

I. Introduction

Over the last three years, Southeastern Wisconsin has been subjected to two major flooding events. The latest of these in August 1998 caused an estimated \$54 million of total damage and forced 300 Milwaukee residents to evacuate their homes (Milwaukee Journal Sentinel, August 30, 1998). Given the severity and frequency of flooding events in this area, a policy debate has erupted over the role of government and community in minimizing flood risk. Typical to any government project, there are questions as to the need for flood control projects and who should pay for them.

There are two opinions over who should cover the burden of flood risk. One posits that individuals located near a river prone to flooding should be held responsible and forced to cover the cost of flood control and damage abatement projects themselves. After all, it is their decision to live near the river and therefore it should be their responsibility to cover the expenses that come with that choice. On the other hand, people located downstream often blame upstream development for increasing the potential for flooding, and therefore argue everyone should share the cost to prevent it down stream. Also, flooding is a problem that not only affects households near the river, but that can also bear costs for an entire community. Flooded streets, backed-up sewer systems and lack of clean water clearly do not only affect individuals living in the flood plain. This enhances the arguments in favor of providing flood risk management as a public good.

This debate over the burden of flood risk reduction is the topic of this paper. Given the arguments and sentiments both for and against, it is important to empirically investigate how a variety of individuals would respond to a proposed policy package to reduce risk. This task requires very detailed information from actual community members to develop the

individuals' willingness to pay for such a non-marketed good. Due to the data requirements then, a Contingent Valuation (CV) study was conducted, in which a hypothetical goods market was developed for a reduction in flood risk that respondents were asked to value. Using this survey data and spatial analysis from ArcView GIS, it is possible to estimate each individual respondents' willingness to pay (WTP) function for this good and determine how each values a proposed reduction in flood risk. This provides insight into how the burden for flood risk management should be shared, either as a public good borne by the community or a private good paid for by those affected.

The paper will first discuss the theory of flood risk, followed by an extensive review of the CV methodology and relevant literature. Then, there will be a brief review of the CV survey employed in this study, the data used along with any potential data limitations and then the proposed empirical methodology to analyze the data. Finally, several empirical models will be tested to determine whether flood risk management is indeed a public good and how individual's WTP responds to changes in spatial flood risk.

II. Defining and Estimating Flood Risk

Since the good being valued in this study is a reduction in flood risk, it is important to understand how this is defined and measured. The definition of flood risk used in this paper follows closely that in Bartosova et al (1999). They define a flood as "...a stream discharge greater than the capacity flow of the channel (Bartosova et al., 1999, 3)." A flood event of this magnitude occurs at a certain frequency, called the recurrence interval. This measures the time between flood events that would reach a point x distance from the river. The most common recurrence interval used is $T_r=100$ years. This corresponds to a flood risk at the border of a 100 year recurrence interval flood plain of $r = 1/T_r = 1/100 = 0.01$. This says that

for a point x distance from a river, there is a 1% annual chance of a flood event that would affect it. Therefore, by computing the border of the flood plain recurrence level that a household is located on, it is possible to determine their risk as a function of their location on the flood plain.

To determine this, consider the following diagram:

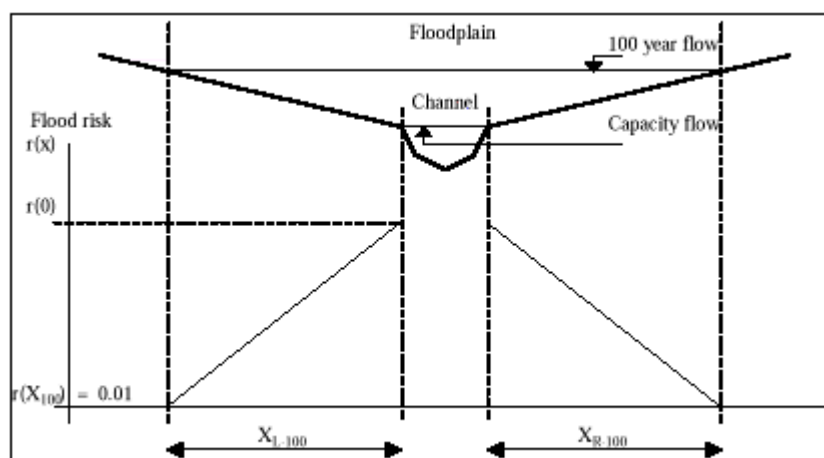


Figure 1: Concept of Flood Risk, from Bartasova et al. (1999), p. 4

A channel can naturally contain a flow of a certain recurrence interval, dubbed the bankfull or capacity flow. As a respondent moves away from the river, the risk of flooding decreases.

Using a logarithmic scale to define the risk, it can be said that at an infinite distance from the flood plain, the risk of flooding is zero (i.e. $r(\infty) = 0$). The base level of risk is right at the river bank so that the bankfull recurrence interval is defined as $r(0)$. Somewhere between $r(0)$ and $r(\infty)$, there is a distance x from the river where the flood recurrence interval equals 100 years (i.e. $r(x) = 1/100 = 0.01$).

Given this, the logarithmic risk function for any observation x distance away from the river's edge can be expressed as

$$(1) r(x) = C10^{-Kx}$$

where C is the bankfull flow (i.e. $r(0)$) and K is the magnitude of the floodplain shape coefficient. With knowledge of the risk of exceeding the bankfull capacity and the extent of the 100 year flood plain, the parameters in (1) can easily be estimated.

The risk function for the entire cross-section of a river can be found by integrating across it so that

$$(2) R = \int_0^{\infty} r_L(x) dx + \int_0^{\infty} r_R(x) dx = r(0) \int_0^{\infty} [10^{-K_L x_L} + 10^{-K_R x_R}] dx$$

where R and L refer to the left and right bank flood plains. K then can be determined from equation (1), so that

$$(3) K = \frac{\log[r(0)] + 2}{X_{100}}$$

where X_{100} is the extent of the 100 year flood plain at the point of interest on the river cross-section. Therefore, the flood plain shape coefficient is a function of the bankfull flow and the 100 year flood plain at the point of interest. Substituting this into equation (2), it is found that the flood plain risk parameter is calculated as

$$(4) R = \frac{r(0)}{2.3(2 + \log(r(0)))} [X_{L-100} + X_{R-100}]$$

This flood plain risk parameter R varies along the stream, and, as can be seen, increases both with bankfull overflow risk and the size of the 100 year flood plain. The engineering team of the Institute for Urban Environmental Risk Management has estimated this specific flood measure and can calculate a Flood Risk Measure for any value x distance from the river ($r(x)$) with the help of GIS software, knowledge of the width of the 100 year flood plain at the closest point on the river and bankfull overflow risk. Converting this to a recurrence interval is accomplished by taking the anti-log of the FRM (ie. $T_r = 10^{\text{FRM}}$).

The discussion above shows the dynamic nature of flood risk and the logic behind some of the policy debate over the cost burden. Obviously, flood risk increases depending on where a person lives in the flood plain, but also, it is not a static variable. Increases to the size of the flood plain and bankfull flow result primarily from urban development that increases the impervious areas of the flood plain. Therefore, flood risk is not just a result of a person's place of residence within the flood plain, but also the degree of urbanization throughout the region that can increase everyone's risk in the future. This makes flood risk inherently dependent on community wide actions, giving it a public dimension.

III. Valuing Non-Traded Amenities

Flood risk management is a good that is currently not traded within a market. Indeed, it is often provided as a public good, due to its public nature. Therefore, it is important to understand the difficulties that arise in valuing a non-traded good. The first and most important problem is how to measure the benefit of increasing provision of an amenity with no market. Unlike the typical private goods regularly priced by economists, a public good is not traded in an observable marketplace where the value can be determined from the exchange of goods between suppliers and consumers. A significant problem then is how exactly to measure the value of the non-marketed good, as traditional price and quantity measures are not available for these. As will be discussed later, several different methods have been developed to get around this problem with varying degrees of success.

Another difficulty in valuing non-traded amenities is distinguishing between the different use and non-use benefits people receive from them. Those actively using and directly affected by the level of provision of such a good are said to receive a use value for it. For example, public provision of clean water in a lake or stream has a use value for tourists

and fishermen who actually utilize the resource and gain a direct benefit from it. On the other hand, a public good also can have a non-use value component representing the value placed on a good or resource "...independent of people's present use of the resource. (Freeman, 1993, 141)." As an example, people may gain utility from knowing the Grand Canyon exists, regardless of whether they personally plan on visiting it. Together, use and non-use values sum to equal the total value of a non-marketed good. Therefore, it is important to account for both potential benefits when trying to estimate the overall value people assign to a good.

IV. Methods to Measure Non-Traded Amenity Values

Mitchell and Carson (1989) develop a framework to categorize the various methods used to measure the values of non-marketed goods based on the type of behavioral linkage used and how preferences are revealed.¹ This framework is shown in Table 1 below.

Table 1 - Behavior Based Methods of Valuing Public Goods

	Direct	Indirect
Observed Market Behavior	OBSERVED/DIRECT Referenda Simulated Markets Parallel private markets	OBSERVED/INDIRECT Household production Hedonic pricing Actions of bureaucrats or politicians
Response to Hypothetical Markets	HYPOTHETICAL/DIRECT Contingent Valuation Allocation game with tax refund Spend more-same-less survey	HYPOTHETICAL/INDIRECT Contingent Ranking Priority evaluation technique Conjoint Analysis Indifference curve mapping

Mitchell and Carson (1989), p. 75

In Observed/Direct methods, consumer preferences are based off actually perceived market behavior, while Observed/Indirect methods infer the value of a non-marketed good from market data for another amenity with which it is known to have a linkage. The

Hypothetical/Indirect methods asks people to respond to hypothetical markets, where the responses are indirectly related to the good of interest. Finally, the Hypothetical/Direct methods directly asks a person to value a hypothetical change in an amenity's quality or quantity.

Historically, economists have preferred the Observed class because it is based off actual market behavior rather than hypothetical transactions within a non-existent market. Yet if it can be believed that individual responses to hypothetical markets are completely comparable to individual responses to actual markets, the Hypothetical methods offer several distinct advantages. First, they allow for the measurement of non-use value, as a person responding to a hypothetical market question does not directly have to use the amenity. In addition, this method provides an ex-ante valuation of the good, increasing the realism of the estimate as it takes into account uncertainty of the future benefit they will receive, much like in an actual government referendum. Finally, Hypothetical/Direct methods are the only ones able to directly estimate an actual demand function, as the others rely on the researcher's assumptions about the form of individual's utility functions. Given these advantages of the Hypothetical/Direct methodology, this family of measurement techniques is generally preferred over the others. Within this class, CVM has emerged as the most reliable because it develops the most sophisticated and realistic hypothetical market.

V. The Contingent Valuation Method

The contingent valuation method uses survey questions to elicit a respondent's preference for a non-marketed good by finding out what they would be willing to pay for it.

¹ Mitchell and Carson (1989) also discuss Physical Linkage methods, such as the damage function approach. These are not directly related to a consumer's utility function though and can not account for use values, and therefore not considered here.

This allows the researcher to determine a dollar price for any good without the necessity of a formal market. It does this through relating a detailed scenario of a hypothetical good to an individual and thereby creating a hypothetical market for the good. Mitchell and Carson (1989) detail the following three parts of a CV study

1. A detailed description of the good being valued and the hypothetical circumstances under which it is made available to the respondent...
2. Questions which elicit the respondents WTP for the goods being valued...
3. Questions about respondents characteristics (for example, age, income, their preferences relevant to the good(s) being valued, and their use of the good(s)... (Mitchell and Carson, 1989, 3).

If the survey is carefully designed, then the responses to these questions should represent valid estimates of the respondents' true WTP for the good.

After eliciting the WTP amount, the next step is to develop a benefits estimate. If the results are accurate enough, then the WTP given by the sample respondents can be extrapolated out to the entire population. This requires detailed regression analysis, controlling for various factors that might influence the WTP amount. The benefit estimate is a powerful end-result of the CV methodology because the findings for a small sample can be generalized to cover an entire region. If this estimate were precise enough, it would be an invaluable tool for future public policy.

VI. Reliability of CVM

An inherent problem in any CVM study is the reliability of the responses, meaning how closely the WTP value elicited from sample respondents resembles the true population WTP. There are three general categories of potential biases in a CV study that can decrease the reliability of the valuation estimate: the design of the survey instrument and its ability to develop a hypothetical market to elicit an unbiased estimate of an amenity's value; the

sampling methodology; and the likelihood respondents will truthfully reveal their preference for the good.

A CV study is only as effective as the survey instrument employed. Broadly, this includes the scenario specification and the elicitation method. Vital to any survey is that it correctly specify the scenario so that the respondent fully understands the amenity they are valuing as intended by the researcher. If this does not occur, it can “...creating a divergence between what the respondent understands about the choice situation and what the investigator intends the respondent to understand (Freeman, 1993, 181).” Mis-specification bias can be minimized through the use of focus groups, pilot surveys and pre-tests to ensure the survey format fully conveys the researcher’s intended choice situation.

Other potential biases are found in the elicitation method. The most important here is the decision of whether to use a Willingness to Accept (WTA) or WTP approach. Theoretically, a study intending to measure the Hicksian compensating surplus lost from the degradation of a resource or decreased provision of a public good necessitates asking respondents for their WTA value.² Unfortunately though, empirical evidence has consistently shown that $WTA > WTP$ because respondents are generally unfamiliar with a property right choice presented in this manner and reject their ownership of the good.³ Therefore, while a WTA measurement could be reliably estimated with a carefully designed survey instrument, there is a greater potential for biased responses. As a result, most CV surveys utilize the WTP format instead.

² Although Mitchell and Carson (1989) also develop a theoretical framework justifying the use of WTP to prevent a deterioration in the quality level of a public good for which the community already makes periodic payments.

³ A more detailed discussion of this can be found in Hanneman (1999) and Mitchell and Carson (1989), pp. 30-41.

In addition, the elicitation method can also lead to implied value cue bias. This happens when respondents do not always have a predetermined, firm set of preferences regarding the hypothetical choice problem proposed to them, and therefore find it difficult to determine a value without first establishing a reference point based on a cue given in the survey. Often this comes from information given in the scenario itself that the investigator does not specifically intend to convey information about the value of the good. As a result, the respondent is incorporating information into their valuation that the researcher did not intend them to use, and therefore will bias their resulting WTP amount. This can be prevented by carefully specifying in the scenario that a zero value is acceptable and choosing an elicitation method that does not ask a respondent to adjust their preference from a base level or give them a range of acceptable values.

Another potential bias comes from sampling. As with any statistical practice, a CV survey sample must represent a random sample of the researchers' intended population. Further, non-response bias, which occurs when a respondent does not answer the valuation question, can lead to a large number who do not correctly value the amenity and therefore cause the sampled value to differ from the population's. This problem can be remedied in the data analysis stage through various weighting techniques or imputing values for the missing data.

Aside from the biases resulting from the survey and how it is employed, the other main source of bias is a respondents incentive to misrepresent values. As Freeman (1993) notes

Biased responses can occur if the scenario specification and the framework for eliciting responses are not incentive-compatible. In an incentive-compatible framework, there is no reason for an individual to respond to any valuation

questions other than in terms of the person's true preferences. If an individual has any reason to believe that his or her response will have any effect on either the provision of the public goods or environmental quality on the individual's taxes or other payment responsibilities, then the respondent may try to use the response to influence the outcomes of the public policy process (182-3).

Of particular concern to economists is the situation where a respondent believes their tax liability will depend on their response while the provision level of the good is independent of their response. In this instance, there would be a great incentive for them to free-ride by giving a response lower than their actual preference. Mitchell and Carson (1989) provide an extensive review of various studies of strategic behavior in CV studies and find it is not a significant problem under most conditions. Their findings suggest it can be reduced by using a WTP instead of WTA format while Freeman (1993) finds it only becomes a problem if the valuation questions are asked in what the respondent believes is a non-hypothetical scenario where they can have some influence on actual amenity provision.

VII. Recent/Relevant CVM Studies

With the increasing importance of CVM in public policy, there have been many CVM studies to date, covering nearly every possible aspect of the CV methodology. For the purposes of this paper, the focus on previous literature will be limited to studies on similar goods, watershed management, flood risk and risk reduction in general, and those detailing the differences between WTP elicitation and empirical estimation methods.

(A). Risk Reduction Studies

The first major WTP study focusing specifically on reduction of Flood Risk is Thunberg (1988). Here, the author analyzes WTP for a reduction in flood risk in Roanoke, Virginia using a phone and mail survey of 142 local landowners. The most important contribution of this paper is the theoretical development of a WTP model for flood risk

reduction. He determines WTP for flood control is "...an investment decision contingent on the individuals subjective assessment of flooding probabilities, subjective property and non-property effects and the landowner's investment position (Thunberg, 1988, 17)." Particularly important here is the importance of subjective assessments and the determination of non-use values for which only a contingent valuation study could determine an estimate.

Within his theoretical framework, he then creates a CV survey using a payment card and iterative bid elicitation format. From the results of this, he develops two sets of empirical models, one for a lump sum payment scheme and another for a fixed, annual payment method. The analysis of results is conducted using OLS regressions with WTP estimates developed through the bidding procedure as the dependent variable. Included as explanatory variables in the models are a measure of flood risk based off previous Army Corps of Engineer estimates of the minimum flood event for which a certain property would experience positive damage; the estimated structure and contents value of a piece of property; the respondents subjective assessment of the success of a flood control project at reducing flooding probability; an index of anxiety relief benefits determined from four separate questions in the survey; the respondent's tenancy status; any community effects due to reduced flood risk; expectations for property value changes; the landowner's time horizon before leaving the flood-plain; subjective assessment of expected flood insurance premium changes; and respondent's income.

The chief finding from this study is that the flood-zone measure, while significant at the 10% level, has a negative sign, implying a landowners WTP decreases the higher their flood risk. The author proposes three possible reasons for this unexpected result: strategic behavior; flood plain owners have already made a trade-off between consumption

opportunities and safety from flooding in picking their flood plain location and therefore there is self-insurance by location choice; and feelings of victimization, frustration and distrust of government. Thunberg considers this to be a result of empirical and model specification issues and indicates that the theoretical relationship between flood-risk and WTP are still valid. As a result of his finding though, Daun (2000) indicates that it is crucial to control for self-insurance by location and feelings of victimization, frustration and distrust of the government in future analyses of flood risk reduction.

Shabman and Stephenson (1996) compare the CV results of Thunberg (1988) to benefit estimates created using property damages avoided (PDA), hedonic price and contingent valuation techniques for the same Roanoke, Virginia study area. They found that the hedonic price technique generated the largest mean estimates. The mean CVM estimates were lower than others at the highest flood risk level, while at lower levels they were often the highest estimates, while the PDA mean estimates were between both other methods. In addition, the authors also compare the responses from homeowners in the CV survey to their actions in a public referendum staged for a similar flood project to that proposed by Thunberg (1988) two years after his study. It is found that non-registered voters were both more likely to offer a higher positive bid in the CC study than those who actually voted. The author's therefore find that "...expressions of willingness to pay in the hypothetical CVM bids did not translate into actual choice behavior."

While there are no other published CV studies of flood risk, Johnson, Swallow and Weaver (1999) did conduct a CV study of preferences for packages of watershed management outcomes in a rural area of Southwestern Rhode Island. The study's goals are to determine both the welfare effects of environmental changes in the watershed and the impact

of chosen funding mechanisms on the preference for environmental outcomes. In the process of determining the latter effect, the authors' argue that the "...respondent's faith in the payment mechanism as a secure and guaranteed funding source (i.e., whether or not respondents trust that 100% of all dollar amounts described in the survey will actually fund specified environmental changes) (97)" could play a role in how they respond.

To test this, they split their sample and informed one half of respondents that the amount they pay is constitutionally guaranteed to be spent only on the proposed watershed management plan. In the analysis, a dummy variable is created to distinguish the responses of those given the guarantee from those not, and various interactions with this and specified watershed policy changes (e.g., water quality improvement) are included. Many of these interactions prove significant, indicating that the guarantee of funding provided a differing rate at which respondents accepted the watershed management package. This finding underlies the need expressed earlier to include attitudinal variables about a respondent's trust of government into any demand specification.

While there are only a few CV studies dealing specifically with flood risk and watershed management, there are several others that analyze WTP for other risk reductions. This literature begins with Smith and Desvousges (1987), which applied CVM to value public risk reduction from a decrease in hazardous waste. In this, the authors divided their sample into eight separate sub-samples with different levels of baseline risks and then asked each participant to value an initial 50% reduction in risk and then a 60% reduction. Surprisingly, the study found that the value of a risk reduction was not contingent on the size of the reduction or the initial level of risk offered. Assuming diminishing marginal utility, the researchers expected offering the second risk reduction would lead to a lower willingness

to pay, and that the higher the initial level of risk, the more the respondent would be willing to pay to reduce 50% of the risk. The authors attributed this problem to difficulty in survey design and respondents difficulty at conceptualizing a market for risk reduction.

Romer, Pommerehne and Feld (1998) continue the analysis of risk reduction with a CV study on the effect of a decrease in hazardous waste risk reduction on WTP in the city of former West Berlin. The authors divide their sample of respondents into two parts, one assigned a very high level of initial risk and another with a significantly lower base level. Then, the respondents with the higher initial level are asked to value two separate 50% decreases in risk and the second group an initial 80% and later 50% reduction.

An initial analysis of the mean results find that the respondents do value a risk reduction positively as expected, but that there is no statistical difference between the mean WTP offered for the higher and lower base risk levels. The authors also create a dummy variable (VERSION) to distinguish between the two samples, expecting a significant regression coefficient from this to show that “the WTP for a larger risk reduction from a larger baseline risk level is higher than the bid for a smaller reduction from a lower baseline (411).” They then did a basic regression on this, income and a dummy variable to account for participants believed to have adjusted risk downward because they believed the initial baseline of risk was incredibly high on WTP. While VERSION does have the expected sign, it is insignificant in the regression.

As this is not consistent with consumer utility theory, the author’s then begin to control for other effects that may have influenced a respondents valuation of risk reduction. Specifically, they add a dummy variable to control for potential strategic behavior evident in questionable zero bids and alternative measures of risk reducing activities. Included in the

latter are several measures of how individuals might already have reduced their risk from hazardous waste, such as using bottled or filtered water and eating only biofood that could not be grown in contaminated soil. Further, they added a dummy variable for if a respondent had either already expressed a complaint about the risk to the media or government or had thought about doing so. Finally, a variable was added to determine political support of the respondent for environmental improvements or if they had been part of the environmental movement earlier. When these changes were made, the VERSION variable became significant and a further test of the second risk reduction showed that WTP did indeed differ negatively from the initial WTP.

The major implications of this paper are that the situation must be created so that initial levels of risk are not deemed incredible by the respondents. In addition, influence of strategic bias found in zero bids must be carefully accounted for. Finally, the authors point to the need to control for respondents' other risk reducing activities and behavior.

A final risk reduction study was Langford and Turner (1998)'s CV analysis of individual's WTP for a reduction in bathing water quality at two British locations. Like earlier CV studies, their results show that behavior and attitude toward both general and health risks are important controls in a WTP equation on public health risk reduction. Further, locational effects and the social context of the respondent (such as group membership) may play an important role too.

Overall, the various studies on flood risk, watershed management and general risk offer several important implications for this study. First, it is very important to create a believable hypothetical market for the public good that will be easy for the respondent to understand and value. In addition, behavioral and attitudinal factors and not just

demographic and income data are important to control for when valuing any public good using WTP. This would include both political leanings and alternative risk aversion measures of the respondent. Finally, strategic behavior and protest zero bids can have a significant impact on the final WTP equation and should be controlled for in the regression analysis.

B.) Elicitation Methods

Within the CVM literature, there is a great debate over which elicitation format is the best to use. Bennet and Tranter (1998) list four general categories of elicitation methods used: (1) the single dichotomous choice format; (2) the ‘bounded’ dichotomous choice format; (3) the single open-ended (OE) question; and (4) the iterative bidding format. The first of these asks a respondent if they would be willing to pay a specific amount, which is varied across subjects according to an experimental design, for a change in the provision level of an amenity and records either a yes or no response. The bounded dichotomous choice format also asks a yes/no WTP question, but follows this with a second yes/no question where the WTP amount is higher if they answered yes to the first and lower if they answered no. In contrast, the OE method asks the respondent to pick a specific WTP amount without prompting. Finally, the iterative bidding game gives the respondent an initial payment level, and then “bids” them up or down to their maximum amount.

In a 1993 report, the National Oceanic and Atmospheric Administration (NOAA) “blue ribbon” panel advocated the use of the single DC format, arguing it was the most realistic elicitation method since it was the closest to a real world market transaction for a public or environmental good (i.e. a referendum). This improves the researcher’s ability to correctly specify the scenario to a respondent who is likely only familiar with pricing a public

good in actual public referenda. There is a tendency with this method though to overestimate as “yea-saying” can lead to an upward bias in the WTP estimate.⁴ Here, a respondent may think the bid presented reflects the estimated cost of provision of the good or that by saying “no” they are explicitly rejecting the good altogether. In addition, the DC format is statistically inefficient compared to the OE format, and therefore requires larger samples to identify the underlying distribution of resource values with any given accuracy. Finally, analyzing DC responses and formatting a WTP estimate from them involves more difficult non-parametric estimation techniques.

The bounded DC method effectively combines the IB and DC approach and is favored because it can be more ‘forgiving’ of poor bid design and may be more statistically efficient than the single DC format. The major problem with it though is that responses to the second bid may be biased by the initial bid. As Cameron and Quiggin (1993) point out, the second bid is endogenous to the first bid as its value depends on the acceptance of the first, and therefore, the error term for the second bid is correlated with the error for the first. This can lead to significant endogeneity bias. In addition, the same problems of “yea-saying” can occur with this format as well.

The OE method was the first measure used in CV surveys, but its use has been called into question after the conclusions by the NOAA panel. As Arrow et al (1993) point out, it is unrealistic, provides respondents with a difficult task, promotes strategic overstatement and yields responses that are sensitive to trivial characteristics of the scenario. Despite these problems though, the OE method is still used due to its relative computational ease.

⁴ This is also termed anchoring. See Desvouges et al (1993) and Green et al (1998).

Finally, the IB method, while once very popular, has now been dismissed by most practitioners because it exhibits very strong starting point bias. Even when the initial bid is chosen as a random number, studies show that the maximum WTP is unduly influenced by the magnitude of the original bid. As starting point bias is a significant problem, this method is rarely used anymore, except in its relative form as a bounded DC or DC with follow-up OE model.

VIII. CVM Flood Risk Theory

As the aim of CVM is to generate a hypothetical market for a public good and then elicit a demand function for changes in the value of that good, the underpinning of CVM rests on the theory of public good expenditure. As developed by Freeman (1979), the consumer's demand for a public good can be specified through the following expenditure minimization problem.⁵

$$(6) \text{ minimize } \sum P_i X_i = M \text{ subject to } U(X, Z) = U^*$$

Here, X_i is a vector of marketed goods with P_i being the vector of prices for the marketed good, Z is a public good with no price and is provided in only fixed amounts, U^* represents the reference level of utility and M is the minimum money expenditure necessary to reach U^* . Solving (6) yields

$$(7) E = E(P, Z, U^*)$$

and differentiating this expenditure function with respect to Z results in the Hicksian compensated inverse-demand function for Z

$$(8) m^* = E_z(P, Z, U^*)$$

⁵ Thunberg (1988) finds that the typical utility maximization solution to develop consumer demand for a public good as developed by Freeman (1979) fails to give a specific demand function for the non-marketed good because it is not priced.

According to Mishan (1976) and Mitchell and Carson (1989) this is the theoretically correct surplus measure for welfare comparisons. Equation (8) is the marginal WTP for a change in the level of Z in terms of the money income transfer required to maintain the individual's utility at U^* . The benefit to the consumer from a change in Z is given by

$$(9) \text{ WTP} = \int_{Z_0}^{Z_1} E_Z(P, Z, U^*) dZ$$

Before narrowing this down to a theoretical model specific to flood risk reduction, it is important to understand the impact of uncertainty on the respondents' WTP. Since a flood risk project can not promise with certainty to lower the level of flood hazard by a specific amount for any household, the valuation of the flood control project depends on the subjective assessment of flood risk by each household. As a result, Thunberg (1988) suggests that each respondent maximizes the utility of the *expected* value of an investment in flood protection. The following scenario maintains the conjecture of uncertainty by assuming households form subjective judgments over future flood events and flood consequences. As a result of these subjective beliefs over flood likelihood, causes and consequences, the landowner also holds subjective expectations over the property and non-property effects from flooding and a subjective probability distribution for flooding.

Given that the homeowner seeks to maximize the utility of their expected present value of annual payments for flood control that will provide long term benefits, the following lifetime expenditure function is suggested by Thunberg (1988)

$$(10) E = E(P, FP, U^0)$$

where E is the minimum lifetime expenditure required to maintain the household's current welfare level (U^0), P is a vector of prices over the time horizon for marketed goods, and FP is the lifetime flow of flood protection services. Differentiating w.r.t. FP yields

$$(11) \quad \partial E / \partial FP = E_{FP}(P, FP, U^0)$$

and then integrating from zero to a specific level of flood protection (FP')

$$(12) \quad WTP = \int_0^{FP'} E_{FP}(P, FP, U^0) dFP$$

Equation (12) provides the maximum WTP that will maintain the communities current level of utility.

In our study, the scenario specifies WTP as a series of twenty annual payments for expected future flows of flood protection necessary to maintain the respondents' current level of flood risk. Therefore, "...the WTP decision represents a budget allocation process contingent on the expected value of flood protection and income position (Thurnberg, 1988, 18)." This is defined as the subjective property (SPE) and non-property (SNPE) effects avoided due to the flood protection project, the household's subjective probability of flooding risk with and without the project (SP), and the household's income position or budget line (INCP). Therefore,

$$(13) \quad WTP = f(SP, SPE, SNPE, INCP)$$

Here, SPNE includes both the household's subjective estimation of expected community effects and other non-property related personal gains like anxiety relief and increased recreational possibilities.

IX. Survey Instrument

To attain the data necessary to develop the WTP equations, a survey instrument was created following closely the suggestions of Mitchell and Carson (1989) to minimize potential biases.^{6,7} This involved using focus groups as a method to ensure respondents understood the WTP elicitation questions, thereby reducing scenario mis-specification bias. This was followed by a pre-test run of the survey to clarify any further problems. As reported by Daun (2000), the focus group testing pointed out the following items. First, residents in the Oak Creek watershed were unable to provide a WTP amount for flood risk reduction and stated this was because they did not think there was a significant flood risk in their area. On the other hand though, they were very concerned about ecological damage to the river, and therefore could easily state a WTP for ecological risk reduction. This finding led to the division of the survey into three separate paths. Path 1 covered just the Menomonee River watershed and asked only the flood risk WTP question. Path 2 was administered to only Oak Creek residents and covered just the ecological risk WTP question. Finally, Path 3 was given to Menomonee River residents and asked both flood and ecological risk WTP questions.

In addition, the focus groups highlighted the need to reword the actual WTP questions slightly so they would be easier to understand. This included further clarifying the scenario to be valued, the project payment vehicle and even creating an FAQ for the more common questions encountered during the scenario. Also, it was found the respondents were highly sensitive to the concept of increased tax burden, stemming from the areas' relatively high

⁶ A copy of the CV survey is included in the appendix.

⁷ The following is an abbreviated analysis of the survey design and its implications. For a more in-depth discussion of the survey, please see Daun (2000) and Giese, Griffin, and Clark (1999).

taxes currently. This required the payment vehicle to be couched in tax-neutral terms so as to decrease any potential bias.

A highly interesting finding was that the benchmark costs of other public goods currently furnished by the government used to help the respondents formulate a WTP amount could highly bias the WTP response. Certain benchmarks, like the current taxation for a new baseball stadium, were too controversial while others, such as funding for NASA, were too difficult to relate to the survey scenario. Therefore, the final survey included benchmarks that were less controversial and more specific to the SE Wisconsin area.

The pretest of the survey, which incorporated the focus group findings, was conducted by the University of Wisconsin Survey Center. The purpose of the pre-test was to approximate the time needed for each survey and to identify any further problems with the WTP question or survey format. This showed the need to incorporate differing elicitation formats: a referendum question, a double-bounded iterative bidding format and finally an open-ended question. The variety of elicitation methods were used to allow for different empirical estimation techniques and therefore cover any bias that might be inherent in one format over the other. Together, this combination should minimize potential non-response bias, protest bids and strategic response bias, while also increasing the respondents ability to make an informed and accurate WTP decision.

The final telephone survey was put in the field between November 1999 and May 2000 to a total of 999 respondents. Of these, 303 followed the Flood Path (Path A), 432 were given the Ecological Path (Path B) and 264 had the Combined Flood and Ecological Path (Path C). The paths differed slightly in questions asked. The Flood Path and Ecological Path had different WTP scenarios, while the Combined Path used the WTP question from the

Flood scenario first followed by the Ecological one. In addition, the Flood and Ecological paths contained a variety of questions covering attitudinal characteristics and media perceptions of the respondent. While Path 3 did not include these questions, all three did cover some pertinent demographic characteristics and a few attitudinal questions. These will be used to help accurately specify a demand function for flood risk.

X. Data Limitations

While this survey gathers information about a multitude of variables, there are still significant pieces of relevant information missing. Some of these are related to the survey itself, but the vast majority rest in difficulties determining spatial characteristics for each respondent.

A) Technical Limitations

In any empirical work, there are bound to be data limitations of some sort. In a previous paper using this particular survey data, Daun (2000) faced almost insurmountable difficulties with her data set that prevented the paper from estimating a true WTP function incorporating spatial flood risk. The major problems were technical difficulties with geographically assigning some addresses and then determining a flood risk measurement for some observations. This paper has succeeded in minimizing these problems for most data points.

As the goal of this paper is to estimate a demand for a reduction in flood risk, a very important variable to include is the actual spatial flood risk for each survey respondent. Unfortunately, this is not a variable which can be asked of respondents, but rather needs to be assigned based on their location on the flood plain and their distance to the river. This requires a two step process. First, the addresses need to be geo-coded, meaning they have to

be matched to a geographic point on a map using ArcView GIS. Daun (2000) correctly geocoded 266 of 303 respondents in Path A (meaning 12.2% of the observations were missing) and 209 addresses in Path C (meaning 10.97% of the 237 total respondents missing). The remaining observations had addresses listed that were either incompatible with the GIS software's geo-coding function or that were too new to be included in the mapping software. As these were all concentrated in either Menomonee Falls or Germantown and therefore not randomly distributed, the author determined these excluded observations would lead to a spatial bias in the results.

To correct for this problem in this paper, the excluded addresses were mapped using an internet mapping tool (<http://maps.yahoo.com>) to determine their location, and then, using this finding, were placed manually on the interactive GIS map. This succeeded in decreasing the number of excluded observations for Path A to 9 (3.0% of sample) and for Path C to 9 (3.7% of sample). The distribution of these missing sample were fairly diverse so most of the spatial bias should be eliminated.

The second part of assigning a flood risk value to each respondent is to estimate an FRM based on their location to the river and flood plain. This is made relatively simple using a special program written by environmental and civil engineers. Unfortunately, before it can assign an FRM value, it needs the entire flood-plain digitized (i.e. located in the GIS coordinated space as a polygon). In Daun (2000), the problem discovered was the digitized portions of the river were incomplete, as the tributaries were not digitized. Since assigning the FRM takes the distance to the flood-plain into account, if the flood-plain around the tributaries are not digitized, then the FRM will consider only the main stem of the river and ignore its actual position relative to the tributary flood-plain. This meant there were

observations where the distance to the river was less than the distance to the flood-plain. This non-sensical result caused the software program to ignore the observation. As a result of this, Daun (2000) could not determine an FRM for 145 responses in Path A (47.85% of the sample) and 133 responses in Path C (57.08% of the sample). Again, this caused a spatial bias that could not be overcome and prevented the author from even being able to include spatial risk in her WTP function.⁸

To partially correct this problem, the tributaries to the river were digitized using Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM). This was effective at defining the 100-year flood plain around the majority of the tributaries in the Southeastern Wisconsin study area. Unfortunately though, there were still several areas that the FIRM's did not cover.⁹ Rather than further biasing the results by placing an arbitrary flood-plain around these tributaries then, they, and the observations near them are excluded from the sample. Digitizing the flood-plain improves considerably the observations available though, decreasing the number of excluded FRM observations in Path A to 20 (6.60% of the sample) and to 14 in Path C (6.17% of the sample).

Even with the re-digitization of the flood-plain, there is still a potential for spatial bias in the FRM measurement though. Since whole tributaries are excluded, there are instances where entire clusters of houses are left out of the sample. This remains a very small part of the final sample area though, so the effect of this should be relatively small. Still, the potential for this should be kept in mind.

⁸ As a proxy for flood-risk, Daun (2000) uses distance to the river with varying degrees of success.

⁹ It is impossible to determine why the FIRM did not delineate a 100 year flood-plain around certain tributaries. Generally, the map states the end of the study has been reached or else the tributary is simply not included in the map. It is unclear whether this indicated there was no flood-plain around the tributary or that it was just not included in that particular study.

Dealing with these technical difficulties means a fairly accurate estimation of the flood-risk can be determined for almost all the observations. Now, the WTP function can include measures of respondents' spatial flood risk. This is something Daun (2000) was unable to do thanks to the technical data limitations she encountered.

B) Non-response Data Limitations

i) Income

As was discussed earlier, a critical determinant in a WTP function is the respondents income. This works to control the initial level of utility prior to the change in the public good provision. Unfortunately, getting an income measurement directly from a respondent via phone survey is not an easy task. To counter this problem, a two step procedure was employed. In the questionnaire, respondents were asked to give a rough estimate of their annual income from all sources prior to taxes (question 159). If they refused to answer this question, then they were asked to indicate the dollar range in which their income would fall (question 159a). If they still refused or indicated they did not know, then the responses were separated for later analysis.

There are two problems then: what to do with those who refused to respond to the initial open-ended income question and those who refused to respond to the closed-ended income question. Since income is such an important part of the WTP regression, the zero-order missing value technique was used to create a continuous income variable for all observations. As described in Pindyck and Rubinfeld (1998), replacing a missing observation from a data series with its sample mean does not change the least-squares slope estimator or its variance if these missing values are random. As a result, least squares slope estimator on a variable containing imputed zero-order missing values will still be BLUE.

The zero-order approach was conducted as a two part procedure. First, those respondents who indicated their income range but did not give an exact value to the open-ended question were assigned the mean value of all other respondents in their stated income range. For the respondents who refused to give any income value, they were assigned the mean value of all respondents given in the sample. To maintain an unbiased estimate of the mean, this was adjusted to account for the true sample mean in each regression.

ii) Other Non-Response

Item non-response occurs when a respondent answers the majority of questions, but refuses to answer several others. Mitchell and Carson (1989) find item non-response can account for up to 30% of the sample in certain situations. This can be a serious problem because non-responses result in excluding observations. Daun (2000) identifies four categories of non-responses: (1) don't know or uncertain; (2) refusals; (3) responses that fail to meet an edit for minimal consistency; and (4) protest bids. The accepted method to deal with the first three is to simply drop them from the data set. The number that are dropped will depend on which variables are placed in the regression..

iii) Protest Bid Identification and Correction

The treatment and identification of protest bids is not nearly as easy though. A protest bid is defined by Mitchell and Carson (1989) as respondents who offer a \$0 bid because they reject the evaluation process itself. Distinguishing between those who actually would bid \$0 and those that are true protest bids is very important, but can be tricky. To separate these then, Mitchell and Carson (1989) suggest the survey instrument have a follow-up question for those offering a \$0 bid asking why they gave that amount. These can then be interpreted in the analysis to find those that potentially are protest bids. This strategy was incorporated in

our survey. An analysis of these follow-up responses by Daun (2000) indicated that both Path A and Path C had 15 protest bids. A complete listing of the open-ended follow-up responses, where those identified as being protest bids are bolded, follows the appendix. To account for any potential impact from these protest bids, a special dummy variable is created that equals one for protest observations and zero for all others. Including this dummy variable in any regressions controls for any bias introduced from these protest bids without requiring the observations be thrown out altogether.¹⁰

(3) Path 3 Data Limitations

Path 3, the Combined response path, has several significant differences from Path 1. In this survey, respondents were asked to value both goods which meant separate consideration of two hypothetical markets. To conserve time then, it was decided not to ask these individuals about their attitudinal and behavioral characteristics relative to flood risk. In addition, the respondents were also asked to value both amenities in the same question. This format leads to several problems. First, because the WTP amounts cover a decrease in both ecological and flood risk, a regression created to model WTP for flood risk reduction from Path C data will have inherent difficulties because the respondents were valuing two goods instead of one. In addition, there is not as much attitudinal or behavioral information that can be controlled for in the WTP regression. Also, this means the WTP questions were asked right at the beginning of the survey. Mitchell and Carson (1989) state that without properly priming a respondent with some initial questions about the subject matter that they will face greater cognitive difficulties in understanding the situation and valuing the good. Therefore, the reliability of these responses is questionable.

¹⁰ For a much more detailed and technical discussion of the identification and treatment of protest bias, see Daun

XI. Survey Data

The actual analysis of the WTP survey data is conducted on both the open-ended and referendum WTP questions from Path A and Path C. Path A contains over 145 questions covering demographic, attitudinal, behavioral and opinion of media questions, of which slightly less than 70 relevant ones are extracted for the sample. Meanwhile, Path C covers just 30 questions of mainly demographic and light attitudinal characteristics, all of which are extracted to use in the sample. In addition, spatial variables are created purely off the respondents location relative to the flood-plain, river and their community, such as the recurrence interval, the respondents position up-stream or down-stream and the physical appearance of the closest point on the river to them.

Together, these myriad variables are combined to form a theoretically accurate and estimable WTP function for all respondents. From the theory section, it was found that it is imperative to include demographic, attitudinal/belief, community and flood characteristics of each respondent in this regression. In Path A, the relevant respondent characteristics questioned cover their political beliefs, opinions on flooding and the public burden of flooding, environmental beliefs, education level, general opinion of government programs, their experience with the flood plain, housing and family characteristics, and personal race and age demographics. Path C covers significantly less variables, mainly demographic, family, housing, political and income characteristics of the respondent.

XI. Model Specification and Estimation Techniques

Even with the data limitations resulting from Path C, the survey gives a multitude of variables to choose from in the WTP regressions. The literature review and theoretical

(2000), Mitchell and Carson (1989) and Romer, Pommerenhe and Feld (1998),

discussion above point out that several classes of variables need to be included in the model. To help attain the best specified model, it is important to control for all relevant factors that might influence a respondent's WTP for flood risk management. Broadly, this means the model needs to include spatial measures of flood risk, spatial community variables, income, attitudes/beliefs of respondents towards government and flooding, and demographic characteristics. This yields the following empirical model

$$(14) \text{ WTP} = f(\text{flood risk, income, demographics, attitudes/beliefs, community characteristics})$$

Given this empirical model, there are two methods that will be utilized to estimate this model. The first is the straight-forward open-ended continuous WTP model, which can easily be estimated using OLS. The second is the dichotomous choice referendum model. Estimating this is not so straight forward because of the nature of the dependent variable. Therefore, a short diversion will be made here to discuss the methodology.

In the DC referendum model, each respondent is randomly assigned a pre-determined bid and then asked if they would be WTP that amount, yes or no. The methodology for this then is understandably different from that with a continuous dependent variable. Several models have been developed, but the most widely used now is that put forth in Hanneman (1984).¹¹ The key equation here is¹²:

$$(15) \text{ Pr("Yes")} = \text{Pr}(\text{WTP} > A) = 1 - G_{\text{wtp}}(A) = F_{\eta}(\Delta V)$$

where A is the bid amount, $G_{\text{wtp}}(A)$ is the c.d.f. of the random variable WTP, η is a random error term and

$$(16) \Delta V = V(z_1, y - A; s_i) - V(z_0, y; s_i)$$

¹¹ For a complete discussion of other DC theories and various extensions, please consult Kristolm (1997), pps. 255-9, and Boman and Bostedt (1999), pps. 163-70.

In (16), V is the mean function of utility, y is the respondent's income, C_i is the socio-economic, locational and attitudinal characteristics of the respondent i , and z_j (1,0) is the response to pay. From here, there are two required inputs, a parametric form for the utility function and a choice of F_η . If η obeys a logistic distribution and a linear-in-income utility function is chosen, then the utility difference becomes

$$(17) \Delta V = \alpha - \beta A + \tau S$$

and the probability of a yes answer is then

$$(18) (1 + \exp(-\alpha + \beta A + \tau C))^{-1}$$

when the logistic is used. To calculate the mean WTP from this,

$$(19) E(WTP) = \int_0^\infty (1 - G_{wtp}(A)) dA - \int_{-\infty}^0 G_{wtp}(A)$$

The determination of (19) depends on the chosen distribution of the WTP or F_η . If WTP is assumed to equal any point on the line, then there is no integration necessary and the ratio of the estimated parameters give the necessary information.¹³ Therefore, $E(WTP)$ is given by

$$(20) 1/\beta(\alpha + \sum \tau_i \hat{x}_i)$$

where \hat{x}_i is the respondents characteristics evaluated at their mean.

As can be seen from this discussion, the estimation of equation (18) can be easily accomplished using a logistic regression. After determining the parameter estimates β , α and τ_i , equation (20) can then be estimated to give a mean sample value for WTP.

With these estimation techniques, there are various ways the many variables in the survey could be combined to create a valid WTP model. In fact, the number is so great that

¹² The following description of Hanneman (1984)'s theoretical model is adapted from a summary by Kristrom (1997), with the addition of an individual's characteristics, s_i , given by the author.

¹³ For a proof of this, see Kristrom (1990).

actually picking a subset was a difficult task. The variable selection process in this paper emphasizes more variables over fewer because the consequences of including irrelevant variables are much less than potential omitted variable bias.¹⁴ Therefore, because there are many theoretically acceptable regressors that could be controlled for in the flood risk WTP regression, attempts are made to whittle these down to the most important ones. In the case though where some theoretically correct variables are included but seem to have little effect, they were generally left in specifically to avoid potential omitted variable bias.

The variables used in the models then are:

Table 2 – Variable Descriptions

Variable	Definition	Sign	Source
WTP	Continuous willingness to pay variable	NA	Survey
REFERENDUM	DC WTP dependent variable	NA	Survey
RECURRENCE	Respondents household recurrence interval	-	GIS
FLDPLN100	Dummy variable equals 1 if respondent in 100 year flood plain	+	GIS
FLDPLN1000	Dummy variable equals 1 if respondent in 1000 year flood plain but not 100 year flood plain	+	GIS
INITIALBID	Initial bid given to respondents to value in referendum	- (in DC model) ? (in Continuous model)	Survey
INCOME	Respondents annual income	+	Survey
UPSTRM	Dummy variable equals 1 if respondent lives in upstream community	-	GIS
COLLEGE	Dummy variable equals 1 if respondent has college or post-graduate degree	+	Survey
Tenurehh	Years in household	+	Survey

¹⁴ As detailed in Gujarati (1995), the inclusion of irrelevant variables will retain the unbiased and consistent nature of the OLS estimators and assure the error variance is correctly estimated. The only drawback is the slope estimators will become inefficient, thereby increasing their variance and making it more difficult to pass a t-test of significance. Meanwhile, omitting a relevant variable will often cause the OLS slope estimators to be biased and inconsistent. Clearly, the greater problem arises from omitting relevant variables rather than including irrelevant ones.

Own	Dummy variable equals 1 if respondent owns home	+	Survey
Protest	Dummy variable equals 1 if respondent elicits protest bid	-	Survey
Politics	A scale from liberal to conservative political beliefs	-	Survey
Sex	Dummy variable equals 1 if female	?	Survey
Married	Dummy variable equals 1 if respondent married	?	Survey
Race	Dummy variable equals 1 if indicate race/ethnicity as white	?	Survey
AGE	Age of respondent in years.	?	Survey
STOPFLOOD	Respondent asked if important that money would hold the line against flooding	+	Survey
EVERYONEPAYDUM	Respondent asked if everyone should pay same amount	?	Survey
TRUSTGOVDUM	Respondent asked if trusted government to protect people from flooding	+	Survey

Below are more detailed descriptions of these variables.

WTP - This is the response to the open-ended WTP question (question 101 in the survey).

The scenario specifies that the respondent should give their WTP for a flood project that would maintain the size of the flood plain and keep the likelihood of floods the same as now.

WTP is the dependent variable in the first set of regressions. Since theory dictates logging this in a WTP function, the \$0 WTP responses are converted to \$0.01 to allow for this.

Referendum - Referendum is the dependent variable in the binary choice models. In question 100 of the survey, each respondent was given a random amount and asked if they would be willing to pay that amount. A 1 is recorded if yes and a 0 is recorded if not. From these responses, a logit model will be estimated and a mean WTP found.

Recurrence - The Recurrence interval is derived from the FRM by calculating 10^{FRM} for each data point.¹⁵ This is the annual frequency of flooding events for any point on the flood plain, or $T = 1/r(x)$. A recurrence interval of 100 would imply a flood would on average reach that point on the flood plain every 100 years, and that $r(x) = 0.01$. As the recurrence interval increases, the risk of flooding decreases. Therefore, the expected sign on this variable in the WTP equation is negative, as people with lower flood risk are expected to be willing to pay less on average.

InitialBid - This is the amount each respondent was asked if they would be willing to pay prior to being given the option of stating their own open-ended WTP in question 101. Inclusion of this in the two models serves different purposes. In the open-ended WTP model, it is important to include this to ensure that this value does not influence the final WTP they gave. If this is significant, then there is likely starting point bias inherent in the WTP estimates they gave, as the initial bid given respondents did influence their responses to the final WTP question.

In the case of the dichotomous choice model, everyone was assigned a random initial bid amount and then asked if they would be WTP that in the Referendum question. Therefore, an important variable in the resulting logit model will be the initial bid, as the higher the initial bid, the less likely the respondent will be willing to pay it. As a result, in the DC model, InitialBid should have a negative sign.

Floodplain100, Floodplain1000 - These are dummy variables created from the recurrence intervals. Floodplain100 equals 1 if the observation is in the 100 year flood plain and 0 otherwise. In Path 1, there are five observations in the 100 year flood plain and in Path 3

¹⁵ There are five observations for which the FRM is so high, the E-Views can not compute the recurrence

there are three such observations. Similarly, Floodplain1000 equals 1 if the observations are outside the 100 year flood plain but within the 1000 year flood plain and 0 otherwise. There are four such observations in Path 1 and three in Path 3. In a regression, the expected sign on these would be positive because the effect of being in the 100 or 1000 year flood plain relative to those farther out from the stream should be higher because the risk is higher.

These variables also can be interacted with the recurrence interval to get the expected change in WTP with a reduction in flood risk for those in the 100 or 1000 year flood plain relative to everyone outside these boundaries.

Income - This is the continuous income measure described earlier. Following typical demand theory, it is expected that the higher a person's income, the higher their expected WTP. This variable is logged in the regression to turn the result into an elasticity.

Upstrm - This is a variable created using GIS that equals one if a respondent lives in the upstream section of the river and 0 otherwise. After consultation with an engineer, it was determined upstream for the Menomonee River can be described as north of Brown Deer Rd. One cause of flooding events is upstream development that increases the flow and flood potential for downstream residents. As a result then, upstream residents are much less likely to experience flooding than downstream. The expected sign on this variable is then negative.

College - Respondents were asked to indicate their highest level of education using the following scale:

- (1) Eighth grade or less
- (2) Some high school
- (3) High school graduate or GED certificate
- (4) Some technical or vocational training
- (5) Technical school graduate
- (6) Some college or associate degree

interval. As a result, 10³¹⁸ is substituted instead as it is the largest number E-views can accept.

- (7) College degree
- (8) Postgraduate or professional degree
- (9) Other [specify]

This data was recoded to make a dummy variable that equals 1 if they answered they were a college graduate or had a postgraduate or professional degree and 0 otherwise. Since educated people generally tend to support more liberal ideas, such as increased government spending for flood control, it is expected this will have a positive influence on WTP. In addition, a college graduate should be better able to understand the hypothetical market good being offered them. This too should increase their WTP.

Tenurehh - Each respondent was asked how many years they had lived in their current household. The responses to this question are continuous, as they could specify the exact number of years they had lived there in question 146. The longer a person has lived in the same residence, the more protective they should be of it and the higher their civic pride, so the higher their WTP amount.

Own - This takes on a value of 1 if the respondent answered in question 143 that they owned their dwelling and 0 otherwise. If the person owns their house, then they should be willing to pay more to prevent flood damage to it than others who rent.

Protest - This is the protest dummy variable described earlier. It equals one if a WTP response was judged to be a protest bid and 0 otherwise. The sign on this should be negative.

Politics -- In question 154, respondents were asked to label their political views on the following scale:

- (1) Liberal
- (2) Somewhat Liberal
- (3) Middle of the Road
- (4) Somewhat Conservative
- (5) Conservative

As conservative minded individuals on average prefer smaller government and lower taxes compared to big-government, liberal minded individuals, it is expected that as they move along this political spectrum, their WTP should decrease. Therefore, the sign on this should be negative.

Sex - At the very end of the survey, the interviewer was asked to record the respondents sex, male or female. Sex is a dummy variable that takes the value 1 if the respondent was female and 0 if male. This has no a-priori sign, but rather is a demographic variable that needs to be controlled for in the regression.

Married - The respondents were asked in question 155 to register their marital or cohabitation status. This question was recoded so that it takes the value of 1 if the respondent is married and 0 otherwise. There is no a-priori sign for this, but it is a demographic variable that needs to be controlled for.

Race - Question 158 asks the respondent to give their ethnic origin or race as one of the following:

- (1) Black/African American
 - (2) Hispanic
 - (3) Asian or Pacific Islander
 - (4) American Indian
 - (5) White
 - (6) Other
 - (7) Don't Know/Not Sure
- Refused

This information was recoded to make the Race variable that takes the value 1 if the respondent indicates in question 158 that they are White and 0 otherwise. This again is a demographic variable that has no a-priori sign but should be controlled for in the regression.

Age - The respondents were asked to give their year of birth in question 156. Age is created by subtracting 2000 from this value. It is uncertain which direction this should influence the WTP, so there is no a-priori sign expectation on this variable.

Medhinc - This is the median household income of the community census blockgroup that a respondent is in. This was attained using GIS and reflects any effect that being in a more affluent community might have on WTP. This effect is in addition to a person's income, and should be considered to have a positive effect on WTP.

Stopflood - After being asked their WTP, each respondent in Path A was later asked why they gave that amount. One question in this sequence (question 112) was: "In deciding how much money you would be willing to pay to prevent an increase in flood risk, how important was it to you whether the money might or might not hold the line against flooding?" They could respond to this on a 10 point scale, with 1 being Not Important and 10 being Extremely Important. This variable is put in the regression as is, and should have a positive sign. This is an attitudinal belief, where one would assume that a respondent who felt holding the line against flooding was a very important consideration in making their WTP decision would be willing to pay more. It is rooted somewhat in their trust of government to adequately provide the project and their belief that stopping flooding would hold some positive benefits.

Everyonepaydum - Question 9 was asked to Path A respondents before they gave their WTP amount, and stated that a statement some people have made about who should pay for costs of flood control was that everyone should pay for the cost of flood control even though only a few people are affected by the floods. They were then asked to rank their agreement with this statement, from either strongly disagree to strongly agree. The responses to this were recoded into a dummy variable that takes the value of 1 if they strongly agreed or agreed

with this statement and 0 if they felt neutral, disagreed or strongly disagreed with it. This variable has no a-priori sign either. It could be that a person agreeing with this would reflect an attitude that everyone should pay, and so should they, thereby increasing their WTP. On the other hand, the respondent could believe that they are taking too high a burden of the current cost of flood protection and answer yes to this with the belief that others should share the cost with them. In this case, there could be a negative sign on the variable as a person with this belief might pay less because they felt they were paying too much already.

Trustgovdum - Question 30 asked the Path A respondents to state their agreement with the statement, "I trust government to protect people from the river flooding." The responses to this were recoded into a dummy variable that takes the value of 1 if they strongly agreed or agreed with this statement and 0 if they felt neutral, disagreed or strongly disagreed with it. People who indicated they agreed with this statement would be expected to be willing to pay more because they believed the government could do something to fix the problem. Those who would disagree would have been willing to pay less because they doubted the government would finish the job adequately and their money would be wasted. Therefore, this has an a-priori positive sign.

XII. Estimation and Results

With the above set of variables, it is possible now to test various hypotheses about spatial flood risk and its effect on WTP for flood risk management. There are several ways to test this influence. A simple method would be to just regress on the recurrence interval for each resident. This would imply that any person on the flood plain considers their personal household flood risk based on their own distance to the river as an issue that would influence their WTP. While this is intuitively appealing, it is also unrealistic. People with an infinitely

high recurrence interval ($r(x) \approx 0$) will probably not have any personal experience with household flooding at their position x distance from the river. Therefore, they are unlikely to even factor their personal spatial flood risk into their WTP amount. It is far more likely that their experience with flooding will be dependent on other aspects not related to their household position on the flood plain, such as flooded streets or empathy towards fellow community members who have experienced household flooding.¹⁶ Therefore, spatial flood risk should be more important for those located closer to the river and who have had a personal experience with flooding. These respondents are more likely to factor their household flood risk into WTP than those with no such similar experience. As a result, it is most important to test the influence of flood risk on WTP for those who are closer to the river.

Given this, the influence of a respondents spatial flood risk on WTP for flood risk management is probably most relevant for those closest to the river that have the highest expected spatial flood risk experience. Therefore, several specifications are estimated that emphasize this potential interaction. The first is to simply incorporate the FLDPLN100 dummy variable to separate out the influence on WTP of those residents living in the 100 year flood plain. This is the population that has most recently experienced a flooding event and therefore is most likely to have a positive WTP based strictly off their spatial household flood risk. This model is given as Tables 3 and 4 in the appendix for both Path A and C.

Notice that there are two sets of regressions here, one using OLS on the continuous WTP dependent variable and the other using a Logit model based off the referendum model.

¹⁶ A regression of the recurrence interval on WTP for all respondents for both Path A and C found the coefficient to be insignificant. This corroborates the conclusion that spatial household flood risk does not influence everyone's WTP for flood risk management.

All the models have acceptable goodness of fit statistics, being above the 25% range for all. Mitchell and Carson note that the reliability of a CV study that fails to pass the 15% level of R^2 is questionable. This seems to indicate that the CV study was a reliable one, although this varies between the models.

One area of concern is the Path C OLS regression which show a significant INITIALBID coefficient. This says that the initial bid given to the respondent in the bidding game did have an impact on the final WTP amount. Specifically, a 1 unit increase in the initial bid amount biased their WTP response up by 0.003% on average. As will be seen throughout the Path C regressions, this starting point bias is inherent in all the OLS models. This, along with the lower R^2 values, questions significantly the reliability of the CV procedure for Path C estimates. As mentioned previously, the reliability problems here are probably a result of the two goods being valued by respondents, the fewer questions asked, the lower number of observations, and the failure to account for any attitudinal/behavioral characteristics of the respondents towards flood risk management specifically.

Another problem that should be immediately clear is the t-statistic on the FLDPLN100 and PROTEST variables in the LOGIT model for Path A and Path C. Throughout all the regressions tested, these are always very high and yield P-values of 1.0000. While it is uncertain what exactly is causing this, it seems one important factor is that these variables are all dummy variables with very few “1” values. FLDPLN100 in Path A has five “1” values and FLDPLN100 in Path C has just three “1” values. Therefore it seems likely the problem is that there is not significant variation in these variables.¹⁷

¹⁷ Note, this same problem is not found in the more widely varying dummy variables, like MARRIED, EVERYONEPAYDUM, etc.

Unfortunately, this will cause problems in interpreting the flood risk hypotheses on the logit model.

Mitchell and Carson (1989) indicate that the theoretical validity of a model can also be assessed by a regression that yields the expected signs on the various demographic and attitudinal/behavioral regressors. For the most part, these are all of the expected signs throughout the models. The main exception here is the COLLEGE variable in Path A, which sometimes has a negative sign and the OWN variable in the first logit model that is also negative. An interesting observation is the income elasticity from the OLS model. This says a 1% increase in income on average leads to a 1.17% increase in WTP, a result that implies flood risk management is a luxury good. In addition, the UPSTRM variable is consistently negative and significant in every regression tried. This says that those living upstream are WTP a much lower amount on average or are less likely to pay anything than any other respondents. This result is in accord with the general theory that because upstream residents do not suffer as much directly from flooding compared to downstream residents, their WTP should be lower.¹⁸

It is also interesting to note the direction of influence that some of the a-priori unsigned variables have. For example, while it is not significant, AGE is always negative. This implies that younger respondents generally were giving higher WTP values or were more likely to do so. Also, note the strong, significantly negative sign on EVERYONEPAYDUM. Recall this question asks respondents to rate their opinion of the statement that everyone should pay for flood control regardless of their position on the flood plain. The sign on this implies that people who strongly agreed with this statement would

pay less for flood control than those who did not agree with this. A possible interpretation of this result is that individuals who agree with the statement feel they are currently paying too much, and the rest of the populace should have to take on some of the flood risk management burden with them. This could prompt them to be willing to pay less. In addition, the sign on TRUSTGOVDUM is positive and significant, implying that the respondents who trust the government will be able to stop flooding is highly important in their WTP decision.

A final interesting result is the insignificant and positive sign on the INITIALBID variable in the logit models. This would indicate that the respondents do not significantly value the size of the amount they are asked to pay in the referendum specification. So, whether they were asked to pay \$500 or \$8 to reduce flood risk, this has no influence on the log of the odds that they would pay anything. There are two possible conclusions from this. First, the CV project had an inherent bias in the referendum questions on WTP and failed to fully develop the hypothetical market, or, second, respondents really did not take into account the amount of the project when asked if it should be provided. This would imply that a person's individual beliefs and experiences with flooding, government, taxes, the survey procedure, etc. were strong enough that they made a decision on whether they would support a flood control project independent of its cost to them. While there was some attempt to control for these influences, there are certainly some effects that could not be included in the regression. Likely, this result is a combination of both a bias in the CV study and the strength of the respondents' prior convictions about the flood project offered them.

The first set of models also give insight nature of flood risk management. Examining the FLDPLN100 variable in Path A and C, it becomes immediately clear that they are

¹⁸ The UPSTRM variable also could explain county variation, as N. Brown Deer Rd. is very close to the dividing

insignificant in both, and in three of the four, have an unexpected negative sign. This result says that residents within the 100 year flood are not statistically significantly willing to pay more or are more likely to pay than others. If anything, the test statistic shows they are willing to pay less. This is interesting because it implies that those with the highest spatial flood-risk and the ones with the greatest danger of losing property would not be WTP more than others with less risk in the flood plain.

Given this unexpected result, another model was estimated that incorporated the interaction term $RECURRENCE*FLDPLN100$ in addition to the $FLDPLN100$ value. Since households within the 100 year flood plain do not have the same flood risk, it is very likely not all respondents in the flood plain valued flood risk the same. Certainly those at the edge of the 100 year recurrence interval would value such a project much less than those right on the river bank. Including this interaction yields the models in Tables 5 and 6. This does not greatly improve the goodness of fit of any models in either Path and, while some signs on the previously insignificant variables do change, it does not notably improve the t-statistics of the other non-flood coefficients.

Including this interaction also doesn't change the unexpected findings on flood risk for found previously in Path A. While it shifts the sign on the $FLDPLN100$ variable to the expected direction, neither of the two flood variables are significantly different than zero. This is not the case with the Path C OLS results though. Here, the $FLDPLN100$ and the interaction term are both of the expected sign, while the $RECURRENCE*FLDPLN100$ variable is significant at the 5% level of a one-tail t-test. Before assigning undue importance to these results though, the sign and significance of the $INITIALBID$ variable must be

considered. Again, this model shows evidence of starting point bias unduly influencing the WTP of all respondents. In addition, the exclusion of attitudinal/behavioral factors like those in Path A make it likely this model is somewhat mis-specified. This mis-specification problem is enhanced by the fact the respondents were valuing two goods, not just one in the survey. Therefore, factors relating to ecological improvements should be included here also to make the models more reliable. Given this, the results in Path C should not be trusted as much as those for Path A. The implication from adding the interaction term then is that there is some evidence flood risk management could be more highly valued privately by those with greater flood risk in the flood plain than others, but the reliability of these findings are highly questionable. Meanwhile, the Path A models do not show a significant influence of spatial flood risk on WTP.

Another specification that can be done is to widen the area of influence by separating the effect of residents in the 1000 year flood plain from everyone else. It is highly unlikely that anyone in the 1000 year flood plain will include their own spatial flood risk in their WTP function, but there is a slight chance this could have an influence. To account for this, the FLDPLN1000 dummy variable is added to the previous model. Regression results from this are shown in Table 7 and 8 in the appendix. Again, this does little to improve the goodness of fit statistics for either model, and does not significantly change the results of the other non-flood variables. Similarly, adding this variable does not help any of the flood variables either for Path A. While both the FLDPLN100 and FLDPLN1000 variables do have the correct sign, the interaction term now moves in the opposite direction. Also, none of these coefficients are significant at the 5% level.

For Path C, adding this does not change any of the previous flood variable results. Unfortunately though, the coefficient on FLDPLN1000 has an unexpected negative sign. Given this and that the Path C findings are subject to the same biases found previously, these results again should not be entirely trusted.

Given the confusing results on the flood variables, one explanation of the insignificance of the flood variables could be strong multicollinearity. If this exists between these variables and anything else in the regression, than this would decrease their significance level. To test for this, Variance Inflation Factors (VIF's) are created for FLDPLN100, RECURRENCE*FLDPLN100 and FLDPLN1000 for the last set of models. These are displayed in the appendix as Table 9. VIF usually only a multicollinearity problem if the score is 10 or greater. Since none of the VIF's match this criteria, the reason for the insignificance of the flood variables is likely not multicollinearity.

Given these findings on the flood risk measures, it is difficult to determine if they belong in the final model of WTP for flood risk management or not. Since they are so insignificant, their inclusion could bias any benefits estimates made off the WTP model. On the other hand, theory does dictate that there should be some measure of spatial flood risk in the model. Since theory should always be the driving force behind model selection, these variables will be left in the final specification. This makes the estimations in Tables 5 and 6 the final models of individuals WTP for flood risk management.

Using these models then, the mean WTP amount can be derived from each specification. This is the amount each respondent on average indicated they were willing to pay for the flood risk management project. In the continuous choice models, this is the exponential mean of the dependent variable (e^{mean}), while the dichotomous choice model is

found using equation (20). Table 10 in the appendix gives these values for the estimations in Tables 7 and 8. As can be seen, the two mean values for Path A are very close around \$5.50. Meanwhile, the values found for Path C are much different. The continuous dependent variable model has a lower mean around \$3.70, while the referendum model mean is actually a negative number. This is a highly unusual result, considering that respondents in Path C were valuing both an ecological and a flood risk reduction. If anything, these mean values should be higher than that for Path A. This is evidence of the “embedding problem”, where respondents asked to value two levels of amenity provision offer relatively the same WTP amount for both regardless of benefit size, often found in CV studies. The “embedding problem” is an indicator of potential bias in the CV study and is something to consider when interpreting the results. Overall then, this reasserts the inadequacies inherent in the Path C data.

XIII. Discussion of Findings

The development and analysis of the WTP model above has yielded some unexpected results regarding flood risk management in Southeastern Wisconsin. First and foremost, if a literal interpretation is made of the flood risk variables, it shows that there is little difference between the WTP of residents with higher spatial flood risk than those with lower spatial flood risk. A sensible conclusion then is that individuals place little value on their own private, spatial flood risk characteristics, and that the community wide effects of flooding may be of more influence on residents willingness to pay. If true, this result enhances the view that flood risk management is a public good, where the cost of provision should be borne by all within the community.

This finding would also be also consistent with the results of the EVERYONEPAYDUM variable. This asked whether the respondent felt everyone should pay for flood risk management regardless of their position on the flood plain. The negative sign on this coefficient for Path A respondents can be interpreted to indicate that people felt they had personally paid enough already for flood control themselves, and that if everyone else were held responsible too, then they should pay less. This is evidence that the respondents across the entire sample were generally interested in having others share the burden of flood risk management, which probably means they viewed it as a public good.

This conclusion on flood risk is intriguing, but there are several confounding factors that should be remembered here. First, there could be some degree of strategic bias evident in these findings. While the survey instrument was designed using the most modern survey methods to reduce all biases, there is always a possibility respondents felt an incentive to misrepresent their preferences by giving an invalid WTP amount. If those in the flood plain felt that the good were going to be provided anyway, then by giving a lower value they could free-ride off the rest of the public. This situation would easily lead to the results found here.

Another explanation is that the UPSTRM variable is catching some of the spatial flood risk induced variation in WTP. Since respondents down-stream embody a lower risk level by nature, there is a possibility of collinearity between this variable and the flood risk measures. While the VIF scores showed no significant multicollinearity, there was some degree of it inherent in the models. As a result, there could be some interaction between the UPSTRM and the flood risk variables that creates the insignificance found.

Given these other possible explanations for the insignificant flood variables, the implication of the findings on spatial flood risk are undetermined. They could be interpreted

to mean that the community wide benefit from a flood risk management project would be valued just as greatly as the benefit specifically provided to those in the flood plain with the highest risk. Therefore, flood risk management would be a public good providing community wide advantages. Yet, it is also entirely possible that the insignificance of those variables is due to the UPSTRM variable or a strategic bias with the respondents. As a result, while there is some evidence of the importance of the community benefits and public nature of a flood risk management project, these results are questionable.

Aside from the spatial flood risk findings, the analysis also found the reliability of Path C within the CV study is questionable. All the regressions showed a significant starting point bias no matter the specification of the OLS model. In addition, the inability to control for attitudinal/behavioral characteristics means that any regressions run from this set of data will be likely mis-specified. As a result, findings from the Path C observations should be viewed with extreme caution.

Finally, the attempts at creating a logit specification using the referendum question were largely unsuccessful at generating useful results about the effect of spatial flood risk on respondents WTP. Due to the lack of variation in the FLDPLN100 and FLDPLN1000 dummy variables created, there is no way to get an accurate measurement for coefficients on these. Also, the logit specification was plagued with an insignificant INITIALBID variable, indicating that the cost of the referendum had no statistically significant influence on the log of the odds ratio that the respondents would pay anything. This could be the result of an improper specification of the hypothetical market in the CV study, or an indicator that the respondents feelings and attitudes towards flood control, the government, increased taxes,

the survey mechanism, or a myriad of other things was so strong, that they did not take price into account when making a decision of whether or not to support the measure.

XV. Conclusion

The flooding problems of Southeastern Wisconsin over the last five years have brought to the forefront a policy debate over how to minimize flood risk and who should pay for it. A CV study conducted over a sample of the population shows that there is a willingness to pay for a reduction in flood risk, and that this WTP amount may not be dependent on a private household's spatial flood risk. The findings give some evidence that people value a flood risk reduction on factors other than their own location on the flood plain. Flooded roads, unsafe drinking water, backed up sewer systems, empathy for community members affected by flooding, and other community effects from flooding are seemingly as important to residents as their own spatial flood risk. While more research is certainly necessary, these initial findings do support the view that flood risk management is a public good whose cost should be borne by all in the community.

These results are an important contribution to the flood risk literature. Yet it also opens many new avenues to explore in future research. With a properly specified individual WTP model, the natural next step would be to extrapolate a community wide demand for flood risk and attain a welfare measure for hypothetical flood control project. This can not be done currently because the exact flood risk reduction expected from the project is still being determined by a team of engineers, but is the ultimate, end goal of any CV study. Further, efforts can be made to control for spatial autocorrelation in the models. As Dubin (1998) points out, "Spatial autocorrelation is likely to be present in any situation in which location matters (304)." Testing and controlling for the influence of this in future models could

improve the results significantly. Finally, an attempt should be made to control for community wide flood risks in future CV studies. If there were variables able to measure how much this influenced the WTP function, then a better benefits estimate might result.

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Appendix A - Tables

Table 3 - Path A with FLDPLN only

Variable	OLS*			Logit		
	Coefficient	t-Statistic	Prob.	Coefficient	z-Statistic	Prob.
C	-13.19690	-2.263966	0.0244	-19.57998	-2.275450	0.0238
INITIALBID	7.65E-05	0.051541	0.9589	0.000477	0.269293	0.7879
FLDPLN100	-1.652760	-0.703995	0.4821	29.06802	9.99E-06	1.0000
UPSTRM	-2.424664	-2.031015	0.0433	-3.073495	-3.076038	0.0023
LOG(INCOME)	1.173524	2.825415	0.0051	1.382687	2.948538	0.0035
COLLEGE	-0.126140	-0.308682	0.7578	-0.215501	-0.411831	0.6808
TENUREHH	0.033963	1.494070	0.1364	0.059312	2.095122	0.0372
OWN	0.260732	0.426480	0.6701	-0.158558	-0.239004	0.8113
PROTEST	-6.070785	-8.371568	0.0000	-61.45077	-1.47E-05	1.0000
POLITICS	-0.173638	-0.949397	0.3434	-0.336352	-1.707430	0.0890
STOPFLOOD	0.499352	7.219070	0.0000	0.573407	5.839168	0.0000
EVERYONEPAYDUM	-1.402208	-3.132571	0.0019	-2.134468	-3.793476	0.0002
	0.809386	2.066268	0.0399	0.502479	0.982734	0.3267
SEX	-0.425090	-0.993402	0.3215	-0.275133	-0.540402	0.5894
MARRIED	-0.464657	-1.014189	0.3115	0.162655	0.295271	0.7680
RACE	-0.867155	-1.056129	0.2919	-1.169534	-1.438841	0.1515
LOG(MEDHINC)	0.192558	0.476892	0.6339	0.741278	1.123624	0.2623
AGE	-0.024139	-1.381688	0.1683	-0.036070	-1.738276	0.0834
R ²	0.459218			McFadden R ²	0.560363	
Adjusted R ²	0.421846			Log likelihood	-62.78802	
S.E. of regression	3.023394			Restr. log likelihood	-142.8180	
Sum squared resid	2248.665			LR statistic (17 df)	160.0600	
Log likelihood	-657.3626			Probability(LR stat)	0.000000	
Durbin-Watson stat	2.034206			Obs with Dep=1	62	
Mean dependent var	1.751340			Obs with Dep=0	198	
S.D. dependent var	3.976246					
Akaike info criterion	2.278506					
Schwarz criterion	2.522321					
F-statistic	12.28803					
Prob(F-statistic)	0.000000					

* - OLS model has passed a Whites Heteroscedasticity test, indicating no heteroscedasticity present.

Table 4 - Path C with FLDPLN Only

Variable	OLS*			Logit		
	Coefficient	t-Statistic	Prob.	Coefficient	z-Statistic	Prob.
C	-28.03720	-2.903824	0.0041	-14.64094	-1.964481	0.0509
INITIALBID	0.003777	1.948027	0.0529	0.001824	1.262463	0.2083
FLDPLN100	-1.303862	-0.570042	0.5693	-1.373838	-0.856450	0.3928
UPSTRM	-0.283710	-0.284857	0.7761	-0.139328	-0.182599	0.8553
LOG(INCOME)	1.288692	2.645899	0.0088	1.159111	3.021932	0.0029
COLLEGE	1.388963	2.433505	0.0159	0.984658	2.147209	0.0331
TENUREHH	-0.005363	-0.201297	0.8407	-0.005259	-0.256550	0.7978
OWN	0.414537	0.555174	0.5794	0.466718	0.864741	0.3883
PROTEST	-5.639445	-4.879019	0.0000	-36.59664	-1.32E-05	1.0000
POLITICS	-0.058593	-0.260695	0.7946	-0.027610	-0.163148	0.8706
SEX1	0.277825	0.492161	0.6232	-0.256015	-0.608701	0.5435
MARRIED	-0.196427	-0.321313	0.7483	-0.520446	-1.089535	0.2773
RACE	1.006738	2.875028	0.0045	0.529061	2.166632	0.0315
LOG(MEDHINC)	1.019126	1.407548	0.1609	0.157581	0.292733	0.7700
AGE	-0.029344	-1.195385	0.2334	-0.017495	-0.933844	0.3516
R ²	0.307091			McFadden R ²	0.324308	
Adjusted R ²	0.256302			Log likelihood	-83.84670	
S.E. of regression	3.722923			Restr. Log likelihood	-124.0901	
Sum squared resid	2647.289			LR statistic (14 df)	80.48672	
Log likelihood	-555.3031			Probability(LR stat)	2.30E-11	
Durbin-Watson stat	2.206588			Obs with Dep=0	61	
Mean dependent var	1.199789			Obs with Dep=1	142	
S.D. dependent var	4.317037			Total obs	203	
Akaike info criterion	5.536923					
Schwarz criterion	5.779244					
F-statistic	6.046397					
Prob(F-statistic)	0.000000					

* - OLS model has passed a Whites Heteroscedasticity test, indicating no heteroscedasticity present.

Table 5 - Path A with Fldpln100*Recurrence Interaction Term

Variable	OLS*			Logit		
	Coefficient	t-Statistic	Prob.	Coefficient	z-Statistic	Prob.
C	-13.20930	-1.953786	0.0519	-19.57998	-2.275450	0.0238
INITIALBID	7.89E-05	0.056560	0.9549	0.000477	0.269293	0.7879
FLDPLN100	-1.736114	-0.739337	0.4604	28.52774	1.32E-05	1.0000
FLDPLN100*RECURRENCE	0.002138	0.047727	0.9620	-0.032868	-6.78E-07	1.0000
UPSTRM	-2.425467	-2.645008	0.0087	-3.073495	-3.076038	0.0023
LOG(INCOME)	1.172598	3.005552	0.0029	1.382687	2.948538	0.0035
COLLEGE	-0.124666	-0.297916	0.7660	-0.215501	-0.411831	0.6808
TENUREHH	0.033983	1.653812	0.0994	0.059312	2.095122	0.0372
OWN	0.258756	0.435365	0.6637	-0.158558	-0.239004	0.8113
PROTEST	-6.067735	-6.902148	0.0000	-59.12149	-2.32E-05	1.0000
POLITICS	-0.172927	-1.053582	0.2931	-0.336352	-1.707430	0.0890
STOPFLOOD	0.499411	7.783997	0.0000	0.573407	5.839168	0.0000
EVERYONEPAYDUM	-1.400818	-3.377643	0.0009	-2.134468	-3.793476	0.0002
TRUSTGOVDUM	0.807883	1.988547	0.0479	0.502479	0.982734	0.3267
SEX	-0.423519	-1.047548	0.2959	-0.275133	-0.540402	0.5894
MARRIED	-0.462697	-1.025206	0.3063	0.162655	0.295271	0.7680
RACE	-0.870167	-1.238318	0.2168	-1.169534	-1.438841	0.1515
LOG(MEDHINC)	0.194572	0.373690	0.7090	0.741278	1.123624	0.2623
AGE	-0.024147	-1.436432	0.1522	-0.036070	-1.738276	0.0834
R ²	0.459223			McFadden R ²	0.560363	
Adjusted R ²	0.419492			Log likelihood	-62.78802	
S.E. of regression	3.029544			Restr. log likelihood	-142.8180	
Sum squared resid	2248.644			LR statistic (17 df)	160.0600	
Log likelihood	-657.3614			Probability(LR stat)	0.000000	
Durbin-Watson stat	2.033633			Obs with Dep=1	62	
Mean dependent var	1.751340			Obs with Dep=0	198	
S.D. dependent var	3.976246					
Akaike info criterion	2.286073					
Schwarz criterion	2.543433					
F-statistic	11.55842					
Prob(F-statistic)	0.000000					

* - OLS model has passed White's Heteroscedasticity test, indicating no heteroscedasticity.

Table 6 - Path C with Fldpln100*Recurrence Interaction Term

Variable	OLS*			Logit		
	Coefficient	t-Statistic	Prob.	Coefficient	z-Statistic	Prob.
C	-28.12406	-2.929049	0.0038	-13.54256	-1.816349	0.0693
INITIALBID	0.003938	2.039919	0.0427	0.001890	1.310005	0.1902
FLDPLN100	3.908137	1.051007	0.2946	419.4805	5.58E-06	1.0000
FLDPLN100*RECURRENCE	-0.378583	-1.771806	0.0780	-63.61483	-5.60E-06	1.0000
UPSTRM	-0.284482	-0.287227	0.7743	-0.116345	-0.152936	0.8784
LOG(INCOME)	1.170759	2.394680	0.0176	1.060713	2.730833	0.0063
COLLEGE	1.474973	2.589177	0.0104	1.014381	2.207504	0.0273
TENUREHH	-0.001050	-0.039461	0.9686	-0.003018	-0.146735	0.8833
OWN	0.292319	0.391991	0.6955	0.442250	0.816783	0.4141
PROTEST	-5.590852	-4.862606	0.0000	-38.63176	-1.99E-06	1.0000
POLITICS	-0.116548	-0.515956	0.6065	-0.047702	-0.279341	0.7800
SEX1	0.233450	0.415449	0.6783	-0.278344	-0.662140	0.5079
MARRIED	-0.194442	-0.319841	0.7494	-0.527976	-1.107794	0.2680
RACE	1.096646	3.116364	0.0021	0.537063	2.197851	0.0280
LOG(MEDHINC)	1.162768	1.604764	0.1102	0.177347	0.330200	0.7412
AGE	-0.036703	-1.482227	0.1399	-0.022020	-1.141533	0.2536
R ²	0.318354			McFadden R ²	0.560363	
Adjusted R ²	0.264540			Log likelihood	-62.78802	
S.E. of regression	3.702247			Restr. log likelihood	-142.8180	
Sum squared resid	2604.260			LR statistic (17 df)	160.0600	
Log likelihood	-553.6152			Probability(LR stat)	0.000000	
Durbin-Watson stat	2.209378			Obs with Dep=1	62	
Mean dependent var	1.199789			Obs with Dep=0	198	
S.D. dependent var	4.317037					
Akaike info criterion	5.530244					
Schwarz criterion	5.788720					
F-statistic	5.915798					
Prob(F-statistic)	0.000000					

* - OLS model has passed White's Heteroscedasticity test, indicating no heteroscedasticity.

Table 7 - Path A with Fldpln1000 term added

Variable	OLS			Logit		
	Coefficient	t-Statistic	Prob.	Coefficient	z-Statistic	Prob.
C	-13.19784	-1.948290	0.0525	-19.62233	-2.277521	0.0236
INITIALBID	6.21E-05	0.044368	0.9646	0.000559	0.314906	0.7531
FLDPLN100	-1.719536	-0.730561	0.4657	31.45373	3.18E-06	1.0000
FLDPLN100*RECURRENCE	0.001921	0.042783	0.9659	-0.033956	-1.57E-07	1.0000
FLDPLN1000	0.435483	0.242436	0.8086	35.11201	1.74E-06	1.0000
UPSTRM	-2.419196	-2.632054	0.0090	-3.063896	-3.061524	0.0025
LOG(INCOME)	1.175719	3.006128	0.0029	1.408344	2.985387	0.0031
COL	-0.129426	-0.308359	0.7581	-0.266800	-0.507509	0.6123
TENUREHH	0.033881	1.645360	0.1012	0.059234	2.079850	0.0386
OWN	0.253186	0.424858	0.6713	-0.171603	-0.257315	0.7972
PROTEST	-6.063978	-6.883546	0.0000	-64.94710	-5.63E-06	1.0000
POLITICS	-0.171179	-1.039929	0.2994	-0.342335	-1.728563	0.0852
STOPFLOOD	0.499598	7.771375	0.0000	0.582328	5.843816	0.0000
EVERYONEPAYDUM	-1.399196	-3.366810	0.0009	-2.169529	-3.822061	0.0002
	0.814507	1.996504	0.0470	0.421113	0.813731	0.4166
SEX1	-0.422900	-1.043985	0.2975	-0.381726	-0.735984	0.4625
MARRIED	-0.471208	-1.038930	0.2999	0.062561	0.112081	0.9109
RACE	-0.852442	-1.204285	0.2296	-1.196862	-1.471715	0.1424
LOG(MEDHINC)	0.188025	0.359940	0.7192	0.724912	1.098060	0.2733
AGE	-0.024016	-1.425141	0.1554	-0.033957	-1.626529	0.1051
R-squared	0.459353			McFadden R ²	0.567581	
Adjusted R-squared	0.417253			Log likelihood	-61.75716	
S.E. of regression	3.035380			Restr. Log likelihood	-142.8180	
Sum squared resid	2248.102			LR statistic (18 df)	162.1217	
Log likelihood	-657.3296			Probability(LR stat)	0.000000	
Durbin-Watson stat	2.033259			Obs with Dep=1	62	
Mean dependent var	1.751340			Obs with Dep=0	198	
S.D. dependent var	3.976246					
Akaike info criterion	2.293408					
Schwarz criterion	2.564313					
F-statistic	10.91110					
Prob(F-statistic)	0.000000					

* - OLS model has passed White's Heteroscedasticity test, indicating no heteroscedasticity.

Table 8 - Path C with Fldpln1000 term added

Variable	OLS			Logit		
	Coefficient	t-Statistic	Prob.	Coefficient	z-Statistic	Prob.
C	-28.55915	-2.985020	0.0032	-6.884747	-1.742456	0.0814
INITIALBID	0.004009	2.084470	0.0385	0.001255	1.497432	0.1343
FLDPLN100	4.010659	1.082722	0.2803	85.30577	1.18E-05	1.0000
FLDPLN100*RECURRENCE	-0.383316	-1.800945	0.0733	-12.91402	-1.18E-05	1.0000
FLDPLN1000	-3.498527	-1.587762	0.1140	-1.178786	-1.529073	0.1262
UPSTRM	-0.355505	-0.360000	0.7192	-0.022357	-0.049467	0.9605
LOG(INCOME)	1.209702	2.481073	0.0140	0.572281	2.747620	0.0060
COL	1.372468	2.403356	0.0172	0.569639	2.238567	0.0252
TENUREHH	0.005253	0.196021	0.8448	0.001930	0.160430	0.8725
OWN	0.199297	0.267488	0.7894	0.254443	0.807142	0.4196
PROTEST	-5.709557	-4.975095	0.0000	-9.388489	-4.97E-06	1.0000
POLITICS	-0.148723	-0.658359	0.5111	-0.057380	-0.577796	0.5634
SEX1	0.185716	0.331343	0.7408	-0.183577	-0.755791	0.4498
MARRIED	-0.170886	-0.282132	0.7782	-0.254125	-0.941220	0.3466
RACE	1.113041	3.174211	0.0018	0.319590	2.235320	0.0254
LOG(MEDHINC)	1.191719	1.650764	0.1004	0.063913	0.214950	0.8298
AGE	-0.039417	-1.594344	0.1125	-0.014957	-1.395375	0.1629
R-squared	0.327326			McFadden R ²	0.338407	
Adjusted R-squared	0.270380			Log likelihood	-82.09708	
S.E. of regression	3.687517			Restr. Log likelihood	-124.0901	
Sum squared resid	2569.980			LR statistic (18 df)	83.98598	
Log likelihood	-552.2504			Probability(LR stat)	3.16E-11	
Durbin-Watson stat	2.178493			Obs with Dep=1	61	
Mean dependent var	1.199789			Obs with Dep=0	142	
S.D. dependent var	4.317037					
Akaike info criterion	5.526703					
Schwarz criterion	5.801333					
F-statistic	5.748020					
Prob(F-statistic)	0.000000					

* - OLS model has passed White's Heteroscedasticity test, indicating no heteroscedasticity.

Table 9 - VIF Scores

Variable/Model	R ² of Auxiliary Regression	VIF = 1/(1-R ²)
Path A		
FLDPLN100	0.574873	2.352
Interaction	0.569990	2.325
FLDPLN1000	0.032900	1.034
Path C		
FLDPLN100	0.664788	2.983
Interaction	0.671538	3.044
FLDPLN1000	0.052633	1.056

Table 10 - Mean WTP Amounts

	Continuous	Referendum
Path A	5.76231901238	5.16899621324
Path C	3.31941645197	-3989.72581647

Appendix B – Open-Ended Responses and Protest Bids

RESPONSES TO THE FOLLOW-UP QUESTIONS ASKED OF \$0 WTP BIDDERS

Note: The text appears exactly as it was reported from the University of Wisconsin Survey Lab

Bolded comments identified as protest bids.

Path A:

Case Text

1078 because i have no income and i am already below the poverty line

1078 I only have social security income and that is low//

1575 doesn't affect me//

1091 I don't have any kids that go to Milwaukee schools, I pay 2000 a year th

1091 at I see no benefit from -- I would rather see my money go to something

1091 like that//

2973 we're both retired on a fixed income, we're lucky we're not using

2973 our kids income - if you got the mail we got, every week, honestly,

2973 law enforcement, lung, cancer, heart, diabetes -- that we receive

2973 in the mail -- even the rescue mission - between my husband and I

2973 - Mom, I don't even know how you and Daddy do it (talking about her

2973 daughter) - good thing we are home paid for, otherwise, I don't know

2973 what we'd do -- prices have gone up so high, I never even made \$5.

2973 an hour - we learned how to live on a little a€€€

2955 i would not be willing to pay because i have to pay for my medication

2955 every month which is \$195. i barely make it on my social security. i

2955 have to eat too.//

2258 because I think anybody who moves close to the river, should know

2258 the responsibilities and shouldn't have bought - if they didn't ,

2258 they aren't too bright///

2930 well i got other things to do with it//

2929 because I am on a fixed income and I don't have the money//

2924 um, b/c I believe a lot of venthough I agree with doing a lot of these

2924 projects I believe they should be done by the private sectors ie the deve

2924 developers should pay for the ponds I believe cleaning up the water ways s

2924 should be the responsibility of the budget of the town at the time of the

2924 development //

2892 well i'm not in the flood plain. a€? no thank you jlg//

2081 um, because I think i know where they would put the ponds that you

2081 mentioned and i don't agree with the location//

1165 i'm considered very low income//

1169 i guess right now i feel it doesn't affect me and working part time, its

1169 not something i could afford//

1185 cause we do not live near the river valley or live near the flood plain.

1185 doesn't make sense to give money to a project that doesn't affect me at

1185 all//

2106 strapped for dough because grad student

2106 apartment owner, no need right now

2106 sdh//

2772 because i lived in that area, people know that there are risks, people

2772 want a new stadium and other things, they don't want to help environment

2772 so i moved, you know the area will flood, tell others the risks, federal

2772 aide deserves aide//

1237 money i think first of all they should talk w/the people to

1237 restore the land instead of building dykes. Just look at the

1237 Mississippi and all the dykes and they get to a certain level

1237 and everything brakes, nature has its own way. The land should

1237 be restored to its natural habitat. Allowing people to live in

1237 the flood plane is ridiculous, that's why its called a flood
 1237 plane. Anyone who lives there is gambling and why should i
 1237 i pay for it. they should pay for it themselves//

**2745 well when city planners get together they should think of this stuff in
 2745 first place. We are already burdened with taxes as it is. they should
 2745 take this into consideration in the first place, thrtowing money only li
 2745 nes the pockets of the developers.//**

**1258 until the developers stop using the flood plains to build houses.
 1258 //**

2065 well I did have some friends up in wauwautosa whose basement was floode
 2065 d and they lost a lot of things, but they moved!--it is unfortuante
 2065 if you live around there but I am truthfully in no position to support
 2065 anything so I am afriad that is there problem//

2719 it depends on how it is going to be laid out, it's a progressive plan
 2719 in an already urbanized area, so it's gonna take 20 years to change this
 2719 so my concern would be that they should specify what kind of money s
 2719 should be involved. if I had more informatino, then I could make a bett
 2719 er decision. ///

2719 R was rambling a lot, at the end he sd that if he was a permanent resid
 2719 of wauwatos, he would give 300-500 dollars//

**2678 anything the government does, it does it wrong, let the private sector
 2678 deal with it, government is completely incompetent//**

2671 because I am planning on moving in this stage of my life. I do not
 2671 think I could, I would like to move into an apartment and sell my home
 2671 //

2658 well, if people live near it, they have to pay for it - I used to
 2658 work at Blue Mound Country Club and it overflows once every 5 years
 2658 -it goes as far as the road but not to the houses -- (or move away--
 2658 first part)////

1329 i feel that in the areas that are effected by this--i don't own a
 1329 home that's anywhere near to the effected areas. i'm far enough
 1329 away, a mile, from the menomenee river--it's not a rough t i travel by
 1329 either. i'm aware of the flooding situation, it's just that i'm not
 1329 effected by it.//

**2174 i give so much to everything else, you stick on one, you get caught
 2174 on to other ones, i would rather have them do it with taxes//**

1608 i dont have the money for it, i cant afford it//

2627 thats the governement project.jf//

2626 my husband and I would not; fixed income - social security - we're
 2626 both old, he's 87 - we need all that to live on - we're not very
 2626 close to where that goes - we're West Allis///

2625 I have to know more about it//

2177 I'm a senior citizen, I'm renting, and I really don't feel I'm going to
 2177 be affected even if things flood more dramatically//

1356 Because I haven't got any money.//

**2595 well i believe our tax dollars are already overly used, and they
 2595 would have to cut some of the spending to do that task.//**

2583 because it really doesn;t concern me. I 'm nowhere near that river//

2581 i belive that people who are directly the floodplain should assume respo
 2581 responsiblitt//

1373 Because I'm not in that area and I don't see how that would affect me.//

2180 Because I believe that the way nature has expanded things--if you build
 2180 on a flood plain you have to expect flooding. Those are the people
 2180 that need to be more cautious. I don't live in that area and I wouldn;t
 2180 build in that area and I'm not willing to put forth any money for this//

2562 i think that it is something that should be done thru the government.//

2533 I don't live near it -- people who are living near it should be

2533 responsible//

2518 because everyone wants money and i just don't have money to go around,

2518 maybe someday sure, but as of now i can't//

2516 well we don't have much flooding in this part of wawatosa I think

2516 it jas something to do with sewer project, we get a water bill sewer

2516 bill that's high enough//

2506 because I don't have the money//

2482 well because it should be paid for by the department of natural resource

2482 , and because we have departments like that, they hould use the money

2482 they already have to pay for it//

1440 i'm a student//

2434 I don't expect to have any problems.//

1473 i bust my backside everyday, and when i bought my house i made sure

1473 that it wasnt in the flood plaid, and for those who live in that area,

1473 they should have considered those factors. they should either move out

1473 or consider those factors//

2410 well I personally would not be affected bny it//

2132 i cant afford it//

1495 well because I never lived along there, I figure whoever is building

1495 the stuff such as for the runoff they should ask for money then //

1523 i'm not a permanent resident of wisconsin. i'm only here for another

1523 4 months.//

1540 i live on a very limited income and i have no money to spare, my

1540 age and my arthritis, i have a lot of medical bills//

2203 well, number one, and most importantly, the people choose to live there,

2203 being very familiar to the area, the only people who would have some

2203 kind of gripe are in piggsville. the government has bought some housed

2203 that have flooded but not all of them. any type of proposal that wouldl

2203 require tax money, i would have to evaluate how they would do it--weathe

2203 it would be green space, a tunnel or water way system or something else

2203 ae? no--it's an issue that concerns very few people vs. the mass of the

2203 4 county area//

2006 i really don't live anywhere close to it, so i don't think its anyt of

2006 my concern.//

1929 cuz the governement take too much money anyway ffrom the little

1929 people already like you and me//

1556 ya b/c the ? in ambigouis and uit doesn't address spesific changes I

1556 don't want them to take land from the county ground that has already bee

1556 n determindt o be used for other purposes ae? no//

2366 main reason doesn't affect me, if you live close to the river you should

2366 expect, obligation what you get lk//

1565 there are numerous reasons that got into this condition, besides the

1565 people that build houses there, things like businesses that bought

1565 land that shoudln't have been bought in the past, and i wouldl say

1565 that they have more of a monetary responsibility///

2372 don't understand enough how it would work, anything i don't know whats r

2372 really going on i don't want that lk//

1610 I can't afford it at this time//

2119 its not that i wouldnt want to provide the funde, its that i want to kno

2119 what the break down would be//

1630 i still think it is the individual's problems and it is thier problem

1630 and they should know there home is in danger before ey buy it. I know wh

1630 ere I live tht there is no chance of flooding//

1952 if you want to live by the river, you take the responsibility for
 1952 living by the river. Insurance takes care of that//
**1664 He thinks it is already included in the taxes we pay and the municipal a
 1664 and sewer charges. //**
 1667 i would need more information//
 1676 isn't flood zones nothing new, people have been rebuilding for
 1676 30 40 50 years.. comes a time when you have to leave a flood zone
 1676 and walk away from it. Knows people in cali. and wauatosa
 1676 and these people left. That is the answer.
 1676 sdh//
**1820 that shouldn't be a personal provision, should be a tax
 1820 provision on property//**
1836 Just Cause I feel that it is an overall tax base//
**1926 Because she is overtaxed on other itmes that are not being handled
 1926 properly, property tatxes are too high and she is not in the folld plain
 1926 or near it.//**
1837 we already pay taxes//
 2232 cause I'm on a limited budget and having trouble paying all those
 2232 bills you were just talking about//
 1857 well bc im an elderly woman and i dont know how long im going to
 1857 be living in my home//
 1879 Because I think there have been federal projects all over the country
 1879 in which the people did not have to pay for this out of their own
 1879 pocket. why not in wisconsin? let the federal government pay for it//
 1865 cuz i don't think that i'm going to live long enough//
 1891 we don't really have the money for that.//

Path C:
 Case Text

 1075 Well, number one we don't live in Milwaukee County. (ae?) no, that's
 1075 about it//
 1089 well i think basically the ones who are polluting should be the ones
 1089 to clean it up, the companies along the shoreline, the ones responsible
 1089 ///
 2957 i think businesses should take the brunt, who polluted it should pay
 2957 the cost and that's the businesses, and the people who moved out of the
 2957 city, they should pay, if you didn't have the outer urban area you
 2957 wouldn't have the problem
 2957 cp//
 2255 i don't think applies to my neighborhood.//
 2096 because my money goes to hud, I can't afford to spend money elsewhere
 2096 outside of food. only thing I pay for is my telephone---sbg//
 2933 because we're retired ae? what we have we need jlg//
 2917 no cp///
 2165 because i'm 50,000 dollars in debt from college//
 1127 well it's a good project, but i'm on a small pension, i do not have
 1127 any x amounts of dollars to give.//
 1152 it doesn't affect me- she is 5 blocks from the river.//
**2860 for one thing--it's like paying for the Green Bay Packers--i don't live
 2860 in green bay, so why should i pay for them. ae? no. //**
 1161 we don't have the finacial help--i don't have the income//
1172 because the govt gets enough of my money now. ae? no//
 1219 i'm a very poor person //
 2759 we are improving our house right now, we want to move and we're

2759 putting a lot of money into our house right now//

1247 because i cant afford it//

1250 far removed

1250 senior citizen, reaching 80

1250 //

1269 well, because i purposely located fro the flood plane, the construct

1269 ion companys and big businesses that build are causing the problems

1269 in other words, the people who are causing the problem should have

1269 to pay. Restrictions by zoning sohould exist so that there is no

1269 over flooding//

2722 I have other places for my money projects I guess//

2295 cannot afford lk//

2704 not being able to afford it. //

1291 fr is 80 yrs old- living on SS and no making much money. //

1299 I personally, we watch every penny that we spend, our family could

1299 not afford it//

2297 affordability number one, //

2298 I don't know. our house isn't close to the river and I thought they

2298 fixed up that Piggsville, they knocked down some houses and they

2298 are working. I think they are working on sav ing the area from flooding.

2298 I don't know who decides that the river is bad, who are the ones that

2298 come up with that. I only know what you are telling me now, I don't

2298 know anything else, I have only spoken to you for 10 minutes, I won't

2298 give anything yet//

2672 right now my husband is on layoff and we don't know when he will get b

2672 ack//

2300 can't afford it-too many medical bills.//

2656 because of fixed income - on disability///

2654 I just said, we're on a limited income////

2301 because i provide enough for everything, i can't afford it. //

2055 well i my personal opinion this is a consequence of individual choice

2055 and those who choice to live in the flood plain should pay the price.

2055 we all have choices in where we want to live. //

2051 because there's other things--I have to learn tolive on the money

2051 you're getting, and that isn;t much. When you're on disability,

2051 it isn't much.//

2629 cause i don't live in the area. i live in an apartment. //

2604 I barely have enough to feed my own family here. //

2602 because my husband is 88 and i'm 82 and we both have health

2602 problems//

1378 bc it doesnt really pertain to me, i do feel for the people who live

1378 there, i live 30 miles away from there, //

1401 well, um, we just purchased our home, and I think flood insurance

1401 is something we can get in our home - and the insurance on hour

1401 your home is more expensive if you live near a waterway and thats

1401 why we don't so....ae//

1425 because the people that cause this pollution to come are the industrial

1425 outfits, stored coal, along the river, etc. these are the guys that

1425 should be the ones that are cleaning it up - if city of Milwaukee,

1425 re: salt - they should be the ones cleaning it up - the coal was

1425 stored by the electric company///

2510 I'm on a fixed income, and i couldn't at this point of my age be

2510 interested//

1449 i dont really have a main reason, i dont know, its a combination of

1449 a bunch of things//

**2457 the money needed for that should come out of the existing tax base, no
2457 additional funds need to be allocated cp///**

2444 i need the money for other stuff and im on a fixed income//

1458 just another ah increased spending and for people that want to live

1458 near the river take that risk when they move there. for people that

1458 live on teh floor plane have an option. they can move away. //

1468 let it go back to the wetlands where it used to be long, isn't there som

1468 ething about restoring lands we're already paying taxes for. because it

1468 is not nice to fool mother nature, we all found out that the hard way

1468 mother nature always gets her revenge in the end. ///

2413 the corps of engineers - I can give you one example, on it is usage

2413 fee and a sewer tax - 2 sewer taxes - 3 times the water usage - the

2413 rest is for the sewer system - when you talk about money - because

2413 of people in the flood plain area - but I can't afford anything -

2413 and will probably move away because of this problem////

1496 well, its costing us too much money as a tax payer as it is//

2351 well i don't know enough about it, that's the problem, they woudl have

2351 to send out something to explain to it us, where we could read about tit

2351 and know something more than we do. //

1530 because i use help myself.//

1542 cause i cannot afford it//

2365 well, my reason is, is why did they put so many houses near the

2365 river - who ever did, that's their fault////

1576 because I think the city should take care of it/

1576 //

1586 because i dont think incouraging wildlife to come back is a bad thing

1586 sorry, is not a good thing, and this causes more problems, this is

1586 conservation, not preservation, bring wildlife back to rural area is

1586 a negative thing, there are deer around by us and thats a problem//

1600 My taxes are going to take care of that--I've been here for 42-years.

1600 Somebody's working on that--why can't the state do that?//

2118 well for 1 reason, next year, im moving out of this state, ill be

2118 moving back south to mississippi, i just wont be around, so this

2118 plan wouldnt be any good to me, im retiring next year, i love kids

2118 i have grandkids, i understand, but im leaving town//

2216 We're retired and on a fixed budget, and we're struggling as it is.

2216 Tell the governor to but money into something like that//

1635 for one thing I can't afford, I'm retired, fixed income - between

1635 that and all the health insurance you have to pay, there's no extra////

1953 if it can be funded by money that is currently in the budget then

1953 thats fine. at one point you have use comparison instead of asking

1953 for more or more money//

1668 i couldn't affor it, i couldn't afford anything ///

1679 let the government pay for it ///

1710 cause i cant afford it. ae?//

2231 Well, I'm sitting here now and looking at a map of the Menomonee River,

2231 and following Menomonee river and I see for the most part that it

2231 goes through green space and it winds on down and by no means is it

2231 covered with areas with people. i personally do not wade in it. The

2231 closest I get to it is the Menomonee parkway. I cannot conceive that

2231 any one in Brookfield is in the Menomonee River Flood Plain.

2231 jae//

1729 i can't afford it//

1734 i think its worthwhile and needs to be done, but i dont think that it

1734 should be provided by private supported, i think that it is a govt

1734 project//
1758 I myself donot live in the flood plain, it doesn't affect me
1758 personally//
1844 because I am moving out of Milwaukee county--not because of the floodin
1844 but for other reasons--I don't know how much more they can build up
1844 on the menominee river--it is pretty built up now buyt maybe industrial/
1844 //
1849 because we are already paying county and state taxes and im sure that
1849 the county is doing things with that already, im not sure if it would
1849 even be on the ballot, because i dont live near there, but if it were
1849 on the ballot, then i would give it some consideration//
1916 no money
1916 fixed income.
1916 sdh//
1796 I can't afford it//
1798 don't live close enough//
1813 can't afford it//
1822 i feel cut back on golf courses and buildings/development to make it
1822 go back to a natural setting lk//

Appendix C - Survey Instrument