Section 319 Non-Point Source Pollution Control Program

Watershed Project Final Report

West Colorado TMDL Implementation

By

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West Colorado River Watershed Coordinator

December 30, 2014

This project was conducted in cooperation with the State of Utah and the United States Environmental Protection Agency, Region 8.

UACD Job # 126-09

UACD Job # 126-10

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1.0 EXECUTIVE SUMMARY

Projects in the West Colorado Watershed have been going on the ground for many years. Water quality improvements under these two West Colorado Watershed 319 grants began in October 2011.

The overall project goals were to implement a variety of best management practices to address multiple categories of non-point source pollution over several years in the West Colorado Watershed Management Unit by:

- Improving local irrigation system efficiencies and irrigation water management thereby reducing TDS loading by deep percolation of surface water.
- Reducing canal, lateral ditch and pond water seepage by limiting infiltration losses.
- Improving stream bank, riparian and upland areas along river and stream corridors to reduce sediment, TDS and nutrient runoff.
- Provide information and education to the public on the importance of surface and ground water protection.
- Maintaining plant ground cover with proper grazing strategies for livestock and wildlife.

The local watershed coordinator, in cooperation with the Utah Association of Conservation Districts (UACD) and the Price River Enhancement Committee, oversaw the project development, planning and implementation. Accomplishments with the funding include an extensive riparian project on the Price River in Helper City, several miles of canal lining and piping, 2 stock watering ponds replaced with more efficient watering troughs and over 2,000 noxious weeds calendars produced and distributed to stakeholders.

West Colorado Project Funding	
Start Date: October 1, 2010	**Completion Date: September 30, 2014**
Total Budget by Funding Year:	
FY 2009	
• 319	**$85,017**
• Required Match	**$56,678**
Total:	**$141,695**
FY 2010	
• 319	**$45,000**
• Required Match	**$30,000**
Total:	**$75,000**
Total FY 2009 & 2010 Budget Combined:	
• 319	**$130,017**
• Required Match	**$86,678**
Total:	**$216,695**
Total EPA Funds Spent:	**$130,017**
Total 319 Match Accrued (as reported by UACD plus state FY14 Utah NPS of $35,000):	**$117,871**
Total Expenditures:	**$247,888**

2.0 BACKGROUND

The Price River, San Rafael River, and Muddy Creek watersheds, which collectively make up the West Colorado River Watershed Management Unit (WCRW), are located in east-central Utah, approximately 100 miles southeast of Salt Lake City. The WCRW is generally encompassed within Carbon and Emery counties and is approximately

100 miles in length north to south and 65 miles in length east to west. Elevations within the WCRW range from approximately 3,700 feet to 11,000 feet.

The Price River is the northernmost river in the WCRW. It is approximately 50 miles long and discharges into the Green River above Green River, Utah. The San Rafael River, located further south, is approximately 55 miles long and empties into the Green River below Green River, Utah. Muddy Creek, the southernmost river in the WCRW, is approximately 40 miles long and empties into the Dirty Devil River. The WCRW contains approximately 2,550 perennial stream miles.

Current land uses in the WCRW are agriculture (crop production and rangeland), mixed use public lands, gas and coal production. There is a small amount of forest production in the higher elevations of the WCRW. Based on data from the USGS (2000), existing land uses in the WCRW were grouped into seven general land use categories including barren, residential, agriculture, rangeland, forest, water, and wetland. Approximately 73 percent of the land in the WCRW is administered by three federal agencies: the U.S. Forest Service (USFS), the Bureau of Land Management (BLM), and the National Park Service (NPS). The State of Utah administers about 11 percent of the WCRW, while 16 percent is privately owned.

In the WCRW, the main beneficial use is agriculture including irrigation and livestock watering. Irrigation water use is impaired when high concentrations of TDS impact the ability of plants to absorb water from soils. As noted in the EPA approved TMDL there are several causes and sources of salinity loading to these stream segments including natural geology, soils, erosion, flood irrigation and return flows. Areas of concern include croplands which are flood irrigated and result in leaching of salts into the streams, as well as degraded riparian zones which facilitate easy movement of TDS overland and into water bodies. According to the TMDL approximately 350,000 tons of salts are contributed to the Colorado River system from the WCRW each year. Of that amount, almost 74% (258,000 tons) is attributed to agriculture in the form of irrigation run-off and canal seepage. (See TMDL, page 57) In addition, dewatering the stream channel concentrates the return flow and groundwater resulting in higher concentrations of TDS. Upland erosion from range lands contributes sediment laden with salts to the rivers. Data suggest that TDS loading to the watershed occurs throughout the year, influenced seasonally by irrigation diversions, return flows, spring run-off, and storm events.

There was a local watershed coordinator in Castle Dale for several years until 2012 when the funding to support the position was shifted to a different location in Utah. The watershed coordinator led this planning process and guided restoration activities until that point in time. The Price River Enhancement Committee is still active, with members continuing to identify areas of concern and potential projects.

The Colorado River Basin Salinity Control Program is being implemented in the project area and is being used to install pressurized irrigation systems on local farm lands. Section 319 funding was used to complement and not duplicate or compete with salinity control irrigation project funding efforts.

These projects sought to address the primary sources of total dissolved solids loading in the West Colorado and to build on the successes of prior cost-shared efforts to reduce non-point source (NPS) pollution. By demonstrating various types of BMPs, we hoped to encourage them to implement similar activities to address water quality problems.

3.0 GOALS

The five overall project goals were identical for the FY09 and FY10 Project Implementation Plans. They included implementing a variety of projects to address multiple categories of non-point source pollution over several years in the West Colorado Watershed Management Unit by:

- Improving local irrigation system efficiencies and irrigation water management thereby reducing TDS loading by deep percolation of surface water.
- Reducing canal, lateral ditch and pond water seepage by limiting infiltration losses.
- Improving stream bank, riparian and upland areas along river and stream corridors to reduce sediment, TDS and nutrient runoff.
- Provide information and education to the public on the importance of surface and ground water protection.

- Maintaining plant ground cover with proper grazing strategies for livestock and wildlife

Section 4.0 will discuss the specifics goals, objectives and tasks and the actual output associated with each of those.

4.0 ACTIVITIES

FY09 and FY10

Goal #1: Improve local irrigation system efficiencies and irrigation water management thereby reducing deep percolation and runoff of surface applied water.

Objective: Continue international salinity control efforts in the West Colorado Watershed Management Unit by promoting the conversion of less efficient (25%-30%) flood irrigation systems to more efficient (70%-90%) pressurized sprinkling systems. This effort has the potential to reduce TDS salt loading by 3.5 tons per acre treated. (TMDL, page A-13)

Task 1: Assist the Natural Resources Conservation Service (NRCS), Bureau of Reclamation (BOR), local conservation districts (CD) and irrigation companies in promoting and implementing salinity control irrigation projects within the West Colorado River Watershed Management Unit under the Colorado River Salinity Control Program.

Actual output: Local watershed coordinator worked closely with partner agencies and stakeholders to increase awareness of water quality concerns associated with flood irrigation and associated return flows. The communities of Ferron and Huntington have both completed massive irrigation conversion projects. They were funded primarily with Bureau of Reclamation funding.

Goal #2: Reduce canal, lateral ditch and pond water seepage by limiting infiltration losses.

Objective: Reduce canal, lateral ditch and pond water seepage losses during the irrigation and winter (livestock) watering months reducing TDS loading of the ground and surface water systems. It is projected of the 165 miles of canals and laterals plus livestock watering ponds within the watershed, 41,285 tons of salts could be reduced or removed from water sources (TMDL, page A-14).

Task 2: Survey and identify areas of canals, lateral ditches and ponds that show signs of seepage to be used for baseline monitoring.

Actual output: Completed by NRCS staff

Task 3: Annually treat and monitor up to one (1) mile of canal and lateral ditch bank with polyacrilamide (PAM), synthetic liner or other practice as a demonstration project in an effort to reduce canal seepage losses.

Actual Output: The Buckhorn Project was completed. Twelve miles of irrigation ditches through mancos shale were replaced with pipeline and two ponds were replaced with troughs. Return flows from the ditches have been completely eliminated, reducing TDS loading significantly. The estimated annual TDS load reduction is 837 lbs/year (NRCS).

Cost: $16,000 319: $9,600 Other: $6,400

Goal #3: Improve stream bank, riparian and upland areas along river and stream corridors to reduce sediment, TDS and nutrient runoff.

Objective: Identify and inventory streams and ditches within the watershed needing erosion control assistance and begin making improvements. Vegetation along streams can measurably reduce sediment inflow. The current estimates of erosion induced TDS loading are 10,156 tons per year in the Price River watershed. Assuming a 60% sediment reduction rate after a one mile riparian habitat restoration, a potential TDS reduction of 6,094 tons per year may be realized. (TMDL, page A-15)

Task 4: Identify, plan and restore up to one (1) mile of stream bank and adjoining upland vegetation.

Actual Output: The majority of the funding from these two grants ($114,848) was used to support the Price River demonstration Project in Helper, Utah. The Price River Conservation District contracted with Helper City/River Restoration to implement a demonstration project on a highly visible segment of the Price River. The project included 400 feet of improved streambank stabilization, removal of trash, in-stream feature enhancement and 0.5 acre of riparian revegetation with suitable native vegetation.
See Section 11.2 for full length report by River Restoration on this work.

Cost: $191,177 319: $114,706 Other: $76,471

Task 5: SVAP (Stream Visual Assessment Protocol) major rivers and streams on one (1) watershed by the fall of 2009.

Actual Output: One SVAP was conducted on the Price River in April of 2007. Without a watershed coordinator in place, this task became less of a priority.

Goal #4: Provide information and education to the public on the importance of surface and ground water protection.

Objective: Share general and technical information with the public.

Task 6: Participate in local cooperative weed management area (CWMA) committee efforts to implement projects and inform the public of water quality problems and projects dealing with noxious weeds, their impacts and control.

Actual Output: The local watershed coordinator attended CWMA meetings and supported their efforts.

Task 7: Participate as a sponsor in the production and distribution of a noxious weed awareness calendar or other Information and Education (I&E) activity over the next five (5) years.

Actual Output: Five hundred calendars with statements and pictures of noxious weeds and their impacts on water quality were produced and distributed.

Cost: $9,500 319: $500 Other: $9,000

Task 8: Present the TMDL and other water quality information to all county and city representatives within the first 2 years of this proposal.

Actual Output: Local watershed coordinator presented TMDL and other water quality information when requested.

Task 9: Provide two (2) information and education workshops, tours, field days or surveys within the watershed to help people become aware of the impact they can have on water quality.

Actual Output: A telephone public opinion survey of Carbon County was conducted in early January 2009 to determine knowledge, attitudes and practices related to the Price River watershed and water quality issues within the county. A total of 233 interviews were conducted. The intent of the survey project is to provide usable data that will help inform future outreach and education choices the Price River Watershed Committee makes, and to provide a pre outreach campaign information, education and behavior baseline for the community.

The Salt Lake City based market research firm of Dan Jones & Associates administered the survey. The Utah Department of Agriculture and Food provided technical support during the survey creation and bidding process, and provided statistical analysis of the raw data. The Price River Watershed Committee and the Castle Country Resource Conservation and Development Council (RC&D) administered the project funds, which were provided by Utah State University Extension. The local watershed coordinator provided background demographic data and overall coordination for the project.

One project tour was conducted in August 2014. There were 18 participants representing DWQ, EPA, Salt Lake County, Grand Conservation District, Rosenburg Associates, NRCS, BLM, USFS and ST. George City.

Cost: $211 **319: $211** **Other: $0**

Task 10: Inform and encourage the public, local government and industry about water quality improvement practices, projects and activities and encourage their implementation.

Actual Output: One hundred and fifty storm drain markers were purchased and applied on the storm drains in various cities and towns throughout the watershed. The small 3 7/8th inch diameter urethane markers inform the public that only rain should go down the drain. The markers are scuff and fade resistant and guaranteed to last for 10 years and offer a useful and cost effective method in conveying the idea of water quality to the public.

Task 11: 5% of requested funds will be allocated to Utah Association of Conservation Districts for contract allocation.

Product: Contract administration, landowner agreements, cooperator reimbursements, validation and maintenance of match records and related accounting.

Cost: $5,000 **319: $5,000** **Other: $0**

Goal #5: Maintain and improve vegetative ground cover with proper grazing management strategies for livestock and wildlife.

Objective: Promote and achieve management intensive grazing or other improved livestock and wildlife grazing management practice on one (1) cattle allotment or private ranch. Vegetative ground cover of at least 50% minimizes the amount of sediment and salt loading on rangelands (TMDL, page A-14).

Task 12: Identify and assist one (1) cattle allotment or one (1) private rancher per year willing to improve grazing practices in an effort to increase vegetative cover and reduce surface runoff and erosion.

Actual Output: Local watershed coordinator developed one grazing management plan in 2010 with a producer at Spur Bay on Scofield Reservoir.

Task 13: Participate with Utah Grazinglands Network, Utah Range Coalition and Utah Partners for Conservation and Development in an effort to improve wildlife and livestock habitat resulting in improved soil and water protection.

Actual Output: Local watershed coordinator coordinated with these entities to ensure partnering whenever possible on water quality improvement efforts. He used UPCD funding on one revegetation project on the Price River.

Total: Cost: $221,888 319: $130,017 Other: $91,871

5.0 PARTNERS

The Price River and San Rafael River Conservation Districts were the sponsors for the projects. They provided oversight of cooperator selection, volunteer work, and information sharing generated by these projects. The following specific duties were covered by the following agencies:

The state and local agencies listed below helped carry out the project by providing support in the following areas:

- Utah State University Extension: Information and Education (I&E), technical assistance
- Utah Department of Agriculture and Food (UDAF): I&E, technical assistance
- Utah Association of Conservation Districts (UACD): Administration, contracting, staff and technical support

The following State Environmental Programs supported the project in the following areas:

- Utah Division of Water Quality: Standard program monitoring, technical assistance, 319 Grant Management
- Utah Division of Water Rights: Permits, advisory and monitoring assistance
- Utah Division of Water Resources: Advisory assistance
- Utah Division of Wildlife Resources: technical assistance, restoration plan development, monitoring assistance

The following federal agencies made key contributions to the project:

- EPA: Financial assistance, Clean Water Act Section 319
- USDA: Coordination with NRCS
- NRCS: Technical planning, design, and oversight
- USFWS: Conceptual planning support
- NPS – Rivers and Trails: Conceptual planning support

The project also benefited from contributions by the following entities:

- Boy Scouts: Volunteer hours
- Carbon County: Financial and technical assistance
- Helper City: Financial assistance

6.0 COMPLICATIONS

The biggest complication resulted from requesting funding for the basin without having first identified the specific projects and locations. General goals and tasks were identified in the PIPs, but not the actual areas needing project implementation or the willing landowners. There have been changes in our program since 2008 when the first of these PIPs was submitted. DWQ now requires the specific details prior to awarding funding to ensure that the financial support goes to worthy projects in a timely manner.

A significant complication for the Price River demonstration project was a large flood event during construction. The raw area had to be reworked after flood waters swept through, which increased the contractor time on the job and the need for additional revegetation.

Another complication was the loss of the watershed coordinator position in Castle Dale. As mentioned earlier, there was a local watershed coordinator in Castle Dale for several years until 2012. At that time the coordinator accepted a new job, so the funding to support the position was shifted to a different location in Utah. The new location is an area where significant watershed planning efforts were starting and spending was going to be focused there as part of the Utah rotating basin sampling and funding approach. Without the watershed coordinator in Castle Dale leading planning efforts several of the tasks mentioned in the West Colorado PIP were not completed. The Price River Enhancement Committee is still active, with members continuing to identify areas of concern and potential projects, but progress is a challenge without a person tasked with taking the lead.

7.0 RECOMMENDATIONS

As noted above, specific projects should be chosen before grant funds were received in order to have a timelier implementation schedule.

If additional funding becomes available in the future it would be helpful to place another watershed coordinator back in this area of the state. UACD and other agencies are doing their best to continue watershed planning and BMP implementation, but that work would be much more efficient and timely with a coordinator focused on it.

8.0 ENVIRONMENTAL RESULTS

The monitoring goals of this project were to document progress in achieving improved water quality conditions as non-point source control programs were implemented. Monitoring goals were also set to document and review effectiveness of BMPs. Monitoring on this project supplements the State's ongoing overall water quality monitoring program. Utah Division of Water Quality will continue to monitor several sites on the Price River and its tributaries as part of its long-term water quality monitoring efforts.

Environmental results of the Price River demonstration project in Helper include (demonstration project/full multi-phased project):

- Riparian and River Corridor Conservation (0.5/53 acres of river and riparian area)
- Improved Bank Stabilization (400/24,000 linear feet)
- Improved Flood Flow Conveyance (200feet/2.3 miles of channel)
- Restored Floodplain Connectivity (0.25/14 acres interior floodplains)
- Diversified Native Riparian Vegetation (0.3/34 acres of removed invasive species and enhanced with native vegetation)
- Enhanced In-channel Benthic Macroinvertebrate Habitat (0.2/11 acres)
- Removed trash fill from the banks and channel (220/12,300 tons)

- Removed fill material and levees from the floodplain (390/323,000 CY)

Biological Sampling

The amount of sediment entering the Price River is expected to decrease as a result of this project, potentially leading to improved conditions for organisms such as macroinvertebrates and fish. DWQ began assessing stream biological health several years ago with the Utah Comprehensive Assessment of Stream Ecosystems (UCASE). This assessment involves sampling a variety of streams each fall and recording measurements of physical habitat, substrate, fish and macro-invertebrate communities, and other biological indicators. The results from the UCASE program are being used by the DWQ for beneficial use assessment and to determine BMP effectiveness. One analysis of these results compares the stream macro-invertebrate populations expected in reference conditions with the populations observed in the sampling site. The ratio of observed to expected organisms can be used as an indicator of benthic community health. If only 60 percent of the expected population is observed (O/E = 0.6) at a particular site, the site is considered to be impaired and does not support the aquatic beneficial use.

The full UCASE protocol was not done for this project, but macroinvertebrate samples were collected at three locations on the Price River prior to project implementation (above, mid and below project). DWQ has not yet received those sample results, but ultimately they will be used for determining BMP effectiveness and also for DWQ assessment purposes. The following locations were sampled:

STORET Monitoring Location ID	Site Description
4932559	Price River above Gigliotti Pond
4932555	Price River at the Ivy Street Bridge (site of demonstration project)
4932553	Price River below Helper City at 5125 North

Spreadsheet Tool For Estimating Pollutant Loads (STEPL)

The Spreadsheet Tool for Estimating Pollutant Load (STEPL) was used for the Price River demonstration project. STEPL calculates nutrient and sediment loads from different land uses and the load reductions that would result from the implementation of various best management practices (BMPs).

Load reduction estimates for the Price River project are as follows:

	Nitrogen				Phosphorus				BOD				Sediment			
	Pre-Implementation (lb/yr)	Load Reduction (lb/yr)	Post-Implementation (lb/yr)	% Reduction	Pre-Implementation (lb/yr)	Load Reduction (lb/yr)	Post-Implementation (lb/yr)	% Reduction	Pre-Implementation (lb/yr)	Load Reduction (lb/yr)	Post-Implementation (lb/yr)	% Reduction	Pre-Implementation (ton/yr)	Load Reduction (ton/yr)	Post-Implementation (ton/yr)	% Reduction
Price River Demonstration Project	10	9.4	0.6	94%	3.8	3.6	0.20	94%	19.9	18.8	1.2	2%	7.2	6.8	0.4	95%

The Buckhorn Project was also completed. Twelve miles of irrigation ditches through mancos shale were replaced with pipeline and two ponds were replaced with troughs. Return flows from the ditches have been completely eliminated, reducing TDS loading significantly. The estimated annual TDS load reduction is 837 lbs/year. This estimate came from a spreadsheet developed by the NRCS.

Project Photos

Figure 1: Buckhorn Canal Pipeline Project

Figure 2: Price River demonstration project area prior to BMP implementation. Note lack of connectivity to the floodplain, non-native riparian vegetation and encroachment of impervious surface.

Figure 3: Price River demonstration project area after BMP implementation. Revegetation efforts will take place in the spring of 2015.

9.0 DELIVERABLES AND FINANCES OF TASKS THAT WERE COMPLETED USING EPA 319 FUNDING

TASK	DELIVERABLES	319/NPS FUNDING	ADDITIONAL FUNDING	TOTAL
Task 1: Assist the Natural Resources Conservation Service (NRCS), Bureau of Reclamation (BOR), local conservation districts (CD) and irrigation companies in promoting and implementing salinity control irrigation projects within the West Colorado River Watershed Management Unit under the Colorado River Salinity Control Program	Local watershed coordinator worked closely with partner agencies and stakeholders to increase awareness of water quality concerns associated with flood irrigation and associated return flows. The communities of Ferron and Huntington have both completed massive irrigation conversion projects. They were funded primarily with Bureau of Reclamation funding.	$0	$0	$0
Task 2: Survey and identify areas of canals, lateral ditches and ponds that show signs of seepage to be used for baseline monitoring	Completed by NRCS staff	$0	$0	$0
Task 3: Annually treat and monitor up to one (1) mile of canal and lateral ditch bank with polyacrilamide (PAM), synthetic liner or other	The Buckhorn Project was completed. Twelve miles of irrigation ditches through mancos shale were replaced with pipeline and two ponds were replaced with troughs. Return flows	$9,600	$6,400	$16,000

practice as a demonstration project in an effort to reduce canal seepage losses.	from the ditches have been completely eliminated, reducing TDS loading significantly. The estimated annual TDS load reduction is 837 lbs/year (NRCS).			
Task 4: Identify, plan and restore up to one (1) mile of stream bank and adjoining upland.	The majority of the funding from these two grants ($114,848) was used to support the Price River demonstration Project in Helper, Utah. The Price River Conservation District contracted with Helper City/River Restoration to implement a demonstration project on a highly visible segment of the Price River. The project included 400 feet of improved streambank stabilization, removal of trash, in-stream feature enhancement and 0.5 acre of riparian revegetation with suitable native vegetation.	$114,706	$111,471	$191,177
Task 5: SVAP (Stream Visual Assessment Protocol) major rivers and streams on one (1) watershed by the fall of 2009	One SVAP was conducted on the Price River in April of 2007. Without a watershed coordinator in place, additional surveys became less of a priority.	$0	$0	$0
Task 6: Participate in local cooperative weed management area (CWMA) committee efforts to implement projects and inform the public of water quality problems and projects dealing with noxious weeds, their impacts and control	The local watershed coordinator attended CWMA meetings and supported their efforts	$0	$0	$0
Task 7: Participate as a sponsor in the production and distribution of a noxious weed awareness calendar or other Information and Education (I&E) activity over the next five (5) years.	500 calendars produced and distributed to stakeholders	$500	$0	$500
Task 8: Present the TMDL and other water quality information to all county and city representatives within the first 2 years of this proposal	Local watershed coordinator presented TMDL and other water quality information when requested	$0	$0	$0
Task 9: Provide two (2) information and education workshops, tours, field days or surveys within the watershed to help people become aware of the impact they can have on water quality	A telephone public opinion survey of Carbon County was conducted in early January 2009 to determine knowledge, attitudes and practices related to the Price River watershed and water quality issues within the county. A total of 233 interviews were conducted. See results in Section 11.2. One project tour was conducted in August 2014. There were 18	$211	$0	$211

	participants representing DWQ, EPA, Salt Lake County, Grand Conservation District, Rosenburg Associates, NRCS, BLM, USFS and ST. George City.			
Task 10: Inform and encourage the public, local government and industry about water quality improvement practices, projects and activities and encourage their implementation.	One hundred and fifty storm drain markers were purchased and applied on the storm drains in various cities and towns throughout the watershed. The small 3 7/8th inch diameter urethane markers inform the public that only rain should go down the drain. The markers are scuff and fade resistant and guaranteed to last for 10 years and offer a useful and cost effective method in conveying the idea of water quality to the public.	$0	$0	$0
Task 11: 5% of requested funds will be allocated to Utah Association of Conservation Districts for contract allocation.	Contract administration, landowner agreements, cooperator reimbursements, validation and maintenance of match records and related accounting	$5,000	$0	$5,000
Task 12: Identify and assist one (1) cattle allotment or one (1) private rancher per year willing to improve grazing practices in an effort to increase vegetative cover and reduce surface runoff and erosion	Local watershed coordinator developed one grazing management plan in 2010 with a producer at Spur Bay on Scofield Reservoir	$0	$0	$0
Task 13: Participate with Utah Grazinglands Network, Utah Range Coalition and Utah Partners for Conservation and Development in an effort to improve wildlife and livestock habitat resulting in improved soil and water protection	Local watershed coordinator coordinated with these entities to ensure partnering whenever possible on water quality improvement efforts	$0	$0	$0
PROJECT TOTALS:		**319: $130,017**	**Match: $117,871**	**Total: $247,888**

10.0 CONCLUSIONS

These EPA 319 grants provided the funding to implement several key projects in the West Colorado watershed. While all of the originally identified PIP tasks were not completed, those that were have proven thus far to be successful. They have generated interest among locals for additional projects, which will not only provide more pleasing watershed aesthetics but more importantly will improve water quality. While delisting the Price River for total dissolved solids isn't likely, incremental improvements in water quality provided by these projects will make a difference for all beneficial uses of the river.

There is still much to do in the West Colorado watershed in terms of non-point source pollution improvement projects. Many great partnerships have come about as a result of these projects and will be vital in the future.

Great interest has come from the projects implemented with the FY09 and FY10 grants. The efforts that have been made to inform, educate and inspire stakeholders to make water quality a priority within the West Colorado watershed have been fruitful but can still be improved upon. Information and education will play a major role in the future and are believed to be the key to permanent change.

11.0 ATTACHEMENTS

11.1 PRICE RIVER PROJECT IN HELPER

The following report was submitted to UACD by River Restoration on behalf of Helper City. The full report is included here because it contains some beneficial background information about need for the project, partners, challenges, and recommendations for additional phases along the Price River.

Final Report for 319 Grant
Helper City River Revitalization Project
Pilot Project at Ivy Street
Engineering Report

Prepared by:
RiverRestoration.org

October 22, 2014

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Salt Lake City, Utah
801-536-4336

Subject: 319 Grant Final Report, Helper River Revitalization, Ivy Street Pilot Project, Price River.
Dear Jim,

Thank you for the 319 and NPS support on the Pilot Project in Helper Utah. The Project is the first phase of the $5M Helper River Revitalization. Construction was awarded to TSJ Construction out of Cleveland, Utah on August 25, 2014. Construction started after Labor Day, but the month of September was marred by severe rainstorms and unprecedented flooding. One of the floods deposited approximately 1 foot of silt in a rough graded interior floodplain, indicating that continued floodplain restoration would be a significant improvement to sediment loading in the Price River. With the lovely weather in October, the project is likely to be substantially complete by Thanksgiving.

Excavation into the river bank fill exposed two cars and construction debris from approximately 2 demolished homes. The fill was obvious junk. The bank excavation quantity grew with approximately 50 percent greater haul off and disposal than initially projected. This will increase the amount of vegetation that needs to be restored onsite. The over excavation also resulted in some changes to the placement of rock from the original plans.

As of October 20th the in stream work was substantially complete with significantly larger pools in the main channel than had previously existed and was a habitat design goal. Floodplain grading and boulder work was approximately 85% complete. No work on the path replacement or revegetation had started. The work completed as of October 20th exceeded $125K in value.

Overall the construction of the Project, including construction management, is anticipated to be completed for approximately $250K; with funding from 319 in the amount of $114K, NPS in the amount of $35K and the remainder from Watershed Restoration Initiative (WRI) 2015 grant of up to $130K. Please find the 319 closeout report attached. The NPS funds are not anticipated to be expended until spring 2015.

Regards,

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SECTION 1.0 EXECUTIVE SUMMARY

Helper City is completing a River Revitalization Concept Planning Study to restore almost 2-1/2 miles of the Price River and revitalize its riverfront. Helper City requested funding assistance for the design and engineering of Phase I & II of the River Revitalization Project. An opportunity exists to conserve lands for a riparian corridor with the objective of reducing non-point source pollution and achieving associated benefits. Phase I & II proposes to reduce NPS pollution by restoring an interior floodplain, stabilizing eroding banks, improving the flood flow capacity, controlling invasive species, enhancing native riparian vegetation, stabilizing gully erosion, buffering storm water inputs and adjacent development. The Concept Planning Study has scoped 5 implementation phases over five years, with a $5.5M budget.

The purpose of the overall River Revitalization Project is to maximize restoration potential of the Price River prior to redevelopments taking place along the riverfront. Phase I & II shall implement restoration measures to improve water quality and community livability with the goal of attaining a functioning urban riverfront. There is a need to reduce NPS pollution by guiding revitalization from the river outward. There is a need to implement TMDL recommendations to help move the Price River toward meeting beneficial uses (aquatic health, and reduced TDS loads). Phase I & II will include the technical assistance needed to design specific green infrastructure and define setbacks to improve water quality which will be an impetus for the overall project and future re-development.

Significant lessons were learned from the construction of the Pilot Project. In restoring floodplains, excavating overbank is likely to be loaded with junk and the need for over excavation should be anticipated. Many of the goals of the project have already been realized prior to full completion of construction. Noticeable reduction in NPS has already been realized after one flood event.

The Pilot Project was in conceptual planning stages July 2012 to July 2013. Prior to that a feasibility study was completed and data was collected on the following: channel morphology, hydraulics, flood flow conveyance, storm water outfalls, sediment transport, soils, geology, and riparian vegetation. From July 2013 to July 2014 final engineering design and planning was completed to prepare the project for implementation.

SECTION 2.0 Background

The proposed Project is located in the Price River in Helper City and Carbon County, Utah. The Price River is in the Upper Colorado River Basin Watershed and flows for 130 miles from 9,000 feet to 4,122 feet at the confluence with the Green River. The reach is in the upper portion of the watershed, approximately 30 miles downstream of Scofield Reservoir, and 0.5 miles downstream of Price Canyon. The reach is along the urban riverfront and characterized by mixed residential and commercial land uses. The Project is located in the heart of Helper City along the River Parkway Trail. The total project length is approximately 280 linear feet of channel.

A successful project in this reach of river is significant to the entire watershed. It demonstrates feasibility of improving stream health and how that can potentially lead to economic revitalization. Improvement of water quality and NPS loading will encourage funding of the remaining phases of the Helper City River Revitalization Conceptual plan.

This Project is a cooperative project between Helper City, Carbon County, and the Division of Water Quality. Three overlying needs have been identified to guide planning efforts for the Project:
1.) The Project is immediately upstream of a 303(d) impaired segment of the Price River listed for partially supporting beneficial uses. There is a need to reduce and repair Non-point Source (NPS) pollution and implement Total Maximum Daily Load (TMDL) recommendations to help move the Price River toward meeting beneficial uses (aquatic health, and reduced TDS loads).

2.) Historic unpredictable flooding lead to levees and retaining walls confining the river. There is a need to maintain the flood control function while restoring ecological functions.

3.) Helper City is known as a historic railroad town with an economic base that fluctuates with coal production and the mining industry. Encouraging tourism and promoting economic development by enhancing recreation with green space, trails, fishing and whitewater will bring additional economic revenue to the area helping to offset the slow periods.

The River Revitalization planning study collaborated with stakeholders to include multiple management objectives and maximize restoration potential. Implementation of the Pilot Project will continue this process of building consensus through sound science, clear objectives, and mutual goals to develop a plan with multiple benefits. The Pilot Project brings the city, landowners, and natural resource agencies together for the goal of improving water quality and restoring riparian and river functions. The Pilot Project will demonstrate how to implement watershed best management practices. Citizens, local governments, water users, and public land managers region wide can appreciate the holistic plan. The Pilot Project is a shared vision to promote ownership and responsibility and foster a network of stewards.

For example, businesses and citizens view the urban waterway as a heritage riverfront that facilitates a healthy lifestyle. The community embraces the riverfront and engages in carrying out activities to maintain the integrity of the Project for future generations.

Water users recognize the multiple benefits of improving structures to maintain channel functions, such as sediment transport, conveying flood flows, reducing bank erosion, and improving fish passage. The Project shows how designs can reduce the maintenance of structures and meet the needs for water delivery and aquatic species.

Local governments throughout the region recognize the economic and social value in investing in green infrastructure. The Project is an example on how to implement urban best management practices, such as development setbacks, riparian buffers, appropriately facilitating recreation uses, creating interior floodplains to improve channel capacity, and other river development BMPs.

Several stakeholders are actively involved in activities. The USU Extension Office is volunteering technical services to assist with the removal of Russian Olive and Tamarisk. Carbon
County Weed Management has prioritized maintenance of lands within the River Revitalization Project for weed control, and donated equipment for Phase I invasive species mitigation efforts. The USU River Watch program has offered to become involved in Tier 1 water quality monitoring for baseline conditions. The Price River Enhancement Committee and other local groups have become involved with volunteer programs. Helper City Councilman Bradley is an educator at the Price River Junior High School and is excited about incorporating outdoor education activities for his students. Several landowners have been approached and are willing to support the project through conservation of lands.

SECTION 3.0 Goals

The Helper City River Revitalization Pilot Project at Ivy Street has been prioritized in the Helper City River Revitalization Conceptual Study Report. The Project will implement BMPs to reduce non-point source pollution (hydromodification, and sediment input), and improve the riparian diversity, canopy cover, aquatic habitat and floodplain connection. The Pilot Project will show adjacent landowners the benefits of land stewardship and riparian conservation. The Pilot Project aims to implement measures identified in the Draft Price River Watershed Plan and the West Colorado Total Maximum Daily Load Implementation Plan.

The goal of the Pilot Project is to demonstrate that a healthy river and riparian environment can feasibly exist within Helper City, benefit the community, and reduce NPS loading. The project includes hydromodifications to improve flow capacity, river bed and bank restoration, riparian enhancement & crossing modifications - with the objective of reduction of non-point source pollution and associated benefits. Restoration incorporated will include a suite of best management practices to specifically alter hydromodifications, storm water inputs, riparian and aquatic impairments, and bank stability. The Project is based on hydraulic and geomorphic investigation that determined appropriate restoration measures sustainable over the long-term under the natural dynamics of the river.

In addition to non-point source pollution reduction practices, the project will include initial educational opportunities to foster a stewardship ethic and build consensus for the overall Project. The Project will facilitate partnerships by integrating multiple natural resource management goals and other stakeholder objectives. The ultimate project will include all BMPs that are appropriate for river function (ie. urban runoff, vegetative strips, retention areas, and development set-backs).

The continuation of the Project in Phases 1-5, will include many strategies to further reduce NPS impacts from future urban development. The overall project will highlight development incentives for continuing to protect the natural channel values. The project will be an educational tool for the city to coordinate with landowners on implementing restoration treatments. A long-term operations and maintenance plan will be developed for this Pilot Project (as well as for the much larger overall Project) to identify efforts necessary to sustain restoration benefits for the long-term.

Success of the Helper Pilot Project will ultimately be measured with continued projects restoring the Price River. Restoration of the floodplain will incrementally reduce NPS as already seen after one flood event. The grade control has successfully created diverse aquatic habitats of runs and pools that were

previously lacking in the reach. Riparian restoration is still ongoing, and will flourish on the foundation of the restored floodplain.

SECTION 4.0 Activities

Task 1: Engineering & Design $22,682
Task 2: Permitting $3,024
Task 3: Construction $151,216

Summary of Tasks

Potential Environmental and Cultural Impacts
No permanent or significant negative impacts to aquatic life, riparian and wetland communities resulted from the project. No historical or cultural resources are known to exist within the Project area.

The project has temporary construction impacts with track equipment driving on, and excavating the bed material to install the boulder structures, thalweg excavations and temporary diversions. Best management practices such as turbidity curtains, oil booms, silt fences, construction sequencing and care of water will be utilized. Mature vegetation has established at the top of the bank and on the slopes of adjacent banks. All native vegetation shall be protected in place. Equivalent canopy cover shall be replaced in areas where native vegetation needs to be removed to achieve grades or for construction activities. There are no wetlands existing within the Project Limits.

Riparian Resources
Banks adjacent to the Project area are dominated by Siberian Elm and Russian Olive trees. There are five cottonwood stands that are protected in place. Cover is primarily tree species growing through fill material, with a few understory clusters of woods rose and ribus aureum. These areas are delineated and are protected in place.

Hydrology
Historical flows for the reach were evaluated using the Heiner gage (USGS-09313000) to determine flood flow scenarios, and bankfull conditions. This gage is no longer in operation, however presents the longest record to evaluate natural hydrograph conditions. Historically flood flows occur during the months of July and August from severe thunderstorms. The hydrograph shows sustained flows from snowmelt runoff typically occurring in April-May. Bankfull flows, or channel forming flows, appear to occur during moderate rain events that produce flows up to 1300cfs. Active diversions within the reach were combined to the North Carbon Canal in 2003, upstream of the Heiner gage. The Wellington Gage less the Utah Division of Water Rights flow records for the Gay Ditch and North Carbon Group were used to determine irrigation and water delivery flows through the reach. Construction of the project is proposed to occur during irrigation delivery flows.

Table 1 presents the daily mean flows for that day in the month. Flash floods are common in the area and the contractor shall monitor weather patterns for storm events, thunderstorms and potential for flash floods. River flows are known to spike up to 1,000cfs in one day from significant rainfall. Runoff typically does not occur until April, however historical record has marked peak run-off occurring as early as March 15th flowing at 910cfs. The month of July shows the highest probability for flash floods.

TABLE 1. Average daily through Helper City for 20 year period of record; Carbon Canal gage, Price-Wellington, less the gay and golf course diversions.

April	May	June	July	Aug	Sept
25	110	147	153	126	94
28	110	146	154	126	92
29	111	146	154	126	95
32	114	146	155	125	93
35	119	146	155	126	92
37	124	146	154	125	91
41	131	145	157	123	90
40	135	147	158	118	89
43	140	147	153	118	86
47	140	145	154	118	84
51	145	142	189	117	82
47	147	142	153	118	81
51	146	143	151	119	81
56	151	143	151	121	80
59	152	144	150	119	79
67	145	147	195	119	78
66	151	145	149	122	75
65	151	144	148	122	73
68	149	145	147	123	69
71	151	146	144	119	66
75	155	146	145	119	64
77	154	146	145	118	64
81	153	146	143	115	64
80	151	150	180	112	63
86	150	151	176	105	62
97	151	151	136	105	61
102	149	152	133	102	61
105	149	151	131	102	63
111	151	154	130	97	64
112	151	153	130	95	63
	150		130	95	

*Yellow are flows below 80cfs
*Green are flows below 150cfs
*Red are flows above 150cfs

Hydraulic Evaluation and Floodplain Management

The feasibility of stabilizing the bank and channel without increasing the Base Flood Elevations (BFEs) is shown herein through 1-dimensional step backwater modeling. This analysis is based on a HEC-RAS floodplain model supplied by URS Corporation; who updated the most recent FEMA model in 2012. We imported the "Effective Geometry" file and updated this with additional detailed survey data collected in August, 2013 and created a new geometry file titled "Corrected Effective".

A proposed geometry file titled “Proposed Effective” was created to show the proposed conditions of the channel enhancement structures and opened up bank. The proposed geometry (proposed modifications to RS 41293.93, RS and RS 41579.54 only) was then run with the “100 Year Floodplain” steady flow data (9,300 cfs). Results show that proposed measures do not impact the Base Flood Elevations.

Table 2 Helper City Pilot Project at Ivy Street Base Flood Elevations

River Station	Effective Geometry	Corrected Effective	Proposed Effective
41728.36	5820.25		
41710		5820.25	5820.25
41579.54	5817.76	5819.19	5817.76
41412.36		5818.57	5815
41367.86	5815.72		
41352.45		5816.85	5816.6
41317.82		5815.78	5815.87
41304.35		5815.53	5815.47
41293.93	5814.47	5814.47	5814.47

Quantifications of Activities

This Project relocates the River Parkway path at the top of the bank and excavates fill material from the bank to establish an interior floodplain. Significant increases in excavation were needed after the discovery of junk cars and a demolished home in the fill bank. The Project entails the placement of boulder structures in the channel to restore and enhance riffle-pool habitat and angler recreation. 120 tons of boulders in the channel and 270 tons at the toe of the bank were placed. Work in the channel includes the installation and maintenance of BMPs necessary for Care of Water.

The Project requires an additional 280 tons of boulders as retaining walls for the path and recreation access. The Project includes boulder access stairs and slabstone patio to concentrate recreational uses. A significant effort is required to class IV prune (chain saw and hand cut) trees and shrubs to clear the work area, protect in place native cottonwood and shrubs, and remove Russian Olive and Siberian Elm. The Project shall replace an equivalent cover of vegetation with native species. The Project entails installing topsoil, seed, erosion control fabrics, container plants and pole plantings.

Efforts of the project include:

4 Identify and maintain erosion control measures and Best Management Practices (BMP);
5 Protect in-place existing facilities, all utilities, all mature trees, all concrete, and landscaping not identified within the area of disturbance;
6 Protect in place mature trees, shrubs, utilities delineated within Project area;
7 Class IV prune;
8 Cut asphalt at parking area;
9 Remove asphalt path;
10 Install temporary channel access road;
11 Divert and care for water of Price River;
12 Excavate and haul-off approximately 113 CY of alluvium and riprap material;

13 Install approximately 120 tons of boulders in the channel;
14 Install approximately 280 tons of boulders at the toe of the bank;
15 Install approximately 384 SY of filter fabric between toe boulders and the bank;
16 Excavate and haul-off approximately 807 CY of fill material on the bank;
17 Install boulder walls, stair access, and landscape features;
18 Install approximately 483 SY of erosion control blanket (ECB) with native seed;
19 Install 95 SY of pole plantings;
20 Install 135 size #1, and 36 size #5 container plants;
21 Install 6,534 SF of native seed;
22 Restore construction staging areas and access areas to equal or better than condition before construction began.

Construction on the Project will to occur between July 15th and October 31st. Construction in the channel shall not occur during storm events. Work in the channel shall be prioritized to be completed within the same day and not have open channel excavation or coffer dams in the event of a flash flood.

Timeline

TASK	Month/Day	Month/Day
Finalize Plans and Specifications for Bid Package	06/14	07/14
Stream Alteration Permits 404/401.	06/14 Submitted	07/14 Issued
Bid Advertisement	06/20 Open	01/31 Close
Evaluate Bids	02/03 Open	02/05 Award
Local Construction Permits/ Mobilization	02/05	02/10
Trout Unlimited approval of Materials, etc.	02/05	02/07
In-stream Construction	02/10 Start	03/15 End
In-stream Punch List	03/07	
On-shore Construction	03/01 Start	TBD
Final Punch List	03/15	
Construction Complete	TBD	

Best Management Practices

The engineer provides clarifications to the contractor, and monitors construction activities are in conformance to the permits, plans and specifications.

Construction sequencing is an essential BMP to minimize impacts to the Price River; this sequence attempts to minimize potential impacts from non-point source pollution by implementing Best

Management Practices prior to commencing work. The sequence of the critical construction processes are defined by the Engineer and Contractor follow the sequence described below or as amended by Engineer:

Initial Site Set Up

a. Notify OWNER and ENGINEER of mobilization date.
b. Notify UDWR of start date.
c. Obtain Mountain Green approval of Traffic Control Plan for roads, bike path and river.
d. Locate Project Limits.
e. Document, with referenced photographs, or video, the project vicinity, structures and vegetation and submit to Engineer..
f. Place barriers, post signs, install safety fencing and isolate work areas.
g. Locate in field all Structures and Utilities and Protect in Place vegetation.
h. Remove/stockpile landscaping bridge, planter pots, and other landscape features.
i. Locate area for storage of spare oil booms and designate oiling and petroleum handling areas with appropriate and adequate BMPs outside of the riparian zone.
j. Establish and post protocol for potential oil spill cleanup and emergency response.

Staging

a. Locate construction haul routes, stockpile, and staging areas and place silt fence or other BMP down gradient.
b. Grade haul routes and staging areas to drain to placed BMPs.
c. Place adequate barriers to prevent public entry of staging area. Designate office and post contact information for public inquires and emergencies.
d. Install wheel wash and equipment tracking at staging area with drainage and BMPs.
e. Install and maintain temporary portable toilet and waste receptacles.
f. Establish construction site safety protocol and other required employer postings.
i. Install silt fence around perimeter of Clean Fill Area.
j. Identify and install any other BMPs as necessary
   1) Control erosion and concentrated runoff
   2) Maintain and facilitate any and all existing Drainage Channels
k. Locate and Protect in Place Survey Control

Riparian Corridor Construction

a. General

1) Maintain, add and repair BMP structures as necessary throughout project
2) Submit to Engineer list of equipment using certified bio-degradable fluids.
3) Clean, repair and maintain to leak free condition any equipment accessing the riparian corridor.
4) Disinfect any equipment accessing any wet channel.
5) Protect in Place all trees adjacent to designated excavation areas.

b. Installation of Channel Access Areas:

1) Locate areas for equipment to access the channel with stone berm at top of bank.
2) Install silt fence at perimeter, and coir log at toe of channel access location.
3) Install Oil Booms across channel downstream of channel access locations
4) Prepare grade for channel access.

c. Construction of In-stream Structures and Stone Toe Protection areas:

1) Monitor snow levels, temperature and runoff forecasts.
(http://www.wcc.nrcs.usda.gov/wsf/daily_forecasts.html)
2) Monitor weather patterns for potential runoff spikes.
3) Plan daily work, each day's work will be a completed work. No in-channel excavations or stockpiles shall be unattended for any period.
4) Install and maintain Oil Booms downstream of work area
5) Isolate bank excavation from the flowing channel.
6) Divert flow around work area through culvert, install energy dissipation at outlet.
7) Install other Care of Water BMPs as necessary.
8) Install Stone Toe Protection Boulders
09) Install Grade Control Boulders.
10) Backfill with clean alluvium.
11) Define thalweg and restore channel grades.
12) Install Boulder Terrace Bank Stabilization.
13) Remove channel access area and restore.
14) Substantially complete all construction activities required working in the channel by March15th, 2014.

d. Construction of upper banks:
1) Install silt fence in channel at toe of upper bank work.
2) Grade water bar at top of proposed bank work to move overland drainage away from exposed bank.
3) Install straw bales or other erosion control devices at extents of water bar where overland flow may return to the Gordon Creek.
4) Grade upper bank fill material per plans, minimizing incidental fall back.
Hand work may be required around root zones.
5) Protect in Place critical roots. Under drip lines, field fit structures to minimize impact on mature vegetation.
6) Dispose of waste material or clean fill as required.
7) Biostabilize upper bank per plans.
8) Complete upper bank construction
9) Remove silt fence.

e. Final Site Restoration
1) Dispose of any excess or waste materials at a qualified disposal facility.
3) Remove all materials from staging areas.
4) Re-grade or repair staging areas to pre-construction condition.
5) Replace landscape bridge, planter pots, and other features.
6) Restore/replace Irrigation
7) Install seed, vegetation, and replace sod at tracking areas.
6) Identify and install BMPs down-gradient from all disturbed areas until establishment of vegetation (approx. 1 yr.).
7) Remove Utilities Protection.
8) Remove Temporary Signage, Barriers and Safety Fencing.
9) Repair damage to any adjacent property, structures or vegetation.
10) Remove non-biodegradable BMPs after the establishment of vegetation (approximately 1 year).

In addition to Construction Sequencing, general environmental protection BMPs are required. The construction site is maintained to minimize mud, noise, erosion, and random water ponding. The Contractor maintains fueling areas and storage of supplies and or any other construction activities. In the event of a spill, all State Water Quality notification, emergency response, disposal, and clean-up is conducted.

All equipment is cleaned prior to being on-site to minimize potential for spreading of invasive species. Equipment is power-sprayed and free of weeds. If any equipment being used for the Project has been previously working in another stream, river, lake, pond or wetland, the equipment is cleaned with disinfection practices to prevent the spread of whirling disease, New Zealand mud snails, zebra mussels, didymosphenia, and other aquatic hitchhikers. All mud and debris from equipment (tracks, turrets, buckets, drags, teeth, hand tools, boots, etc.) is removed the equipment and sprayed/soaked in a 1:15 solution of Sparquat institutional cleaner and water. Keep equipment moist for at least 10 minutes; or with water greater than 140 degrees Fahrenheit for at least 10 minutes.

The excavators and backhoes may need to be cleaned on site to remove excess sediments stuck to the track or hoes. Sediments that are removed with a shovel is placed in designated clean fill material storage areas. Sediments removed with clean water are washed into the dewatering area. All dewatering areas have erosion control logs staked at flow lines before discharge into city curb gutters.

Equipment operating in or adjacent to any wet channels is free of any fluid leaks and in excellent operating condition. Biodegradable hydraulic fluids are utilized for any equipment operating in the flowing river channel. No equipment is left unattended, at any time, in any wet channel. Equipment storage shall occur in a designated upland location or in the Staging Area. Mobilization within the channel is sequenced for minimal disturbance. Construction Sequencing is time the excavation and placing of materials in order to minimize equipment driving on the channel bed. All in-stream structures are constructed in sections sized to minimize open excavation area**.** Each day of work is a completed work and no excavations of the bank or streambed are left open to flow**.**

Any and all riparian areas and riparian vegetation outside of the limits of excavation are protected in place. No construction supplies, fuels nor oils are stored in riparian areas, no vehicles nor shall heavy equipment be allowed into riparian areas other than the designated channel access sites. No discharge of any unspecified materials is allowed into any riparian areas. Riparian areas are traversed only by foot and leak free hoses may cross riparian vegetation. Any incidentally disturbed riparian areas are restored to better than pre-construction conditions.

SECTION 5.0 Partners

The magnitude of the project involves resource sharing and strong partnerships to ensure a successfully completed Project. The town of Helper is actively working with several entities to support implementation of the River Revitalization project. These include regional, county, state, federal, nonprofit foundations, and educational institutions. A Price River Watershed group was formed and coalesced around this project and authored a draft watershed plan that included the Pilot Project as a priority.

Carbon County is a committed partner and provided technical support and funding resources for the Conceptual Planning Study. Carbon County also provided funding support for the design and construction of the Pilot Project.

The Division of Wildlife Resources is a committed partner for the River Revitalization Project. The DWR will monitor baseline conditions prior to implementation, and post restoration as phases are implemented. The DWR is willing to provide support through technical assistance for conceptual design, construction field services, monitoring fish populations, and assistance with securing funding sources. As the River Revitalization Project improves angler access and habitats, the DWR may prioritize resources to stock fish in restored reaches.

The Natural Resource Conservation Service provided conceptual planning support to assist with fore sighting potential funding programs to enhance water quality, wetlands, habitat and the environment. Most of the NRCS programs are for private agricultural landowners who are willing participate in riparian conservation and the River Revitalization Project.

Conceptual planning has been coordinated with the US Fish & Wildlife Service to foresight resources that will support project restoration elements such as fish passage and enhance aquatic and riparian habitat.

National Park Service – Rivers and Trails has been engaged for conceptual planning and is excited to be involved with the trail planning and riparian conservation. They have several programs that are being coordinated to assisting with funding aspects of the Project.

The Utah Food and Agriculture Department invasive species mitigation program has been coordinated with as a potential funding partner to remove and control invasive species and assist with enhancing native riparian vegetation.

The AmeriCorps program will assist the Project in watershed education, community outreach, and volunteer recruitment. This program engages young adults and links restoration science and education. They have offered to provide discounted and in-kind labor resources to remove the Russian Olive and Tamarisk this August thru October as a proactive management approach for Phase I.

Several landowners have offered to support the project through conservation of lands for riparian restoration.

2013 (Pilot Project)
Funding Source; Amount; Requested Status
DWQ-319 EPA Price Watershed; $100,000; pending
DWQ-NPS; $35,000; pending
Carbon County Special Service; $40,000; pending

Utah Food and Agriculture-ISM; $1,900; pending
Total Cash Contribution $176,900

Requested
In-Kind
Landowner Easement; TBD; pending
Helper City; TBD (equipment,administrative)
2013 (Phase I)
Urban Waters-5 Star Grant; $50,000; pending
Utah Food and Agriculture-ISM; $26,700; pending
Americorps In-Kind; $7,000; secured pending ISM grant approval

SECTION 6.0 Complications

The 319 funds were expended as planned. Other funding match is scheduled to be completed as planned. Construction of the project was slowed due to unanticipated cut needed of the river bank. During construction 2 cars and debris of an old house were uncovered. Cut of the bank was significantly increased to remove the obvious junk. Extra riparian restoration will be needed to cover this extensive cut. The issue was resolved with coordination with the contractor and partnership agencies to distribute funds accordingly.

SECITON 7.0 Recommendations

The Pilot Project is the first phase of the River Revitalization Concept Planning study that would restore almost 2 ½ miles of the Price River and revitalize its riverfront in Helper City. This is has a total project cost of $5.5 million. There are 4 more phases included in this study. If the river becomes fishable and swimmable as is planning, these additional phases of the $5.5 million project may get more support. The momentum built up by this project can significantly help with completeing the subsequent phases of the larger project.

SECTION 8.0 Environmental Results

The UDWR project manager will conduct a single baseline fish population census in the Price River within the project area during late fall 2014. This multi-pass depletion survey will be performed using a backpack electrofisher. The length of the survey station will be 40 times the wetted stream width. The survey station will encompass all representative instream habitats (e.g., riffles, pools, and runs). Upstream and downstream extents of the survey station will be blocked with seines. All fish captured will be identified to species. A subsample of captured fish will be measured and weighed to allow for analysis of species-specific population size structure and health (condition).

A concurrent baseline population census will also be conducted at a reference area of the Price River using the aforementioned methodology. This survey will take place in an undisturbed area of the Price

River (reference area) upstream from the project location. Project and reference area fish sampling locations will be documented (i.e., coordinates of upstream and downstream extents collected) to allow for replication throughout the monitoring effort.

Water quality improvements are measured through actual implementation of restoration measures such as; acres of riparian enhancements, floodplain connection, linear feet of bank stabilized, mile of channel restored, amount of fill material removed, and acres of hydromodifications reduced.

- Riparian and River Corridor Conservation (0.5/53 acres of river and riparian area)
- Improved Bank Stabilization (400/24,000 linear feet)
- Improved Flood Flow Conveyance (200feet/2.3 miles of channel)
- Restored Floodplain Connectivity (0.25/14 acres interior floodplains)
- Diversified Native Riparian Vegetation (0.3/34 acres of removed invasive species and enhanced with native vegetation)
- Enhanced In-channel Benthic Macroinvertebrate Habitat (0.2/11 acres)
- Removed trash fill from the banks and channel (220/12,300 tons)
- Removed fill material and levees from the floodplain (390/323,000 CY)
- Over 20,000 region-wide citizens embracing their riverfront with stewardship, education, recreation and volunteer service.

The effectiveness of restoration efforts will be evaluated through a long-term monitoring program. Following construction, active monitoring will be performed by Helper City and participating resource agencies as previously identified. Maintenance will also be performed by the city. An Operations, Maintenance, Repair, Replacement, and Rehabilitation (OMRR&R) program will be implemented (see below). The program is designated for the full 50-year project life. This program will be adaptively managed to ensure long-term success of the Project. The Project includes baseline and ongoing monitoring for selected physical and biological parameters.

- Photographic Monitoring: Photographs will be taken at repeated stations to evaluate changes over time and make recommendations to adaptively manage the riverfront. For example, photographs will show the success of riparian plantings and invasive species removal. Photographs may show the need to plant thorny vegetation to prevent random trampling from pedestrian traffic. (see Section 11.0 Attachements)
- Channel Cross Sections: Helper City plans to conducted baseline conditions and as-built conditions. Future monitoring may be recommended as Photographic Monitoring warrants repeating cross section surveys. (see Section 11.0 Attachements)
- Water Quality: A Water Watch Program with local volunteers will collect Tier 1 Water Quality parameters. Fish Population: The Division of Wildlife plans to conduct baseline conditions of fish population in the reach in fall 2013. These surveys may be repeated 3-5 years after construction to evaluate the success of fish holding capacity and native fish species recruitment.
- Other: Riparian greenline, sediment gradation, redd counts for spawning, and a suite of other parameters are recommended as student projects. Educational programs are being developed to enhance monitoring and outreach community involvement.

Operations, Maintenance, Repair, and Rehabilitation

The objective of all operations, maintenance, repair, replacement and rehabilitation (OMRR&R) plan is to give the project a 50 year lifetime and commitment to success of the project. OMRR&R strives to maximize native planting survival, to restore structures to as built conditions and/or to adjust structures that are adversely affecting hydraulics. Helper City shall monitor the site through Photographic Documentation, and on-going maintenance for weeds, trash, clearing, and other for the River Parkway. If photographs show that structures are in need of maintenance, Helper City shall implement adaptive management measures to reduce failure and maintain structures for the lifetime of the Project.

SECTION 9.0 Deliverables and Finances

Task	Deliverables	319/NPS Funding	Additional Funding	Total
Task 1: Engineering and Design	Final Plans and Specifications	$22,682		$22,682.00
Task 2: Permitting	404/201 Stream Alteration Permit	$3,024		$3,024.00
Task 3: Construction	Constructed Pilot Project	$74,316	$40,000 Carbon County $35,000 DWQ/NPS $1,900 UDFA/ISM	$151,216.00
			Total:	$176,922.00

SECTION 10.0 Conclusions

The completion the Pilot Project of the Helper City River Revitalization Project is the catalyst for a comprehensive restoration. Any success measured in this project will aid in the support of the subsequent phases of the revitalization project.

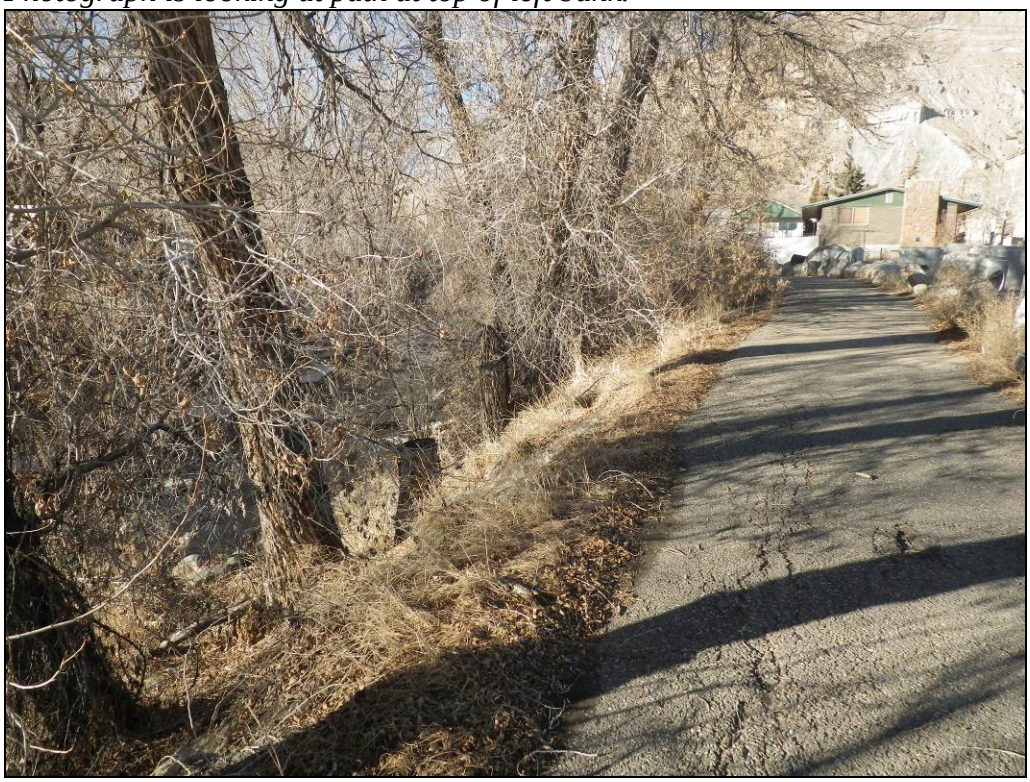
SECTION 11.0 Attachments

Photograph is looking upstream of Ivy Street Bridge

Photograph is looking downstream under the abandon pedestrian and Ivy Street Bridge.

Photograph is looking at left bank where excavation and RO removal is proposed.

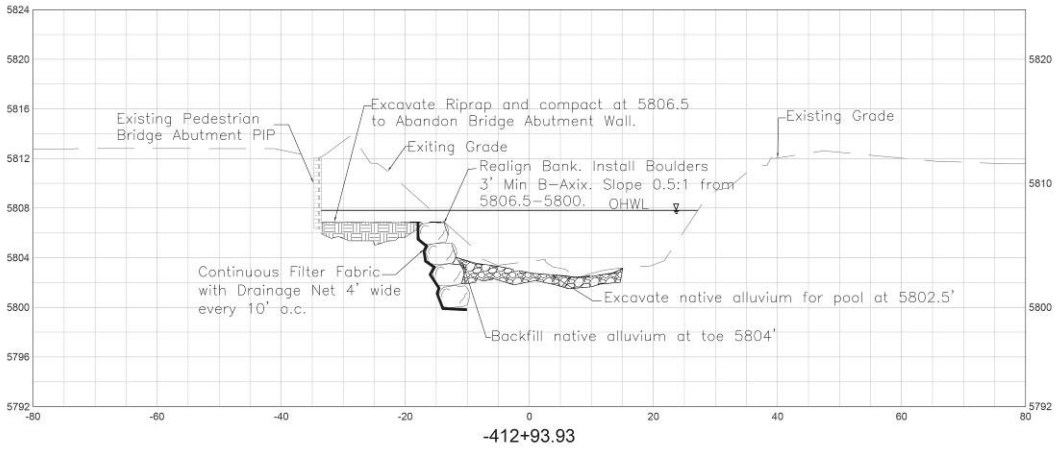
Photograph is looking at path at top of left bank.



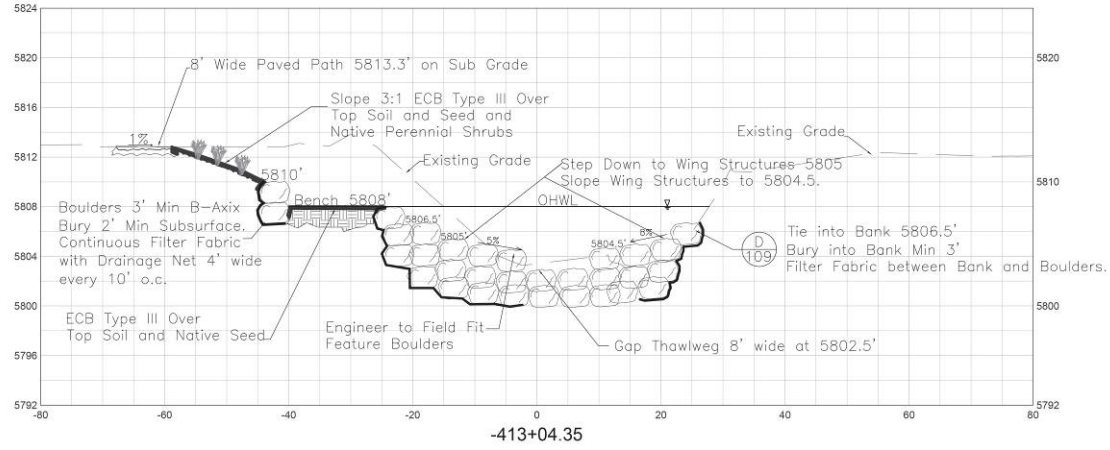
Photograph is looking at bank where channel access, cross vane and bank work is proposed near RS 41304.

Photograph is looking at right bank where proposed cross vane will tie into the bank.

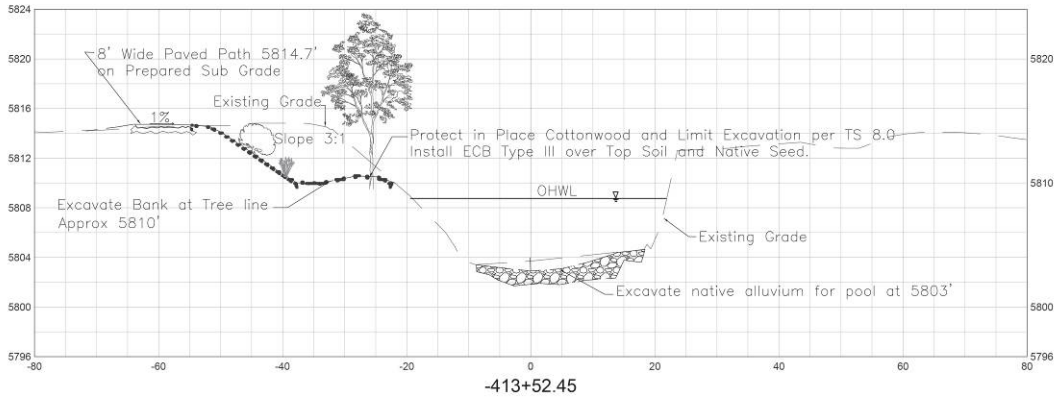
Photograph is looking at right bank at end of existing timber wall. The proposed cross vane will tie into bank downstream of the timber wall, remove ailanthus and elm trees, and replace with pole plantings.



-412+93.93



-413+04.35



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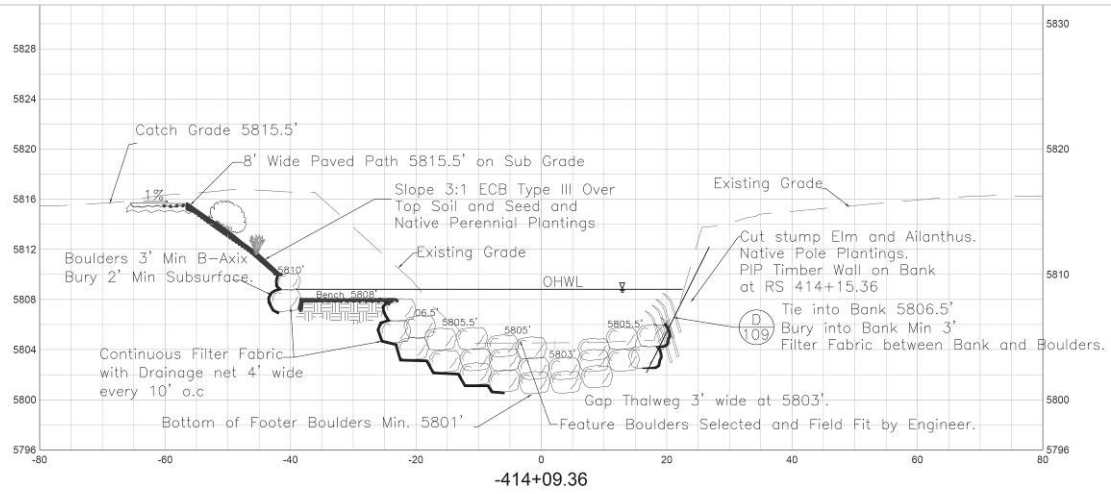

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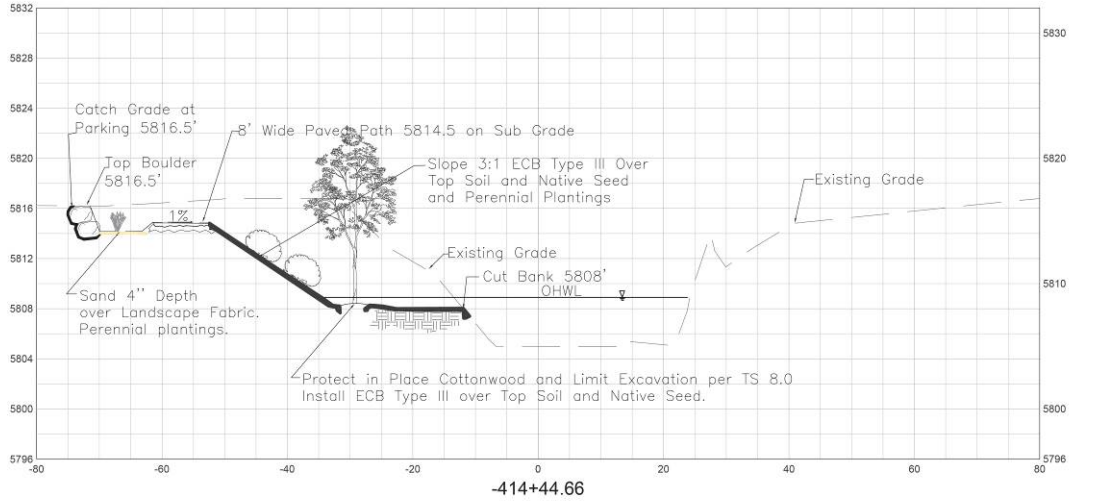


-414+44.66

-414+82.03

11.2 RESULTS OF PRICE RIVER SURVEY

Price River Watershed Survey

Summary Report and Data

A telephone public opinion survey of Carbon County was conducted in early January 2009 to determine knowledge, attitudes and practices related to the Price River watershed and water quality issues within the county. A total of 233 interviews were conducted, which yielded a margin of error of approximate +/-6.38 margin of error, with a 95 percent confidence interval.

The Salt Lake City based market research firm of Dan Jones & Associates provided the winning bid and received the contract to administer the survey. The Utah Department of Agriculture and Food provided technical support during the survey creation and bidding process, and provided statistical analysis of the raw data. The Price River Watershed Committee and the Castle Country Resource Conservation and Development Council (RC&D) administered the project funds, which were provided by US EPA and Utah State University Extension. The local coordinators provided background demographic data and overall coordination for the project.

The intent of the survey project is to provide usable data that will help inform future outreach and education choices the Price River Watershed Committee makes, and to provide a pre outreach campaign information, education and behavior baseline for the community.

The report is presented in three sections:

1. **Narrative analysis of statistical trends and specific questions**
2. **The final draft of the survey instrument**
3. **Statistical tables and charts for each question**
4. **Cross tabulations**

A few interesting findings

Of general environmental concerns, residents seem most concerned about water supply/water quantity issues, followed by water pollution and air pollution. Of potential sources of water pollution, respondents believe that improper disposal of hazardous waste from homes and farms has the most impact on the water, followed by noxious weeds/invasive plants, and mine drainage.

There seems to be a fairly strong stewardship ethic and desire to take care of the resources, even if it costs a little more. Fifty five percent (55%) of non-farm residents and 61 percent of farmers strongly believe it is their personal responsibility to take care of the water resources.

Residents need to be more familiar with basic water pollution prevention practices. While 68 percent are very familiar with the practices of taking hazardous household waste to a disposal site, and 50 percent are very familiar with the importance of keeping grass and leaves out of gutters, only 28 percent were very familiar with the water quality benefits of reducing fertilizer

and pesticide use. Additionally, only 24 percent were familiar with the environmental benefits of having your septic system serviced regularly.

The actions non-farm residents are most likely to take are taking hazardous household waste to a drop off site, keeping streets and gutters clear of leaves and removing invasive plants. Farmers and ranchers seem most likely to keep livestock out of water ways, use a nutrient management plan and reduce fertilizers and pesticide use.

In both cases—farm and non farm—the likelihood of taking action corresponds fairly closely to how familiar residents are with the practices. For example, farmers may be more likely to use integrated pest management if they were more familiar with it.

Survey Data Summary

The Price River survey consists of 64 questions, including demographic questions. Questions range from general environmental concerns, to specific water quality beliefs and practices in which residents engage.

A portion of the survey was divided into two branches. Interviewers asked one set of questions to those who indicated they are urban, suburban or rural non-farm residents, while those respondents who are part time or fulltime farmers answered a different set of questions for a short time in the middle of the interview.

The survey started out by asking about the general health of the environment in Carbon County and about the general health of the rivers, streams and lakes within the county. More than 90 percent (93%) indicated that the environment in general is either somewhat or very healthy. A similar number (86 %) said that the water bodies in the area are somewhat or very healthy. Three percent said they did not know. Considering that this survey took place in Coal country and that there are water quality impairments, it may be somewhat surprising that the percentage of people that thought the environment and the water environment were healthy or very healthy.

When asked about where storm water goes when it leaves their property, Carbon County residents seem more aware than respondents from other surveys throughout the U.S. Nearly 60 percent (59%) correctly said that the water goes untreated to a nearby water body. Other answers included waste water treatment plant (13%), a septic system (1%), some other place (undefined) (13%), and about 15 percent did not know.

Respondents were asked their level of concern about air pollution, water pollution and water supply (shortages). Nearly one-fourth (24%) of those asked indicated that they were concerned or extremely concerned about air pollution, while 35 percent were either concerned or extremely concerned about water pollution, and 47 percent were concerned or extremely concerned about water supply. This seems to indicate that water pollution prevention messages can be strengthened if they can also be tied to water conservation, or having enough water.

The next set of several questions asked residents to indicate in their opinion the degree of perceived impact several potential concerns have on watershed health. The potential concerns range from mine drainage and sewer treatment plant discharge, to animal waste and erosion

from field fields, to noxious weeds and grass clippings in storm drains. Respondents were asked to rate each question on a scale of 1-5, where 1= no impact and 5= major impact. Residents perceive runoff from developments and streets as having the greatest impact (39% answered 4 or 5, where 5= major impact) Improper disposal of hazardous household waste or farm waste ranked second, with 37% answering four or five. Noxious weeds and mine drainage provide the next biggest impact, according to residents. Grass clippings in storm drains and canals, and erosion from farm fields were perceived to have the least impact to local water quality.

The next set of questions was designed to assess respondents' attitudes toward water quality. Interviewers read a series of statements and asked residents rate their level of agreement from 1-5, with one being strongly disagree and five being strongly agree. Reaction to the statement: Households like mine do not have much impact of water quality was fairly equally mixed (20% each answered 1-strongly disagree, and 5-strongly agree). On a 1-5 scale, three is usually considered a fairly neutral answer. In this case 26 percent answered three.

Taking action is too expensive for individual landowners also received a fairly balanced response (25% strongly disagree, 20% strongly agree and 25% answered in the middle of the scale).

The rest of the answers in that category seem fairly predictable. People were fairly split in their answers about whether time of year you apply fertilizers to your lawn impact water quality. They strongly agree with the statements that it is important to protect water quality and that it is everyone's personal responsibility to protect water quality. Respondents strongly disagree that it is okay to sacrifice water quality to promote economic development. Half of those asked strongly disagree with that statement, while only 13 percent strongly agree. But when asked if they are willing to pay more in taxes to protect water quality, they were closely divided again. An equal percentage (21% each) answered strongly disagree and strongly agree).

Respondents were asked several questions to determine how familiar they are with practices that can help reduce or prevent water pollution. Again, a five point scale was used, where 1=not at all familiar and 5=very familiar.

The concept of reducing the amount of fertilizers or pesticides used as a means of protecting or enhancing water quality was not at all familiar to 15 percent of those asked, while 28 percent were very familiar with the concept and more than a third (36%) answered right in the middle (3). Servicing septic systems was a less familiar concept, with 30 percent saying that they were not at all familiar with it and 24 percent being very familiar. Few people (8%) answered in the middle. Almost 70 percent were very familiar with the idea of taking hazardous household and farm waste to an official disposal site, while only 14 percent were not at all familiar with the practice. Finally, the idea of controlling the spread of invasive plant species was very familiar to 30 percent, not at all familiar to 20 percent and 22 percent answered in the middle of the 5-point scale.

The next five questions asked respondents how likely they are to engage in those same actions. When it comes to reducing the amount of fertilizers they apply to their lawns, 37 percent answered five (5) (very likely), while 22 percent answered four, 21 percent said three, seven percent answered two, and 10 percent said 1-Very unlikely. Nearly 60 percent (59%) are very likely to keep leaves and grass clippings out of street and gutters, while only eight

percent are very unlikely to take on that action. Only 27 percent are very likely to have septic systems serviced regularly. On the other hand, only 13 percent are very unlikely to take on the action. Nearly half (45%) don't know. This may be an area to focus education on, if it is deemed a significant enough source of water quality problems. Please note here that San Pete County is also looking at doing a septic system servicing campaign. There may be some opportunity to share ideas and approaches. More than three fourths of those surveyed (80%) said they are very likely to drop off hazardous household waste. If there is a facility and/or a mechanism for this in Carbon County, an aggressive outreach campaign could be very effective. Finally, nearly 60 percent (58%) are very likely to remove invasive plants. Only 13 percent are very unlikely to take on the action.

When asked what keeps them from taking on a new practice around their yard or home, 32 percent said it is because they are not aware of it, 23 percent indicated it came down to cost, 16 percent said it was something other than what was listed, 14 percent said they are too busy, seven percent said it is because they don't know how to do the new action, and nine percent had no opinion.

The next several questions were asked only of farmers. They were very similar to the knowledge and intent questions asked urban, suburban and rural residential residents. That statement that Farms like mine don't have that much of an impact on water quality rang very true (strongly agreed) with 14 percent of the farmers surveyed. Another 28 percent rated that question as a four (4), which indicates that they agree with the statement, but not as much as those that answered five (5). One the opposite end, 22 percent strongly disagree with the statement and 19 percent answered two (2). The split between 1,2 and 4,5 is almost equal. Nearly 30 percent strongly agree that it is too expensive for land owners to take on environmental practices, and 25 percent strongly agree that the time of year fertilizers and pesticides are applied makes a difference. When the answers to that question are compared to the answers of the same question asked of non farm residents throughout the county, it is interesting that a much higher percentage of farmers strongly agree that time of year of fertilizer application makes a difference. There is also a much smaller percentage of farmers that answered right in the middle of the scale, which is usually considered to be a safe answer for people who really don't know the answer. This seems to indicate that non farm residents have less information about chemical application practices than do farmers. This may not be a shock, but it is something to consider as education efforts move forward.

Question 39: It is important to protect water quality, even if my land produces/earns less, yielded an interesting answer. Exactly half of those asked strongly agree with the statement, while only 17 percent strongly disagree. The next question, Investing in water quality puts the land owner at an economic disadvantage, produced more evenly distributed results. Eleven percent strongly agree, while 25 percent strongly disagree. Sixty-one percent believe strongly that it is their personal responsibility to protect water quality, and nearly half (47 percent) strongly disagree with the idea that it is okay to reduce water quality to promote growth.

Seventy percent either agree or strongly agree with the idea of changing practices to promote water quality if cost share incentives are provided.

When asked about their familiarity with certain practices, answers indicate that there is room for additional education and information about various practices. Twenty eight percent (28%) are very familiar with riparian planting concepts, 36 percent are very familiar with the idea of

restoring wetlands, no-tillage or low tillage practices are very familiar to 31 percent of those surveyed, while reducing fertilizers and pesticides is very familiar to 33 percent. The idea of creating and implementing nutrient management plans is very familiar to 36 percent, and finally, keeping livestock out of streams is very familiar to 44 percent of those farmers asked.

When asked how likely they are to take on the same practices, 31 percent are very likely to plant riparian areas, 36 percent are very likely to restore wetlands, 22 percent are very likely to use no-till/low till practices, 25 percent are very likely to use integrated pest management, 36 percent are very likely to reduce fertilizer/pesticide use, 26 percent are very likely to use a nutrient management plan, and 39 percent are very likely to keep livestock out of streams.

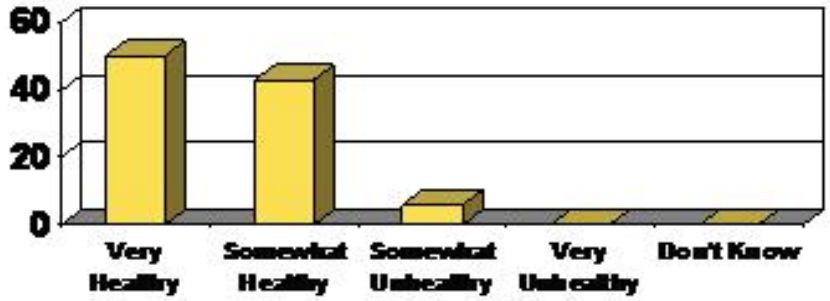
Television is the most widely used source of local news and information (48%), followed by newspapers (28%). The rest of the list scored below ten percent.

The remainder of the questions were strictly demographic in nature. The distributions seem to be in line with census data.

Price River Watershed
Survey Report

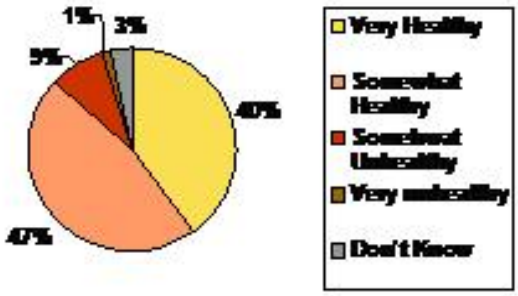
1: QUALITY OF ENVIRONMENT N= 233 M= 1.57 95%-Conf=0.08

50% 116.000 - VERY HEALTHY
43% 100.000 - SOMEWHAT HEALTHY
6% 15.000 - SOMEWHAT UNHEALTHY
0% 1.000 - VERY UNHEALTHY
0% 1.000 - DON'T KNOW
0% 0.00 - NO REPLY



2: QUALITY OF STREAMS/RIVERS/LAKES N= 233 M= 1.72 95%-Conf=0.10

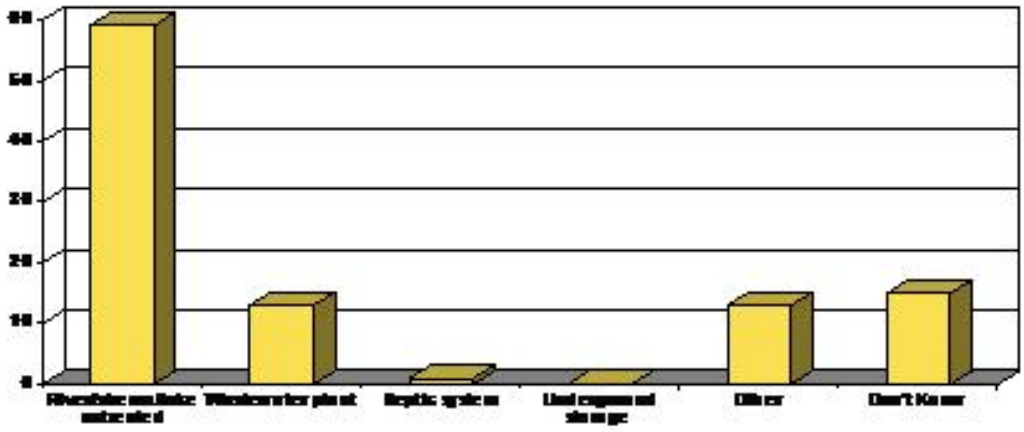
40% 93.000 - VERY HEALTHY
46% 108.000 - SOMEWHAT HEALTHY
9% 20.000 - SOMEWHAT UNHEALTHY
1% 3.000 - VERY UNHEALTHY
3% 8.000 - DON'T KNOW



Price River Watershed
Survey Report

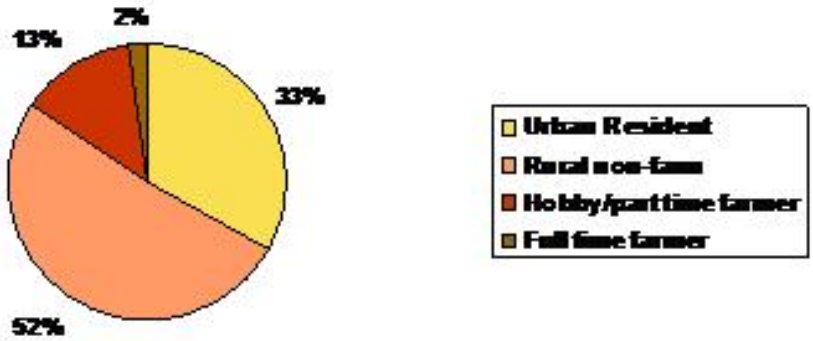
3: WHERE DOES STORM WATER GO N= 233 M= 1.77 95%-Conf=0.18

59% 137.000 - RIVER/STREAM/LAKE UNTREATED
13% 30.000 - WASTE WATER TREATMENT FACILITY
1% 2.000 - A SEPTIC SYSTEM
0% 0.000 - AN UNDERGROUND STORAGE FACILITY
13% 30.000 - OTHER
15% 34.000 - DONT KNOW



4: CURRENT HOUSING/LIVING SITUATION N= 233 M= 1.85 95%-Conf=0.09

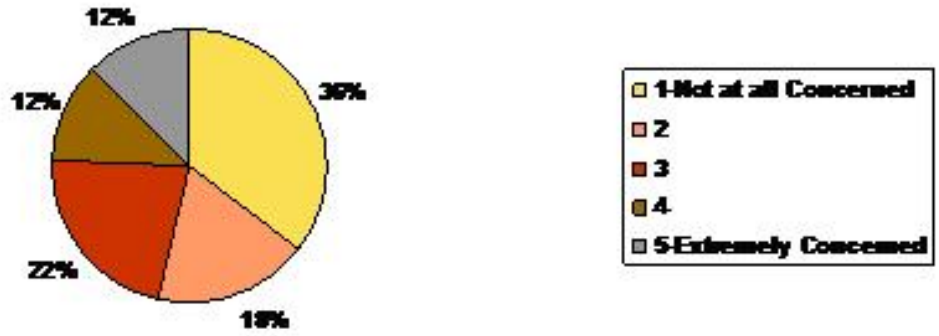
33% 77.000 - URBAN RESIDENT
52% 120.000 - RURAL NON-FARM RESIDENT
13% 31.000 - HOBBY OR PART-TIME FARMER
2% 5.000 - FULL TIME FARMER



Price River Watershed
Survey Report

5: AIR POLLUTION N= 233 M= 2.46 95%-Conf=0.18

35% 82.000 - 1 NOT AT ALL CONCERNED
18% 43.000 - 2 - -
22% 51.000 - 3 - -
12% 28.000 - 4 - -
12% 29.000 - 5 EXTREMELY CONCERNED
0% 0.000 - DONT KNOW



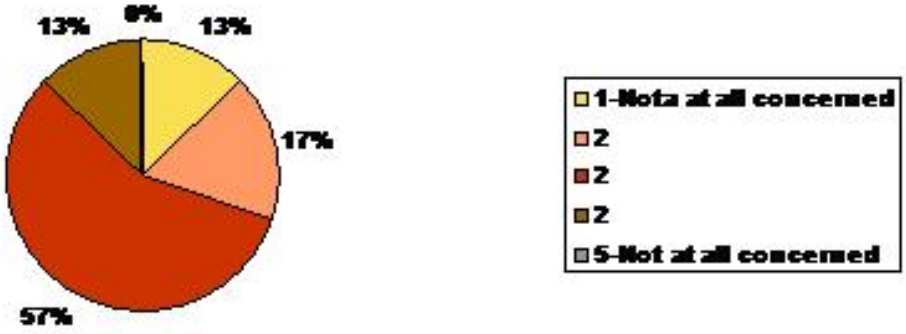
6: WATER POLLUTION N= 233 M= 2.94 95%-Conf=0.18

21% 48.000 - 1 NOT AT ALL CONCERNED
21% 49.000 - 2 - -
22% 52.000 - 3 - -
15% 36.000 - 4 - -
20% 47.000 - 5 EXTREMELY CONCERNED
0% 1.000 - DONT KNOW

Price River Watershed
Survey Report

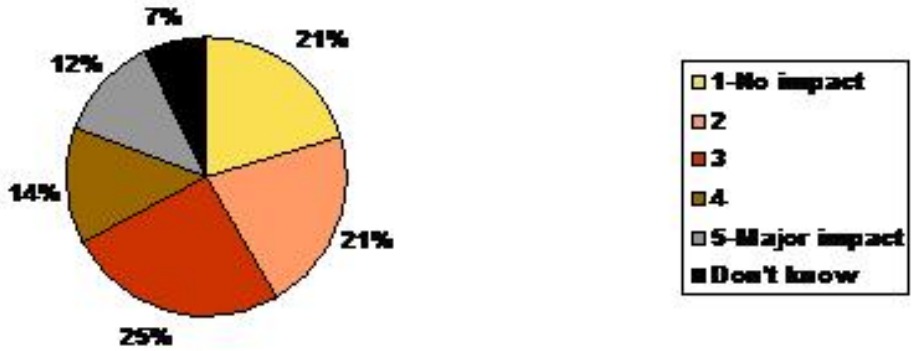
7: WATER SUPPLY N= 233 M= 3.27 95%-Conf=0.18

17% 39.000 - 1 NOT AT ALL CONCERNED
13% 31.000 - 2 - -
22% 52.000 - 3 - -
20% 46.000 - 4 - -
27% 63.000 - 5 EXTREMELY CONCERNED
1% 2.000 - DONT KNOW



8: DRAINAGE FROM MINES N= 233 M= 2.74 95%-Conf=0.17

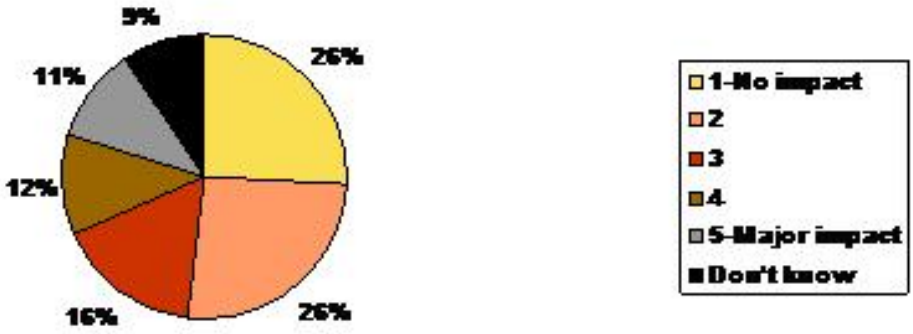
21% 48.000 - 1 NO IMPACT
21% 49.000 - 2 - -
25% 59.000 - 3 - -
14% 32.000 - 4 - -
12% 28.000 - 5 MAJOR IMPACT
7% 17.000 - DONT KNOW



Price River Watershed
Survey Report

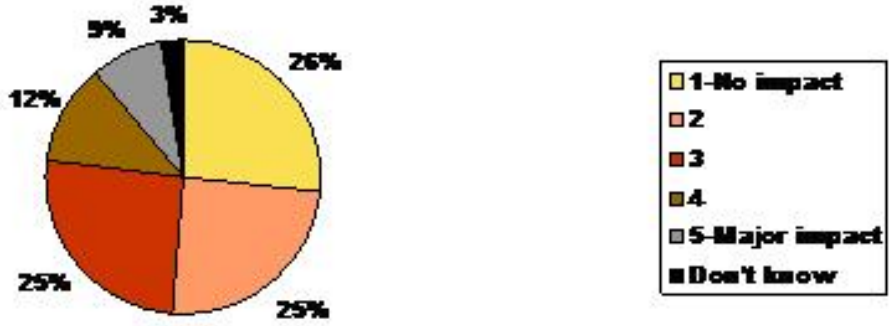
9: DISCHARGE-SEWAGE TREATMENT PLANT N= 233 M= 2.51 95%-Conf=0.17

26% 60.000 - 1 NO IMPACT
26% 61.000 - 2 - -
16% 38.000 - 3 - -
12% 27.000 - 4 - -
11% 25.000 - 5 MAJOR IMPACT
9% 22.000 - DONT KNOW



10: EROSION FROM CONSTRUCTION SITES N= 233 M= 2.50 95%-Conf=0.16

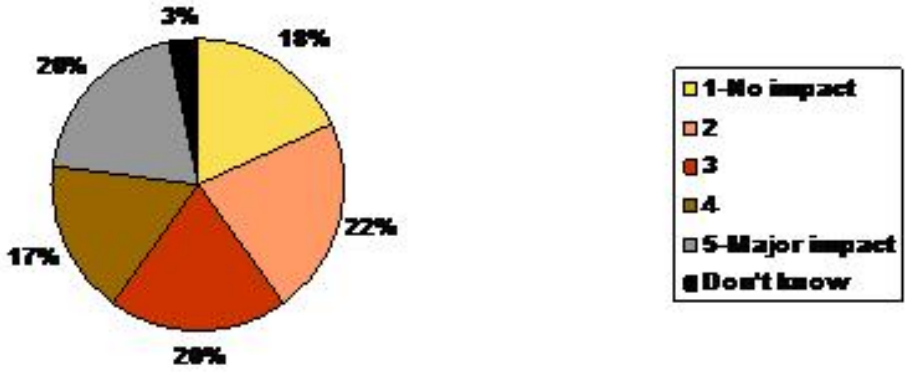
27% 62.000 - 1 NO IMPACT
25% 58.000 - 2 - -
25% 59.000 - 3 - -
12% 28.000 - 4 - -
9% 20.000 - 5 MAJOR IMPACT
3% 6.000 - DONT KNOW



Price River Watershed
Survey Report

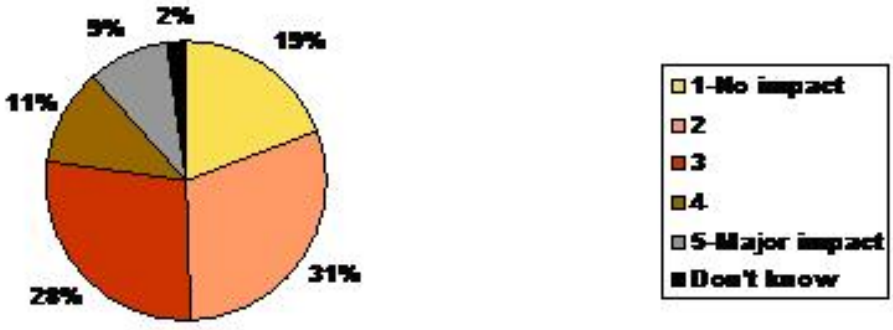
11: IMPROPER DISPOSAL-HAZARDOUS WAST N= 233 M= 2.98 95%-Conf=0.18

18% 42.000 - 1 NO IMPACT
22% 51.000 - 2 - -
20% 47.000 - 3 - -
17% 39.000 - 4 - -
20% 46.000 - 5 MAJOR IMPACT
3% 8.000 - DONT KNOW



12: RUNOFF FROM DEVELOPMENTS/STEETS N= 233 M= 2.61 95%-Conf=0.16

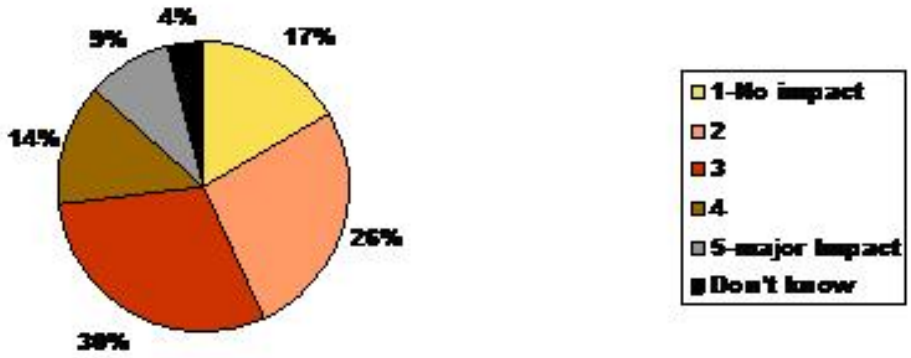
19% 45.000 - 1 NO IMPACT
30% 70.000 - 2 - -
28% 65.000 - 3 - -
11% 26.000 - 4 - -
9% 22.000 - 5 MAJOR IMPACT
2% 5.000 - DONT KNOW



Price River Watershed
Survey Report

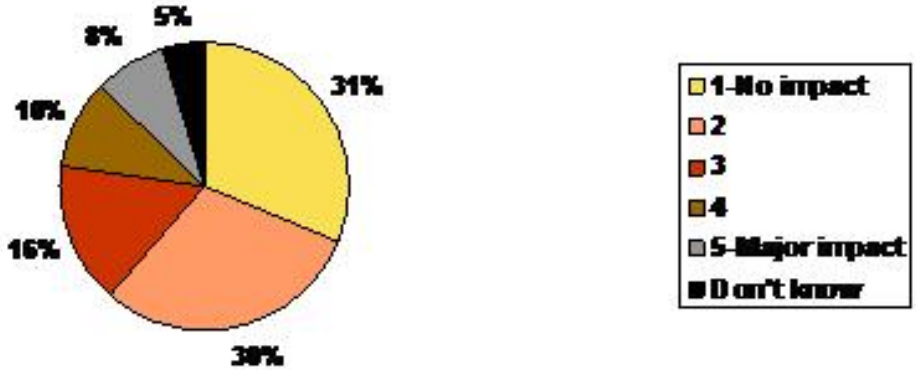
13: LAWN FERTILIZERS AND PESTICIDES N= 233 M= 2.72 95%-Conf=0.15

17% 39.000 - 1 NO IMPACT
26% 61.000 - 2 - -
30% 70.000 - 3 - -
14% 32.000 - 4 - -
9% 22.000 - 5 MAJOR IMPACT
4% 9.000 - DONT KNOW



14: GRASS CLIPPINGS IN STORM DRAINS N= 233 M= 2.30 95%-Conf=0.16

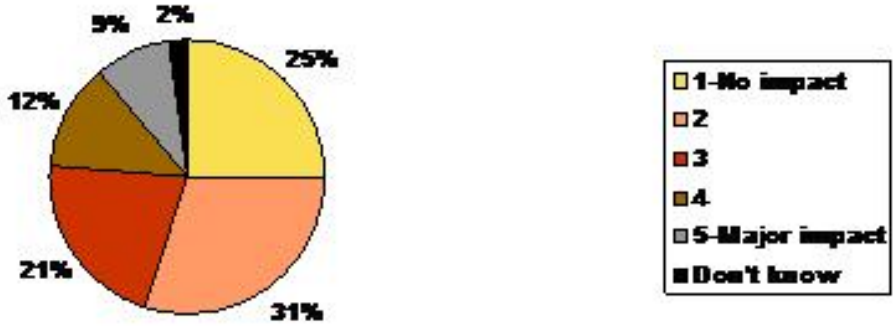
31% 73.000 - 1 NO IMPACT
30% 70.000 - 2 - -
16% 37.000 - 3 - -
10% 23.000 - 4 - -
8% 19.000 - 5 MAJOR IMPACT
5% 11.000 - DONT KNOW



Price River Watershed
Survey Report

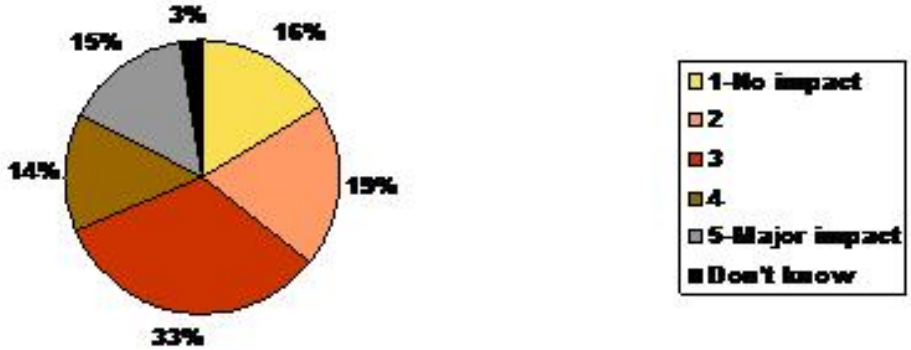
15: ANIMAL WASTE N= 233 M= 2.50 95%-Conf=0.16

25% 58.000 - 1 NO IMPACT
30% 70.000 - 2 - -
21% 50.000 - 3 - -
12% 29.000 - 4 - -
9% 21.000 - 5 MAJOR IMPACT
2% 5.000 - DONT KNOW



16: NOXIOUS WEEDS/INVASIVE PLANTS N= 233 M= 2.92 95%-Conf=0.16

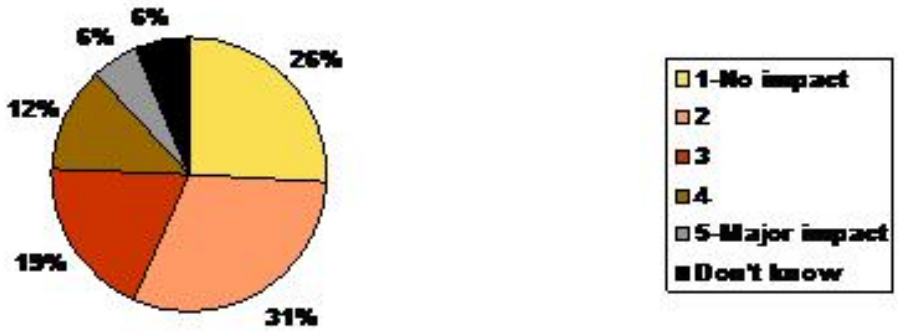
16% 38.000 - 1 NO IMPACT
19% 45.000 - 2 - -
33% 77.000 - 3 - -
14% 32.000 - 4 - -
15% 35.000 - 5 MAJOR IMPACT
3% 6.000 - DONT KNOW



Price River Watershed
Survey Report

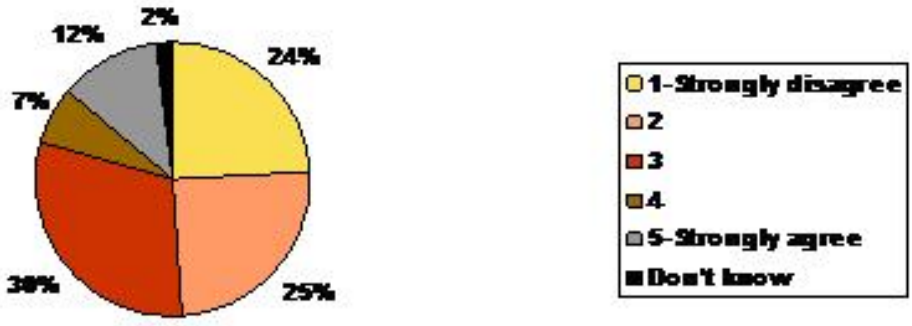
17: EROSION OF FARM FIELDS N= 233 M= 2.37 95%-Conf=0.15

26% 60.000 - 1 NO IMPACT
31% 72.000 - 2 - -
19% 44.000 - 3 - -
12% 29.000 - 4 - -
6% 13.000 - 5 MAJOR IMPACT
6% 15.000 - DONT KNOW



18: HOUSEHOLDS - NOT MUCH IMPACT N= 197 M= 2.90 95%-Conf=0.20

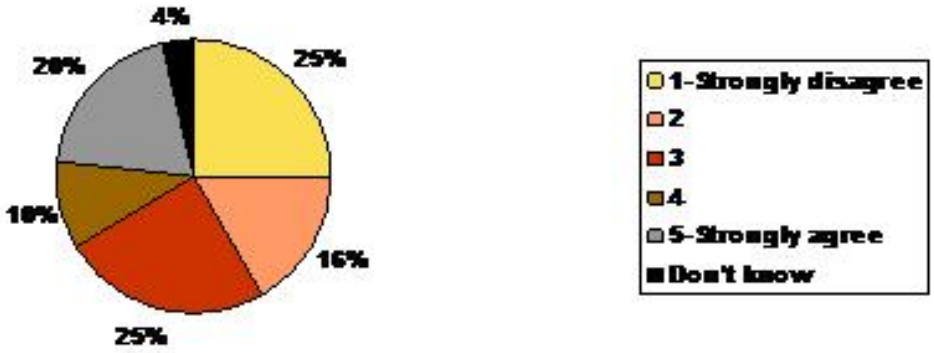
20% 40.000 - 1 STRONGLY DISAGREE
21% 41.000 - 2 - -
26% 51.000 - 3 - -
11% 22.000 - 4 - -
20% 40.000 - 5 STRONGLY AGREE
2% 3.000 - DONT KNOW



Price River Watershed
Survey Report

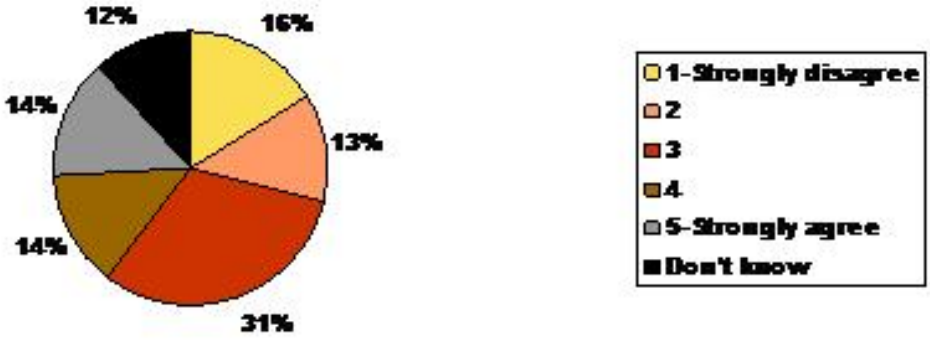
19: TAKING ACTION IS TOO EXPENSIVE N= 197 M= 2.82 95%-Conf=0.21

25% 50.000 - 1 STRONGLY DISAGREE
16% 32.000 - 2 - -
25% 49.000 - 3 - -
10% 20.000 - 4 - -
20% 39.000 - 5 STRONGLY AGREE
4% 7.000 - DONT KNOW



20: TIME OF YR YOU APPLY FERTILIZER N= 197 M= 2.97 95%-Conf=0.18

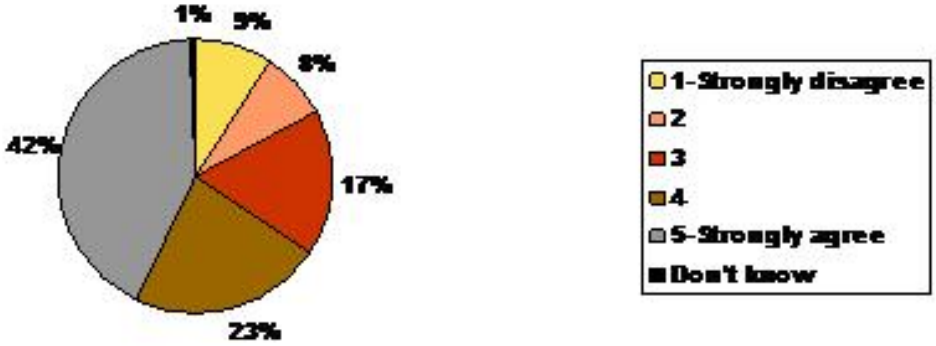
16% 32.000 - 1 STRONGLY DISAGREE
13% 25.000 - 2 - -
31% 62.000 - 3 - -
14% 27.000 - 4 - -
14% 28.000 - 5 STRONGLY AGREE
12% 23.000 - DONT KNOW



Price River Watershed
Survey Report

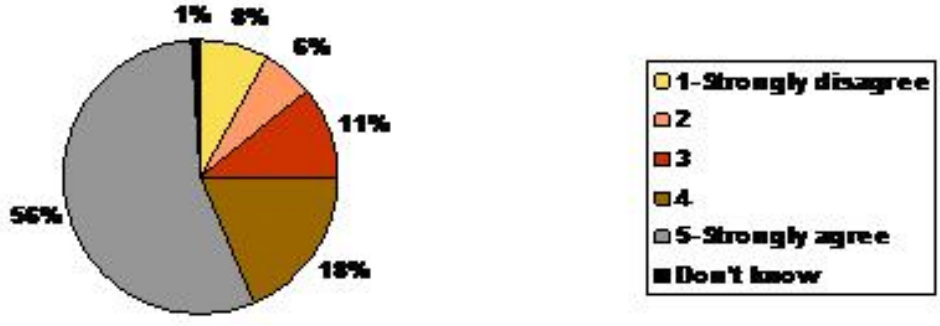
21: IMPORTANT TO PROTECT WATER QUAL. N= 197 M= 3.81 95%-Conf=0.19

9% 18.000 - 1 STRONGLY DISAGREE
8% 16.000 - 2 - -
17% 34.000 - 3 - -
23% 45.000 - 4 - -
42% 83.000 - 5 STRONGLY AGREE
1% 1.000 - DONT KNOW



22: PERSONAL RESPONSIBILITY N= 197 M= 4.08 95%-Conf=0.18

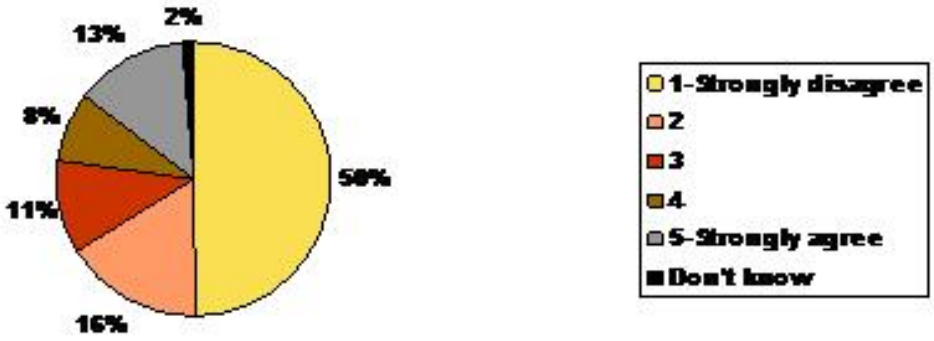
8% 16.000 - 1 STRONGLY DISAGREE
6% 12.000 - 2 - -
11% 22.000 - 3 - -
18% 36.000 - 4 - -
55% 109.000 - 5 STRONGLY AGREE
1% 2.000 - DONT KNOW



Price River Watershed
Survey Report

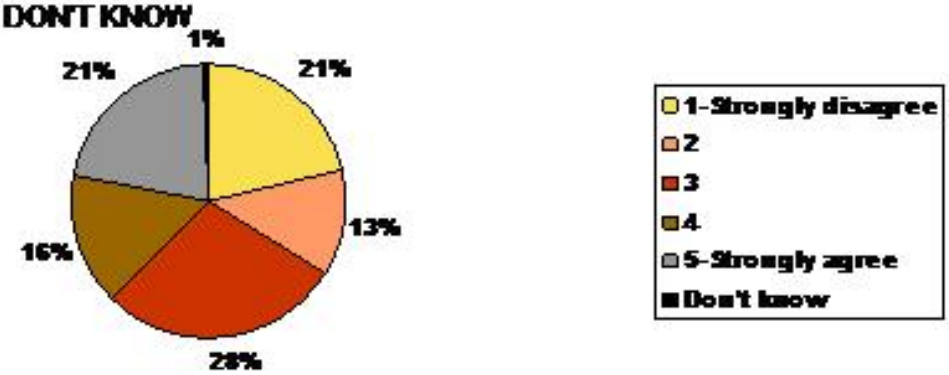
23: OK-PROMOTE ECONOMIC DEVELOPMENT N= 197 M= 2.18 95%-Conf=0.21

50% 98.000 - 1 STRONGLY DISAGREE
16% 32.000 - 2 - -
11% 22.000 - 3 - -
8% 16.000 - 4 - -
13% 26.000 - 5 STRONGLY AGREE
2% 3.000 - DONT KNOW



24: WILLING TO PAY MORE IN TAXES N= 197 M= 3.03 95%-Conf=0.20

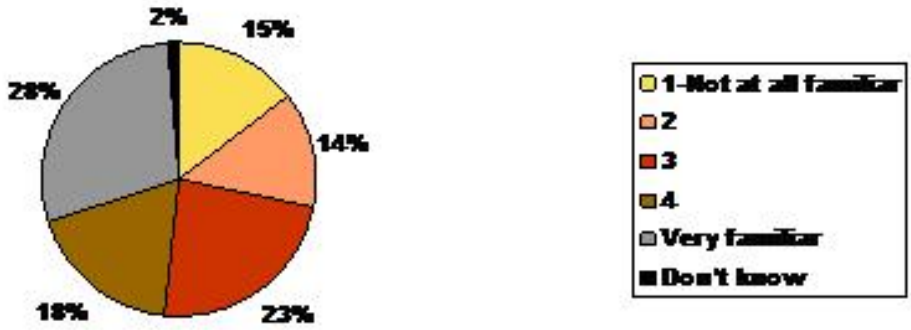
21% 42.000 - 1 STRONGLY DISAGREE
13% 25.000 - 2 - -
28% 56.000 - 3 - -
16% 31.000 - 4 - -
21% 42.000 - 5 STRONGLY AGREE
1% 1.000 - DONT KNOW



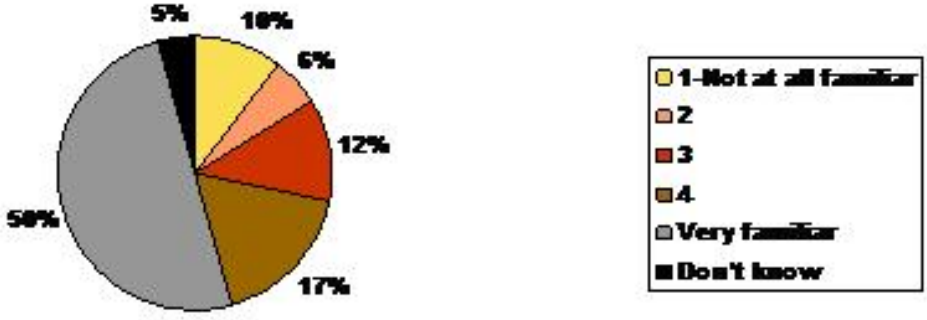
Price River Watershed Survey Report

25: REDUCING FERTILIZERS/PESTICIDES N= 197 M= 3.32 95%-Conf=0.20

15% 29.000 - 1 NOT AT ALL FAMILIAR
14% 27.000 - 2 - -
23% 46.000 - 3 - -
18% 36.000 - 4 - -
28% 56.000 - 5 VERY FAMILIAR
2% 3.000 - DONT KNOW



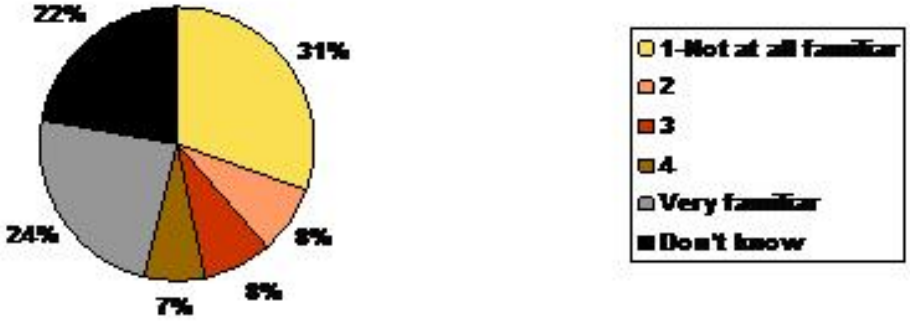
- 26: KEEP GRASS/LEAVES OUT OF GUTTER N= 197 M= 3.95 95%-Conf=0.19
- 10% 20.000 - 1 NOT AT ALL FAMILIAR
- 6% 12.000 - 2 - -
- 12% 24.000 - 3 - -
- 17% 34.000 - 4 - -
- 50% 98.000 - 5 VERY FAMILIAR
- 5% 9.000 - DONT KNOW



Price River Watershed
Survey Report

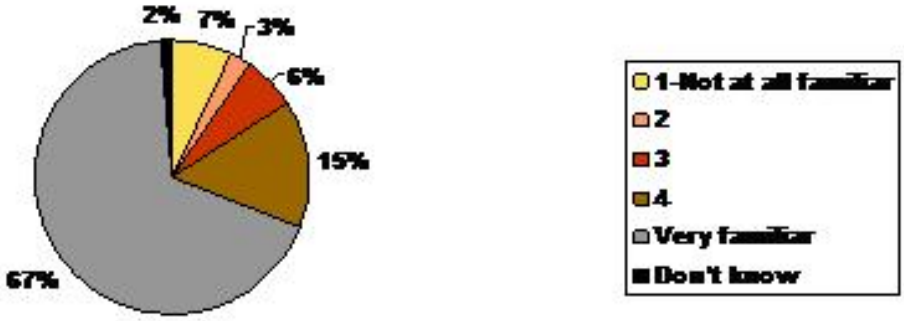
27: SERVICING SEPTIC SYSTEM N= 197 M= 2.82 95%-Conf=0.24

30% 60.000 - 1 NOT AT ALL FAMILIAR
8% 16.000 - 2 - -
8% 16.000 - 3 - -
7% 14.000 - 4 - -
24% 47.000 - 5 VERY FAMILIAR
22% 44.000 - DONT KNOW



28: HAZARDOUS WASTE TO DISPOSAL SITE N= 197 M= 4.36 95%-Conf=0.17

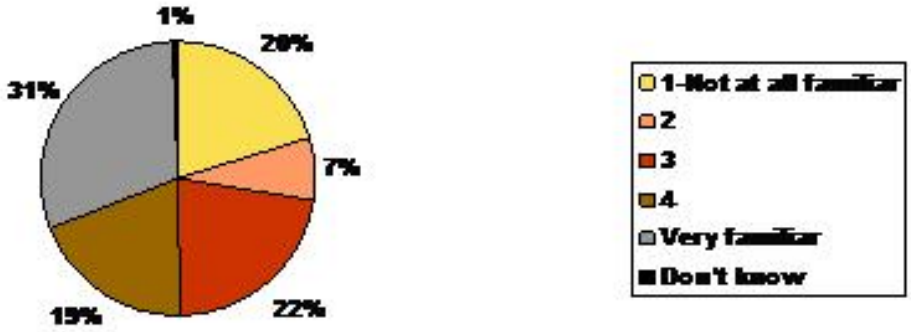
7% 14.000 - 1 NOT AT ALL FAMILIAR
3% 5.000 - 2 - -
6% 12.000 - 3 - -
15% 30.000 - 4 - -
68% 133.000 - 5 VERY FAMILIAR
2% 3.000 - DONT KNOW



Price River Watershed Survey Report

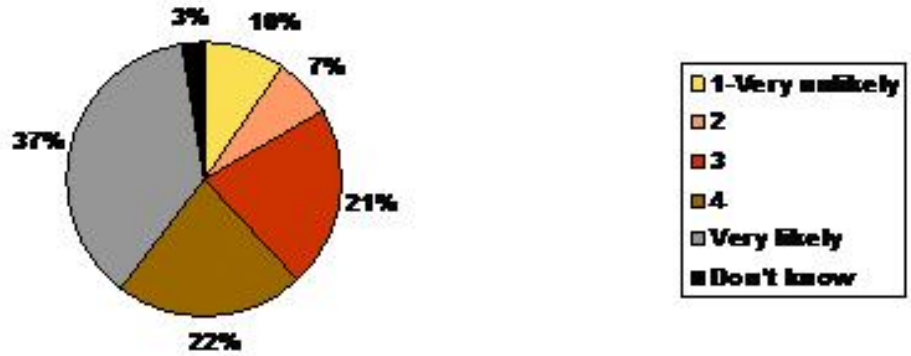
29: CONTROL SPREAD-INVASIVE PLANTS N= 197 M= 3.33 95%-Conf=0.21

20% 40.000 - 1 NOT AT ALL FAMILIAR
7% 14.000 - 2 - -
22% 44.000 - 3 - -
19% 38.000 - 4 - -
30% 60.000 - 5 VERY FAMILIAR
1% 1.000 - DONT KNOW



30: WILL REDUCE FERTILIZER/PESTICIDE N= 197 M= 3.72 95%-Conf=0.18

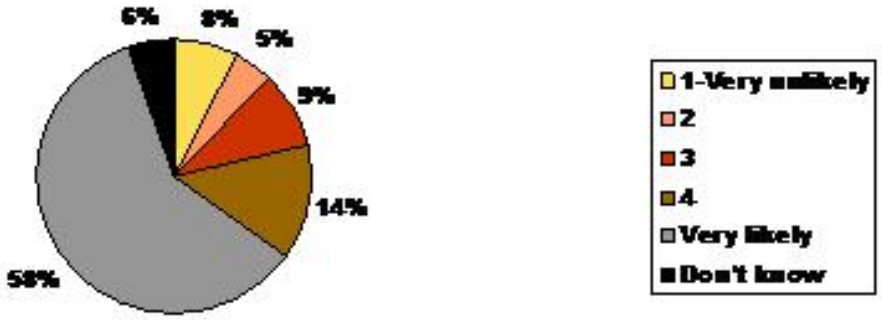
10% 19.000 - 1 VERY UNLIKELY
7% 14.000 - 2 - -
21% 42.000 - 3 - -
22% 44.000 - 4 - -
37% 73.000 - 5 VERY LIKELY
3% 5.000 - DONT KNOW



Price River Watershed
Survey Report

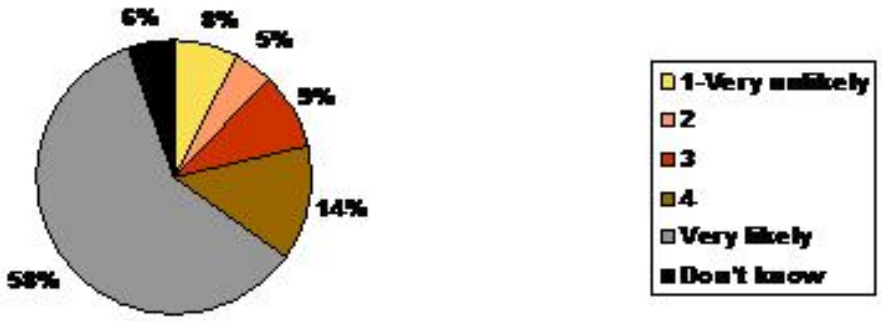
31: KEEPING STREETS/GUTTERS CLEAR N= 197 M= 4.19 95%-Conf=0.18

8% 15.000 - 1 VERY UNLIKELY
5% 9.000 - 2 - -
9% 18.000 - 3 - -
14% 27.000 - 4 - -
59% 117.000 - 5 VERY LIKELY
6% 11.000 - DONT KNOW



32: REGULARLY SERVICING SEPTIC SYS. N= 197 M= 3.61 95%-Conf=0.23

13% 25.000 - 1 VERY UNLIKELY
3% 5.000 - 2 - -
6% 12.000 - 3 - -
7% 13.000 - 4 - -
27% 54.000 - 5 VERY LIKELY
45% 88.000 - DONT KNOW



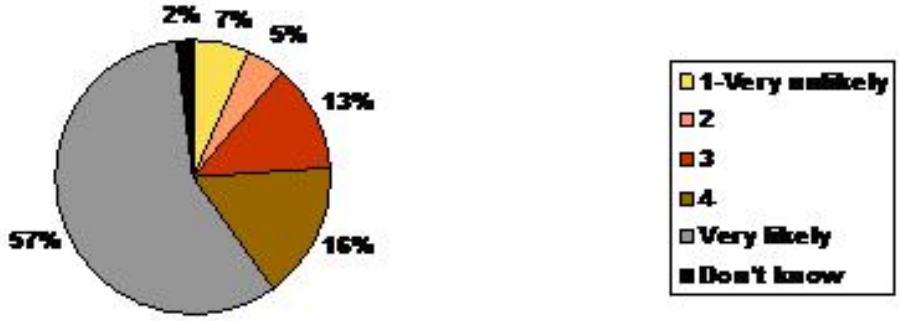
Price River Watershed
Survey Report

33: TAKE HAZARDOUS WASTE TO DROP OFF N= 197 M= 4.58 95%-Conf=0.14

5% 10.000 - 1 VERY UNLIKELY
1% 2.000 - 2 - -
5% 10.000 - 3 - -
8% 16.000 - 4 - -
80% 157.000 - 5 VERY LIKELY
1% 2.000 - DONT KNOW

34: REMOVING INVASIVE PLANTS N= 197 M= 4.17 95%-Conf=0.17

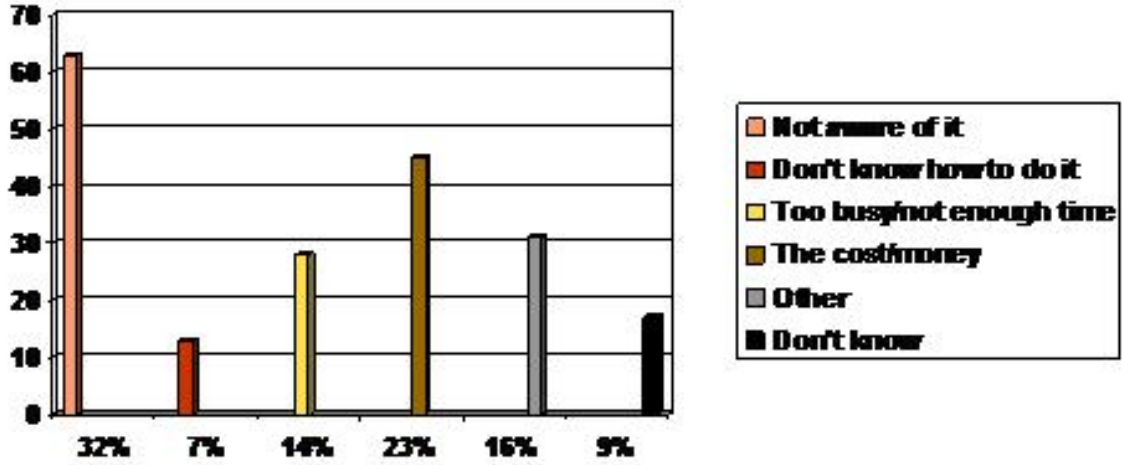
7% 13.000 - 1 VERY UNLIKELY
5% 9.000 - 2 - -
13% 25.000 - 3 - -
16% 32.000 - 4 - -
58% 114.000 - 5 VERY LIKELY
2% 4.000 - DONT KNOW



Price River Watershed
Survey Report

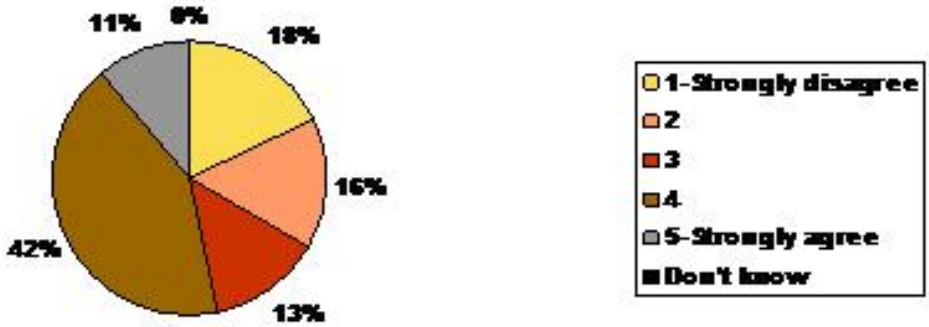
35: TAKING ON A NEW PRACTICE N= 197 M= 2.89 95%-Conf=0.22

32% 63.000 - NOT AWARE OF IT
7% 13.000 - DON'T KNOW HOW TO DO IT
14% 28.000 - TOO BUSY/ NOT ENOUGH TIME
23% 45.000 - THE COST/ MONEY
16% 31.000 - OTHER
9% 17.000 - DON'T KNOW



36: HOMES/FARMS-NOT MUCH IMPACT N= 36 M= 2.92 95%-Conf=0.47

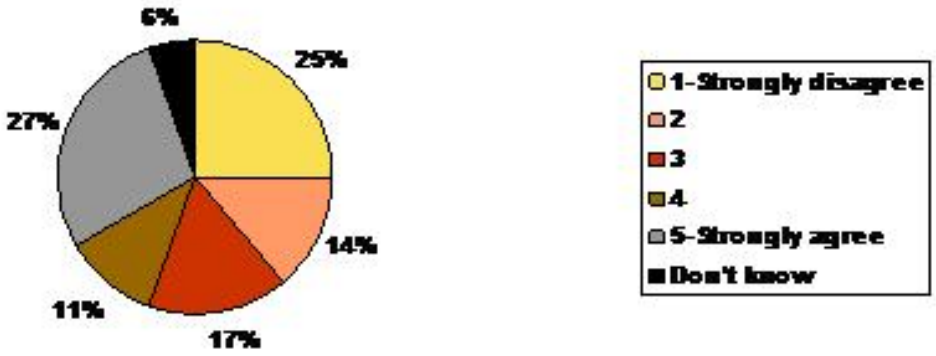
22% 8.000 - 1 STRONGLY DISAGREE
19% 7.000 - 2 - -
17% 6.000 - 3 - -
28% 10.000 - 4 - -
14% 5.000 - 5 STRONGLY AGREE
0% 0.000 - DON'T KNOW



Price River Watershed
Survey Report

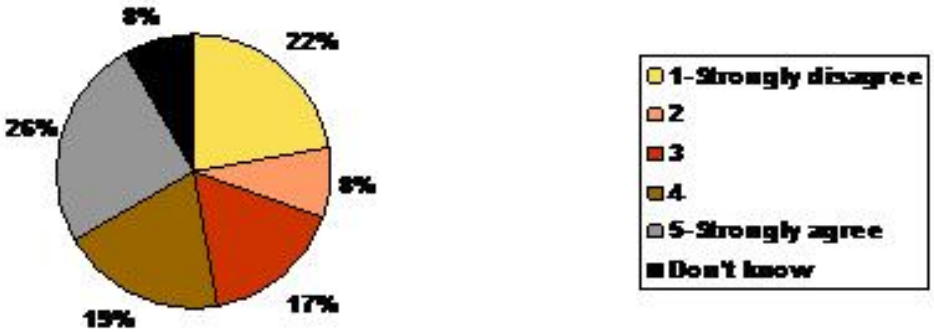
37: TOO EXPENSIVE FOR LANDOWNER N= 36 M= 3.03 95%-Conf=0.54

25% 9.000 - 1 STRONGLY DISAGREE
14% 5.000 - 2 - -
17% 6.000 - 3 - -
11% 4.000 - 4 - -
28% 10.000 - 5 STRONGLY AGREE
6% 2.000 - DONT KNOW



38: TIME OF YR YOU APPLY FERTILIZER N= 36 M= 3.18 95%-Conf=0.52

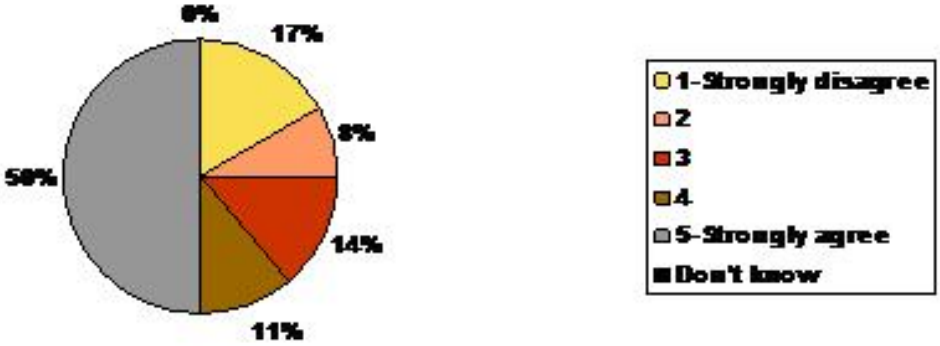
22% 8.000 - 1 STRONGLY DISAGREE
8% 3.000 - 2 - -
17% 6.000 - 3 - -
19% 7.000 - 4 - -
25% 9.000 - 5 STRONGLY AGREE
8% 3.000 - DONT KNOW



Price River Watershed
Survey Report

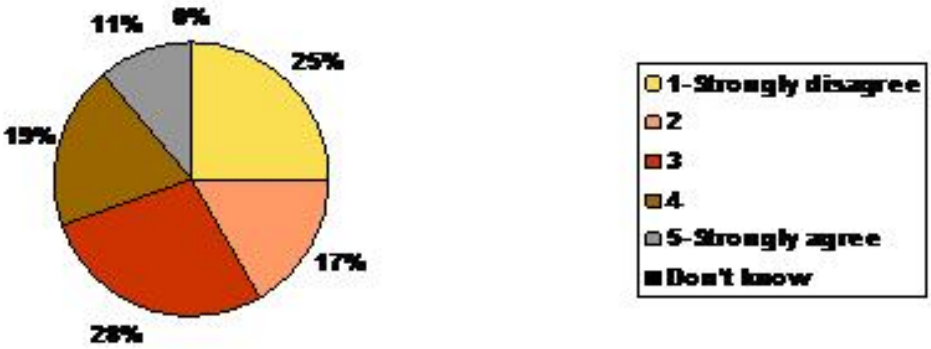
39: PROTECT QUAL./LAND PRODUCES LESS N= 36 M= 3.69 95%-Conf=0.53

17% 6.000 - 1 STRONGLY DISAGREE
8% 3.000 - 2 - -
14% 5.000 - 3 - -
11% 4.000 - 4 - -
50% 18.000 - 5 STRONGLY AGREE
0% 0.000 - DONT KNOW



40: PUTS LANDOWNER AT DISADVANTAGE N= 36 M= 2.75 95%-Conf=0.45

25% 9.000 - 1 STRONGLY DISAGREE
17% 6.000 - 2 - -
28% 10.000 - 3 - -
19% 7.000 - 4 - -
11% 4.000 - 5 STRONGLY AGREE
0% 0.000 - DONT KNOW



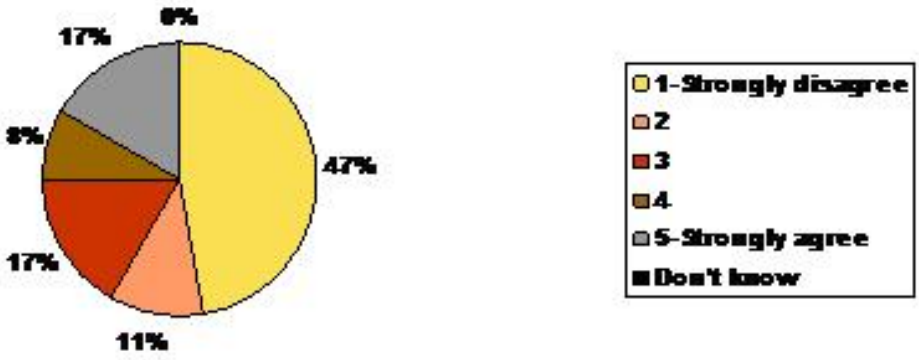
Price River Watershed
Survey Report

41: YOUR PERSONAL RESPONSIBILITY N= 36 M= 4.14 95%-Conf=0.47

14% 5.000 - 1 STRONGLY DISAGREE
0% 0.000 - 2 - -
6% 2.000 - 3 - -
19% 7.000 - 4 - -
61% 22.000 - 5 STRONGLY AGREE
0% 0.000 - DONT KNOW

42: REDUCE QUALITY/PROMOTE GROWTH N= 36 M= 2.36 95%-Conf=0.52

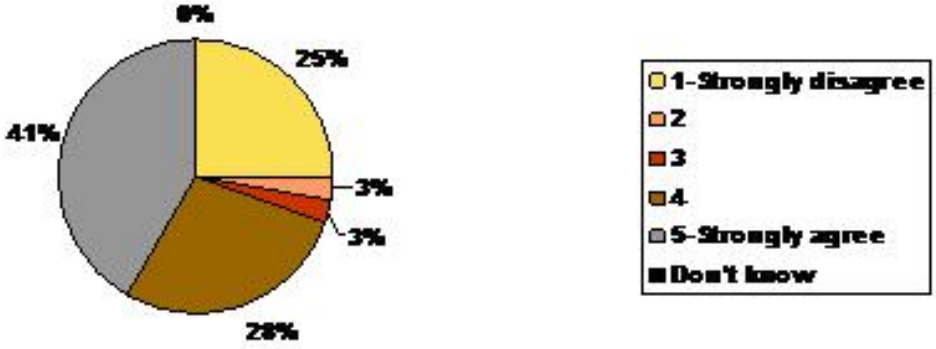
47% 17.000 - 1 STRONGLY DISAGREE
11% 4.000 - 2 - -
17% 6.000 - 3 - -
8% 3.000 - 4 - -
17% 6.000 - 5 STRONGLY AGREE
0% 0.000 - DONT KNOW



Price River Watershed
Survey Report

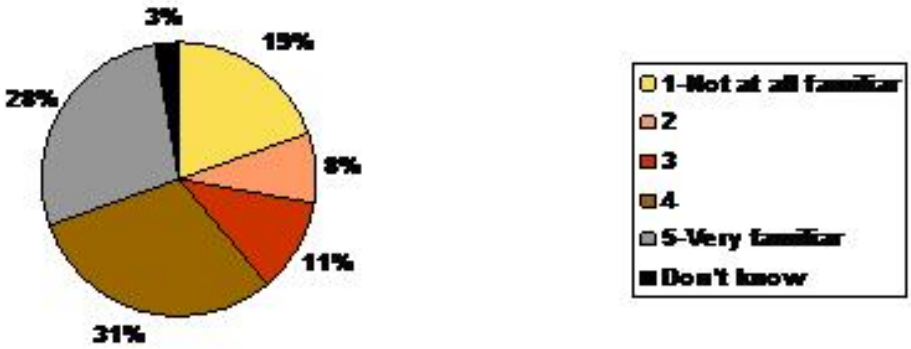
43: WILLING TO CHANGE PRACTICES N= 36 M= 3.58 95%-Conf=0.55

25% 9.000 - 1 STRONGLY DISAGREE
3% 1.000 - 2 - -
3% 1.000 - 3 - -
28% 10.000 - 4 - -
42% 15.000 - 5 STRONGLY AGREE
0% 0.000 - DONT KNOW



44: PLANTS/GRASSES ALONG STREAM BANK N= 36 M= 3.40 95%-Conf=0.50

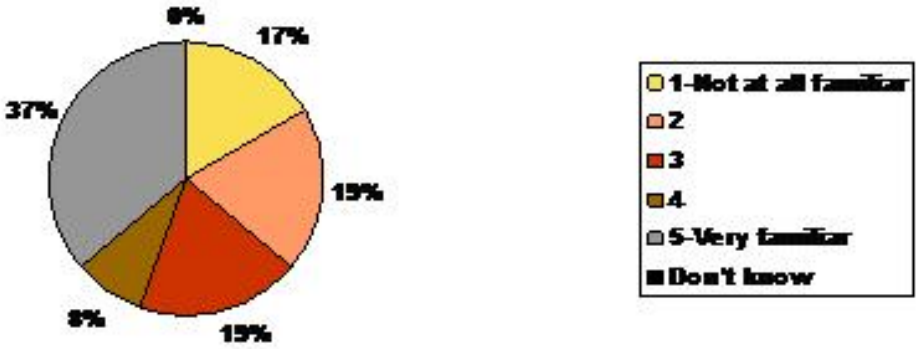
19% 7.000 - 1 NOT AT ALL FAMILIAR
8% 3.000 - 2 - -
11% 4.000 - 3 - -
31% 11.000 - 4 - -
28% 10.000 - 5 VERY FAMILIAR
3% 1.000 - DONT KNOW



Price River Watershed
Survey Report

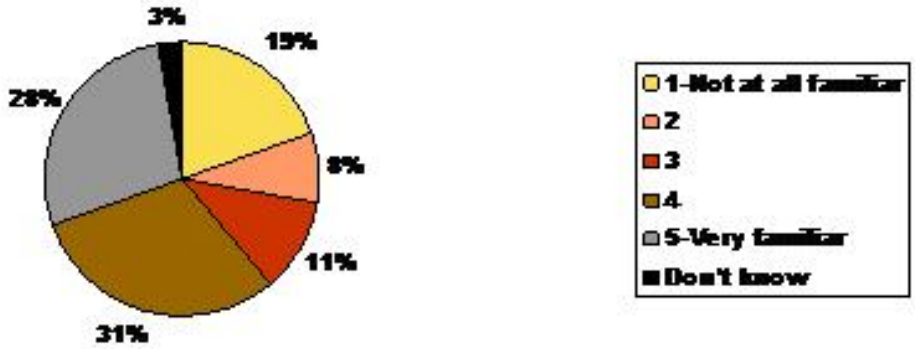
45: RESTORING WETLANDS N= 36 M= 3.28 95%-Conf=0.52

17% 6.000 - 1 NOT AT ALL FAMILIAR
19% 7.000 - 2 - -
19% 7.000 - 3 - -
8% 3.000 - 4 - -
36% 13.000 - 5 VERY FAMILIAR
0% 0.000 - DONT KNOW



46: USING NO-TILLAGE/LOW-TILLAGE N= 36 M= 3.18 95%-Conf=0.53

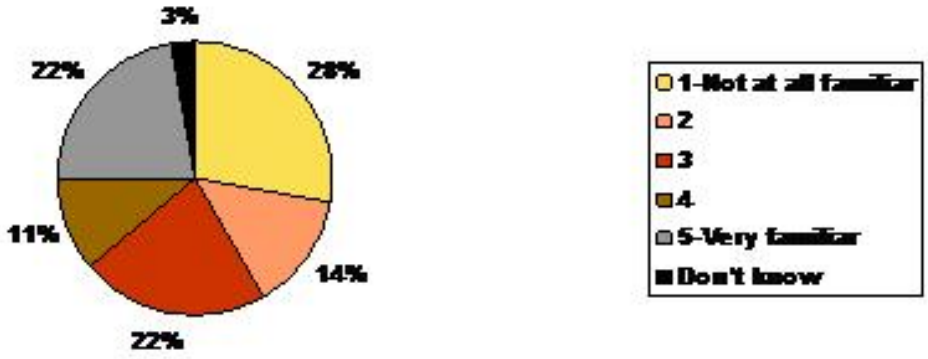
19% 7.000 - 1 NOT AT ALL FAMILIAR
17% 6.000 - 2 - -
14% 5.000 - 3 - -
11% 4.000 - 4 - -
31% 11.000 - 5 VERY FAMILIAR
8% 3.000 - DONT KNOW



Price River Watershed
Survey Report

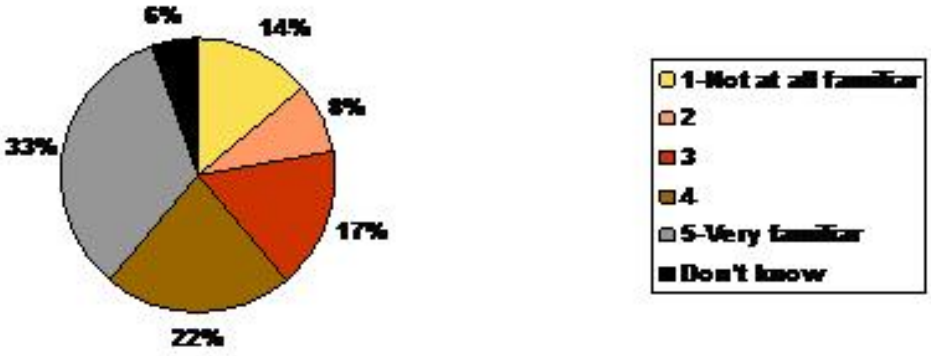
47: USING INTEGRATED PEST MANAGEMENT N= 36 M= 2.86 95%-Conf=0.52

28% 10.000 - 1 NOT AT ALL FAMILIAR
14% 5.000 - 2 - -
22% 8.000 - 3 - -
11% 4.000 - 4 - -
22% 8.000 - 5 VERY FAMILIAR
3% 1.000 - DONT KNOW



48: REDUCING FERTILIZERS/PESTICIDES N= 36 M= 3.56 95%-Conf=0.48

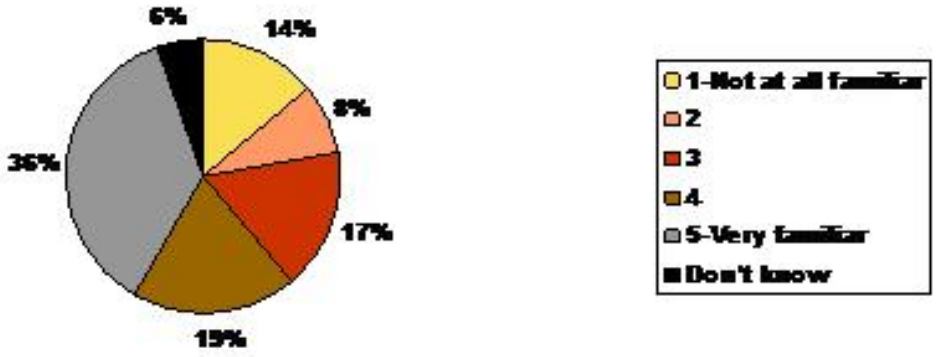
14% 5.000 - 1 NOT AT ALL FAMILIAR
8% 3.000 - 2 - -
17% 6.000 - 3 - -
22% 8.000 - 4 - -
33% 12.000 - 5 VERY FAMILIAR
6% 2.000 - DONT KNOW



Price River Watershed
Survey Report

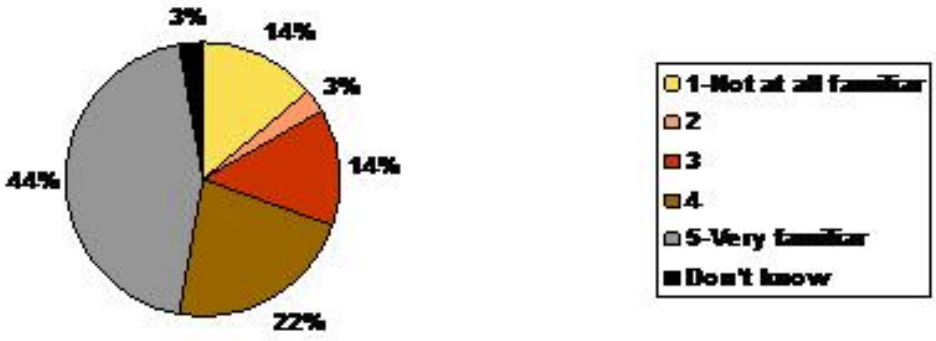
49: NUTRIENT MANAGEMENT PLAN/MANURE N= 36 M= 3.59 95%-Conf=0.49

14% 5.000 - 1 NOT AT ALL FAMILIAR
8% 3.000 - 2 - -
17% 6.000 - 3 - -
19% 7.000 - 4 - -
36% 13.000 - 5 VERY FAMILIAR
6% 2.000 - DONT KNOW



50: KEEPING LIVESTOCK OUT OF STREAM N= 36 M= 3.83 95%-Conf=0.48

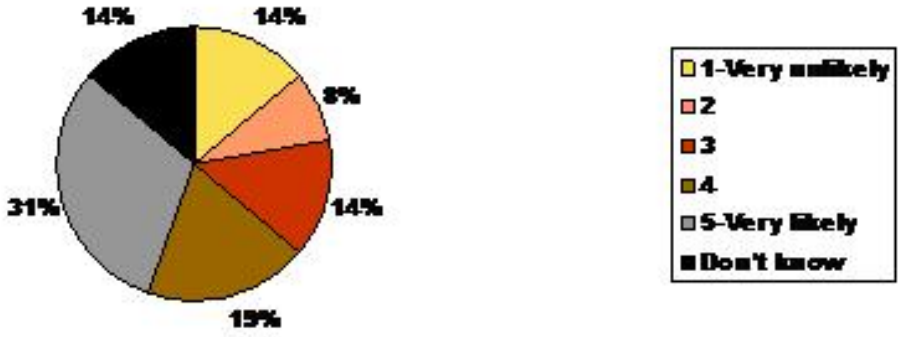
14% 5.000 - 1 NOT AT ALL FAMILIAR
3% 1.000 - 2 - -
14% 5.000 - 3 - -
22% 8.000 - 4 - -
44% 16.000 - 5 VERY FAMILIAR
3% 1.000 - DONT KNOW



Price River Watershed
Survey Report

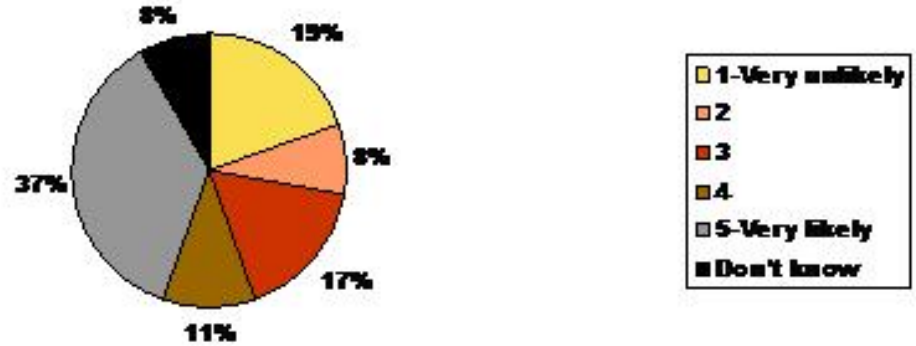
51: INSTALLING PLANTS/GRASSES N= 36 M= 3.52 95%-Conf=0.50

14% 5.000 - 1 VERY UNLIKELY
8% 3.000 - 2 - -
14% 5.000 - 3 - -
19% 7.000 - 4 - -
31% 11.000 - 5 VERY LIKELY
14% 5.000 - DONT KNOW



52: RESTORING WETLANDS N= 36 M= 3.39 95%-Conf=0.54

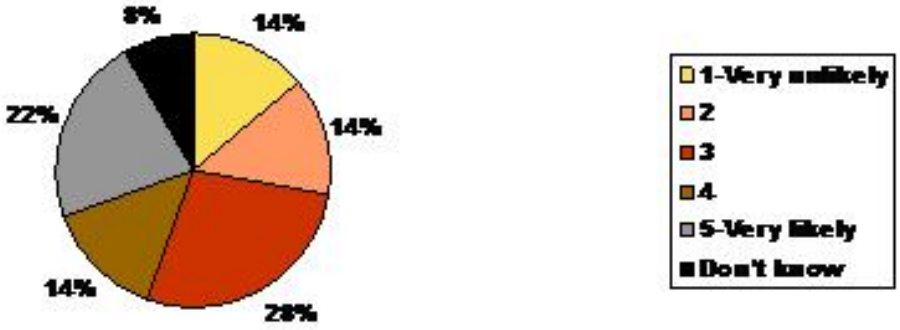
19% 7.000 - 1 VERY UNLIKELY
8% 3.000 - 2 - -
17% 6.000 - 3 - -
11% 4.000 - 4 - -
36% 13.000 - 5 VERY LIKELY
8% 3.000 - DONT KNOW



Price River Watershed
Survey Report

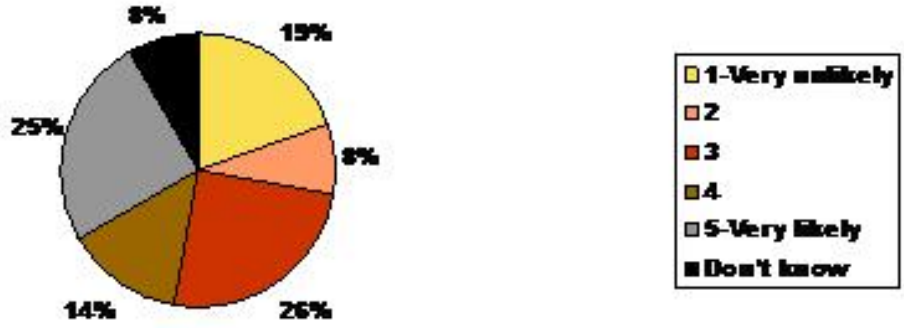
53: USING NO-TILLAGE/LOW-TILLAGE N= 36 M= 3.18 95%-Conf=0.46

14% 5.000 - 1 VERY UNLIKELY
14% 5.000 - 2 - -
28% 10.000 - 3 - -
14% 5.000 - 4 - -
22% 8.000 - 5 VERY LIKELY
8% 3.000 - DONT KNOW



54: USING INTEGRATED PEST MANAGEMENT N= 36 M= 3.18 95%-Conf=0.50

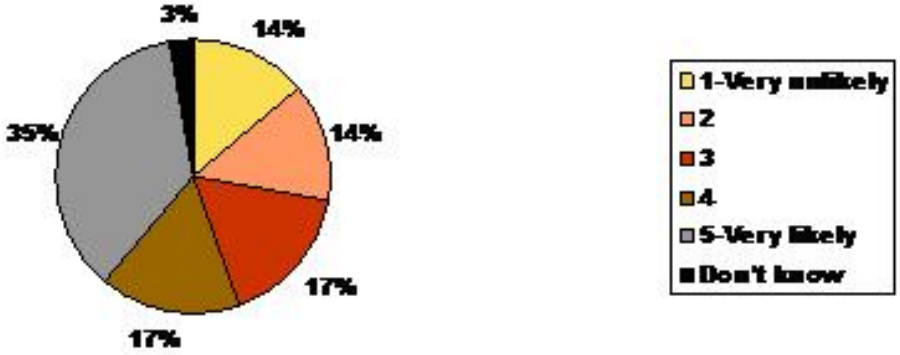
19% 7.000 - 1 VERY UNLIKELY
8% 3.000 - 2 - -
25% 9.000 - 3 - -
14% 5.000 - 4 - -
25% 9.000 - 5 VERY LIKELY
8% 3.000 - DONT KNOW



Price River Watershed
Survey Report

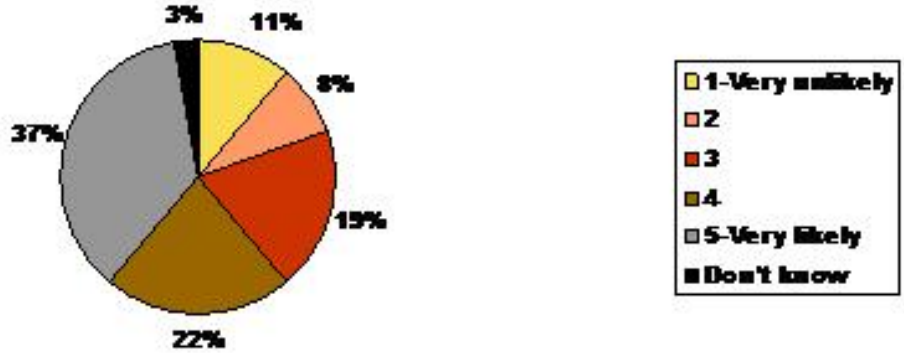
55: REDUCING FERTILIZERS/PESTICIDES N= 36 M= 3.49 95%-Conf=0.50

14% 5.000 - 1 VERY UNLIKELY
14% 5.000 - 2 - -
17% 6.000 - 3 - -
17% 6.000 - 4 - -
36% 13.000 - 5 VERY LIKELY
3% 1.000 - DONT KNOW



56: USING A NUTRIENT MANAGEMENT PLAN N= 36 M= 3.66 95%-Conf=0.46

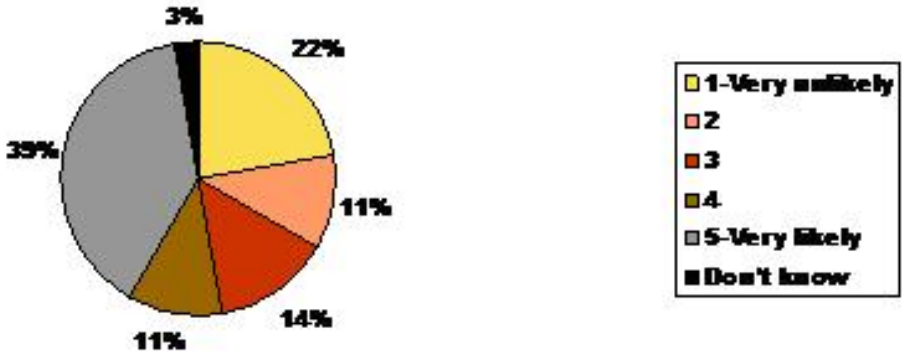
11% 4.000 - 1 VERY UNLIKELY
8% 3.000 - 2 - -
19% 7.000 - 3 - -
22% 8.000 - 4 - -
36% 13.000 - 5 VERY LIKELY
3% 1.000 - DONT KNOW



Price River Watershed
Survey Report

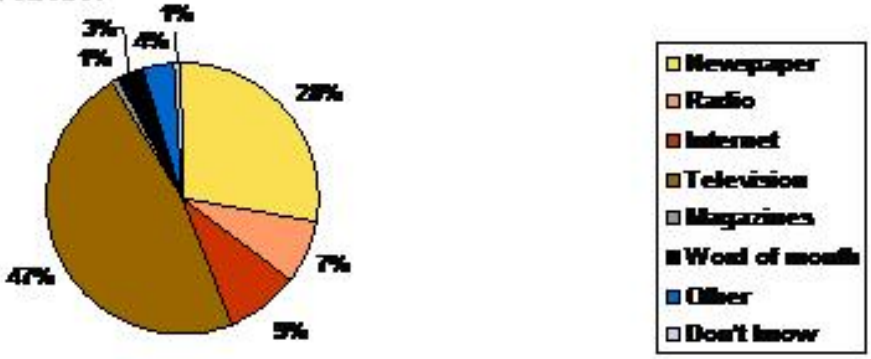
57: KEEPING LIVESTOCK OUT OF STREAM N= 36 M= 3.34 95%-Conf=0.55

22% 8.000 - 1 VERY UNLIKELY
11% 4.000 - 2 - -
14% 5.000 - 3 - -
11% 4.000 - 4 - -
39% 14.000 - 5 VERY LIKELY
3% 1.000 - DONT KNOW



58: SOURCE OF NEWS AND INFORMATION N= 233 M= 3.11 95%-Conf=0.21

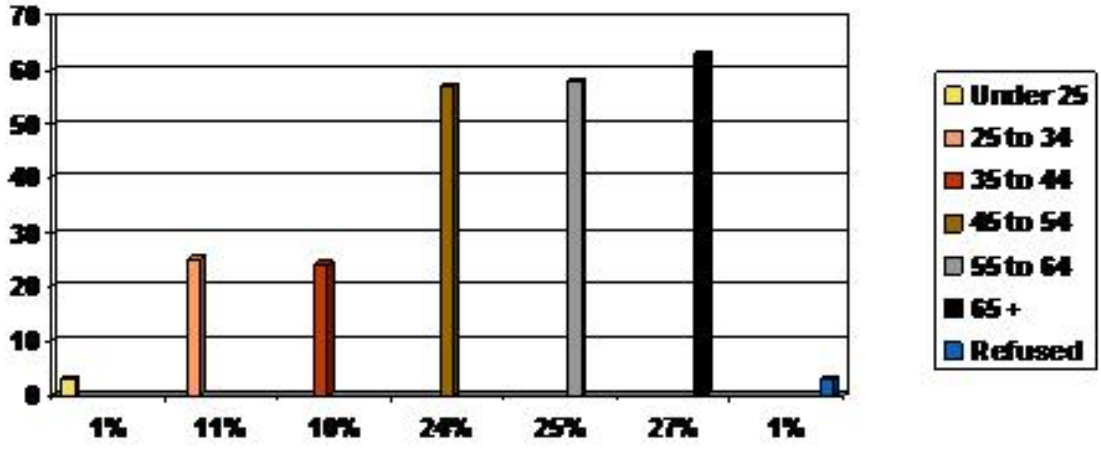
28% 65.000 - NEWSPAPER
7% 17.000 - RADIO
9% 20.000 - INTERNET
48% 111.000 - TELEVISION
1% 2.000 - MAGAZINES
3% 7.000 - WORD OF MOUTH
4% 9.000 - OTHER
1% 2.000 - DONT KNOW



Price River Watershed
Survey Report

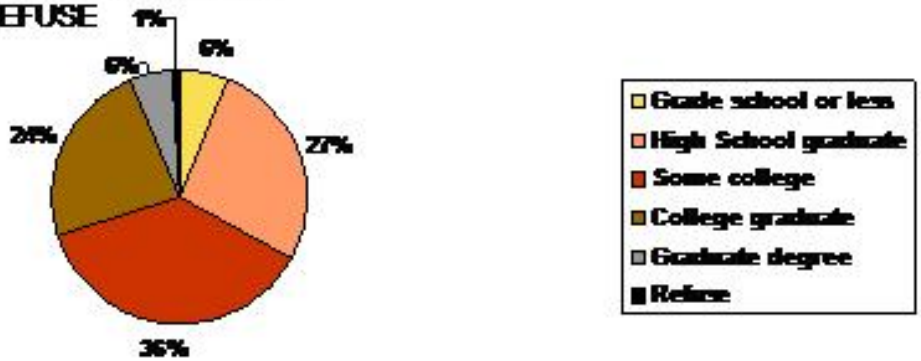
59: AGE N= 233 M= 4.44 95%-Conf=0.17

1% 3.000 - UNDER 25
11% 25.000 - 25 TO 34
10% 24.000 - 35 TO 44
24% 57.000 - 45 TO 54
25% 58.000 - 55 TO 64
27% 63.000 - 65+
1% 3.000 - REFUSE



60: EDUCATION N= 233 M= 2.96 95%-Conf=0.13

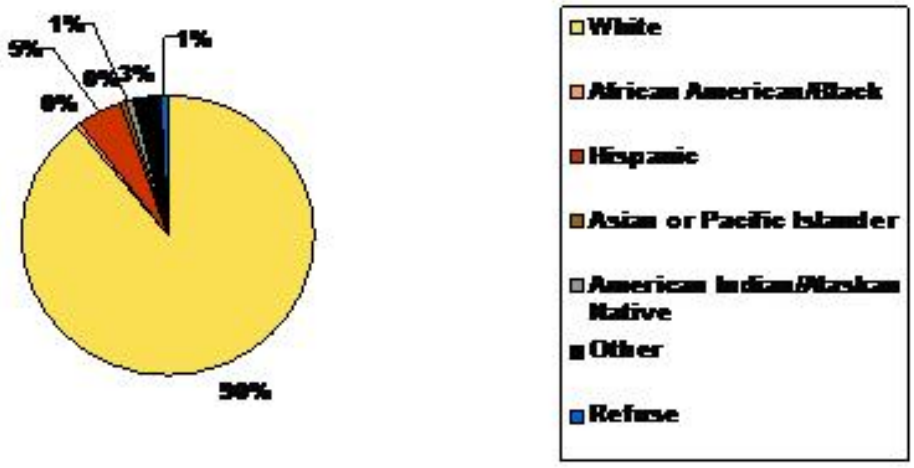
6% 14.000 - GRADE SCHOOL OR LESS
27% 63.000 - HIGH SCHOOL GRADUATE
37% 86.000 - SOME COLLEGE
24% 55.000 - COLLEGE GRADUATE
6% 13.000 - GRADUATE DEGREE
1% 2.000 - REFUSE



Price River Watershed
Survey Report

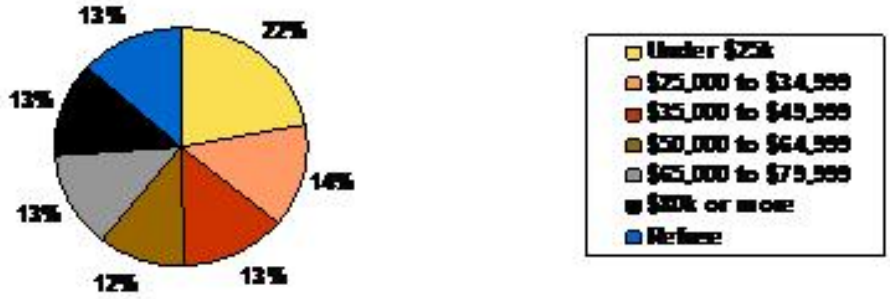
61: ETHNIC BACKGROUND N= 233 M= 1.31 95%-Conf=0.13

89% 208.000 - WHITE
0% 1.000 - AFRICAN AMERICAN/BLACK
5% 12.000 - HISPANIC
0% 1.000 - ASIAN OR PACIFIC ISLANDER
1% 2.000 - AMERICAN INDIAN OR ALASKAN NATIV
3% 7.000 - OTHER
1% 2.000 - REFUSE



62: HOUSEHOLD INCOME N= 233 M= 3.21 95%-Conf=0.23

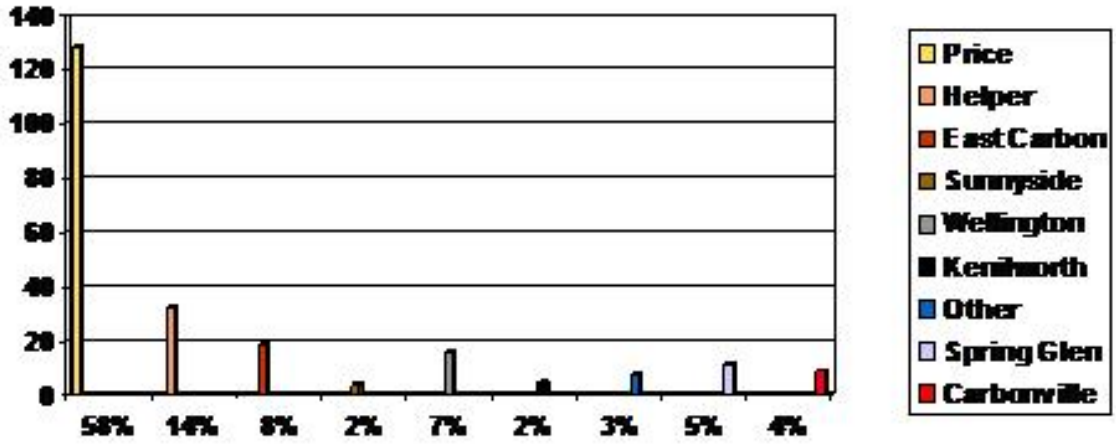
22% 51.000 - UNDER $25,000
14% 33.000 - $25,000 TO $34,999
13% 31.000 - $35,000 TO $49,999
12% 27.000 - $50,000 TO $64,999
13% 30.000 - $65,000 TO $79,999
13% 30.000 - $80,000 OR MORE
13% 31.000 - REFUSE



Price River Watershed
Survey Report

64: AREA OF RESIDENCE N= 233 M= 2.61 95%-Conf=0.31

55% 128.000 - PRICE
14% 32.000 - HELPER
8% 19.000 - EAST CARBON
2% 4.000 - SUNNYSIDE
7% 16.000 - WELLINGTON
2% 5.000 - KENILWORTH
3% 8.000 - OTHER
5% 12.000 - SPRING GLEN
4% 9.000 - CARBONVILLE



Cross tab: 1-17 with #4

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
1. How would you rate the overall quality of the environment and natural resources in Carbon County?	Very Healthy	Count	37	53	22
		Pct	15.88%	22.75%	9.44%
	Somewhat healthy	Count	34	59	6
		Pct	14.59%	25.32%	2.58%
	Somewhat unhealthy	Count	4	8	3
		Pct	1.72%	3.43%	1.29%
	Very Unhealthy	Count	1	0	0
		Pct	0.43%	0.00%	0.00%
	Don't know	Count	1	0	0
		Pct	0.43%	0.00%	0.00%
	Total	Count	77	120	31
		Pct	33.05%	51.50%	13.30%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
2. How would you rate the overall quality of the streams, rivers and lakes in Carbon County?	Very Healthy	Count	30	41	18
		Pct	12.93%	17.67%	7.76%
	Somewhat healthy	Count	37	62	8
		Pct	15.95%	26.72%	3.45%
	Somewhat unhealthy	Count	7	10	3
		Pct	3.02%	4.31%	1.29%
	Very Unhealthy	Count	1	1	1
		Pct	0.43%	0.43%	0.43%
	Don't know	Count	2	5	1
		Pct	0.86%	2.16%	0.43%
	Total	Count	77	119	31
		Pct	33.19%	51.29%	13.36%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
3. Where does storm water (the water that runs off your property) in your community go?	Nearest river, stream or lake untreated	Count	41	72	19
		Pct	20.60%	36.18%	9.55%
	Local waste water treatment facility	Count	14	15	1
		Pct	7.04%	7.54%	0.50%
	A septic	Count	0	2	0
		Pct	0.00%	1.01%	0.00%
	Underground storage facility	Count	0	0	0
		Pct	0.00%	0.00%	0.00%
	Don't know	Count	10	11	9
		Pct	5.03%	5.53%	4.52%
	Total	Count	65	100	29
		Pct	32.66%	50.25%	14.57%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
4. Rate your level of concern about the following environmental topics on a scale of 1-5, where one is not at all concerned and five is extremely concerned: Air Pollution:	not at all concerned 1	Count	23	40	15
		Pct	9.87%	17.17%	6.44%
	2	Count	17	21	5
		Pct	7.30%	9.01%	2.15%
	3	Count	17	27	6
		Pct	7.30%	11.59%	2.58%
	4	Count	10	17	1
		Pct	4.29%	7.30%	0.43%
	Extremely concerned 5	Count	10	15	4

		Pct	4.29%	6.44%	1.72%
	Total	Count	77	120	31
		Pct	33.05%	51.50%	13.30%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
6. Water pollution:	not at all concerned 1	Count	16	24	6
		Pct	6.90%	10.34%	2.59%
	2	Count	13	30	5
		Pct	5.60%	12.93%	2.16%
	3	Count	19	28	4
		Pct	8.19%	12.07%	1.72%
	4	Count	15	15	6
		Pct	6.47%	6.47%	2.59%
	Extremely concerned 5	Count	13	23	10
		Pct	5.60%	9.91%	4.31%
	Total	Count	76	120	31
		Pct	32.76%	51.72%	13.36%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
7. Water supply (having enough water):	not at all concerned 1	Count	17	17	4
		Pct	7.36%	7.36%	1.73%
	2	Count	5	20	4
		Pct	2.16%	8.66%	1.73%
	3	Count	19	29	4
		Pct	8.23%	12.55%	1.73%
	4	Count	17	26	2
		Pct	7.36%	11.26%	0.87%
	Extremely concerned 5	Count	17	28	17
		Pct	7.36%	12.12%	7.36%
	Total	Count	75	120	31
		Pct	32.47%	51.95%	13.42%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
8. Drainage from mines	No impact	Count	18	22	7
		Pct	8.33%	10.19%	3.24%
	Minor impact	Count	15	24	8
		Pct	6.94%	11.11%	3.70%
	Moderate impact	Count	16	34	8
		Pct	7.41%	15.74%	3.70%
	Major impact	Count	12	17	2
		Pct	5.56%	7.87%	0.93%
	Don't know	Count	10	14	4
		Pct	4.63%	6.48%	1.85%
	Total	Count	71	111	29
		Pct	32.87%	51.39%	13.43%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
9. Discharges from sewage treatment plants	No impact	Count	24	24	9
		Pct	11.37%	11.37%	4.27%
	Minor impact	Count	16	38	6
		Pct	7.58%	18.01%	2.84%
	Moderate impact	Count	12	19	6
		Pct	5.69%	9.00%	2.84%
	Major impact	Count	11	14	2
		Pct	5.21%	6.64%	0.95%
	Don't know	Count	8	11	6
		Pct	3.79%	5.21%	2.84%
	Total	Count	71	106	29
		Pct	33.65%	50.24%	13.74%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer

10. Erosion from construction sites	No impact	Count	24	26	11
		Pct	10.57%	11.45%	4.85%
	Minor impact	Count	9	40	8
		Pct	3.96%	17.62%	3.52%
	Moderate impact	Count	21	33	4
		Pct	9.25%	14.54%	1.76%
	Major impact	Count	16	8	2
		Pct	7.05%	3.52%	0.88%
	Don't know	Count	5	10	5
		Pct	2.20%	4.41%	2.20%
	Total	Count	75	117	30
		Pct	33.04%	51.54%	13.22%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
11. Improper disposal of hazardous household/fram wastes such as chemicals, batteries, florescent light bulbs, etc.	No impact	Count	15	15	10
		Pct	6.67%	6.67%	4.44%
	Minor impact	Count	13	33	4
		Pct	5.78%	14.67%	1.78%
	Moderate impact	Count	16	26	4
		Pct	7.11%	11.56%	1.78%
	Major impact	Count	14	20	4
		Pct	6.22%	8.89%	1.78%
	Don't know	Count	15	23	8
		Pct	6.67%	10.22%	3.56%
	Total	Count	73	117	30
		Pct	32.44%	52.00%	13.33%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
12. Runoff from developments close to streams and rivers	No impact	Count	15	22	6

		Pct	6.58%	9.65%	2.63%
	Minor impact	Count	23	37	9
		Pct	10.09%	16.23%	3.95%
	Moderate impact	Count	24	30	9
		Pct	10.53%	13.16%	3.95%
	Major impact	Count	9	16	1
		Pct	3.95%	7.02%	0.44%
	Don't know	Count	6	12	4
		Pct	2.63%	5.26%	1.75%
	Total	Count	77	117	29
		Pct	33.77%	51.32%	12.72%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
13. Excess use of lawn fertilizers and pesticides	No impact	Count	15	14	8
		Pct	6.70%	6.25%	3.57%
	Minor impact	Count	18	37	6
		Pct	8.04%	16.52%	2.68%
	Moderate impact	Count	24	37	6
		Pct	10.71%	16.52%	2.68%
	Major impact	Count	10	15	7
		Pct	4.46%	6.70%	3.13%
	Don't know	Count	8	11	3
		Pct	3.57%	4.91%	1.34%
	Total	Count	75	114	30
		Pct	33.48%	50.89%	13.39%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
14. Grass clippings and leaves entering storm drains or canals	No impact	Count	25	34	12
		Pct	11.26%	15.32%	5.41%
	Minor impact	Count	17	44	7
		Pct	7.66%	19.82%	3.15%
	Moderate impact	Count	17	17	2

		Pct	7.66%	7.66%	0.90%
	Major impact	Count	8	12	3
		Pct	3.60%	5.41%	1.35%
	Don't know	Count	7	7	5
		Pct	3.15%	3.15%	2.25%
	Total	Count	74	114	29
		Pct	33.33%	51.35%	13.06%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
15. Animal waste from pets	No impact	Count	14	27	14
		Pct	6.14%	11.84%	6.14%
	Minor impact	Count	26	37	5
		Pct	11.40%	16.23%	2.19%
	Moderate impact	Count	13	31	6
		Pct	5.70%	13.60%	2.63%
	Major impact	Count	12	15	2
		Pct	5.26%	6.58%	0.88%
	Don't know	Count	7	10	4
		Pct	3.07%	4.39%	1.75%
	Total	Count	72	120	31
		Pct	31.58%	52.63%	13.60%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
16. Noxious weeds and other invasive plant species	No impact	Count	13	21	3
		Pct	5.73%	9.25%	1.32%
	Minor impact	Count	11	29	5
		Pct	4.85%	12.78%	2.20%
	Moderate impact	Count	27	41	7
		Pct	11.89%	18.06%	3.08%
	Major impact	Count	10	16	4
		Pct	4.41%	7.05%	1.76%
	Don't know	Count	13	12	10
		Pct	5.73%	5.29%	4.41%
	Total	Count	74	119	29

		Pct	32.60%	52.42%	12.78%

			4. How would you describe your current housing and living situation		
			Urban Resident	Rural non-farm resident	Hobby or part-time farmer
17. Erosion of farm fields	No impact	Count	22	24	13
		Pct	10.09%	11.01%	5.96%
	Minor impact	Count	20	47	4
		Pct	9.17%	21.56%	1.83%
	Moderate impact	Count	13	23	6
		Pct	5.96%	10.55%	2.75%
	Major impact	Count	14	13	1
		Pct	6.42%	5.96%	0.46%
	Don't know	Count	4	5	4
		Pct	1.83%	2.29%	1.83%
	Total	Count	73	112	28
		Pct	33.49%	51.38%	12.84%

Cross tab: 19-24, with #35

			35. Generally speaking, what keeps you from taking on a new practice around your yard or home		
			I'm not aware of the practice	I don't know how to do the practice	Time/ convenience
19. Taking action to improve water quality is too expensive for an individual property owner	Strongly agree	Count	21	2	11
		Pct	12.00%	1.14%	6.29%
	Agree	Count	13	1	5
		Pct	7.43%	0.57%	2.86%
	Neither agree nor disagree	Count	15	4	5
		Pct	8.57%	2.29%	2.86%
	Disagree	Count	3	2	3
		Pct	1.71%	1.14%	1.71%
	Strongly disagree	Count	10	3	2
		Pct	5.71%	1.71%	1.14%
	Total	Count	62	12	26

		Pct	35.43%	6.86%	14.86%

			35. Generally speaking, what keeps you from taking on a new practice around your yard or home		
			I'm not aware of the practice	I don't know how to do the practice	Time/ convenience
20. The time of year I apply fertilizer to my lawn impacts water quality	Strongly agree	Count	8	1	3
		Pct	5.03%	0.63%	1.89%
	Agree	Count	10	2	4
		Pct	6.29%	1.26%	2.52%
	Neither agree nor disagree	Count	18	5	10
		Pct	11.32%	3.14%	6.29%
	Disagree	Count	11	3	4
		Pct	6.92%	1.89%	2.52%
	Strongly disagree	Count	4	2	3
		Pct	2.52%	1.26%	1.89%
	Total	Count	51	13	24
		Pct	32.08%	8.18%	15.09%

			35. Generally speaking, what keeps you from taking on a new practice around your yard or home		
			I'm not aware of the practice	I don't know how to do the practice	Time/ convenience
21. It is important to protect water quality, even when it means less economic development	Strongly agree	Count	6	0	3
		Pct	3.35%	0.00%	1.68%
	Agree	Count	4	2	2
		Pct	2.23%	1.12%	1.12%
	Neither agree nor disagree	Count	9	1	7
		Pct	5.03%	0.56%	3.91%
	Disagree	Count	18	3	6
		Pct	10.06%	1.68%	3.35%

	Strongly disagree	Count	26	7	9
		Pct	14.53%	3.91%	5.03%
	Total	Count	63	13	27
		Pct	35.20%	7.26%	15.08%

			35. Generally speaking, what keeps you from taking on a new practice around your yard or home		
			I'm not aware of the practice	I don't know how to do the practice	Time/ convenience
22. It's my personal responsibility to safeguard water quality	Strongly agree	Count	8	0	2
		Pct	4.49%	0.00%	1.12%
	Agree	Count	2	0	2
		Pct	1.12%	0.00%	1.12%
	Neither agree nor disagree	Count	7	2	4
		Pct	3.93%	1.12%	2.25%
	Disagree	Count	12	3	6
		Pct	6.74%	1.69%	3.37%
	Strongly disagree	Count	34	8	13
		Pct	19.10%	4.49%	7.30%
	Total	Count	63	13	27
		Pct	35.39%	7.30%	15.17%

			35. Generally speaking, what keeps you from taking on a new practice around your yard or home		
			I'm not aware of the practice	I don't know how to do the practice	Time/ convenience
23. Sometimes it's okay to reduce water quality to promote economic development	Strongly agree	Count	38	7	13
		Pct	21.35%	3.93%	7.30%
	Agree	Count	8	1	6
		Pct	4.49%	0.56%	3.37%
	Neither agree nor disagree	Count	6	1	3
		Pct	3.37%	0.56%	1.69%

	Disagree	Count	4	2	3
		Pct	2.25%	1.12%	1.69%
	Strongly disagree	Count	6	2	3
		Pct	3.37%	1.12%	1.69%
	Total	Count	62	13	28
		Pct	34.83%	7.30%	15.73%

			35. Generally speaking, what keeps you from taking on a new practice around your yard or home		
			I'm not aware of the practice	I don't know how to do the practice	Time/ convenience
24. I would be willing to pay more in taxes if it would improve water quality	Strongly agree	Count	6	2	6
		Pct	3.35%	1.12%	3.35%
	Agree	Count	7	5	5
		Pct	3.91%	2.79%	2.79%
	Neither agree nor disagree	Count	22	2	8
		Pct	12.29%	1.12%	4.47%
	Disagree	Count	12	3	3
		Pct	6.70%	1.68%	1.68%
	Strongly disagree	Count	16	1	6
		Pct	8.94%	0.56%	3.35%
	Total	Count	63	13	28
		Pct	35.20%	7.26%	15.64%

Cross tab: 18, 20, 36, 38, with #64

			64. Area of residence					
			Price	Helper	E. Carbon	Sunnyville	Wellington	Kenilworth
18. Households like mine don't have much impact on water quality	Strongly agree	Count	21	6	5	1	2	0
		Pct	10.82%	3.09%	2.58%	0.52%	1.03%	0.00%
	Agree	Count	22	4	6	1	4	0
		Pct	11.34%	2.06%	3.09%	0.52%	2.06%	0.00%
	Neither agree nor disagree	Count	25	8	5	0	3	4
		Pct	12.89%	4.12%	2.58%	0.00%	1.55%	2.06%

	Disagree	Count	16	2	1	1	1	1
		Pct	8.25%	1.03%	0.52%	0.52%	0.52%	0.52%
	Strongly disagree	Count	23	7	2	1	2	0
		Pct	11.86%	3.61%	1.03%	0.52%	1.03%	0.00%
	Total	Count	107	27	19	4	12	5
		Pct	55.15%	13.92%	9.79%	2.06%	6.19%	2.58%

			64. Area of residence					
			Price	Helper	E. Carbon	Sunnyville	Wellington	Kenilworth
20. The time of year I apply fertilizer to my lawn impacts water quality	Strongly agree	Count	15	3	4	2	3	0
		Pct	8.62%	1.72%	2.30%	1.15%	1.72%	0.00%
	Agree	Count	14	3	4	0	1	0
		Pct	8.05%	1.72%	2.30%	0.00%	0.57%	0.00%
	Neither agree nor disagree	Count	40	10	4	1	1	1
		Pct	22.99%	5.75%	2.30%	0.57%	0.57%	0.57%
	Disagree	Count	14	1	5	0	2	4
		Pct	8.05%	0.57%	2.87%	0.00%	1.15%	2.30%
	Strongly disagree	Count	15	6	1	0	2	0
		Pct	8.62%	3.45%	0.57%	0.00%	1.15%	0.00%
	Total	Count	98	23	18	3	9	5
		Pct	56.32%	13.22%	10.34%	1.72%	5.17%	2.87%

			64. Area of residence					
			Price	Helper	E. Carbon	Sunnyville	Wellington	Kenilworth
36. My home and farm don't have much impact on water quality	Strongly disagree	Count	6	2	0	0	0	0
		Pct	16.67%	5.56%	0.00%	0.00%	0.00%	0.00%
	Disagree	Count	4	0	0	0	1	0
		Pct	11.11%	0.00%	0.00%	0.00%	2.78%	0.00%
	Neither agree nor disagree	Count	3	1	0	0	1	0
		Pct	8.33%	2.78%	0.00%	0.00%	2.78%	0.00%
	Agree	Count	4	1	0	0	2	0
		Pct	11.11%	2.78%	0.00%	0.00%	5.56%	0.00%
	Strongly agree	Count	2	1	0	0	0	0
		Pct	5.56%	2.78%	0.00%	0.00%	0.00%	0.00%
	Total	Count	19	5	0	0	4	0

		Pct	52.78%	13.89%	0.00%	0.00%	11.11%	0.00%

			64. Area of residence					
			Price	Helper	E. Carbon	Sunnyville	Wellington	Kenilworth
38. The time of year that I apply fertilizer on my fields impacts water quality	Strongly disagree	Count	4	3	0	0	0	0
		Pct	11.11%	8.33%	0.00%	0.00%	0.00%	0.00%
	Disagree	Count	1	0	0	0	0	0
		Pct	2.78%	0.00%	0.00%	0.00%	0.00%	0.00%
	Neither agree nor disagree	Count	4	0	0	0	1	0
		Pct	11.11%	0.00%	0.00%	0.00%	2.78%	0.00%
	Agree	Count	4	1	0	0	0	0
		Pct	11.11%	2.78%	0.00%	0.00%	0.00%	0.00%
	Strongly agree	Count	4	1	0	0	3	0
		Pct	11.11%	2.78%	0.00%	0.00%	8.33%	0.00%
	Total	Count	19	5	0	0	4	0
		Pct	52.78%	13.89%	0.00%	0.00%	11.11%	0.00%