



**BRIDGING STUDENTS' ACHIEVEMENT  
THROUGH ENVIRONMENTAL SERVICE:  
THE AUSTIN YOUTH RIVER WATCH  
2007-08 EVALUATION REPORT**

**PREPARED BY**

**G. SUE KASUN  
UNIVERSITY OF TEXAS AT AUSTIN**

**ROCÍO VILLALOBOS  
UNIVERSITY OF TEXAS AT AUSTIN**

## EXECUTIVE SUMMARY

<b><i>Program Description</i></b>	<b><i>Major Findings</i></b>	<b><i>Recommendations</i></b>
<p>Funding (approximately \$180,000) for the 2007-08 school-year was provided by the Austin Water Utility, City of Austin's water and wastewater utility revenues and drainage fees administered by the Watershed Protection and Development Review Department, and private donations.</p> <p>The Austin Youth River Watch program, which grew out of a combined concern for water quality protection and a desire to assist under-served minority students, has three major goals:</p> <ol style="list-style-type: none"> <li>1. To improve the water quality of the Colorado River and its tributaries through ecological understanding and systematic analysis,</li> <li>2. To reduce the dropout rate of students in the Austin area secondary schools through positive role-model interactions and tutoring, and</li> <li>3. To increase the participation of minority students in critical environmental issues and in technical careers that require understanding of science and mathematics.</li> </ol> <p>The fundamental principle behind the Austin Youth River Watch program is to engage under-served students in learning about mathematics, science, and English by involving them in real-world applications that use these subjects.</p>	<ol style="list-style-type: none"> <li>1. During the 2007-08 school-year, 45 high school students were actively involved in the AYRW program. Expansion of the AYRW program began during the summer of 2008 with 11 new students who continued their participation through the following school year.</li> <li>2. Program students represented 8 Austin high schools; 78% of the students were female. The ethnic composition of students was: 82% Latino, 9% African-American, 2% Asian, 2% Anglo, and 2% Other.</li> <li>3. All ten 2007-08 AYRW seniors graduated high school.</li> <li>4. Most students believed they knew more about water pollution issues, environmental issues, and science because of participation in the program.</li> <li>5. Most students believed their participation in the AYRW program had been very important to them, they would encourage others to participate, and they planned to continue their participation.</li> <li>6. Socially, most of the students felt they belonged in this group, were making new friends inside and outside of their schools, and were being supported by their new friends and supervisor.</li> <li>7. Academically, average AYRW students' GPAs were higher than the average of AISD high school students. Additionally, the number of absences for program students was, on average, slightly lower than the average of AISD high school students.</li> </ol>	<p>Based on the present evaluation findings, the following recommendations are offered:</p> <ul style="list-style-type: none"> <li>• The Austin Youth River Watch program should continue to recruit and train minority under-served students for river water monitoring and interacting with experienced student role models.</li> <li>• The Austin Youth River Watch program should continue to tutor under-served student trainees and to expose these students to activities that include water quality and/or environmental themes.</li> <li>• The Austin Youth River Watch program should continue to provide students supplemental educational activities that provide them with a variety of experiences that broaden their understanding of the world as well as prepare them for future academic and professional endeavors.</li> <li>• The Austin Youth River Watch program should continue to provide students with a safe, positive, and emotionally supportive environment.</li> <li>• The Austin Youth River Watch program should continue its river water monitoring service for the City of Austin.</li> <li>• The Austin Youth River Watch program should continue to add to the water quality data base of the Lower Colorado River Authority.</li> </ul>

## TABLE OF CONTENTS

SOURCES OF EVALUATION DATA .....	1
INTRODUCTION .....	2
PROGRAM DESCRIPTION .....	4
ADDITIONAL PROGRAM ACTIVITIES .....	9
STUDENT CHARACTERISTICS .....	14
PROGRAM OUTCOMES .....	18
STUDENTS' PERCEPTIONS OF PROGRAM IMPACT .....	23
SERVICE TO THE COMMUNITY .....	29
SUMMARY AND CONCLUSIONS .....	30
RECOMMENDATIONS .....	31
BIBLIOGRAPHY .....	32

## **SOURCES OF EVALUATION DATA**

Information to assess the degree to which the Austin Youth River Watch program is conducting activities as planned, and the effects that the program has on participants, is collected from several sources. For the evaluation of the 2007-08 Austin Youth River Watch program, data were obtained from the following:

- **STUDENT DATA FILES**, provided by the program coordinator, supplied information concerning student characteristics (i.e., gender, ethnicity, grade-levels, and the schools they attend).
- **STUDENT QUESTIONNAIRES**, provided students' perceptions of program benefits and effects upon the students as a result of their participation in the program. Students are requested to complete questionnaires at the completion of their spring semester.
- **INTERVIEWS AND CORRESPONDENCE**, with the program coordinator provided information on program activities, program implementation, and the aspirations and academic endeavors of the 2007-08 Austin Youth River Watch high school graduates.
- **STUDENTS' GRADES AND ATTENDANCE**, for Austin Youth River Watch participants and high school students, were obtained from the Austin Independent School District.
- **STUDENT NEWSLETTER**, was obtained and analyzed for content.

## **INTRODUCTION**

The Austin Youth River Watch began in 1992, after the Colorado River Watch Foundation (CRWF) approached the City of Austin, Texas, with a proposal for involving minority students in river-monitoring activities. The CRWF is a nonprofit 501 (c) (3) organization that is dedicated to the scientific study, preservation, and conservation of the Colorado River—which flows through downtown Austin. As part of the CRWF's efforts, the Colorado River Watch Network (CRWN) has contributed numerous volunteer river-monitoring groups who regularly conduct water quality tests along the Colorado River. The CRWF proposal to the City of Austin was based on the idea that, perhaps by involving minority students in river-monitoring activities, along with providing them with tutoring and interactions with positive role-models, these students might be encouraged to complete school, and might even pursue scientific/environmental careers. With this idea in mind, the overall purpose of the CRWF proposal to the City of Austin was to reduce the dropout potential of minority students. Seeing the potential merit and worth of the proposal, the City of Austin funded the proposal. For a detailed account of the program's creation and initial implementation, see the Austin Youth River Watch program 1992-93 Final Report (ORE Publication No. 92.33).

## **FUNDING**

Although the concept of the Austin Youth River Watch was originally developed by associates of the Colorado River Watch Network, AYRW now serves as the primary program of its own separate 501 (c) 3 non-profit organization. The Austin Youth River Watch receives the bulk of its funding (approximately \$180,000) from the City of Austin's Austin Water Utility and its Watershed Protection and Development Review Department.

## **PROGRAM GOALS**

The Austin Youth River Watch (AYRW) program grew out of a combined concern for water quality protection in the City of Austin and a desire to assist under-served minority students. Since its inception, the program has focused on three overarching goals:

1. To improve the water quality of the Colorado River and its tributaries through ecological understanding and systematic analysis,
2. To reduce the dropout potential of students enrolled in Austin-area secondary schools through positive role-model interaction and tutoring, and
3. To increase the participation of minority students in critical environmental issues and encourage them to pursue technical careers that require understanding of science and mathematics.

The fundamental principle behind the Austin Youth River Watch program is to engage under-served students in learning about mathematics, science, and English by involving them in real-world applications that use these subjects. The embedding of learning within authentic activities is a process described as “situated cognition” (Brown, Collins, & Duguid, 1989). In learning activities that provide situated cognition, students benefit from using specific knowledge within real-world situations. Consequently, students can more easily make direct connections that facilitate greater understanding of academic information and its applications. As a situated cognition learning-environment, Austin Youth River Watch students must use mathematic calculations and measurements to conduct water quality tests. Because they use chemicals in these tests, they must also learn about chemical properties so that they can understand the results of their tests. Additionally, students write in personal journals, contribute articles and poems to the Austin Youth River Watch program’s newsletter, and prepare written reports that are sent to the Lower Colorado River Authority (LCRA). Thus, the Austin Youth River Watch program is providing situated-cognition learning experiences in which under-served students are learning and practicing mathematics, science, and English while participating in environmental studies and providing a service to the City of Austin, Texas.

# **PROGRAM DESCRIPTION**

## **GENERAL PROGRAM DESIGN**

To meet program goals, the original 1992-93 program design stipulated that eleventh- and twelfth-grade students, who were experienced in river water monitoring, would be brought in as “mentors” to work with ninth- and tenth-grade under-served student “trainees.” Student mentors, with their trainees, would be required to conduct weekly chemical and biological monitoring at designated monitoring sites located along the 22 creeks within the City of Austin that feed into the Colorado River. After completion of their water-monitoring duties, time would be provided for students to study, work on their school homework assignments, and/or participate in academic tutoring. Students would receive a stipend check for both their river water monitoring as well as their involvement with school-related work.

## **CURRENT PROGRAM GUIDELINES**

Currently, the program follows most of the original guidelines. However, through the years, a few changes have been made. The first change that was made allowed for student “trainees” to have an opportunity to be promoted to student “mentors.” Following the initial program year, student trainees who had demonstrated a high degree of water monitoring knowledge (through an oral test as well as throughout program activities) were promoted to the position of student mentor. Allowing the trainees to become mentors recognizes their growth in knowledge and skills, and provides these students with opportunities for leadership development.

Another change in the program guidelines allowed middle school students to join the program as student trainees. Similar to the high school student trainees, if the middle school students demonstrate a high degree of water monitoring knowledge and skills, they may also be promoted to the position of student mentor. For the 2007-08 school year, the program did not have middle school student participants. An independent evaluator, Dr. Jeannine Turner, recommended that AYRW focus its efforts on high school students so that AYRW could collect enough surveys and student academic data to be statistically significant. Although an effort is still made to involve middle school students,

high school students are more highly sought after.

### **UNDER-SERVED STATUS**

As stipulated in the program design, the 2007-08 recruiting efforts focused on minority, under-served students—although no student is excluded from participating because of ethnicity or class standing. Students considered to be academically “at-risk” have a greater probability of leaving school before completing the twelfth-grade than students who are not classified as being under-served. The Texas Education Agency (TEA) and Austin Independent School District (AISD) use the following definitions for identification of “at-risk” secondary students:

- Two or more years older than expected for the student’s grade level,
- Two or more years below current grade level in reading or mathematics, as measured by the most recent administration of a norm-referenced achievement test,
- Two or more F’s in a semester,
- Failed at least one of the Mathematics, Reading, or Writing tests in the most recent administration of the Texas Assessment of Knowledge and Skills (TAKS), the state mandated criterion-referenced test.

\* Throughout this document we use the term under-served as opposed to at-risk.

### **MONITORING SITES**

Water quality testing occurred in numerous sites around the City of Austin on the Colorado River and its tributaries. During the 2007-08 school year, Austin Youth River Watch participants conducted water quality tests at the seventeen sites listed in Figure 1.

**FIGURE 1**  
**2007-08 AUSTIN YOUTH RIVER WATCH**  
**WATER QUALITY TESTING SITES**

<b>CREEK/RIVER &amp; LOCATION</b>
Barton Creek @ Barton Creek Habitat Preserve
Barton Creek @ Barton Springs
Bee Creek @ Wild Basin Preserve
Blunn Creek @ Blunn Creek Preserve
Colorado River @ 2.5 mile marker
Colorado River @ Austin Youth Hostel
Colorado River @ Old Ford, Hornsby Bend
Colorado River @ Redbud Isle
East Bouldin Creek behind Jovitas
East Bouldin Creek below El Mercado
Little Bear Creek @ Lower Check Dam, Tabor Track WQPL
Onion Creek @ Lower Falls, McKinney Falls State Park
Waller Creek @ Colorado River
Waller Creek @ Waller Creek Center
Wells Branch @ Metropolitan Park
West Bouldin Creek @ the Colorado River
Williamson Creek @ Dove Springs Park

**WATER-MONITORING PARAMETERS**

Each week, measurements and tests were conducted for seven water quality parameters. The parameters, described in Figure 2, are dissolved oxygen (DO), temperature, conductivity, pH, ortho-phosphorus, and nitrate/nitrogen (NO<sub>3</sub>). The results of each water quality testing session were sent to the Lower Colorado River Authority (LCRA) and added to the database of water quality test results that have been conducted throughout the LCRA district.

**FIGURE 2**  
**WATER QUALITY PARAMETERS**  
**TESTED BY AUSTIN YOUTH RIVER WATCH PARTICIPANTS**

Dissolved oxygen (DO) is measured in milligrams per liter (mg/l) and shows the amount of oxygen available to fish and other aquatic organisms.

Temperature is measured in degrees Celsius. The temperature of the water determines how much DO the water can hold.

Conductivity is measured in microsiemens per centimeter ( $\mu\text{S}/\text{cm}$ ), determining how fast the water allows electricity to move through it. This conductance measure allows for extrapolation as to the amount of pollution dissolved in water. The higher the reading, the more pollution dissolved in the water.

pH is a measurement of acidity that ranges from 0-14 standard units, with 7 being neutral. The lower the number, the more acidic the water.

Ortho-phosphorus and nitrate/nitrogen are measured as milligrams per liter (mg/l) and are nutrients that can promote excessive aquatic plant growth. Both are products of the natural decomposition of organic material or from excess fertilizer, but they may become elevated downstream from the wastewater treatment facilities.

## **ADDITIONAL MONITORING INFORMATION**

In addition to the water quality test data collected at the sites, students also wrote field-observation notes. These observation notes included information about water color, water clarity, water surface clarity, odor, algae color, algae cover of the surface, and algae cover of the substrate. Other notes that students collected included the flow of the water or water level, notes about animals or people at the site, plants growing at the site, and weather patterns for the day of monitoring. Students also participated in macroinvertebrate identification and classification as a biological assessment method related to water quality.

## **ADDITIONAL PROGRAM ACTIVITIES**

### **SPECIAL ACTIVITIES**

To provide students with the opportunity to get to know each other, build camaraderie, and support knowledge-building with respect to water quality issues, special activities were scheduled approximately once a month. Special activities and field trips always contained a component that links environmental information with educational opportunities. For example, AYRW students participated in field trips such as visiting the SPLASH exhibit near Barton Springs where they learned about the Edwards Aquifer and interacted with educational games and exhibits. Specific information about the events that the Austin Youth River Watch program participated, as well as the number of students who participated in each event, is listed in Figure 3.

**FIGURE 3**  
**EVENTS ATTENDED BY**  
**AUSTIN YOUTH RIVER WATCH PARTICIPANTS**

<b>DATE</b>	<b>NUMBER OF PARTICIPANTS</b>	<b>ACTIVITY DESCRIPTION</b>
21-Aug-07	5 AYRW Students and a few hundred other community members	AYRW students served cake and ice cream at the Birth Day Party for John Henry Faulk, for whom Austin's Main Library is named, and watched a film at the Zilker Hillside Theater about his life and about his defense of the first amendment of the US Constitution.
Aug 27-31, 2007	27	Students set AYRW, personal and academic goals for the semester.
7-Sep-07	6	AYRW students helped paint the mural on the wall of the student mural room at the AYRW EcoHouse.
11-Sep-07	4	AYRW student did a frog count in the greenhouse at the Hornsby Bend Biosolids Management Plant and looked at ducks on the ponds there.
6-Oct-07	6 + 20	AYRW students met with about 20 other students from different schools up and downstream from Austin at the LCRA Colorado River Watch Network Student Symposium. The AYRW students talked about our part of the river and learned from other students about the river in the areas where they came from.
13-Oct-07	4	AYRW students volunteered for the Green City Festival where they taught citizens about water quality and demonstrated some of the tests. The students also learned about many of the interesting environmentally oriented work going on in Austin. Program Coordinator spoke with a forum of other environmental youth programming folks.
18-Oct-07	4	Students tested water at Hornsby Bend for World Water Monitoring Day.

October 20-21, 2007	6	AYRW Young Women's Retreat at the AYRW EcoHouse: students listened for night sounds and watched movies while they got to know students from other AYRW groups.
3-Nov-07	6	The young women of AYRW had a campout at the Texas Nature Conservancy's Barton Creek Habitat Preserve. The students tested water, identified fish, birds and native plants and discussed the habitats of the two species of endangered birds that use the habitat preserve for their survival.
15-Nov-07	2	AYRW students helped the Program Coordinator prepare all of the field lab materials for the CAST field trip for the next day.
16-Nov-07	8	Program Coordinator hosted 8 Science Teachers and other community members as part of the Conference for the Advancement of Science Teaching. The science teachers came from all over the state of Texas. The program coordinator lead the teachers through a benthic macroinvertebrate training where the participants learned and practiced the skills of collecting water bugs, sorting and identifying them and then using a rubric to analyze the meaning of their findings.
19-Nov-07	8	AYRW students attended the the Save Barton Creek Association Annual Meeting where they were treated to stories of local environmental heroism and a tasty turkey dinner. The students met many local elected officials and other active community members including two of the founders of Austin Youth River Watch and a River Watch graduate.
Dec 10-14, 2007	33	AYRW students evaluated themselves on their three goals for the semester.
Jan 14-18, 2007	31	AYRW students set three goals each for the semester: a River Watch Goal, a School Goal and a Home or Personal Goal.

25-Jan-08	8	AYRW students helped take and sort the recycling from the AYRW EcoHouse to the Ecology Action Recycling Center downtown at 9th St. and IH-35.
2-Feb-08	3 AYRW students + ~50 other community members	AYRW students joined hundreds of volunteers from all over the city to plant 2008 trees provided by TreeFolks for their annual planting event, this year called Tree 2008. Students worked in a group of about 50 people to first plant trees in Patterson Park and then at the intersection of MLK and Airport Blvd.
23-Feb-08	2	AYRW Students helped present for 30 Capitol Area Master Naturalists.
25-Feb-08	3	AYRW EcoHouse Volunteer Day: AYRW students painted parts of the Colorado River watershed onto the floor in the Mural Room at the AYRW EcoHouse.
7-March-08	8	AYRW students helped prepare for Spring Break by checking the tents, testing equipment and making sure all supplies were ready to load into the van.
9-March-08	5	AYRW students, coordinator and one River Watch Mom volunteer, Dr. Darlene Reesor loaded up in the van and drove West from the prairies of East Austin across the hill country into the desert and mountain country in South West Texas. We stayed the night at Post Park in Brewster County. It was such a treasure of a place with a deep oasis surrounded by grass, tall trees and high cliffs that attracted dozens of soaring vultures, riding the thermals created by the uplift at Sunset.
10-March-08	5	AYRW students ventured into Big Bend National Park. We went to the Basin and set up our camp where we would be for two nights. After we set up camp, we hiked the Window Trail to a large V-Shaped outlook on the Mountain that showed like a window overlooking the desert.

11-March-08	5	AYRW students continued our Big Bend Adventure by hiking in Boquillas Canyon where aeolian sand deposits and the Rio Grande provided hours of engagement with the landscape. On our way back toward the Basin, we stopped at the Hot Springs where students enjoyed the warm waters of the springs and then dipped into the cool waters of the Rio Grande. The students saw pictographs and petroglyphs on the canyon walls here left behind by the native people who once lived near the hot springs. Students also experienced the coolness of the shade amongst large clumps of tall grasses and palm trees.
12-March-08	5	Today AYRW students had ice cream in the village at Castolon and then hiked and played in Santa Elena Canyon. The Rio Grande has continuously down cut through the rock as the cliff face has risen here creating an incredible canyon. Students enjoyed skipping stones in the river, looking for macroinvertebrates, waving hello to river goers and playing softball at the base of the canyon, in the shadow of its great walls. From here we drove through the desert to our final oasis of the 2008 Spring Break EcoLearning Adventure - the San Solomon Springs at Balmorhea State Park.
13-March-08	5	AYRW Students swam in the second largest Spring Fed pool in Texas at Balmorhea State Park - another desert oasis on the last day of the trip before returning home to our native ecotone region in central Texas.
19-March-08	6	AYRW Students planted the Spring Garden in the backyard at the AYRW EcoHouse.

March 25-31, 2007	31	Career Exploration and Life Skills Activity: Students used local job finder guides, apartment and home buyers guides, the internet and local newspapers to find jobs that pay for the type of lifestyle they want to lead, created a budget, found living accommodations and found out what level of education and experience are necessary for the jobs.
April 14-18, 2008	27	Students wrote articles, drew pictures and came up with games like crossword puzzles and word finds for the AYRW newsletter, The Flying Fish Review.
19-April-08	7 + 3 volunteers large community event	Earth Day 2008 - AYRW Students joined hundreds of other Austin citizens in a celebration of Earth Day. They demonstrated water quality monitoring techniques and helped some community members to learn about some of the tests we do. They also met much of the Austin Water Utility staff that supports this program and helped them to pass out materials to community members.
April 26-27, 2008	4	The Young Women of AYRW had a retreat at the AYRW EcoHouse.
30-April-08	5	AYRW students flew kites and relaxed after a day of taking TAKS tests.
2-May-08	8	AYRW students flew kites and relaxed after a day of taking the TAKS tests.
May 5-9, 2008	26	Students completed end of School Year Evaluation Surveys.
May 13, 14 and 16, 2008	16	AYRW students looked for frogs and did frog counts by species at the Hornsby Bend Biosolids Management Plant's Aquatic Greenhouse. Students found Green Treefrogs, Bullfrogs, Cricket frogs and Leopard frogs. We also heard the calls of most of these species.
May 19-23, 2008	28	AYRW Students evaluated themselves on their semester goals for home, school and River Watch.
June 2008		Graduations

June 9-11, 2008	27	New Program Coordinator, Suzette Ermler, began the official expansion of AYRW by working with students from North Austin schools including Reagan and Lanier. AYRW students began participation in the Summer Leadership Program by talking about ways to stay safe in the AYRW this summer and also set personal and River watch goals for the summer.
10-June-08	4	AYRW Students went caving in Whirlpool Cave in South Austin in conjunction with an activity with the City of Austin.
12-June-08	7	AYRW students challenged themselves and helped each other climb at the South Austin Rock Gym.
18-June-08	8	AYRW students did a benthic macroinvertebrate workshop with the Program Coordinator. They did a "bug stomp" or collection, identified the invertebrates they caught, sorted them by the quality of water each requires and released the bugs back into the water. They then used a rubric to help them assess the longer term water quality at the site indicated by the population of water bugs found there.
19-June-08	7	AYRW students challenged themselves and helped each other climb at the South Austin Rock Gym. Students also celebrated Juneteenth and talked about the Emancipation Proclamation.
26-June-08	7	AYRW students challenged themselves and helped each other climb at the South Austin Rock Gym.
30-June-08	7	AYRW students visited the Barton Creek Habitat Preserve where they met Habitat Steward, Brandon Crawford, of the Nature Conservancy of Texas Barton Creek Habitat Preserve. Students asked him about his job and his education background and other career-related questions and then tested water and swam in the creek.

3-July-08	7	AYRW students canoed on Lady Bird Lake Thanks to the Zilker Park Boat Rentals for providing Canoeing Experiences for AYRW Students this summer!
8-July-08	10	AYRW students visited the Barton Creek Habitat Preserve where they met Habitat Steward, Brandon Crawford, of the Nature Conservancy of Texas Barton Creek Habitat Preserve. Students asked him about his job and his education background and other career-related questions and then tested water and swam in the creek.
10-July-08	11	AYRW students canoed on Lady Bird Lake Thanks to the Zilker Park Boat Rentals for providing Canoeing Experiences for AYRW Students this summer!
July 11-12, 2008	13	The Young Women of the AYRW had a retreat at the AYRW EcoHouse where they got to know each other better, listened to frogs, played games like Apples to Apples and Pit and watched movies.
15-July-08	11	AYRW students took recycling from the AYRW EcoHouse to the Ecology Action Recycling Center downtown.
July 14-16, 2008	29	AYRW students had final day pizza parties at Double Daves by UT and evaluated themselves on their summer goals.
17-July-08	6	AYRW students canoed on Lady Bird Lake Thanks to the Zilker Park Boat Rentals for providing Canoeing Experiences for AYRW Students this summer!

## **CAREER EXPLORATION AND LIFE SKILLS ACTIVITIES AND DISCUSSION**

Each Spring, Austin Youth River Watch students participate in a series of career exploration and lifeskills activities and discussions. For example, one week each Spring, the program coordinator provides the students with job guides, apartment locators, and budget worksheets. Students have to find an apartment and a job that pays at least three times as much as they would pay in rent. Students, then, create a monthly budget and provide a written explanation about how they can achieve the education and training required to obtain the job.

### **THE FLYING FISH REVIEW**

The “Flying Fish Review” is the newsletter of the Austin Youth River Watch program. Under the direction of the project coordinator, the “Flying Fish Review” is composed of articles, poems, thoughts, essays, drawings, and book reviews written by Austin Youth River Watch members. The newsletter is printed approximately twice a year and is distributed to Austin Youth River Watch program participants as well as individuals who are interested in the program.

Analysis of the contents indicates participation from at least six AYRW members, though positive references are made to at least seven other student participants. Student drawings indicate a positive sense toward nature, toward collaborating with the group, and toward the program leaders. The drawings also indicate a clear sense of the scientific process involved in testing the waters.

In terms of written content, two student contributors describe their positive experiences surrounding collaboration in the projects and express a high level of enthusiasm. One student has written the lead article and compellingly describes how AYRW has been critical and instrumental in her new, emerging sense of future purpose, stating that she wants to become a biologist, and, that prior to her work with AYRW, she had no prior sense of work she hoped to do in the future. She expresses gratitude toward the program director for “inspiring” her toward a “passion” that began in the AYRW. The newsletter demonstrates a sense of inclusion by offering information regarding how other community members, particularly high schools students, may become involved.

## STUDENT CHARACTERISTICS

By the end of the 2007-08 school year, a total of 45 students (20 student mentors and 25 student trainees) were involved in the Austin Youth River Watch program. The following sections describe the characteristics of the student participants.

### GENDER

Historically, female participation in courses and careers in the areas of advanced mathematics and science has been below that of males. One goal of the program is to influence the participation of female students in environmental issues and career paths. As Figure 4 shows, the number of female participants in the 2007-08 Austin Youth River Watch program was markedly higher than that of males. Of the 45 participants, 35 students (78%) were female; 10 students (22%) were male.

**FIGURE 4**  
**GENDER OF 2007-08**  
**AUSTIN YOUTH RIVER WATCH STUDENTS**

<b>GENDER</b>	<b># OF TRAINEES</b>	<b># OF MENTORS</b>	<b>TOTAL</b>
<b>MALE</b>	5	5	10 (22%)
<b>FEMALE</b>	20	15	35 (78%)
<b>TOTAL</b>	25 (56%)	20 (44%)	45 (100%)

### ETHNICITY

One of the major goals of the Austin Youth River Watch program is to increase the participation of minority students in environmental issues and to encourage them to pursue technical careers in science and mathematics. This goal seems particularly daunting given that a greater proportion of Latino and African American students are

more likely to be classified as being at-risk of dropping out of school than White/Other students (see ORE Pub. No. 91.41).

As Figure 5 displays, the Austin Youth River Watch program appears to be successfully addressing the goal of involving a high percentage of minority students in the program. Indeed, 94% of the AYRW participants are minority students (non-Anglo). Latino students comprised the largest number (n=37, 82%) of minority student participants.

With respect to the percent of specific minority groups represented in the Austin Youth River Watch, thirty-seven (37) of the program’s students were classified as being Latino (82% of total), four students (4) were classified as being African American (9% of total), two students (2) were classified as being Anglo (4% of total), one student (1) was classified as Asian (2% of total), and one student (1) was classified as being of other ethnicities (2% of total).

**FIGURE 5**  
**ETHNICITY OF 2007-08**  
**AUSTIN YOUTH RIVER WATCH STUDENTS**

<b>ETHNICITY</b>	<b># OF TRAINEES</b>	<b># OF MENTORS</b>	<b>TOTAL</b>
<b>AFRICAN AMERICAN</b>	0	4	4 (9%)
<b>ANGLO</b>	0	2	2 (4%)
<b>LATINO</b>	24	13	37 (82%)
<b>ASIAN</b>	0	1	1 (2%)
<b>OTHER</b>	1	0	1 (2%)
<b>TOTAL</b>	25 (56%)	20 (44%)	45 (100%)

## GRADE LEVELS

In compliance with the grant's objectives, members of the 2007-08 Austin Youth River Watch program represented a diverse population of Austin-area high schools as well as a wide range of ages and grade levels. Grades 10 and 11 contained the largest number of trainees while grades 11 and 12 contained the largest number of mentors. Figure 6 displays the grade levels of 2007-08 program students.

**FIGURE 6**  
**GRADE LEVELS OF 2007-08**  
**AUSTIN YOUTH RIVER WATCH STUDENTS**

<b>GRADE LEVEL</b>	<b># OF TRAINEES</b>	<b># OF MENTORS</b>	<b>TOTAL</b>
<b>GRADE 9</b>	4	0	4 (9%)
<b>GRADE 10</b>	11	4	15 (33%)
<b>GRADE 11</b>	8	8	16 (36%)
<b>GRADE 12</b>	2	8	10 (22%)
<b>TOTAL</b>	25 (56%)	20 (44%)	45 (100%)

## SCHOOLS

Participants of the Austin Youth River Watch attended a number of Austin schools. This year, all of the participating students were high school students (100%). The schools that Austin Youth River Watch participants attended are displayed in Figure 7.

**FIGURE 7**  
**SCHOOLS ATTENDED BY 2007-08**  
**AUSTIN YOUTH RIVER WATCH TRAINEES & MENTORS**

<b>SCHOOL</b>	<b># OF TRAINEES</b>	<b># OF MENTORS*</b>	<b>TOTAL</b>
<b>AKINS HIGH SCHOOL</b>	5	2	7 (16%)
<b>AMERICAN YOUTH WORKS</b>	0	2	2 (4%)
<b>AUSTIN HIGH SCHOOL</b>	10	0	10 (22%)
<b>GARZA INDEPENDENCE HIGH SCHOOL</b>	1	1	2 (4%)
<b>JOHNSTON HIGH SCHOOL</b>	2	7	9 (20%)
<b>LIBERAL ARTS &amp; SCIENCE ACADEMY (LASA)</b>	1	3	4 (9%)
<b>LBJ HIGH SCHOOL</b>	2	4	6 (13%)
<b>TRAVIS HIGH SCHOOL</b>	4	0	4 (9%)
<b>TOTAL</b>	25 (56%)	20 (44%)*	45 (100%)*

\*Note: One mentor moved at the end of the year to another district.

**SUMMARY OF AUSTIN YOUTH RIVER WATCH PARTICIPANTS**

In summary, during the 2007-08 school-year, 45 high school students (25 trainees and 20 mentors) were actively involved in the AYRW program. Students attended a variety of Austin-area schools. Specifically, program students represented eight Austin high schools across four grade levels (9-12). Participants also represented a range of ethnic groups, with the majority of students classified as “minority.” Of the total participants, 78% (35) of the students were female. The ethnic composition of students included 82% (37) Latino students, 9% (4) African-American students, 2% (1) Asian student, 4% (2) Anglo students, and 2% (1) was classified as being of other ethnicities.

# **PROGRAM OUTCOMES**

## **OUTCOMES ANALYSIS OVERVIEW**

One of the major goals of the Austin Youth River Watch program is to reduce the dropout potential of students in Austin-area schools. To assess the program's progress toward meeting this goal program, students' grades and school attendance were investigated. To obtain student data, consent forms were requested to be signed by students' parents. Of the total AYRW program students (45), 35 (78%) parent-signed consent forms were obtained. Student data were obtained for each of the 35 students with signed parent-consent forms. Although the majority of the students submitted signed parental consent forms, results should be interpreted with caution. The 35 students, whose school data were obtained from AISD, represented six schools. AISD provided students' (with signed consent forms) grade-point averages and average absences as well as the average GPA and absences of all AISD high schools. The following sections describe these students' information.

## **STUDENTS' SCHOOL ATTENDANCE**

One measure of program effectiveness is students' attendance at school. Not surprisingly, students often have lower academic achievement when they do not attend school. Low attendance can also lead to leaving school before completing the school year. For the Austin Youth River Watch program, students' school attendance may indicate the program is having a positive affect on students' school attendance.

Austin Youth River Watch students' school absences were averaged and compared to the average absences of AISD high school students. As Figure 8 shows, in comparison to all AISD high school students, the average school attendance of AYRW high school participants (whose consent forms were obtained) was higher than the average of all AISD high school students. The program may or may not have had a positive influence on high school students' attendance.

**FIGURE 8**  
**AVERAGE PERCENTAGE OF SCHOOL ATTENDANCE FOR**  
**AISD HIGH SCHOOL STUDENTS**  
**AND AUSTIN YOUTH RIVER WATCH PARTICIPANTS**

<b>AISD</b>	<b>AYRW</b>
<b>HIGH SCHOOL</b>	<b>HIGH SCHOOL</b>
<b>STUDENTS</b>	<b>STUDENTS</b>
87.9%	88.6%

**GRADE POINT AVERAGES**

Many of the Austin Youth River Watch students have been identified by AISD as being at-risk of dropping out of school. One of the main indications of being at-risk is low academic achievement. To help raise the academic achievement of program students, the students are required to work on their homework as one aspect of their “jobs.” Assistance with completing their homework may be obtained by other students, the program coordinator, and/or university student volunteers.

As a general indicator of students’ progress, Austin Youth River Watch students’ grade point averages (GPAs) were averaged and compared to the average GPAs of AISD high school students. As Figure 9 shows, in comparison to all AISD high school students, the GPAs of AYRW high school participants (whose consent forms were obtained) were higher.

**FIGURE 9**  
**AVERAGE GPA FOR AISD HIGH SCHOOL STUDENTS**  
**AND AUSTIN YOUTH RIVER WATCH PARTICIPANTS**

<b>AISD</b>	<b>AYRW</b>
<b>HIGH SCHOOL</b>	<b>HIGH SCHOOL</b>
<b>STUDENTS</b>	<b>STUDENTS</b>
81.6%	83.3%

**2007-08 HIGH SCHOOL GRADUATES**

The ultimate goal of the program is to have program participants graduate from high school. This year ten (10) 2007-08 AYRW seniors graduated, having attended a range of schools in the Austin Independent School District; one (1) successfully completed a GED. No seniors failed to complete either high school or a GED.

**DESCRIPTIONS OF PROGRAM GRADUATES**

Having 10 Austin Youth River Watch program participants receive their high school diplomas suggested that by (1) helping them to remain in school and (2) helping them to successfully complete all of the requirements for graduation, the program is having a positive effect on students. The following scenarios, written by the program coordinator, describe some of the graduates' program-participation and future aspirations.

- The final valedictorian for Johnston High School was also an AYRW veteran participant.
- Three AYRW senior participants graduated in the top 10% of their class.
- AYRW graduates of 2008 will be attending UT Austin, Texas A&M, Texas State University and ACC.

- A former AYRW participant had just graduated with her two year degree from Cottey College in Missouri and was headed to The Evergreen State College in Washington State to major in Environmental Science while also having an opportunity to work on social justice issues.

Graduating from high school, (and hence from the Austin Youth River Watch program), is an important accomplishment. It is evidence that the program is meeting its over-arching primary goal and suggests that the program, indeed, helps students to graduate by linking academic subjects within a situated-cognition, service-providing environment. The educational activities provided by the Austin Youth River Watch program may promote deeper knowledge of environmental sciences as well as inform participants about potential environmental science careers. Additionally, the programs' activities allow for the development of supportive peer- and adult- relationships while helping the community maintain high standards of water quality.

Evaluations of students' perceptions of their involvement suggest that the activities of the Austin Youth River Watch program offer academic support and social support that nurture and promote a supportive "community of learners." The following sections, describing students' perceptions of Austin Youth River Watch activities, provide evidence of the success of the program's approaches and activities

## **STUDENTS' PERCEPTIONS OF PROGRAM IMPACT**

At the end of the 2007-08 school year, Austin Youth River Watch participants were asked to complete a student questionnaire packet. The focus of the questionnaire packet was the participants' perceptions of program benefits and experiences.

Students were requested to answer 29 Likert items (5-point scale, ranging from 1 = "strongly disagree" to 5 = "strongly agree") and two items that requested a "yes" or "no" answer. There were also five open-ended questions to allow students to provide unconstrained answers.

### **SURVEY RESULTS: QUANTITATIVE DATA**

Of the 45 participants, 33 returned their questionnaires (a 72% response rate). The following sections summarize the results of students' responses to survey items.

**PERCEIVED IMPORTANCE.** The vast majority of students who answered the survey agreed or strongly agreed that their participation in the Austin Youth River Watch program had been very important to them (91%). Additionally, 100% of the respondents agreed (responded "yes") that they would encourage others to participate in the Austin Youth River Watch program. Furthermore, all of the non-senior respondents indicated (responded "yes") that they planned to continue their participation in the program.

**PERCEIVED IMPACT ON ACADEMIC SUBJECTS.** Many of the questionnaire items focused on students' perceptions of the program's assistance with respect to their feelings toward academic subjects as well as their perceptions of knowledge gained because of their participation in the program. Students' perceptions regarding the outcomes of their participation in the Austin Youth River Watch program were positive. Indeed, most students responded that they now knew more about water pollution issues, environmental issues, and science because of their participation in the Austin

Youth River Watch program. Specifically, students indicated that they agreed or strongly agreed that program participation had helped them to know more about:

- Water issues (94%),
- Environmental issues (91%), and
- Science (76%).

Additionally, most students responded that they were *more* interested in water pollution issues, environmental issues, and science because of their participation in the Austin Youth River Watch program. Most of the participants agreed or strongly agreed that program participation had helped them to become more interested in:

- Environmental issues (91%),
- Water pollution issues (88%), and
- Science (58%).

One of the components of the Austin Youth River Watch Program is its emphasis on students' working on after-school homework and/or participating in tutoring. If students are not actively being tutored, they must still spend time on homework or other academic activities. A portion of their payment includes time spent on their individual academic endeavors. Over half (55%) of the students indicated that they enjoyed going to school more than they did before they joined the program. Because of the school-work time they received in the Austin Youth River Watch program, many students agreed or strongly agreed that they:

- felt more confident about their ability in participating in science and/or environmental activities (82%),
- would be better students because of their experience in the program (79%),  
and
- Felt much more confident in their abilities in the areas of science and/or environmental science (61%).

As part of the educational aspects of the program, students indicated that they were more aware of science careers. Additionally, over half of the students indicated that they would like to pursue a career within the fields of Science and/or Environmental Studies and several of them had aspirations to pursue a college degree within the science or environmental science fields. Students indicated that they agreed or strongly agreed that they:

- had become aware of careers in Science and/or Environmental Studies that they had not previously known about (88%),
- would like to pursue a career in Science and/or Environmental Studies (52%), and
- would like to pursue a college degree in Science and/or Environmental Studies (39%).

In summary, the vast majority of the questionnaire respondents felt more confident about their ability in the areas of Science and/or Environmental Studies; they indicated they were learning more—and were more interested—in Science (although not as much in Mathematics). Students also indicated that they felt they were doing better in their school work and would be better students in the future because of their participation in the program. Additionally, most of the students indicated that they had become aware of careers in Science and/or Environmental Studies that they had not previously known. Finally, several students indicated they would like to pursue a career and/or a college degree in Science and/or Environmental Studies.

**SOCIAL ASPECTS.** Social relationships can help support students' academic success. In addition to assessing aspects of students' perceptions of the Austin Youth River Watch program's influence on their academic abilities and attitude toward their school experiences, the student-questionnaire also assessed their perceptions toward aspects of social relationships as well as their perceptions of their developing social competence skills. The majority of the students who responded to the questionnaire thought that

they were making more friends, they felt like they belonged to the group, and that the supervisor was supportive. Most of the students agreed or strongly agreed that they:

- felt supported by their supervisor (94%),
- felt like they belonged in this group (88%),
- were making good friends that were outside of their school (70%),
- were being supported by new friends (73%), and
- were making new friends that go to their school (70%).

As part of the social aspects of the program, students indicated that the program was successfully impacting important social skills. Specifically, students indicated that they agreed or strongly agreed that they:

- were more aware of the choices they were making (76%),
- were taking more responsibility for their actions (73%),
- have developed leadership skills (85%), and
- were more comfortable working with other students (88%).

## **SURVEY RESULTS: OPEN-ENDED RESPONSES**

To allow students to give their opinions in a less restricted format, open-ended questions were provided to students at the end of questionnaire. The open-ended questions focused on students' perceptions of how the Austin Youth River Watch has affected them, the most important thing they have learned because of their involvement with the program, what they enjoyed most and least, and how academic subjects tied into their program activities.

Most students answered the open-ended questions, although a few students chose not to respond. The length of the answers ranged from extremely short (one or two words) to quite elaborate (four to six lines). The following pages contain sample statements of students' answers to the open-ended questions.

**PROGRAM EFFECTS.** In answering the question, “*How has participating in the Austin Youth River Watch program affected you?*” participants wrote the following remarks:

- AYRW has [changed] the way I look at water and pollution. It has made me more of a caring person; thinking about how our water needs to be treated. AYRW is also a very big stress reliever for me.
- I have a third family, other than work and my real family. There are more people for me to trust and I learned some of [the] things I will use in life.
- [AYRW] made me more confident about college and helped me figure out my major.
- It’s opened my eyes to the world around me and made me more aware of the world [and its] current situation.
- It has made me more earth friendly. I realize how pollution affects animals and now I try and take action.
- It has let me develop new friendships and understand the environment.
- This program has really helped me, it has opened my eyes to how much the environment is important to us!
- It’s made me more aware of my surroundings, [it’s] given me more experience in Science, and has increased my enjoyment of Science. It just makes Science more lively!
- I am now more aware of my actions and the effects they will have on my environment.
- I have found a confidence in myself that I didn’t have before in my academic self. I am confident in my answers.

**IMPORTANCE OF RIVER WATER.** Participants who responded to the question, “*What is the most important thing you have learned about river water through the Austin Youth River Watch program?*” made the following comments:

- Just how everything I do has an influence on my environment.
- I've learned about the water and different kinds of animals we see while at the river. However, the most important thing was how to make sure the water in our environment is safe and clean.
- That it's not as clean as it looks and to just care for it because you depend on it.
- If something is wrong we [should] call the hotline, and we are the scientists.
- I have learned what the pollution does to the water and how it affects the environment.
- It's important to know when there is something going on with the water and when that happens we gotta call the environmental hotline.
- I've learned that it takes a lot of willpower to keep your closest body of water clean.
- That water is very important and when we test the water if [there is] a problem we [try to] find it and if we can't the environmental hotline will send people out who can.

**USE OF EDUCATIONAL SUBJECTS.** In response to the open-ended question, "*How did you use the knowledge of math, science, environmental issues and/or English in testing the river water?*" students wrote the following:

- I [used] my Science skills to find new species and to identify new species.
- We use Math when we [take the water] temperature, and for most of the water testing.
- I used the Science I have known and a newfound knowledge while testing conductivity and other water-testing activities.
- I used Math in measuring and Science in [determining how] the different types of chemicals work.
- I used all of those skills in water testing, for example when you use DO. You need to know the certain amount of liquids to put in the needle.

- I used Science to calculate how much O<sub>2</sub> is in the water [as well as] phosphates and nitrates.
- I need to know how to read a graduated cylinder to take [the water] temperature and [use] the water tube. Science is also used when mixing chemicals for the DO test.
- I used this knowledge of Math to help read the thermometer and my knowledge of environmental issues to know how the water was doing.

**MOST ENJOYABLE ASPECTS.** In responding to the question, *“What did you most enjoy about your participation in the Austin Youth River Watch program?”* participants made these comments:

- I enjoyed learning and feeling like an important part of the environment.
- I enjoyed being with my friends and having to learn about the animals.
- I enjoyed going to the rivers and seeing all types of wildlife and just being with my friends.
- I felt very good about myself, it made me feel like a scientist.
- Going out [and] testing [the] water.
- I like meeting new people that share similar values.
- The fact that it helped me figure out that I want to major in Biology.
- My conversations with Elisabeth, the friendships I’ve created, and being out in the field was very enjoyable.
- All the activities that I got to participate [in because] I met even more people and I was with people that cared.
- Hanging out at the house and camping trips – Big Bend!
- I love hanging out with friends with our gloves and goggles on!

**LEAST ENJOYABLE ASPECTS.** In responding to the question, *“What did you least enjoy about your participation in the Austin Youth River Watch Program?”* participants made these comments:

- The [thing I least liked] was when I couldn't come.
- I least [enjoyed] getting poison ivy.
- I [least enjoyed] the rainy days because we couldn't go test the rivers.
- It's pretty difficult to learn the chemicals.
- That I only go once a week.
- The heat and cold weather that would either not let us test or just make it difficult.
- When a river watch member / friend was absent.
- The bugs! Heat!

## **SERVICE TO THE COMMUNITY**

In addition to encouraging under-served students to improve their mathematics and science skills, enhance their interest and knowledge about environmental issues, and remain in school, the Austin Youth River Watch mentors and trainees have performed a valuable service to the City of Austin. During the past year, results of each water quality testing session were sent to the Lower Colorado River Authority (LCRA) and added to the database of water quality testing that is conducted throughout the LCRA district.

Through the students' participation in the Austin Youth River Watch program, the water quality database of the Colorado River and its tributaries has been enhanced and expanded. Most importantly, the high water quality was sustained due to the water quality monitoring of program participants.

## SUMMARY AND CONCLUSIONS

This evaluation, as with previous evaluations, has sought to investigate the impact of the Austin Youth River Watch program upon its participants. The evidence, based on an analysis of the Austin Youth River Watch program's outcomes, indicates that the program is effectively addressing the program goals for which it was originally conceived. These positive impacts are apparent in students' perceptions, their attitudes toward learning and school, and the fact that ten Austin Youth River Watch students graduated from high school. However, the positive influences of program participation extend far beyond students' perceptions and attitudes. The program's positive influence also includes an array of positive social relationships and the development of students' social competence skills. Additionally, the program has provided students with important environmental information that they will, hopefully, carry with them throughout their lives.

In summary, the 2007-08 Austin Youth River Watch program outcomes, as presented in this report, provided continuing evidence that well-conceived intervention programs that combine the use of student mentors within authentic, situated-learning activities, can effectively address the needs of under-served youth. In addition, evaluation results suggest that the program is meeting these needs in ways that are socially meaningful to the students as well as academically beneficial.

The Austin Youth River Watch program provides a solid example of continued success that others may wish to follow. This program has received national attention by being listed in the American Youth Policy Forum (1999, 2001) publications: *Raising academic achievement: A study of 20 successful programs*, and *More things that do make a difference for youth: A compendium of evaluations of youth programs and practices*.

## RECOMMENDATIONS

Based on the present evaluation findings, the following recommendations are offered. The Austin Youth River Watch program should continue to:

- Recruit and train minority under-served students for river water monitoring and interaction with successful and experienced student role models.
- Tutor under-served student trainees and expose these students to activities that include water quality and/or environmental themes.
- Provide students supplemental educational activities that provide them with a variety of experiences that broaden their understanding of the world as well as prepare them for future academic and professional endeavors.
- Provide students with a safe, positive, and emotionally- supportive environment.
- Provide river water monitoring services for the City of Austin and the Lower Colorado River Authority (LCRA).
- Add to the water quality database of the Lower Colorado River Authority.

Additionally, the Austin Youth River Watch program should consider:

Conducting an additional study, locating past AYRW participants, to systematically investigate the extent to which, and the ways in which, the Austin Youth River Watch provides long-term effects and outcomes.

## BIBLIOGRAPHY

- Brown, S. J., Collins, A., Duguid, P. (1989). Situated cognition and the culture of learning. *Educational Researcher*, 18, 32-42.
- Frazer, L. (1991). 1991-92 *Under-served Report: What Does The Future Hold?* (ORE Pub. No. 91.41). Austin, TX: Austin Independent School District, Office of Research and Evaluation.
- Turner, J. (2002). *Watching the River: 2000-2001 Austin Youth River Watch Final Report*. Unpublished manuscript.
- Turner, J. (2001). Youth River Watch: Austin, TX. In S. Jurich & S. Estes (Eds.), *Raising academic achievement: A study of 20 successful programs*. American Youth Policy Forum: Washington, D.C.
- Turner, J. (2000). *Learning from the River: 1999-2000 Austin Youth River Watch Final Report*. Unpublished manuscript.
- Turner, J. (1999). Youth River Watch: Austin, TX. In D. W. James & S. Jurich (Eds.) *More things that do make a difference for youth: A compendium of evaluations of youth programs and practices*. American Youth Policy Forum: Washington, D.C.
- Turner, J. (1999). *Learning from the River: 1998-99 Austin Youth River Watch Final Report*. Unpublished manuscript.
- Turner, J. (1998). *Working on the River: 1997-98 Austin Youth River Watch Final Report*. Unpublished manuscript.
- Turner, J. (1997). *1996-97 Austin Youth River Watch Final Report*. Unpublished manuscript.
- Turner, J. (1996). *1995-96 Austin Youth River Watch Final Report*. Unpublished manuscript.
- Turner, J. (1995). *Life Is Like A River: 1994-95 Austin Youth River Watch Final Report* (ORE Pub. No. 94.15). Austin, TX: Austin Independent School District, Office of Research and Evaluation.
- Turner, J. (1994). *A River Runs Through It: 1993-94 Austin Youth River Watch Final Report* (ORE Pub. No. 93.15). Austin, TX: Austin Independent School District, Office of Research and Evaluation.
- Turner, J. (1993). *Austin Youth River Watch Program: 1992-93 Final Report* (ORE Pub. No. 92.33). Austin, TX: Austin Independent School District, Office of Research and Evaluation.
- Turner, J. & Festa-Dreher, D. (2005). *What the river reveals: The Austin Youth River Watch 2003-2004 Evaluation Report*. Unpublished manuscript.
- Turner, J. & Freedman, K. (2006). Bridging learning and service: *The Austin Youth River Watch 2004-2005 Evaluation Report*. Unpublished manuscript.