

Illinois River Education Program (continuation) Final Report

**CWA Section 319(h) FY 1996
Nonpoint Source Pollution Program Task 600
Oklahoma Conservation Commission Task #82
OSU Project Account AC-5-90360**

Project Coordinator:
Mitchell J. Fram
Area Extension Water Quality Specialist
OCES Water Quality Program

Timothy L. Propst
Extension Engineer/Environmental Scientist
Biosystems & Agricultural Engineering, OSU
OCES Water Quality Program

Project Director
Dr. Michael D. Smolen
Professor, Biosystems & Agricultural Engineering, OSU
OCES Water Quality Program Coordinator

February 2002



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OCES Water Quality Program**

Project Director

Dr. Michael D. Smolen

**Professor, Biosystems & Agricultural Engineering, OSU
OCES Water Quality Program Coordinator**

Correspondence: **OCES Water Quality Programs**
218 Agriculture Hall
Oklahoma State University
Stillwater, OK 74078
Tel: 405/744-5653, FAX: 405/744-6059
Email: smolen@okstate.edu
Web: <http://biosystems.okstate.edu/waterquality>

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LIST OF COMMONLY USED ABBREVIATIONS

BAE – Biosystems and Agricultural Engineering Department
BMP – Best Management Practice
CorpComm – Oklahoma Corporation Commission
DEQ – Department of Environmental Quality
EPP – Entomology and Plant Pathology Department
EQIP – Environmental Quality Incentives Program
FSA – Farm Service Agency
IRB – Institutional Review Board
NPS – Non-Point Source
NRCS – Natural Resource Conservation Service
OCC – Oklahoma Conservation Commission
OCES – Oklahoma Cooperative Extension Service
ODA – Oklahoma Department of Agriculture
ODA-FD – Oklahoma Department of Agriculture-Forestry Division
ODWC – Oklahoma Department of Wildlife Conservation
ONLA – Oklahoma Nursery and Landscape Association
OSE – Office of the Secretary of the Environment
OSNA – Oklahoma State Nursery Association (now known as ONLA)
OSU – Oklahoma State University
OWRB – Oklahoma Water Resources Board
PPP – Pollution Prevention Plan
TMDL – Total Maximum Daily Load
USDA – United States Department of Agriculture
USFS – United States Forestry Service
USFWS – United States Fish and Wildlife Service
USGS – United States Geological Survey
WHIP – Wildlife Habitat Improvement Program

TABLE OF CONTENTS

Acknowledgements iii

List of Commonly Used Abbreviations v

Table of Contents vii

List of Tables ix

Appendices ix

Executive Summary xiii

Project Description xiii

Project Management xiii

Project Tasks xiii

Task 1. Illinois River Environmental Education Brochures xiii

Task 2. Illinois Basin Landowner Conservation and Pollution Prevention Handbook xiii

Task 3. Youth Education xiv

 A) Youth Environmental Fairs: xiv

 B) Blue Thumb Program xiv

 C) Teacher / Youth Leader Training xv

Task 4. Public Events and Adult Education xvi

 Task 604A RiverFair xvi

 Task 604B Flotilla Tour xvi

Task 5. Final Report xvi

Measures of Success xvii

Conclusions xvii

Final Project Report 1

Introduction 1

 Poorly Informed Public 1

 Nutrient Loading from Point and Nonpoint Sources 1

 Habitat Degradation 2

Project Area 2

Project Goals 2

 Approaches to Poorly Informed Public: 3

 Approaches to Nutrient Enrichment: 4

 Approaches to Habitat Degradation: 4

 Support of Concurrent Illinois River Basin Initiatives 5

Project Management 5

Project Tasks 6

Task 1. Illinois River Environmental Education Brochures 6

Task 2. Illinois Basin Landowner Conservation and Pollution Prevention Handbook 7

Task 3. Youth Education 8

 Task 603A Youth Environmental Fairs 8

 Miscellaneous Youth Programs 10

Task 603B Blue Thumb Program	10
Task 603C Educator/Youth Leader Training	15
Task 4. Public Events and Adult Education.....	18
Task 604A RiverFair	18
Task 604B Flotilla Tour	20
Miscellaneous Public Programs	22
Task 5. Final Report	22
Measures of Success.....	22
Task 601 – Environmental Education Brochures	23
Task 602 – Landowner Handbook	23
Task 603A.1 – Youth Environmental Fairs	23
Miscellaneous Youth Programs.....	25
Task 603B – Blue Thumb Volunteer Monitor Program.....	26
Task 603C – Educator/Youth Leader Training	30
Task 604A – RiverFair.....	34
Task 604A – Flotilla Tour	35
Miscellaneous Public Programs	36
Conclusions.....	36
Literature Cited.....	41
Appendix 1:.....	1
Appendix 2:.....	1
Appendix 3:.....	1
Appendix 4:.....	1
Appendix 5:.....	1
Appendix 6:.....	1
Appendix 7:.....	1
Appendix 8:.....	1
Appendix 9:.....	1
Appendix 10:.....	1
Appendix 11:.....	1
Appendix 12:.....	1
Appendix 13:.....	1
Appendix 14:.....	1
Appendix 15:.....	1
Appendix 16:.....	1
Appendix 17:.....	1
Appendix 18:.....	1
Appendix 19:.....	1
Appendix 20:.....	1

LIST OF TABLES

Table 1. Summary of Illinois River Basin Youth Environmental Fairs, 2000-2002.....	9
Table 2. Listing of Educator/Youth Leader training workshops sponsored by 319 Task 600 Illinois River Basin Education Project, 2000-2002.	16
Table 3. 2001 Illinois RiverFair Educational Presentations.....	19
Table 4. Results of 2001 Illinois RiverFair evaluation analysis.	35
Table 5. In-stream phosphorus load contributions of selected Illinois River Basin treatment plants.	21

APPENDICES

Appendix 1. EdWAG Members List.....	6
Appendix 2. 20000711 EdWAG Meeting Announcement	6
Appendix 3. 20000711 EdWAG Meeting Agenda	6
Appendix 4. 20000711 EdWAG Meeting Minutes.....	6
Appendix 5. 20000711 EdWAG Meeting Presentation, Task 600 Summary	6
Appendix 6. 20000801 EdWAG Meeting Agenda	6
Appendix 7. 20000801 EdWAG Meeting Questionnaire, Brochure Topic Prioritization	6
Appendix 8. 20000824 EdWAG Meeting Announcement	6
Appendix 9. 20000824 EdWAG Meeting Agenda	6
Appendix 10. 20001005 EdWAG Meeting Announcement	6
Appendix 11. 20001005 EdWAG Meeting Agenda	6
Appendix 12. 20001005 EdWAG Meeting Minutes.....	6
Appendix 13. 20010313 EdWAG Meeting Agenda	6
Appendix 14. 319 Task 600 Project Workplan	6
Appendix 15. OCES Pub. L-310, "Protect the Illinois River from the Threat of TRASH"	7
Appendix 16. OCES Pub. L-311, "Protect Riparian Areas for the Illinois River"	7
Appendix 17. OCES Pub. L-312, "Protect the Illinois River from Nutrient Pollution".....	7
Appendix 18. OCES Pub. L-313, "Maintain Your Septic System for a Healthy Illinois River" 7	7
Appendix 19. online publication "Give the Illinois River a Hand, Help Prevent Urban Storm Water Pollution"	7
Appendix 20. Landowner Conservation and P2 Handbook	8
Appendix 21. 20000707 Adair Co. Cons. Dist. Resource Fair Meeting Notes	9
Appendix 22. 20000718 Adair Co. Cons. Dist. Resource Fair Correspondence	9
Appendix 23. 20000828 Adair Co. Cons. Dist. Resource Fair Correspondence	9
Appendix 24. Adair Co. Cons. Dist. Resource Fair Flyer	9
Appendix 25. 20010124 Cherokee Co. Cons. Dist. Resource Fair Correspondence	9
Appendix 26. 20010221 Cherokee Co. Cons. Dist. Resource Fair Correspondence	9
Appendix 27. May/June 2001 "The Tri-County Conservation District Newsletter" article promoting the Grove Outdoor Classroom	9
Appendix 28. 20020730 Grove Outdoor Classroom (Delaware Co. Cons. Dist. Resource Fair) Correspondence.....	9
Appendix 29. 20020824 Adair Co. Cons. Dist. Resource Fair Correspondence	9
Appendix 30. 20000630 Campground Programs at Round Hollow correspondence re: "Macroinvertebrate Mayhem!".....	10
Appendix 31. 2001 Tahlequah Daily Press article promoting "Macroinvertebrate Mayhem!" Campground Program at Round Hollow	10

Appendix 32. Blue Thumb Stream Teams Brochure.....	10
Appendix 33. Blue Thumb General Interest Handout	10
Appendix 34. Flyer for September 2000 Blue Thumb Training in Grove, OK	12
Appendix 35. Flyer for November 2000 Blue Thumb Training in Tahlequah, OK	12
Appendix 36. Draft News Release for November 2000 Blue Thumb Training in Tahlequah, OK.....	12
Appendix 37. Letters to Schools and Monastery Promoting November 2000 Blue Thumb Training in Tahlequah, OK.....	12
Appendix 38. Flyer for September 2001 Blue Thumb Training in Tahlequah, OK.....	12
Appendix 39. Draft News Release for September 2001 Blue Thumb Training in Tahlequah, OK.....	12
Appendix 40. Sign-up Sheet for September 2001 Blue Thumb Training in Tahlequah, OK displayed at 2001 RiverFair	12
Appendix 41. 20010912 article in Jay "American" re: September 2001 Blue Thumb Training in Tahlequah	12
Appendix 42. Flyer for June 2002 Blue Thumb Training in Kansas, OK.....	12
Appendix 43. Sign-up Sheets for June 2002 Blue Thumb Training in Kansas, OK displayed at Smallmouth Bass Rendezvous and Project WET training.....	12
Appendix 44. Draft News Release for June 2002 Blue Thumb Training in Kansas, OK.....	12
Appendix 45. 20020618 article in Tahlequah "Daily Press" re: June 2002 Blue Thumb Training in Kansas, OK.....	12
Appendix 46. 20020612 article in Stilwell "Democrat-Journal" re: June 2002 Blue Thumb Training in Kansas, OK.....	12
Appendix 47. Undated article in Tahlequah "Daily Press" re: June 2002 Blue Thumb Training in Kansas, OK.....	12
Appendix 48. Blue Thumb Handout on Curb Marking.....	12
Appendix 49. Sign-up Sheets for Curb Marking Displayed at 2001 RiverFair and April 2002 4-H Club Meeting.....	12
Appendix 50. Oklahoma Statewide Blue Thumb Training Materials	13
Appendix 51. 20001030 Registration Letter for November 2000 Blue Thumb Training in Tahlequah, OK from OSRC Administrator and Education.....	13
Appendix 52. 20001030 Registration Confirmation Letter for November 2000 Blue Thumb Training in Tahlequah, OK to OSRC Administrator and Education	13
Appendix 53. 20001107 Letter to Registrants for November 2000 Blue Thumb Training in Tahlequah, OK.....	13
Appendix 54. Agenda for November 2000 Blue Thumb Training in Tahlequah, OK.....	13
Appendix 55. 20001116 Email from Cheryl Cheadle with Additional Agenda Information for November 2000 Blue Thumb Training in Tahlequah, OK.....	13
Appendix 56. Agenda for September 2001 Blue Thumb Training in Tahlequah, OK.....	13
Appendix 57. Agenda for June 2002 Blue Thumb Training in Kansas, OK	13
Appendix 58. Letter to Registrants for June 2002 Blue Thumb Training in Kansas, OK	13
Appendix 59. 20010518 Illinois Basin/Spring Creek Blue Thumb UPDATE	13
Appendix 60. 20010711 Illinois Basin/Spring Creek Blue Thumb UPDATE	13
Appendix 61. 20010914 Illinois Basin/Spring Creek Blue Thumb UPDATE	13
Appendix 62. 20011005 Illinois Basin/Spring Creek Blue Thumb UPDATE	13
Appendix 63. 20011217 Illinois Basin/Spring Creek Blue Thumb UPDATE	13
Appendix 64. 20020308 Illinois Basin/Spring Creek Blue Thumb UPDATE	13
Appendix 65. 20020626 Illinois Basin/Spring Creek Blue Thumb UPDATE	13
Appendix 66. 20020925 Illinois Basin/Spring Creek Blue Thumb UPDATE	13
Appendix 67. 20030106 Illinois Basin/Spring Creek Blue Thumb UPDATE	13
Appendix 68. 20030305 Illinois Basin/Spring Creek Blue Thumb UPDATE	13

Appendix 69. Blue Thumb Data Sheet.....	14
Appendix 70. Sample copies of Blue Thumb Animal Collection Data Sheets.....	14
Appendix 71. Sample copies of Blue Thumb Habitat Assessment Data Sheet	14
Appendix 72. 20010420 Email Correspondence Describing Training.....	15
Appendix 73. 20010424 Report Form: Training for Youth Fairs	15
Appendix 74. Oklahoma 4-H AquaTimes brochure.....	16
Appendix 75. Oklahoma 4-H Handout, “ <i>Environmental Programs for Educators and Youth</i> ”	16
Appendix 76. Fram PowerPoint Presentation, “ <i>OCES Water Quality/Environmental Programs for Youth</i> ”.....	16
Appendix 77. Oklahoma 4-H Stream and Lakes Projects flyer.....	16
Appendix 78. Oklahoma 4-H Stream and Lakes Projects Factsheets	16
Appendix 79. 2000 OCES In-Service Education Proposal for Stream Hydrology Trailer Workshop.....	16
Appendix 80. 2000 OCES In-Service Education Proposal for Oklahoma 4-H AquaTimes Workshop.....	16
Appendix 81. 2002 Oklahoma 4-H Stream and Lakes Projects Leadership Development Conference Workshop Proposal.....	16
Appendix 82. Memo to OCES Educators re: October 2000 Stream Trailer Training in Adair County.....	17
Appendix 83. Agenda for October 2000 Stream Trailer Training in Adair County	17
Appendix 84. Email from Fram to Northeast OCES Educators re: October 2000 4-H Stream and Lake Water Quality Projects Workshop in Rogers County	17
Appendix 85. Flyer/Sign-up Sheet for October 2000 4-H Stream and Lake Water Quality Projects Workshop in Rogers County.....	17
Appendix 86. Agenda for October 2000 4-H Stream and Lake Water Quality Projects Workshop in Rogers County.....	17
Appendix 87. Email Agenda for November 2000 “Inquiry Based Science Instruction Program” meeting at NSU.....	17
Appendix 88. 20010126 Memo from Fram to OCES Educators re: February 2001 AquaTimes Workshop.....	17
Appendix 89. 20010130 Memo from Fram to OCES Educators re: February 2001 AquaTimes Workshop.....	18
Appendix 90. Agenda for February 2001 AquaTimes Workshop.....	18
Appendix 91. 20020515 Invitation from NSU to Fram re: Co-facilitation of June 2002 Project WET Workshops.....	18
Appendix 92. Agenda for June 2002 Project WET Workshops.....	18
Appendix 93. Agenda for July 2000 4-H Stream and Lake Water Quality Projects Workshop in Payne County.....	18
Appendix 94. 2001 Illinois RiverFair Flyer.....	18
Appendix 95. 2001 Illinois RiverFair Press Release	18
Appendix 96. 20010831 Muskogee Daily Phoenix article re: RiverFair 2001	18
Appendix 97. 20010831 Lake and River Guide article re: RiverFair 2001	18
Appendix 98. 2002 Illinois River Flotilla Tour List of Invitees	20
Appendix 99. 2002 Illinois River Flotilla Tour Letter of Invitation	20
Appendix 100. 2002 Illinois River Flotilla Tour Map.....	20
Appendix 101. 20020919 Letter to Reasor’s Food Store, Tahlequah, OK re: Support for 2002 Illinois River Flotilla Tour.....	20
Appendix 102. 20020919 Letter to Wal-Mart Supercenter, Tahlequah, OK re: Support for 2002 Illinois River Flotilla Tour.....	20
Appendix 103. Phosphorus in the Illinois River Basin, 2002 Float Trip Poster Session	21

Appendix 103. Flyer for November 2000 "Water Quality Wildlife" Seminar22

Appendix 103. Agenda for November 2000 "Water Quality Wildlife" Seminar.....22

Appendix 103. Articles by Fram: "New Broiler House Cleanout Schedule Can Save Money",
and "Water Suppliers Provide Annual drinking Water Reports" published in July-August
2001 edition of The Tri-County Conservation District Newsletter 22

Appendix 103. Article by Fram: "Consider Summer/Fall Cleanout and Litter Application" for
July 11, 2000 edition of Delaware County Conservation District Newsletter 22

Appendix 103. Article by Fram: "Illinois River Basin Education Program 600" for August 16,
2000 edition of Illinois River Project/Cherokee County Conservation District Newsletter
..... 22

Appendix 103. Article by Fram: "Chopped Enough Ice" for March/April 2001 edition of Lake
Eucha Watershed Advisory Committee Newsletter 22

Appendix 103. 20011115 Muskogee County OCES Teacher's Resource Institute
Attendance Sheet re: Stream Trailer Demonstration 22

Appendix 103. Flyer for July 2002 "Alfalfa" Seminar 22

Appendix 103. Flyer for 2002 Illinois River Cleanup Event 22

Appendix 103. Flyer for November 2000 "Water Quality Wildlife" Seminar 22

Appendix 103. Agenda for October 2002 "Pond Management, Habitat Establishment, and
Riparian Areas" presentation to Adair County Cattlemen's Association 22

Appendix 105. 20001011 Adair Co. Cons. Dist. Resource Fair Attendance Sheet 23

Appendix 106. 20010424 Cherokee Co. Cons. Dist. Resource Fair Report Form..... 23

Appendix 107. 20010424 Cherokee Co. Cons. Dist. Resource Fair Attendance Sheets 23

Appendix 108. 20010518 University of Arkansas "Farm Friends" Report..... 23

Appendix 109. 20010424 Cherokee Co. Cons. Dist. Resource Fair Attendance Sheet 23

Appendix 110. Nov 2001 "Illinois River News" article on Adair Co. Cons. Dist. Resource Fair
..... 23

Appendix 111. 20010912 Adair Co. Cons. Dist. Resource Fair Attendance Sheet 23

Appendix 112. Nov/Dec 2001 "The Tri-County Conservation District Newsletter" article
reporting on the Grove Outdoor Classroom (Delaware Co. Cons. Dist. Resource Fair) 23

Appendix 113. 20011024 "Jay American" article reporting on the Grove Outdoor Classroom
(Delaware Co. Cons. Dist. Resource Fair)..... 23

Appendix 114. 20020912 Adair Co. Cons. Dist. Resource Fair Attendance Sheet 23

Appendix 115. Nov/Dec 2002 "The Tri-County Conservation District Newsletter" article
reporting on the Grove Outdoor Classroom (Delaware Co. Cons. Dist. Resource Fair) 23

Appendix 116. 20020919 Grove Outdoor Classroom (Delaware Co. Cons. Dist. Resource
Fair) Correspondence 24

Appendix 117. 20030317 email from Marti Mefford with attendance from 2001 and 2002
Grove Outdoor Classroom (Delaware Co. Cons. Dist. Resource Fair)..... 24

Appendix 118. 2000 Adair County Environmental Fair Evaluations..... 24

Appendix 119. 2002 Grove Outdoor Classroom (Delaware Co. Cons. Dist. Resource Fair)
Essays from Mr. Hendren's Fifth Grade, Colcord Elementary School 24

Appendix 120. Task 600 Suggested Questions for 2002 Adair County Environmental Fair
Quiz..... 24

Appendix 121. 2002 Adair County Environmental Fair Quiz..... 24

Appendix 122. Article on 20000722 Round Hollow Campground Program
"Macroinvertebrate Mayhem!" published in Delaware County Journal (20000802) and
Grand Lake Magazine (20000820) 26

Appendix 123. 20000726 Round Hollow Campground Program "Macroinvertebrate
Mayhem!" Correspondence, with attendance 26

Appendix 124. 20010526 Round Hollow Campground Program "Macroinvertebrate
Mayhem!" Report Form 26

Appendix 125. 2001 Multi-county Water Quality Camp on Grand Lake Pre and Post-Test	26
Appendix 126. 2001 Multi-county Water Quality Camp Photographs	26
Appendix 127. 2001 Multi-county Water Quality Camp Evaluations	26
Appendix 128. Attendance Sheet from November 2000 Blue Thumb Training	27
Appendix 129. 20001203 Tahlequah Daily Press article re: November 2000 Blue Thumb Training	27
Appendix 130. Attendance Sheet from September 2001 Blue Thumb Training	27
Appendix 131. Attendance Sheet from June 2002 Blue Thumb Training	27
Appendix 132. 20020703 Stillwell Democrat-Journal article re: June 2002 Blue Thumb Training	27
Appendix 133. 20020809 Teacher Commendation Letter to Tahlequah Public Schools Professional Development Center	27
Appendix 134. 20020809 Teacher Commendation Letter to Rocky Mountain Schools	27
Appendix 135. 2003 Illinois River Basin/Spring Creek Volunteer Roster	27
Appendix 136. Illinois River Basin/Spring Creek Blue Thumb Monitoring Sites	28
Appendix 137. 20021004 Illinois River Basin Blue Thumb Data Report from Cheadle to Fram	28
Appendix 138. 20021028 Illinois River Basin Blue Thumb Data Report from Cheadle to Lemmon	28
Appendix 139. Summary Table of Illinois River Basin Blue Thumb Data	28
Appendix 140. Summary of pre- and post-training test scores and participant evaluations from September 2000 Blue Thumb Training	28
Appendix 141. 20010504 Commendation Letter to Students	28
Appendix 142. 20011215 Letter from Volunteer re: Educational Activity	28
Appendix 143. April 2002 Email correspondence between Fram and Walters re: Educational Activity	28
Appendix 144. 20020417 Commendation Letter for Students to Tahlequah High School principal	29
Appendix 145. 20021012 Stillwell Democrat-Journal article re: Blue Thumb Educational Activity	29
Appendix 146. May 2003 IRB/Spring Creek Blue Thumb Volunteer Survey Questions	29
Appendix 147. May 2003 IRB/Spring Creek Blue Thumb Volunteer Survey Questions	29
Appendix 148. 20010219 AquaTimes Workshop Attendance Roster	30
Appendix 149. 20010219 AquaTimes Workshop Pre/post-Test Questions	30
Appendix 150. 20010219 AquaTimes Workshop Pre-test Results	30
Appendix 151. 20010219 AquaTimes Workshop Post-test Results	30
Appendix 152. 20010219 AquaTimes Workshop Evaluation Form	30
Appendix 153. 20010219 AquaTimes Workshop Evaluation Results	30
Appendix 154. 20010223 Teacher Commendation Letter to Briggs School Superintendent re: 20010219 AquaTimes Workshop	30
Appendix 155. 20001021 4-H Water Quality Projects Workshop Evaluation Summary	31
Appendix 156. 20020719 4-H Water Quality Projects Workshop Attendance Sheet	31
Appendix 157. 20020719 4-H Water Quality Projects Workshop Evaluation Summary	31
Appendix 158. Description of 4-H Environmental Stewardship Fair Projects	31
Appendix 159. Table of 2000-2002 4-H Environmental Stewardship Fair Projects	31
Appendix 160. June 7-8, 2002 Project WET Workshop Evaluation Summary	32
Appendix 161. June 21-22, 2002 Project WET Workshop Evaluation Summary	32
Appendix 162. 20001002 Stream Hydrology Training Attendance Sheet	33
Appendix 163. 20001002 Stream Hydrology Training Pre/post Test Results and Evaluation Summary	33

Appendix 164. 20001004 Commendation Letter to Fram from Westville Schools
Professional Development Chairperson re: 20001002 Stream Hydrology Training 33

Appendix 165. 20001130 Environmental Education Workshop Attendance Sheet 34

Appendix 166. 20010503 Letter from NSU Assistant Professor Adams to Fram re:
Environmental Education Presentations 34

Appendix 167. Ill. River News, Issue #6, Nov '01 34

Appendix 168. Oct '01 letter from Ed Fite 34

Appendix 169. 2001 RiverFair Evaluation Responses 35

Appendix 170. 2002 Illinois River Flotilla Tour Attendance Sheet 36

Appendix 171. 20020929 The Morning News (Northwest Arkansas) article re: 2002 Illinois
River Flotilla Tour 36

Appendix 172. 20020930 Muskogee Daily Phoenix article re: 2002 Illinois River Flotilla Tour
..... 36

Appendix 173. 2002 Illinois River Flotilla Tour Evaluation Forms 36

Appendix 174. 2002 Illinois River Flotilla Tour Evaluation Responses (summarized) 36

EXECUTIVE SUMMARY

This report details OCES 1996–2002 activities supporting FY1996 CWA 319(h) NPS Pollution Program, “*Task 600: Illinois River Education Program (continuation)*,” (OCC Task #82, OSU Account No. 3-5-90360). The grant was administered by OCC. Key personnel at OSU included Project Director Michael D. Smolen, and Project Coordinator Mitchell J. Fram.

Project Description

The Illinois River helps define northeast Oklahoma, but development in its Basin has degraded water quality. Problems include excessive nutrients from local nonpoint sources, aquatic habitat degradation, and eutrophication of Lake Tenkiller, located at the Basin outlet.

Though the focus of several programs, the Basin’s size (1.1 million acres) has diluted the impact of these efforts. The current project, Task 600, addressed three main issues: nutrient loading from point and nonpoint sources, habitat degradation, and a poorly informed public. It targeted the Oklahoma portion of the Basin, a 600,000-acre project area encompassing portions of Adair, Cherokee, Delaware, and Sequoyah counties.

The original project vision included support for both the cost-share incentive program of FY1999 319(h) Task 800 and the development of a TMDL for Lake Tenkiller. These items were removed from the final workplan. OCC and OCES made Task 600 a concentrated education effort to get pollution control information into the hands of the general public.

Project Management

OCC supervised the project. OCES conducted educational programs under cooperative agreement with OCC. Other cooperators included the FY1999 319(h) Task 800 Watershed Advisory Group (WAG) and its Education subcommittee (EdWAG), OSRC, NRCS, OWRB, ODA, local Conservation Districts (CDs), Cherokee Nation, and DEQ.

Project Tasks

The goals of the project were accomplished through seven different tasks:

Task 1. Illinois River Environmental Education Brochures

Output 601.1 – Riparian Management

Output 601.2 – Nutrient Management

Output 601.3 – Septic System Maintenance

Output 601.4 – Solid Waste and Trash Disposal

Output 601.5 – Urban Runoff and/or Pollution Prevention for Recreation Users

Appendix 2 contains the initial submittal of all five of these outputs.

Five environmental education brochures tailored to the Basin resident audience were produced. The brochures discussed nutrient, riparian, and solid waste management, as well as private domestic waste, and urban runoff pollution. Four of the five brochures were printed and distributed in October 2002. Copies were allocated among the Conservation Districts, OSRC, and OCES. The “Urban Runoff” brochure was completed in 2003 and has been published online at <http://waterquality.okstate.edu/>.

Task 2. Illinois Basin Landowner Conservation and Pollution Prevention Handbook

*Output 602.1 – Landowner Conservation and P2 Handbook, **Appendix 3 is the initial submittal of this output***

Urbanization and intensifying landuse in the Basin has created more impervious surfaces, increased flood frequency, and put pressure on riparian habitat. Many new rural landowners are particularly unaware of the environmental impact of their landuse practices. Working in committee, Fram helped create a website (<http://www.dasnr.okstate.edu/landowners/>) for this audience. This information was adapted for use in the handbook.

The handbook provides tips for country living while emphasizing Best Management Practices to raise “watershed awareness”. A listing of agencies and other land management resources is included. The handbook was completed in late 2002 and is published online at <http://waterquality.okstate.edu/>. There are tentative plans to combine cited publications with the handbook in a manual for Basin Extension and real estate professionals.

Task 3. Youth Education

A) Youth Environmental Fairs:

Output 603.A.1 – Adair County Youth Environmental Fair

Output 603.A.2 – Cherokee County Youth Environmental Fair

Output 603.A.3 – Delaware County Youth Environmental Fair

Output 603.A.4 – Sequoyah County Youth Environmental Fair

This section of the final report is the initial submittal for these outputs.

OCES helped the Conservation Districts facilitate environmental fairs in all project area counties for elementary- to middle school-age youth and teachers, including the first ever Delaware County Environmental Fair in 2001. Several groups and/or agencies exhibited booths at the fairs, providing a broad-based educational experience for over 5,000 Basin children (Appendix ??). Fram helped Task 800 personnel plan and recruit. He also trained volunteers to display aquatic biology, stream hydrology, and pollution prevention exhibits.

B) Blue Thumb Program

Output 603.B.1 – Blue Thumb Recruitment

Output 603.B.2 – Blue Thumb Orientation & Training

Output 603.B.3 – Blue Thumb Meetings with Data Reports

Output 603.B.4 – Blue Thumb Animal Collections

Output 603.B.5 – Blue Thumb Habitat Assessments

Output 603.B.6 – Training of Blue Thumb Volunteers to Assist at Environmental Fairs

This section of the final report is the initial submittal for these outputs.

OCES, the Blue Thumb Statewide Coordinator, Task 800 Education Coordinators, and OSRC staff worked cooperatively to implement the Blue Thumb volunteer water quality-monitoring program in the Basin. After 20 hours of training, “Blue Thumbers” are responsible for monthly testing at established monitoring sites.

Fram worked with the Cherokee and Adair County conservation districts, and local schools, to sponsor Blue Thumb groups in those counties. With support from Statewide Blue Thumb staff, he took major responsibility for recruiting, training, and equipping volunteers as water quality monitors and watershed educators. As of this report, 42 certified Blue Thumb volunteers are active in the Basin and nearby Spring Creek Watershed. In addition, non-certified students from area schools often accompany volunteers during fieldwork. New trainings are being requested on a regular basis.

Task 603B.1 - Recruitment

Recruitment occupied the majority of Fram’s time early in the project. He contacted schools, called prospects, developed publicity for training events, and presented the program to

various youth and adult groups. In addition, he published flyers and news releases that were sent to 12 local papers in the four-county project area.

A Blue Thumb storm-drain marking activity was presented to Cherokee County 4-H clubs, who will implement the program in Spring 2003. Fram, OCC Basin Education Coordinator Teresa Butler, and OCES 4-H Educator Heather Winn have also received support for this program in Tahlequah and Stilwell, in Cherokee and Adair County, respectively.

Task 603B.2 - Orientation and Training

From 2000 to 2002, five Blue Thumb training events certified at least 70 volunteers in Basin counties. Delaware County conservation district staff arranged the first. Fram was an integral part of the remaining four. He helped prepare news releases, scouted potential sites, assisted and presented during the sessions, and provided make-up training. He also developed and distributed a newsletter to volunteers on a quarterly basis. Agendas and other materials were largely the responsibility of the Statewide Blue Thumb Program. For more details, see Appendix 3.

Task 603B.3 - Meeting with Data Reports

The Basin Blue Thumb groups held mandatory quarterly QA meetings, but attendance was rather low. To combat the problem, Fram and the other Blue Thumb leaders tried to include other Blue Thumb activities simultaneously.

Submission of quarterly data reports was difficult. Blue Thumb data must be submitted to a central location for analysis, preventing timely compilation. More efficient reporting methods are being discussed. By project's end, when sufficient data was available, data reports were provided to QA meeting attendees. Samples are provided in Appendix 4.

Task 603B.4 - Animal Collection

To help connect chemical water quality indices to ecosystem health, Blue Thumb volunteers collect aquatic macro-invertebrates from monitoring sites semi-annually. Sub-samples (100-150 organisms) were sent to a professional for identification and used to calculate a bio-indication ranking for the site. Fish collections were also conducted on some sites. Fram assisted by recruiting volunteer help, sending reminders, arranging schedules, and aiding in the actual sampling. For sites near schools, students were encouraged to participate, with enthusiastic support from teachers.

Task 603B.5 - Habitat Assessment

Abbreviated habitat assessments were performed during semiannual macro-invertebrate collections. More extensive ones were done during occasional fish collections. (Data sheet samples provided in Appendix 5). Some Blue Thumb groups collected occasional water samples that Fram had laboratory tested for chlorpyrifos pesticides and *E. coli* bacteria. Results allowed volunteers to further assess the habitat quality of their streams.

Task 603B.6 - Training for Youth Fairs

Fram trained volunteers to assist with displays at the 2001 Cherokee County Environmental Fair and the 2002 Osage County Earth Day Fair. He also trained Blue Thumb student-volunteers so they could present the groundwater, storm sewer, and enviroscape models to 150 disabled students at the Tahlequah Schools Science Expo in 2002.

C) Teacher / Youth Leader Training

Output 603.C.1 – Teacher/Youth Leader Training Workshops

This section of the final report is the initial submittal for these outputs.

To indirectly reach youth, the project trained Basin educators and youth leaders on how to use available water quality education materials. Task 800 coordinators and EdWAG helped market workshops to schools and youth programs. Professional development credits and scholarships were offered when applicable. Training was offered for the following programs:

- ◆ 4-H Water Quality Projects - promotes field activities for youth in pond and stream biology and watershed studies; guides preparation of County and State Fair projects
- ◆ Stream Trailer - model and curriculum teaches concepts of stream bank stability and erosion, riparian values, flood plain management, and watershed effects on streams
- ◆ Oklahoma Aqua Times - 4-H elementary/middle school interdisciplinary curriculum teaches groundwater/water conservation and pollution prevention
- ◆ Project WET - The Watercourse – Montana State University; 500+ page “Curriculum and Activity Guide” contains interdisciplinary activities for grades K-12
- ◆ Lifestyles of the Wet 'n Wild - 4-H curriculum that illustrates basic principles of groundwater hydrology, erosion and runoff, and lake and stream biology

Fram sponsored and/or participated in 17 workshops and seminars during 2000-2002, reaching over 280 educators/youth leaders. In addition, mailings, discussions, and presentations indirectly affected several other Basin educational outlets. See Appendix ??.

Task 4. Public Events and Adult Education

Output 604.A.1 – Illinois Basin Riverfair
Output 604.B.1 – Illinois River Flotilla Tour

This section of the final report is the initial submittal for these outputs.

Task 604A RiverFair

The project, Adair and Cherokee County Conservation Districts, OCC, OSRC, and OCES cooperatively sponsored the first Illinois RiverFair in September 2001. Twenty area organizations, including RiverFair host Eagle Bluff Resort, provided support. The Task 800 EdWAG helped plan and schedule the fair. Fram served on the Planning Committee to recruit and line up educational presentations.

The event combined education, service, and fun. Nearly 100 people took part in the canoe-based river cleanup, removing over 3,000 pounds of trash from the waterway. A similar number participated in games and educational activities offered by about 20 organizations. Evaluation responses ($n=56$) were encouraging. Evening festivities were attended by about 175 fairgoers. For a complete listing of the day's activities, see Appendix ??.

Task 604B Flotilla Tour

The project, OCES, OCC, and OSRC conducted an *Environmental Impact Tour for Community Leaders on the Illinois River* in the fall of 2002. OSRC and Peyton's Place Resort, provided canoes and rafts free of charge to pre-registrants for the float trip. The Illinois River 319 Project Education Coordinator and OSRC Administrator helped plan and schedule the event.

OSRC, OCC, Oklahoma Department of Wildlife Conservation, Oklahoma Blue Thumb and OCES Water Quality Programs provided educational presentations to the flotilla at various stops. Over 100 individuals were invited; about 50 attended. It was a very diverse group, but virtually all 26 of the post-tour evaluation respondents were extremely positive. Articles published in area papers by journalists in attendance were also very supportive. (Appendices ??).

Task 5. Final Report

Output 605.1 – Final Report

This document, including tables, figures, and appendices, is the initial submittal of the final report.

Measures of Success

The following list of accomplishments is a summary of the quantifiable impact of the Project. A more complete discussion of the Measures of Success, as defined in the workplan, is provided in the body of the final report.

- ◆ *One thousand of each of 4 brochures distributed to agencies in the Basin*
- ◆ *Five brochures and a Handbook available online*
- ◆ *Approximately 5000 children at county Resource Fairs received hands-on exposure to basic stream ecology, basic stream hydrology and riparian areas, and elementary stormwater and groundwater concepts*
- ◆ *An additional 150 special needs children at a Tahlequah Schools – sponsored resource fair taught about groundwater and stormwater by trained Blue Thumb Volunteer students*
- ◆ *134 children received actual experience with water resources, including animal collection, at camps and campground programs*
- ◆ *Sixty-four prospective water monitoring and education volunteers trained in the Basin, of which 42 are currently active in the Blue Thumb program, and another ten remain in touch with the program, possibly to begin monitoring in the future*
- ◆ *Eleven stream sites in Basin counties received monthly volunteer monitoring for water chemistry by the end of the Project*
- ◆ *Volunteers turned in 206 site-monitoring reports over a two-year period, in addition to approximately 32 invertebrate collections and three fish collections with accompanying habitat assessments*
- ◆ *Over 2500 volunteer hours devoted to the Blue Thumb program during the Project period, including:*
 - *1150 hours in training*
 - *1260 hours in site monitoring and invertebrate collections*
 - *130 hours in Quality Assurance sessions*
 - *80 hours assisting at educational activities; resource fairs, RiverFair and Flotilla Tour*
 - *uncounted hours in informal knowledge transfer to friends, families and passers-by at monitoring sites*
- ◆ *281 adults and teen leaders attended training workshops and formal presentations on Project material in 17 different programs (11 of these lasted a minimum of 3 hours!)*
- ◆ *The vast majority of workshop attendees (246 of 281) were educators – school teachers and Extension Educators*
- ◆ *Two workshop trainees took the stream trailer and accompanying riparian education materials to several hundred adults and children at events on the Arkansas side of the Illinois River Basin*
- ◆ *Between 62 and 150 visitors passed by educational booths and attended presentations and youth activities at the 2001 Illinois RiverFair*
- ◆ *Thirteen volunteers from Blue Thumb and the NSU Safety and Environmental Management Association trained in the morning on the various educational models and devoted a total of at least 80 volunteer hours to the 2001 Illinois RiverFair*
- ◆ *Some 88 volunteers collected 3000 pounds (two truckloads) of trash at the morning canoe-based cleanup portion of 2001 Illinois RiverFair*
- ◆ *Forty-eight community leaders, teachers, Blue Thumb volunteers and agency staff attended a five hour “Flotilla Tour” of a six-mile segment of the Illinois River, during which they got hands-on experience with, and/or detailed information on, river fisheries,*

water sampling and testing, biological monitoring, riparian issues, cost-share assistance opportunities, and the phosphorus problem

- ◆ *Several newspaper articles carrying photos and information about Project activities appeared in area markets including Muskogee, Tahlequah, Stilwell, Westville, Jay, and Grove in Oklahoma, as well as Springdale, Siloam Springs, Fayetteville, Rogers, and Bentonville in Arkansas (AR)*

Conclusions

To summarize, although the quantifiable results listed previously are indeed a measure of the success of the Project, some of the most important outcomes from this effort cannot be captured in answers to test questions or responses on evaluation forms. In fact, these accomplishments will probably make the greatest difference in helping improve and protect the water quality of the Illinois River Basin. These include:

- ◆ A publications series including BMP fact sheets and a landowner's handbook, which is web-published and therefore easily updateable for future Basin programming and adaptable to other watersheds;
- ◆ A trained corps of school teachers and other professional educators and volunteers who are familiar with diverse water quality and aquatic ecology curricula and resources
- ◆ A strong and on-going Blue Thumb volunteer corps, with a sustainable structure of support, from local (Extension, CD, OSRC, schools) as well as statewide sources.
- ◆ The beginnings of a tradition (2 years) of Fall Illinois Watershed education events with support from agencies and volunteers inside and outside the watershed, and experience on which to base more effective educational planning.
- ◆ A background of experience from seven youth environmental resource fairs on which to base planning for increased educational effect and evaluation at future activities.

In conclusion, the Illinois River Basin Education Program accomplishments were significant, not just for the quantity and diversity of programming, but also as a solid base from which to build future efforts in this and nearby watersheds.

FINAL PROJECT REPORT

This report details OCES activities from 1996–2002 in support of the FY1996 CWA 319(h) NPS Pollution Program grant, “Task 600: Illinois River Education Program (continuation),” (OCC Task #82, OSU Account No. 3-5-90360). The grant was administered by OCC. Key personnel at OSU included Project Director Michael D. Smolen (OCES Water Quality Programs Coordinator) and Project Coordinator Mitchell J. Fram (OCES Area Extension Water Quality Specialist).

Introduction

As Oklahoma’s first designated “Scenic River” and “Outstanding Resource Water”, the Illinois River helps define the northeast portion of the State. A popular destination for area residents and visitors from four states, the Basin’s waterways and reservoirs help form the core of a thriving tourism industry. One of the major recreational and economic resources in the region is Lake Tenkiller, located just a few miles upstream of the Basin outlet where the Illinois joins the Arkansas River.

Recent increases in urban, suburban, and rural development in the region have resulted in more homes, community facilities, golf courses, and more intensive rural landuse in the watershed. Unfortunately, these changes have resulted in decreased water quality in the Basin. Problems include excessive nutrients in the Illinois River from local nonpoint sources, aquatic habitat degradation in tributaries, and eutrophication of Lake Tenkiller. In fact, it is estimated that a 40% reduction in phosphorus load will be required to maintain the current lake water quality. The problem includes both urban and rural nonpoint sources.

Commented [t1p1]: Who estimated this??

These factors have been well known for quite some time. The Basin has been the focal point of several efforts under 319, as well as other state and federal programs. However, due to the Basin’s size, the impact of previous implementation programs has not yet become apparent. Additional educational efforts are needed to make the residents, agricultural producers, and recreational users of the Illinois River Basin more fully aware of their roles in pollution control.

Most of the effort for the current project addressed three primary problems and needs: nutrient loading from point and nonpoint sources enriching the Illinois River and Lake Tenkiller, habitat degradation in the Illinois River and tributaries, and a poorly informed public. Each of these problems is discussed in more detail below.

Poorly Informed Public

Relatively few residents of the Basin are well informed about water quality problems and the resources needed to solve them. For example, they know little about the Illinois River Management Plan, developed with public input by the Oklahoma Scenic River Commission (OSRC) and published in 1999. Urban and suburban residents are particularly unaware of the part they play in water quality problems and the distinction between point and nonpoint sources. Even when they are concerned and motivated, people don’t know where to go for help and advice, and there are few opportunities for direct involvement.

Nutrient Loading from Point and Nonpoint Sources

Problems of excessive nutrients entering streams in the Illinois River Basin and eutrophication of Lake Tenkiller have been well documented (Shackleford, 1991; Burks *et al.* 1991; Burks, 1995). The major portion of these nutrients originates from nonpoint sources.

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An estimated 88% of total P loads entering Lake Tenkiller from the Oklahoma portion of the Basin comes from nonpoint sources. Much of these are from poultry, cattle, and dairy animal wastes. An estimated 5.1 million pounds of N and 4.1 million pounds of P are generated as poultry manure in Oklahoma's upper Illinois Basin.

Commented [tlp3]: Annually?

Manure is typically applied to pastures close to poultry operations or dairy barns. Although some nutrients are stabilized in soil-forming processes and some are harvested as forage and beef, repeated applications have resulted in high soil P loads in some areas, increasing the risk of P loss to local streams. A significant amount of nutrients are also transported directly to streams and ponds by cattle. Urban and non-agricultural sources must also be considered in light of the rapid development in the region.

The human component of nonpoint sources includes the problem of failing septic tanks. Many residents of the area have no septic system or one that is failing. Education is needed to promote proper maintenance of septic systems and proper installation for new construction or retrofit applications.

Finally, the public also needs to understand the impact of waste treatment plants on the overall nutrient load.

Habitat Degradation

Aquatic habitat degradation has received increasing attention in the Basin. The fertilizer resource brought to the area by the poultry industry has greatly increased the carrying capacity of pastures for cow-calf and dairy operations. Clearing of forest cover is accelerating, due to increasing timber values and availability of manure fertilizer. The combination of increased livestock in and near streams and removal of permanent tree cover has resulted in stream and riparian habitat degradation. Shading has been reduced and streambeds are filling with sediment, resulting in wider, shallower and warmer streams. Ultimately this has destabilized streambanks, removed in-stream cover, and degraded habitat for desirable species. A similar process occurs in farm ponds with unrestricted livestock access. Area residents need to know the impacts of tree removal and riparian grazing, as well as management alternatives that can protect aquatic and riparian habitat.

Project Area

The Illinois River Basin encompasses some 1.1 million acres in northwest Arkansas and northeast Oklahoma. The project targeted the Oklahoma portion of the Basin, including Lake Tenkiller, altogether an area of some 600,000 acres. It included parts of Adair, Cherokee, Delaware, and Sequoyah counties.

Project Goals

Task 600 was a concentrated education effort to get pollution control information into the hands of farmers and the general public. The task coordinated with other education and implementation activities, particularly FY1997 319(h) Task 800 (OCC Task#93), "*Watershed Protection through Manure Marketing (Pilot Study)*" and FY1999 319(h) Task 800, "*Illinois River and Baron Fork Watershed Implementation*". The Illinois River Management Plan also provided public context, interest, and support. The OSRC Commissioners and Administrator, as well as the 1999 Task 800 Watershed Advisory Group (WAG) and its educational sub-committee (EdWAG), all played a role in the guidance of Task 600 goals and activities.

The workplan for Task 600 was based partly on the nonpoint source pollution educational goals and strategies set forth in the Illinois River Management Plan, with the exception of gravel mining and commercial nursery runoff issues, which are covered by regulatory agencies and other grants. As a result, this project fits into, and supports an ongoing, public, Basin-wide initiative.

The Illinois River Management Plan recommends that:

- Planning tools and educational materials be provided to all agricultural operators;
- Increased effort be made to coordinate water quality protection activities with poultry integrators;
- Educational activities be undertaken to encourage landowners to restrict livestock from riparian areas;
- Educational efforts be stepped up to reduce urban stormwater pollution;
- The rural public be educated about the proper permitting, construction, and maintenance of on-site wastewater systems;
- A volunteer water quality monitoring and education program be initiated.

Project goals included specific approaches addressing each of the problem areas described in the *Introduction*. These included:

Approaches to Poorly Informed Public:

1. *Citizen and multi-agency involvement*. The 1999 Task 800 project established a Watershed Advisory Group (WAG) to operate as an advisory committee for 319 activities in the Basin. This volunteer, citizen-stakeholders group and its sub-committee, the Educational Watershed Advisory Group (EdWAG), reviewed the educational plans, priorities, and activities of this project, helped identify target audiences, shared local concerns, and helped develop public support. Additionally, Task 600 Project Coordinator Mitch Fram consulted with personnel from agricultural, environmental, tribal, and other agencies with interests in Basin management, to review Project objectives and plan cooperative activities, including tours, seminars, training workshops, and media efforts. Finally, opportunities for youth and adult volunteer activities were open to everyone and well publicized.
2. *Public environmental education and outreach*: Citizens who live, work, or recreate in the Illinois River Basin received information on environmental protection goals, water quality standards, BMPs for nonpoint source control, riparian management, solid waste management, private domestic waste management, and regulatory programs. This education laid the foundation of respect for the environment and improved cooperation and compliance with existing and future regulations. Specific approaches included:
 - a) Cooperative efforts with the conservation districts, OSRC, and other agencies to gain local media coverage and address information deficiencies
 - b) Youth environmental education through 4-H clubs, classroom enrichment with the Blue Thumb program, environmental fairs, and camps
 - c) Environmental education training and curricula distribution to teachers and youth leaders
 - d) Expansion of environmental fairs, successful in Cherokee County, to other areas in the Basin

- e) Initiation of a youth and adult water quality monitoring and education program, with monitoring sites located on streams easily accessible to schools
- f) Recruitment of 4-H, and other rural and urban youth groups, as well as teachers, other adults in-service, and fly-fishing clubs to participate in the volunteer water quality monitoring program
- g) Publication of newsletters, brochures, and handbooks specific to environmental issues in the Basin, including collaboration with outside agencies so that publication continues beyond the project period

Approaches to Nutrient Enrichment:

Resource management education for area farmers: While not included specifically in the workplan of Task 600, forage and grazing programs and soil fertility and weed management workshops were conducted in and near the Basin through joint efforts of OCES and conservation districts. These events educated producers about BMPs and record keeping for the least polluting, most economical operation of their farms and ranches. Most of these were offered for credit against the requirements of the State-mandated waste management education program for poultry producers. However, they were also offered to and attended by non-poultry producers and natural resource agency staff. Emphasis was placed on reduction of unnecessary nutrient applications, not just compliance with the law.

Sale of excess manure was also encouraged as part of sound economic management. Task 600 Project Coordinator Mitch Fram Project was working concurrently on FY1997 319(h) Task 800, *Watershed Protection Through Manure Marketing (Pilot Program)* during the project period.

Outreach: Since agriculture is not the only nonpoint source of nutrients, all landowners and urban dwellers need information on fertilizer use and stormwater and wastewater management. Public support is also needed for funding cost-share programs for farmers. Teachers, school administrators, and the general public were made aware of programs supported by this project through local media publicity, Blue Thumb recruitment activities, presentations at university classes and civic clubs, and personal communications. While not listed in the Task 600 workplan, farm and ranch operators were informed by OCES about programs addressing nutrient problems, including demonstrations, workshops, and technical and planning assistance. Producers were also kept up-to-date about new uses for, and opportunities to market, excess manure.

Approaches to Habitat Degradation:

Resource and riparian management education: The resource management programs mentioned above also emphasized methods to control livestock impact on sensitive areas. They promoted the use of appropriate grazing management systems to protect and improve upland plant cover; livestock are less likely to concentrate in riparian areas if sufficient forage is provided in the upland pasture. The OSU trailer-mounted stream hydrology model proved particularly useful for illustrating basic concepts in stream and riparian management to both adults and youth at these programs.

Outreach: OCES cooperated with conservation districts and NRCS personnel to present workshops and tours that made landowners aware of the need to include riparian, stream, and pond habitat protection in their management plans. Some of the programs specifically called for in Task 600, such as Blue Thumb (Task 603B) and Teacher/Educator training (Task 603C), also addressed habitat degradation. Outreach for these programs included media efforts as well as personal contacts to recruit volunteer participants and audiences.

In addition, public events such as the RiverFair (Task 604A) and Illinois River Flotilla Tour (Task 604B) were essentially outreach events to raise public and community leader awareness of resource management programs available to farmers and the general public.

Support of Concurrent Illinois River Basin Initiatives

The project also strove to support other concurrent initiatives in the Basin, including:

Cost-share Incentive Program Support

The 1999 Task 800 project funded cost share incentives for cooperating farmers, ranchers and landowners implementing BMPs to reduce or prevent pollution and habitat degradation. The early draft proposals for Task 600 included direct educational support for these practices so cooperators could understand how the BMPs work, how to implement them correctly, and why and how the practices need to be maintained after the incentive period ends. However, the final Task 600 workplan agreed upon by OCES and OCC, envisioned an approach to educating the general public, especially those living in rural areas. As a result, efforts were concentrated on youth and educator preparation and programs for citizen involvement in water quality restoration. While some programs in the workplan, such as the Environmental Education water quality brochures (Outputs 601.1-5) and the Landowners' Handbook (Output 602.1), provided educational materials directly to 319 cooperators, most programs were aimed at the general public who must support the program through authorization of State cost-sharing and public attitude.

TMDL and Standards Support

The Illinois River Management Plan calls for numerical standards for nutrient and other pollutant loading to the Illinois River. The long hoped-for TMDL for Lake Tenkiller, which would mean mandated reductions in nonpoint source pollutants, or pollutant trading, has not yet materialized. However, during the course of the Project, the Oklahoma Water Resources Board enacted a significant new rule. This rule placed a limit on in-stream phosphorus concentration in Oklahoma Scenic Rivers, including the Illinois. Amid much controversy, the Governor and Legislature approved the rule in 2002 and it was submitted to EPA for approval as part of Oklahoma's Water Quality Standards. Significant reductions of both point-and non-point sources of phosphorus will be required to meet the standard.

The new standard has raised the importance of the public educational efforts undertaken by the Project, as Basin inhabitants, both rural and urban, come to realize they must all play a part in nutrient pollution prevention.

Project Management

OCC oversaw the project, acted as liaison to EPA, and coordinated activities of cooperating agencies. OSU-Cooperative Extension (OCES) conducted educational programs for rural and urban residents, and youth. They promoted the objectives of the Illinois River Project and educated the public about water quality issues, nutrient management, septic tank maintenance, and riparian management. OSRC was an important collaborator in these efforts, and contributed guidance and informal evaluation for the overall project. Besides OCC, partners in education programs included NRCS, OWRB, ODA, local conservation districts, Cherokee Nation, and DEQ. OCC received federal funds, and OSU operated under cooperative agreement with OCC.

The Task 800 Watershed Advisory Group (WAG) guided project planning and helped focus project activities. The Education subcommittee (EdWAG) of this group, in particular, was quite helpful in this regard. Task 600 Project Coordinator Mitch Fram served as an advisor

and non-voting member of this body. He made presentations concerning the project at their meetings.

[Appendix 1. EdWAG Members List](#)

[Appendix 2. 20000711 EdWAG Meeting Announcement](#)

[Appendix 3. 20000711 EdWAG Meeting Agenda](#)

[Appendix 4. 20000711 EdWAG Meeting Minutes](#)

[Appendix 5. 20000711 EdWAG Meeting Presentation, Task 600 Summary](#)

[Appendix 6. 20000801 EdWAG Meeting Agenda](#)

[Appendix 7. 20000801 EdWAG Meeting Questionnaire, Brochure Topic Prioritization](#)

[Appendix 8. 20000824 EdWAG Meeting Announcement](#)

[Appendix 9. 20000824 EdWAG Meeting Agenda](#)

[Appendix 10. 20001005 EdWAG Meeting Announcement](#)

[Appendix 11. 20001005 EdWAG Meeting Agenda](#)

[Appendix 12. 20001005 EdWAG Meeting Minutes](#)

[Appendix 13. 20010313 EdWAG Meeting Agenda](#)

Project Tasks

As outlined in the workplan,

[Appendix 14. 319 Task 600 Project Workplan](#)

the goals of the project were accomplished through seven different tasks. A listing of the seven tasks with a discussion of the activities undertaken each follows.

Task 1. Illinois River Environmental Education Brochures

Output 601.1 – Riparian Management brochure

Output 601.2 – Nutrient Management brochure

Output 601.3 – Septic System Maintenance brochure

Output 601.4 – Solid Waste and Trash Disposal brochure

Output 601.5 – Urban Runoff and/or Pollution Prevention for Recreation Users brochure

Outputs 601.1-5 are presented in Appendix 2. This is the initial submittal of these documents.

A series of Environmental Education Brochures tailored to the information needs of Illinois River Basin residents was produced. In August 2000, Extension Water Quality Specialist and Task 600 Project Coordinator Mitch Fram discussed the brochures with the Illinois River Basin WAG and EdWAG committees. These two groups were polled to help guide the topics and content for the brochures. It was decided that five brochures would be developed to address subjects including: nutrient management, riparian management, private domestic waste, trash and solid waste management, and reducing pollution in urban runoff.

Under these guidelines, Fram reviewed publications and discussed brochure content with various technical resource personnel during the winter of 2000. These included:

- Otis Bennett – Special Projects Coordinator, OCC
- Cheryl Cheadle – State Coordinator, Oklahoma Blue Thumb Volunteer Water Quality Monitoring Program
- Ed Fite – Administrator, Oklahoma Scenic Rivers Commission

- Kay Frank – Solid Waste Institute of Northeast Oklahoma
- Tim Propst – Extension Engineer/Environmental Scientist, OCES
- Mike Smolen – Coordinator, OCES Water Quality Programs

Due to the workload required under the Blue Thumb portion of this project (Task 603B), Fram did not revisit the brochures again until February 2002. At this time, Fram met with Smolen and Propst and developed outlines for each of the brochures. Four of the five brochures were completed, printed, and distributed in October 2002. The printed copies were allocated among the conservation districts, OSRC, and OCES county offices in proportion to their distribution needs. There was no charge for brochures printed from this budget. The fifth brochure, “*Preventing Urban Water Pollution*”, was completed in the spring of 2003 and published online at <http://waterquality.okstate.edu/>. Copies of all five brochures are included as

[Appendix 15. OCES Pub. L-310, “Protect the Illinois River from the Threat of TRASH”](#)

[Appendix 16. OCES Pub. L-311, “Protect Riparian Areas for the Illinois River”](#)

[Appendix 17. OCES Pub. L-312, “Protect the Illinois River from Nutrient Pollution”](#)

[Appendix 18. OCES Pub. L-313, “Maintain Your Septic System for a Healthy Illinois River”](#)

Appendix 19. online publication “Give the Illinois River a Hand, Help Prevent Urban Storm Water Pollution”

Task 2. Illinois Basin Landowner Conservation and Pollution Prevention Handbook

*Output 602.1 – Landowner Conservation and P2 Handbook – **presented in Appendix 3, initial submittal***

Portions of the Illinois River Basin in Arkansas are undergoing rapid urbanization and similar, though less intensive, development is proceeding on the Oklahoma side. As land values increase, large farms and ranches are being subdivided and occupied by new landowners, increasing the intensity of landuse. The new owners frequently come from a more urban background and many of them are not well prepared for the new challenges offered by the rural lifestyle. They are unfamiliar with traditional agencies of rural and conservation assistance – Conservation Districts, NRCS, ODAFF, and OSU Extension. They are often unaware of how greatly their activities can impact their new surroundings. Their lack of knowledge about such matters as the carrying capacities of pastures and the proper management of private water and wastewater systems can result in potentially severe impact on the local environment. At the same time, these developing watersheds are becoming more impervious and subject to increasing flood frequency and consequent pressure on streambanks and stream habitat.

OCES recognizes that new rural landowners are becoming an increasingly large part of their clientele. In fact, Fram worked in committee on the development of a new website with this specific demographic in mind. The “*Help for New Rural Landowners in Eastern Oklahoma*” website can be viewed at (<http://www.dasnr.okstate.edu/landowners/>).

This shift in priorities also affected the current project. The handbook required as Output 602.1 under Task 2 was originally envisioned as a publication for cost-share recipients and 319 cooperating producers. However, the final Task 600 workplan shifted emphasis to a broader urban/rural clientele. During the course of the project the project team determined that new rural landowners had been largely overlooked in the environmental education effort. Therefore, this group, formerly cited as a secondary audience for the handbook, was targeted as its primary focus.

The handbook was a means to help smooth the transition from city blocks to country miles for these individuals, while at the same time emphasizing to them the importance of utilizing Best Management Practices (BMPs) in their activities. It included information on real estate dealings, how to co-exist with wildlife, utility options for rural areas, effects of livestock grazing, and more. Soil and water conservation BMPs, including wellhead protection and riparian area preservation, raised watershed awareness and gave examples of how to lessen negative impacts upon water quality and the environment. The handbook was published online (<http://waterquality.okstate.edu/>).

Appendix 20. Landowner Conservation and P2 Handbook

The project team utilized some of the structure and much of the information from the OCES New Rural Landowners website, adapting it for their use. The document references several other Extension publications, including Oklahom*A*Syst worksheets and Extension factsheets, that go into much greater detail on specific topics. Links to these other references in the online document allow the reader to access the additional information directly. One section provides a complete listing of government agencies and other land and environmental management resources available in the Basin. This and other sections of the document include information that has been updated from the original website. Accordingly, the website will also be updated soon.

Task 3. Youth Education

Task 603A Youth Environmental Fairs

Cooperative Extension assisted the conservation districts in facilitating Earth Day environmental fairs held in Cherokee and Adair counties. Project Coordinator Mitch Fram and OCES Educators also worked cooperatively with Delaware and Sequoyah County conservation districts to develop environmental fair programs in those counties. Fram assisted the Task 800 project coordinators in event planning and recruiting exhibit participants. He also trained some volunteer presenters for the fairs, including Blue Thumb volunteers and 4-H youth leaders, and helped them set up exhibits on aquatic biology, stream hydrology, and pollution prevention.

The target audience for the fairs was elementary- to middle school-age youth and teachers, as well as parent chaperones. A number of environmental groups and/or agencies, including, but not limited to, the Army Corps of Engineers, Oklahoma Conservation Commission, Oklahoma Cooperative Extension Service, Oklahoma Department of Wildlife Conservation, and the Solid Waste Institute of Northeast Oklahoma exhibited booths at these fairs. The wide range of topics covered, as well as the diversity of groups represented, helped provide a broad-based educational experience.

Project personnel utilized one of three displays at these fairs:

- The aquatic organisms display emphasized that a good quality water resource supports a diversity of life. A variety of live macroscopic aquatic organisms, ranging from mayfly and other insect larvae to pollution-sensitive madtom and darter fish, were made available for students to view through magnifiers and aquaria. A brief summary of the natural history of each organism and its contribution to water body health were also provided. Exhibits were made literally "hands-on" by allowing youth to handle some of the organisms, such as crayfish. Live microscopic plankton collected from pond water were also put on display using a video microscope provided by the Cherokee County Conservation District.

- The stream trailer is a stream hydrology model on wheels. This 5'x8' display pumps a stream of water through a medium of plastic granules to simulate the action of water against soil. Various stream channel scenarios are constructed to demonstrate the effect of channel configuration, streambank erosion, and the importance of riparian area protection.
- The groundwater station utilizes a groundwater flow model. This Plexiglas "ant-farm"-type display provides a cross-sectional view of underground hydrology. As water flows by gravity through the system, dye can be added through wellheads and other surface features, simulating different routes of groundwater contamination. Viewers can see a water table establish itself and watch the flow from an artesian well. Groundwater concepts such as discharge, recharge, and cone of depression, as well as the connection between ground and surface water, can be taught visually. When appropriate, youth were allowed to manipulate the model themselves to test the effects of various scenarios. All displays and models were used to facilitate a dialog with children and their teachers, which allowed Project personnel to assure and evaluate their understanding of the material presented.

Appendix 21. 20000707 Adair Co. Cons. Dist. Resource Fair Meeting Notes

Appendix 22. 20000718 Adair Co. Cons. Dist. Resource Fair Correspondence

Appendix 23. 20000828 Adair Co. Cons. Dist. Resource Fair Correspondence

Appendix 24. Adair Co. Cons. Dist. Resource Fair Flyer

Appendix 25. 20010124 Cherokee Co. Cons. Dist. Resource Fair Correspondence

Appendix 26. 20010221 Cherokee Co. Cons. Dist. Resource Fair Correspondence

Appendix 27. May/June 2001 "The Tri-County Conservation District Newsletter" article promoting the Grove Outdoor Classroom

Appendix 28. 20020730 Grove Outdoor Classroom (Delaware Co. Cons. Dist. Resource Fair) Correspondence

Appendix 29. 20020824 Adair Co. Cons. Dist. Resource Fair Correspondence

Table 1 lists the fairs sponsored and the corresponding exhibits displayed at each one.

Table 1. Summary of Illinois River Basin Youth Environmental Fairs, 2000-2002.

Date	Location	Display	Age of Students	Number of Schools	Total Number of Students
10-11-2000	Adair Co	Aquatic organisms	6 th grade	13	382
4-24 to 4-26-2001	Cherokee Co	Aquatic organisms	2 nd -7 th grade	15	2532
May 2001	Washington Co (Arkansas)*	Stream trailer	NA	NA	742
9-12-2001	Adair Co	Groundwater station	5 th grade	~15	394
10-17-2001	Delaware Co	Stream trailer	5 th grade	5	289
4-24-2002	Sequoyah Co	Aquatic organisms	Middle school	?	~150
9-12-2002	Adair Co	Aquatic organisms	6 th grade	13	368
9-18-2002	Delaware Co	Stream trailer	5 th grade	1	157
Total					~5011

"University of Arkansas Extension Educators trained under Task 603C displayed the stream hydrology model at their "Farm Friends" event.

Besides these events, Fram trained three volunteers to assist him in displaying aquatic organisms at the Osage County Earth Day Fair in April 2002. Two county educators also displayed the stream trailer at the Ottawa County outdoor classroom on May 21, 2002. Although outside the boundaries of the Illinois River watershed, at these events another 300 middle school students were educated about the benefits of maintaining water quality in northeast Oklahoma.

Miscellaneous Youth Programs

In addition to the Environmental Fairs, Fram was involved with other youth education activities throughout the Basin. These included campground talks and water quality day camps. In May 2001, he presented a water "critter" talk and streambank "treasure hunt" to approximately 20 campers, both parents and children, as part of the weekly OSRC Illinois River Campground Program. In June of 2001, he used the "Aquatic Life Sessions" display with 45 children at the OCES multi-county (Adair, Cherokee, and Muskogee counties) day camp on Parkhill Branch Creek in Cherokee County.

On June 13-14, 2001, Fram participated in the overnight Water Quality camp on Grand Lake in Delaware County. Fifty-four (54) children from Adair, Cherokee, Delaware, and Sequoyah counties spent two days learning about and enjoying this water resource. Activities included the A-Maze-ing Water Game, Water Olympics (from Project WET), lake "critter" hunt, plankton survey, a tour of the Pensacola Dam, and a ride on the "Cherokee Queen" (a tour boat with a decorative revolving stern-mounted paddlewheel).

In July of 2002, he presented the stream hydrology model (trailer) to 15 adults and children at another OSRC Illinois River Campground Program.

Appendix 30. 20000630 Campground Programs at Round Hollow correspondence re: "Macroinvertebrate Mayhem!"

Appendix 31. 2001 Tahlequah Daily Press article promoting "Macroinvertebrate Mayhem!" Campground Program at Round Hollow

Task 603B Blue Thumb Program

Blue Thumb Overview

Blue Thumb is a statewide non-point source pollution education program that organizes and trains volunteers to monitor water quality in streams and other water bodies. The program attempts to place groups of 2-4 volunteers who are responsible for monthly testing at established monitoring sites. Obviously, the more volunteers, the more sites that can be monitored and the more data collected, providing a better picture of the water quality situation within a particular watershed.

Appendix 32. Blue Thumb Stream Teams Brochure

Appendix 33. Blue Thumb General Interest Handout

The OCES Water Quality program helped found the Oklahoma Blue Thumb Program in Tulsa in 1993. However, OCC eventually shouldered the responsibility for sponsoring this group and now supports the Oklahoma Statewide Blue Thumb Program and staff in Tulsa and Oklahoma City, as well as volunteers at various locations throughout the state. Local coordination is most often the responsibility of the local county conservation district. The Illinois Basin and surrounding area is a notable exception, where OCES is a full partner once again.

The project, OCES, the Blue Thumb Statewide Coordinator, Task 800 education coordinators, and OSRC staff worked cooperatively on: marketing of the Blue Thumb program to educators and other youth leaders in the Basin; orientation, training and QA programs; data management; support of volunteers in the field; and participation of Blue Thumb volunteers to enhance public watershed education. The Task 800 EdWAG and the Oklahoma Scenic River Commissioners provided encouragement to Blue Thumb efforts in the Basin.

Task 600 provided direct support for the Blue Thumb program. As Project Coordinator, Fram worked in close cooperation with the Cherokee and Adair County conservation districts, as well as local schools, to sponsor Blue Thumb groups in those counties. He actively participated in all aspects of Blue Thumb. He took major responsibility for local coordination of volunteer recruitment, training and monitoring site work, as well as scheduling of QA sessions, provision and maintenance of equipment, and communications among the volunteer group. Using periodic hard copy and email newsletters and other means, he also supported watershed education of volunteers and encouraged and enabled volunteers in their own education efforts (e.g., at fairs, tours, and storm drain stenciling events).

Blue Thumb Sub-task Accomplishments

The Task 600 workplan organized the project's Blue Thumb activities into six categories, or sub-tasks; recruitment, orientation and training, meetings with data reports, animal collections, habitat assessments, and training for youth fairs. The following is a discussion of project accomplishments in each of these areas.

Task 603B.1 - Recruitment

Recruitment efforts occupied much of Fram's time early in the project. In the summer of 2000, he contacted over 25 schools and volunteer organizations within the Basin to advertise the program. In October of that year, he called prospects, developed publicity for a November training event, and participated in the Blue Thumb/Oklahoma Clean Lakes Association Volunteer Monitor Appreciation Day at Lake Stroud in Lincoln County. He also presented the Blue Thumb program to a group of senior adults with the Cherokee County Travel Group at Western Hills Lodge near Fort Gibson, OK. In October 2000 he was invited to present the program, as well as other educational efforts, to the Professional Development Committee at Tahlequah High School. Members of the committee subsequently recommended the program to several members of the school Science Department staff, who eventually attended training.

In January 2001, Fram had the opportunity to speak with students at several area high schools about the program. He set up a Blue Thumb recruitment table at the RiverFair held by this project in September 2001 (see Task 604A), and contacted 20 prospective trainees by phone and by letter, in preparation for Blue Thumb training later that month.

Although the workplan only called for recruitment to take place through 2001, the program had gained much momentum and several opportunities to continue this phase presented themselves in 2002. Fram made presentations to 15 members of the Fly Fisherman Club in Cherokee County in March, at the request of an OSRC Commissioner who had been trained earlier as a Blue Thumber. Later, with the assistance of Teresa Butler, the new IRB Education Coordinator for OCC, Fram conducted recruitment activities at the Tahlequah Smallmouth Bass Roundup for fly fishing enthusiasts in May and held open houses in Adair and Cherokee counties using the stream trailer and enviroscape in June. At the latter two events he recruited four new individuals, including the OSRC Chairperson, and two families

involved in the 4-H program. In addition, he published flyers and news releases that were sent to 12 local papers in the four-county project area. He also provided sign-up sheets at the Project WET trainings done under Project Task 603C.

Appendix 34. Flyer for September 2000 Blue Thumb Training in Grove, OK

Appendix 35. Flyer for November 2000 Blue Thumb Training in Tahlequah, OK

Appendix 36. Draft News Release for November 2000 Blue Thumb Training in Tahlequah, OK

Appendix 37. Letters to Schools and Monastery Promoting November 2000 Blue Thumb Training in Tahlequah, OK

Appendix 38. Flyer for September 2001 Blue Thumb Training in Tahlequah, OK

Appendix 39. Draft News Release for September 2001 Blue Thumb Training in Tahlequah, OK

Appendix 40. Sign-up Sheet for September 2001 Blue Thumb Training in Tahlequah, OK displayed at 2001 RiverFair

Appendix 41. 20010912 article in Jay "American" re: September 2001 Blue Thumb Training in Tahlequah

Appendix 42. Flyer for June 2002 Blue Thumb Training in Kansas, OK

Appendix 43. Sign-up Sheets for June 2002 Blue Thumb Training in Kansas, OK displayed at Smallmouth Bass Rendezvous and Project WET training

Appendix 44. Draft News Release for June 2002 Blue Thumb Training in Kansas, OK

Appendix 45. 20020618 article in Tahlequah "Daily Press" re: June 2002 Blue Thumb Training in Kansas, OK

Appendix 46. 20020612 article in Stilwell "Democrat-Journal" re: June 2002 Blue Thumb Training in Kansas, OK

Appendix 47. Undated article in Tahlequah "Daily Press" re: June 2002 Blue Thumb Training in Kansas, OK

Finally, volunteers have been recruited to participate in what promises to be one of the more visible Blue Thumb program activities; the marking of storm drains with signs reminding local



residents, "No Dumping, Keep Our Water Clean." Fram presented this activity as a service project to 25 youth and leaders of the Cherokee County 4-H program. After several delays due to the busy 4-H schedule, they are implementing the program in their area in the spring of 2003. This proposed activity was also well received in meetings with Ms. Butler, 4-H Educator Heather Winn, and the Mayor of Tahlequah. Butler has also contacted

officials and received support for a similar program in Stilwell, in Adair County.

Appendix 48. Blue Thumb Handout on Curb Marking

Appendix 49. Sign-up Sheets for Curb Marking Displayed at 2001 RiverFair and April 2002 4-H Club Meeting

Task 603B.2 - Orientation and Training

In order to become a "Blue Thumber", volunteers must undergo some 20 hours of training over a three-day period on observation, sampling, chemical testing, and recording methods to meet quality assurance standards. Trainees are also given background on the causes and prevention of nonpoint source pollution and in the use of water quality models to conduct educational programming. Training agendas and most of the material presented were the responsibility of Cheryl Cheadle and Jean Lemmon, of the Statewide Blue Thumb Program.

Appendix 50. Oklahoma Statewide Blue Thumb Training Materials

In the two years from September 2000 to November 2002, there were five Blue Thumb training events held in the area of the Illinois River Basin. A total of over 70 new volunteers were trained at these meetings. Delaware Co. Conservation District staff arranged a training in September 2000. For the subsequent four training sessions, Task 600 Project Coordinator Mitch Fram was an integral part of organizing and conducting the sessions, which trained 64 individuals.

Appendix 51. 20001030 Registration Letter for November 2000 Blue Thumb Training in Tahlequah, OK from OSRC Administrator and Education

Appendix 52. 20001030 Registration Confirmation Letter for November 2000 Blue Thumb Training in Tahlequah, OK to OSRC Administrator and Education

Appendix 53. 20001107 Letter to Registrants for November 2000 Blue Thumb Training in Tahlequah, OK

Appendix 54. Agenda for November 2000 Blue Thumb Training in Tahlequah, OK

Appendix 55. 20001116 Email from Cheryl Cheadle with Additional Agenda Information for November 2000 Blue Thumb Training in Tahlequah, OK

Appendix 56. Agenda for September 2001 Blue Thumb Training in Tahlequah, OK

Appendix 57. Agenda for June 2002 Blue Thumb Training in Kansas, OK

Appendix 58. Letter to Registrants for June 2002 Blue Thumb Training in Kansas, OK

Fram helped prepare news releases for distribution to project area newspapers, scouted out sites for training, provided assistance and presentations during the training session itself, and on different occasions provided make-up training for individuals that were unable to attend all three days of the training. In addition, for two of the trainings, he prepared a 20-minute PowerPoint presentation on the Illinois River Basin Spring Creek Blue Thumb Project. Fram also made a point of sending letters of commendation to the supervisors of area educators who became certified volunteers.

In order to keep volunteers aware of various upcoming trainings and meeting dates, as well as watershed news, Fram developed a newsletter, the "Illinois Basin-Spring Creek Blue Thumb Update," which he sent out in hard copy format to trainees on a more or less quarterly basis. Digital email updates and hard copies of the Statewide Blue Thumb newsletter were also sent from his office. On average then, volunteers received communications 8 or more times per year.

Appendix 59. 20010518 Illinois Basin/Spring Creek Blue Thumb UPDATE

Appendix 60. 20010711 Illinois Basin/Spring Creek Blue Thumb UPDATE

Appendix 61. 20010914 Illinois Basin/Spring Creek Blue Thumb UPDATE

Appendix 62. 20011005 Illinois Basin/Spring Creek Blue Thumb UPDATE

Appendix 63. 20011217 Illinois Basin/Spring Creek Blue Thumb UPDATE

Appendix 64. 20020308 Illinois Basin/Spring Creek Blue Thumb UPDATE

Appendix 65. 20020626 Illinois Basin/Spring Creek Blue Thumb UPDATE

Appendix 66. 20020925 Illinois Basin/Spring Creek Blue Thumb UPDATE

Appendix 67. 20030106 Illinois Basin/Spring Creek Blue Thumb UPDATE

Appendix 68. 20030305 Illinois Basin/Spring Creek Blue Thumb UPDATE

Task 603B.3 - Meeting with Data Reports

One of the requirements for an active Blue Thumb group is to hold quarterly meetings to review QA methods and data reports. The IRB Blue Thumb groups did hold these meetings, but attendance by the members was rather sporadic, a common malady among volunteer organizations. To maximize time efficiency, Fram and the rest of the Blue Thumb

leadership usually tried to schedule other Blue Thumb activities on the same days as the QA meetings. For instance, volunteers could participate in sifting through (sub-sampling) the invertebrate collections (see Task 603B.4). At other times an educational presentation was given during the QA session itself. David Martinez, with the US Fish & Wildlife Service office in Tulsa, gave a talk on freshwater mussels to the Cherokee County group in July of 2002.

Although the Task 600 workplan called for submission of quarterly data reports, that proved to be difficult. Due to the structure of the Blue Thumb organization, data collected by the volunteer monitors must be submitted to a central location for analysis. At the Statewide level, the Blue Thumb program is operating short-handed. Statewide Blue Thumb staff have been overwhelmed with data. This bottleneck prevented data from being compiled in a more timely manner. This has been brought to the attention of the appropriate Blue Thumb staff, and alternative methods for more efficient reporting are being discussed. By the end of Task 600 in October 2002, data reports were provided to volunteers attending QA sessions, where sufficient data was available.

Appendix 69. Blue Thumb Data Sheet

Task 603B.4 - Animal Collection

Blue Thumb volunteers collected aquatic invertebrates from their monitoring sites semi-annually, in January and July, as part of the Blue Thumb biomonitoring protocol. Fish collections were also conducted on some sites. Twice annual sub-samplings of the macro-invertebrate collections were conducted with volunteer help in the intervening quarters, usually in April and October. The sub-samplings – or bug-picking as the Blue Thumb volunteers knew it – resulted in a clean sub-sample of 100–150 organisms from each invertebrate collection. This was sent to a professional for identification and used to help calculate a bio-indication ranking for the stream site.

Fram coordinated and assisted with all these efforts by recruiting volunteer help, sending reminders, arranging schedules, and aiding in the actual sampling and bug-picking. These activities are vital in helping volunteers make the connection between the chemical indices of water quality and the biological indicators of ecosystem health.

Appendix 70. Sample copies of Blue Thumb Animal Collection Data Sheets

With help from Cheadle, Lemmon, and Butler, Fram took good advantage of the natural interest these activities engender by inviting teachers and students – regardless of Blue Thumb training – to participate. At least a few students participated at nearly all the collections and sub-samplings where schools were involved – Tahlequah Creek by Tahlequah Schools, Spring Creek near Oaks School, Ballard Creek near Watts School, and Smith Hollow near Rocky Mountain School. For some collections, over 20 students participated. Before encouraging them to actively engage in the collecting and sampling, time was taken by Fram, Cheadle, and/or Lemmon to explain to the students the purpose of the activities and the statistical basis for the protocols. Teachers frequently remarked about the informative and engaging nature of these events.

Task 603B.5 - Habitat Assessment

Abbreviated habitat assessments were performed during each of the semiannual macro-invertebrate collections. Additionally, more extensive habitat collections were performed over a 400-meter stream reach during occasional fish collections. These were done on Spring Creek at Cherokee Cattle Ranch in October of 2000, on Tahlequah Creek at the Spring Street site in September of 2001, and on Tahlequah Creek at the Basin Street site in August of 2002. Samples of data sheets used in these assessments are provided in

Appendix 71. Sample copies of Blue Thumb Habitat Assessment Data Sheet

In addition to habitat data recorded during animal collections, some Blue Thumb groups collected occasional water samples during the summer from their sites to be used for pesticide and bacteria analysis. Fram arranged for these samples to be taken to Tulsa and laboratory tested for the presence of pesticides in the chlorpyrifos family and *E. coli* bacteria. Results from these procedures, published in the "Blue Thumb UPDATE", allowed the volunteers to further assess the water quality of their streams.

Task 603B.6 - Training for Youth Fairs

In April 2001, Fram trained two volunteers to present a display at the Cherokee Co Environmental Fair. Those in attendance commended their efforts. A year later, he trained some student-volunteers to assist him at the Osage County Earth Day Fair. He also provided training to Tahlequah High School Blue Thumb student-volunteers on the groundwater, storm sewer, and enviroscape models during that month. They presented these displays to 150 disabled students at their school's Science Expo.

Appendix 72. 20010420 Email Correspondence Describing Training

Appendix 73. 20010424 Report Form: Training for Youth Fairs

Task 603C Educator/Youth Leader Training

The project sponsored in-service workshops in Basin counties that placed special emphasis on the needs and issues of the Illinois River Basin, i.e., riparian management, NPS pollution, private domestic waste treatment, and groundwater protection. The objective was to indirectly reach large numbers of youth by making schoolteachers and other educators and youth leaders aware of water quality education materials that are available and how to use them. In cooperation with Task 800 project coordinators and with the guidance of the Illinois Basin Education WAG, the workshops were marketed to schools and youth programs such as 4-H. Depending on level of outside support, nominal fees covered lunch and materials. Professional development credits were offered where applicable and scholarships made available. Potential participants were polled to determine favored times for workshops and priorities among the following available programs:

- ◆ 4-H Environmental Stewardship and Water Quality Projects promote field activities for youth of various ages in the areas of pond and stream biology and watershed studies, as well as composting, solid waste management, and environmental posters. Use of fact sheets and report forms facilitate preparation of County and State Fair projects, as well as science fair projects.
- ◆ The OSU trailer-mounted Stream Hydrology Model and curriculum uses an actual flowing stream to teach concepts of stream bank stability and erosion, riparian values, flood plain management, and watershed effects on streams.
- ◆ Oklahoma Aqua Times, a 4-H production, is a self-contained elementary/middle school curriculum that focuses on Groundwater and Water Conservation. It consists of a teacher's guide, videos, and student newspapers. Aqua Times uses interdisciplinary activities in science, math, language and art to suggest ways to understand and manage our water supply and to develop personal commitment to water conservation. The videos and newspapers introduce each of five units, with students interviewing water science professionals, "hard news" articles, and suggested activities. All classroom projects are hands-on, and use readily available materials with minimal expense.
- ◆ Project WET, a curriculum of The Watercourse at Montana State University, is well known in Oklahoma. It consists of a 500+ page "Curriculum and Activity Guide" containing interdisciplinary activities for grades K-12. Most activities can be

conducted in a classroom or on school grounds, although many complementary activities are suggested for fieldwork. The Guide is only available to attendees of WET Workshops led by trained facilitators. Fram is a trained WET facilitator, as was the OSRC Education Specialist, early in the Project, and the current Illinois River 319 Task 800 Education Coordinator.

- ◆ The 4-H “Lifestyles of the Wet ‘n Wild” water quality curriculum and resource trunks use hands-on activities to illustrate basic principles of groundwater hydrology, erosion and runoff, and lake and stream biology. While it includes a few activities similar to Project WET, Wet ‘n Wild emphasizes actual aquatic field science activities, such as invertebrate sampling and water quality testing. The trunks contain all the equipment necessary to complete the activities and are available for checkout to any workshop-trained educator or leader.

Appendix 74. Oklahoma 4-H AquaTimes brochure

Appendix 75. Oklahoma 4-H Handout, “*Environmental Programs for Educators and Youth*”

Appendix 76. Fram Presentation, “*OCES Water Quality/Environmental Programs for Youth*”

Appendix 77. Oklahoma 4-H Stream and Lakes Projects flyer

Appendix 78. Oklahoma 4-H Stream and Lakes Projects Factsheets

Appendix 79. 2000 OCES In-Service Education Proposal for Stream Hydrology Trailer Workshop

Appendix 80. 2000 OCES In-Service Education Proposal for Oklahoma 4-H AquaTimes Workshop

Appendix 81. 2002 Oklahoma 4-H Stream and Lakes Projects Leadership Development Conference Workshop Proposal

The table below contains a listing of the Educator/Youth Leader training workshops that Fram co-sponsored and/or participated in during the 2000-2002 project period.

In addition to these formal workshops, Fram was able to indirectly affect several other educational outlets within the watershed. He mailed out a list of all available youth environmental programs to the county Extension offices in the Basin, he discussed ideas for school science fairs with Kristie Hughes (former OCC IRB Education Coordinator), he helped make preparations for other workshops, and he gave a presentation on water quality issues in the Basin to 50 students in an Environmental Problems course at NSU.

Although several of the listed workshops were held in locations outside the watershed boundary, personnel with educational responsibilities inside the Basin attended most of these. Also worthy of note is the fact that Extension Educators from Arkansas were trained to use the stream trailer. They did use it at least twice inside the Illinois River Basin at a Wildlife Habitat Improvement Program function and a 4-H event in Washington County, AR. So, despite being outside the designated project area, at least part of the Arkansas portion of the watershed benefited from the project’s educational efforts. Fortunately for the program, education, like water, is not bound by the limits of political geography. In other words, the impact of programs given in areas immediately adjacent to, or in close proximity to, the watershed, could very well cross over and influence activities within the Basin.

Table 2. Listing of Educator/Youth Leader training workshops sponsored by 319 Task 600 Illinois River Basin Education Project, 2000-2002.

Date	Program	Location (County)	Audience	Attendance
July 2000	Stream trailer	Tahlequah (Cherokee)	OSRC Ed Coordinator	1
Oct 2000	Overview of available WQ programming	Tahlequah (Cherokee)	Tahlequah Schools Prof Dev Comm	12
Oct 2000	Stream Trailer	Westville (Adair)	Teachers	13
Oct 2000	Stream trailer	(Mayes)	OCES Eduators	2
Oct 2000	4-H WQ Projects	Claremore (Rogers)	Rogers Co. Cons Education Reserve	18 (youth and adults)
Nov 2000	Overview of available WQ/Env. programming and resources	Tahlequah (Cherokee)	Eisenhower Grant Prof. Dev. Prgm at NSU	16
Feb 2001	Stream trailer	Watts (Adair)	AR Ag., 4-H Educators, Watts teacher	3
Feb 2001	AquaTimes	Muskogee (Muskogee)	OCES Educators and teachers	11
March 2001	Overview of available WQ programming	Tahlequah (Cherokee)	Pre-service rural K-9 th grade teachers at NSU	66
June 2001	Stream trailer	Stillwater (Payne)	OCES Educators	9
June 2001	Project WET	Tahlequah (Cherokee)	Pre-service teachers, and interns	44
Nov 2001	Stream Trailer	Muskogee (Muskogee)	4-H teen leader	1
May 2002	Stream trailer	Kansas (Delaware)	4-H Educators, ConsDist pers., teacher	6
June 2002	Project WET*	Tahlequah (Cherokee)	Pre-service teachers, and interns	38
June 2002	Project WET*	Tahlequah (Cherokee)	Pre-service teachers, and interns	31
July 2002	4-H WQ Projects	Stillwater (Payne)	4-H Leader Conference	12
Aug 2002	Stream Trailer	(Rogers)	OCES Hort Educator, ODWC biologists	3

**These workshops utilized the OCC- and Conservation District-supported Durrett Outdoor Classroom and Pond, as well as the Stream Trailer. They were offered for 1 unit of college credit.*

Appendix 82. Memo to OCES Educators re: October 2000 Adair County Stream Trailer Training

Appendix 83. Agenda for October 2000 Stream Trailer Training in Adair County

Appendix 84. Email from Fram to Northeast OCES Educators re: October 2000 4-H Stream and Lake Water Quality Projects Workshop in Rogers County

Appendix 85. Flyer/Sign-up Sheet for October 2000 4-H Water Quality Projects Workshop in Rogers County

Appendix 86. October 2000 Rogers County 4-H Water Quality Projects Workshop Agenda

Appendix 87. November 2000 NSU "Inquiry Based Science Instruction Program" Agenda

Appendix 88. 20010126 Memo to OCES Educators re: February 2001 AquaTimes Workshop

Appendix 89. 20010130 Memo to OCES Educators re: February 2001 AquaTimes Workshop

Appendix 90. Agenda for February 2001 AquaTimes Workshop

Appendix 91. 20020515 Invitation from NSU re: Co-facilitation of June 2002 Project WET Workshops

Appendix 92. Agenda for June 2002 Project WET Workshops

Appendix 93. July 2000 Payne County 4-H Water Quality Projects Workshop Agenda

Task 4. Public Events and Adult Education

Task 604A RiverFair

In the fall of 2001, the first RiverFair took place on the banks of the Illinois. The fair was a cooperative effort of Oklahoma Scenic Rivers Commission, conservation districts in Adair and Cherokee counties, Oklahoma Conservation Commission, Oklahoma Cooperative Extension Service, and the Project. Planning and scheduling of the fair took place with the guidance of the EdWAG. The event was designed to combine education, service and fun into a single package for area residents and visitors to enjoy. It included a morning canoe-based river cleanup, followed by educational activities and games, information booths, free water well testing and kayak races in the afternoon. A barbecue dinner, live music, and inspirational speakers wound up the evening.

Appendix 94. 2001 Illinois RiverFair Flyer

Appendix 95. 2001 Illinois RiverFair Press Release

Appendix 96. 20010831 Muskogee Daily Phoenix article re: RiverFair 2001

Appendix 97. 20010831 Lake and River Guide article re: RiverFair 2001

A number of organizations came together to help sponsor the fair, including:

- Adair County Conservation District
- Adair County OCES
- Armstrong Bank of Muskogee and Tahlequah
- Cherokee County Conservation District
- Cherokee County OCES
- Cherokee Nation
- Eagle Bluff Resort (RiverFair host)
- Georgia Pacific
- Illinois River Association
- KOCH
- Northeastern State University
- Northeastern State University - Safety & Environmental Management Association
- Oklahoma Conservation Commission
- Oklahoma Department of Wildlife Conservation
- Oklahoma Scenic Rivers Commission
- Oklahoma Cooperative Extension Service
- Pepsi
- Reasor's Foods
- Roxie's BBQ
- Save the Illinois River (STIR)
- Solid Waste Institute of Northeast Oklahoma

Project Coordinator Mitch Fram conceived the event, along with Ed Fite, OSRC Administrator, and Otis Bennett, Special Projects Coordinator, OCC. He also served on the Planning Committee for this event and devoted much time and effort to helping plan and organize the Fair. His main responsibility was recruiting and lining up educational presentations and speakers for the afternoon-evening educational portion of the event. A wide range of exhibits was offered by about 20 organizations to increase public awareness on a variety of environmental issues. Presentations included:

Table 3. 2001 Illinois RiverFair Educational Presentations.

Organization	Presenter	Exhibit
Adair and Cherokee County Conservation District	Kristie Hughes	Public conservation district programs
EarthSave	Donna Harris	Program info
Hanging Rock Floats	Brian Jenni	Live reptile exhibit and presentation
Langston University Cooperative Extension Service	Candice Howell	Butterfly gardening and migration info
Natural Resources Conservation Service	Andy Inman	Program info
The Nature Conservancy	Mary Coley, Chris Wilson	Program display, Nickel Preserve Trail Guide program, volunteer needs
NSU Safety and Environmental Management Assn.	Julie Vandebos and other volunteers	Program info, and demonstrations of OSU and CD water quality models
Oklahoma Conservation Commission	Brooks Trammell	Fish & invertebrates from Illinois River
Oklahoma Conservation Commission - Blue Thumb	Cheryl Cheadle	"Storm Sewer in a Suitcase" display, curb marking info
Oklahoma Cooperative Extension Service/4-H Environmental Education	Mitch Fram, Fredeick Family (BThmb, 4H), Wes Bigfeather (4H)	Stream trailer
Oklahoma Cooperative Extension Service/Oklahoma*A*Syst Program	Mike Kizer, Maifan Silitonga, LaDonna McCowan	Well water testing
Oklahoma Cooperative Extension Service/Poultry Program	Jim Britton	Oklahoma Poultry Producer Education Program
Oklahoma Department of Environmental Quality	Susie Shields	"Oil & Water Don't Mix" display, info for "America Recycles Day"
Oklahoma Department of Wildlife Conservation	Paul Balkenbush, James Vincent	Fish aquarium
Sierra Club	Jeannine Hale	Water education
Solid Waste Institute of Northeast Oklahoma	Kay Frank	"Let's Recycle Cans" aluminum can toss display
U.S. Army Corps of Engineers	Joe Remondini, Carolyn Schultz	River & floodplain model, wetland demonstration
U.S. Fish & Wildlife Service	Erich Langer, Jontie Aldrich	"Partners for Wetlands" info
U.S. Geological Survey	Kathy Peter	Streamflow monitoring

The evening festivities were highlighted by a barbecue dinner and awarding of the many door prizes donated by RiverFair sponsors. Evening speakers included John Hassel, former Water Quality Director for the Oklahoma Conservation Commission, presently director of the

Conservation Technology Information Center, and professor/political candidate/comic Jim Boren, recently retired from Northeastern State University. Both presentations were inspirational for the majority in the crowd who are concerned about the future of the Illinois River. The program ended with Bluegrass Music from a local band headed by Jerry Latty, a former poultry farmer.

Task 604B Flotilla Tour

The Project, Oklahoma Scenic Rivers Commission, Oklahoma Cooperative Extension Service, Oklahoma Conservation Commission, and county conservation districts cooperated to conduct an Environmental Impact Tour for Community Leaders on the Illinois River in the fall of 2002. Through the efforts of the OSRC Administrator, and courtesy of Peyton's Place Resort, a canoe livery operator, canoes and rafts were obtained free of charge for those who pre-registered for a 3- to 5-hour float trip. The flotilla made stops to demonstrate stream hydrology, biology, and pollution concepts, and discussed problems and solutions in stream conservation. The tour included a picnic lunch and question/answer session. Several Blue Thumb Volunteers, including teachers, were on hand to help as needed.

The tour began at 10 a.m. on September 28, 2002, at Peyton's Place Resort, located on State Highway 10, eight miles north of the junction with US 62 east of Tahlequah, OK. Over 100 individuals were invited to attend the tour; about 50 attended. It was a very diverse group, with ages ranging from high school students to retired or semi-retired couples; backgrounds from technical resource professionals to politicians, journalists, and teachers; and locations from Oklahoma and Arkansas.

Appendix 98. 2002 Illinois River Flotilla Tour List of Invitees

Appendix 99. 2002 Illinois River Flotilla Tour Letter of Invitation

Appendix 100. 2002 Illinois River Flotilla Tour Map

Appendix 101. 20020919 Letter to Reasor's Food Store, Tahlequah, OK re: Support for 2002 Illinois River Flotilla Tour

Appendix 102. 20020919 Letter to Wal-Mart Supercenter, Tahlequah, OK re: Support for 2002 Illinois River Flotilla Tour

At Peyton's Place, Mitch Fram made some opening remarks about the purpose of the tour, including acknowledgements to those who donated time and resources to support it. A bus then transported participants approximately six miles upstream to the put-in point, where attendees arranged themselves to utilize the canoes, rafts, and kayaks made available to them for the trip.

Before the group set off, Ed Fite, OSRC Administrator, gave a brief introduction and welcome at the riverbank. Two stream biologists from the Oklahoma Department of Wildlife Conservation also provided the first educational presentation at this point. They demonstrated the use of electrofishing equipment and collected a number of fish for the group to view. In addition to providing a visual example of the diversity of fish present in the River, the biologists shared how results from electrofishing surveys are used to help manage this natural resource. For example, ODWC data indicated a scarcity of mid-size to large adults in the smallmouth bass population structure. These older individuals are vital to reproduction of the species. A new daily slot limit of six smallmouth bass outside of the 9 to 12 inch slot length has been instituted. This will protect more of these reproductive age fish while thinning the population of excess younger individuals and improving recruitment to the "trophy" size categories. Continued surveys will be used to monitor how successful the limit is and when it can be removed. The ultimate goal, of course, is to maintain a healthy population of these fish for many years to come.

After enjoying seeing and handling river redhorse, channel catfish, largemouth buffalo, northern hogsucker, drum, long-eared sunfish, spotted or Kentucky bass, largemouth bass, rock bass and smallmouth bass (Davis, 2002), the group headed down the river. A couple of miles into the trip, a stop was made at an area with high, cut banks. Here a discussion of the importance of riparian area protection was initiated. A number of the technical resource personnel present gave insight to the principles and importance of this issue. John Auffet, with the Oklahoma Conservation Commission, made a brief presentation on the cost-share opportunities available to Basin landowners through the Implementation project, Task 800. Project Coordinator Mitch Fram also discussed the importance of education and promoted the project, as well as the Blue Thumb Volunteer Program.

Commented [t1p4]: Is this correct?

The group set off downstream again and stopped for lunch near a set of riffles. OSRC and the Reasor's and Wal-Mart stores of Tahlequah, OK provided a fine lunch. During the break, OCES Water Quality Coordinator Mike Smolen gave a poster presentation on the phosphorus problem in the Illinois River Basin.

Appendix 103. Phosphorus in the Illinois River Basin, 2002 Float Trip Poster Session

Smolen shared data on the phosphorus loads that several Basin community treatment plants contribute to the Illinois River. However, he also stressed that several other activities within the watershed contribute phosphorus to the system. These nonpoint pollution sources include urban fertilization of lawns, septic systems, plant nurseries, erosion, and agricultural field fertilization using commercial fertilizers and/or poultry litter (Gerard, 2002).

Table 4. In-stream phosphorus load contributions of selected Illinois River Basin treatment plants.

Treatment Plant	Total P lb/yr	Total P lb/day
Fayetteville	5409	33
Siloam Springs	22705	139
Gentry	1424	9
Lincoln	1413	9
Prairie Grove	764	5
Rogers	21549	132
Springdale	47953	294
Tahlequah	2330	14
Stillwell	5309	33

Following Smolen's presentation, the group moved to the riffles where Oklahoma Blue Thumb State Coordinator Cheryl Cheadle demonstrated the use of a kicknet to collect specimens of aquatic invertebrates. She indicated that Blue Thumb volunteers use this survey method as a biological indicator of stream health, much like the electrofishing data discussed earlier. The group was able to view and handle a number of species. Cheadle also collected a water sample and used Blue Thumb monitoring kit materials to obtain an on-the-spot phosphorus reading and to demonstrate volunteer monitoring techniques. Her reading of 0.113 ppm P (Gerard, 2002) was three times the average of 0.037 ppm P that will be required within ten years under the new Oklahoma statute.

When the flotilla landed at Peyton's Place in the afternoon, participants had experienced an enjoyable and educational day.

Miscellaneous Public Programs

In addition to these two formal Project events, Task 600 Coordinator Mitch Fram made several water quality-related presentations at public educational programs and wrote articles for resource agency newsletters that were distributed within the Basin.

Appendix 104. Flyer for November 2000 "Water Quality Wildlife" Seminar

Appendix 105. Agenda for November 2000 "Water Quality Wildlife" Seminar

Appendix 106. Articles by Fram: "New Broiler House Cleanout Schedule Can Save Money", and "Water Suppliers Provide Annual drinking Water Reports" published in July-August 2001 edition of The Tri-County Conservation District Newsletter

Appendix 107. Article by Fram: "Consider Summer/Fall Cleanout and Litter Application" for July 11, 2000 edition of Delaware County Conservation District Newsletter

Appendix 108. Article by Fram: "[Illinois River Basin Education Program 600](#)" for August 16, 2000 edition of [Illinois River Project/Cherokee County Conservation District Newsletter](#)

Appendix 109. Article by Fram: "Chopped Enough Ice" for March/April 2001 edition of Lake Eucha Watershed Advisory Committee Newsletter

Appendix 110. 20011115 Muskogee County OCES Teacher's Resource Institute Attendance Sheet re: Stream Trailer Demonstration

Appendix 111. Flyer for July 2002 "Alfalfa" Seminar

Appendix 112. Flyer for 2002 Illinois River Cleanup Event

Appendix 113. Flyer for November 2000 "Water Quality Wildlife" Seminar

Appendix 114. Agenda for October 2002 "Pond Management, Habitat Establishment, and Riparian Areas" presentation to Adair County Cattlemen's Association

Task 5. Final Report

Output 605.1 – Final Report

This document, including tables, figures, photos, and appendices, is the final report.

Measures of Success

Project effectiveness was tracked in the following ways:

1. *In projects focusing on information dissemination and education, traditional measures of success are designed to determine information learned, newly acquired awareness, changes in attitude, and changes in behavior. Pre and post-event questionnaires will be used to evaluate awareness, learning, and change in behavior.*
2. *Objective evidence of behavioral change is difficult and expensive to monitor. However, project events will be followed up by using an evaluation instrument, which asks participants if they are or will soon be doing anything differently as a result of their participation.*
3. *The project will report attendance at public events, and youth events, and any site visits for technical assistance. Formal collaboration will be sought with NRCS and the WAG to monitor the use of nutrient management record keeping, implementation of riparian systems and other land management BMPs by Project cooperators who receive publications and attend tours.*

(The underlined portion of the text in Measure of Success #3 refers to activities not included in the final version of the Task 600 workplan. As is explained in the

narrative of this report, educational support for the 1999 319(h) Task 800 cost-share recipients was in the original proposal for the current Project, but was removed due to budget and time constraints. The reference to it here should have been removed.)

4. *For school-age youth, before-and-after testing will be used to evaluate water quality camps and other youth programs. Changes in attitude toward water pollution and resource issues resulting from educational programs will be assessed. Teachers, volunteer monitors, and other educators who participate in workshops will be surveyed for changes in their environmental literacy. Volunteer hours put in and the number of 4-H environmental projects undertaken will be reported. Videotaping will be used to document youth activities where appropriate, since watching and listening to youth interact with subject matter and each other is often the best way to judge interest and participation. Any tape segments generated for evaluation purposes will be submitted with the Final Project Report.*

Task 601 – Environmental Education Brochures

Quantifiable knowledge of the impact of these documents upon individuals is almost impossible to obtain. What can be reported is that approximately 1000 of the 3000 copies of the four brochures that were printed have been distributed to agencies within the Basin.

Task 602 – Landowner Handbook

Quantifiable knowledge of the impact of this document upon individuals is almost impossible to obtain, especially since it has only recently been completed. Tentative plans to distribute the handbook, in combination with other relevant publications, together as a reference manual to county Extension offices and real estate professionals, could greatly enhance its area of influence.

Task 603A.1 – Youth Environmental Fairs

The final tally indicated that the Project influenced at least eight (8) natural resource education fairs for youth in the Basin with a total audience of over 5000 children, plus teachers and chaperones. While the Adair and Cherokee County Conservation Districts took the major responsibility for setup of their fairs, the Project Coordinator did participate in planning these fairs. In Delaware County, the Task 600 Project Coordinator initiated Fair planning with the County Conservation District Water Quality Coordinator, Marti Mefford, with the assistance of her EdWAG (Beaty Creek). Consequently, their first ever Resource Fair was held on October 17, 2001. Fram also trained two University of Arkansas Extension Educators on the use of the Stream Trailer. They utilized the model at their “Farm Friends” event in 2001. This fair took place in the Basin.

Appendix 115. 20001011 Adair Co. Cons. Dist. Resource Fair Attendance Sheet

[Appendix 116. 20010424 Cherokee Co. Cons. Dist. Resource Fair Report Form](#)

Appendix 117. 20010424 Cherokee Co. Cons. Dist. Resource Fair Attendance Sheets

Appendix 118. 20010518 University of Arkansas “Farm Friends” Report

Appendix 119. 20010424 Cherokee Co. Cons. Dist. Resource Fair Attendance Sheet

Appendix 120. Nov 2001 “Illinois River News” article on Adair Co. Cons. Dist. Resource Fair

Appendix 121. 20010912 Adair Co. Cons. Dist. Resource Fair Attendance Sheet

Appendix 122. Nov/Dec 2001 “The Tri-County Conservation District Newsletter” article reporting on the Grove Outdoor Classroom (Delaware Co. Cons. Dist. Resource Fair)

Appendix 123. 20011024 “Jay American” article reporting on the Grove Outdoor Classroom (Delaware Co. Cons. Dist. Resource Fair)

Appendix 124. 20020912 Adair Co. Cons. Dist. Resource Fair Attendance Sheet

Appendix 125. Nov/Dec 2002 “The Tri-County Conservation District Newsletter” article reporting on the Grove Outdoor Classroom (Delaware Co. Cons. Dist. Resource Fair)

Appendix 126. 20020919 Grove Outdoor Classroom (Delaware Co. Cons. Dist. Resource Fair) Correspondence

Appendix 127. 20030317 email from Marti Mefford with attendance from 2001 and 2002 Grove Outdoor Classroom (Delaware Co. Cons. Dist. Resource Fair)

At the 2000 Adair County environmental fair, teachers in attendance and presenters were asked to fill out an evaluation of the event. Analysis of the results indicated that, for the most part, this group was very pleased with the fair. Several respondents mentioned that live animal exhibits are very influential, an encouraging critique for the Task 600 "Aquatic Critters" display. Additional evaluation of the resource fair venue came from the students themselves. Mr. Mark Hendren, a teacher at Colcord Elementary School had his students write an essay and/or draw a picture of their favorite booth from the 2002 Grove Outdoor Classroom. These essays reveal that the children were able to grasp several concepts during the fair, including causes and prevention of streambank erosion and the effects of pollution on the water supply.

[Appendix 128. 2000 Adair County Environmental Fair Evaluations](#)

Appendix 129. 2002 Grove Outdoor Classroom (Delaware Co. Cons. Dist. Resource Fair) Essays from Mr. Hendren's Fifth Grade, Colcord Elementary School

There was very little in the way of formal evaluations that could be done for the natural resource fairs. This is also true for most of the education events listed in this report that were not specified in the Task 600 workplan, such as the Illinois River Summer Campground programs and the Adair County Wildlife and EQIP Seminars. These types of events were most often done with young children, though some were for adults. In the case of the resource fairs, the children were being hurriedly moved from one education booth to another, leaving no time for any formal evaluation. Ms. Teresa Butler (OCC Illinois River Basin Education Coordinator) did attempt some formal evaluation at the 2002 Adair County Resource Fair. She created a quiz with questions based on the exhibits and provided a copy to each teacher that attended, with the understanding that the teachers could use these back in their classrooms to measure what the students had learned. Unfortunately, she received only one response from a teacher, leaving only impressions from a few of the teachers who attended about the organization of the event and the general interest level of the students as points of reference.

Appendix 130. Task 600 Suggested Questions for 2002 Adair County Environmental Fair Quiz

Appendix 131. 2002 Adair County Environmental Fair Quiz

However, there are other ways to informally evaluate the effectiveness of these events. Task 600 Project Coordinator, Mitch Fram, consistently made an effort in his and his volunteers' presentations, to get feedback from the audience to judge whether the "message was getting through".

For example, during the 2000 and 2001 OSRC - sponsored campground programs and the 2001 Cherokee County and 2002 Adair County Resource Fairs, live stream and pond invertebrates were the main attraction on display. ("Macro-invertebrate Mayhem" was the program title, borrowed from Project WET). During these programs, children were asked to raise their hands if they felt comfortable swimming in or drinking treated water from streams and lakes with these critters in them. Usually they didn't raise their hands, but shouted "NO!" After a brief explanation of the organisms' importance as indicators, and further viewing under magnifiers or video microscopes, they were asked the same question again. Although a few - usually older - children were still negative, most said they had been swimming with them anyway, but were just unaware of it, and that it was o.k. When asked if they felt comfortable swimming in or drinking water where none or very few of these

organisms could be found, they consistently said "No", indicating that the message about water quality, indicator organisms, and/or food chains was getting across.

In the case of the outdoor activities, the questions were followed up by a short visit to the riverbank to look for invertebrates. The enthusiasm and lack of fear during this activity may be taken as a sign that these youth believed that the organisms were harmless, maybe beneficial, and at the very least, interesting. Enjoyment and engagement with such aspects of the resource (streams) should be a goal of these activities, whenever possible. Some understanding of the system, combined with having fun with the resource itself, could be an important precursor to future attitudes of stewardship.

For some Fairs and other activities, the Stream Trailer was the main attraction of a Water Quality booth. Presenters with the Stream Trailer were encouraged to do informal evaluation with children by asking beforehand: "How many of you think streams are neat (fun, cool) places?" and then repeating the question for a show of hands after the demonstration. This approach was used at the Grove "Outdoor Classroom" (Resource Fair at Jay County Fairgrounds on Sept. 18, 2002) and more than 75% of the children answered in the affirmative at the beginning! Many of these fifth grade children were rural, and clearly enjoyed poking about in creeks. Although a few more children raised their hands afterward, with this group it was unreasonable to expect much of an increase after the 25-minute demonstration.

After a Trailer demonstration, sessions were sometimes cut off abruptly due to timing problems. When time permitted, an effort was made to ask, "Can you remember some things we can do to protect streams?" The following answers were received: "Leave trees and brush on the banks"; "Use those [silt] fence things"; "Plant trees and stuff"; "Keep cows out"; "Don't dump your trash"; and "Put rocks and old cars up against the bank." (The latter answer was singled out for further explanation.) The response of the kids indicated, again, that the message was getting through.

Perhaps just as important, with both the Stream Trailer and Aquatic Invertebrate demonstrations, was the effect of these displays on adult teachers and leaders accompanying the children. In many cases, they stepped in and helped with explanations, once they came to understand the gist of the activity and saw some of their kids struggling to understand. Listening to the explanations they gave their student charges and how they responded in conversation with presenters provided evidence that, in general, they understood the message. Examples of common responses to presenters: "Gee, I had no idea there were so many of those odd critters in the creek --- is that really what the fish eat?"; "I kind-of knew what zooplankton were, but I have never seen them moving like that - never realized there were so many different ones."; "You know, I [my folks, my friends] live on a creek that is [eating away at its banks; flooding a lot; filling up with gravel] -- it's great to understand a little more about what causes it."; "I always thought that [trees, brush] were the problem on creeks, I never realized they could be helping." Almost always, some adults came back during intervals or after the event to relate a stream bank saga of their own and asked for advice.

Miscellaneous Youth Programs

Approximately 120 other children attended miscellaneous other youth programs co-facilitated by the Project. The OSRC Campground Program is very well-received and publicized. Task 600 Coordinator Mitch Fram's talk on "Macroinvertebrate Mayhem!" was reported on in area publications.

Appendix 132. Article on 20000722 Round Hollow Campground Program “Macroinvertebrate Mayhem!” published in Delaware County Journal (20000802) and Grand Lake Magazine (20000820)

Appendix 133. 20000726 Round Hollow Campground Program “Macroinvertebrate Mayhem!” Correspondence, with attendance

[Appendix 134. 20010526 Round Hollow Campground Program “Macroinvertebrate Mayhem!” Report Form](#)

The above discussion on evaluation of the resource fairs also applies here. However, there was some formal evaluation done at one event, the multi-county Water Quality Camp on Grand Lake in Delaware County on June 13-14, 2001. There was an opportunity to administer a formal pre- and post-test.

[Appendix 135. 2001 Multi-county Water Quality Camp on Grand Lake Pre and Post-Test](#)

Table 5. Pre- and post-test results from 2001 Multi-county Water Quality Camp on Grand Lake.

Subject	Pre-test % Correct (n=54)	Post-test % Correct (n=46)	% Increase
Definition of plankton	54	67	13
Lake zone of highest O ₂ concentration	30	57	27
How O ₂ gets into lake water	54	78	24
Function of Secchi disk	35	57	22
Effects of excess fertilizer use	6	15	9
Definition of watershed	24	74	50
Average	34	58	24

The children made a large increase in the number of correct answers, approximately 70% more than they did on the pre-test. Interestingly, by the post-test, 60-75% of them understood all of the subjects covered except for the fertilizer question. This could be because the question itself was difficult for them to understand, or it could be the camp activities were not conducive to illustrating this concept in a manner that they could comprehend.

Videotaping of the educational events was not accomplished during the Project. In part, this was due to an oversight by the Project team. At many of these activities, Project Coordinator Mitch Fram or his volunteers were almost overwhelmed by the schedule and/or audience. To simultaneously make a coherent presentation and capture it on videotape was beyond their resources and expertise, to say nothing of the time and equipment required for editing the raw footage and then producing a useful end product. However, snapshots of some of the activities were taken, a sampling of which are provided in the appendices. Evaluation forms were handed out to campers at the 2001 Multi-county Water Quality Camp on Grand Lake. Although “swimming and goofing off” received the highest marks, other more educational activities were also ranked well.

Appendix 136. 2001 Multi-county Water Quality Camp Photographs

Appendix 137. 2001 Multi-county Water Quality Camp Evaluations

Task 603B – Blue Thumb Volunteer Monitor Program

For a program such as the Illinois River Basin (IRB) Blue Thumb Volunteer Monitoring and Education Program, a significant measure of success is the retention of trained volunteers and their level of participation in the program. On such terms we feel the program has been

quite successful. Much of the credit for this success is due to the level of support we received from the Statewide Blue Thumb staff, in particular Cheryl Cheadle and Jean Lemmon.

At the time of this report, about [45] volunteers, including 10 officially trained high school students, are active in the Illinois River Basin and nearby Spring Creek Watershed. In addition, numerous classroom students accompany teacher and student volunteers from four area school districts (Tahlequah, Oaks, Watts, and Rocky Mountain) during most monitoring fieldwork. As an indication of the project's success in the area, new training opportunities are being requested on a regular basis as news of the program spreads. Training is currently being arranged for the fall of 2003, after the start of school.

The Blue Thumb program began as part of the Illinois Basin Project in October of 2000. (A small pilot program began in 1999 on Spring Creek in Cherokee County with five volunteers, including the Task 600 Project Coordinator Mitch Fram. These were integrated into the current program). Sixty-four prospective volunteers have been trained in four training programs in the Illinois Basin since Nov. 13, 2000. This includes 18 Tahlequah High School students who were not officially trained until after the Project end date. However, their attendance was a direct result of recruitment efforts by Fram during the Project period, so their participation is considered a measure of the Project's success.

Appendix 138. Attendance Sheet from November 2000 Blue Thumb Training

Appendix 139. 20001203 Tahlequah Daily Press article re: November 2000 Blue Thumb Training

Appendix 140. Attendance Sheet from September 2001 Blue Thumb Training

Appendix 141. Attendance Sheet from June 2002 Blue Thumb Training

Appendix 142. 20020703 Stillwell Democrat-Journal article re: June 2002 Blue Thumb Training

Appendix 143. 20020809 Teacher Commendation Letter to Tahlequah Public Schools Professional Development Center

Appendix 144. 20020809 Teacher Commendation Letter to Rocky Mountain Schools

Of the 64 volunteers, 52 are listed on the official Volunteer Roster, which means they are still in the area and have indicated interest in remaining in touch with program staff. This includes two who lack one training day to be certified as volunteers. The 12 who are no longer listed include several high school and college volunteers who have graduated and moved off, a few who trained with the IRB group but monitor as part of another program, and some who did not initiate monitoring or remain in touch.

Appendix 145. 2003 Illinois River Basin/Spring Creek Volunteer Roster

Of the 52 on the roster, 42 are currently active either monitoring or otherwise participating (in one case, educating and recruiting new participants). Six are currently inactive but still in touch, and four are currently not assigned to a site but intend to begin monitoring soon. According to Cheryl Cheadle, Statewide Blue Thumb Coordinator, this active volunteer retention rate compares "very favorably" with previous experience in the Statewide Program. This can be at least partially attributed to the dedication of the Task 600 Coordinator serving on the ground in the Basin, in close, regular contact with volunteers, monitoring on Saturdays even at sites other than his own assigned location. The IRB success shows the importance of a local coordinator that is a Blue Thumb volunteer him/herself. This, instead of a secretary who takes phone calls but is not intimately involved with the program. Fram is quick to admit that coordinating volunteers is a big job. What the IRB Blue Thumb group accomplished took lots of time, but he really enjoyed it and would love to see what could be done if more time was available.

Currently, 11 stream sites are being monitored for water chemistry, usually on a monthly basis. Two other sites, Spring Creek - Oaks and Parkhill Branch are monitored on a more intermittent basis. All sites have twice yearly macro-invertebrate collections with abbreviated habitat assessment. Volunteers who meet regularly with the Illinois Basin group also monitor four sites in Spring Creek, Cherokee County.

Appendix 146. Illinois River Basin/Spring Creek Blue Thumb Monitoring Sites

Appendix 147. 20021004 Illinois River Basin Blue Thumb Data Report from Cheadle to Fram

Appendix 148. 20021028 Illinois River Basin Blue Thumb Data Report from Cheadle to Lemmon

Appendix 149. Summary Table of Illinois River Basin Blue Thumb Data

The first Blue Thumb training program held under this project included a pre/post test and participant evaluation. Statewide Blue Thumb trainings do not usually include pre/post testing, so the Task 600 Coordinator devised this test. Unfortunately, he did not repeat pre/post testing for the 2001 or 2002 trainings due to an oversight.

For the first training program pre-post test, participants raised their scores, on the average, from 2.88 to 5.85 correct out of 8 questions, an increase of over 100%. Greatest improvements were shown on questions concerning (1) what biological monitoring includes, (2) where in a stream water samples should be taken, (3) the best time of day to sample, and (4) how kit glassware should be cleaned. Smaller improvements were shown for questions concerning (1) the QA schedule, (2) which area of a stream has the greatest water velocity, (3) the meaning of the word "benthic", and (4) interpretation of biological diversity data.

In a post-training evaluation in 2000, eight of 14 responding trainees said they would have preferred more time spent in the field, especially for biological assessment, as well as on background information concerning non-point source pollution. Six of 14 said they could have spent less time on reasons for monitoring. The greatest number of respondents (12 of 14) rated stream ecology and activities in the field as the most useful sessions in the training. Ten participants found training in the use of the monitoring kits to be "very useful". Material dealing with non-point source pollution was found to be only moderately useful by most participants. Eight of 14 indicated they felt very comfortable about doing Blue Thumb activities, with the rest choosing "fairly comfortable". There were numerous compliments given the trainers in the handwritten comments.

Appendix 150. Summary of pre- and post-training test scores and participant evaluations from September 2000 Blue Thumb Training

During the Project period, volunteers returned a total of 206 site reports. Volunteer monitoring hours are estimated on the basis of three hours per volunteer per site monitored for chemistry, and two hours per volunteer per site for invertebrate collections. On this basis, approximately 1260 volunteer hours were devoted to monitoring. (This includes 4 non-certified students that help the Watts High School teacher at Ballard Creek and 5 others that help the Oaks teacher.) Additionally, about 1150 volunteer hours were devoted to training, 130 hours to eight QA activities during the Project period, and 80 hours spent conducting educational events (High School students worked at 3 resource fairs for younger children, volunteers also assisted at the Project-sponsored River Fair and Flotilla Tour).

Appendix 151. 20010504 Commendation Letter to Students

Appendix 152. 20011215 Letter from Volunteer re: Educational Activity

Appendix 153. April 2002 Email correspondence between Fram and Walters re: Educational Activity

Appendix 154. 20020417 Commendation Letter for Students to Tahlequah High School principal

Appendix 155. 20021012 Stilwell Democrat-Journal article re: Blue Thumb Educational Activity

In an attempt to gain a better idea of the Illinois Basin Blue Thumb Program's progress to date, a survey was sent out to volunteers in early May 2003. All the volunteers polled were in the program as of September 30, 2002. Ten actively monitoring students from Tahlequah High School were included in the polling, although they did not complete their formal training and receive certification until after that date. The responses were kept anonymous. Email responses were sent to the Secretary in the OCES District Office, who removed all email headers before tallying responses.

The survey was basically a self-assessment by volunteers and does not purport to be an objective measure of volunteer knowledge or of impact in the community. Twenty-five surveys were returned out of 52 sent to the current roster of active and inactive Blue Thumb volunteers. Forty-two of those volunteers were considered active as of Fall 2002. Many of the written comments from survey returns speak eloquently of the respondents' view of the program's successes and failures.

Appendix 156. May 2003 IRB/Spring Creek Blue Thumb Volunteer Survey Questions

Appendix 157. May 2003 IRB/Spring Creek Blue Thumb Volunteer Survey Questions

Among those who responded, there is a clear self-perception of increasing understanding of the main local water quality issues as a result of being in the program. The majority of volunteers ranked themselves at the level of 4 or 5 out of a possible 5 in being well informed as a layperson on many issues since becoming a Blue Thumb member. Understanding of watersheds and non-point vs point-source pollution were subjects showing the greatest confidence levels since involvement in Blue Thumb. Lowest confidence level was expressed in the area of riparian issues.

Of twenty-two respondents that answered questions about changes in "environmental lifestyle", all reported at least one area of change, and most reported multiple areas. More than half the group reported more water conservation and better care taken of riparian areas. Ten of 22 performed volunteer environmental education. One, likely a teacher, stated that Blue Thumb "upped classroom focus on water quality." This could be taken to mean that there was a significant spillover effect of the program on non-volunteer students.

While the great majority expressed positive views of their preparation to do Blue Thumb work, as well as of the program organization and staff support, there was somewhat lower, though still positive, confidence in the areas of data management / volunteer feedback and the Quality Assurance process. This was not surprising. These areas of the program are potentially the most demanding of staff time, on both statewide and local coordination levels. Despite heroic and well-organized efforts of statewide Blue Thumb staff, there is simply insufficient staff time available to fulfill volunteers' needs for thorough feedback about the data they are returning. Quality Assurance is often not a volunteer's favorite part of a monitoring program. Sessions are perceived to be too frequent (they are quarterly), time consuming, and many volunteers form negative associations with "being tested". Again, limited staff time prevents scheduling duplicate QA sessions in the same geographic program area and in the same quarter which might better accommodate the diverse schedules of students, teachers, professional and retired people.

As the Statewide program grows, these problems can only increase unless more BT staff are brought on, or local coordinators receive more training (and reserve more time in their own workplans) to attend to the needs of volunteers. However, in the meantime, efforts

could be instituted to take better advantage of volunteers' own abilities and willingness to manage data. In Tahlequah High School, in particular, an energetic Blue Thumb volunteer - Teacher is currently seeking to work with his students on a local Blue Thumb website, where data can be posted and discussed. This could be useful in giving the other volunteers a greater feeling of real-time feedback and involvement, instead of just being data generators.

Task 603C – Educator/Youth Leader Training

4-H Aqua-Times Workshop

The February 19, 2001, Oklahoma AquaTimes Water Curriculum Workshop was originally arranged for Staff Development Day for Tahlequah and a few other nearby schools. However, in late January, the Project was notified that staff development was cancelled in order to hold classes to make up for snow days. Efforts were hurriedly made to market the workshop as an in-service opportunity for Extension educators and a few rural schools that were not holding classes. Since there was no room to hold the workshop at Tahlequah High School as originally planned, it was moved to the Indian Capital Technology Center in Muskogee. Eight participants attended, including four teachers from the Illinois Basin, and five Extension Educators. One of those Educators has since moved to the Basin.

Comparison of pre/post test results indicated that participants improved from an average of 38% correct answers to 92%. The most significant improvement was in understanding the nature of non-point source pollution, and in identifying Oklahoma's most widespread water pollutant (sediment). About half the participants felt the workshop quite worthwhile, while three of eight disagreed with that sentiment. However, five of the eight said they felt prepared to conduct the AquaTimes activities. It is unclear why participants were mixed in their assessment. One stated that the workshop was too basic, while another said he/she would have preferred to work with the Stream Hydrology Trailer (part of a different curriculum). All other comments were quite positive. Six of the eight said they planned to use AquaTimes activities in the classroom, and four planned to do so in camps or 4-H clubs. Three said they planned to train others. No one said they did not plan to use the material.

Appendix 158. 20010219 AquaTimes Workshop Attendance Roster

Appendix 159. 20010219 AquaTimes Workshop Pre/post-Test Questions

Appendix 160. 20010219 AquaTimes Workshop Pre-test Results

Appendix 161. 20010219 AquaTimes Workshop Post-test Results

Appendix 162. 20010219 AquaTimes Workshop Evaluation Form

Appendix 163. 20010219 AquaTimes Workshop Evaluation Results

Appendix 164. 20010223 Teacher Commendation Letter to Briggs School Superintendent re: 20010219 AquaTimes Workshop

4-H Water Quality Projects In-Services

An in-service workshop to enhance support of the 4-H Water Quality Projects was held at the Rogers Co. Conservation Education Reserve on Saturday, October 21, 2000. The workshop was designed for 4-H Educators and Volunteer Leaders and was marketed to audiences in the Illinois Basin. As it turned out, some of the Leaders brought 4-H youth with them. Total attendance was 15. Although seven adult and teen leaders, and three Extension Educators attended, only five turned in their evaluation forms. The workshop covered all the 4-H Environmental Stewardship County and State Fair Projects (coincidentally, these projects are described in Section 319 of the fair books), but concentrated on those projects dealing with streams and lakes. Particular emphasis was put on collection and identification of aquatic organisms as indicators of aquatic ecosystems health. 4-H fair project displays consist of small invertebrate collections (one of each type

found) preserved in alcohol, with an accompanying report or poster, or just posters alone describing aquatic habitats.

Evaluations indicated that all the respondents felt more comfortable about assisting youth with these fair projects, and were planning on helping with such projects over the coming year. Most found the 4-hour afternoon workshop to be about the right length, but one leader suggested more discussion of the specimens found would be appropriate. One leader thought there was not enough time to use all the equipment and would prefer some wetlands plant identification. One leader suggested more advertising of the projects to 4-H'ers, as well as more effort to get word of these projects and supporting materials out to the counties, and from the county Educators to the 4-H clubs.

Appendix 165. 20001021 4-H Water Quality Projects Workshop Evaluation Summary

A second, two-hour workshop was undertaken at the Annual 4-H Volunteer Leader Conference held on the campus of Oklahoma State University in Stillwater on July 19, 2002. Over two hundred adult and teen leaders attend this annual conference and some 30 workshops are offered over a two-day period. Ten volunteer leaders, including at least 5 from Cherokee County, attended this workshop. Evaluations indicated that leaders expected all the Water Quality Project options to be attractive to their 4-H youth. During the indoor workshop, presenters brought in an ice chest with freshly collected live benthic invertebrates, as well as some gravel, debris and detritus from both streams and ponds. Participants were asked to sort through the material, pick out a few "critters," attempt to identify them with resource books and lists made available, and preserve them in babyfood jars with alcohol, as would be required for a fair project. This activity drew a lot of interest, with many commenting that they wanted to get their kids out to the creek to look for critters and start projects before the summer was over. Completed project displays from the 2001 Tulsa State Fair were also shown and discussed.

Appendix 166. 20020719 4-H Water Quality Projects Workshop Attendance Sheet

Appendix 167. 20020719 4-H Water Quality Projects Workshop Evaluation Summary

There is some evidence that these trainings are effective in interesting Educators, teen and adult leaders and the 4-H youth themselves in doing environmental stewardship projects. The appendices include 3 tables comparing numbers of Environmental Stewardship projects shown at the Tulsa State Fair since 1999. Also included is a description of Project classes. Since project classes changed after 1999, and again after 2000, three tables are necessary to show this change. Still, too few projects on "water critters" were being taken to the Tulsa Fair as of 2002. Informal surveys of the Cherokee County Fair in 2001 and 2002 indicated increasing interest in projects on Recycling (making useable items from trash) and Homemade Stream or Lake Sampling Equipment – such as Secchi disks and kicknets. Such projects are favored presumably because they can be done quickly, indoors, with very specific instructions. Clearly, more needs to be done to encourage youth and their leaders to venture outdoors and use these tools on streams, ponds and lakes, where they can be directly involved with the resource and begin to appreciate – and have fun with - the ecological relationships between habitat, water quality and living organisms.

Appendix 168. Description of 4-H Environmental Stewardship Fair Projects

Appendix 169. Table of 2000-2002 4-H Environmental Stewardship Fair Projects

Project WET Workshops

Oklahoma Project WET provides standard evaluation forms, which are filled out by participants at the end of the workshop. The majority of participants were either education students planning to teach in elementary grades or active elementary teachers. 106 of 109 respondents found the workshops met their expectations and were appropriate to the grade

levels and subjects they teach. All respondents said they obtained strategies to integrate Project WET into their curricula. 107 of 109 felt that instructors held their attention well. Two expressed that they would have preferred a shorter workshop – especially on the second day. The largest number of respondents ranked the diversity of activities presented as the best feature of the workshop. Field and hands-on activities also ranked high, cited 104 times in comments returned. A number of respondents commented that they would have preferred even more field and outdoor activities.

Appendix 170. June 7-8, 2002 Project WET Workshop Evaluation Summary

Appendix 171. June 21-22, 2002 Project WET Workshop Evaluation Summary

In general, the comments were exceedingly positive for both the workshops and the curriculum, but there were only two comments praising the workshop's organization. Nine participants said they felt the workshop could be better organized, that there was too much rushing between activities, and not enough time provided for the best activities. Although this comment comes from a small number of respondents, it is an important consideration. Project WET trainers have a tendency to try to cover too large a portion of a massive curriculum (there are 86 separate activities in the WET Curriculum Guide). On the other hand, dwelling too long on too few exercises often leads to complaints of "beating it to death" and other expressions of boredom. We have favored erring on the side of keeping participants at least a little busier than they would prefer – as long as the workshop maintains a sense of interest and enjoyment. For all three of the workshops, the Project Coordinator (Fram) suggested that participants have an opportunity to go out to a local creek and pond to learn to collect and observe and fish benthic invertebrates and other aspects of aquatic ecology. This activity has now become a feature of the WET agendas locally. Teachers get a chance to use equipment such as a plankton net, kicknet, secchi disk, thermometers and magnifiers. This provides a needed break with some fresh air, and introduces them to the fun of direct involvement with the resource. This is not a universal feature of WET workshops elsewhere. Most Project WET activities are designed for use indoors or on the school lawn. In all three of these workshops, the outdoor aquatic activities were highly rated, and many participants expressed interest that it was so easy and fun to get a group out to the creek or pond, and that there was always something surprising to find.

One of the best indicators of Project WET's appeal to teachers is the fact that 13 participants signed up to become Project WET Facilitators themselves. This is a relatively high number, considering the significant time and effort involved: a 2½ day training, plus a commitment to conduct at least one workshop per year. If only a small proportion of these finally become facilitators, the effect of these workshops will be multiplied many times.

Stream Trailer Training

The October 2, 2000, Stream Hydrology Model In-service for Westville, OK, School was conducted as an option to fulfill staff development requirements for teachers. On a pre/post test consisting of 8 questions, the average number of correct responses was 5.16 (range 3-6) on the pre-test, compared to 6.75 on the post-test. This represented an improvement of over 30% in correct responses. Greatest improvement was shown on questions dealing with sediment deposition and methods for maintaining a stable creek bank.

On the evaluation questionnaires used in Westville, participants indicated that in general the workshop was worthwhile. They strongly felt the hands-on nature of instruction was the most useful aspect of the training. They saw less value in the lunchtime slide presentation on basic Stream Hydrology Concepts. All participants felt at least fairly comfortable with the prospect of using the trailer with groups of students. Six participants indicated uncertainty about the number of presentations they would do with the trailer and one said s/he would

not be using it. However, 5 participants indicated plans to use it at least once. Westville teachers' plans to use the Trailer have not generally been borne out since their workshop. Only one reservation to check out the trailer was made by an attending teacher over the following school year. However, we have encountered some of the teachers at other Extension activities in Adair County and they attested to gaining appreciation for stream environmental issues at the workshop. So, although they have made little use of a newly available curriculum and equipment resource, they did take home significant new knowledge about streams and riparian areas. When future workshops are conducted for school teachers, an effort will be made to get them to commit to class or school-wide activities using the Trailer within a month or two following training, so momentum is not lost.

Appendix 172. 20001002 Stream Hydrology Training Attendance Sheet

Appendix 173. 20001002 Stream Hydrology Training Pre/post Test Results and Evaluation Summary

Appendix 174. 20001004 Commendation Letter to Fram from Westville Schools Professional Development Chairperson re: 20001002 Stream Hydrology Training

Unfortunately, the data from the pre-post tests for the Stream Trailer training of May 16, 2001, in Kansas, OK in Delaware County cannot be located at this time. There were six participants. Among those were four working at the Delaware and Adair County Conservation Districts. These were: Teresa Butler, Illinois River 319 Education Coordinator; Tammy Mancia, Delaware County Conservation District Water Quality Technician; Marti Mefford, Information/Education Coordinator for the Delaware County Conservation District Water Quality Office, and Christine Sumter, the Delaware County Conservation District Secretary. Two Cooperative Extension 4-H Educators also attended: Heather Wright from Delaware County, and Heather Winn from Cherokee County. Subsequent to their training, Ms. Mancia and Ms. Mefford used the Stream Trailer at an Ottawa County Resource Fair later that month, and then again at a Delaware County Resource Fair in the fall. They reported great success in using the trailer, and expressed intentions to check it out again in the future. Since her training, Ms. Butler has assisted with many demonstrations of the Stream Trailer at Outdoor Classrooms and adult activities, such as an Adair County Farm Show Event. She is adept at setting up the stream scenarios and operating the trailer.

Other training sessions reported for the stream trailer were for smaller groups, were shorter in length (under 3 hours), and were conducted outdoors. Most of these participants were somewhat familiar with riparian/stream hydrology issues, but needed to know how the trailer works. Formal pre-post tests and evaluations were not requested from these participants.

It is important to note that all these workshops and trainings were conducted in a hands-on format which enables the trainer to monitor participants' understanding and facility with the model. Scenarios are set up and explained, after which the grit bed of the trailer is cleared and teams of 2-3 participants are asked to repeat the set-up and explain the scenario. If a participant seems confused on any detail, efforts are made immediately to correct the problem or procedure being used.

Miscellaneous Educator/Youth Leader Training

As noted by Dr. April Adams, Assistant Professor of Science Education at Northeastern State University in Tahlequah, OK, Task 600 Coordinator Mitch Fram served as a "willing and knowledgeable resource for environmental education" in the Project area in a number of different venues. Included among those were two programs initiated by Dr. Adams. In November 2000, Fram's presentation to K-9th grade teachers as part of her "Inquiry Based Science Instruction" workshop was listed as "an asset to the program" on participants' evaluations. In addition, a number of her 66 "Elementary Education, Early Childhood

Education, and Special Education” students indicated that they would make use of the resources he promoted, once they became teachers.

Appendix 175. 20001130 Environmental Education Workshop Attendance Sheet

Appendix 176. 20010503 Letter from NSU Assistant Professor Adams to Fram re: Environmental Education Presentations

Task 604A – RiverFair

The First Illinois RiverFair and Cleanup Event, Sept 7, 2001, was seen as an educational success by those involved. The response of the Oklahoma Scenic Rivers Commission Administrator and Commissioners was particularly gratifying. They greatly appreciated the true cooperative spirit of the Fair. This event was a joint effort among seven agencies (the Adair and Cherokee County Conservation Districts, OCC, OCES, OSRC, Cherokee Nation, and NSU), and a private sponsor (Armstrong Bank). Such cooperation in itself could be considered a measure of success, since it sets precedent for future efforts. In fact, plans are currently underway for another fair in the fall of 2003.

Appendix 177. III. River News, Issue #6, Nov '01

Appendix 178. Oct '01 letter from Ed Fite

The RiverFair’s activities started in the morning with canoe-based cleanup along a stretch of the Illinois River. These events are not new in the Basin, as they are regularly sponsored by OSRC. However, pairing them with a multi-agency educational event represented a definite innovation, and advanced the transfer of information in the Basin. Registrants for this activity numbered 78, plus at least 10 who arrived late. Together, they recovered two full truckloads (about 3000 pounds) of trash and provided a major boost to OSRC staff trash removal efforts following the Labor Day weekend.

An educational expo was arranged under a big-top tent on the bank of the River. Educational displays were set up to run after the cleanup, starting at about noon. Aside from the cooperating sponsors, twenty agencies or groups contributed educational booths to the expo, another indication of the success of the RiverFair organizers. This included two “environmentalist” groups – Sierra Club and EarthSaver. A wide-ranging educational experience and a chance to exchange ideas in a relaxed atmosphere were thus provided to attendees. Seven volunteers and a faculty advisor from Northeastern State University’s Safety & Environmental Management Association (SEMA, for more information go online to <http://arapaho.nsuok.edu/~sema/frame.html>) assisted at the educational venue, along with 6 Blue Thumb Volunteers, providing at least 80 total hours of volunteer help. This number does not include the time of the educational booth providers, many of whom were also private volunteers.

SEMA and Blue Thumb Volunteers tended the groundwater flow model, urban storm-sewer model, and Enviroscape, as well as the Stream Trailer, after an hour of training by the Project Coordinator in the morning. They reported constant contact with visitors throughout the expo. Regardless of how much knowledge was transferred to the general public during this event, it is clear that these 13 volunteer educators gained much from the activity. They became noticeably more adept at presenting their models as the day progressed.

The exact number of visitors to the educational expo could not be determined as people entered from all sides of the big-top tent setup. Of the free meal tickets handed out at the expo, only 62 were redeemed at the evening meal. However, educational attendance was likely greater than this. Although many of the river cleanup volunteers left shortly after the free hotdog lunch, several did stay for the mid-afternoon kayak races. It is unknown how many of them attended the educational activities. It is also likely that several people came in the afternoon and left prior to the evening meal.

Pre-post testing evaluations are impractical at an event such as this, so it was difficult to judge exactly how much learning took place. Observations by event staff and volunteers indicated much conversation specific to river and water quality issues. The Task 600 Coordinator helped tend the stream trailer, at some distance from the main tent, and was visited by several youth as well as adults with questions and comments about riparian and stream habitat management. The Department of Wildlife Conservation fish tank display was a major draw and provided an opportunity for discussion of aquatic habitat stewardship and fishery management. The OSU well water-testing booth had very few samples turned in – only three or four. This was attributed to inadequate pre-event publicity for this opportunity. However, a dozen or more DEQ water test kits were handed out with instructions and many questions concerning wells and groundwater protection were answered. Booths with only posters or signs seemed to get the least attention from visitors. The Solid Waste Institute activity, a can-toss game, was particularly successful at drawing parents and their children.

Event evaluation forms were distributed at the evening festivities, which included the meal, music, and speakers. Although the crowd was estimated at nearly 175 by OSRC, only fifty-six evaluations were turned in to RiverFair organizers. Again, it is likely this number did not include many who left early. Evaluations indicated that educational booths were for the most part very well received. They were second only to the dinner and evening music in the number of highly positive votes received. Results also indicated that the canoe-based river cleanup was a popular activity of the day. Overall, several comments and suggestions encouraging that the RiverFair be made a regular event were made.

Table 6. Results of 2001 Illinois RiverFair evaluation analysis.

Fair Activity	Average Ranking
Canoe-based River cleanup	4.4*
Kayak races	4.5
Educational booths	4.4
Kid's activities	3.6
Dinner	4.3
After-dinner speakers/music	4.4

*A ranking of 1=poor, 5=best.

Appendix 179. 2001 RiverFair Evaluation Responses

In informal evaluative discussions among the organizers, a few thoughts for future events stood out. The BBQ dinner, an expensive component of the event, was not perceived to draw many more people to the education as it was intended to do. Some attendees arrived just as dinner was beginning. Certainly, some food and music would be an attraction, but perhaps dinners could be offered for sale or concessions used to reduce overhead at future events. Scheduling on a Friday was also questioned. A Saturday event might be more attractive to schoolchildren and their parents. If the event continues to be scheduled on a weekday, more involvement from the schools should be solicited. Drinking water testing at the RiverFair could be an attraction for many Fair visitors who most need water quality education. However, greater pre-event publicity for this aspect is needed, so that more of the public is aware of this resource and prompted to bring in well water samples.

Task 604A – Flotilla Tour

Invitations to the flotilla tour were extended to over 100 individuals. Approximately half (48 persons) of these attended. As with the RiverFair the previous year, this type of event does

not lend itself well to a meaningful pre-post testing protocol. Most of the invitees were community leaders and volunteers already somewhat familiar with many of the issues on the River. Therefore, for most of these participants the flotilla trip was an opportunity to delve into these issues in greater detail.

Appendix 180. 2002 Illinois River Flotilla Tour Attendance Sheet

For example, the presentation by Dr. Michael Smolen about phosphorus loading from the watershed was an attempt to achieve this. Judging from the discussion that followed his presentation, he appeared to be successful. The same could be said for the detailed explanation of the game fishery (and non-game fishes) by Oklahoma Department of Wildlife Conservation staff and the demonstration of Blue Thumb monitoring and bio-assessment techniques by Ms. Cheadle.

OSRC Administrator Ed Fite and several OSRC Commissioners in attendance were involved in vigorous discussion with other Tour participants at each stop. Consequently, the Blue Thumb volunteer students, teachers, and others in attendance were thus exposed to a lively and enlightening exchange about water quality and pollution policy. This was reflected in the detailed accounts of the event that were published in both Oklahoma and Arkansas media. This front-page coverage, in turn, exposed many thousands more on both sides of the state line to the discussion. When they cover an OSRC meeting or press conference, it is unusual to have reporters' attention for more than a few moments for an informal exchange. The tour's format provided them an opportunity to flesh out the details of an issue and this was reflected in their print coverage.

Appendix 181. 20020929 The Morning News (Northwest Arkansas) article re: 2002 Illinois River Flotilla Tour

Appendix 182. 20020930 Muskogee Daily Phoenix article re: 2002 Illinois River Flotilla Tour

Although evaluation forms were handed out to all 48 attendees, only 26 were returned. This was due to the fact that the program staff was obligated to "bring up the rear" of the flotilla, to make sure no stragglers were lost on the River. Upon landing at the tour's end, many participants left before they could be reminded to turn in their forms. This less successful aspect of planning will be avoided in future events.

Appendix 183. 2002 Illinois River Flotilla Tour Evaluation Forms

Appendix 184. 2002 Illinois River Flotilla Tour Evaluation Responses (summarized)

Review of the evaluation responses indicated that the great majority of participants highly rated all aspects of the Tour, including logistics, refreshments, and the educational program. All said they would return to a future such event. Suggestions for the next tour included better introductions, a loudspeaker for speakers, a shadier stop for the lunchtime program, less time spent waiting for the electro fishing demonstration to finish, and provision of restroom facilities somewhere along the tour. Most, but not all, favored the same time of year for future tours.

Miscellaneous Public Programs

Since Fram was an invited speaker to these programs and not involved with their organization, there was very little means to obtain quantifiable results of their impact.

Conclusions

Many of the successes of this Project can be expressed in terms of numbers:

- ◆ *One thousand of each of 4 brochures distributed to agencies in the Basin*

- ◆ *Five brochures and a Handbook available online*
- ◆ *Approximately 5000 children at county Resource Fairs received hands-on exposure to basic stream ecology, basic stream hydrology and riparian areas, or elementary stormwater and groundwater concepts*
- ◆ *An additional 150 special needs children at a Tahlequah Schools – sponsored resource fair taught about groundwater and stormwater by trained Blue Thumb Volunteer students*
- ◆ *134 children received actual experience with water resources, including animal collection, at camps and campground programs*
- ◆ *Sixty-four prospective water monitoring and education volunteers trained in the Basin, of which 42 are currently active in the Blue Thumb program, and another ten remain in touch with the program, possibly to begin monitoring in the future*
- ◆ *Eleven stream sites in Basin counties received monthly volunteer monitoring for water chemistry by the end of the Project*
- ◆ *Volunteers turned in 206 site-monitoring reports over a two-year period, in addition to approximately 32 invertebrate collections and three fish collections with accompanying habitat assessments*
- ◆ *Over 2500 volunteer hours devoted to the Blue Thumb program during the Project period, including:*
 - *1150 hours in training*
 - *1260 hours in site monitoring and invertebrate collections*
 - *130 hours in Quality Assurance sessions*
 - *80 hours helping conduct educational activities – resource fairs, RiverFair and Flotilla Tour*
 - *uncounted hours in informal knowledge transfer to friends, families and passers-by at monitoring sites*
- ◆ *281 adults and teen leaders attended training workshops and formal presentations on Project material in 17 different programs (11 of these lasted a minimum of 3 hours!)*
- ◆ *The vast majority of workshop attendees (246 of 281) were educators – school teachers and Extension Educators*
- ◆ *Two workshop trainees took the stream trailer and accompanying riparian education materials to several hundred adults and children at events on the Arkansas side of the Illinois River Basin*
- ◆ *Between 62 and 150 visitors passed by educational booths and attended presentations and youth activities at the 2001 Illinois RiverFair*
- ◆ *Thirteen volunteers from Blue Thumb and the NSU Safety and Environmental Management Association trained in the morning on the various educational models and devoted a total of at least 80 volunteer hours to the 2001 Illinois RiverFair*
- ◆ *Some 88 volunteers collected 3000 pounds (two truckloads) of trash at the morning canoe-based cleanup portion of 2001 Illinois RiverFair*
- ◆ *Forty-eight community leaders, teachers, Blue Thumb volunteers and agency staff attended a five hour “Flotilla Tour” of a six-mile segment of the Illinois River, during*

which they got hands-on experience with, and/or detailed information on, river fisheries, water sampling and testing, biological monitoring, riparian issues, cost-share assistance opportunities, and the phosphorus problem

- ◆ *Several newspaper articles carrying photos and information about Project activities appeared in area markets including Muskogee, Tahlequah, Stilwell, Westville, Jay, and Grove in Oklahoma, as well as Springdale, Siloam Springs, Fayetteville, Rogers, and Bentonville in Arkansas (AR)*

However, there is more to the story than is revealed in the numbers and listings. Simple attendance numbers can give a false impression of educational success. That criticism could be applied to some activities in this project. Objective measures of knowledge attainment were not easily obtainable for many programs, and some were omitted due to lack of time, personnel, or simple oversights.

For example, it is hard to assess the amount of information that gets transferred at a RiverFair, where people pass back and forth through a tent full of educational booths. During that activity, Project personnel witnessed some intense conversations going on between presenters and visitors. These conversations probably were enlightening, but may have involved only a small proportion of visitors. The Flotilla Tour, on the other hand, concentrated participants at educational stops along the river, making it easier to command their attention. Flotilla organizers unanimously agreed that this was the case when they gathered informally after the event. This realization will help direct planning for future public educational events, which will hopefully become a tradition in the area. Planning is underway for a Fall 2003 event.

County resource fairs for elementary and middle school children represent another case where numbers can be misleading. A frequently heard complaint is that children are herded through a fragmented program with little time (10 to 20 minutes per session) to dwell on exhibits and ask questions. These fairs provide little opportunity for objective evaluation. Essays and drawings done by children the following day may be the best obtainable success measure, and should be encouraged in future such programs. In the case of the exhibits done with the help of the Project Coordinator, children received close-up, hands-on experience with live invertebrates or moving water (in stream and groundwater models) during the brief sessions. The use of a question-response dialog with the children, as explained in the Measures of Success, assured that many children came away with at least basic awareness of the central theme of the display, e.g., that critters can be indicators of the health of the water body, that trees and brush along a creek bank are beneficial, or that materials spilled on the ground can eventually seep into a groundwater aquifer used as a drinking water source. The presence of teachers and other adults accompanying these children is quite important. Informal conversations with them invariably revealed they were picking up new ideas. Finally, it is notable that this Project was instrumental in initiating a Resource Fair (or "Outdoor Classroom") in Delaware County, one of the Basin counties, where none had been held in the past. The Project Coordinator regarded this fair as being among the best planned, because they concentrated on a single grade level and allowed slightly more session time (20-30 minutes) for each exhibit. This "quality vs. quantity" approach helped avoid overcrowding and confusion.

Educator/Youth Leader Training was a major achievement of the Program. Where four activities were called for in the original workplan, a total of 17 different activities were held in three Basin counties, 11 of them workshops of 3 hours or greater duration. Pre-post testing from some of these activities indicated significant gains in knowledge. Some 250 educators, many of them teachers-in-training, received exposure to water quality and aquatic ecology

resources they can employ in their own classrooms or outdoor activities: Stream Trailer, Wet'n Wild trunk sets, Groundwater Flow Model, AquaTimes, Project WET, EnviroScape and Storm Sewer Model. In addition, many educators were introduced for the first time (at least since childhood) to the simple process of poking through a small stream riffle, turning over a few rocks, or dipping a net at the edge of a farm pond or slough, and sharing in the delight and curiosity that children experience in finding live "treasures." They also learned they need not be fearful about leading youth on such outings. These activities have now become a central part of Project WET training in the Illinois Basin (and NSU), as a result of this Project's emphasis. In Project WET workshops scheduled for June of 2003, two of the new WET facilitators will be Blue Thumb volunteer/teachers who participated in the 2002 WET workshops. One of them, from Tahlequah, intends to make creek-walking and invertebrate collecting and identification not only a part of his WET workshop, but also a significant part of a new Entomology course offering for Advanced Placement students at the High School.

From the Project Coordinator's perspective, the Illinois Basin/Spring Creek Blue Thumb Program was the greatest success of the Project. The intensive Blue Thumb recruitment, training, and Quality Assurance regime led to a corps of well-informed lay volunteers with a detailed grasp of water quality issues. Education in the Blue thumb program is a continual process with most volunteers: there are monthly monitoring activities, quarterly QA sessions, and frequent mailed and emailed newsletters and other contact from program personnel. The program structure is now well established in the area, providing a base for expansion in volunteer numbers, as well as new watershed activities, such as storm-drain marking, which will begin in spring, 2003. While schools are involved in other Blue Thumb programs around the state, the strong connection of four schools in the Illinois Basin program provides important institutional and community support for the program, and helps attract media notice. Blue Thumb also provides the schools an important classroom enrichment resource, especially with its periodic bio-assessment activities that enable teachers to provide hands-on lab sessions. Tahlequah High School has requested a training program for the incoming High School students in early Fall, 2003.

Some deficiencies in the Blue Thumb structure became apparent over the two years of the Project. These lie mostly in the area of volunteer feedback and data interpretation. They are caused mainly by limitations on resources at the statewide program level – lack of personnel to accommodate a growing program, and bottlenecks in obtaining macro-invertebrate identification and bio-assessment results from contractors. The most likely solutions will be local ones, which are being discussed, and will be implemented as resources become available. Managing volunteers is a time-intensive task, and perhaps the most efficient solution is involving volunteers themselves in program management. Teachers and students in Tahlequah, for example, are looking forward to developing a website, complete with database and bulletin board, to specifically address data handling and volunteer feedback, as well as sharing results with other programs, such as OK Water Watch. In addition, resources for macro-invertebrate identification will soon become available at NSU, possibly enabling a local solution to that problem.

To summarize, although the quantifiable results listed previously are indeed a measure of the success of the Project, some of the most important outcomes from this effort cannot be captured in answers to test questions or responses on evaluation forms. In fact, these accomplishments will probably make the greatest difference in helping improve and protect the water quality of the Illinois River Basin. These include:

- ◆ A publications series including BMP fact sheets and a landowner's handbook, which is web-published and therefore easily updateable for future Basin programming and adaptable to other watersheds;
- ◆ A trained corps of school teachers and other professional educators and volunteers who are familiar with diverse water quality and aquatic ecology curricula and resources
- ◆ A strong and on-going Blue Thumb volunteer corps, with a sustainable structure of support, from local (Extension, CD, OSRC, schools) as well as statewide sources.
- ◆ The beginnings of a tradition (2 years) of Fall Illinois Watershed education events with support from agencies and volunteers inside and outside the watershed, and experience on which to base more effective educational planning.
- ◆ A background of experience from seven youth environmental resource fairs on which to base planning for increased educational effect and evaluation at future activities.

In conclusion, the Illinois River Basin Education Program accomplishments were significant, not just for the quantity and diversity of programming, but also as a solid base from which to build future efforts in this and nearby watersheds.

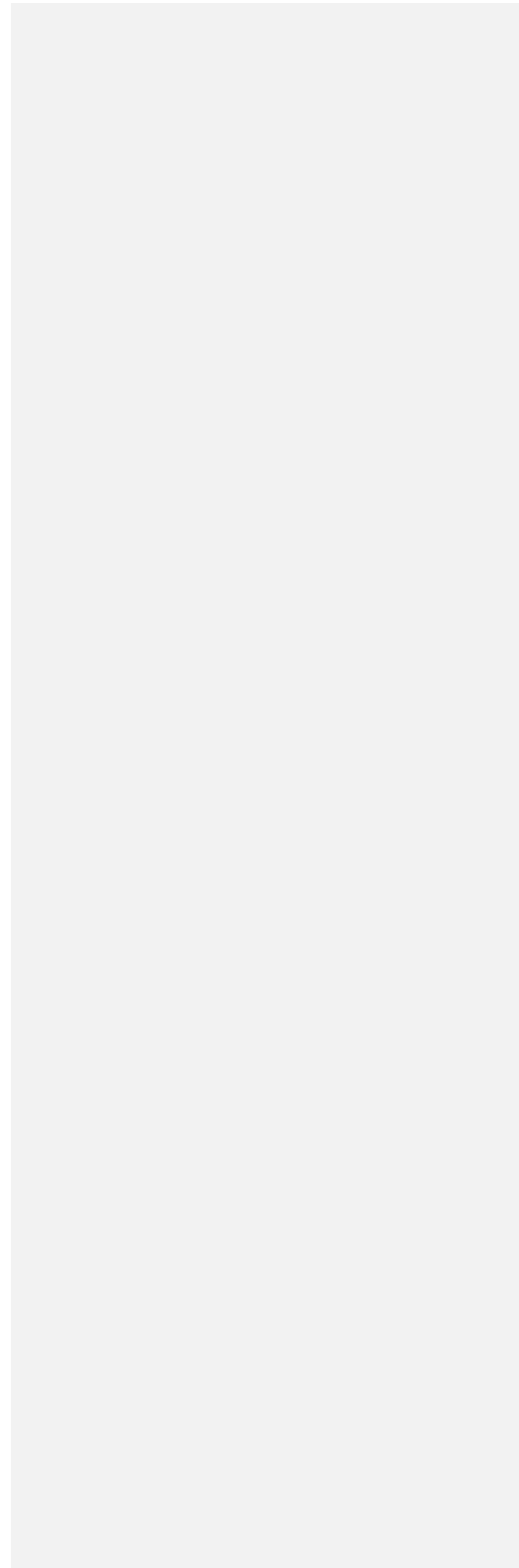
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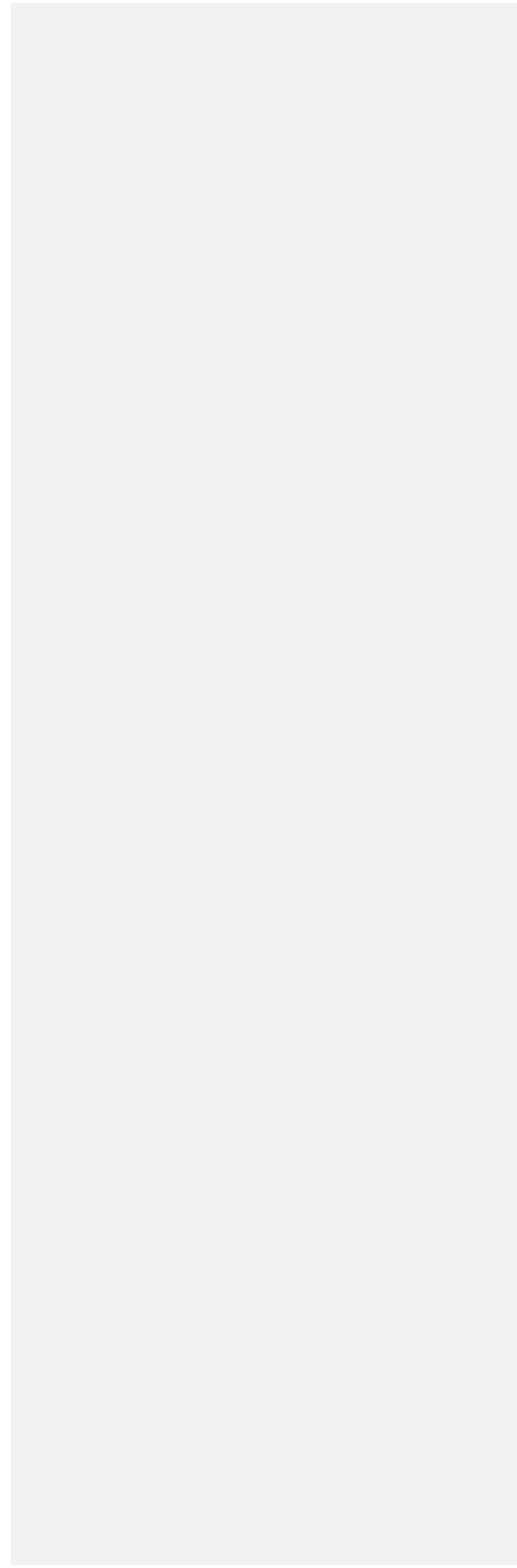
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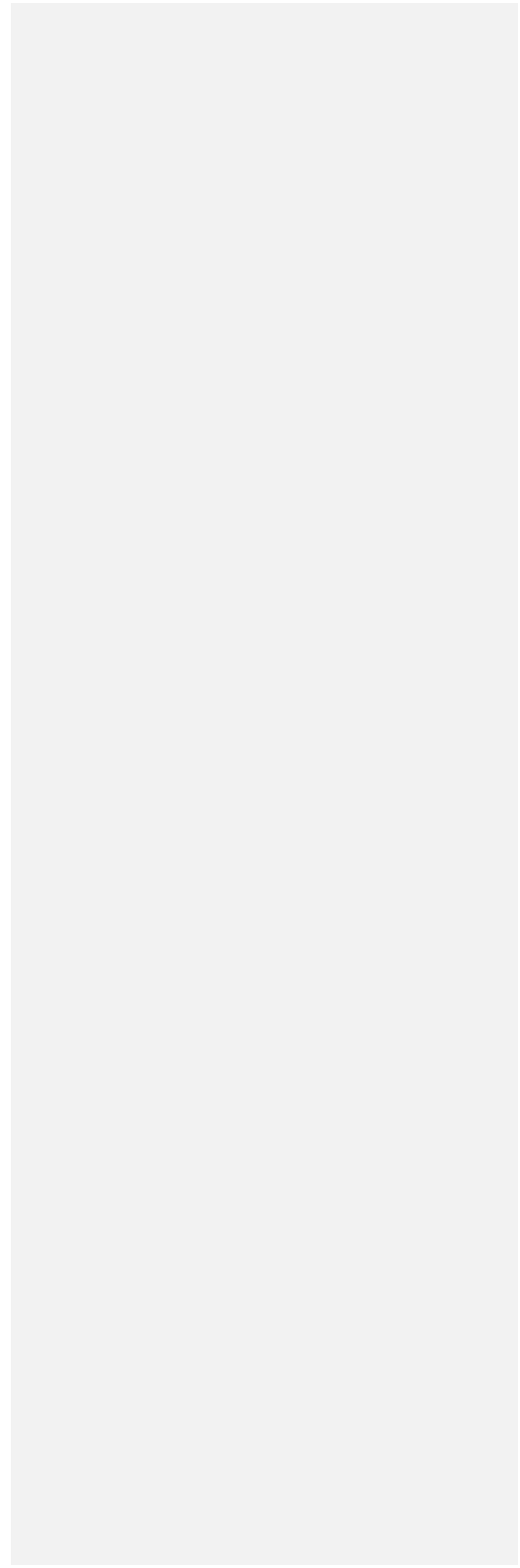
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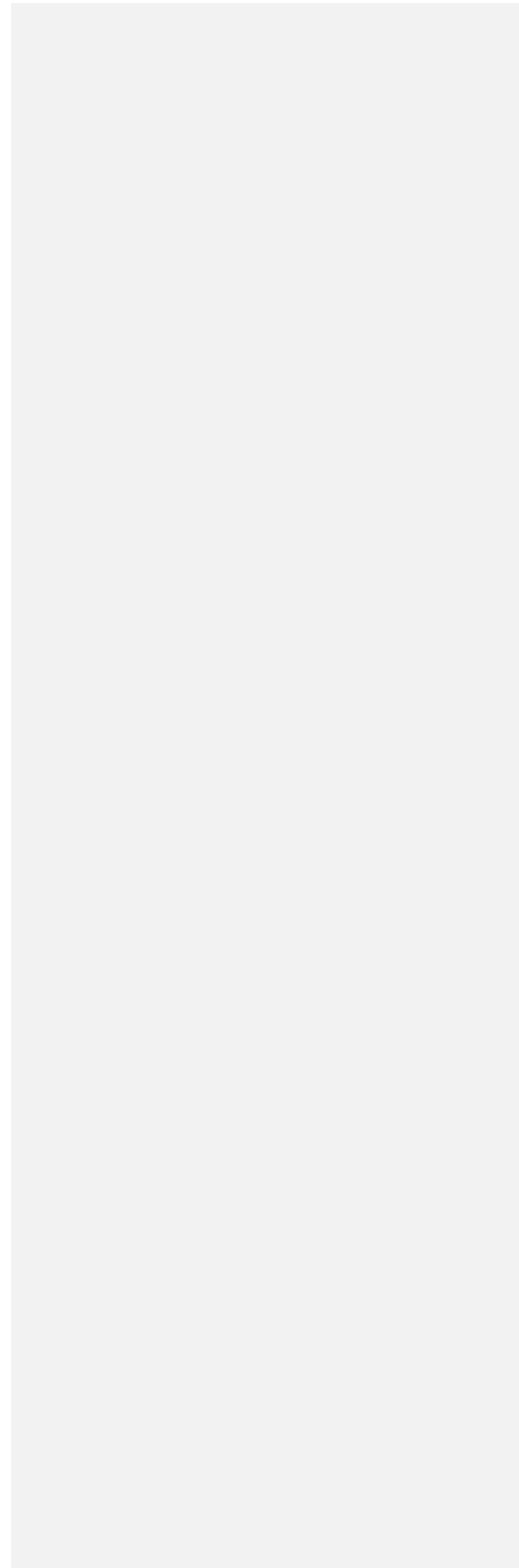
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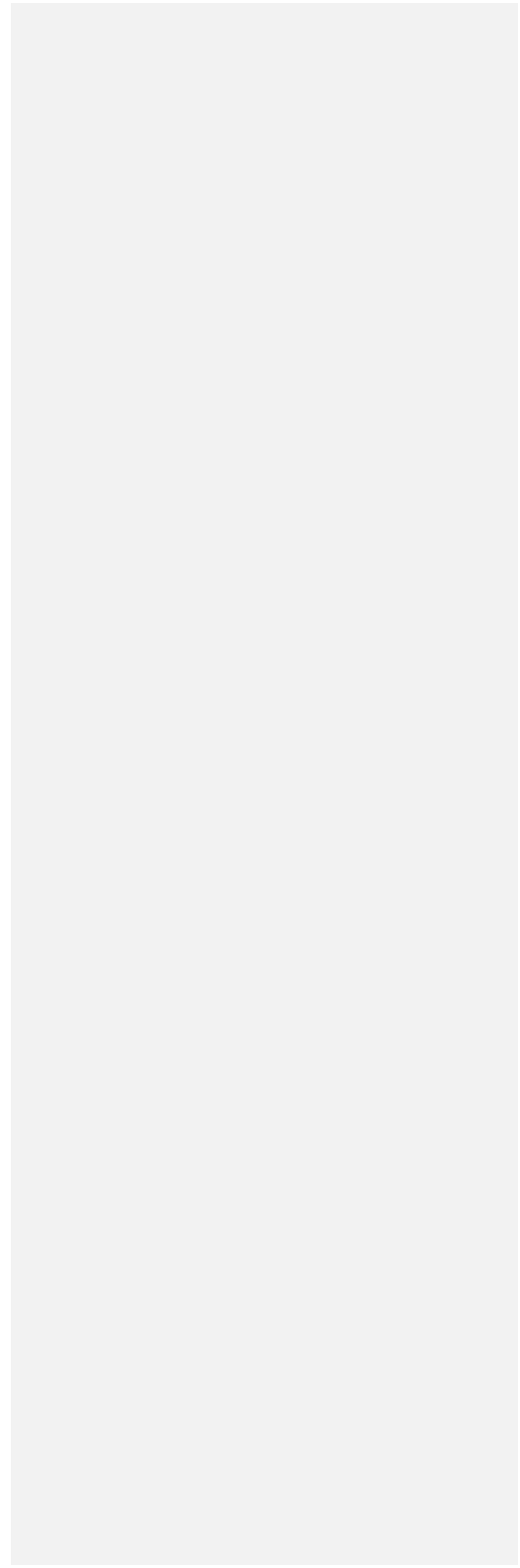
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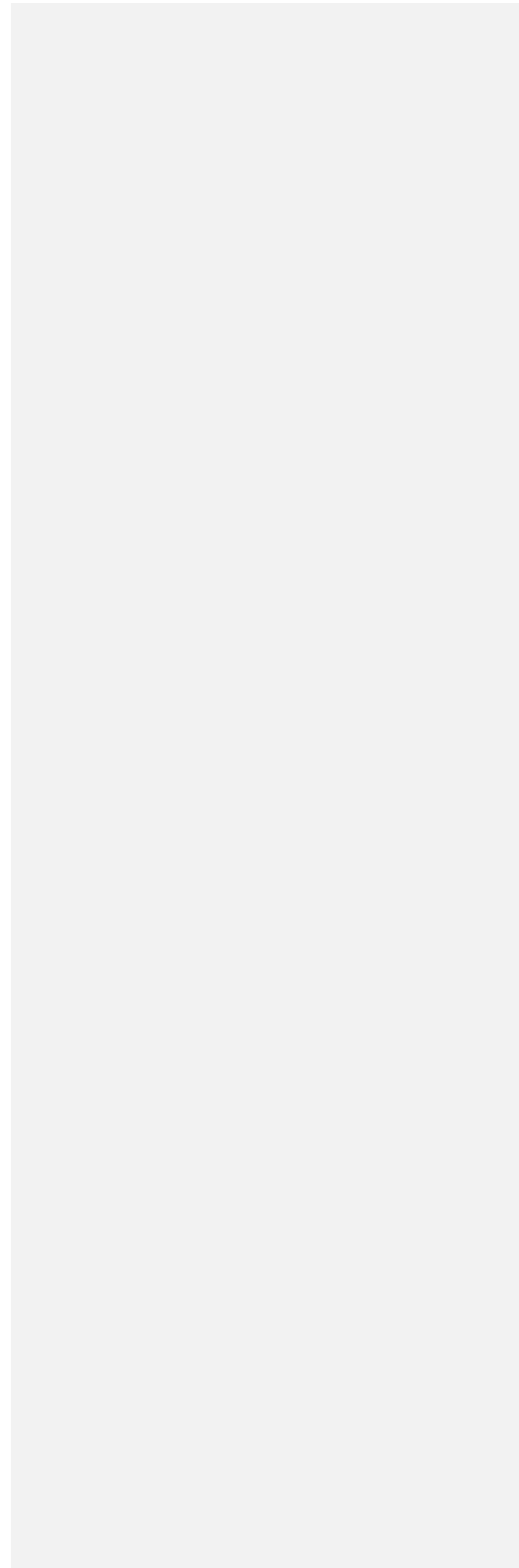
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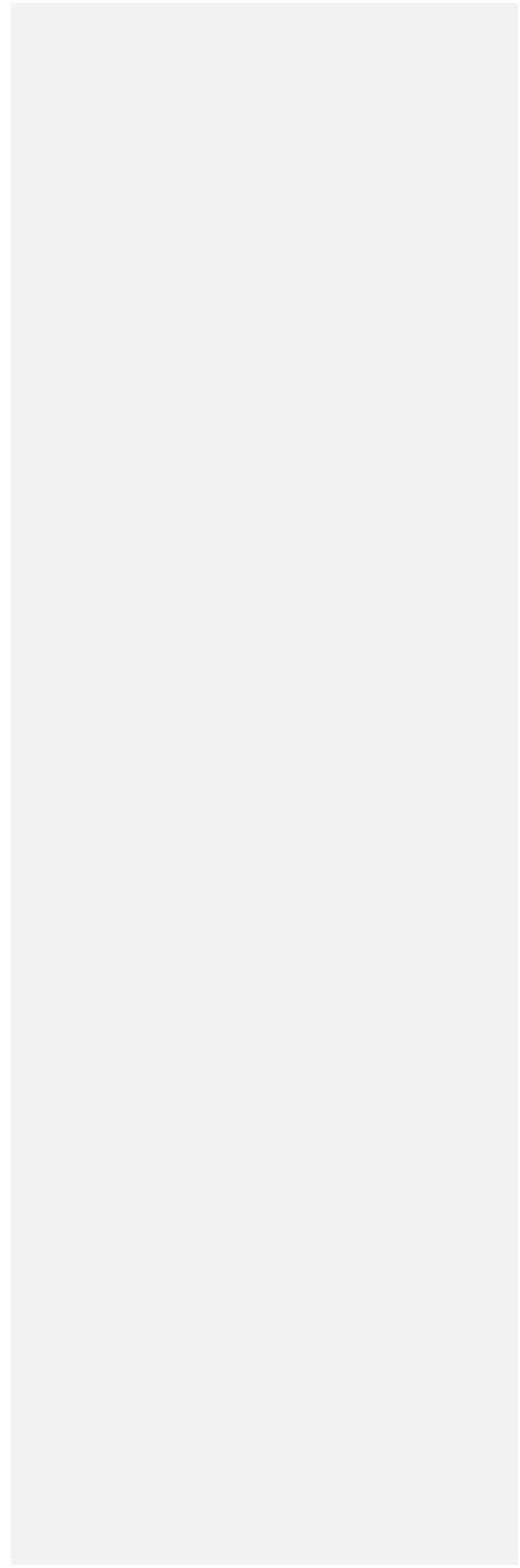
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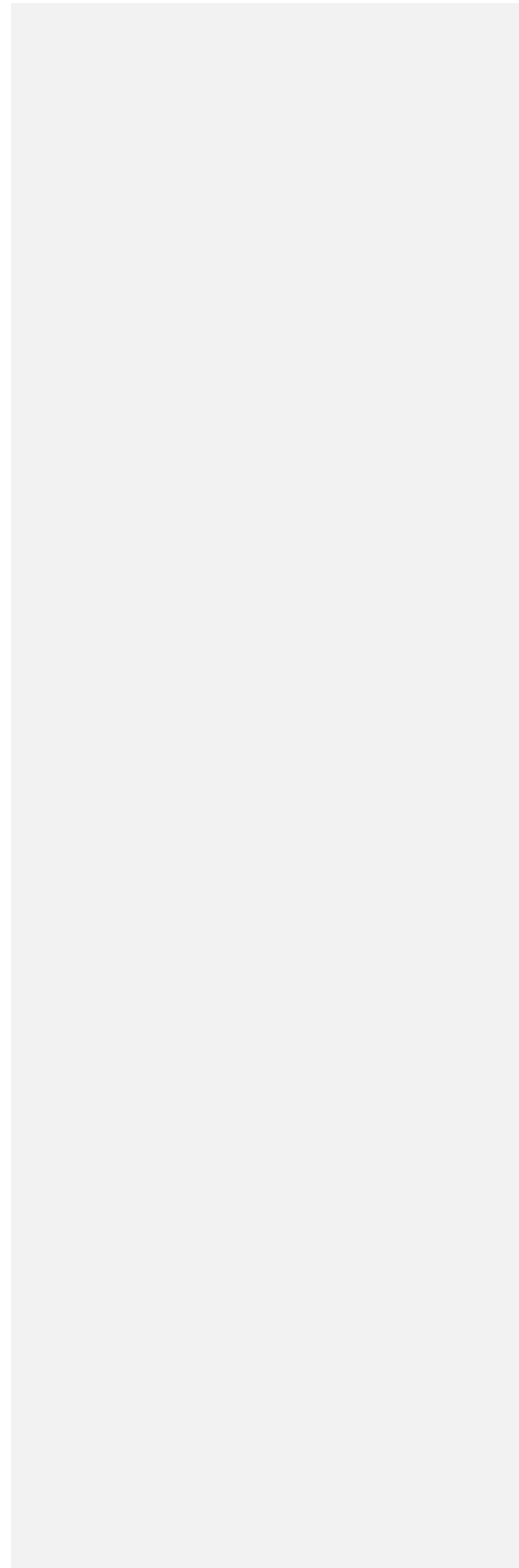
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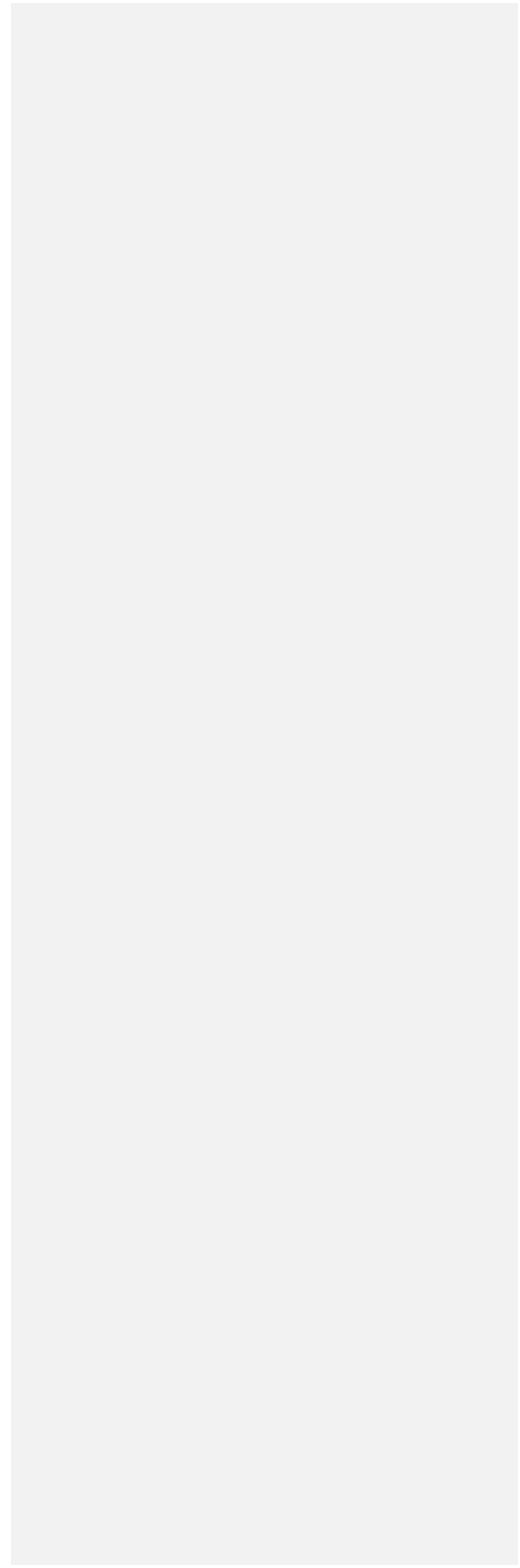
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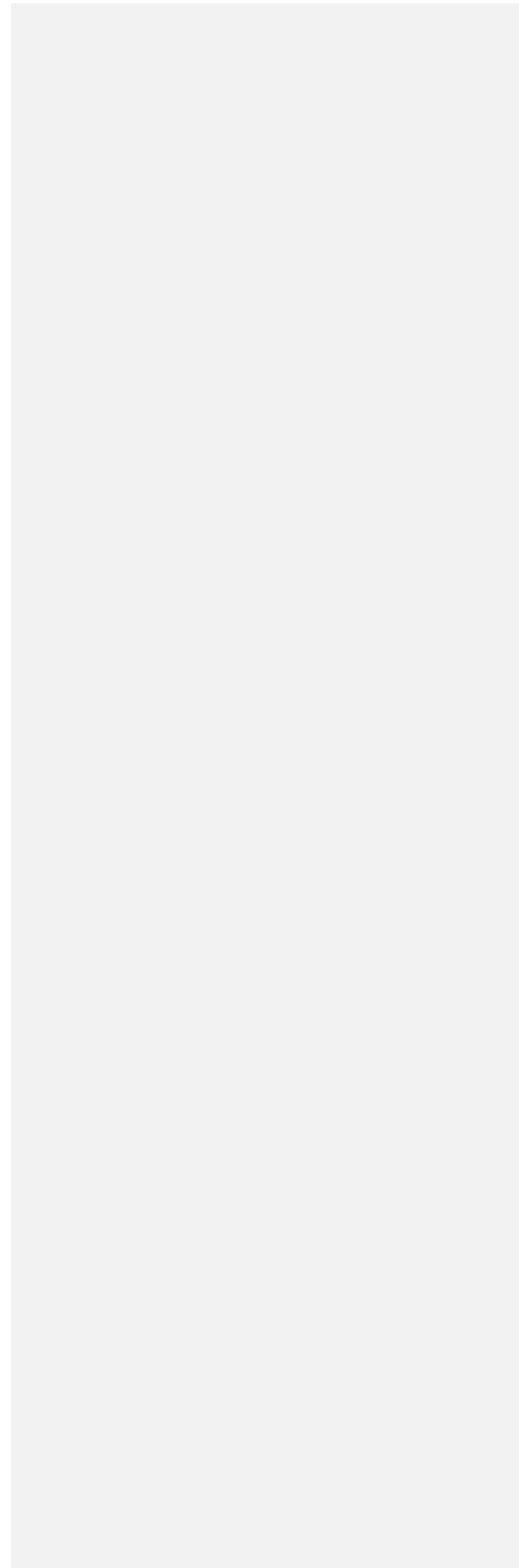
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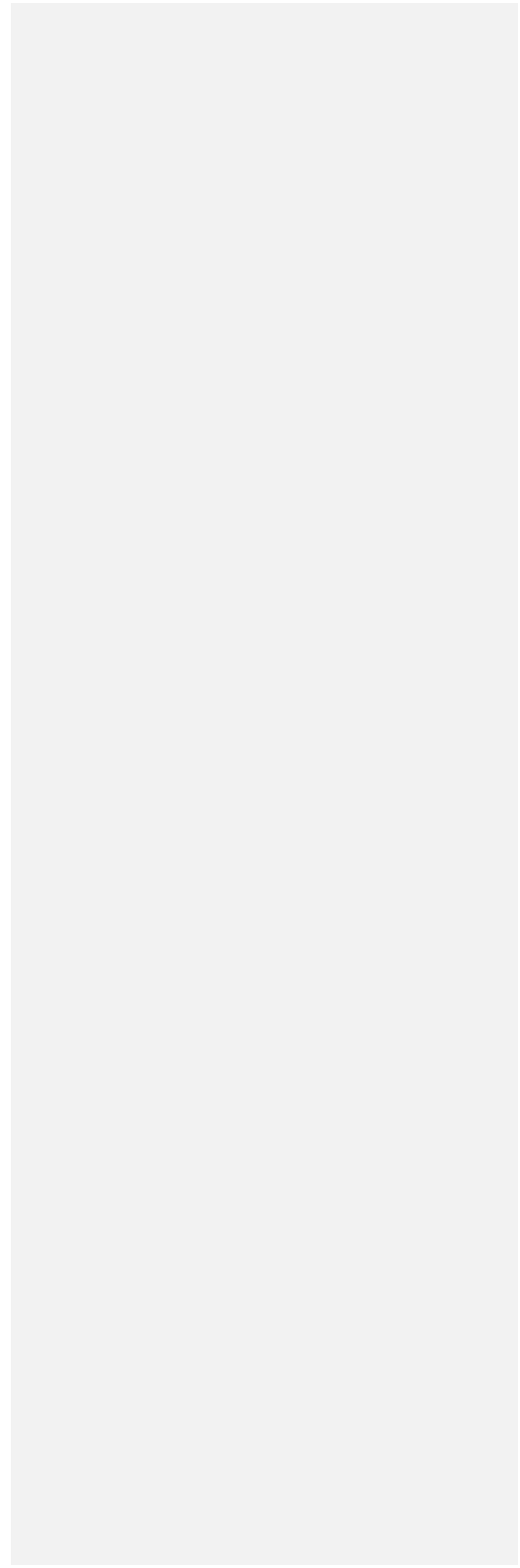
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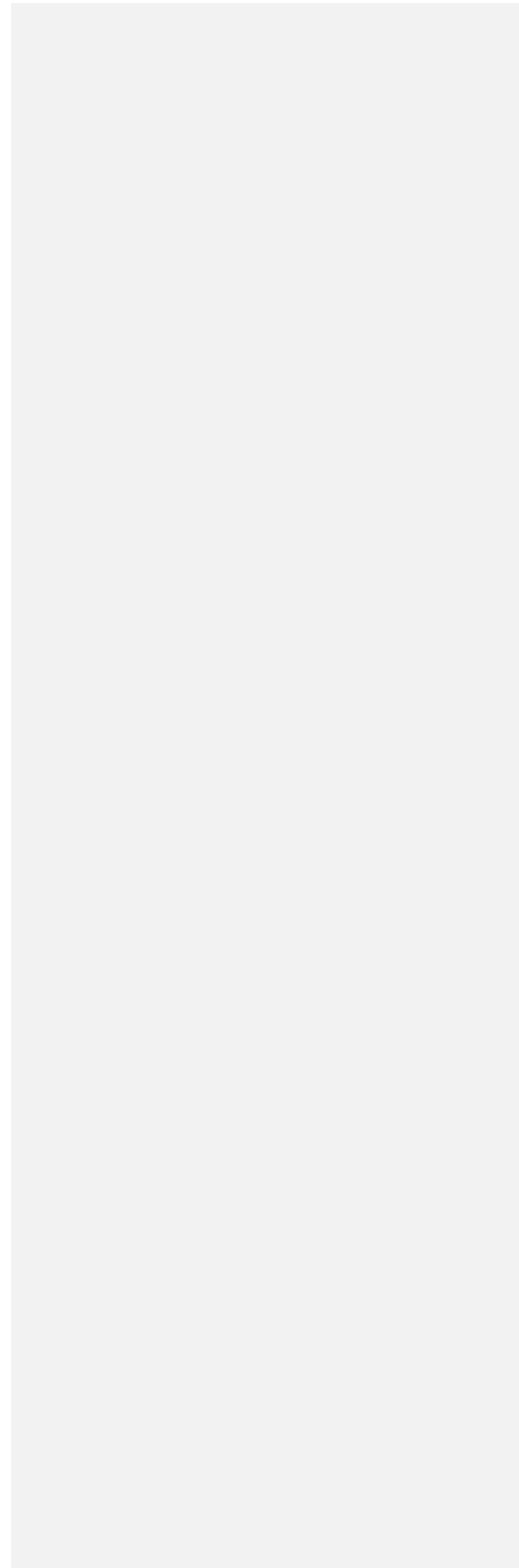
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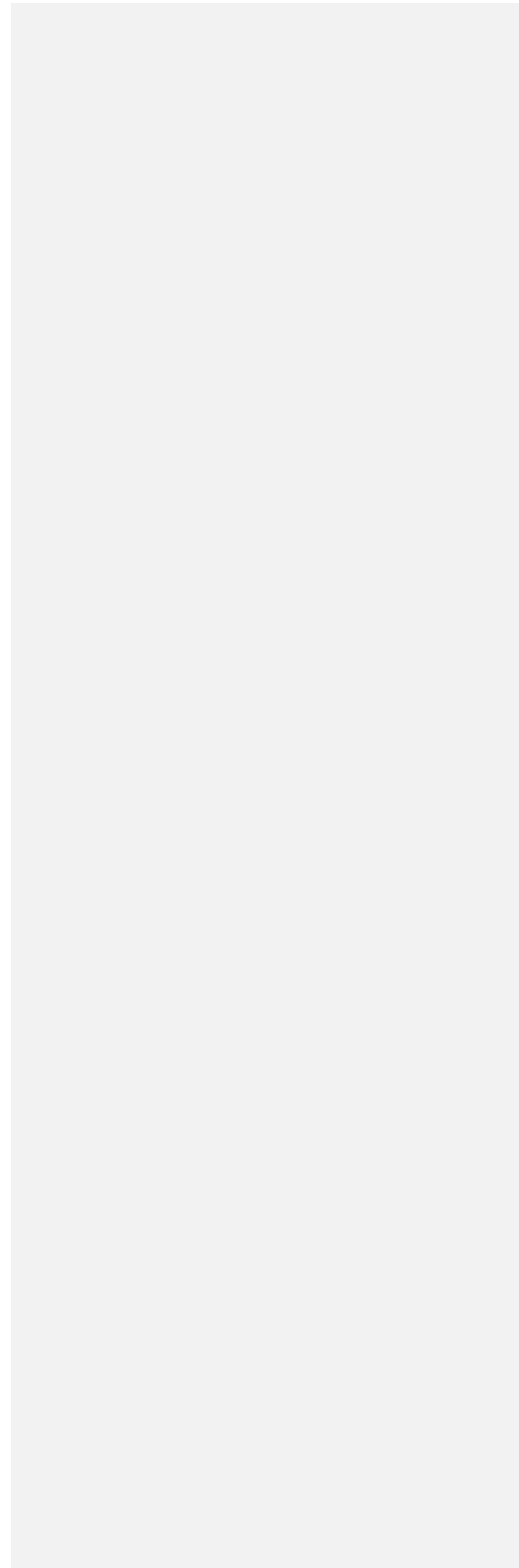
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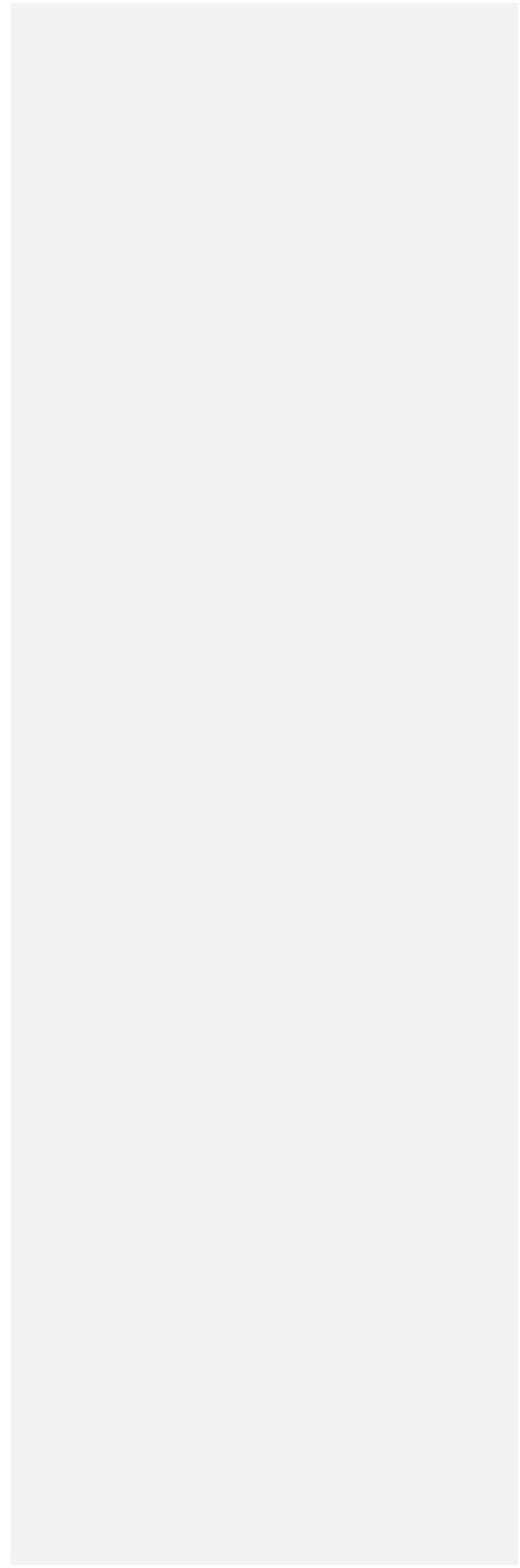
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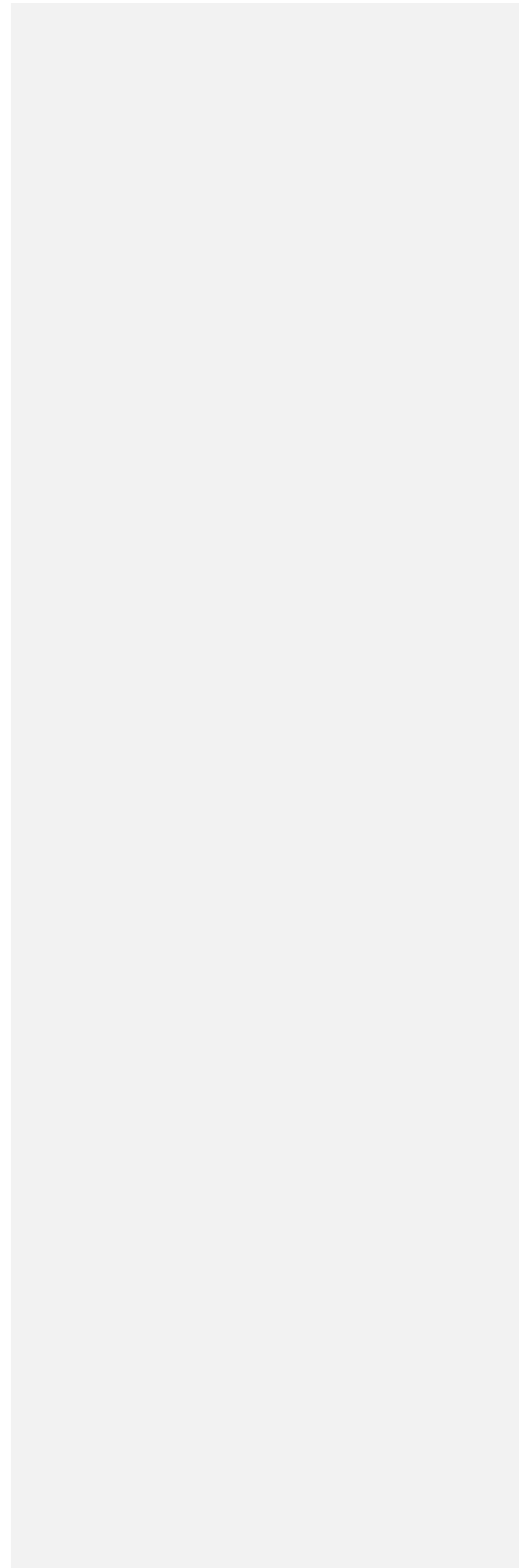
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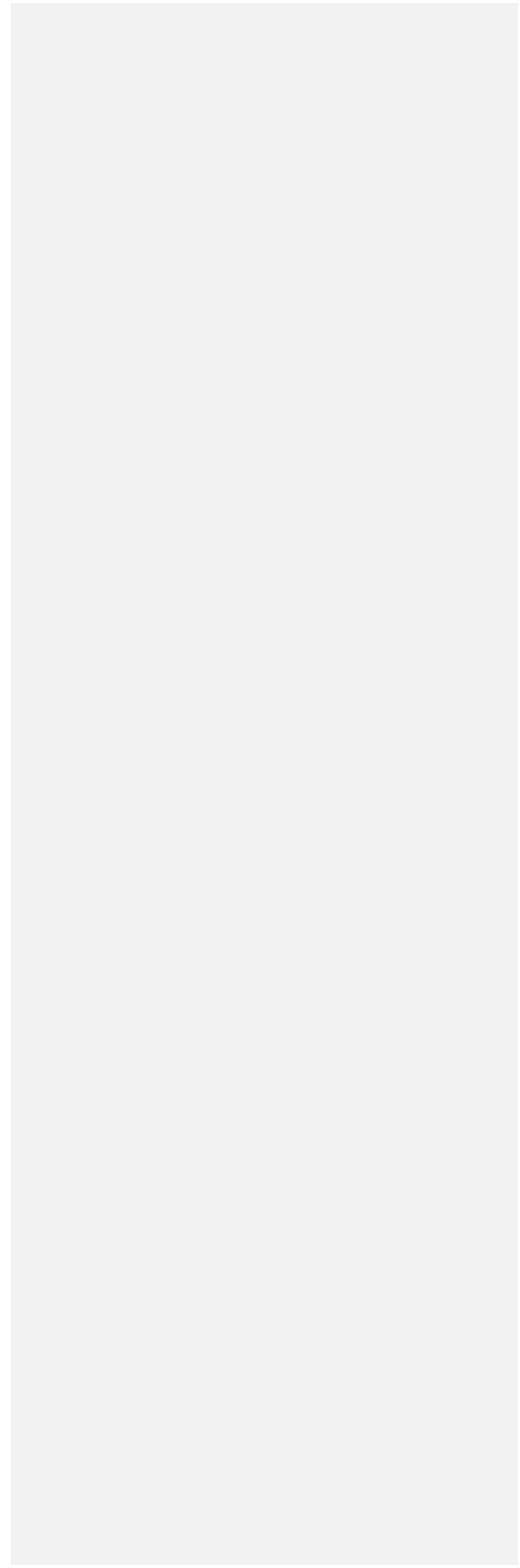
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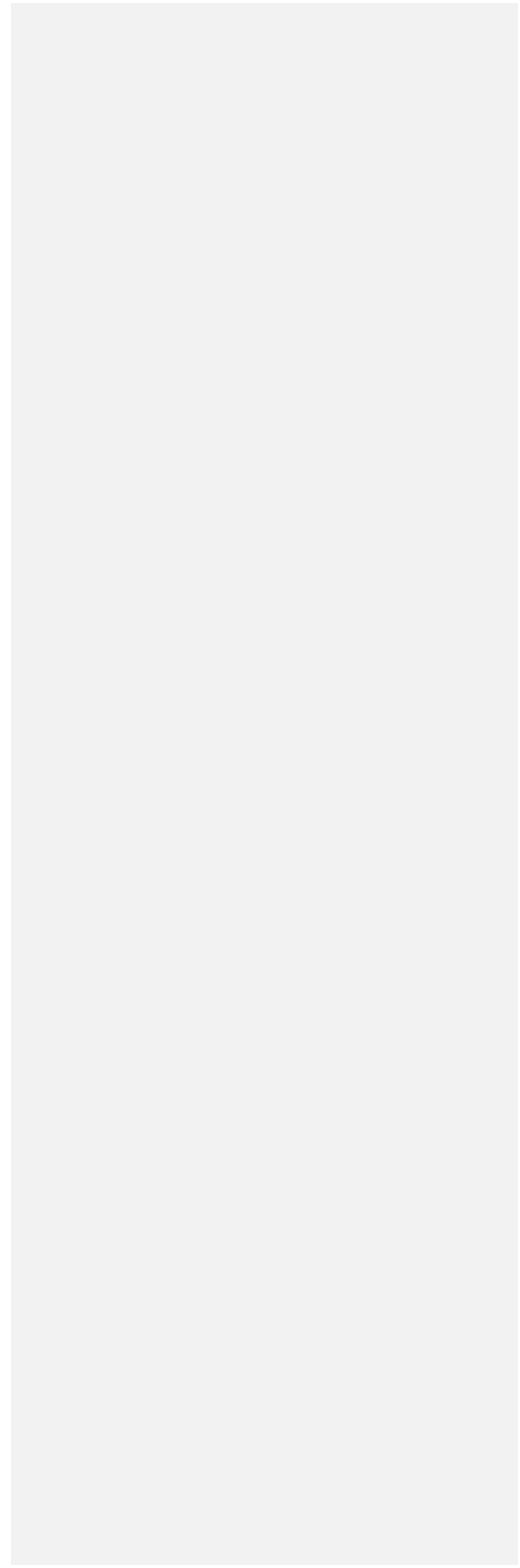
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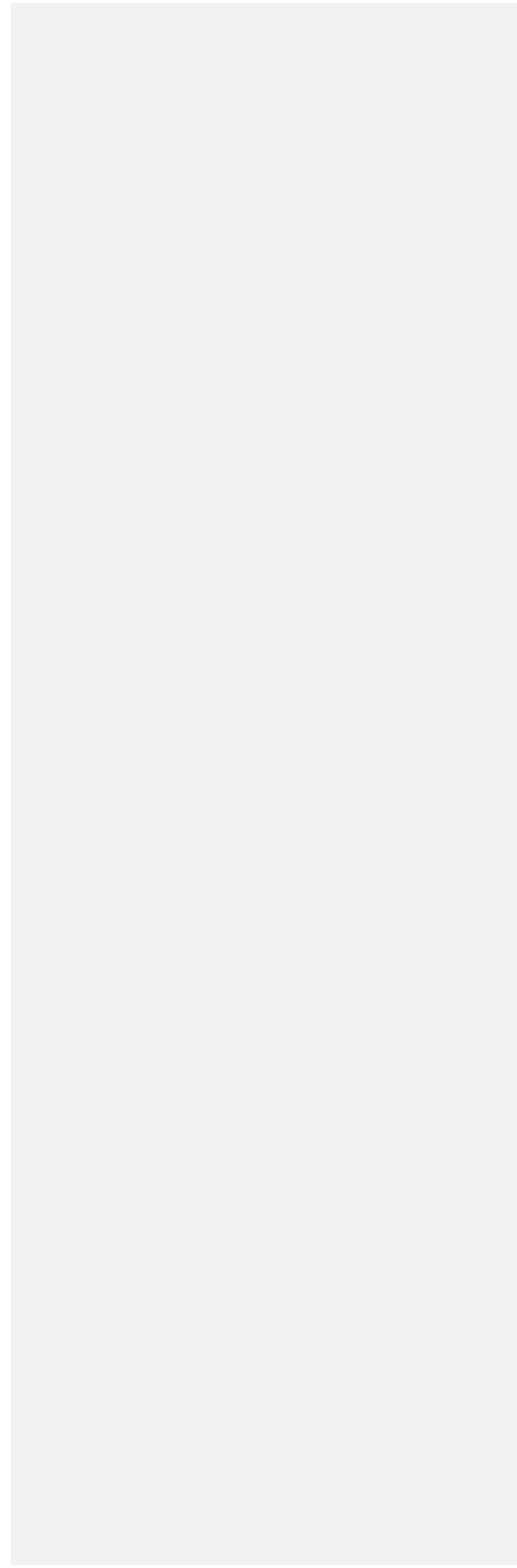
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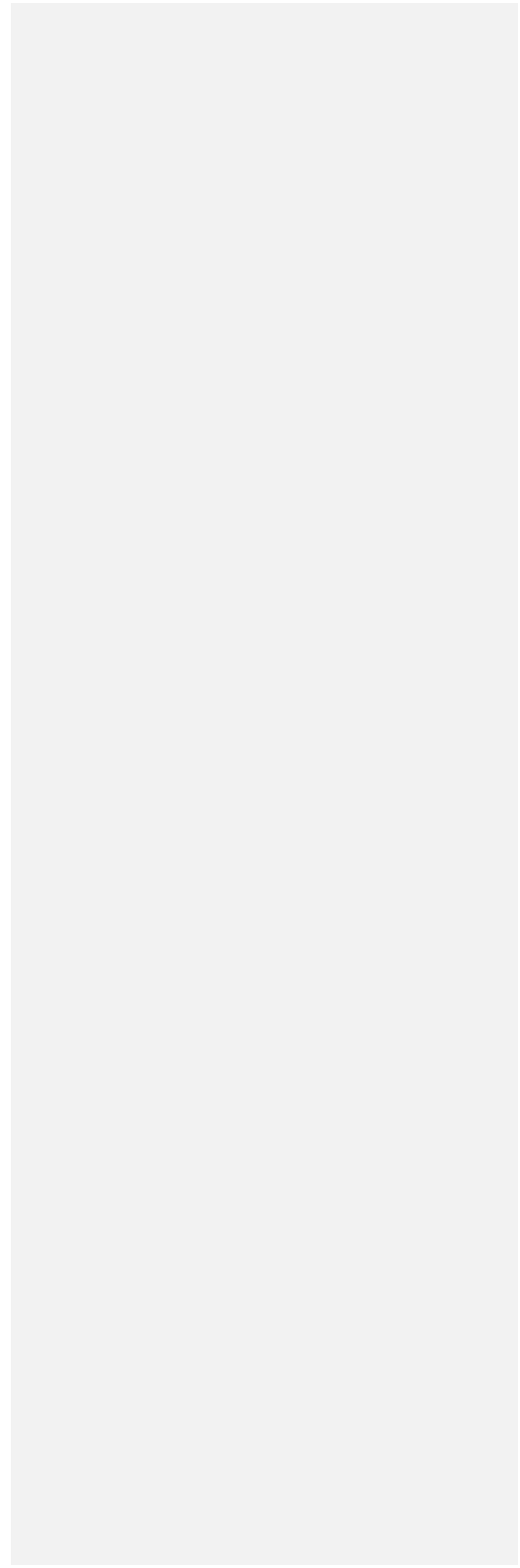
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APPENDIX 18:



APPENDIX 19:



APPENDIX 20:

