Developing a World Wide Web (WWW) site that public school teachers and students can use to bring environmental resources on the Internet into the classroom

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I. List and Describe EPA Priorities Addressed in the Project

EPA priority issues addressed in this project included 1) providing public school teachers and students with hands-on exposure to the Internet and the World Wide Web (WWW) and increasing their capability to use these resources; 2) developing linkages from the Texas Water Resources Institute (TWRI) at Texas A&M University (TAMU) to public schools and districts throughout Texas to share water resources information; and 3) increasing public school teachers' and students' awareness of important findings from water and environmental research at Texas universities.

II. Primary Objectives of This Project

The overall purpose of this project is to create a tool that educators throughout Texas can use to more easily gain access to environmental resources that are on the WWW. The specific objective is to create a WWW site ("Texas WaterNet") using free software that includes digitized information (including graphics, photographs, video clippings, and text files) about TWRI and its environmental and water-related research and education programs. For some time TWRI has produced educational information about water and environmental research in Texas that has been made available through printed newsletters. Texas WaterNet also links users to other sites in Texas and the U.S. with environmental education information. Teachers and students are shown a list of WWW sites that they can access. Materials developed in this program are useful for all classrooms with internet connections or high speed modems.

III. Target Populations Served by This Project

The primary target audience is science and environmental middle and high school teachers and students from throughout Texas. Secondary audiences included researchers at universities throughout Texas who work with water issues, professional staff at federal, state, and local water-related agencies throughout Texas, and the general public. These target audiences were served by visits to public schools and districts, universities, and agencies, as well as presentations made by Jensen at academic meetings and conferences dealing with water resources and/or Internet issues.

IV. Area of Application

The primary area of application included public schools throughout Texas. In the initial stages of the project, Jensen contacted all the junior high and high schools and school districts that are shown to have WWW sites on the Texas Education Agency (TENET) WWW site and requested that he be allowed to give a presentation to them. As a result, Jensen was able to present hands-on "live" demonstrations of this project to public school educators and their students in Houston (twice), Dallas, Fort Worth, Richardson, Bryan-College Station (twice), Conroe, Somerville, El Paso, Edinburgh, Mercedes, Belton, and Waco. Jensen also provided demonstrations to water agencies and organizations at meetings and conferences in Houston, Waco, Austin, Galveston, San Antonio, and San Marcos. Groups that Jensen described this work to include the Texas WWW Water Users Group, the Texas Academy of Science, the Texas Alliance for Science and Math Education, the Universities Council on Water Resources, and the American Water Resources Association.

V. Outcomes and Results of This Project

Outcomes and results of this project can be grouped into the following broad categories: A) Improvements to the TWRI WWW site, B) Data preparation, C) Site visits to public school teachers and other groups, and D) Data analyses about use of the site, results of pre-and post-surveys, and discussion of those results.

A) Improvements to the TWRI WWW site

A main result of this project is that it allowed TWRI to make substantial improvements to fully develop its "Texas WaterNet" WWW site. The grant allowed TWRI to hire a student worker (Jonathan Jones) with expertise in computer science who worked under the close supervision of Jensen to build additional components and capabilities into the WWW site. Specific improvements that were added to the basic TWRI WWW site that existed prior to this grant include the following:

1) All issues of the *New Waves* (9 years), *Texas On-Site Insights (5 years)*, and *Texas Water Savers* (2 years) newsletters have been posted, while 5 years of the *Texas Water Resources* newsletter have been published on the WWW site;

2) Abstracts of 35 technical reports from 1985 to 1996 have been published on the WWW site. The full text of 7 recent technical reports have been added to Texas WaterNet and these reports will soon be available in "pdf" format, which allows users to view on-line documents in the same format as the printed reports. A form has been created allowing users to easily order specific reports from TWRI through the Internet;

3) A searchable database with information about 500 researchers at Texas universities has been published on the WWW site. The database lets users

search by the scientist's name, university, academic department, or any keyword;

4) Summaries of research projects funded by TWRI since 1985 have been posted and are on-line. These summaries contain links to TWRI technical reports, newsletter articles, and the researchers directory;

5) Three powerful search engines have been developed that let users easily find information on the TWRI WWW site. These include a "simple search" tool that enables users to search for a single word, a "speed search" that can be used to search for groups of words in specific sections of Texas WaterNet, and a "power search" engine that allows users to seek information using powerful Boolean search tools;

6) A searchable database of sites where wastewater is being reused in Texas has been created and put on-line;

7) Links to many other WWW sites have been established. Major sections of our links page include: K-12 Public Education Resources, Texas Universities, Texas State Agencies, Federal Agencies with offices in Texas, Water Resources Information, and Natural Resources Information. Some of the WWW sites listed under the K-12 Public Education Resources section include the Texas Environmental Center's *GreenBeat* student magazine, the Houston Independent School District's Armadillo WWW server, instructional activities on water resources topics, K-12 environmental resources on the Internet for teachers, Texas Schools' And School Districts' WWW Sites, National Aeronautics and Space Administration (NASA) On-line Educational Resources, the National Clearing House for Science, Mathematics, and Environment, the National Science Teachers Association, the Science Teachers Association of Texas, and many other resources;

8) An Internet mailing service was created and linked to the TWRI WWW site. Titled "Texas WaterTalk", this feature allows individuals to sign up to receive regular Internet mail messages from TWRI about such topics as news, funding opportunities, announcements of new publications, and meetings. The messages are posted on the WWW site after they have been sent and can be searched by keyword, date, and author;

9) Funds from this grant also helped TWRI improve computer hardware and software resources. Specifically, this grant was used to help purchase a large (2 gigabyte) hard drive, a system to back up computer files onto tapes, computer software and hardware that can be used to edit videotapes that can be published and made available on the WWW site, as well as miscellaneous software programs that are used in WWW production.

B) Data preparation

Shortly after the grant was awarded, a draft survey instrument was developed by
Jensen, with consultation by TWRI Director Wayne Jordan, Don Albrecht of the
TAMU Rural Sociology Department, and Robert Terry and Glenn Shinn of the
TAMU Agricultural Education Department. The survey instrument was modified
and a final survey instrument was produced (see Appendix 1) and used when
presentations were made to K-12 schools and districts. In general, the survey asks
questions in three broad categories: 1) basic demographic information, including
grade level and courses taught; 2) ability (do the teachers have the knowledge or
skills needed to use the Internet?), and capability (is their school or district
connected to the Internet and are adequate computing resources available) of
teachers to use the Internet for classroom teaching or lesson preparation; and 3)
opinions of teachers about whether the TWRI WWW site contains the kind of
information educators need and would be willing to use for classroom teaching or
lesson planning. The survey uses two types of questions: closed-ended short essay
and a Likert Scale that respondents rate, on a scale of 1 to 5, how likely they are
to use specific components of the TWRI WWW site.

C) Site visits to public school teachers and other groups

All presentations were made in the Spring of 1996. Specifically, Jensen visited
A&M Consolidated High School (College Station) March 1, Dallas Skyline High
School March 7, the Socorro Independent School District (ISD) (El Paso) March
12, the South Texas Science Academy (Mercedes) March 26, Edinburg High
School March 27, Bryan ISD April 1, Spring Branch ISD (Houston) April 2,
Belton High School April 3, Birdville ISD (Fort Worth) April 8, Richardson ISD
April 9, Conroe ISD April 23, the Rice School and Houston ISD (both Houston)
April 24, and the Texas Education Agency Regional Service Center in Waco May
3.

The overall strategy was to provide a "hands-on" and "live" demonstration at each
school that would last roughly half an hour. The presentation format was as
follows. A few minutes was spent describing and demonstrating the following
components of the TWRI WWW site: the searchable researchers directory, on-
line newsletters, the three search engines, and links to other sites. Due to time
constraints, Jensen usually was able to provide only a brief mention of the
following portions of the TWRI WWW site: the general description of TWRI, on-
line technical reports, and summaries of TWRI research projects. When time
permitted, Jensen often helped teachers find particular Internet sites of interest.

In mid-August, the representative who arranged for a visit at each school or
district was contacted by fax and/or e-mail. A supplemental survey was
distributed (Appendix 2). Jensen waited until August to give teachers a chance to
return from summer vacations. A total of 15 post-surveys was distributed.

D) <u>Data analyses about use of the site and results of pre-and post-surveys</u>

1) Results of overall surveys taken at the time demonstrations wereheld.

Roughly 98 individuals filled out and returned survey forms. These forms were filled out immediately after the hands-on presentations. The full survey results are shown in Appendix 3. A general description of key survey findings follows. Only 45% of survey respondents currently use the Internet at school. Most of these respondents (76%) have used the Internet for 1 to 3 years. Of the 44 individuals who are not yet connected to the Internet, none expected to become connected in less than 6 months and only 38% of them expected to go on-line in less than 2 years. The number of individuals now using modems (27) and hard-wired "direct" connections (25) was evenly split. More than 76% of modem users reported using high speed modems (faster than 14,400 kbps). The most common answer to the number of teachers, administrators, and students with access to the Internet at a given school was 10 to 25 individuals (35%), although 39% of schools provided no one with access and 19% provided access to 76 or more people. Computer labs for student use were reported at only 45% of the schools in the survey. Netscape was overwhelmingly the most popular Internet software tool now being used among those with Internet connections (75%), while Lynx, a text only browser, came in a surprising second with 12%. A large percentage of survey respondents (86%) reported they will be upgrading hardware and software so they can use a WWW browser within a year, although only 23 of the 98 survey respondents actually answered this question. Most of the teachers participating in these presentations were specialists in general sciences (50%) or computing sciences (26%). The most common grade level taught by survey respondents was middle school/ junior high school (45%), followed by high school (31%), and elementary school (24%).

Some of the most important findings of the survey describe how teachers want to use the Internet. For example, an overwhelming number of respondents said they would use a WWW site about water and environmental research at Texas universities (92%), as well as other sites pertaining to water and the environment (98%). The survey results show that teachers were most likely to use the Internet to help students with their research (average score of 4.3 on a Likert scale 5 representing "Most Likely") and to supplement existing lessons (4.2). Two other options, use of the Internet for in-class presentations (3.8) and to prepare new lessons (3.5) were less popular but still fell into the "likely" range.

A specific area of interest was teacher perceptions of the potential use of TWRI's "Texas WaterNet" WWW site, which was the focus of the hands-on demonstrations. Three parts of this WWW site received positive Likert rankings (greater than 3): links to other sites (3.6), use of the search tools

(3.5), and on-line newsletters (3.1). Two other categories received "neutral" scores: directory of university researchers and summaries of TWRI research (both 2.9). The remaining two sections of the TWRI WWW site received slightly less favorably scores falling within the "less likely" range (2 to 3). These include general information about TWRI (2.8) and on-line technical reports (2.6). The low rankings of the reports may be due to the fact that teachers may have perceived this information as being too technical for their students.

2) Results of Post-Surveys.

As of August 28, only six individuals at 4 of the 15 schools responded (35% of schools visited). This may be because many schools are just beginning their Fall semester and teachers are very busy. Jensen will follow-up in a month to see if more schools respond. Although there were a limited number of responses, the answers provide meaningful insights. Even though respondents were evenly divided as to whether or not they used the Internet more for teaching after viewing the presentation, 100% of respondents said they visited "Texas WaterNet" at least once after the presentations. Roughly 67% reported they use our site weekly, while 33% said they seek our site at least monthly. Significantly, the average Likert scores graded by teachers concerning the use of specific portions of our WWW site were much higher than in the overall survey. All portions of "Texas WaterNet" were rated higher than 4.3. All but one respondent said they would welcome follow-up presentations about our WWW site and Internet use for teaching. Many teachers reported that they felt the WWW is or would soon become "very important" for K-12 education. They recommended that more WWW sites be established that provide databases and results of university research.

3) Analysis of Usage Statistics from the TWRI "WaterNet" WWW Site.

Another way of assessing the success of this project is to examine usage statistics that are generated by the TWRI WWW site. In general terms, TWRI webmaster Jonathan Jones has customized three readily available software packages ("gwstat", "ACE/gr", and "wwwstat") to track usage of our site in various ways. Example outputs include hourly, daily, weekly, monthly and yearly statistics as well as general and detailed information on the types of users and specific users who visit our site most often.

In general, these statistics complement the survey analyses and show that use of "Texas WaterNet" has increased steadily since this project began. For example, before the site visits to schools began in February 1996, "Texas WaterNet" averaged only about 20,000 "hits" per month (hits are the number of times individuals access any item on our WWW site). Since visits to schools began the number of hits per month doubled to more than

40,000 per month. It should be noted, though, that it is difficult to isolate whether the EPA project was solely responsible for the increased use. At the same time TWRI also publicized the site in its newsletters and at meetings and conferences. Weekly analyses reveal that the number of educational sites (those with "edu" suffixes) is consistently roughly twice the number of any other domain (for example, commercial, network, or government). While many of these are universities, a good number are also public schools. Measuring which parts of the WWW site are used most often is also a good indicator of the relative value of different parts of our efforts. Data analyses reveal that the search tools are typically used more than twice as often as any other part of our WWW site, followed by (in order) links to other sites, newsletters, reports, research summaries, the experts directory, and TWRI WaterTalk.

4) Discussion of Results

Less than half of survey respondents now use the Internet at school, which indicates that much more work needs to be done to equip more teachers with Internet resources they need to become proficient at Internet use. However, there is a small core of Texas teachers that now use the Internet. Surprisingly, many teachers still use modems was evenly split. The repercussion is that developers of educational WWW sites may want to limit the use of graphics to fit teacher limitations. Still, most teachers are using graphical WWW browsers although a small number of respondents still use a text only browser. Data suggests that the Internet is now likely being used primarily by teachers, not students, and that students are not now being encouraged to use the Internet for research into special topics and projects. Most of the teachers who participated are specialists in general science or computing sciences. It would be useful to repeat this experiment with teachers in other specialties including agriculture, natural resources, geology, earth sciences, and other fields to see how survey results differ. Surprisingly, most survey participants were middle and junior high school teachers (45%) -- not high school teachers, who were the initial primary target audience --and a significant number of grade school teachers also took part. This occurred because many of the sites I visited were school districts -- not individual schools. It may be useful to follow-up this effort with another project targeted more specifically at the needs of high school students and teachers. General questions about the Internet conclusively show that teachers are interested in WWW sites about water and environmental research as well as natural resources information. Likert scale scores from the surveys distributed at the time of the demonstration show that teachers are most interested in using links to other sites, search tools, and on-line newsletters. This suggests that teachers want to use our site for networking to other related sites and that they want a way they can effectively search for and extract specific items of interest. The high rankings given to on-line newsletters reinforces the

idea that readers want news about research, especially if it is presented in an easy to read manner. Components of the TWRI WWW site that received neutral or less likely rankings were generally more technical and primarily for teacher, not student, use. A compounding factor may be that because of time constraints, all the individual sections of the WWW site could not always be demonstrated. Generally, the sections of the WWW site that were presented in more detail received the highest Likert scores. Post-survey Likert scores were much higher, although a much lower number of participants responded. Post-survey response was limited because only one individual at each school (the key contact) was sent a post-survey questionnaire and because the surveys were sent at roughly the same time the Fall 1996 academic year began. However, we will redo the post-survey in October 1995 to try to increase the number of respondents and will report the results then. Another factor may be that those teachers that took the time to participate in the post-survey are technology enthusiasts who were generally excited about arranging and taking part in my presentations. Post-survey Likert scores ranked all sections of the TWRI WWW site as "more likely". Usage statistics generated by the WWW site generally confirm the survey results. They show that use of the WWW site is gradually increasing (from 20,000 to 40,000 hits per month), that many educational institutions are using our WWW site. Usage statistics show that the search engine, links to other sites, technical reports, TWRI research summaries, and the experts directory are the most commonly used components of the TWRI WWW site.

VI. How the Project Was New or Innovative

This project was new and innovative because it dealt with introduction of a new and emerging technology (the Internet and WWW) to a group of individuals (school teachers) who either have not begun to use or are just beginning to use it. The project is also new and innovative in the sense that this use of the WWW (transferring research results and bringing them into the classroom) has not been explored in great detail and much more work is needed in this area. Another new and innovative aspect of this work is that it combines the use of survey data and actual usage statistics to evaluate the success of the project. Finally, the project is new and innovative because it will be posted as part of the permanent TWRI "WaterTalk" WWW site.

VII. How the Project Can be Replicated

The general nature of this project (presenting hands-on instruction in the use of the WWW to public school teachers and evaluating their perspectives and/or use of a particular WWW site with targeted information) can easily be replicated by many other users. There will likely be many situations in the future in which new WWW sites are developed and shown to target audiences. However, typically there would not be the detailed data collection and analysis that was an essential component of this project.

Hopefully, this project includes some ideas that others can use to develop or improve WWW sites, obtain data on the usefulness of these efforts, and track the numbers of people using these sites and their activity. For example, the use of the Likert scale and the WWW data analyses programs may both be items others want to include in future work.

VIII. How the Project Could Be Improved

In many ways, this project was very successful. However, there are some areas in which the project could be improved. First, it was very difficult to find schools and districts in Texas that had been connected to the WWW for any length of time and/or used it for instructional purposes. This problem will be resolved in the future as more schools become connected and teach their personnel how to use the WWW. Second, it was difficult to work through the school bureaucracy and schedule visits to the schools, even though there was no obligation or expense to the schools. I believe this is largely due to four factors: 1) in many cases, schools had not installed or were in the process of installing the necessary hardware and software so teachers could use the Internet; 2) many schools schedule meetings far in advance and Jensen was not able to give them enough notice for scheduling presentations; 3) TWRI traditionally has not had a high profile in K-12 education and, therefore, school personnel were unaware of our programs; and 4) because so many administrators and teachers were not aware of how to use the Internet, there was some confusion in their minds of what the presentation was to be about. Some of the project goals had to be modified as the project progressed. For example, original plans included a demonstration of the project at a large meeting of K-12 agricultural and natural resource teachers at a meeting scheduled by the TAMU Agricultural Education Department, but that meeting was canceled. Plans will also be made to bring science teachers together to discuss use of the Internet as a teaching tool for public school educators. Work will continue with the Texas Academy of Science and other K-12 education groups to reach as many teachers as possible. Videotape footage has been posted on our WWW site that describes the national water research institute program. Plans to publish and make available segments of other educational videos are in the works, but discussions with producers of individual videos to obtain permission to offer those segments on our WWW site are ongoing. Of course, responding to requests from teachers on a regular basis will continue.

IX. Plans for Dissemination or Continuation of the Project

As mentioned previously in this report, TWRI has regularly disseminated information about this project in many ways, including newsletters, "Texas WaterNet" and TWRI "WaterTalk", visits to schools and other groups, and presentations at meetings and conferences. TWRI will continue to prominently mention this project as part of its overall public information program.

The project will be continued in a number of ways. First, TWRI will continue to maintain the "Texas WaterNet" WWW site for well into the foreseeable future. This will ensure that the resources generated in this project will be available and accessible to many client groups for many years. Second, results of the project will be published in both printed

and on-line forms as a TWRI technical report that will be widely distributed. Third, TWRI will continue to work with classroom teachers in many ways. The links to K-12 education resources and Texas educational resources will be consistently updated and enlarged. TWRI will continue to encourage that links be established from our site to the EPA, public schools, teachers groups and others so that our site can be accessed easily by many different users at remote sites. TWRI will still be active in making presentations to schools and districts as requested, although this will be limited in both the number of visits made and the distance traveled since grant funds from this project have expired. Fourth, TWRI will continue to pursue grant opportunities that explore the use of the Internet to transmit water and environmental research results from universities to public schools in a form that public school teachers and students can and will want to use. For example, TWRI has recently submitted grant proposals to develop detailed interactive information about outstanding EPA Environmental Education projects that have been awarded nationally. These could be in the form of interactive book chapters that students could use at their own pace that would include animation, video footage, links to other WWW sites from throughout the world, and other features, as well as detailed evaluation mechanisms so teachers could score students results. Unfortunately, this proposal was not funded. One off-shoot of this project is that TWRI has received funding to develop another WWW site describing rural water quality and wastewater issues for the Texas On-Site Wastewater Treatment Research Council. TWRI continues to pursue ways in which we can work with Texas school districts and other organizations to enhance water and environmental education.

X. Summary

In this project, TWRI developed a WWW site with detailed information about water and environmental research at Texas universities. The WWW site includes many separate components including a description of TWRI and its programs, a searchable database of water experts, on-line newsletters and technical reports, summaries of TWRI projects, powerful search tools, links to other sites, and statistics on use of the site. In Spring 1996, TWRI contacted school districts throughout Texas who were likely to use the WWW as a teaching tool to schedule hands-on demonstrations of this technology and to gather data on teacher perceptions of this site. A total of 15 schools were visited, representing many different geographic regions, school populations, grade levels, and types of classes taught. In Summer 1996, key personnel at each of the 15 sites visited were contacted and were sent a follow-up survey. The follow-up survey measured use of "Texas WaterNet" after the initial visit. Survey data were compiled and analyzed using a Likert scale that asks respondents to indicate if they were less likely or more likely to use the Internet, in general, and the TWRI WWW site in particular. Results were compared to tracking information developed by software that directly measures usage trends. In general, results suggest that there is a high level of enthusiasm for the use of the WWW as a tool to enhance K-12 science education, particularly in the fields of water and environmental programs. Results also suggest that, in general, many parts of "Texas WaterNet" are especially useful for K-12 educators in Texas, including links to other sites, search tools, and on-line newsletters. Results of the follow-up surveys showed a high level of interest in using the separate components of "Texas WaterNet" with Likert scale ratings much

higher than those in the initial visits. Possibly because those who took the time to respond to the follow-up survey were most enthusiastic about the WWW and the TWRI WWW site. However, the number of responses in the follow-up survey may be too small to be statistically significant.

A number of personal observations can be made, based on visits to schools and districts. In general, there were only a few schools visited where a concerted effort was currently being made to incorporate the use of the WWW into lesson planning, classroom teaching, or student research. Notable exceptions include the excellent work at the Houston ISD and the Rice School, the Socorro ISD, and the South Texas Science Academy. At many sites, schools were still trying to come to grips with such issues as acquiring and fully connecting and installing appropriate hardware and software, establishing and training teachers on the use of these resources, and developing appropriate use policies and procedures. In several instances, use of the WWW was the result of one or a handful of forward thinking, innovative, pioneering teachers who often taught themselves how to use these technologies, in spite of the lack of assistance from their school or district. In conversations with teachers, they stated that much more needs to be done in the way of teacher and student training in how to use these technologies as well as developing technical support resources needed to create and maintain WWW sites. In general, nearly all the sites visited displayed an enthusiasm for eventually incorporating some aspect of the WWW and the Internet into their programs. Many questions remain as to how and when this will be accomplished, however.

Finally, TWRI is making many efforts to continue this project and to disseminate results from this effort. The main project of this project, "Texas WaterNet", will be continued for some time, upgraded, and expanded. TWRI will continue to work with teachers, schools and districts, as resources permit. Future efforts include working with K-12 educators in Texas and throughout the United States to develop WWW sites that supplement environmental education. Of particular interest are efforts to develop interactive lesson chapters teachers can use that would include multi-media (video and animation), graphics, links to other sites and evaluation mechanisms. Proposals for this type of work have been submitted to EPA and others but have not yet been funded.

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Appendix 1
Survey K-12 Texas Science Teachers Use of the Internet and the "Texas WaterNet WWW Site"

1. Do you currently use the Internet ? Yes No

2. If so, how long have you been using it?

If not, when do you expect your school will be connected?

3. What kind of connection do you have? [direct connection or modem]

If you use a modem, what speed is it?

4. How many teachers, administrators, and/or students have access to the Internet at your school?

Is there a computer lab that students can use to access the Internet?

5. Please circle which Internet software you use now: Lynx Gopher Netscape Mosaic other

If you don't use a WWW browser like Mosaic or Netscape now, do you expect to upgrade hardware and software within the next year so you can do so? Yes No

6. Rank the following activities according to how you would most likely use the WWW

Least Likely Most Likely

* To prepare new lessons 1 2 3 4 5

* To supplement existing lessons 1 2 3 4 5

* For in-class presentations 1 2 3 4 5

* To provide students resources they can use to 1 2 3 4 5

obtain additional information

* Other 1 2 3 4 5

7. What course[s] do you teach?

8 What grade level[s] do you teach?

9. If specific information about environmental research at Texas universities were available, would you be likely to use it?

10. If you were made aware of other WWW sites relating to water and the environment, would you be willing to use them?

11. Based on the demonstration of TWRI WWW site that was recently provided, how likely are you to use the following items from "Texas WaterNet"

Least Likely Most Likely

* General Info. about TWRI 1 2 3 4 5

* Directory of University researchers 1 2 3 4 5

* On-Line Newsletters 1 2 3 4 5

* On-Line Technical Reports 1 2 3 4 5

* On-Line Summaries of TWRI projects 1 2 3 4 5

* "WaterNet" Search Tool 1 2 3 4 5

* Links to other sites 1 2 3 4 5

12. Which items are NOT currently on "Texas WaterNet" that you feel need to be added?

13. Would you be willing to log your use of "Texas WaterNet" during the next month? Yes No

14. Other comments:

Please fill out the following information:

Name:

School:

Mailing Address:

Phone: Fax:

E-mail Address:

Please return the survey to:

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Appendix 2
Results
Survey of K-12 Science Teachers About Use of the Internet and the TWRI "Texas WaterNet" WWW Site

1. Do You Currently Use the Internet?

Yes 45 No 54

2A. If Applicable, How Long Have You Been Using the Internet?

Do Not Use the Internet 54

Less than 6 months 0

6 Months to 1 Year 3

1 to 2 Years 14

2 to 3 Years 9

3 to 5 Years 4

More than 5 Years 0

2B. If Your School is NOT Already Connected to the Internet, When Do You Expect Your School Will Be Connected?

Already Connected 44

Less than 6 Months 0

6 Months to 1 Year 9

1 to 2 Years 8

3A. What Kind of Connection Do You Have, If Applicable?

Direct Hard-Wired Internet Connection 25

Modem 27

3B. What Speed is Your Modem, if Applicable?

300 BPS 1

2,400 BPS 1

9,600 BPS 4

14,400 BPS 8

19,200 BPS 2

28,800 BPS 5

4A. How Many Teachers, Administrators, and Students Have Access to the Internet at Your School?

0 39

1-10 25

11-25 10

26-49 1

50-75 3

76 or more 18

4B. Does Your School or District Have a Computer Lab that Students Can Use to Access the Internet?

Yes 33 No 41

5A. Which Internet Software Do You Currently Use?

Netscape 43

Lynx 7

Mosaic 1

Gopher 1

Other 5

None 36

5B. If You Don't Use a WWW Browser Currently, Do You Expect to Upgrade Hardware and Software within the Next Year So You Can Do So?

Yes 20 No 3

6. Rank the Following Activities According to How You Will Most Likely Use the WWW to:

A. Prepare New Lessons Avg. Score= 3.5, 85 responses, 297 points

B. Supplement Existing Lessons Avg. Score= 4.2, 90 responses, 372 points

C. In-Class Presentations Avg. Score= 3.8, 87 responses, 334 points

D. Help Student Research Avg. Score= 4.3, 91 responses, 389 points

7. What Courses Do You Teach?

General Science 47

Computing 25

Mathematics 7

English 6

Social Studies 2

Others 7

8. Which Grade Level Do You Teach?

Elementary (K - 5) 23

6th 9

7th 15

8th 20

High School 30

9. If Specific Information About Environmental Research at Texas Universities Were Available On a Single WWW Site, Would You Be Likely to Use It?

Yes 83 No 7

10. If You Were Made Aware of Other WWW Sites Relating to Water and the Environment, Would You be Willing to Use Them?

Yes 91 No 2

11. Based on the Demonstration of the TWRI WWW site that was recently provided, how likely are you to use the following items from "Texas WaterNet?"

A. General Information About TWRI Avg. Score = 2.8 (60 responses)

B. Directory of University Researchers Avg. Score = 2.9 (97 responses)

C. On-Line Newsletters Avg. Score = 3.1 (97 responses)

D. On-Line Technical Reports Avg. Score = 2.6 (98 responses)

E. Summaries of TWRI Research Avg. Score = 2.9 (98 responses)

F. "WaterNet" Search Tool Avg. Score = 3.5 (96 responses)

G. Links to Other Sites Avg. Score = 3.6 (98 responses)

12. Which Items Are NOT Currently on "Texas WaterNet" that You Feel Need to be Added?

1 response (more ecological information)

13. Would You be Willing to Log Your Use of "Texas WaterNet" During the Next Month?

Yes 31 No 21

14. Other Comments

More math information needed (1)

Internet access is not convenient for me (1)

My school is not on-line yet, but I want to participate when we get connected (1)

I want to learn more but am unfamiliar with the Internet now (1)

We only use TENET now and don't have the capability to use the WWW (1)

I am interested in working with you to develop follow-up ideas (1)

Appendix 3
Follow-Up Survey of K-12 Texas Science Teachers on Use of the Internet and the TWRI "Texas WaterNet" WWW Site

1. Since I gave my presentation, do you find that you use the Internet more as a teaching tool?

2. Since I gave my presentation, have you visited our WWW site -- TexasWaterNet, "http://twri.tamu.edu"?

2A. If so, how often do you visit and use our site? Monthly? Weekly? More Often?

3. How would you rate the various sections of our WWW site as tools that may improve classroom teaching about water and environmental issues? Please simply use one of these phrases (excellent, good, fair, unsatisfactory, or no opinion).

* Searchable Water Experts Directory

* Search Tool

* On-Line Newsletters

* On-Line Technical Reports

* Links to Other Sites

* Descriptions of TWRI Projects

* TWRI "WaterTalk" Internet Mail Service

4. Would it benefit you if I could revisit your school in the upcoming school year to further discuss the use of the Internet for science teaching?

5A. What do you see as the future of the WWW for classroom teaching?

5B. What kinds of products, if any, would enhance classroom teaching?

Appendix 4
Results
Follow-Up Survey of K-12 Texas Science Teachers on Use of the Internet and the TWRI "Texas WaterNet" WWW Site

1. Since I gave my presentation, do you find that you use the Internet more as a teaching tool?

Yes (3) Same as before (3)

2. Since I gave my presentation, have you visited our WWW site -- Texas WaterNet, "http://twri.tamu.edu" ?

Yes (6)

2A. If so, how often do you visit and use our site? Monthly? Weekly? More Often?

Monthly (2) Weekly (4)

3. How would you rate the various sections of our WWW site as tools that may improve classroom teaching about water and environmental issues? Please simply use one of these phrases (5=excellent, 4=good, 3=fair, 2=unsatisfactory, or 1=no opinion).

* Searchable Water Experts Directory (4.5)

* Search Tool (4.5)

* On-Line Newsletters (4.3)

* On-Line Technical Reports (4.5)

* Links to Other Sites (4.5)

* Descriptions of TWRI Projects (4.3)

* TWRI "WaterTalk" (4.5)

4. Would it benefit you if I could revisit your school in the upcoming school year to further discuss the use of the Internet for teaching science?

Yes (5) Maybe (1)

5A. What do you see as the future of the WWW for classroom teaching?

Researchers sharing data and communicating results with teachers (2), it will be very important for teachers and students (3).

5B. What kinds of products, if any, would enhance classroom teaching?

More research based information (1), more climate and rainfall data (1), and objective and unbiased information about water and environmental issues.