

Upper Big Walnut Watershed

A Conjoint Analysis of Local Opinion
Towards Water Quality

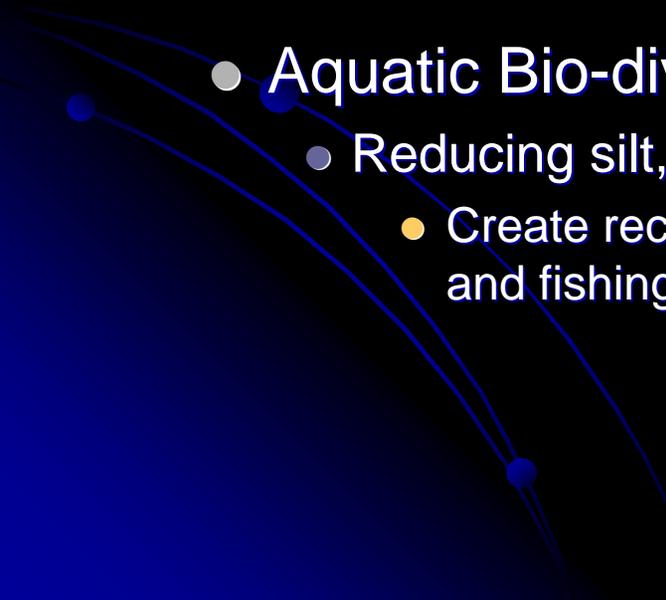
Colleen Tennity, Brent Sohngen, Norm Fausey, Kevin King

The Ohio State University
Agriculture Research Service

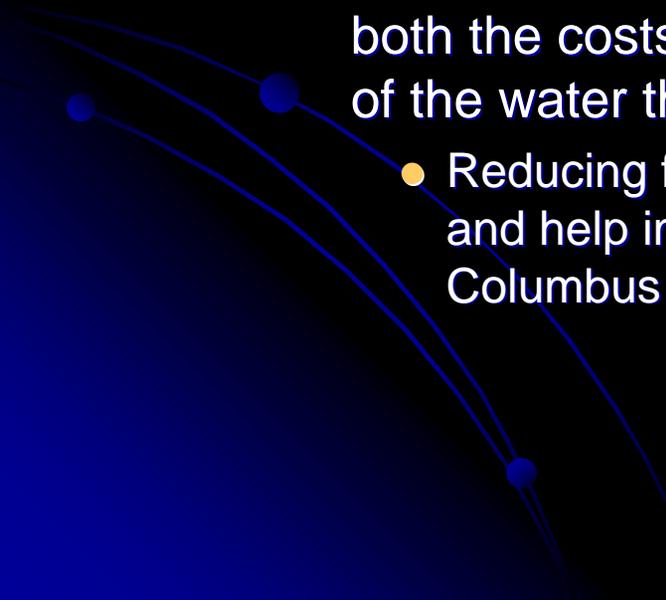
Economic Study - Conjoint

- 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

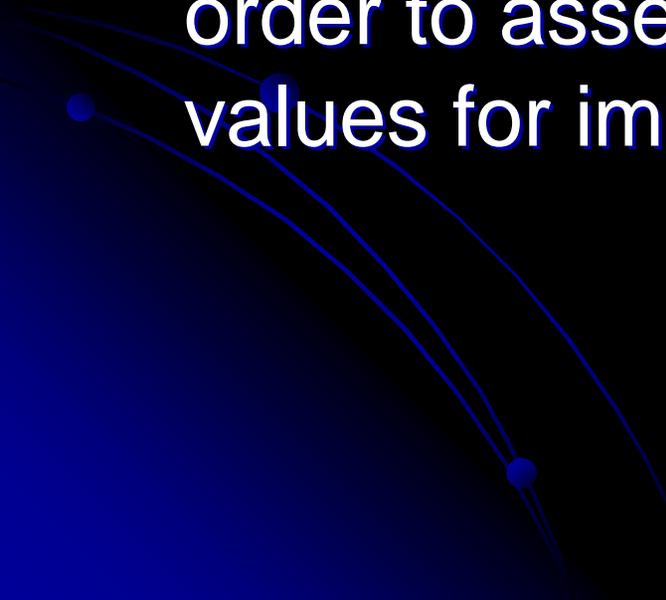
Why Those Attributes?

- 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
- 

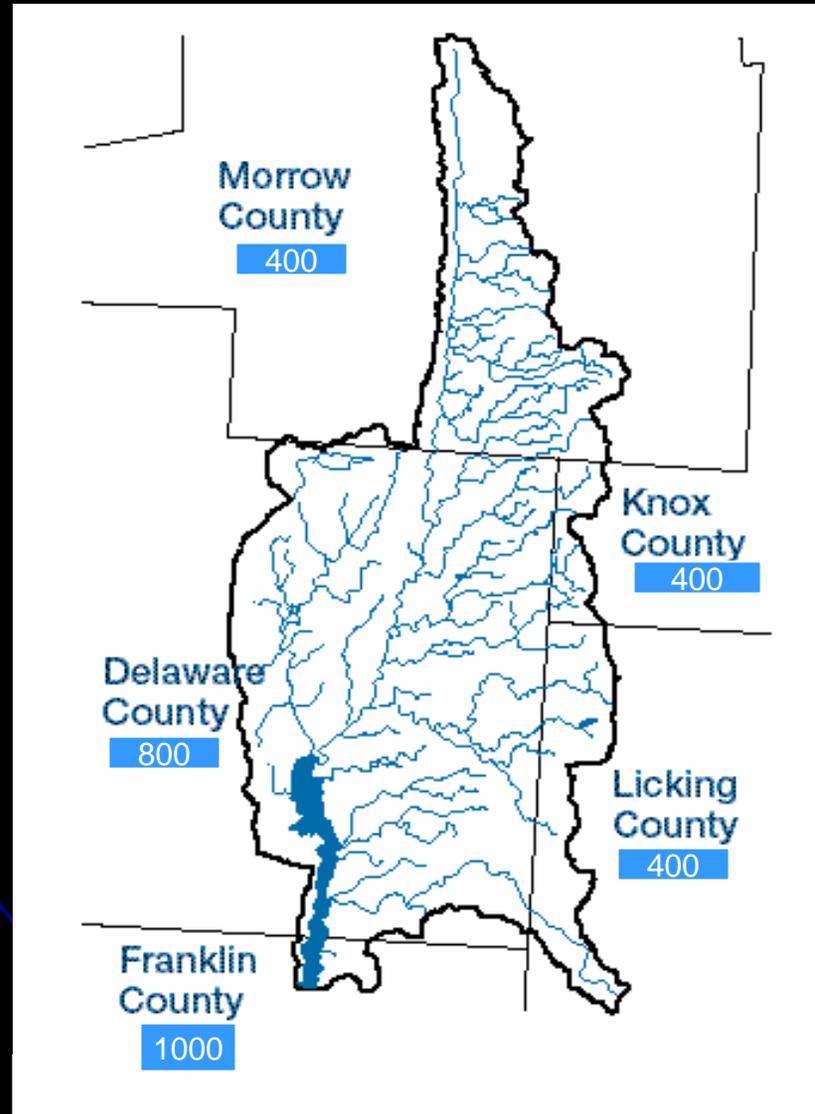
Why Those Attributes?

- 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 can influence both the costs of treating the water as well as the palatability of the water that people drink
 - Reducing farm run-off can help reduce costs of treating water and help improve the palatability of water that people in Columbus drink
- 

Survey Method

- survey **1,000 residents** in central Ohio
 - Ensure adequate sampling of individuals **inside and outside the watershed** in order to assess potential differences in values for improvements in this watershed
- 

Upper Big Walnut Watershed Map



Survey Questionnaire

- 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**
- Respondents asked to consider **human consumption, recreation, and aquatic habitat** when answering
- A dollar bill will be included in every survey to encourage response
- Reminder cards will be sent, along with a follow up copy of the survey

Sample Survey Question

Scenario 1: Check your preferred alternative below

Current Conditions	Alternative 1	Alternative 2
<p>Land bio-diversity: On a 2.5 hour hike through the watershed, you will see:</p> <p>350 total song birds 15 different species of song birds (such as Willow Flycatchers, Yellow Warblers, Eastern Bluebirds, Baltimore Orioles, Northern Cardinals)</p> <p>5 total ground birds (such as Ring Necked Pheasants and Wild Turkeys)</p>	<p>400 total song birds</p> <p>20 species of song birds</p> <p>10 ground birds</p>	<p>500 total song birds</p> <p>30 species of song birds</p> <p>15 ground birds</p>
<p>Aquatic bio-diversity: 4 out of 10 of the small streams in the watershed (see map) currently meet the Federal Clean Water Act standards for water quality</p> <p>Drinking water quality: In 20 out of 100 uses, Columbus city tap water is not palatable due to abnormal colors, tastes, or smells.</p>	<p>6 out of 10 small streams meet water quality standards</p> <p>10 out of 100 uses not palatable</p>	<p>8 out of 10 small streams meet water quality standards</p> <p>5 out of 100 uses not palatable</p>
<p>Each household in the Upper Big Walnut Watershed currently pays an average of \$20 a year through Federal income tax for conservation programs.</p>	<p>Price: \$30 (or \$10 in addition to the current tax contribution)</p>	<p>Price: \$40 (or \$20 in addition to the current tax contribution)</p>
<p>Check your Preferred Alternative Here: <input data-bbox="824 1218 896 1289" type="checkbox"/></p>	<p><input data-bbox="1195 1210 1268 1282" type="checkbox"/></p>	<p><input data-bbox="1662 1220 1734 1292" type="checkbox"/></p>

Examples of Environmental Quality Questions

- Please rank the following water uses, in terms of importance of high water quality. Rank from 1 to 5, with 1 being the most important, 5 being the least important

_____ Drinking water

_____ Swimming

_____ Fishing

_____ Boating

_____ Adequate wildlife habitat (for species living in and around the water)

- On average, how many bottles of water do you drink a month (check the best response)?

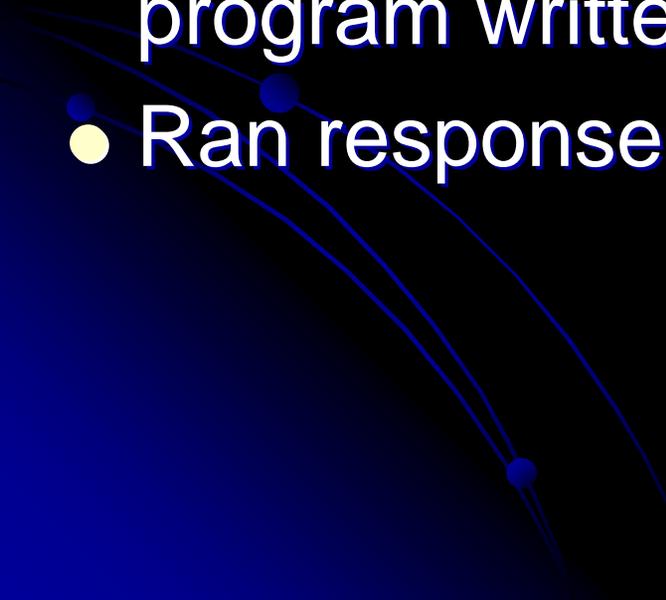
_____ None _____ 0-10 _____ 10 – 25 _____ 25 - 50 _____ more than 50

- We should continue working to improve water quality so that future generations will have the option to use streams and rivers in the future.

(Strongly Disagree.....Strongly Agree)

1 2 3 4 5 6 7

Preliminary Results!

- D – Efficient design needed - “human factor”
 - Preliminary study done of 20 people who live in the Columbus / Upper Big Walnut Area
 - Asked 18 questions developed through a program written in Gauss
 - Ran responses of the survey through Limdep
- 

Limdep Results

- Limdep measures an indirect utility function, so its parameters are utility weightings
- Results:

b1 (ground birds) = .062

b2 (water quality) = .425

b3 (tap water) = -.097

b4 (price) = - .09

What do Utilities Mean?

- Welfare effects of one unit change in each variable is measured as:

$\$ / \text{unit}$ (a.k.a. compensating variation) = $-b_X/b_4$;

where $X = 1, 2, \text{ or } 3$

So from this formula, we can determine:

Value of 1 additional ground bird = $-.062/-.09 = \$0.69$

(CI: \$.041 to \$1.38)

Value of 10% additional streams meeting EPA = $\$4.71$

(CI: \$3.49 to \$6.45)

Value of reducing the possibility of having a bad drink = $\$1.08$

(CI: \$.59 to \$1.68)

What's Next?

- Use the d-efficient design to pick the appropriate 8 questions we are going to study
- Send the survey out to 1000 residents in Central Ohio
- Run the final responses through Limdep
- Compare the results with initial findings of ARS BMP monitoring study

ANY QUESTIONS??

