

## **Overview: Young Scientists Project 2011-2012 School Year at Cuddeback Elementary School**

The Young Scientist Project provided firsthand experiences in a Redwood Forest to a select group of students chosen for their scientific aptitude and curiosity. In addition, this project, in collaboration with the Watershed Science in the Schools and the California Department of Fish and Game grant, provided school wide salmon education throughout grades K-8 at Cuddeback Elementary School.

Students at Cuddeback Elementary School were able to expand their knowledge of the redwood ecosystem, learn the life cycle of salmon, raise salmon in the classroom, visit the local salmon aquarium in Scotia, write poetry, develop a curriculum guide to salmon education, and to witness and document firsthand the mysterious salmon cycle of migration, spawning, and death.

The Young Scientists observed and conducted field experiments in turbidity, temperature, ph, and fish counting at select locations along the Van Duzen River at three specific sites : the Main Stem by Riverside Park, and two sites in the Humboldt County Park at Swimmers Delight.

Students in grades 1-2 and 6-8 raised salmon eggs and released them back into the Mad River. Field trips were conducted for all grades to the Scotia Aquarium in coordination with the Humboldt Redwoods Company. A select group of students from grades 5<sup>th</sup>-8<sup>th</sup> were selected to conduct experiments and do field work under the guidance of Sal Steinberg and guest scientists.

Many activities aligned with the California State Board of Education especially in the investigation and experiment objectives. Young Scientists used gps devices, Hach Model 2100P Portable turbidimeters, the Eutech Multi parameter PCST tester 35 ph/temperature meters, Hach Aquacheck 5-1 , and the Hach Aquacheck ph strips to study the Van Duzen River. They learned the power of observation, learned to take field notes, and experienced the difficulty of differentiating salmon species during their salmon counting experiences. Students studied salmon carcasses in the field, counting and measuring.



Young Scientists : Cuddeback Elementary School

## Water Quality Monitoring



Dr. Paul Trichilo at the Main Stem

## Salmon Watch



Identifying Salmon : Chinook



Measuring Carcasses in the Van Duzen

Data Collection: The Young Scientists engaged in monitoring activities in four sessions from October 17, 2011 through January 23<sup>rd</sup>, 2012. We studied the main stem at Riverside Park, and two sites at Swimmers Delight.

Our goal was to learn about water quality, to learn and witness the salmon cycle, and study the temperature effects on the Van Duzen. This river system has suffered from toxic algae and the Van Duzen River is the most sedimented of its size in the United States.

The temperature started warmer in October and cooled down in January. The range of temperature went from 64.9 to 38.9. The temperature gauge was the most consistent instrument that we used.

Using the Turbidimeter, each group took three samples every time. The results for each of the three groups was consistent every time except the 1<sup>st</sup> time. Group 2 had disturbed the water prior to taking the test.

The PH meter provided the most consistent measurement for ph. The ph strips were harder to read because the colors sometime blended, and did not have enough contrast. There was inconsistency between ph strips and ph meter. The ph meter gave a more exact reading, and on the 5-1 strip gave you a decimal range and we estimated the decimal.

### **World Monitoring Challenge**

**World Water Monitoring Challenge™** is an international education and outreach program that builds public awareness and involvement in protecting water resources around the world by engaging citizens to conduct basic monitoring of their local water bodies.

In 2011, approximately 340,000 people in 77 countries monitored their local waterways. We challenge you to test the quality of your waterways, share your findings, and protect our most precious resource!

We participated in collecting data for the World Monitoring Project on 10/17/2011 and 12/23/2011. In comparing our data with the world data, we find the following

Our Oct 17<sup>th</sup> water temperature of 65 degrees Fahrenheit compares pretty favorably with the average temperature in other North American rivers. Our Dec. 23<sup>rd</sup> reading of 39 degrees Fahrenheit was much colder than the North American average.

Our turbidity readings of 2.590 and 1.370 were quite a bit lower than the average turbidity in any of the survey showing that on these days water quality was significantly lower which means that our water was significantly cleaner and clearer on these dates.

Our ph readings are 8.4 and 8.080 were significantly higher than the data from the World Monitoring Project. This shows our water more alkaline than other water in other countries.

**Results :** Young Scientists took water quality data on the Van Duzen River over a slice of time from October 17<sup>th</sup> – January 23<sup>rd</sup>. Over this period of time the river changes, weather fluctuates, and the salmon migrate from the ocean, to the estuary, to the Eel River, and to the Van Duzen River.

**Temperature :** Temperature ranged from a high of 64.8 degrees to a low of 38.9 degrees in our data points from October to January. These temperatures are compatible for salmon migration, spawning, and survival.

**PH:** PH continues to show readings in the 8.0 – 8.72 range. This is consistent with the research from Karen Bromley and her master’s thesis on the Van Duzen which shows an increase in ph from 2006-2007.

VDR Water Quality Report\_KB\_Sep08 (1).pdf - Adobe Reader

Table 3. Descriptive statistics for pH values from sampling sites in the lower Van Duzen River Basin for the time period of October 2006 to April 2008 (N=32).

Site	Minimum	Maximum	Range	Mean	St. Dev
	Date	Date			
Van Duzen River at Weares (river mile 11)	6.4	8.4	2.0	7.5	0.62
	12/10/2006	8/10/07			
Van Duzen River at Rainbow Br. (river mile 18)	6.2	8.2	2.0	7.5	0.57
	12/10/06	10/12/07			
Wolverton Gulch	6.2	7.9	1.7	7.3	0.46
	2/10/07	7/30/07			
Yager Creek	6.0	7.9	1.9	7.3	0.52
	2/10/07	8/10/07			
Cummings Creek	6.6	8.1	1.5	7.4	0.46
	2/10/07	7/30/07			
Hely Creek	6.2	7.8	1.6	7.3	0.48
	11/15/07	11/15/07			
Grizzly Creek	6.4	8.2	1.8	7.3	0.55
	12/10/07	8/10/07			

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**Karen Bromley, Water Quality of the Lower Van Duzen River Basin, Oct.2006-April 2008**



Overall the pH values for all the sites were within the range of 6.0-8.5 that salmonid species and most aquatic organisms require for survival.

**Turbidity:** Turbidity ranged from a low of 0.99 on 10/17/2011 to a high of 462 on 1/23/2012 following a storm event. Overall the clarity of the water from October to December was excellent.

**Salmon Cycle:** As a group we developed a scientific model related to the salmon cycle. We observed the salmon cycle in the wild and in our classroom with the Salmon in the Schools Project. We observed spawning at our Swimmer's Delight station, and were able to observe and measure salmon carcasses in the Van Duzen River. We released steelhead from eggs in our classroom back to the Mad River.

We were fortunate to be able to witness the salmon cycle in the wild and in a controlled environment in our classroom.

**The Science in the Schools project** allowed us to develop our powers of observation, utilize measurement tools in the field, test our understanding, and allow us to develop scientific skills.

"As a group we studied the Van Duzen River. We learned how to find the turbidity of water. We learned what ph means. We learned how to use ph strips and a ph meter to find the base-acid value of water in the Van Duzen River. We analyzed data from past research and our research. We observed that the temperature was the most consistent for each date but that turbidity and ph had more of a range.

We learned how salmon interact in the field. When they come up to spawn, they normally stick in groups. We learned the life stages, and how salmon find their way back home where they spawn and die. We learned about the different kinds of salmon and conducted salmon counts at Swimmer's Delight Park. Then we got a chance to measure the carcasses. We experienced the life cycle in the field and in our Salmon in the Classroom tanks.

We learned to act like scientists."

Young Scientists of Cuddeback Elementary School

Josh Kyber, Jedediah Cooper, Sierra MacMillan, Beth Noel, Leland Justesen Hailey McEnry



Recommendations : Our group would like to continue to investigate the mysteries of the salmon cycle, and maintain our water monitoring as a way to measure water quality conditions for salmon habitat. We would like to follow the salmon migration from the estuary to the Van Duzen and back to the estuary.

We would like to enter the World Monitoring Day as a way to compare us to other places and connect us to other students around the world.

As far as instrumentation, we will discontinue the use of the Hach Aquatech PH strips but continue using the PH meter and the 5-1 Hach Aquatech strips.

We would like to study the Van Duzen River, examine the salmon cycle model, eventually improve salmon habitat, and help to promote the return of the salmon to the Eel River and Van Duzen watersheds.



*Art by Sharon Greene, Friends of the Van Duzen*