# Running to Stand Still: Challenges Economists Face with Imperfect Data

**Nathan P. Kemper**

Department of Agricultural Economics and Agribusiness, University of Arkansas, 217 Agriculture Building, Fayetteville, AR 72701, e-mail: nkemper@uark.edu

**Jennie S. Popp**

Department of Agricultural Economics and Agribusiness, University of Arkansas, 217 Agriculture Building, Fayetteville, AR 72701, e-mail: jhpopp@uark.edu

**Wayne P. Miller**

Cooperative Extension Service, University of Arkansas, 2301 South University Ave. Room 110E, Little Rock AR 72203, e-mail: wmiller@uaex.edu

**H.L. Goodwin Jr.**

Department of Agricultural Economics and Agribusiness, University of Arkansas, 217 Agriculture Building, Fayetteville, AR 72701; Department of Poultry Science and Center of Excellence for Poultry Science, University of Arkansas, POSC O-114, Fayetteville, AR 72701, e-mail: haroldg@uark.edu

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## Abstract

Some suggest that land application of phosphorus rich poultry litter has negatively affected area waters' recreational value. However, key data are unavailable to conduct thorough economic analysis to aid in policy development. This paper examines the challenges associated with using limited economic analyses to construct policy to address this situation.



*Key Words:* poultry industry, water recreation industry, economic impact, poultry litter

*JEL:* Q13, Q52, R15

**BACKGROUND**

Economists are often asked to evaluate the potential economic impacts of environmental policy changes. The United States government has a history of supporting such benefit-cost analysis; policies assessed have ranged from flood control to reducing lead in gasoline (Andrews; Arnold; Clinton; EPA 1985 and 1987). For economists to effectively contribute to the policy process they must use appropriate economic methods to analyze the relevant data. However, these relevant data are often incomplete and can be unreliable; thus, there are consequences of using these imperfect data. The objective of this paper is to present an example that highlights the limitations of relevant and reliable data to address economic and environmental concerns in an environmentally embattled area of the nation and to discuss how some of these limitations can be addressed to provide economic analyses that can contribute to sound environmental policy for the region.

This paper focuses on a recent study that examined the relative economic contributions of the poultry and water recreation sectors in a region where water quality concerns are of great importance. The poultry industry has played a primary role in developing the regional economy and in turn contributed to population growth in Northwest Arkansas (AR), Southwest Missouri (MO), and Northeast Oklahoma (OK) (AASS; Hawkins; MASS; OASS; Strausberg). Both the growth in population and in the poultry industry has placed greater demands on water and its suitability for recreational purposes. A consequence of poultry production and processing concentrated in the study area is the accumulation of nutrient rich poultry litter. Due to the high phosphorus (P) content of the litter, the runoff from land application of the litter into surface waters can degrade water quality (Sharpley et al. 1992, 1996; Sauer et al.); some believe to the point that it is no longer suitable for recreational purposes (Edmonson; Smith).

The water recreation industry is directly threatened by decreases in water quality. Some surface and ground waters flow from one state into another in the region, thus lawsuits at the local, state and regional levels abound (Edmondson; Shane; Tulsa Settlement). Legal counsel for stakeholders with differing interests debate over the cause, source and potential damages associated with degraded water quality. To evaluate water quality policy, data related to the biological, ecological and chemical processes are needed. This paper focused on the economic data required to analyze 1) the economic importance of the poultry and water recreation industries and 2) changes to the region's economy brought on by regulations that could lead to reductions in the poultry industry and the increases in water recreation that would be required to offset these losses. Input-output models are built using revised baseline data and proxies to conduct the analysis. This paper discussed this regional example and in particular, it highlighted common data problems that can arise when conducting input-output analyses, means to address these problems, and the caution that must be taken when using these results as part of the policy making process.

## LITERATURE REVIEW

### Environmental Economic Theory

Environmental economic theory can help explain the relationship between economic activity and nature so this understanding can be used to make well-informed decisions. Trade-offs are inherent between economic activity and environmental quality; however, there is rarely a case in which perfect information exists, and this makes it difficult to construct optimal policy (Baumol and Oates; Callan and Thomas). A first best solution would be possible if all parties involved had complete information regarding all costs and benefits, including externalities. The use of second best solutions involves constructing policy using the most information possible, but these decisions are not likely to bring the market to its most efficient point. Economists and policy makers can identify and implement policy that is the best possible under the conditions that exist by considering all the relevant information available but these second best solutions, though well intentioned, could result in unforeseen consequences.

**Measuring Market Values in Economic Impact Analyses**

Goods and services in a free market economy are sold for prices that reflect a balance between the costs of production and what people are willing to pay (Varian); thus their market value can be directly observed[1]. However, the values of non-market goods and services have no observable monetary values. Both market and non-market values need to be included when conducting economic impacts of policy that affects industries and the environment. However, in the interest of a focused presentation, the complexities and difficulties in estimating non-market values and the potential consequences of omissions of such estimates in a thorough economic analysis are not included in this analysis[2]. Instead, this paper focused on a discussion of market values, and specifically the data required for conducting relevant economic impact analysis.

Three prevalent approaches for economic impact analysis are: 1) Input-Output (I-O), 2) Computable General Equilibrium (CGE), and 3) Econometric. Each method has its own requirements, advantages and disadvantages, and produces a different set of information (table 1). While there are numerous well-documented limitations of I-O analysis (Leontief; Miernyk; Olson and Lindall 2000; Weisbrod and Weisbrod; and Charney and Vest), I-O is used to estimate the economic impacts in this study for the following reasons. First, it has the ability to estimate the economy wide impacts of a change in final demand in any given sector or group. Second, I-O models are detailed with over 500 sectors. Third, they provide a complete accounting of all

[1] However, their true market value may not be reflected in the market prices due to the presence of externalities.
[2] Recommended readings on non-market valuation: Braden and Kolstad; Callan and Thomas; Freeman.

monetary flows throughout an economy.  Most importantly for this discussion, much of the data needed for I-O analysis can be easily obtained through secondary sources and both the data and software are relatively inexpensive.

## METHODOLOGY

The I-O models constructed for this study focus on the economic importance of the poultry and water recreation industries in a 22 county area in Northwest AR (Benton, Carroll, Boone, Washington, and Madison), Southwest MO (McDonald, Newton, Jasper, Barry, Lawrence, Stone, Taney and Greene), and Northeast OK (Ottawa, Craig, Nowata, Rogers, Mayes, Delaware, Tulsa, Adair and Cherokee).  Additionally, the impacts of two phosphorus (P) limits under consideration to regulate water quality in the region are estimated.  Impact analysis results can vary greatly depending on the sources and availability of data.  All of the I-O models used in this study are constructed using the IMPLAN (MIG 2004) software and the IMPLAN county level data for the year 2001.  IMPLAN offers for a fee both yearly county-level data to construct the models and the input-out modeling software to conduct impact analysis.  The models constructed here show the level of economic activity within each of the over 500 industry sectors as organized by IMPLAN.  The sectoring scheme used by IMPLAN is based on the 2002 North American Industrial Classification System (NAICS).

The analysis of this study is accomplished in three parts.  First, the economic contributions of the poultry and water recreation industries to the regional economy are estimated.  Second, the decline in economic activity due to poultry industry contractions from the imposition of a proposed P limit are estimated.  Third, using the results from these two analyses, an estimation of the increase in water recreation activity required to offset losses in regional economic activity resulting from poultry industry contractions is calculated.  In each of these steps, issues related to inaccurate and/or missing data arose and are discussed, as well as the decisions that are made to address these issues. A discussion of the consequences of those decisions and the final economic impact estimates are presented in the results. This section continues with a short description of the appropriate procedures needed to conduct the impact analysis using IMPLAN, followed by a discussion of the important issues related to the relevant data and how these issues are addressed. The results section then describes the range of outcomes that are derived when different methods of addressing the data limitations are used.

**Procedures for Conducting Impact Analysis with IMPLAN**

The procedures for conducting impact analysis for different industries and activities vary depending of the accuracy of the baseline data and if the default model specifications reflect the industry activity in the study region. Of importance for this study are: Regional Purchase Coefficients (RPC), multipliers, transaction basis, and Local Purchase Coefficients (LPC). The RPC represents the proportion of local intermediate demands and final demands for a specific commodity that will be satisfied by local production (Olson and Lindall, 2000). For the poultry industry and policy impact analyses, the RPCs are set to zero in the two IMPLAN poultry industry sectors: 12- Poultry and egg production, and 70- Poultry processing[3]. Multipliers describe the response of the study area economy to a change in demand which translates into a change in production. Type SAM multipliers are used in all parts of this study to incorporate household expenditures into the models and to calculate indirect and induced impacts. Type SAM multipliers are chosen due to the potential of large numbers of commuting workers in the area (USCB 2002) and their ability to account for other types of leakages that typically occur in

[3] This is a method used to avoid overestimation, the RPCs are set to zero and when reconstructing the models, the poultry sectors (and the commodities they produce) are removed from the production function, therefore not allowing any indirect and induced effects. However, if either sector produces any byproducts, some indirect and induced effects in the industry might be experienced (Olsen and Lindall, 2000).

small study areas. The industry transaction basis is used and the LPC was left at 100 percent local[4].

For the water recreation industry impact analysis, type SAM multipliers are once again used, but RPCs are left unedited[5]. The industry basis is used for sectors solely responsible for the entire value of the product or service being sold (such as hotels and restaurants) and the commodity basis is used for retail sectors (such as sporting goods and grocery stores) with household margins selected. Third, LPCs are set to 100% local for spending on service sectors but spending in other sectors, such as gas and oil, the RPC generated LPC is selected. The following sections outline the procedures as they pertain to each part of the analysis.

**Poultry Industry Methods**

***The Procedure:*** Estimation of the impacts of the poultry industry is undertaken in two steps. First, default IMPLAN data for the relevant counties is used to build a model to estimate the impacts of the poultry industry to the region (Default Data Model). Second, the default IMPLAN data for the poultry production and processing sectors from the Default Data Model is updated to develop a new IMPLAN model that also shows the contribution of the poultry industry to the regional economy (Updated Data Model).

***The Data Issues:*** Two key problems can arise when using default data. First, IMPLAN total industry output data for all sectors outside of agriculture are estimated from a large number of sources, but most data comes from the Bureau of Economic Analysis (BEA). However, data for agriculture production are derived entirely from NASS value of production data and the most

[4] LPCs indicate the portion of spending that accrues to the local economy. For service sectors and producing sectors where the commodity is 100% locally produced (such as the poultry) 100% local is selected; for other commodity producing sector where not all is produced locally, the RPC generated LPC is selected.

[5] To calculate the impact of a change in the current level of production as a result of recreation expenditures (i.e., the marginal changes) we would expect there to be additional indirect and induced effects on the industries involved directly. The backward linkages re-involve the industries directly affected creating further demands. The input-output multipliers are used normally with the assumption that the production functions represented by the current accounts accurately portray new activity (Olsen and Lindall, 2000).

recent U.S. Census of Agriculture (Census of Ag). Due to publication lags, IMPLAN data are often released using preliminary NASS estimates for a given year. IMPLAN data releases are typically two to three years behind the actual current year (2001 data available in 2004). To check the accuracy of the IMPLAN data, the agricultural production sectors must be compared against finalized NASS data for the most recent year available. There are also non-disclosure problems, particularly at the county level; this makes data reconciliation difficult at the county level. Second, employment estimates for the agriculture sectors are difficult to estimate since there are no employment and earnings data collected on a commodity basis. The only farm employment data are derived by BEA's Regional Economic Information System (REIS) program. MIG derives output per worker from the most recent Census of Ag and uses this estimate to translate both livestock and crop market value data into employment estimates. However, MIG's worker productivity estimates for the poultry production sector varied greatly between the 1999 and 2001 data set (MIG 2002 and 2004). In fact, MIG encourages analysts with better agriculture data to use it when building models (Olson and Lindall 2004 p. 237).

***The Approach:*** Data issues are addressed in the following manner. First, a data check of the poultry production sector is done at the county level. The most current complete IMPLAN data set year available was 2001. The most current data available at the county level on the market value of poultry production for the study area is from the 2002 Census of Ag data set. Thus the 2002 data on the market value of poultry production in the region is compared to the default 2001 IMPLAN estimates; only slight discrepancies are present. The Census of Ag data is used to update the poultry production data in the model because they are the most recently available estimates. Third, worker productivity numbers (value of output per worker) are compared for 1999 and 2001 IMPLAN data. The comparison shows that default poultry production worker productivity increased from $178,688 in 1999 to $261,969 for 2001. Based on observations of the poultry industry in the region by Goodwin, this dramatic change in worker productivity between the 1999 and 2001 data sets is not justified. As a result, 1999 worker productivity estimates are substituted into the model, leading to larger employment numbers in the poultry production sector. The results and comparison of the Default Data Model and the Updated Data Model are presented in table 2 and are discussed in the results section.

**Water Recreation Industry Methods**

***The Procedure:*** Analysis of the water recreation industry requires that a series of calculations be made before impact analysis can be conducted in IMPLAN. These calculations include the: 1) number of visitors, 2) average expenditure patterns, 3) type of visitor and 4) duration of visit. The results of these estimations are used to calculate the total expenditures of water recreation visitors. While each of these components represents an important piece of the analysis, obtaining the number of water recreation visitors is of particular importance and difficulty.

***The Data Issues:*** Ideally, the actual number of water recreation visitors would be used; however, these data are not readily available. Instead, we have to derive these numbers from the best available information. Because these data are entirely derived, there is no way to verify their accuracy; therefore, we make two visitor estimates for the purpose of sensitivity analysis.

***The Approach:*** Calculating the number of water recreation visitors first requires obtaining the total number of all visitors to the counties in the study area[6]. The total state visitor estimates for AR, OK, and MO are gathered from three different sources - one for each state (TIA; ARDPT; Kaylen). County level visitor numbers are available for AR, but have to be estimated for OK

[6] All states' estimates were based on data from primary data from TIA which defines a visitor as a person taking a "trip" which occurs if a person travels 50 miles or more, each way, from home in one day, out of town for one or more nights in paid accommodations and returns to his/her origin. Excluded from this definition are: 1) travel as part of a public or private transportation operating crew, 2) commuting to work, and 3) student trips to school or while in school.

and MO in two steps. First, OK and MO visitor expenditures for each county are divided by total state expenditures in their state to estimate the portion of each county's contribution to total visitor expenditures. Second, the number of total state visitors for OK and MO, respectively, are multiplied by their county allocation rates to estimate the number of visitors in each of their counties. These estimates for MO and OK are then added to each of the county visitor estimates in AR to determine the total number of visitors to the entire study area.

Survey information consulted from all three states (ARDPT; Kaylen; OKTR) suggests that 12 to 39 percent of all visitors in the study area travel for the purpose of water-related recreation. Since the actual number of water recreation visitors is unavailable, low and high visitor numbers are calculated for use in the analysis based on this survey data. The "low" visitor number represents visitors that reported their primary activity involved direct use of a water recreation area, e.g. fishing or canoeing and is calculated by multiplying the total water recreation visitors to the region by 12 percent. The high visitor number represents a broader definition of water recreation based on the observation that most outdoor recreation activities actually overlap (McLemore) and is calculated by multiplying the visitors estimate this time by 39 percent.

Once the number of water recreation visitors to the area is estimated, the remainder of the impact analysis is accomplished in two steps. First the total expenditures of the water recreation visitors are estimated by consulting the Army Corps of Engineers (CE) 16 Lakes Visitor Spending Profile Survey which provided estimates of average visitor spending for purchases of services and goods during visitor trips (CE 2001). The equations for estimating total expenditures and economic impacts of water recreation visitors were (Stynes and Chang):

(1) Total Expenditures = Number of Visitors * Average Spending per Visitor

(2) Economic Impact = Total Expenditures * Regional Multipliers

Second, to estimate the economic impacts of these total expenditures, the spending categories from the CE survey need to be converted to IMPLAN producing sectors. The primary data source for this "bridge table" is from Chang and used Personal Consumption Expenditure (PCE) data. Five separate accounts appropriately allocate the expenditures as they are classified by the CE categories to the IMPLAN sectors responsible for producing the goods or services. The results of the impact analysis of the high and low visitor estimates can be found in table 2 and are located in the results section.

**Policy Analysis Methods**

***The Procedure:*** The final part of the analysis focuses on estimating the economic impacts of a P limit of particular interest in the region. The economic impacts of the 0.037 mg/l P limit are estimated in two steps. First the impact of the regulation on production and processing output is estimated. Second, the resulting decreases in output are placed back into IMPLAN to calculate the impact of these reductions on region's economic activity.

***The Data Issues:*** It is unknown what the actual impact of this P limit will be on the poultry industry. The key assumption made here is that a reduction in poultry production is the only feasible way to reduce phosphorus and meet the aforementioned P limit[7]. Only one study (Willet et al.) is known to exist for the region that addressed potential reductions in poultry activity associated with the 0.037 mg/l P limit. Another study by Kemper applied these results to a larger area.

***The Approach:*** First, the reduction to total output in the poultry production sector is estimated using results from Willet et al. and as set forth in Kemper. Reductions are made to poultry

[7] These production cuts may be only short term, but large impacts can be experienced in a short time.

production and processing in any county either 1) having a concentration ratio (number of broiler equivalents per acre of crop and pasture land) greater than approximately 192:1 or 2) where all/part of that county existed in a watershed with extensive water quality conflicts. The calculated county output reductions are 29% for OK, 71% for AR and 64% for MO. Next, the reductions to poultry processing are calculated by dividing the poultry production reduction numbers by the processing sector's absorption coefficient for the production sector, but no reductions are made in OK counties because processing in these counties is mostly secondary. The reductions to output in the poultry production and processing sectors are entered into IMPLAN to estimate the impacts of these hypothetical reductions. The results and comparison of the policy analysis models can be founding table 2 and in the following results section.

## RESULTS

Results for the poultry industry, water recreation industry and policy analysis are listed separately in the following section. First, the results of the poultry industry models are discussed followed by the results of the water recreation industry models. Third, the policy analysis models results are reported. The emphasis for the following sections is on the differences in the results depending on the data used and the pitfalls of using these differing results to guide policy construction. Results of all models can be found in table 2.

### Poultry Results

Default IMPLAN data for the agriculture production sectors can be unreliable for reasons discussed above. The Default Data Model was constructed using default 2001 IMPLAN data. The Updated Data Model was constructed using data from the 2002 Census of Ag (NASS 2004) and 1999 IMPLAN worker productivity data for the poultry production sector (MIG 2002). The results of both models are found in table 2.

Default Data Model and Updated Data Model resulted in differing estimations of the economic impacts of the poultry industry on the region's economy. Updated Data Model estimates the total employment impact to be 1,799 jobs (or 3.58%) greater than estimates under Default Data Model. Within the poultry industry, Updated Data Model estimates of the direct employment impacts are 2,321 jobs (or 8.33%) larger than Default Data Model job estimates.

This study showed that within the poultry industry, a simple data change can lead to a substantial change in employment impacts. Underestimation of the industry's importance to employment in the region's economy could lead to the adoption of policy that constrains activity in the industry to a level that the regional change in unemployment becomes a concern. Additionally, other sectors in the region may not be able to increase activity to fully offset these losses. This study shows that while the data needed to construct the poultry I-O models is easily obtained, the possible consequences of using the default data indicates that validation of any secondary data is warranted.

**Water Recreation Results**

Data on the number of water recreation visitors to the study area are unavailable. Two impact scenarios were constructed to examine the range of potential impacts of the water recreation industry in the region. The Low estimate scenario consists of 1.62 M visitors whose total regional spending is $104.35 M. The High estimate scenario consists of 5.37 M visitors spending a total of $339.12 M in the region. Results of both scenarios are found in table 2.

These results show how greatly impact analyses vary in the absence of data on the actual number of water recreation visitors. Furthermore, when deriving these data, changing the assumption about what constitutes a water recreation visit can notably impact results as well. For example, the impact on jobs is 4,504 jobs (or 225%) higher in the High scenario than the

Low scenario. The High scenario would make a more compelling argument that the water recreation industry is an economically important part of the economy than would the Low scenario. The construction of policy aimed at protecting water quality could potentially be influenced by the perceived economic importance of the water recreation industry. This study shows that the economic impact of the water recreation industry is difficult to estimate and the reliability of these estimates can not be verified. Basing policy on such estimates alone would not be responsible.

**Policy Analysis Results**

The actual impact of the 0.037 mg/l P limit is unknown; the assumption is made that the industry will have to reduce production to comply with the standard. The P-limit of 0.037 mg/l will result in a reduction in poultry production of 56% in the study area. These production reductions will result in total economic losses in the study area of 27,936 jobs, $761.73 M in income and $1,100.44 M in value added. Results suggest that the unemployment rate in the region could increase to 7.7%, which represents an increase of 37.9% over average annual rates (BLS 2005)[8]. Other than the two poultry sectors, the top five 2-digit NAICS industries impacted by the contractions in the poultry industry are: 1) Wholesale Trade, 2) Management of companies, 3) Transportation and Warehousing, 4) Health and Social services, and 5) Professional- Scientific and Technical Services. To offset the total economic losses (in value-added) to the region, water recreation visitors will need to increase by 448% using the high estimate of water recreation visitors or by 1,455% using the low estimate.

The results of this portion of the analysis represent an extreme scenario and such a dramatic decrease in poultry activity is unlikely. The potential economic impact of policy aimed

[8] This shock to the unemployment rate is for purpose of illustration, not a forecast of the impact on long-term unemployment in the region. In reality, workers would likely have the skills to obtain other jobs currently open in the area and have the ability to move to other areas to seek employment.

at the industry is relevant, thus this extreme case must be examined. However, if the estimates made here are accepted and used in the policy construction process, the restrictions on the use of poultry litter may not be as strict as they should be in the interest of minimizing the negative economic impacts to the region; as a result, water quality would continue to suffer. If the results are not taken into consideration in the construction of policy because the true impact on the poultry industry in unknown, then the poultry litter restrictions could be set at a level too high, and the poultry industry and region's economy could be penalized unfairly.

**DISCUSSION**

The study area is facing growing concern over environmental degradation that may be caused in part by industries that are essential to the region's economic activity. While the need for open communication is important, informed policy decisions cannot be made without considering the costs and benefits related to a desired level of environmental quality. This study highlights some of the difficulties researchers face when estimating these economic costs and benefits by outlining the processes to: 1) measure the economic importance of competing industries and 2) measure the potential impacts of changing activity levels within the poultry industry. Even when ignoring the more difficult side of economic impact analysis – inclusion of non market benefits and costs – serious limitations in analyses may exist. Improved analysis on this topic would be possible through 1) consistency in data collection, 2) unbiased and accurate assumptions, 3) the inclusion of the non-market benefits/costs, and 4) the availability of accurate data for all relevant components of the analysis. However, these conditions are not likely to be met in the near future, thus full disclosure regarding the limitations of the analysis and sensitivity analysis to test the robustness of the results are needed to aid decision makers in the construction of current environmental policy.

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Table 1: Comparison of I-O, CGE, and Econometric Models for Impact Analysis

| | I-O | CGE | Econometric |
|---|---|---|---|
| **Summary** | Estimates economy wide impacts of a change in final demand in any sector(s) | Determine economic behavior and modeld corporate, household and government financial decisions | Demand driven using time series data and estimated parameters to predict the business cycle |
| **Data Requirements** | Massive. Private firms provide both data and software | Massive. Much of the data required are not available from traditional sources | Massive for impact analysis |
| **Level of Detail** | Very detailed with 500+ sectors. | Aggregated with typically 50 sectors. | Can be designed for all levels of detail |
| **Forecasting Ability** | Limited | Limited | Very Useful |
| **Usability** | Typically easy to use and require little training to do basic analysis | Requires advanced knowledge and often difficult and expensive to build | Rrequires advanced knowledge and ability to use formal statistical methods |
| **Assumptions** | Rigid | Rigid | Flexible |
| **Advantages** | 1. Useful for impact analysis<br>2. Account for all monetary flows throughout an economy<br>3. High level of detail<br>4. Widely available, relatively inexpensive, easy to use | 1. Accounts for all flows in an economy<br>2. Specifications are flexible<br>3. Include price effects<br>4. Computes feedback effects | 1. Extremely useful for forecasting<br>2. Endogenous price estimation, capital and labor supply<br>3. Dynamic in nature<br>4. Estimated with time series data<br>5. Parameter estimated using statisitcal methods |
| **Disadvantages** | 1. Enormous data requirements<br>2. Cross-section in nature<br>3. Static, but implicitly long-run<br>4.Assumes fixed prices<br>5. Not useful for forecasting | 1. Calibration limits forcasting ability<br>2. Aggregated<br>3. Calibration done to fit one year using no statistical methods<br>4. Parameter estimation problems<br>5. Results highly sensitive to assumptions | 1. Do not account for all flows<br>2. Designed for forecasting<br>3. Trade-offs between models designed for forecasting and for impact analysis<br>4. Data requirements would be astronomical for impact analysis |

Source: Adamowicz et al.; Charney and Vest; Leontief; Miernyk; Olson and Lindall 2000; Pereira and Shoven; and Weisbrod and Weisbrod

Table 2: Analysis Results and the Differences between Model Results

| | | Direct | Indirect | Induced | Total |
|---|---|---|---|---|---|
| Poultry Results | Default Data Model | | | | |
| | Employment | 27,864 | 11,383 | 10,956 | 50,203 |
| | Income* | 718.63 | 421.83 | 293.84 | 1,434.31 |
| | Value Added* | 944.11 | 639.05 | 508.93 | 2,092.09 |
| | Updated Data Model | | | | |
| | Employment | 30,184 | 11,051 | 10,766 | 52,001 |
| | Income* | 718.63 | 411.31 | 288.86 | 1,418.80 |
| | Value Added* | 944.11 | 621.73 | 480.34 | 2,046.18 |
| | Results Differences (%) | | | | |
| | Employment | 8.33 | -2.92 | -1.73 | 3.58 |
| | Income | 0.00 | -2.50 | -1.69 | -1.08 |
| | Value Added | 0.00 | -2.71 | -5.62 | -2.19 |
| Water Recreation Results | Water Recreation Low | | | | |
| | Employment | 1,283 | 352 | 368 | 2,002 |
| | Income* | 26.71 | 10.98 | 9.86 | 47.55 |
| | Value Added* | 40.92 | 18.34 | 16.38 | 75.65 |
| | Water Recreation High | | | | |
| | Employment | 4,169 | 1,143 | 1,194 | 6,506 |
| | Income* | 86.82 | 35.69 | 32.05 | 154.55 |
| | Value Added* | 132.99 | 59.62 | 53.24 | 245.85 |
| | Results Differences (%) | | | | |
| | Employment | 224.99 | 225.03 | 225.01 | 225.00 |
| | Income | 225.00 | 225.00 | 225.00 | 225.00 |
| | Value Added | 225.00 | 225.00 | 225.00 | 225.00 |
| Policy Models | P Limit 0.037 mg/L | | | | |
| | Employment | -16,209 | -5,947 | -5,781 | -27,936 |
| | Income* | -385.53 | -221.10 | -155.11 | -761.73 |
| | Value Added* | -508.13 | -334.39 | -257.92 | -1,100.44 |
| | % Increase in Visitors | | | | |
| | High Visitor Estimate | n/a | n/a | n/a | 448 |
| | Low Visitor Estimate | n/a | n/a | n/a | 1555 |

*millions