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MEMORANDUM

November 22, 2005

TO: Peter Grigelis, USFWS

FROM: Industrial Economics, Incorporated (IEc)

SUBJECT: Estimated Economic Impacts of Conservation Efforts in Designated Critical Habitat for the Arkansas River Shiner

The September 2005 Final Economic Analysis of Proposed Critical Habitat Designation for the Arkansas River Shiner (FEA) assesses the potential economic impacts in areas contemplated for critical habitat designation for the shiner as described by the U.S. Fish and Wildlife Service (Service) in the Proposed Rule.¹ Because the geographic scope of the FEA is consistent with the Proposed Rule, it does not reflect changes made to the proposed critical habitat in the Final Rule. This memorandum provides information on the economic impacts of conservation efforts for the shiner within the final critical habitat as described in the Final Rule.²

The Service excluded from final critical habitat three units in their entirety (Units 1a, 2, and 4), and portions of one unit (Unit 1b). Units 2 and 4 were identified for exclusion in the Proposed Rule; however, Units 1a and 1b were previously proposed for inclusion. Details of the geographic scope of final critical habitat and reasons for the various exclusions are described in detail in the Final Rule.

¹ USFWS, Endangered and Threatened Wildlife and Plants: Proposed Designation of Critical Habitat for the Arkansas River Basin Population of the Arkansas River Shiner; Proposed Rule, published in the *Federal Register* on October 16, 2004, Vol. 69, No. 193.

² USFWS, Endangered and Threatened Wildlife and Plants: Final Designation of Critical Habitat for the Arkansas River Basin Population of the Arkansas River Shiner; Final Rule, published in the *Federal Register* on October 13, 2005, Vol. 70, No. 197.

In order to estimate costs associated with the Final Rule, this memorandum takes the following steps. First, costs associated with Unit 3 are included in their entirety. Then, the costs associated with the portion of Unit 1b that was designated are identified and added to the costs in Unit 3.

Impacts associated with Unit 3 are reported in Exhibits ES-4a through ES-4c of the FEA. The present value (assuming a seven percent discount rate) of costs range from \$74 million to \$150 million. In annualized terms, this range is \$7 million to \$14 million.

To identify the costs in the final Unit 1b, the analysis relies on watershed-level impact estimates. The FEA estimates costs based on watershed delineations at the eight-digit hydrologic unit code (HUC) level (see Appendix C), also referred to as "watersheds." Four watersheds encompass Unit 1a as described in the Proposed Rule. Of these four watersheds, habitat in two, the Lower Canadian Walnut and Lower Canadian watersheds, was designated in the Final Rule. Therefore, costs associated with these watersheds are included in the final cost estimate. Habitat associated with one, the Middle Canadian Spring watershed, was excluded; therefore, the costs estimated in the FEA for this HUC are not part of the final cost estimate.

Only a portion of the habitat associated with the fourth, the Lower Canadian Deer watershed, was designated. To isolate the costs associated with the critical habitat portion of this HUC, the analysis relies on finer resolution mapping of the hydrologic processes within this watershed. The State of Oklahoma subdivides this eight-digit HUC into smaller watersheds that are named using an 11-digit code. Relying on geographic information systems (GIS) data layers of the 11-digit HUCs, the analysis determines that designated habitat in the Lower Canadian Deer watershed is found in a single 11-digit HUC.

The analysis determines the proportion of CAFOs and oil and gas operations in this 11-digit HUC relative to the larger Lower Canadian Deer watershed. This proportion is multiplied by the impact estimates in the FEA for Unit 1b for these two types of activities. In addition, the amount of habitat in this 11-digit HUC is divided by the total habitat in the Lower Canadian Deer watershed. The resulting ratio is multiplied by the impact estimates for the other affected activities (e.g., transportation projects, farm operations). The total costs in this 11-digit HUC are added to the impact estimates for the Lower Canadian Walnut and Lower Canadian watersheds for an estimate of the total costs associated with the final Unit 1b.³ Impacts associated with the designated portion of Unit 1b are \$62 million to \$156 million in present value terms (assuming a seven percent discount rate). In annualized terms, this range is \$6 million to \$15 million.

Exhibit 1 provides an estimate of the economic impacts of shiner conservation efforts in areas designated as critical habitat for the shiner. The present value (assuming a seven percent discount rate) of costs range from \$137 million to \$307 million. In annualized terms, this range is \$13 million to \$29 million.

³ Because impacts to these activities are distributed evenly throughout the habitat, apportioning costs based on the amount of designated habitat in the watershed is appropriate.

Exhibit 1

**ECONOMIC IMPACTS OF CONSERVATION EFFORTS FOR THE SHINER
WITHIN THE AREAS DESIGNATED AS FINAL CRITICAL HABITAT**

Total Post-designation Impacts (2005-2025)	Impacts Estimated in Final CHD
Undiscounted	High: \$528,397,000 Low: \$227,887,000
Present Value (7% discount rate)	High: \$306,562,000 Low: \$136,559,000
Annualized (7% discount rate)	High: \$28,937,000 Low: \$12,890,000
Present Value (3% discount rate)	High: \$405,654,000 Low: \$175,000,000
Annualized (3% discount rate)	High: \$27,396,000 Low: \$11,893,000