvert. When a stream or river is changed greatly there needs to be oversight from CDFW. After the agency is notified, an application needs to be submitted (http://www.dfg.ca.gov/habcon/1600/forms.html) for further review, along with possible fees determined by the Department. Additional paperwork might be needed after the first stages of the process.

We believe the project might qualify for an Categorical Exemption from the California Environmental Quality Act (CEQA) because this is a small restoration project. If not, by following the CEQA checklist, a proper design should have no problem qualifying for a Negative Declaration, requiring no further permits. A Negative Declaration is given to projects that are determined to have no significant environmental impacts to the project site (http://www.dfg.ca.gov/habcon/1600/forms.html). Redwood Community Action Agency is both experienced and qualified to handle any permitting and associated paperwork needed for the project.

The next constraint is available funding for implementing the actually design. The cost of daylighting projects in the United States range from $5,000 to $15,000 per linear feet (Pinkham, 2002). In contrast, the cost of replacing failing pipes and culverts can start at $45,000 per linear feet (Buchholz, 2007). However, there are local, state, and federal grants available to help aid in lowering the cost of small scale restoration and daylighting projects such as Zane Middle School. The United States Environmental Protection Agency (EPA) has a Five Star Restoration Grant Program that supports wetland and stream restoration projects that incorporates educational, youth groups, citizens, and conservation corps. The average amount of funding the Five Star Restoration Grant Program awards to restoration projects is $10,000, but can range from $5,000 to $20,000. In 2002, a restoration project on Jacoby Creek located in Arcata, California was awarded $15,000, and serves as an educational and recreational experience for students and citizens.

There is also available funding from corporate sponsors such as Lowe's which has an available grant to fund outdoor classrooms up to $2,000 (Mayes, 2010). To receive maximum attention and incentive from government agencies similar to the United States Fish and Wildlife Services (USFWS) and California Department of Fish and Wildlife to fund this project, then including a fish habitat restoration element to the project will help. Projects that restore fish and animal habitats that are appealing to society have a higher probability of getting funded than projects that do not include this aspect.

The last constraint is related to unknown site conditions due to the lack of accuracy of historical records that could impede implementation and the project as initially designed. This constraint can partially be resolved by receiving the blueprints of the culvert however matching the blueprints to what it is on the ground most of the time will not match. We have found with more research of historical photos that our specified area was not photographed to see its previous condition (Shuster, 2009). Most conditions of the culvert and site will be further known during the process of the project. Avoiding unforeseeable setbacks can be accomplished by creating a project design that will be adaptive to future occurrences.

PROJECT ASSESSMENTS

This section will give detailed descriptions and sketches of suggested design features that are in congruence with the surrounding area. An analysis of the cost of implementing the design will also be investigated in this section.

Habitat Assessment

A habitat assessment will provide information on the quality of the instream and riparian habitat that influences the structure and function of the aquatic community in McFarlan Creek

(Barbour et al., 1999). If the conditions of the habitat is are not well understood, the cause and source of degradation can be misleading. Most habitat assessments conducted by water resource agencies include data based on physical and chemical characteristics that incorporate site descriptions, composition, transect analysis, bank stability, stream type, stream origin, water level, and much more.

Although we have collected some preliminary data from Zane Middle School's athletic field we have not conducted a thorough habitat assessment due to time constraints. A habitat assessment is an important component to any daylighting project; therefore, it must be conducted by a professional prior to construction. This crucial process will gain more insight on how to monitor, manage, improve construction design, and limit inefficient use of public funds.

Biological Assessment

A biological assessment is an evaluation of the condition of water bodies using surveys and other direct measurements of resident biological organisms (e.g., macroinvertebrates, fish, and plants). The presence, condition and amount of different fish, insects, algae, plants, and other organisms provide important information about the health of aquatic ecosystems (EPA, 2013). Different organisms can provide information on the level of pollution as well as types of pollution. A case study provided by the Environmental Protection Agency showed how a the fish kill of 150,000 fish in 2000 along an 8- mile stretch in Rock Creek in Maryland indicated high concentrations of pesticides (EPA, 2013). Although this is an extreme example, it still illustrates the importance of bioassessments. A biological assessment also provides information on long-term conditions of a site and not just a snapshot, therefore, it should be conducted before and after implementation of the project. We will discuss the implementation of biological assessments in more detail in the monitoring section of this report.

Building community is also a part of our proposed project because it enhances a sense of place for all who participate. This project will include the local community by allowing volunteer opportunities before and after the restoration takes place. Our efforts are focused on educating and inspiring the public to take responsibility for their urban environment by social, environmental, and holistic growth (Gobster, 2000). To gain further understanding of the community standing on the daylighting project local surveys should be conducted for surrounding schools, residents, environmental agencies, and other stakeholders. Similar to the NEPA scoping process, the public should have a time period to state suggestions and concerns about the project. Community involvement is an important aspect to this restoration project to reduce cost and educate the public on best management practices as well as ecosystem services.

PROPOSED PROJECT DESIGN

The primary focus of the project design is to reconnect the hydrologic structures of the area, so that drainage function can properly resume again. The combination of the culvert and the in-fill have disrupted the natural movement of the water across the landscape in several ways. The culvert itself has created a disconnect between the subsurface water and how it drains into the creek and out of the area (Ward and Trimble, 2004). The extensive length of the culvert (more than 600 feet) compounds the issue by disrupting the hydrology over a large area, increasing the antecedent soil moisture levels, and changing seasonal drainage patterns (Ward and Trimble, 2004).

The soil used to fill in the creek area and create the field further complicates the hydrology of this area. Preliminary testing indicated soil types ranging from sandy loam to sandy clay loam (Schaetzl and Anderson, 2005) in both the field and along the hillslope leading down into the field, indicating the soil fill was used extensively in creating the field area. We believe the soil soil material is different enough from the natural watershed soil that it creates a hydraulic barrier (Schaetzl and Anderson, 2005), preventing the water from draining the usual rate from the field (Schaetzl and Anderson, 2005; Ward and Trimble, 2004).

The fill has also changed the natural topography of the area (see Appendix B). The area where the field exists is the low spot in the surrounding landscape, naturally funneling the water into the area. A relatively level athletics field without subsurface drainage creates a situation where the water enters the area, and loses momentum without a defined channel or slope (Ward and Trimble, 2004). This contributes to the ponding seen on the field after precipitation events.

Our project design is based on field observations, preliminary site data, information about site alterations, financial considerations and potential permitting processes required for the school to implement the design. We developed a preliminary site design that can be installed in phases, and contains features easily altered and incorporated into the science curriculum. We also included suggestions of other design features that can be included at future point in time, depending upon the school's discretion and available funding.

Our research has indicated it is inadvisable and unfeasible to either place the daylighted stream channel where the culvert is, or excavate down to the historic stream channel. The close proximity of the active sewer line to the culvert would make placement of a stream channel in the same area problematic. Site alterations combined with the lack of historical images or pre-1950s topographic maps makes determination of the pathway of historic stream channel almost impossible. The possibility of having to excavate more than 12 feet down to reach the historic bed material (City of Eureka Planning Department, 2013) while being unable to relocate the sewer line made most of our initial design ideas unworkable or financial unviable.

Since we could not restore the stream to its original channel, we decided to divert the stream out of the culvert and into an excavated channel running along south area of the playing field, and then up the east side (See Appendix B). The channel would be engineered to restore the historic slope gradient to help facilitate subsurface drainage and maximize the potential for hydrologic reconnectivity. The depth and width of the channel, as well as the slope of the banks would be graded and engineered to address any safety issues. The excavated channel bed will be left open to allow the water to create its own pattern and thalweg within the containment of the channel.

The stream banks and bed would be planted with appropriate riparian vegetation to stabilize the banks, increase the existing riparian corridor, add inputs into the aquatic nutrient cycle, and prevent an increase in water temperature. While the creek might need to remain partial culverted at the outlet because of landowner concerns, resizing and repositioning of the section could help ensure fish passage (Meixler and Walter, 2009) and reconnect the aquatic community.

During a site visit in late September, after a rain event, indications of runoff from the hillslope leading from the asphalt playground were observed. We decided to include the hillslope into the project design, since it contributes to the problem of standing water in the field. Our design calls for removing the existing grass, mixing in soil amendments (i.e. organic material or landscape soil), regarding the hillslope with berms and swales, planted with a variety of native trees and shrubs, and then covered with mulch. The berms and swales will slow down and capture the surface runoff, while increasing infiltration rates (Ward and Trimble, 2004). The vegetation selection will complement this with additional water capture, and facilitating the movement of the water from the landscape with increased evapotranspiration rates (Schaetzl and Anderson, 2005; Ward and Trimble, 2004). These features will require less maintenance than the current grass surface, and increase overall habitat and biodiversity.

Along with changing the vegetation on the hillslope, native and riparian vegetation will be planted in areas to the north of the field, and in the open sections south of the field. The plants will increase the amount of water being pulled from the soil, lowering the overall soil moisture, and decreasing the potential for ponding. They will also increase the habitat diversity for wildlife, developing into food sources, nesting grounds, and protective covering.

Planting additional vegetation to the area is also an easy way to get the students and community involved in the project. Specific locations for trees and larger shrubs can be mapped out in small sections ahead of time, and then planted using volunteer labor coordinated with the most optimal planting times.

A trail system will be installed to facilitate use of the area by school members and the larger community. Trails will be out a pervious material to decrease potential sources of runoff. Two bridges are included in the design to keep disturbance of the stream channel and wildlife habitat to a minimum, while allowing maximum area access.

Our design also has an embedded experiment included in it. The areas along the hillslope and to the north of the playing field (dark green areas on map in Appendix B) will have planted with a shrub species mix that is different than the areas to the south of the field (light green areas on map in Appendix B), while the stream corridor to the east will be left unplanted of shrubs. The unplanted area will then be monitored for the rate of natural recruitment, and which plant species show up where.

ADDITIONAL FEATURES

In addition to our proposed project design we have designed additional features that could be added at some point in the future to address hydrologic issues, and create a more diverse landscape and complex outdoor classroom. We suggest a wetland pond located in the unused area south of the field (Appendix C). This would still allow a full size athletics field for the school, as well as providing greater habitat cover and connectivity for local wildlife. The wetland pond would allow for biological uptake, water filtering, runoff collection, and additional habitat for migrating wildlife.

We also included features to changeable signage along the trail system can be used by teacher to tailor the information to a specific topic or season, and allow student work to be featured as well on map in (Appendix D). Designated photo points will allow the student to track qualitative changes to the landscape over time from the same location.

MONITORING AND EVALUATION

School Curriculum

For our proposed project, monitoring and evaluation serves two different purposes: measuring the success of the stream daylighting restoration project through objective standards, and incorporating standard environmental monitoring techniques into the science curriculum at Zane Middle School. Biannual evaluations and monitoring will be implemented and conducted by students from Zane Middle School and Humboldt State University (HSU). The science teacher, Steven Wartburg, at Zane Middle School has agreed to incorporate the project into his curriculum. We have not confirmed who will take on the curriculum at HSU, but it will most likely be students and faculty in related disciplinary studies. This hands-on experience will contribute to the new STEAM (Science, Technology, Engineering, Arts and Math) program at Zane Middle School (City of Eureka). The STEAM program gives students the opportunity to choose electives that will increase their success in getting admitted into a college such as HSU by gaining science based experiences. HSU undergraduates studying Environmental Education and Interpretation, Ecological Restoration, Wildlife, Forestry, Biological science, and other similar interdisciplinary subjects can use this program as a way to integrate their knowledge to the nearby community and create a well-rounded curriculum for Zane Middle School. To reach this goal, the following monitoring plans and objectives will be conducted (Appendix E) Information gathered from monitoring and evaluation can be analyzed for statistical changes over time, as well as used for monitoring requirements for grants and permits.

Pre Construction Monitoring

1. Photo points can be taken a year before construction to have baseline data. Examples of photo point locations can be found in (Appendix C).
2. Initial soil, water, and macro invertebrate samples can be taken prior 6 months before construction by Zane Middle School students
3. Vegetation presence/absence as well as identification should take place in the spring before construction.

Post Construction Monitoring

1. Train students and all necessary personnel on monitoring tasks
2. Partner with HSU students/interns from the Environmental Science department that will conduct monitoring each semester that will provide for the long-term improvement.
3. The science students from Zane will conduct annual monitoring of the aspects described in Appendix E with students.

RECOMMENDATIONS

Our recommendations for the next steps of the project will be to have an engineering firm such as Mike Love and Associates to create an engineered channel based on their professional opinion. The development of this new channel should be combined with extensive soil surveys to identify any subsurface obstructions or limitations to the excavation of the channel. Initiating the permit process will also be a part of the next steps to accomplish the completion of this project.

CONCLUSION

During this semester we found valuable information that will be the foundation for this project. We determined this project will be feasible while learning about specific constraints that would halt excavation of the stream. Once again these constraints would be lack of historic photos, financial and budgetary issues, permit issues, and possible issues with open water sources in proximity to sewer lines. We combated these constraints with alternatives that will prevent stoppage of our proposed project. Our proposed project can be modified to keep the athletics field or to complete a full creation project it is ultimately up to the school on how to go forward with the project.

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Appendix A: Slough Channels in Eureka, CA

Appendix B: Proposed Project Design

Appendix C: Additional Features, Wetlands

Zane Middle School athletics field alternative project design
with the primary focus to
bring the functional hydrology to the area.
Projected in NAD 1927.
Modified by Sabrena Ambrezewicz

Appendix D: Project Design with Additional Features, Curriculum Elements

Appendix E: Monitoring and Evaluation Table

Parameters	**Schedule**	**Method**	**Goal**	**Success Criteria**	**Responsible Party**
Benthic macro-invertebrates	Fall (Sept-Nov)	EPT % calculation and ANOVA	Measure overall stream health	By comparing a locate reference stream reach to an urban stream reach	HSU students and Zane Middle School students
Tree Survival and Growth	Spring (March-May)	DBH, Clinometer, total number of trees	Planted trees survive and surviving trees reproduce	> 50% survival of trees, increase DBH, increase height	HSU students and Zane Middle School students
Photopoints	Once per month during first year, than one per year after three years.	Images taken from specific GPS coordinates.	To capture changes in the landscape over time from the same perspective.	Photopoints show a drastic change over the 5 years of monitoring	HSU students and Zane Middle School students
Vegetation monitoring (Native to non native composition)	Spring (March - May)	Identify species, tally the amount of different species, and categorize different life stage of plants.	Change plant composition to native riparian vegetation instead of grass and invasive	If native plant composition out numbers invasive and if the plants are self sustaining	HSU students and Zane Middle School students
Soil Samples	Once every six months. Conducting a wet	Bulk Density, Soil texture, infiltration, and compaction	Soil represents a predated condition	Soil texture will be a loam or clay loam, Increased infiltration,	HSU students and Zane Middle School

	and dry sample every time.			decreased compaction	students.
Stream survey	During Oct through Dec, advised after rain events	Cross-section surveys, discharge rates, pebble counts, LWD, temperature, pH and turbidity measurements	To track seasonal and long term fluctuations in stream bed channel and water quality.	Change in hydrology, increase discharge, change in pebble size, and some wood structures.	HSU students and Zane Middle School students.
Wildlife Monitoring	Spring (March - June) for terrestrial mammals and winter (Oct-Dec) for birds	Identifying animals by visual sight, tracks, scat, feathers, and bird calls	To track changes in area animal biodiversity, and habitat use through life stages.	Increased native vegetation and riparian corridor cover should create more use by larger animals.	HSU students and Zane Middle School students.

Table 1: School curriculum that focuses on parameters of success of restoration project. *Timeframe is based on the assumption the project will be completed two years from now and the monitoring will happen 3- 5 years after the original project is complete (2018-2022). LWD =Large Woody Debris.

Appendix G - CEQA Fees

CEQA Document	Fees Effective January 1, 2013	Fees Effective January 1, 2014
Negative Declaration (ND)	$2,156.25	$2,181.25
Mitigated Negative Declaration (MND)	$2,156.25	$2,181.25
Environmental Impact Report (EIR)	$2,995.25	$3,029.75
Environmental Document pursuant to a Certified Regulatory Program (CRP)*	$1,018.50	$1,030.25
County Clerk Processing Fee**	$50.00	$50.00

Table 2. Contains a list of the fees from CEQA. Source: California Department of Fish and Wildlife

<http://www.dfg.ca.gov/habcon/ceqa/ceqa_changes.html>

Appendix H: Community Member Contact List

Name(Title)	Phone number	Email/ Location	Notes
Craig Benson (Planner for RCAA)		craig@nrsrcaa.org	Coordinator with Zane Middle school, reason for project
Eureka City Schools District (ECSD) Maintenance Dept	707 441 2503		Dead End (Could not get info about history or culvert)
Frank Mathus (Public works office)	707 441 4253		Dead end
Gary Bougton (City of Eureka planning Dept)	707 441 4187	gboughton@ci.eureka.ca.gov	Info about sewer/sanitary line (maps and depth of sewer and sanitary line)
Humboldt County Historical Society (HCHS)	707 445 4342	703 8th st Eureka,CA 95502 noon to 4pm: T,W,F 3 to 7pm Th	Have a Zane middle school photo collection
Jan Schmidit (Principal at Zane)		schmidtj@eurekacityschools.org	Gave access to field
Jerry Rohde (Humboldt Room:HSU)		jerry.rohde@gmail.com	Info about leroy/ catherine zane and referral to Steve Lazar (Aerial photos of Eureka)
Steve Lazar (Humboldt County planning Office)	707 268 3741		Possible info about culvert (Could help in Future)
Steve Wartburg (Earth Science teacher at Zane)		wartburgs@eurekacityschools.org	Gave vital input about project design and has already been incorporating monitoring and evaluation into curriculum
Trevor Hammons (Historical context for Zane Middle school)		hammonst@eurekacityschools.org	Counselor at Zane that has not responded to emails.

Table 3: contains the contact information of all the community members that aided us in finding information and the extent of how much they helped in this process.