

A Review of the Revised Grain
Traffic Forecasts Used in the
U.S. Army Corps of Engineers'
Upper Mississippi River/Illinois
Waterway System Navigation Study

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Introduction

In April 1997, Jack Faucett Associates (JFA) submitted a report to the U.S. Army Corps of Engineers (COE) that provided freight traffic forecasts to 2050 for the Upper Mississippi River and Illinois Waterway. The forecasts were used as inputs into a benefit-cost model that evaluates and prioritizes capital improvement proposals for the rivers.

The forecasts have come under sharp criticism because recent data shows that barge traffic has been grossly overestimated. The discrepancy is due in large part to inaccurate forecasts in U.S. grain exports, particularly corn. In September 2000, JFA provided revised forecasts to COE. The revised forecasts extrapolate USDA's Agricultural Baseline Projections to 2009 out 50 years for corn, and use historic data for the past 11 years for soybeans.

This forecasting method still raises significant concerns. This review details some of these concerns and calls for a more thorough assessment of U.S. grain export forecasts.

Inappropriate Use of USDA 10-Year Projection as a 50-Year Forecast

First, we echo the sentiments expressed by the critical review team of Dr. John Bitzan and Dr. Denver Tolliver regarding the difficulties of creating 50-year traffic forecasts. Given the significant inaccuracies in the original JFA forecast, the revised forecast uses the United States Department of Agriculture's (USDA) 10-year export projections and extrapolating the results out 50 years. Yet USDA explicitly states that its baseline projections are not intended for use as forecasts even for 10 years:

The projections are a conditional scenario with no shocks and are based on specific assumptions regarding the macroeconomy, agricultural policy, the weather, and international developments. In particular, the baseline incorporates provisions of the Federal Agricultural Improvement and Reform Act of 1996 (1996 Farm Act) and assumes that current farm legislation remains in effect through the projections period. The projections are not intended to be a Departmental forecast of what the future will be, but instead a description of what would be expected to happen under the 1996 Farm Act, with very specific external circumstances.¹

As Dr. Bitzan expressed in a recorded telephone conversation with COE employees, the USDA projection and Faucett extrapolation do not "assign probabilities to specific events/assumptions and the methodology does not describe the uncertainties, especially as the forecast period is extended for 50 years."² The one revision JFA made to the USDA projection is the assumption that China will be granted access to the World Trade Organization (WTO). To include this one assumption, while completely ignoring other significant events such as the enormous expansion of soybean production in South America, is unacceptable.

Events that affect barge traffic need to be assigned probabilities and incorporated into the forecast. Bitzan and Tolliver's Review states that JFA has implicitly imposed a probability of zero on events such as changes in the competitiveness of foreign suppliers, uncertainty over the future of trade barriers, uncertainty over the future of the farm program, uncertainty over whether foreign countries will import meat or feed, uncertainty over the future of the ethanol subsidy and sugar program, uncertainty over the growth of western feed lots, and uncertainty over the size of vessels demanded by Asian countries.³ We also add that several environmental concerns may limit corn and

¹ Agricultural Baseline Projections to 2009. World Agricultural Outlook Board, Office of the Chief Economist, U.S. Department of Agriculture. Prepared by the Interagency Agricultural Projections Committee. Staff Report No. WAOB-2000-1, February 2000. Available at <http://www.ers.usda.gov/epubs/pdf/waob001/index.htm>

² Record of Telephone Conversation, September 12, 2000. Available in Appendix B of the September 20, 2000 Draft Report "Review of Historic and Projected Grain Traffic on the Upper Mississippi River and Illinois Waterway: An Addendum." Contract No. DACW72-95-D-0004.

³ "Review of Waterway Grain Traffic Forecasts for the Upper Mississippi River Basin." Prepared by John D. Bitzan, Ph.D. and Denver D. Tolliver, Ph.D. Available in Appendix A of the September 20, 2000 Draft Report "Review of Historic and Projected Grain Traffic on the Upper Mississippi River and Illinois Waterway: An Addendum." Contract No. DACW72-95-D-0004.

soybean production. For example, a series of scientific reports on hypoxia in the Gulf of Mexico commissioned by the White House Office of Science and Technology recommended a 20% reduction in fertilizer and 5-million additional acres of wetlands in the Mississippi River Basin.⁴ The development of Total Maximum Daily Loads (TMDLs) may also limit production agriculture. Further, many scientists are concerned that disease and pest problems may hamper long-term use of the corn-soybean rotation. Ignoring these uncertainties leads to forecasts with an upward bias.

Bitzan and Tolliver conclude that the entire approach to the revised forecasts is flawed. Instead, they recommend a comprehensive spatial equilibrium approach that takes into account worldwide supply and demand conditions in conjunction with a Delphi process that surveys experts on the probabilities of future events. We strongly agree that a forecast is needed that incorporates these probabilities.

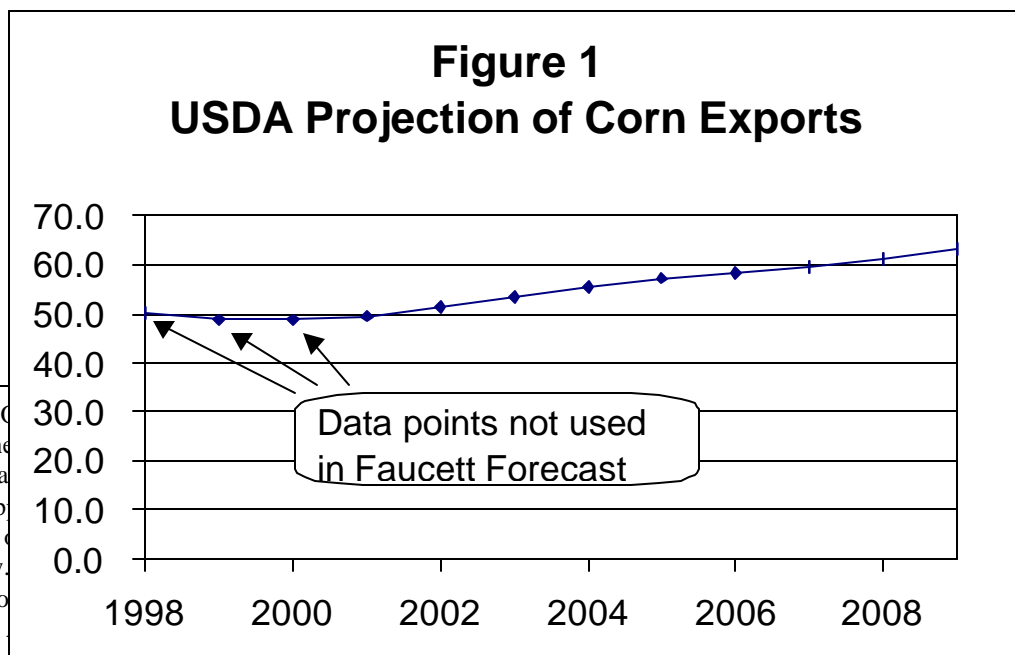
The counter to this new forecasting method is that it will require more time and money. Yet USDA projections for corn and soybean exports peg these exports at levels similar to peak volumes at which these crops have been exported in the past 20 years. For example, the U.S. exported 63.2 million metric tons (mmt) of corn in 1980; in 2009, USDA projects the export of 62.9 mmt. As Dr. Donald Sweeney states in his affidavit filed in the Office of Special Counsel, “At current traffic levels evidenced on the UMR-IW navigation system, there is broad agreement among economists that expensive, large-scale measures like providing larger locks to process tows are not economically justified.”⁵ USDA projections provide no indication that large-scale measures are needed in at least the next 10 years. Delaying the construction of longer locks until they are truly needed will provide tremendous financial savings. We owe it to taxpayers to use better forecasting procedures, rather than spending money now on a project that may or may not be useful in 50 years.

Unexplained Assumptions in the Extrapolation of Corn and Soybeans

In the revised JFA forecast, the authors state that “Given the politically charged atmosphere surrounding the Navigation Study, we decided to rely upon forecasts of corn and soybean exports contained in USDA’s *Agricultural Baseline Projections to 2009*, a source which was considered to be both neutral and credible.”⁶ However, JFA’s selective use of these projections results in a forecast that is neither neutral nor credible.

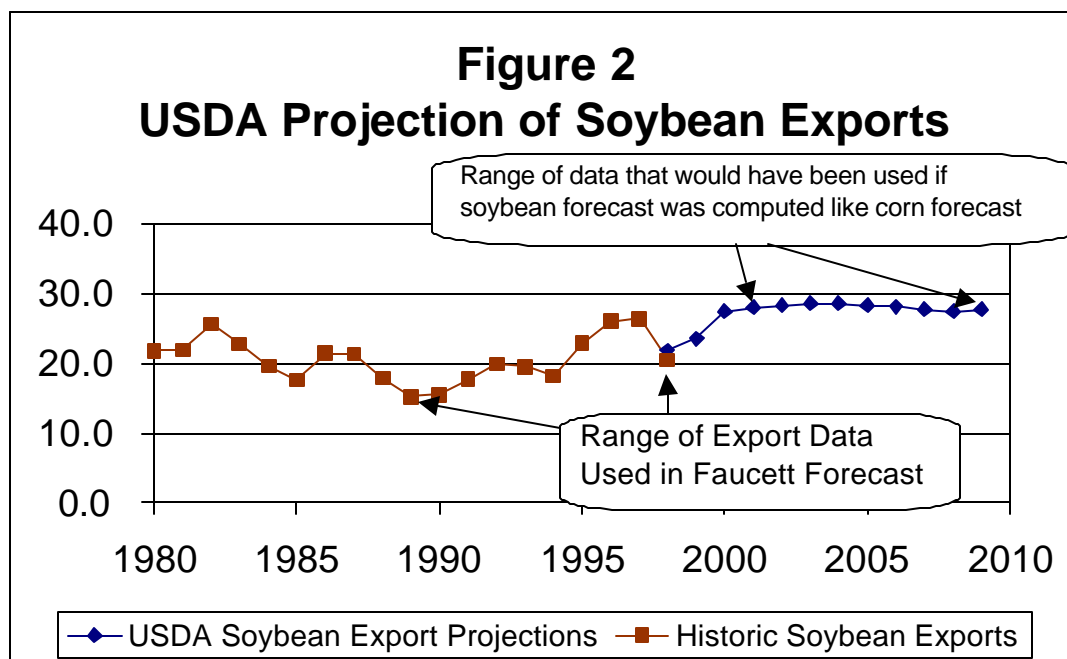
- The extrapolation of USDA’s corn forecast was based upon projections from the period 2001 to 2009. Yet USDA provided corn export projections for the years 1998 to 2009. The initial years of the USDA projection show a decline in corn exports. By removing these data points, JFA creates a 50-year extrapolation greater than would be expected if all the USDA data was used.

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The revised report states that “Extension of the soybean export forecast, on the other hand, was based upon historical data between 1988 and 1999.” No rationale was given for ignoring the USDA projection and arbitrarily using data between 1988 and 1999. As can be seen from Figure 2, the points selected provide a substantial increase in soybean exports, much more than would have resulted if USDA projections from 2001 to 2009 were used, as was done for corn. The lack of any documentation to justify the different methods of creating corn and soybean forecasts is inappropriate, and gives the reader the impression that data points were selectively used to produce the most positive 50-year extrapolation.



- JFA adjusts USDA projections under the assumption that China will join the WTO, and that the U.S. will capture 70% of China’s increased corn import demand. JFA also assumes that China will import corn at the level of the tariff-rate quota (TRQ), which is scheduled to increase from 4.5 million metric tons (mmt) to 7.2 mmt.

In *Agricultural Baseline Projections to 2009*, USDA does review the implications on agricultural trade of China accession into the WTO. The review states that, for corn, “In the near term, imports may not reach the TRQ level because high stocks and a weakening livestock sector are likely to reduce import demand. Also, farmers in Northeast China, the most important corn-producing region, are unlikely to reduce production significantly in the near future.” JFA does not explain why this guidance in the USDA report was not followed, and instead assumed China corn imports would meet TRQ levels.

Furthermore, JFA admits that this assumption may lead to an upward bias in the near term:

“Given the large quantity of stocks in China, it is acknowledged that corn imports probably will not achieve the TRQ levels over the next several years. While this may add a slight upward bias to the forecast between now and 2009, it should be noted that we have not addressed China’s export volumes, which may fall after joining the WTO. In addition, the forecasts beyond 2009 (the period when the benefits of lock improvements would start to accrue) are believed to be reasonable.”

We do not find it acceptable to have upward biases in any time period, particularly since the data from 2001 to 2009 is extrapolated out to 2050, thereby magnifying these biases. JFA appears to not believe that data forecasted to 2009 is critical because only then is “the period when the benefits of lock improvement would start to accrue.” If the traffic forecasters do not consider lock construction a positive benefit until 2009, why is immediate construction even under review?

- Different methods were used to determine the share of corn and soybeans exported through the Central Gulf. JFA states that “To assign a portion of the U.S. corn export forecast to the Central Gulf, we used the port share developed by SCI (Sparks Companies, Inc.) and used in the original forecast...With soybeans, on the other hand, we decided to use the percent of exports handled by the Central Gulf between 1994 and 1998.” Again, no justification is given for the use of different methods.

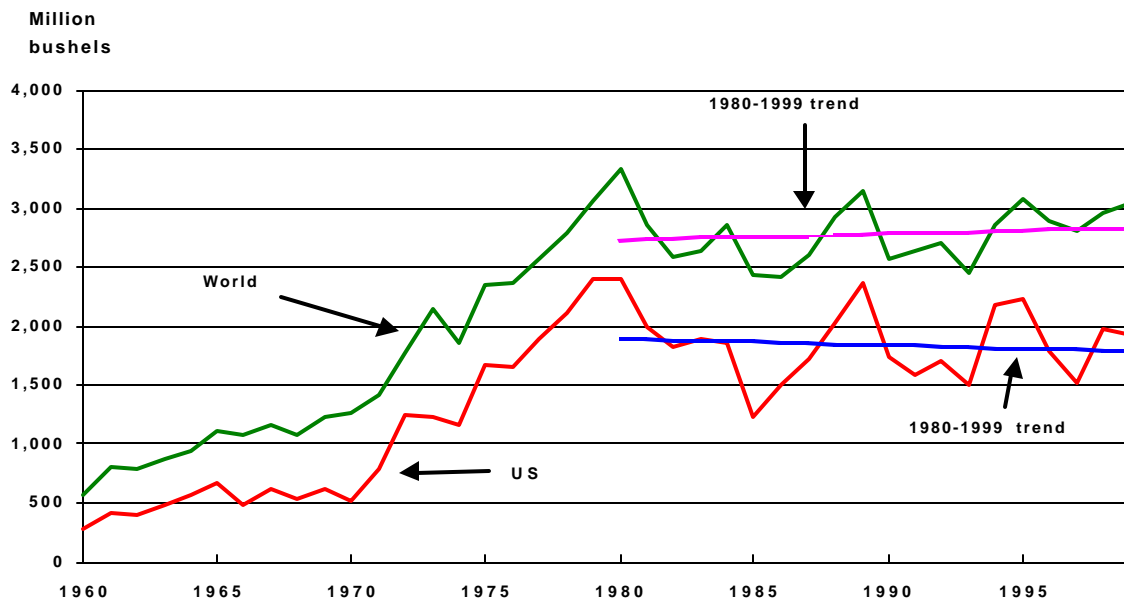
Foreign Supply and Demand Must Be Taken Into Account

Both the initial and revised forecasts appear to assume that U.S. grain exports can be forecast as the residual of supply less domestic use. In the initial forecast, JFA states that this is correct if, among other things, U.S. producers are among the world’s low cost producers. Bitzan and Tolliver found this to be inappropriate and stated that “The practice of basing export projections on production capability alone appears to completely disregard foreign supply and demand conditions.”

Neither the original nor the revised JFA forecasts mention the increased production in South America, which appears to be a key factor in the stagnation of U.S. grain exports since 1980. Without an assessment of these impacts, export forecasts will continue to be unreasonable.

Dr. C. Phillip Baumel of Iowa State University has provided a more reasonable U.S. grain export forecast by incorporating international supply and demand factors. Baumel concludes that JFA and COE fail to recognize that trends in U.S. grain exports have shifted since 1980 due to these changes. Figures 3 and 4 demonstrate that shift.⁷

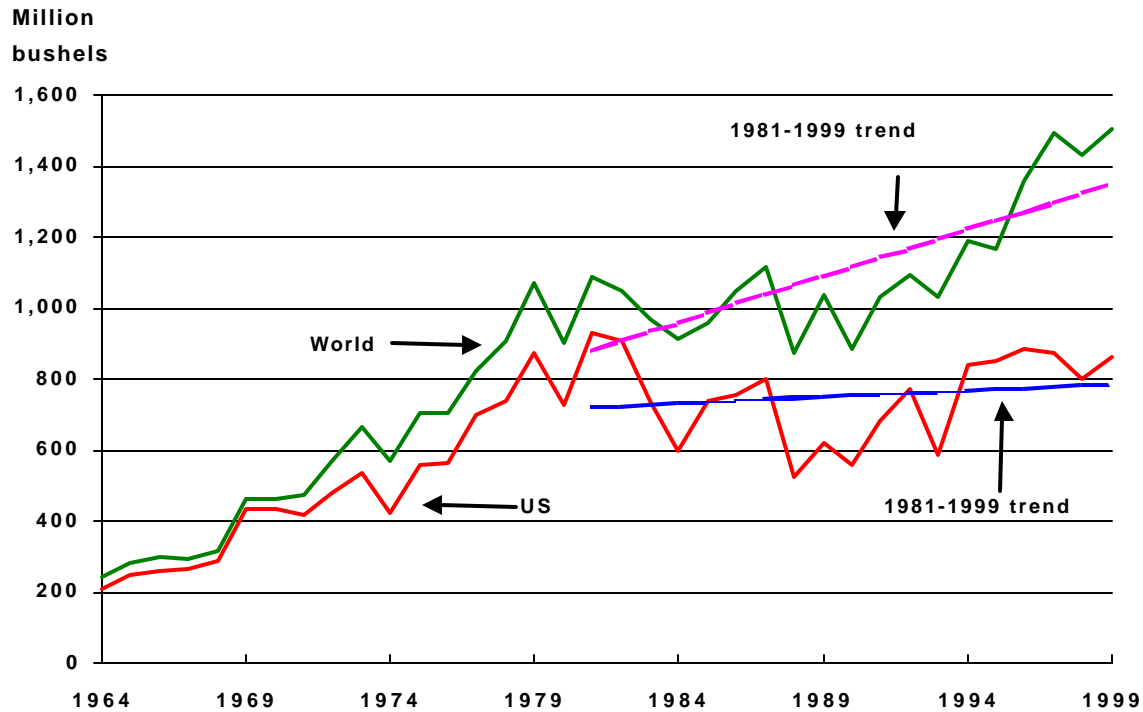
**Figure 3
World and U.S. Corn Exports 1960-1999**



Sources: U.S. Department of Agriculture. USDA Economics and Statistics System-World Agricultural Supply and Demand Estimates; Baumel, Phillip: Evaluation of the U.S. Army Corps of Engineers Forecasts of U.S. Grain Exports. 2000.

⁷ C. Phillip Baumel. “Evaluation of the U.S. Army Corps of Engineers Forecasts of U.S. Grain Exports.”

Figure 4
World and U.S. Soybean Exports 1964 -1999



Sources: U.S. Department of Agriculture. USDA Economics and Statistics System-World Agricultural Supply and Demand Estimates. 1 Dec. 1999: Baumel, Philipp: Evaluation of the U.S. Army Corps of Engineers Forecasts of U.S. Grain Exports. 2000.1999

Conclusion

The difficulties of forecasting barge traffic on the Mississippi River and Illinois Waterway over the next 50 years is understandable. The primary concern with both the JFA initial and revised forecasts is that they ignore numerous events that could have dramatic effects on U.S. corn and soybean exports, essentially placing the probability of any of these events happening at zero. USDA projections have historically been overly optimistic because they explicitly do not consider these events. To convert these projections into forecasts, and then extrapolate the trends out 40 years, is inappropriate. Figures 5 and 6 demonstrate how dramatically JFA’s forecasts differ from export trends for the past 20 years. Of further concern is that the rationale for many decisions in the forecast are undocumented.

Forecasts need to account for the different factors that affect U.S. grain exports. A process that incorporates the advice of experts in grain production, agronomy transportation, international markets, environmental impacts, and many other aspects is recommended. U.S. taxpayers and farmers deserve better forecasting methods.

Figure 5 Forecasts of Corn Exports

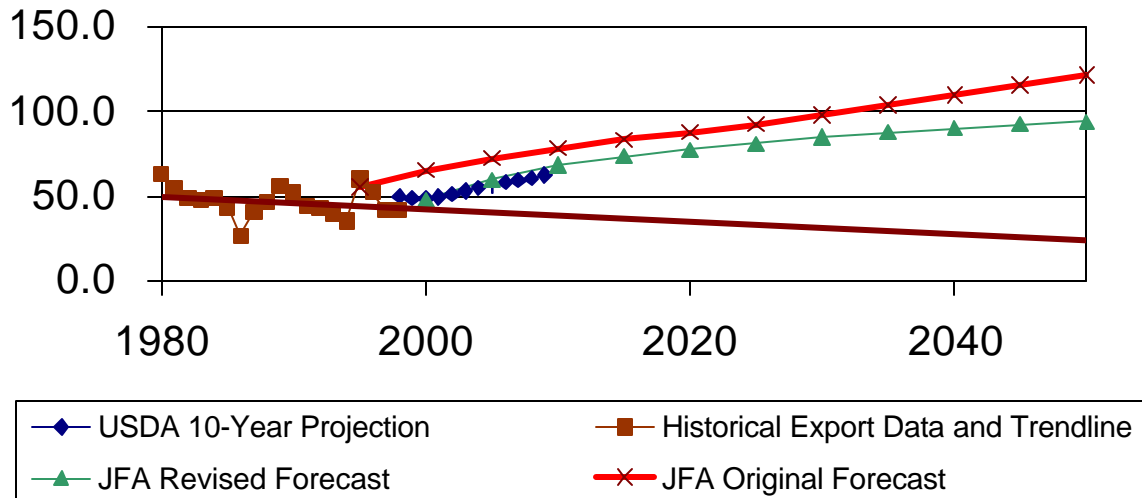


Figure 6 Forecasts of Soybean Exports

