

VICKSBURG DISTRICT AND JAYMAC CONSULTANTS
REVIEW OF SHABMAN REPORT

CORPS RESPONSE TO SHABMAN REPORT

1. As stated on page xi of the Extended Report Summary, opponents of the Yazoo Backwater Pump Project have questioned the justification of a pump and called for nonstructural measures such as expanded crop insurance and removal of agricultural activity and structures from flood-prone areas. Region IV of the Environmental Protection Agency issued a grant to Leonard Shabman and Laura Zepp of the Virginia Tech Department of Agricultural and Applied Economics to adapt existing economic analysis protocols for evaluating nonstructural alternatives, demonstrate the protocol with an evaluation of the Yazoo Backwater Area, and describe an implementation plan providing incentives for landowner adoption of nonstructural actions, hereinafter referred to as "the Shabman Report" or "Shabman."
2. The Shabman Report was forwarded to the U.S. Army Corps of Engineers, Vicksburg District, in February 2000. Although its recommendations were received too late for consideration by the consensus committee, the report offers an alternative to the recommended plan which will be evaluated in this document.
3. It should be noted that the Corps has no statutory or regulatory authority to implement the recommendations of the Shabman Report. Shabman calls for a new study which has not been congressionally authorized or funded, as well as suggesting an agenda for that study. It further suggests changes to existing farm programs or creation of new programs to implement its suggestions. This would also require action by Congress and Federal agencies other than the Corps. Therefore, the analysis of Shabman which follows will be limited to the Corps opinion of the reasonableness of the report's assumptions and the anticipated results of its implementation. Dr. Shabman summarizes his report in Section 6 which is entitled "Findings and Implications." The following 15 comment-response items are the Corps response to these findings and implications.

a. Comment. The nonstructural approach can be justified using NED benefits for carbon sequestration and nutrient reduction¹. (6A1a)

Response. Before the proposed benefit categories can be applied in Federal water resources studies, the supporting methodologies and assumptions must be reviewed and found to be quantifiable and valid. The economic markets for sequestered carbon and nutrient reduction must be found to exist and to be predictable. The benefit analyses would have to be applied equally to the with- and without-project conditions to determine the net benefit. The proposed reforestation must compete successfully in the economic markets with alternative sources of sequestered carbon and nutrient reduction before benefits can be claimed.

Based on other studies, the use of filter strips can reduce the amount of soil particles that are allowed to leave a field to nearly the same level as Dr. Shabman theorizes in his nutrient reduction benefit and this method is significantly less expensive than the approach proposed by Dr. Shabman.

On page 75, Table 4-24, the author uses a nitrogen loading value of 11.17 pounds per acre for soybean land. The author's own tables in Appendix A note that no nitrogen is applied to soybean land, yet the yield off the land is nearly the same as from cropland that receives 150 to 185 pounds of nitrogen per acre. Soybeans do not require nitrogen since they generate their own. Based on available information, a value of 6 to 8 pounds per acre would probably be more reasonable.

The hypoxia problems in the Gulf of Mexico can be attributed in part to the nitrogen loading transported by the Mississippi River. The Yazoo Basin has been estimated to contribute less than 3 percent of this nitrogen. (He makes the assumption that producers have the right to produce a certain quantity of pollutants, and that by reducing their nutrient loads, they would

have pollutant credits to sell to others.) The Yazoo Backwater Area is a subbasin of the Yazoo River and is estimated to contribute less than 1 percent of the nitrogen associated with hypoxia. Therefore, utilizing a nutrient reduction benefit for this study area is in effect inflating the benefits.

The carbon sequestration benefit can only be the excess carbon sequestered over what would be sequestered under existing or expected future conditions. The practice of no-till farming increases the carbon sequestration of cropping. Although the estimates of the carbon sequestered ranged up to 4 tons per acre, the actual benefit is closer to 0.21 tons per acre. Due to Clean Water Act amendments, farmers are switching to no-till methods and the carbon sequestration benefit should be reduced by a factor which would account for some farmers switching to no-till methods each year. A 5 percent change per year for 15 years would be a reasonable rate. Dr. Shabman's report does not appear to reflect this understanding of carbon sequestration, which may result in an inflation of benefits for this category.

b. Comment. The nonstructural approach can be justified using ecosystem restoration guidelines²; i.e., without NED benefits for carbon sequestration and nutrient reduction. Reforestation is a cost-effective means to enhance water quality. (6A1b)

Response. Reforestation is a cost-effective means to enhance some water quality parameters, but Dr. Shabman has not demonstrated this with his report.

Conservation easements with reforestation are legitimate measures to achieve nonstructural flood damage reduction benefits and incidental environmental benefits. However, water quality enhancement is not a budget priority.

c. Comment. NED justification for a pump should be reviewed. There are flaws in the agricultural flood damage reduction benefits. (6A2)

Response. The proposed Yazoo Backwater Reformulation Report is currently under review for compliance with policy, law, and Administration priorities. The reformulation study utilized guidance from P&G.

Based on internal review by the Corps, no flaws were found in our agricultural damage analysis. Similar analyses were utilized on numerous agricultural flood control studies that have undergone countless reviews, and no flaws have been documented.

d. Comment. OMB should review agricultural return calculations. EPA should request an OMB review of the reformulation report. (6B1)

Response. OMB can choose to review any document, and as always, can impact funding decisions.

e. Comment. The Administration should secure revised study authority from the Congress. A Corps-led interagency study would develop a nonstructural plan to be implemented as a Federal responsibility and as a model for the Nation. The effort would refine the analysis tools, set a restoration target for the area, coordinate voluntary reforestation implementation, coordinate farm income assurance with the Federal Crop Insurance Corp and USDA, and coordinate local protection and relocation efforts with FEMA. (6B2)

Response. The Corps has participated in a consensus committee made up of different Federal and state agencies, local government, environmental groups, and other concerns in developing the plans included in the Yazoo Backwater Reformulation Study. Plans advocated by this group include nonstructural, structural, and a combination of features. This is exactly what Dr. Shabman is advocating.

The Corps has sufficient authority under the current authorization to achieve both economic and environmental benefits to the area. However, should the Administration wish to revise the study authority then legislation should be sent to Congress requesting this change. Should this legislation be approved by Congress, then the Corps could institute these changes.

f. Comment. Income assurance options should be developed in the new study. Compensate landowners for future flood losses through contracts with landowners or a subsidy added to the existing crop insurance program. (6B3)

Response. Several of the plans in the final array propose to make lands at certain lower elevations more compatible with the existing flooding regime. This includes compensating those participating landowners who desire to make this change in land use.

None of the plans in the final array will interfere with the USDA in developing and implementing crop insurance subsidies.

g. Comment. Programs to supplement the Wetlands Reserve Program should be developed in the new study. Expand landowner incentives to encourage voluntary reforestation of lands where soybean production is marginally profitable. (6B3)

Response. The USDA Natural Resources Conservation Service administers the Wetlands Reserve Program (WRP) and Conservation Reserve Program (CRP) in consultation with the Farm Service Agency and other Federal agencies. The WRP offers landowners the opportunity to voluntarily protect, restore, and enhance wetlands on their property where CRP allows the landowner the opportunity to protect erodible cropland. Currently, the ceiling for these two programs has been reached in some of the counties in the study area. Raising the ceiling will require input from the local governments in the effective counties. Based on actions taken to date, it does not appear that these ceilings will be raised.

Based on recent congressional actions, future expansion of these programs is not likely.

h. Comment. Designing the WRP Supplemental program. An incentive program could apply to the whole watershed and the Delta. Budget limitations should be recognized. A logical basis is needed for enrolling land in a reforestation program. Landowner payments should not exceed inducements to reforest. (6B41)

Response. The Corps would defer to the Natural Resources Conservation Service for the design and implementation of a WRP Supplemental Program.

Local counties are already concerned about loss of tax revenue when lands are enrolled in WRP and CRP programs. The issue of reduced tax revenue on local counties must be addressed when developing a WRP supplemental payment program.

i. Comment. Government easement payments – A bid-in system. Landowners would bid for lost-income compensation payments. Low bidders who meet reforestation success criteria would receive payment priority. (6B41a)

Response. The Corps would defer the evaluation and implementation of such a program to other agencies.

Several plans evaluated in the final array include easements that would compensate willing landowners for changing land use to one that is more compatible with the existing flooding regime.

j. Comment. Advance the hunting lease markets. Market development could involve (1) technical and financial planning advice services for landowners, (2) a program to match buyers and sellers, and (3) advertising or other programs to increase demand and maintain lease prices. (6B41b)

Response. Benefits from sale of hunting leases are included in the Corps analysis.

Hunting lease markets have already developed in this area.

k. Comment. Advance markets for carbon sequestration. Assess and adapt existing market development activities to develop market sales opportunities in the area. Include certification programs and monitoring. (6B41c)

Response. Developing and managing markets are not within the authorities and missions of the Corps. The Corps would defer development and implementation to others.

Carbon sequestration benefits will incidentally accrue to all plans even though no attempt was made to quantify these benefits or include them in economic justification of the plans in the final array. Reforestation is included in all plans in the final array and would be a cost borne by

the Federal Government. Some of the costs for easements and reforestation are not accounted for in Dr. Shabman's report. The assumption that up to 40,000 additional acres will be placed into existing government programs should not be used as justification to exclude the costs of these lands from the analysis as the Shabman report concluded.

l. Comment. Advance markets for nutrient reduction credit sales. Proposed EPA regulations would require point sources to apply to meet water quality standards when feasible and to buy nonpoint source reductions (offsets) when the standards are not met. Monitor the possibility of securing offset payments for reforestation. (6B41d)

Response. Developing and managing markets are not within the authorities and missions of the Corps. The Corps would defer development and implementation to others.

Nitrogen reduction benefits will incidentally accrue even though it was not included in economic justification of the plans in the final array. Reforestation is included in all plans in the final array and would be a cost borne by the Federal Government.

m. Comment. Contracting systems to seize market opportunities. Encourage private firms and non-governmental organizations to buy timber management rights from the landowners and then sell the carbon sequestration credits and nutrient reduction offsets. (6B41e)

Response. This activity would be beyond the authorities and missions of the Corps. The Corps would defer the action to other agencies.

Landowners who participate with the Corps with conservation easements could benefit more than those who do not due to the fact that an easement would have been purchased and the cost of reforesting the easement land would be borne by the Federal Government.

n. Comment. Budget costs. Features of the watershed action plan would cost less than the proposed pump plant. (6C)

Response. Dr. Shabman's solution does not address the flooding problems over the entire spectrum of flooding elevations. His solution is directed toward the 2-year flood plain only. He has not included the total cost to buy easements and reforest the 88,000 acres because he assumes WRP and CRP will convert 40,000 of the 88,000 acres, and assumes that no costs would be incurred for his plan. However, these costs are borne by the Treasury and must be included as costs to his plan.

Dr. Shabman's plan does nothing to protect those homes, structures, roads, etc., above the 2-year flood event. The cost to flood proof those structures that would continue to flood was not included in his plan. Analyses by the Corps for localized flood protection in this area demonstrated that this proposal was not economically justified. Dr. Shabman's plan calls for an income assurance program for landowners above the 2-year flood frequency, but it is difficult to determine if all costs for this feature are included in his report. This plan would not provide any means for the producers to reduce costs of production or increase the efficiency of their operations.

Several of the plans carried into the final array are economically justified and provide environmental benefits above those required to offset any environmental damage.

o. Comment. Moving forward. This paragraph summarizes the above findings. (6D)

Response. The Corps plans included in the Yazoo Backwater Reformulation Study include a number of the features proposed in Dr. Shabman's report. The Corps has developed a comprehensive watershed plan that addresses flooding problems over the whole range of flooding frequencies. The lowest lying lands would have damages reduced by a change in land use. A conservation easement from willing sellers would allow the open lands to be reforested, thereby reducing the loss from flooding. A structural component would protect those lands at higher elevations on which conservation easements are not secured. The reforestation included in all the plans in the final array would allow carbon sequestration, nitrogen reduction, and improved water quality benefits to accrue to the area.

Conservation easements will compensate willing landowners for a change in land use and would not be an income compensation program.

The Corps plan has identified all the costs and benefits that have been recognized under P&G and several plans are economically and environmentally sustainable.

The plans proposed by the Corps will provide both environmental and economic benefits to the area.

CONCLUSIONS

4. It must be said that purely nonstructural plans are at best an attempt to change the land use patterns of the Delta by compensating landowners for their economic loss from implementing those changes. This land use change is recommended as environmentally beneficial, and if Congress and the Administration choose to alter national policy in this way, they have the means

to do so. However, flooding affects all persons residing and working in the project area, not just landowners. Plans which do no more than compensate landowners for their economic loss for converting from agriculture to silviculture benefit only the landowners and not all the residents of this economically depressed area. The benefits of the Corps recommended plan accrue to all area residents who must live, work, travel, and recreate in the project area. Those benefits are of national significance and are in excess of project costs as demonstrated by Appendix 7.

5. The Administration has mandated that nonstructural plans receive evaluation as a part of project formulation. The Corps has analyzed various plans, including total and partial nonstructural elements. In addition, the Corps has evaluated Shabman's proposals. In the present case, the Corps cannot recommend adoption of a purely nonstructural plan nor can it support Shabman's analysis.

6. The Shabman Report suggests a means of assigning a dollar value to environmental benefits associated with nonstructural flood damage reduction measures in order to economically justify the selection of purely nonstructural measures over either structural measures or a combination of structural and nonstructural measures such as those proposed by the Corps. The report makes an effort to quantify what has previously been unquantifiable, but as the above analysis shows, the effort is flawed. These flaws are of such a magnitude that the Shabman proposal must be rejected as unreasonable.

7. Shabman recommends further study of its proposed plan and a legislative agenda for implementation of its suggestions. This is beyond the authority of the Corps. There is current congressional authority for a flood control project in the Yazoo Backwater. The Reformulation Report recommends a reasonable and cost-effective means of accomplishing the congressional purpose while simultaneously generating substantial environmental benefits. This reformulation report therefore defers further action on Shabman's recommendations to the appropriate parties with the above-noted reservations, observations, and objections.



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February 3, 2006

U.S. Army Engineer District, Vicksburg
ATTN: Mr. Kent Parrish
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Dear Kent,

I have completed my review of "An Approach for Evaluating Nonstructural Actions With Application to the Yazoo River (Mississippi) Backwater Area" by Leonard Shabman and Laura Zepp. This report proposed to adapt existing economic analysis protocols for evaluating nonstructural alternatives, demonstrate the protocol with an evaluation of the Yazoo Backwater Area, and describe an implementation plan providing incentives for landowner adoption of nonstructural actions.

It should be noted that this report calls for a new study that has not been congressionally authorized or funded. It further suggests changes to existing farm programs or creation of new programs to implement its suggestions. This would also require action by Congress and Federal agencies other than the Corps.

A significant portion of the economic benefits presented in this report accrue to sequestered carbon and nitrogen reduction. Before these proposed methodologies can be applied in Federal water resource studies, the supporting methodologies and assumptions must be reviewed and found to be quantifiable and valid. The economic markets for sequestered carbon and nitrogen reduction must be found to exist and be predictable.

The Corps has participated in a consensus committee made up of different Federal and state agencies, local government, environmental groups, and others concerned in developing plans to be included in the Yazoo Backwater Reformulation Study. Plans advocated by this group include nonstructural, structural, and a combination of features. These alternatives are being considered in the "Revised Economic Appendix" currently under preparation.

Enclosure 1 contains numerous page specific comments on subject report. It is my opinion, based on the numerous discrepancies found in the report and the significant overestimation of the benefits to reduction of nitrogen loads from soybean land (see comments 3 and 28) that the report and its conclusions are invalid. As can be seen from the 42 specific comments on the report, there are many inconsistencies and invalid

February 3, 2006

assumptions throughout the report. Many of the assumptions used in this report are prohibited by law and/or regulation in analyses performed by the Corps.

If you have additional comments or questions, please let me know.

Sincerely,

Jesse K. McDonald
President/Senior Economist

Encl

Comments on
“An Approach for Evaluating Nonstructural Actions With
Application to the Yazoo River (Mississippi) Backwater Area”
by Leonard Shabman and Laura Zepp,
Prepared on February 7, 2000 and updated on February 2, 2003
Comments Prepared by JAYMAC Consultants

1. Page 29, Second Paragraph. This paragraph states “.....in lower elevations soybeans predominate due to the heavy soils and the shortened growing season caused by later winter/early spring flood regime. Other crops are found in the higher elevations of the watershed on lands with the better soils where planting delays are few. However, while planting may be delayed for a crop in a lower elevation area, the farm operator can employ intensive production practices once the water is off the field.” This statement does not recognize the significance of the loss of revenue caused by late planting of soybeans. This is even more relevant under conditions found in 2005. In an study currently being conducted by Mississippi State University, non-irrigated soybeans planted before April 16 in the lower Mississippi Delta average averaged 41 bushels per acre while those planted after May 31 average only 28 bushels per acre. At a price of \$6.00 per bushel, that would be a loss of \$78.00 per acre in income.

2. Page 29, Fourth Paragraph. In discussing the relocation and localized protection of structures, the last paragraphs states “Such a plan can be warranted because of the limited number of structures involved and the concentration of those structures in a few small towns.” Most of the structures receiving damage are scattered over the rural areas and are not located in small towns. Therefore, this assumption is invalid. However, in the “Revised Economic Appendix” that is currently being prepared by the Corps, non-structural alternatives such as relocations, ring levees, etc. are being analyzed in detail.

3. Page 29, Fifth Paragraph. Report states “.....the nutrient loads from the Yazoo contribute to water quality problems in the Mississippi River and the Gulf of Mexico.” The percentage of nutrient load entering the Mississippi River from the Mississippi Delta is a very small percentage of the total nutrient load the river carries to the Gulf. This will be addressed in more detail later in these comments. Additionally, as reported in the December 2004 Farm Journal, “A Gulf of Opinion,” a new draft EPA report acknowledges mistakes were made in the research and reports used to formulate the Hypoxia Action Plan which recommended a voluntary 30% reduction in nitrogen loading of the Gulf. This new information suggests that reducing phosphorous rather than nitrogen may help the hypoxia problem. The mistakes came to light during a research review led by EPA water quality scientist Howard Marshall. His team included scientists from EPA and universities, with statistical analytical support from the Illinois Water Survey.

Marshall’s discovery led Derek Winstanley, chief of the Illinois Water Survey, and his staff to review all the nitrogen and phosphorous data ever collected on the lower Mississippi and Atchafalaya rivers by the USFS. Winstanley believes reducing dissolved inorganic phosphorus loading by 30%, or about 13,000 metric tons, might reduce the size

of the hypoxia zone. Phosphorous should be easier to control than nitrogen, he adds, because most of it appears to come from point sources rather than agriculture.

USGS data indicate that the Chicago metropolitan area has four times greater phosphorus yield than the lower Illinois River basin, which is agricultural. The draft EPA report in January 2004 supported Marshall's contentions that phosphorus reduction, rather than nitrogen reduction, might help reduce hypoxia in the Gulf. However, that report was superseded by an EPA report in August 2004 that called for reduction in both nitrogen and phosphorus. In contrast, Marshall said the January report did not suggest reducing nitrogen in the river basin. He stated, "It (the January report) supported the conclusion with an extensive analysis of nutrient data, That nutrient data analysis was deleted from the August report, apparently to suppress data that would contradict EPA management's continued support for nitrogen reduction."

4. Page 34, Third Paragraph. Report states ".....A nonstructural plan is the package of financial incentive payments to encourage such changes. However, due to study time and resource limitations, no effort was made to predict how an incentive program would affect landowner decisions." A plan must be implemental to be considered a valid alternative. The ability to implement a plan of reforestation in the Yazoo Backwater Area is questionable. The majority of the farmers would probably be very resistant to any plan that that had the perception that it was, in any way, mandatory.

5. Page 34, Fourth Paragraph. Reports states that one of the three nonstructural actions was "voluntary reforestation of 88,000 acres of land with a 2-year return frequency of flooding." On page xiv, the report states ".....the budget cost in excess of the existing Wetlands Reserve Program (WRP) payments would be \$26 million, at \$650 per acre." At \$650 an acre, the cost of 88,000 acres would be \$57.2 million. This would mean that WRP payments for the area below the 2-year return frequency of flooding in the Yazoo Backwater Area is \$21.2 million (\$57.2 million less \$26.0 million). There appears to be no basis for this number.

6. Page 35, First Paragraph. Reports states that another of the three nonstructural actions was "expanded farmer participation in an income assurance program to offset agricultural flood damage losses of landowners who choose not to reforest; however, the program only would be available for land above the 2-year floodplain....." Since reforestation is only being considered for "88,000 acres of land with a 2-year return frequency of flooding," the income assurance program would only be available to persons who were not considered for reforestation and not for those who chose not to participate.

7. Page 35, Second Paragraph. Report states that the 88,000 acres of land to be reforested were assumed to be soybean land. This is an inaccurate assumption since the data used in the Corps report indicated that only 67 percent of the cropland below the 2-year frequency was in soybeans. In the past few years, soybeans may have been an even smaller percentage. In 2002, the amount of soybeans planted in Humphreys, Issaquena, Sharkey, Washington, and Yazoo Counties was only 30% of the total cropland.

8. Page 40, Last Paragraph. Report states “It is assumed for the NED analysis of the watershed action scenario that relocation and localized protection will be undertaken to the point where the total NED costs will be equal to the total NED benefits from avoided damages. In effect, the net NED from residential, commercial, and infrastructure protection is set at zero.” With this assumption, we have no knowledge of how many, if any, structures will be relocated and how much residual damage will remain.
9. Page 42, Third Paragraph. Report states “Per acre estimates of benefits and costs are calculated for each year of a 120 year planning period.” P&G limits the period of analysis to 50 years, except for major multiple purpose reservoir projects, which are limited to 100 years.
10. Page 42-43, Equation 4-2. In the calculation of NPV of foregone agricultural production (Ag_1) the variable $Acres_a$ is used. This variable is described as “number of reforested acres previously planted to crop type a. a is described as crop types 1-7 (soybean, cotton, rice, sorghum, wheat, corn, pasture).” This is not compatible with the previous assumption (Page 35, Second Paragraph) that all land to be reforested is soybean land.
11. Page 44, Second Paragraph. Report states “.....It is difficult to defend price and yield projections made so far into the future.This analysis does not attempt to make any price, yield or cost projections any further than 10 years into the future.” ER 1105-2-100, Paragraph 2-4i, First Sentence states “The general level of prices for inputs and outputs prevailing during or immediately preceding the period of planning shall be used for the entire period of analysis.” Projection of prices is not allowed by current Federal guidance for evaluating water resource development projects.
12. Page 45, First Paragraph. Report states “....soybean yields can range from zero to 30 bushels depending on the flooding regime during the growing season.” During the period 2000 through 2004, the five year average soybean yield in the lower Mississippi Delta was 35.9 bushels. Soybeans planted before April 16 can be expected to produce average yields of 41 bushels per acre.
13. Page 47, Third Paragraph. Report states “For this study, an experimental technique developed by USGS called HydroGrow was used to determine the number of acres inundated in each elevation.” It would be interesting to see how the number of acres inundated as computed using HydroGrow compares with the number of acres computed with Corps models. If the numbers are not very similar, then analytic comparisons lose much of their value.
14. Page 48, Second Paragraph. Report states “In the final evaluation of the watershed action scenario it was assumed that the reforested land would all be soybean land.” As stated in an earlier comment, this is not a valid depiction of the actual crops planted on the lands being considered for reforestation. The Report further states “As shown in equation 4-2, the estimation of net returns requires estimates of prices, yields and costs in

the current and future years.” As stated earlier, current guidance for evaluation of water resource projects does not allow for projection of prices and costs.

15. Page 49, Second Paragraph. Report states “To reflect future changes in market conditions projected production costs were used for the first ten years of the simulation.” The remainder of the paragraph discusses use of FAPRI (Food and Agricultural Policy Research Institute) projections of production costs, removal of inflation, 1997 dollars, and 2000 dollars. It is very confusing in deciding exactly what costs were used. Current guidance does allow for projection costs based on changes in technology but not because of changes in price levels. Prices of inputs and outputs must be on same price levels and should be current. Current normalized prices for agricultural crops are required to be used in the evaluation of crop benefits.

16. Tables 4-4a through 4-6b. The data in these tables seem to indicate that projections in production costs was based on changes in technology and not on inflation (price levels). This is acceptable under current guidance (see previous comment).

17. Page 51, First and Second Paragraphs. The Report discusses flood-free yields, cropping practices, etc. Report states “Once the water has left the field, farmers are likely to employ the best available management practices because late season flooding is unlikely. The backwater flooding may delay planting and reduce yields or even cause a switch of crops, but the flooding would not deter the farm operator from using the highest yielding farm production practices after flooding has subsided.” Many aspects of the hydrologic and economic conditions faced by farmers affect their willingness and ability to grow crops using the highest yielding varieties, optimum planting dates, and current technologies. Even though cropland may not be physically flooded at the optimum planting date, farmers may be reluctant to plant crops if projected hydrologic conditions indicate a significant probability of flooding in the near future. Additionally, flooding or the threat of flooding may cause farmers to delay planting until the variety of seed on hand (farmers book seeds for planting late in previous year or very early in current year) is not the variety that has the potential for the highest yields for current planting window. Farmers will also be reluctant to employ such long-term technological improvements as land leveling, irrigation, etc. on land that is susceptible to flooding. Therefore, this statement does not reflect what actually happens in the flood prone area of the lower Mississippi Delta.

18. Page 51, Last Paragraph. Report states “From interviews with these experts, it was clear that flood free yields in the study area are lower than flood free yields elsewhere in the state.” This statement is considered to be valid and provides justification to the benefit category “benefits from increased yield levels” used in the Corps Report.

19. Page 53, Third Paragraph. Report states “We found the normalized prices report by USDA to be technically flawed, unresponsive to the intent of the P&G, and inconsistent with the federal governments own price projections used in the formulation of farm policy. For this reason, we used the FAPRI price projections in our modeling and not the normalized prices.” Paragraph 2.3.3(b) of P&G states “ Use normalized crop prices

issued by the Department of Agriculture to evaluate NED agricultural benefits; adjustments may be made to reflect quality changes caused by floods or drought. For crops not covered above, statewide average prices over the three previous years may be used.” Paragraph 2.3.3(c)(ii) states “ Value purchased inputs at current market prices.” The use of different prices than those required under Federal Law to be used by Corps does not produce results that are comparable to the Corps analysis.

20. Page 54, First Paragraph. Reports states “.....the commodity price projections used were FAPRI regional projections made in developing the annual FAPRI Agricultural Outlook Report.” As stated before, the use of projected prices by a Federal Agency in the analysis of a water resource development project is prohibited by Federal Law.

21. Page 56, Third Paragraph. In the discussion of the algorithm for calculating crop damages, the report states “....The final planting day is the last day within the cropping season that floodwaters recede from the field.” This is not accurate in that it does not allow for the field to dry out sufficiently for planting to occur. The Corps normally uses a 10-day dry out period after flood waters recede before planting will occur.

22. Page 57, Table 4-11. The planting dates shown in referenced table accurately reflect typical planting dates that existed in the lower Mississippi Delta prior to the mid 1990s. However, because of the development of new varieties of soybeans, typical planting dates are now much earlier, with yield decreases beginning with beans planted after April 16. For example, Maturity Group (MG) IV soybeans planted before April 16 yield an average of 41 bushels per acre; whereas, MG IV soybeans planted from April 16 through April 30 yield an average of 35 bushels per acre. The ability to plant soybeans early allows them to mature before the drought and heat stress that normally occurs from July through September.

23. Page 57, Last Paragraph. This paragraph discusses the variable “PLANTINGDATE.” The report states “For each elevation range, the Corps stage data was examined to determine the timing of flooding during the cropping season and the final planting date was identified in each of the fifty years. The earliest, latest and most frequent final planting dates from the Corps data set were used as the parameters for the PLANTINGDATE distribution.” As discussed in previous comment, the failure to allow for dry out time after the flood waters recede causes the PLANTINGDATE distribution to be invalid.

24. Page 58, First, Second, and Third Paragraphs. These paragraphs discuss the theoretical effect of replacing soybean production from lower Mississippi Delta land that would be reforested by putting CRP/WRP land in the Midwest back into production. It also makes a case for the efficiencies of soybean production in the Midwest (Illinois, production costs of \$3.64 per bushel) over the lower Mississippi Delta (production costs of \$4.36 per acre, including the cost of flooding). There are several fallacies in this discussion.

- a. There are numerous flooding events in Midwestern states such as Illinois that probably were not included in the production costs of \$3.64 per bushel.

- b. The return of CRP/WRP land to production does not account for the fact that these programs require signup for a certain number of years and cannot be converted back to farmland on a year-to-year basis.
- c. This discussion does not account for the fact that there may be other market efficiencies to production of soybeans in certain areas such as transportation costs to consumers, processing capacity, etc. The use of such comparisons are invalid unless a complete market analysis is conducted.
- d. One of the major benefits claimed for reforestation of soybean land in the lower Mississippi Delta is nitrate reductions. If the soybean land taken out of production in the lower Mississippi Delta is replaced by equal acreage of soybeans in the Midwest, there would be no reduction, and in fact could cause and increase in nitrates because of the higher erosion on soils in the Midwest.

25. Page 65, First Paragraph. Report states “For each tree species, sawtimber prices were assumed to increase by 1% (above inflation), from current prices through the first ten years. Prices remain constant through the rest of the rotation.” As stated several times previously, current Federal Law concerning the evaluation of water resource development projects does not allow for the projection of prices. Furthermore, many things can affect timber prices in the U.S. Prices can fall because of increased imports from other countries, especially Canada or because of other market factors such as a depressed housing market. Prices can sharply escalate because of increased demand from wars, natural disasters, increased demand for houses, etc. or decreased supply because of natural disasters (hurricanes, forest fires, etc.) or environmental restrictions (spotted owl). These largely unpredictable market factors are one of the primary reasons for the restriction of projection of prices in the analysis.

26. Page 65, Third Paragraph. This paragraph discusses using a seeded nuttall oak (acorns) regime rather than using nuttall seedlings. Is there a difference in the survivability and growth of trees using the two different methods of stand establishment? If so, was this accounted for in the analysis?

27. Page 65, Last Paragraph. The report discusses increased mortality rates caused by flooding and the fact that landowners plant higher densities than they hope to harvest to account for this problem. It would seem that it would be more effective to assume a certain number of acres would be lost and have to be replanted or that a less than desirable stand would be realized.

28. Page 76, Table 4-24. This table shows pollutant loads from the land uses in the Yazoo watershed. Tetra Tech, Inc. calculated this data for VPI using the BASINS model. The table shows total nitrogen loads of 13.07 pounds per acre per year for cotton and 11.17 pounds per acre per year for soybeans. These loads are significantly higher than what has been observed in the Yazoo and Sunflower Basins. In September 2004, the Vicksburg District calculated nitrogen loads from soybeans in the Yazoo/Sunflower area to be 1.87 pounds per acre per year based on data from “Concentrations and Loads on Nitrogen and Phosphorus in the Yazoo River, Northwestern Mississippi, 1996-1997,” USGS Water Resources Investigations Report 98-4219 by R. H. Coupe. The Corps

currently has a joint monitoring project in the Backwater area with USGS but very few rainfall events have occurred since the monitoring started in 2005. However, a Mississippi Delta Management Systems Evaluation Areas (MDMSEA) project managed by USGS has some good data on nitrogen loads from cotton land. They found that conventionally tilled cotton yielded approximately 11.0 pounds per acre per year. Conventionally cotton with edge-of-field best management practices (BMPs) had a yield of 9.0 pounds per acre per year (This site was unusual in that the field had a 5% slope on it. This is unusually steep for the Mississippi Delta). The final site used conservation tilled cotton and edge-of-field BMPs and had a nitrogen load of approximately 2.5 pounds per acre per year. It is expected that nitrogen yields from soybean lands will be significantly lower than any of these amounts since no nitrogen is applied to soybeans, and most soybeans are now planted using “limited tilling” practices. Base on these facts, nitrogen loads released into the water from soybean land in the area below the 2-year flood event in the Yazoo Backwater area are expected to be in the 2.0, or less, pound per acre per year. Therefore, the benefits to reduction of nitrogen loads shown in this report are significantly overestimated, and the correct calculation of these benefits would probably make the recommended reforestation plan unjustified from an NED standpoint.

29. Page 78, Table 4-25. The highest amount of “metric tons of carbon sequestered annually per acre” for any individual species shown in referenced table is 1.89 tons per acre for cottonwood. However, the table shows sequestration rates as high as 2.48 tons per acre for cottonwood-oak mixed. How can the sequestration rate for the mixed stand be greater than for either species alone?

30. Page 79, Third Paragraph. Report states “.....a number of structures are concentrated in a few developed areas. The damages associated with these structures is mostly for a recurrence of the 100-year event.....we assume that nonstructural actions will be undertaken to the point where benefits would just equal costs.” There are several inaccuracies in these statements. The reviewer does not believe very many of the structures are concentrated in a few developed areas. Most of the structures are located in rural areas and are composed of mostly farmsteads and related development. Secondly, the assumption that nonstructural actions will be undertaken to the point where benefits equals costs gives no indications of how many, if any, structures would actually be relocated or protected by local works. However, as mentioned in an earlier comment, the “Revised Economic Appendix” will include a detailed analysis of relocations, ring levees, etc.

31. Page 79, Fourth Paragraph. Report states “.....we can speculate that relocation programs for properties in the lower elevations will be justified because of the frequency of recurring damages and the low value of these properties.” This statement has no validity as to its impact on flood damage to structures. As is stated in the proceeding paragraph of the report, most structures are damaged by the less frequent floods. Of the 1,599 total structures flooded by a 100-year event, two are flooded by a 2-year event and 151 (48 of these are camps) are flooded by the 5-year event.

32. Page 80, Second Paragraph. Report states “ No NED analysis of the insurance program action scenario was completed.” Without such an analysis, the effectiveness of such a program in mediating damages and protecting farm income is unknown.

33. Page 81, Third Paragraph. Report states “Calculating the total agricultural returns forgone under the Watershed Action Scenario involved multiplying the total number of acres to be reforested in each analytical unit by the per acre NPV of soybean return for that unit.” Numerous other places in the report also refer to the assumption that all of the reforested land is assumed to be in soybeans. However, on page 42, Equations 4-1 and 412, the report indicates that seven crops are used in the calculation of NPV of forgone agricultural production, per acre. There are numerous inconsistencies concerning this in the report.

34. Page 82, Footnote 51. Report states “This means that replacing Yazoo soybean production with production on an average acre in Illinois would lower the nations cost of producing soybeans. Therefore, reducing soybean production on frequently flooded areas of the Yazoo would increase NED because there would be a NED cost savings (benefit) of \$0.72 per bushel. What appears as a cost of reforestation with the standard analysis is a benefit under the assumption of supply control. A total of \$1.8 M in cost savings (benefits) would be produced under the watershed action scenario, instead of a loss of NED of \$40.1 M ($\$0.72/\text{bu} * 29 \text{ bu}/\text{ac} * 88,000 \text{ ac.} = \1.8M).” If the assumption that soybean production from the Yazoo Basin is replaced in Illinois is accepted, the nitrogen reduction benefit cannot be claimed. In fact, because soils in Illinois are more likely to experience more erosion than the heavy clays of the Yazoo Basin, nitrogen load would likely increase.

35. Page 83, Last Paragraph. In discussing the Corps intentions to look at reforestation as a component of other plans, the report correctly indicates that hydrological and/or economical separable increments of a project should be analyzed individually. In this discussion, the report states “If there is not separable justification, then one NED justified action might provide sufficient net benefits to mask the fact that an unjustified action is being “carried” by a justified action.” With the discrepancies in this report, especially as applies to nitrogen reduction (i.e. the unreasonable high loads shown for soybean land in the Yazoo Basin, the discussion of replacing soybean production in the Yazoo with soybean production in Illinois, etc.), it seems that reforestation alone is not even close to being justified. Therefore, the only way to justify any reforestation is to include it as a part of the overall project.

36. Page 85, Last Paragraph. The report discusses several reasons why the authors believe the agricultural flood damage reduction benefits computed for their analysis differs from the benefits likely to be reported by the Corps. The report states “One important area of difference is that our estimates of the current flood-free net returns for some crops in this study are far less than the Corps’ estimates.” The Corps’ estimates are based on yields provided by interviews with farmers and confirmed by agricultural specialists with the Cooperative Extension Service, NRCS, etc.; budgets prepared by Mississippi State University; and current normalized prices as required by P&G. Corps’

estimates of net returns are based on the best data available that is in compliance with Federal Law regarding the evaluation of water resource development projects. Additionally, a new study just completed by Mississippi State University indicates that actual yields in the Yazoo Basin are significantly higher than the yields used in the Corps study.

37. Page 86, Third Paragraph. Report states “First, the Corps includes “intensification benefits” in their analysis of the pump. Intensification benefits are those improvements in flood-free agricultural returns that occur with the pump for reasons other than reduced flood damages. The Corps argues that, in addition to reducing flood damages, the presence of a pump will enable producers to employ improved management practices. We did not accept this argument. As reported in Section 4, once the water leaves the field there is little likelihood of return flooding. Therefore, the farm operators will employ the best available production practices. We argue that the effect of flooding is to delay planting or cause a shift in crop planted, not to discourage the best production practices for a given crop when planting is initiated.” The lack of available capital because of the magnitude of flood damages may prevent the farmer from leveling his land, irrigating crops, improving drainage, etc. which will all result in improved yields and higher net returns. The threat of flooding, even in years when a flood might not actually occur may cause a farmer to plant later than the optimum thus reducing yields and net returns. Additionally, page 51, last paragraph of the report states “From interviews with these experts, it was clear that flood free yields in the study area are lower than flood free yields elsewhere in the state.” This statement is considered to be valid and provides justification to the “intensification benefits” used in the Corps Report.

38. Page 86, Fourth Paragraph. Report states “Historical and projected growth in crop sales does not provide any information about future changes in the costs of production, rather only describes change in agricultural revenues.” Based on information provided in the report, production costs, in real dollars, are expected to decrease over time (see Table 4-4a). Therefore, the Corps’ projection method would under estimate the increase in benefits over time. The report further states “Furthermore, projected growth rates based on historical crop sales produces estimates of increasing growth rates that contradict present trends of falling prices and increasing yield levels.” The use of the historical “value of farm products sold” in constant dollars to project the increase in agricultural benefits uses the historical change in crop prices (in constant dollars) and yields (value of farm products sold) and is a valid projection methodology.

39. Page 90, Table 5-2. The net returns provided in Corps budgets are based on “flood-free” conditions (i.e. conditions in years when no flood occurs but the threat of flooding is still present). The net returns are also returns to land and management and do not have management costs or land costs included as fixed costs in the budget. Once these net returns are adjusted for the “expected annual crop damages” that occur in the project area, they are much lower than those in the budgets. If you were to include flood damages and all fixed costs such as management, you would have much lower net returns (negative in many cases) and the capitalized land values probably would be lower than market prices. Therefore, this table is very misleading.

40. Page 91, First Paragraph. Report states “We used a careful budget analysis and prudent and realistic projection approach. The validity of our approach is certified by the land price comparison.” As stated above, the net returns used by the Corps will probably produce capitalized land values less than market prices when flood damages and all fixed costs are included in the budgets.

41. Page 101, Second Paragraph. Report states “The present value of the maximum flood damages estimated for the eligible area (the area above the 2-year flood event) are \$13.9M, although a somewhat larger amount of damages may be possible.” The Corps’ estimate of flood damages in the area above the 2-year flood is \$2,405,000 annually, or about \$36M capitalized at a 6.625% discount rate. Additionally, there are flood damages on land below the 2-year flood event that were not included in the 88,000 acres to be reforested. These acres would also need to be included in the income assurance program. This would make the cost of the program even higher than the \$36M.

42. Page 106, Fourth Paragraph. Report states “The direct costs to the federal government for the easement payment program plus income assurance programs will be around 39.9\$ million, using the estimates made for this study.” Based on data in the Corps report and the opinion of this analyst, this cost is much too low. The income assurance program alone approaches this cost (see comment immediately above).