MEMO

TO: Board of Directors

FROM: Betsy Herbert, Ph.D.

SUBJECT: 2008 EDUCATION GRANT FINAL PROJECT REPORTS: "HEALTHY SALMONID HABITATS," AND "DISTRIBUTION & NESTING ECOLOGY OF YELLOW WARBLERS ON THE CENTRAL COAST OF CALIFORNIA."

DATE: July 30, 2009

RECOMMENDATION:

It is recommended that the Board of Directors review this memo and accept Final Project Reports for two projects funded by the District's Education Grant Program in 2008: "Healthy Salmonid Habitats," and "Distribution & Nesting Ecology of Yellow Warblers (*Dendroica petechia*) on the Central Coast of California." The Education Grant Program requires that, upon completion of a project, each grant recipient submit a written narrative report documenting the accomplishments of the project and a financial accounting of all expenditures of Education Grant Program funds. Additional requirements may also be specified by the individual grant award agreement.

BACKGROUND:

At the June 15, 2008 Board of Directors meeting, your Board awarded Education Grant Program funds in the sum of $2,500.00 to Tammy Osharow, a teacher at Boulder Creek Elementary School, for a project entitled "Healthy Salmonid Habitats." The grant provided funds for a hands-on project for 4th & 5th graders to learn about life-cycle & habitat requirements of steelhead trout, and to assess health of watershed for salmon through water quality testing.

On July 8, 2009 the District received Ms. Osharow's Final Project Report. See Attachment 1. It is recommended that your Board receive and accept the Education Grant Program Final Project Report for "Healthy Salmonid Habitats."

At the June 15, 2008 Board of Directors meeting, your Board awarded Education Grant Program funds in the sum of $1,460.00 to Matthew Strusis-Timmer, a graduate student at San Jose State University for a project entitled "Distribution & Nesting Ecology of Yellow Warblers (*Dendroica petechia*) on the Central Coast of California." The grant provided funds for Mr. Strusis-Timmer's M.S. thesis research into the distribution and nesting ecology of yellow warblers in the region, including the San Lorenzo River watershed, to help conserve the species. Mr. Strusis-Timmer's grant agreement also required him to provide the District with a digital copy of his thesis, and that he write and publish a news article about the project.

On July 9, 2009 the District received Mr. Strusis-Timmer's Final Project Report, a digital copy of his thesis, and a copy of a news article written and published about the project. Attachment 2 contains the final project report, excerpts from the thesis, and the news article. It is recommended that your Board receive and accept the Education Grant Program Final Project Report for "Distribution & Nesting Ecology of Yellow Warblers (*Dendroica petechia*) on the Central Coast of California."

Betsy Herbert, Ph.D.
Environmental Analyst

"Healthy Salmonid Habitats"
Grant Completion Report
Tammy Osharow
Boulder Creek Elementary School
July 9, 2009

After working with approximately 150 4th and 5th grade students to understand the impacts of pollution on the watershed, I believe this project has been incredibly successful. We spent the entire school year completing games, art projects, demonstrations, activities, and demonstrations to gain a better understanding of watersheds and steelhead. All that let up to a week of field trips where I took students to the San Lorenzo River at Junction Park in downtown Boulder Creek to learn how water quality testing works.

We began the year learning about why people care if steelhead and salmon disappear. Students completed art projects demonstrating knowledge of the internal and external anatomy of steelhead. As the year went on, students created posters to show the life cycle of steelhead and salmon, which helped students understand how important the river is in the life of these fish.

Later in the school year, students began a unit about insects that live in the river ecosystem. They played games such as, "Baby Bug Bingo," and "Habitat Battleship" to help them understand what they look like and where they live. Students learned the importance of aquatic invertebrates in the watershed.

In May we received steelhead eggs from the hatchery, which we incubated in our chilled fishtank. The eggs hatched, and students were able to see the eggs develop from alevin into fry. Just before the fry were to be released, I took all five of my science classes on field trips to the release site to test the quality of the water we would be releasing the steelhead into.

On this field trip, I was helped by a number of volunteers, which included parents, grandparents, and high school students from the Watershed Academy at SLVHS. Students were able to go through stations to perform different tests on the water. Students greatly benefited from the use of the Teachcam in the classroom, where they were able to see demonstrations of how to use different chemical test before we went on the trip.

At one station, students found out the water temperature and performed the tests for dissolved oxygen, pH, and turbidity. Students were very aware of the importance of the tests were through classroom activities and learning. After that, students went to a station where they searched for aquatic invertebrates. Finally, students went to a third station where they measured the width, depth, and velocity of the water in a small area and attempted to calculate the stream flow.

When we got back to the classroom, we took a swab of river water and were able to grow a coliform bacteria culture. I was able to create a slide of that and put it under the digital microscope for students to see.

Overall, this project was a complete success. Students have gained an understanding of their local watershed and some of the resources that are a part of it. Not only have students gained more of a conservation ethic, but they have been passing this information onto their families, and begun dialogue in many households on protecting and improving our water quality.

This project may actually help inspire the next generation to be more proactive on environmental causes.

Financial Accounting

Carolina Biological Supply	Carolina Water Quality of Natural Water Kit	$350
	Motic DM52 Digital Microscope	$349
	Teachcam 2.0	$899
	Shipping and Handling	$160
	Sales Tax	$145
Glacier Corporation	Aquarium Chiller	$625
	Shipping and Handling	$45
	Sales Tax	$50
	TOTAL	$2,623 *

*I went over the $2,500 and covered the rest through classroom funds.

SLVWD Education Grant Project Report

Date: May 30, 2009
Name of Project: Distribution and Nesting Ecology of Yellow Warblers (*Dendroica petechia*) on the Central Coast of California
Date Grant Awarded: June 10, 2008
Name: Matthew Strusis-Timmer

I. PROJECT ACTIVITIES AND ACCOMPLISHMENTS

I stated in my grant proposal that I hoped to answer questions regarding the distribution and nesting ecology of Yellow Warblers in the San Lorenzo River watershed and other watersheds in Santa Cruz County in order to conserve their populations. I believe that I met this goal with the help of the San Lorenzo Valley Water District Education Program Grant. In spring/summer of 2008, using the funds from the Education Program Grant, I surveyed 33 miles of streamside habitat for Yellow Warblers to determine their breeding distribution was in Santa Cruz County. I also collected vegetation data at each of the survey points and built a habitat association model that can predict the probability of their presence at a site.

In addition, I found 26 nests at the Pajaro River, the site with the highest population density, and painstakingly monitored each nest every 3-4 days until it fledged young or failed. I found that nest survival was very low due to both high Brown-headed Cowbird brood parasitism and high nest predation. The very low reproductive success at the Pajaro River site may be the reason that Yellow Warblers are declining along other streams in the region.

I believe that this research project enhanced the understanding of the San Lorenzo River Watershed environment by yielding important information that can be used for the conservation of Yellow Warblers, which is currently a Species of Special Concern in California. The results of the study may inform future management and policy decisions regarding the San Lorenzo River watershed and its wildlife. Additionally, I succeeded in informing the public about the plight of this charismatic songbird.

II. FINANCIAL REPORT

The San Lorenzo Valley Water District Education Grant Program enabled the Grantee to develop and carry out important scientific research on one of the disappearing birds in our region. The grant provided funds to travel to and from field sites and buy equipment to collect and analyze data. An itemized spreadsheet of expenses is included with this report. Receipts of expenditures are available upon request.

Date	Item	Source	Cost	Receipt (Y or N)
04/22/08	chest waders	Outdoor World-Santa Cruz	$156.23	Y
04/01/08	Garmin GPS with batteries	REI	$335.80	Y
04/01/08	Garmin Topo basemap	REI	$108.25	Y
04/01/08	MS Office 2007/memory card	Office Max	$156.94	Y
05/27/08	paper	Office Max	$12.36	Y
04/22/08	clipboard/mechanical pencil	Office Max	$29.82	Y
04/11/08	sharpies/printer ink	Office Max	$37.40	Y
05/06/08	flagging tape/honing stone	Lumbermens	$13.09	Y
05/24/08	small inspection mirrors	Scarborough Ace-SV	$12.78	Y
06/06/08	spraypaint/rubber boots	Scarborough Ace-SV	$29.82	Y
05/01/08	telescopic pole/mirror/hardware	Scarborough Ace-SV	$38.57	Y
04/11/08	paint/flagging	Lumbermens	$11.79	Y
04/15/08	machete	OSH	$11.90	Y
04/16/08	flagging/hardware	Lumbermens	$8.94	Y
05/24/08	flexible camera tripod	Bay Photo	$43.25	Y
03/04/08	Refurbished desktop computer	Dell	$553.75	Y
06/27/08	bike lock/flat tire preventer	Scotts Valley Cyclesport	$23.85	Y
04/17/08	bike tubes/tough strip tire protector	Scotts Valley Cyclesport	$29.27	Y
04/01/08	ArcGIS-Grad. 1 year use	ESRI	$100.00	N
05/01/08	SPSS Statistical software	Academic Superstore	$218.45	Y
04/08/08-07/31/08	Mileage-~3,200mi X .37 $/mi	various	$1,184.00	gas receipts
TOTAL			$3,116.26	

III. MEDIA AND PUBLICITY

This SLVWD Education Grant project has received the following publicity through print and presentation:

1. The research project and the results were described in an article written by the Grantee for the Santa Cruz Bird Club bi-monthly newsletter The Albatross (Nov/Dec 2008).
   An online version of the article acknowledging the District is available at:
   http://www.santacruzbirdclub.org/53_2a.pdf
2. An article describing the project and findings was written by Michael Torrice for the Santa Cruz Sentinel on March 15, 2009 entitled Researcher: Warblers fall into habitat trap. A copy of the article is held by Betsy Herbert of the District.
3. The research that was funded by the SLVWD Education Grant was written up as a thesis titled HABITAT ASSOCIATIONS AND NEST SURVIVAL OF YELLOW WARBLERS IN CALIFORNIA in completion of a Master's degree at San Jose State University in May 2009. The District is acknowledged in the document. A digital copy of the thesis is included with this report.
4. The research was presented at a professional ornithological convention. A 12 minute presentation entitled Habitat Association and Nest Survival of the Yellow Warbler: factors

influencing their distribution on the Central Coast of California was given at the annual meeting of the Western Field Ornithologists in San Mateo on October 10, 2008. The SLVWD was acknowledged in word and logo on a powerpoint slide at the beginning of the presentation.

5. The Grantee gave a 1 hour talk titled Life History, Nesting Ecology and Conservation of the Yellow Warbler to approximately 25 people at the Santa Cruz Bird Club monthly meeting on April 23, 2009. The District's involvement was acknowledged at the beginning of the talk.
6. The Grantee gave a public defense of his thesis on April 28, 2009 and acknowledged the District as one of the funding sources for the research project.

HABITAT ASSOCIATIONS AND NEST SURVIVAL OF YELLOW WARBLERS IN CALIFORNIA

A Thesis

Presented to

The Faculty of the Department of Biological Sciences

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Science

Matthew Strusis-Timmer

May 2009

ACKNOWLEDGEMENTS

I thank my advisor S. Bros-Seemann, committee members S. Lambrecht and D. Suddjian, and good friend W.S. Smithson for guidance and suggestions on this project. I am grateful to S. Gerow and C. Strusis-Timmer for assistance in the field and the private landowners who granted me permission to access streams via their property. Financial assistance was provided by San Jose State University through an Arthur and Karin Nelson and Evelyn Gerdts Research Fellowship and an Arthur and Karin Nelson Scholarship. The San Lorenzo Valley Water District contributed with an Education Program Grant.

ABSTRACT

HABITAT ASSOCIATIONS AND NEST SURVIVAL OF YELLOW WARBLERS IN CALIFORNIA

by Matthew Strusis-Timmer

Yellow Warblers have experienced population declines in California, earning them special status as a Species of Special Concern. The causes are thought to be habitat loss, nest predation, and Brown-headed Cowbird parasitism. In order to effectively conserve their remaining populations it is imperative to understand their specific habitat requirements and susceptibility to predation and parasitism. Ecological factors that best explained the distribution of Yellow Warblers were investigated by conducting point counts and recording stream and landscape, vegetation, and predator and parasite characteristics along streams in Santa Cruz County, California. In addition, predation and parasitism pressures were examined by monitoring nests and determining reproductive success. Yellow Warblers were highly associated with agriculture on the landscape scale. On the patch scale, willow (*Salix* sp.) shrubs and stream characteristics that are conducive to willow growth were the best predictors of Yellow Warbler presence at a site. A notably large portion of the Yellow Warblers breeding in the study area was found along the Pajaro River, a stream that is leveed and managed for flood control through annual vegetation-reduction regimes. However, the Yellow Warbler's partiality to this heavily disturbed system was met with very low nesting success due to high predation rates and cowbird parasitism, indicating that this scenario may be an ecological trap.

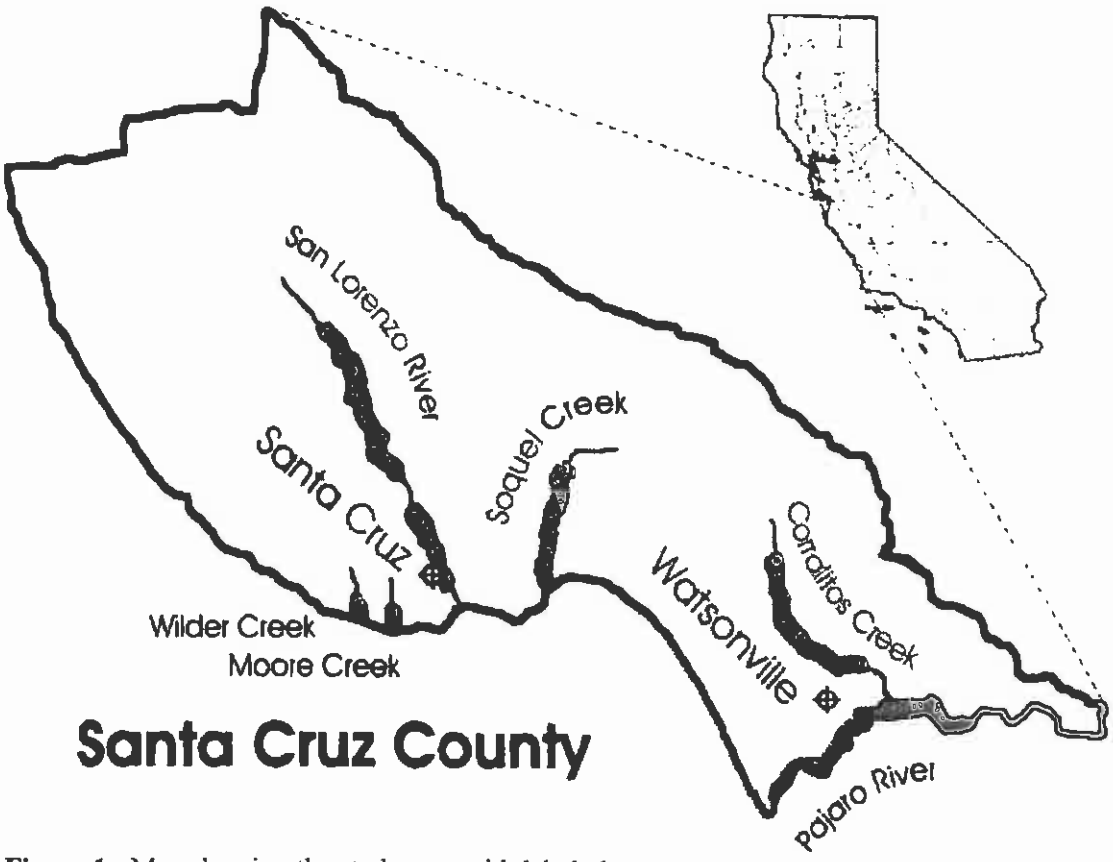


Figure 1. Map showing the study area with labeled streams and point count locations.

To examine the influence of patch and landscape-scale ecological factors on the distribution of Yellow Warblers along streams on the central coast of California, I measured factors relating to the stream and landscape, vegetation composition and structure, and predators and brood parasites at each of the 176 point count stations (Table 2). For logistical reasons of working in streams that flow mostly through private property and to maximize the range of inference, I developed a rapid habitat assessment method that used discrete data measurements to assess the stream and landscape and vegetation characteristics. I measured components of the vegetation within a 25 m radius circle, centered on the point count station. Dominant plant species in the canopy (≥5 m) and

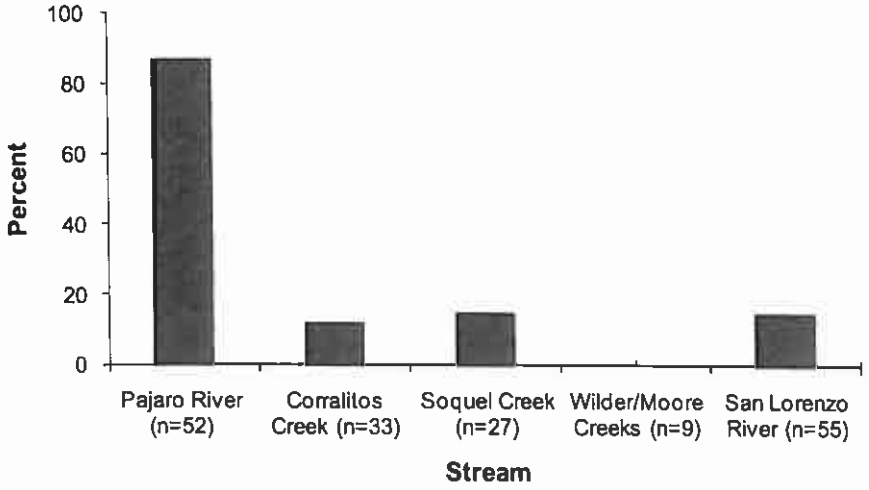


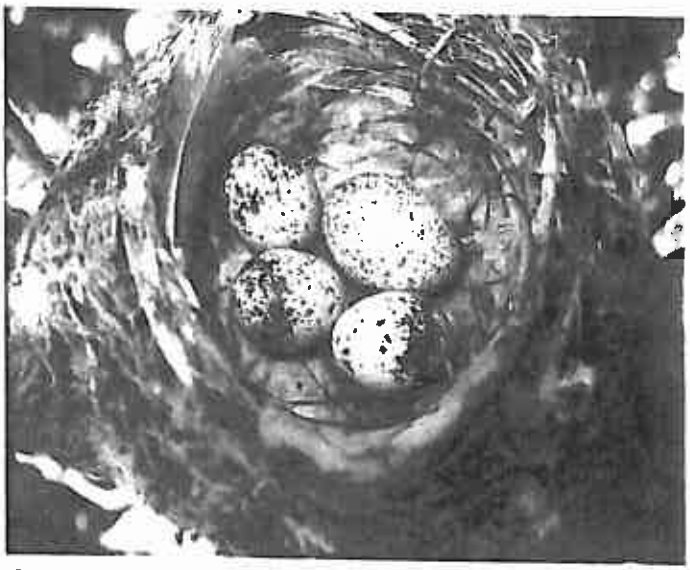
Figure 2. Occupancy rates of Yellow Warblers among streams in Santa Cruz County resulting from censuses conducted during the 2008 breeding season. Rates are expressed as the percentage of point count stations with at least one singing male detected during one or more of the surveys.

The log-linear analysis indicated that stream and landscape characteristics were associated with Yellow Warblers (Table 3). The significant interaction between Yellow Warbler presence and Yellow Warbler absence and stream flow direction showed that warblers were present proportionately more often at points in streams that flowed in south, southwest, and west directions than in other directions (Figure 3). The significant three-way interaction between Yellow Warbler presence and Yellow Warbler absence, flood evidence, and adjacent land use suggested that the proportion of warblers present at points with adjacent agriculture was significantly greater than those without, especially if there was evidence of high water present (Figure 4). The significant interaction between Yellow Warbler presence and Yellow Warbler absence and the presence or absence of

Habitat Associations and Nesting Success of Yellow Warblers in Santa Cruz County, CA

by Matthew Strusis-Timmer

Yellow Warblers have experienced both local and regional population declines, earning them a "Species of Special Concern" status in California. These declines are often attributed to habitat loss, predation, and cowbird parasitism. Therefore, it is imperative to understand the specific habitat requirements of this declining species as well as predation and parasitism pressures in order to effectively conserve remaining populations. This spring and summer I investigated which ecological factors best explain the presence of Yellow Warblers by conducting point counts and recording vegetation characteristics at 176 stations randomly placed along 33 miles of streams in Santa Cruz County. I examined predation and parasitism pressures by finding and monitoring nests at the Pajaro River, where the warblers were most numerous.

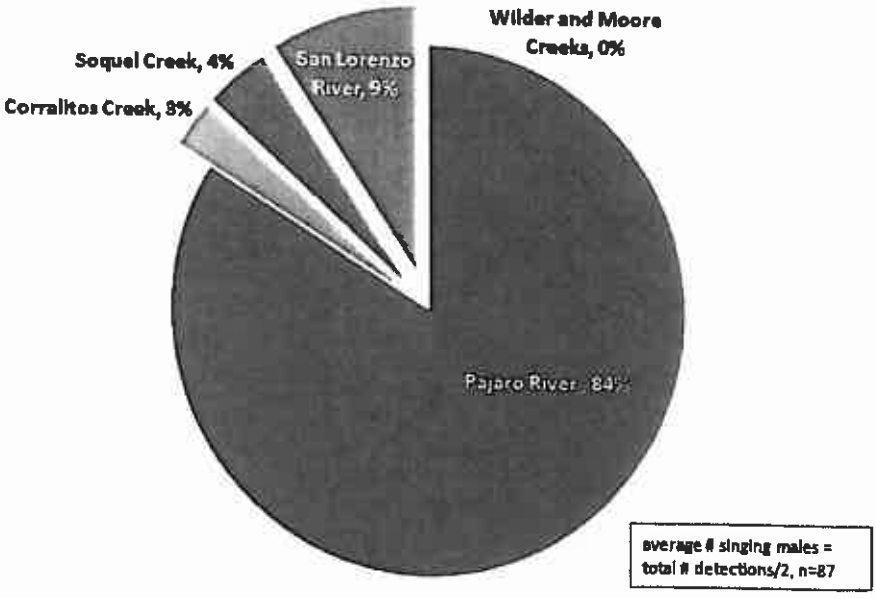


Can you identify the Brown Cowbird egg in this nest?

Habitat factors that best predicted the presence of Yellow Warblers at a site were low canopy height, increasing willow cover, and increasing willow height. Overall, Yellow Warblers were found at 34% of the stations, but most (84%) were along the Pajaro River (see graph). Nesting success along the Pajaro was very low. I found 26 nests but only two (8%) were successful, each fledging one young. Many of the nests were depredated (77%) and of those that reached the egg-laying stage, 61% were parasitized by Brown-headed Cowbirds

The downstream stretches of the Pajaro River, where the research was conducted, is leveed and managed for flood control through annual vegetation reduction regimes. This ongoing maintenance to the levee benches, coupled with flood disturbance, produces conditions that are attractive to this species through the creation of large areas of patchy willow thickets. However, the Yellow Warbler's partiality to this heavily disturbed system is met with low nesting success. It will take creative biologists and land managers to remediate the problems of predation and nest parasitism.

Distribution of Yellow Warblers among streams in Santa Cruz Co. 2008



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This research was funded by a San Lorenzo Valley Water District Education Program Grant, Arthur and Karin Nelson Scholarship, and Arthur and Karin Nelson & Evelyn Gerdts Research Fellowship; the latter two through the Department of Biological Sciences at San Jose State University.