

# Upper Big Walnut Watershed



A Conjoint Analysis of Local Opinion  
Towards Water Quality

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# How Effective is Conservation?

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- 2002 Farm Bill
  - 9 Major Conservation Programs
  - 6 Programs Currently Being Funded in Ohio
  
- No Proof that Program Dollars Provide Environmental Benefits
  - Billions of \$\$ Being Spent Nationwide
  - Money seen as a supplemental income for farmers
  - NRCS Competition

# 2002 Farm Bill Allocations (So Far)

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	2002	2003	2004	2005
<b>EQIP</b>	<b>\$5,167,260</b>	<b>\$10,150,400</b>	<b>\$13,412,400</b>	<b>\$15,823,019</b>
<b>WRP</b>	<b>\$3,570,875</b>	<b>\$4,162,900</b>	<b>\$3,700,000</b>	<b>\$3,234,000</b>
<b>GRP</b>	<b>-</b>	<b>-</b>	<b>\$1,631,500</b>	<b>\$1,343,860</b>
<b>WHIP</b>	<b>\$255,000</b>	<b>\$422,800</b>	<b>\$415,000</b>	<b>\$440,181</b>
<b>CSP</b>	<b>-</b>	<b>-</b>	<b>-</b>	<b>\$4,007,000</b>
<b>FRPP</b>	<b>\$1,612,800</b>	<b>\$2,070,200</b>	<b>\$2,679,600</b>	<b>\$3,744,271</b>
<b>TOTAL</b>	<b>\$10,605,935</b>	<b>\$16,806,300</b>	<b>\$21,838,500</b>	<b>\$28,592,331</b>

# Conservation Effects Assessment Project

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- NRCS, ARS, NASS, FSA, and Others
  - National Assessment of benefits and effects of 2002 Farm Bill Programs
  
- Two Components of CEAP
  - National Assessment
    - Farmer Surveys – Field Level
  - Watershed Studies
    - 25 Watersheds, 3 levels of Study



# Conservation Effects Assessment Project

## Conservation Effects Assessment Project (CEAP): Watershed Studies Component, 2004



### ARS Benchmark Research Watersheds

- |    | <u>Watershed name</u>  |
|----|------------------------|
| GA | Little River           |
| IA | South Fork, Iowa River |
| IA | Walnut Creek           |
| IN | St. Joseph River       |
| MO | Mark Twain             |
| NY | Town Brook             |
| OH | Upper Big Walnut Creek |
| OK | Upper Washita River    |
| MS | Goodwin Creek          |
| MS | Beasley Lake           |
| MS | Yalobusha River        |
| TX | Upper Leon River       |

### Competitive Grants Watersheds

	<u>Watershed name</u>	<u>Research Lead</u>
IA	Three watersheds (Walnut Creek, South Fork Iowa River, Sny Magill)	(Iowa St. U.)
UT	Little Bear River	(Utah St. U.)
OH	Rock Creek	(Heidelberg College)
ID	Paradise Creek	(U. of Idaho)

### Special Emphasis Watersheds

- |    | <u>Watershed name</u>            |
|----|----------------------------------|
| CA | Stemple Creek                    |
| ID | Upper Snake Rock Creek           |
| KS | Cheney Lake                      |
| MD | Choptank River                   |
| OH | Maumee River (Upper Auglaize R.) |
| MI | Maumee River (Upper Tiffin R.)   |
| OR | Upper Klamath Lakes              |
| TX | North Bosque River               |

Note: CEAP Watershed locations are plotted as 8-digit Hydrologic Unit Code Watershed boundaries for general locations only.



# Environmental Attributes

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- Initial CEAP study - water quality
  - Land Bio-diversity Enhancement
    - Set aside programs and Buffers
      - Create recreational opportunities for hiking, birding, or hunting
  - Aquatic Bio-diversity Enhancement
    - Reducing silt, fertilizer, and pesticide run-off from farms
      - Create recreational opportunities such as swimming, boating, and fishing

# Environmental Attributes

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## □ Drinking Water Quality Enhancement

(Used so that respondents distinguished between Aquatic Habitat and what actually comes out of the tap)

- Silt, fertilizer, and pesticide run-off from farms
  - Costs of treating the water
  - Palatability of the water
  - Reducing farm run-off can help

# Economic Study - Conjoint

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- What is a Conjoint Analysis & Why Use it?
  - Marketing technique used to determine what attributes of a product people value most and therefore it tells us how to market that product best
    - The Product – Conservation
    - The Attributes
      - Number of Ground Nesting Birds
      - Number of Song Birds
      - Percentage of Small Streams Meeting EPA Standards
      - Percent Chance that Consumers Downstream have Clean water to Drink

# Conjoint Analysis

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- Narrow Focus
- $2^2 \times 2^3 = 36$  Possible Choice Sets
- D-Efficient Design
- Preliminary Survey
- Gauss Choice Set Selection Program (Dr. Terawaki)

Final Results of  
Choice Set  
Selection  
Program

choice set	gb	wq	tw	price
1	5	4	20	20
1	15	10	5	50
1	10	6	10	30
2	5	4	20	20
2	10	10	10	50
2	15	6	5	30
3	5	4	20	20
3	15	6	10	30
3	10	10	5	50
4	5	4	20	20
4	10	6	5	50
4	15	8	10	40
5	5	4	20	20
5	15	10	10	50
5	10	6	5	30
6	5	4	20	20
6	10	8	10	30
6	15	8	5	40
7	5	4	20	20
7	15	6	5	40
7	10	10	10	40
8	5	4	20	20
8	15	6	10	50
8	10	8	5	40

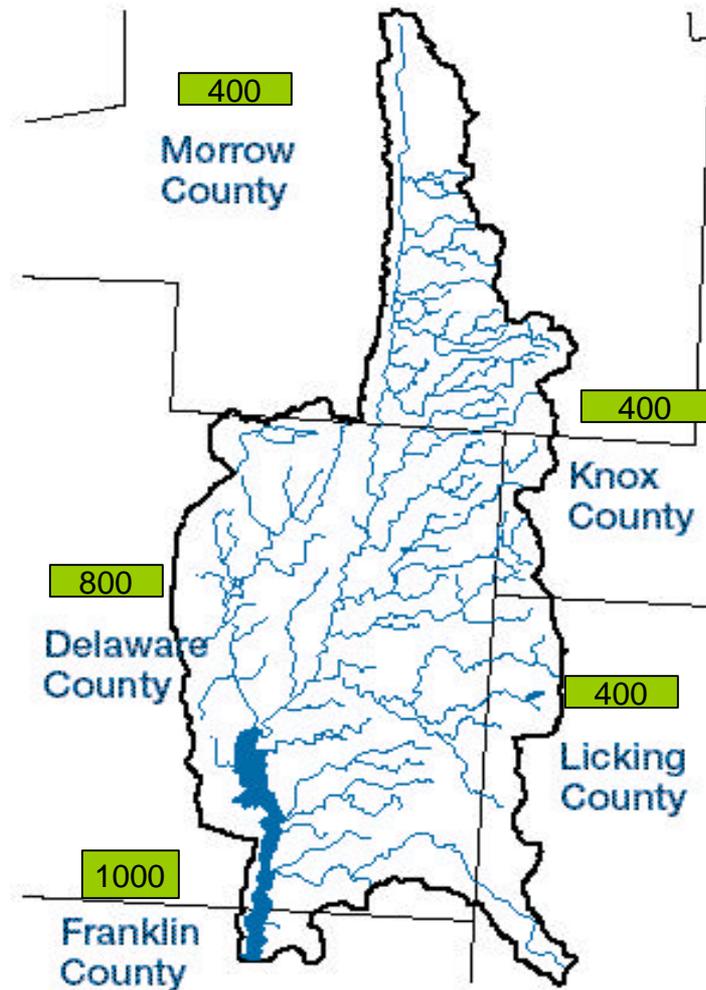
# Survey Method

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- survey 1,000 residents in central Ohio
- Ensure adequate sampling of individuals inside and outside the watershed
- Assess Willingness to pay (WTP) for improvements in this watershed

# Upper Big Walnut Watershed Map

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# Survey Questionnaire

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- Three types of questions
  1. Determine what **type of water quality they prefer**, prices are associated to attributes (used for the conjoint analysis)
  2. Determine **opinions towards water quality** in general
  3. Determine the general **demographic in central Ohio**
  
- Consider **human consumption, recreation, and aquatic habitat** when answering
  
- follow up survey & reminder postcards

□ Sample Stated Preference Survey Question

Current Condition	Condition 1	Condition 2
<p><b>Land bio-diversity:</b> On a 2.5 hour hike through the watershed, you will see: <b>350 total song birds</b> <b>15 different species of song birds</b> (such as Willow Catchers, Horned Larks, Eastern Bluebirds, Baltimore Orioles, Northern Cardinals) <b>5 total upland game birds</b> (such as Turkey, Quail, Pheasant, and Ruffed Grouse)</p> <p><b>Aquatic bio-diversity:</b> <b>4 out of 10</b> of the small streams in the watershed (see map) currently meet the federal water quality standards.</p> <p><b>Drinking water quality:</b> In <b>20 out of 100</b> uses, Columbus city tap water has <u>abnormal</u> colors, tastes, or smells.</p>	<p><b>500 total song birds</b> <b>30 species of song birds</b></p> <p><b>15 upland game birds</b></p> <p><b>10 out of 10</b> small streams meet water quality standards</p> <p><b>5 out of 100</b> uses are <u>abnormal</u></p>	<p><b>400 total song birds</b> <b>20 species of song birds</b></p> <p><b>10 upland game birds</b></p> <p><b>6 out of 10</b> small streams meet water quality standards</p> <p><b>10 out of 100</b> uses are <u>abnormal</u></p>
<p>Each household in the Upper Big Walnut Watershed currently pays an average of <b>\$20 a year</b> through Federal income tax for conservation programs.</p>	<p>Cost: Additional <b>\$30/yr</b> for 3 years for a Local Conservation Fund</p>	<p>Cost: Additional <b>\$10/yr</b> for 3 years for a Local Conservation Fund</p>
<p>Please decide which condition you prefer. If you prefer the current condition, check the box under the current condition. <b>Check your preference below:</b></p>		
<p><b>Current Conditions</b></p> <p style="text-align: center;"><input type="checkbox"/></p>	<p><b>Condition 1</b></p> <p style="text-align: center;"><input type="checkbox"/></p>	<p><b>Condition 2</b></p> <p style="text-align: center;"><input type="checkbox"/></p>



# Examples of Demographic Questions

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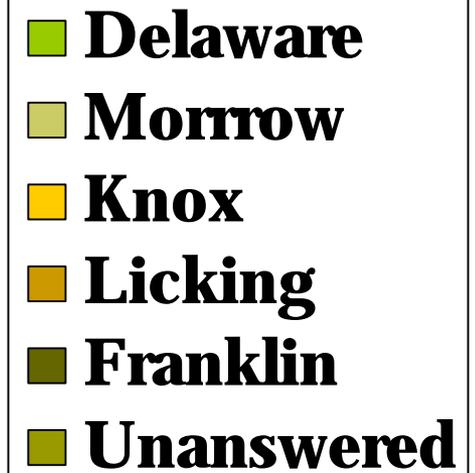
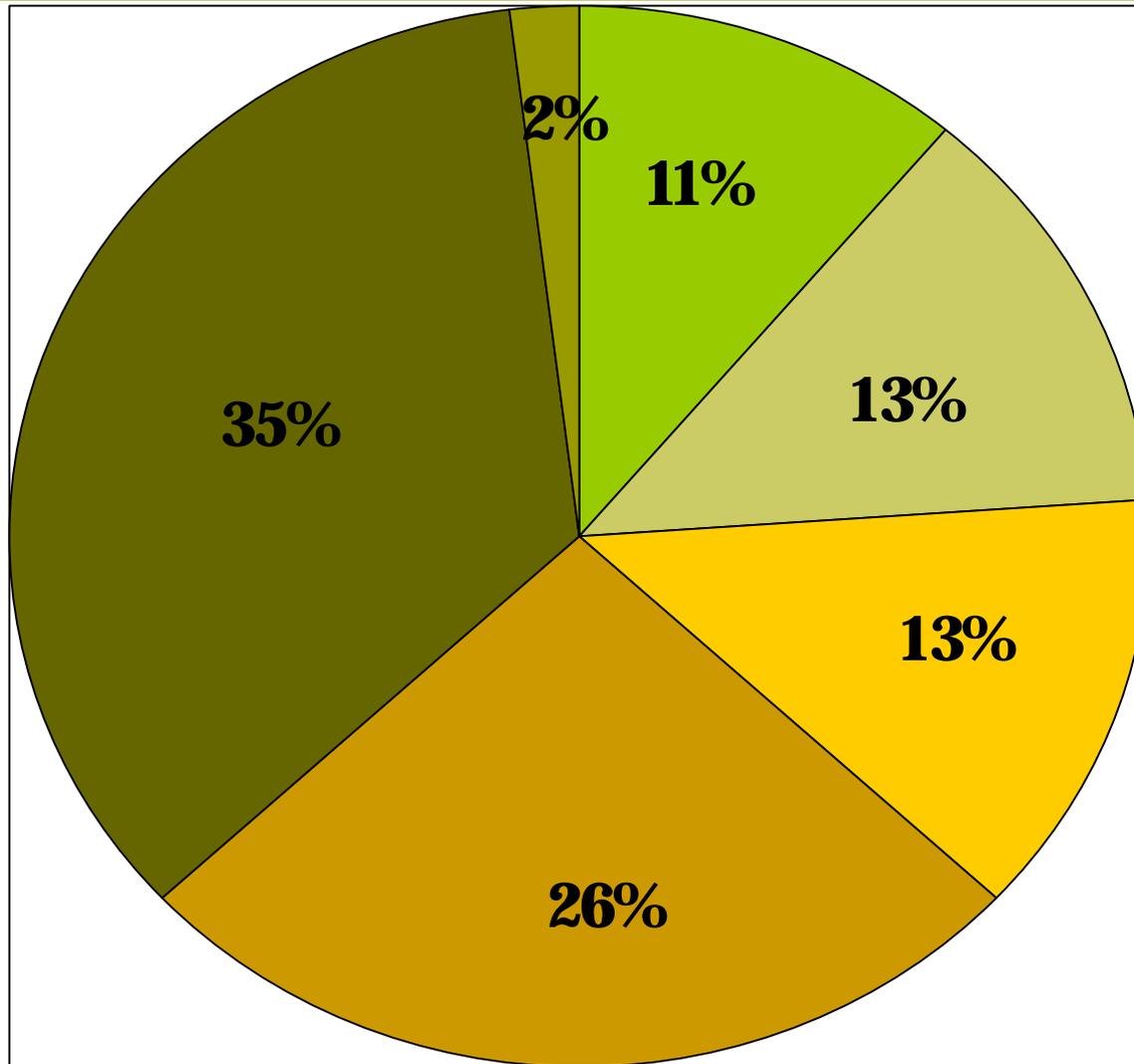
- Have you ever owned farmland or worked on a farm (check one)?  
 Yes                       No
  
- How many miles do you live from downtown Columbus, Ohio (check one)?  
 0-10       10 - 25                       25 - 50                       50 - 75  
 more than 75
  
- What was the total before tax income of your entire household in 2004?  
 Less than \$25,000  
 Between \$25,000 and \$49,999  
 Between \$50,000 and \$74,999  
 Between \$75,000 and \$99,999  
 More than \$100,000
  
- Have you ever hunted ground birds?  
 yes                       no

# Survey Results!

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- 254 valid responses out of 1,000
- 89 bad addresses – marked return to sender
- 28% response rate

# Survey Response Rates by County



# Who Did We Survey?

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## □ Average Statistics

- 24.6 - miles from the City of Columbus
- 2.4 – average people per household
- 22.2 – average years living in central Ohio
- \$49,500 – 2004 average household income
- 1941 (64 years old) – average respondent's birth year

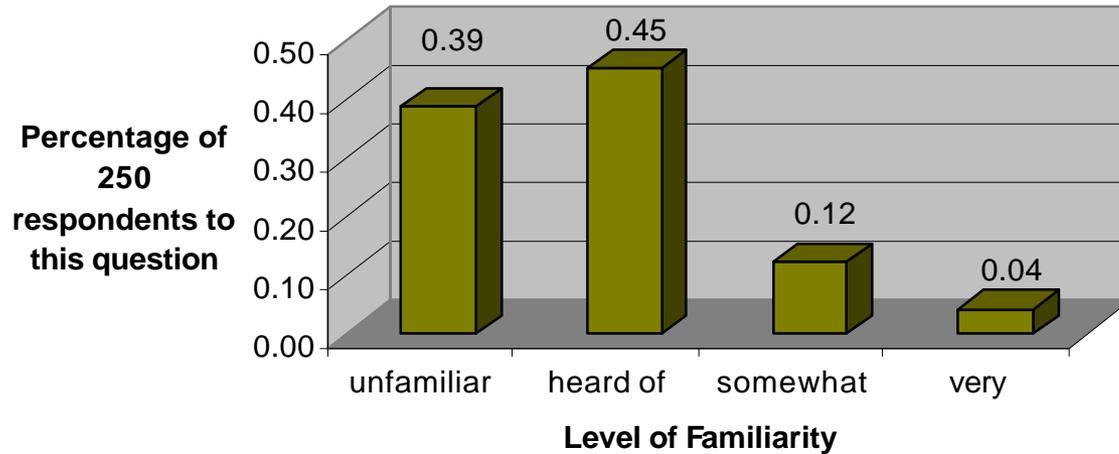
# Who Did I Survey?

## ▣ Statistics Cont.

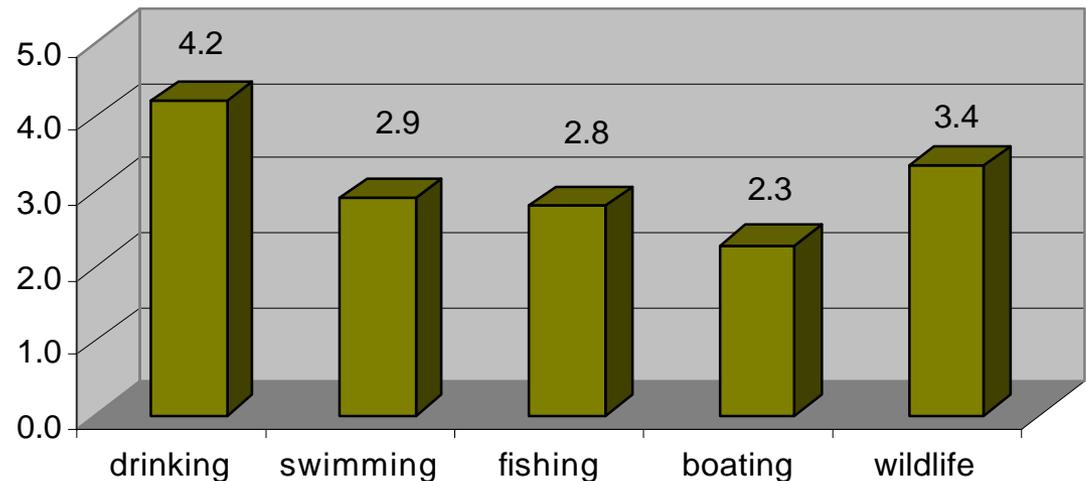
- ▣ 5% did not graduate high school, 21% high school graduate, 28% completed some college, 24% completed college, and 15% have advanced degrees
- ▣ 61% male / 39% female
- ▣ 54% work full time, 27% retired, 12% work part time, 5% work full time in the household, 2% other
- ▣ 53% consider themselves bird watchers
- ▣ 17% consider themselves hunters

# Selected Survey Responses

## Familiarity with Farm Bill Conservation Programs

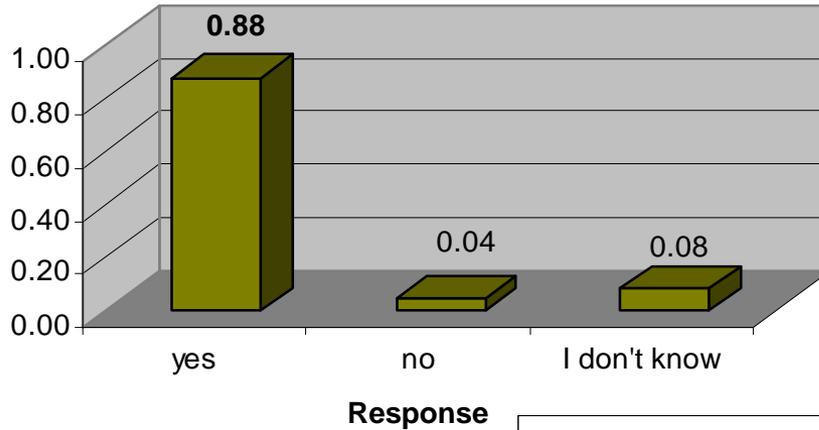


## Importance of Water Usage (Ranked from 1-5)

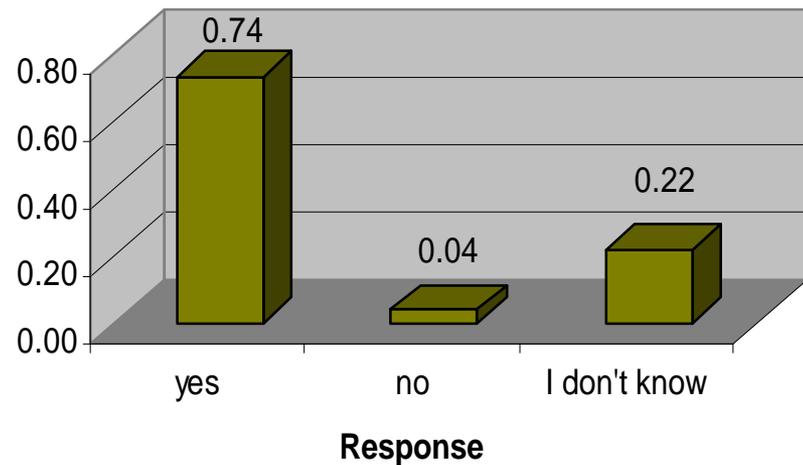


# Selected Survey Responses

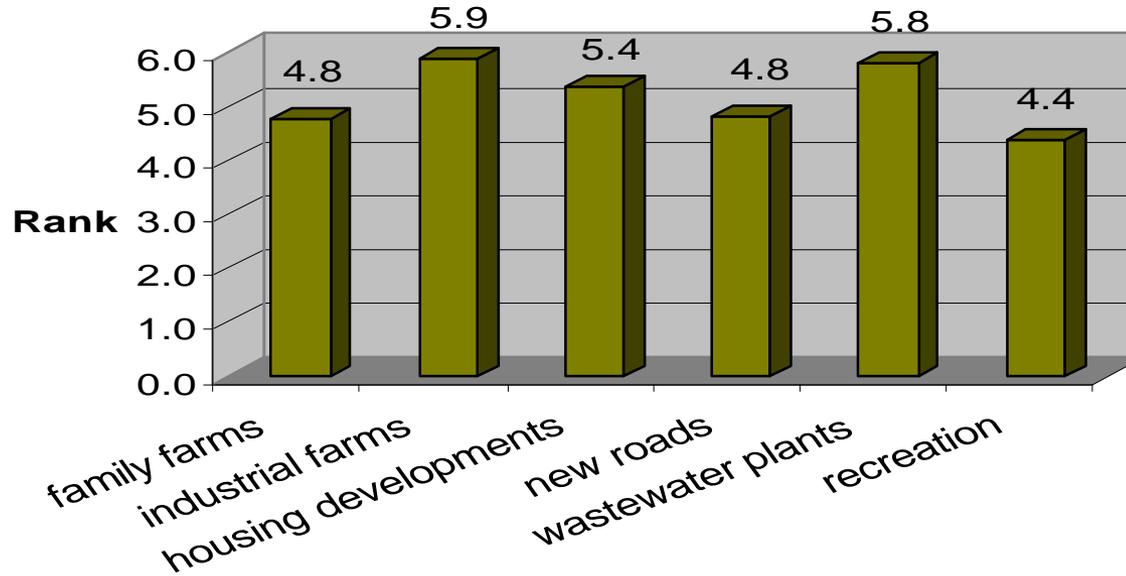
## Importance of Water Quality in the State of Ohio



## Importance of Water Quality in the Upper Big Walnut Watershed



## Sources of Water Pollution (Ranked on a Scale of 1 -7)



	Recreation Trips						
	boating / fishing in Hoover	boating / fishing in UBWW	boating / fishing in Ohio	non- boating / fishing Hoover	non- boating / fishing UBWW	non- boating / fishing Ohio	sightseeing
<b># of trips</b>							
<b>0</b>	<b>198</b>	<b>242</b>	<b>232</b>	<b>205</b>	<b>223</b>	<b>245</b>	<b>195</b>
<b>3</b>	<b>39</b>	<b>23</b>	<b>52</b>	<b>64</b>	<b>48</b>	<b>70</b>	<b>91</b>
<b>8</b>	<b>7</b>	<b>8</b>	<b>11</b>	<b>9</b>	<b>11</b>	<b>26</b>	<b>18</b>
<b>13</b>	<b>1</b>	<b>2</b>	<b>6</b>	<b>4</b>	<b>4</b>	<b>11</b>	<b>8</b>
<b>20</b>	<b>1</b>	<b>1</b>	<b>13</b>	<b>2</b>	<b>2</b>	<b>24</b>	<b>6</b>

# Final Limdep Results

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- Final Utility Weightings:

b1 (ground birds) = .039

b2 (water quality) = .200

b3 (tap water) = -.051

b4 (price) = - .049

- Marginalized Value Using 5% Discount Rate:

Value of 1 additional ground bird = \$2.20

(CI: \$1.39 to \$3.13)

Value of 10% additional streams meeting EPA = \$11.08

(CI: \$10.02 to \$12.28)

Value of reducing the possibility of having a bad drink = \$2.80

(CI: \$2.23 to \$3.43)

# Data Interpretation

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- Benefit Cost Analysis
  - Drinking Water Quality
    - Interview with Dan Binder of OEC
  - Stream Water Quality
    - Cost Data from Multiple Sources
  - Ground and Song Bird Conservation

□ Drinking Water Quality

<u>Reduction Level and Indicator</u>	<u>Dan Binder's Improvement Assumption</u>	<u>Cost Public is WTP for Improvement in gallon / year</u>	<u>Total Improved Drinks / year</u>
5% Reduction in Sediment	No Improvement	\$0	0
20% Reduction in Sediment	20% Improvement	\$.09	28 million
40% Reduction in Sediment	35% Improvement	\$.05	49 million
5% Reduction in Nitrogen	No Improvement	\$0	0
10% Reduction in Nitrogen	No Improvement	\$0	0
40% Reduction in Nitrogen	10% Improvement	\$.19	14 million
5% Reduction in Phosphorous	10% Improvement	\$.19	14 million
20% Reduction in Phosphorous	40% Improvement	\$.04	56 million
25% Reduction in Phosphorous	40% Improvement	\$.04	56 million
5% Reduction in Pesticides	No Improvement	\$0	0
10% Reduction in Pesticides	No Improvement	\$0	0
20% Reduction in Pesticides	10% Improvement	\$.19	14 million

# Stream Water Quality

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- One additional Small Stream Meeting EPA Standards = \$11.08
  
- \$11.08 x 600,000 consumers = \$6.6 Million
  
- Environmental Improvements Possible
  - Buffers
  - Tillage
  - Pest Management
  - Nutrient Management

# Ground and Song Bird Conservation

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	Conservation Buffers		Conservation Tillage	
	3%	5%	75%	95%
Increased Ground Birds	20%	20%	0%	10%
Increased Song Birds	5%	5%	0%	5%

# Conclusions

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- Simple Questions – Limiting Factor
  
- Recommendations
  - Follow up Survey after new Conservation Installed
  
  - Repeat Study in other areas of the State or Country

ANY QUESTIONS??

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