

**ECONOMIC ANALYSIS
OF CRITICAL HABITAT DESIGNATION
FOR ELEVEN MOBILE RIVER BASIN MUSSELS**

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TABLE OF CONTENTS

EXECUTIVE SUMMARY	ES-1
1 INTRODUCTION AND BACKGROUND	1-1
1.1 Description of Species and Habitat	1-2
1.2 Proposed Critical Habitat	1-3
1.3 Framework and Methodology	1-11
1.4 Information Sources	1-22
2 SOCIOECONOMIC PROFILE AND BASELINE ELEMENTS	2-1
2.1 Socioeconomic Profile of the Critical Habitat Area	2-1
2.2 Relevant Baseline Elements	2-12
3 SECTION 7 ACTIVITIES WITHIN THE MUSSEL CRITICAL HABITAT DESIGNATION	3-1
3.1 Categories of Economic Impacts Associated with Section 7 Implementation .	3-1
3.2 Activities Potentially Affected by Critical Habitat Designation for the Mussels	3-4
3.3 Summary of Results	3-18
4 ECONOMIC IMPACT OF CRITICAL HABITAT DESIGNATION	4-1
4.1 Estimated Total Costs of Section 7	4-1
4.2 Section 7 Activity Details Within Proposed Critical Habitat	4-11
4.3 Estimated Technical Assistance Efforts	4-55
4.4 Other Regulatory Assessments	4-58
5 POTENTIAL BENEFITS OF PROPOSED CRITICAL HABITAT	5-1
5.1 Categories of Benefits	5-2
REFERENCES	R-1
APPENDIX A: State-level Baseline Protections to the Mussels and Habitat	A-1
APPENDIX B: Other Regulatory Assessments	B-1
APPENDIX C: Section 7 Costs for the Mussels Per Unit and Activity	C-1

EXECUTIVE SUMMARY

1. On March 26, 2003, the U.S. Fish and Wildlife Service (Service) proposed to designate critical habitat for 11 mussels in the Mobile River basin, hereafter referred to as the mussels. The purpose of this report is to identify and analyze the potential economic impacts associated with the designation of critical habitat designation for these mussels. This report was prepared by Industrial Economics, Incorporated (IEC), under contract to the U.S. Fish and Wildlife Service's (Service) Division of Economics.
2. Section 4(b)(2) of the Endangered Species Act (Act) requires the Service to designate critical habitat on the basis of the best scientific data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.

KEY FINDINGS

- The present value cost associated with the designation of critical habitat for the 11 Mobile River Basin Mussels is forecast to be **\$20 million to \$144 million** (seven percent discount rate), or approximately \$2 to \$13.6 million annually over the first ten years.
- Consultations regarding proposed construction of water supply dams within the designation represent approximately 51 percent of the total designation costs. This is due to the high potential nominal opportunity cost of \$154 million associated with constructing at an alternative site a water supply reservoir that is currently proposed to be built at Locust Fork in Unit 12. The relatively large range in costs results from whether section 7 considerations represent the precipitating factor concerning the construction of the dam at Locust Fork and its possible relocation. As discussed in detail in Section 4.2.3 of this analysis, many factors may influence the construction decision.
- Consultations and resulting impacts regarding hydropower accounts for another 36 percent of the total costs. This is driven by the estimated annual costs of decreased energy production and dependable capacity at Weiss Dam and Carters Dam of up to \$107 million over 30 years. This analysis assumes this cost is passed on to power consumers in the form of fuel price adjustments.
- Of the proposed 26 critical habitat units, approximately 79 percent of the total designation costs are anticipated to stem from the designation of two Units. Economic activity within proposed critical habitat Unit 12 is anticipated to result in approximately 52 percent of the total costs of the designation due to the potential relocation of Locust Fork Reservoir from this Unit. Unit 18 is anticipated to generate another 29 percent of total costs associated mostly with decreased power production due to flow modifications at Weiss Dam. Consultations within Unit 25 are forecast to result in another nine percent of the total costs due to impacts at Carters Dam. Unit 14 is anticipated to bear approximately three percent of total costs, and Unit 1 another two percent. All other Units are anticipated to engender less than one percent of the total costs associated with section 7 for the mussels.
- State, and local agencies will bear 62 percent of the costs of the designation; private entities will incur another 32 percent. The Service is anticipated to bear approximately one percent of the designation costs, with the remaining five percent being borne by other Federal agencies.
- The designation is not expected to have a significant economic impact on small businesses or the energy industry.

Framework for the Analysis

3. This analysis is consistent with the designation as described in the proposed rule. As such, this analysis does not reflect potential changes to the proposed units in the final rule. Description of the habitat designation in the final rule may consequently differ from that presented in this analysis.
4. The primary purpose of this analysis is to estimate the economic impact associated with the designation of critical habitat for the mussels.¹ This information is intended to assist the Secretary in making decisions about whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.² This economic analysis considers both the economic efficiency effects that may result from the designation and addresses how the impacts of the designation are distributed, including an assessment of any local or regional economic impacts and the potential effects on small entities and the energy industry. This information can be used by decision-makers to assess whether the effects of the designation might unduly burden a particular group or economic sector.
5. This analysis focuses on the direct and indirect costs of the rule. However, economic impacts to land use activities exist due to multiple regulations irrespective of mussel conservation efforts or related critical habitat. These impacts may result from, for example, local zoning laws, State natural resource laws, and enforceable management plans and best management practices applied by other State and Federal agencies. Economic impacts that result from these types of regulations are not included in this assessment; they are considered to be part of the “baseline.”
6. This analysis describes impacts that are expected to occur above and beyond the baseline. In other words, it measures the costs of compliance with the Act that would not occur in the absence of constraints on activities engendered by section 7 of the Act. In addition, where appropriate, costs associated with sections 9 and 10 of the Act are considered related to the designation of critical habitat.
7. The measurement of direct compliance costs focuses on the implementation of section 7 of the Act. This section requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or

¹ This analysis considers the effects of the regulatory action as proposed in the Federal Register on March 26, 2003 (68 FR 14752).

² 16 U.S.C. § 1533(b)(2).

adverse modification of critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent the direct compliance costs of designating critical habitat. *Importantly, this analysis does not differentiate between consultations that result from the listing of the species (i.e., the jeopardy standard) and consultations that result from the presence of critical habitat (i.e., the adverse modification standard).*

8. The designation may, under certain circumstances, affect actions that do not have a Federal nexus or are otherwise not subject to the provisions of section 7 under the Act. For the purposes of this analysis, these impacts are defined as indirect effects. For example, although technical assistance is not a direct cost of section 7 of the Act, these costs are incorporated into the cost analysis when they are explicitly propagated by consideration of species and habitat conservation. Similarly, a State agency may request technical assistance from the Service as a precaution to ensure that activities without a Federal nexus, such as the issuance of National Pollutant Discharge Elimination System (NPDES) permits, adequately provide for particular species and habitats. In this case, costs of Service review of such activities would be included as a cost of critical habitat designation.
9. The analysis examines activities taking place both within and adjacent to the proposed designation. It estimates impacts based on activities that are "reasonably foreseeable," including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Accordingly, the analysis bases estimates on activities that are likely to occur within a ten year time frame, beginning on the day that the current proposed rule becomes available to the public. The ten-year time frame was chosen for the analysis because, as the time horizon for an economic analysis is expanded, the assumptions on which the projected numbers of projects are based become increasingly speculative. Where information is available for particular projects that costs may be incurred over a different period of time, the appropriate time frame is employed. For example, this analysis estimates that the annual costs of lost power generation associated with changes in flow regime at hydropower plants may be incurred over a 30 year time horizon.³ Further, costs associated with relocation of the water supply reservoir at Locust Fork are anticipated to be incurred over a 25 year time frame as the project is anticipated to take 25 years to complete.⁴

³ Letter from Balch and Bingham, LLP, on behalf of the Alabama-Tombigbee Rivers Coalition, October 13, 2003; letter from Mac R. Holmes, Professor of Economics and Business, Troy State University, October 13, 2003. The 30 year time horizon is recommended for hydropower plants as licenses for hydropower projects are typically renewed on a 30 to 50 year schedule. Applying the same lost power costs over 30 years, however, may overstate the real annual impacts as is it likely that changes to rate structures will be brought about through broader market adjustments in the long term.

⁴ O'Brien and Gere Engineers, Inc., *Draft Assessment of Alternative Sources of Supply The Water Works and Sewer Board of The City of Birmingham, Alabama*, July 1993.

10. This report relies on a sequential methodology and focuses on distilling the salient and relevant aspects of potential economic impacts. The steps followed in this analysis consist of:

- Describing current and projected economic activity within and around the proposed critical habitat area;
- Identifying whether such activities are likely to involve a Federal nexus;
- For activities with a Federal nexus, evaluating the likelihood that these activities will require consultations under section 7 of the Act and, in turn, result in any modifications to projects.
- Estimating the direct costs of expected section 7 consultations, project modifications and other economic impacts;
- Estimating the likelihood that current or future activities may require additional compliance with other Federal, State, and local laws as a result of new information provided by the proposed designation;
- Estimating the likelihood that projects will be delayed by the consultation process or other regulatory requirements triggered by the designation;
- Estimating the likelihood that economic activity and/or property values will be affected by regulatory uncertainty;
- Estimating the indirect costs of the designation, as reflected in the cost of compliance with State and local laws, project delays, regulatory uncertainty, and effects on property values;
- Assessing the extent to which critical habitat designation and other co-extensive regulations will create costs for small entities as a result of modifications or delays to projects;
- Assessing the effects of administrative costs and project modifications on the supply, distribution, and use of energy; and
- Determining the benefits that may be associated with the designation of critical habitat.

Results of the Analysis

11. Exhibit ES-1 provides an overview of the present value of total section 7 costs associated with the listing and designation of critical habitat for the mussels.⁵ As the exhibit shows, estimates of the costs associated with section 7 consultations for the mussels, discounted to present value using a rate of seven percent, range from \$20 million to \$144 million.⁶ This present value range equates to an annualized stream of costs of \$2 million to \$13.6 million for the first ten years. This cost range represents the costs of the designation associated with section 7 consultations and resulting project modifications, and technical assistance efforts.

⁵ To discount and annualize costs, guidance provided by the Office of Management and Budget (OMB) specifies the use of a real rate of seven percent. In addition, OMB recommends sensitivity analysis using other discount rates. One commonly applied rate is three percent, which some economists believe better reflects the social rate of time preference. U.S. Office of Management and Budget, "Guidelines to Standardize Measures of Costs and Benefits and the Format of Accounting Statements," in *Appendix 4: Report to Congress on the Costs and Benefits of Federal Regulations*, March 22, 2000 and U.S. Office of Management and Budget, "Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice," 68 *Federal Register* 5492, February 3, 2003.

⁶ The primary reason for the broad range in costs stems from the inclusion, at the high end, of the impacts associated with a potential effort to locate a water supply dam at Locust Fork in Unit 12 of the proposed designation. Critical habitat may affect whether it is located at this site. Locating the dam at an alternative site may result in incremental costs of up to \$154 million in nominal terms. Section 7 consideration for the mussels represent one of many factors in the decision of whether to relocate the proposed reservoir. It is unclear which of these factors may serve as the precipitating reason for the relocation of the reservoir.

Exhibit ES-1

SECTION 7 AND TECHNICAL ASSISTANCE COSTS ASSOCIATED WITH THE LISTING AND DESIGNATION OF CRITICAL HABITAT FOR THE MUSSELS

	Total Estimated Section 7 Costs
Nominal value of total section 7 costs	\$41.6 million to \$301 million
Present Value (7% discount rate)	\$19.9 million to \$143 million
Annualized Costs (ten years)*	\$2 million to \$13.6 million
Present Value (3% discount rate)	\$29.1 million to \$211 million
Annualized Costs (ten years)*	\$2 million to \$13.6 million

Notes: Estimates are rounded to three significant digits. Costs may not add up due to rounding. These estimates include all section 7 costs, including both those associated with the species listing and designation of critical habitat for the mussels. Consultations costs known to occur in specific years are discounted accordingly. The broad range in costs stems from the inclusion, at the high end, of the incremental costs associated with identifying and constructing at an alternative site a water supply reservoir that is currently proposed to be constructed at Locust Fork Reservoir in Unit 12. The relocation costs may be up to \$154 million in nominal terms. Section 7 consideration for the mussels represent one of many factors in the decision of whether to relocate the reservoir. It is unclear which of these factors may serve as the precipitating reason for the relocation of the reservoir.

Costs of lost power generation are assumed to be incurred annually over 30 years. Costs associated with alternative siting of the proposed Locust Fork Reservoir in Unit 12 are assumed to be spread over 25 years. All remaining consultations costs are assumed to be evenly spread across the ten years.

*The annualized costs represent the estimated average annual cost anticipated over the first ten years. It is possible that these annual costs may be incurred over the first 30 years.

12. The general distribution of these costs by activity, unit, and party bearing them is as follows:

- Costs by type of major activity.** As detailed in Exhibits ES-2 and ES-3, a range of activities may be affected by the designation of critical habitat for the mussels. The largest portion of the total designation costs, 51 percent, are expected to stem from consultation regarding the proposed water supply reservoir at Locust Fork in Unit 12. The nominal opportunity cost of locating the proposed reservoir at the second best identified site is anticipated to be approximately \$154 million. It is unclear, however, what issue may trigger the relocation of this reservoir as multiple Federally-listed species are present in this region, and high levels of public opposition to the project have been experienced with past proposals at this site. As such, this analysis includes a range of impacts for this projects of \$0 to \$154 million. Recommendations for changes in flow regime at hydropower projects accounts for another 36 percent of the total designation costs. Annual costs associated with decreased power production resulting from increases in flow

from the dams will be borne by the power consumers. Considerable uncertainty exists, however, with respect to the level of project modification that may be recommended with respect to operations at the hydropower dams, particularly regarding minimum flow recommendations.

- **Costs by type of entity.** As illustrated in Exhibit ES-4, approximately, 57 percent of total section 7 costs will be borne by State and local governmental agencies. Of the remaining costs, approximately 36 percent will be borne by private parties, one percent will be borne by the Service, and six percent by other Federal agencies, such as the USACE.
- **Costs by unit.** As detailed in Exhibit ES-5 and ES-6, Units 12 and 18 are likely to engender the highest costs on a unit-by-unit basis, accounting for approximately 81 percent of the total costs of the designation. The opportunity cost of siting the Locust Fork Reservoir outside of critical habitat accounts for high costs associated with Unit 12, which represent 52 percent of the total designation costs. Power production losses of up to \$2.84 million are attributable to recommendations to increase flow at Weiss Dam in Unit 18. This Unit accounts for another 29 percent of the total designation costs. Lost power generation and decreased dependable capacity, estimated to cost approximately \$724,000 annually at Carter's Dam upstream, drive the relatively high costs of Unit 25 (nine percent of the total costs). Economic Activity in Unit 14, including the USACE dredging of the Federal Navigation Channel on the Alabama River, contributes approximately three percent of the total costs, and two percent of the total costs are in Unit 1, stemming from a high number of informal consultations regarding clearing and desnagging of the tributaries of the Tombigbee River for flood control. The remaining Units are anticipated to generate less than one percent of the total costs of section 7 consultation regarding the mussels.
- **Costs by category.** Administrative costs of consultations will generate a high end estimate of approximately 4 percent of total designation costs. Costs resulting from project modifications are anticipated to account for 96 percent. Of the project modification costs, approximately 53 percent are the costs of using an alternative site for the proposed Locust Fork Reservoir in Unit 12. Another 37 percent of project modification costs are lost power generation at Weiss Dam, and lost power generation and dependable capacity at Carters Dam. The increased costs of purchasing substitute power are ultimately passed on to the power consumers.

Detail of Section 7 Costs

13. The following section first outlines costs by major activity affected by critical habitat designation, and then allocates these costs on a unit-by-unit basis. A detailed itemization of this cost information by activity, unit, type of entity, and category is provided in Appendix C.

Costs By Major Activity

14. The following discussion summarizes the activities anticipated to experience impacts due to mussel conservation activities. Related consultations and project modification costs are summarized in Exhibit ES-2. Federal agencies that may consult with the Service concerning these activities include the Army Corps of Engineers (USACE), the Federal Energy Regulatory Commission (FERC), Natural Resources Conservation Service (NRCS), the Federal Highway Administration (through State Departments of Transportation (DOT)), Farm Service Agency (FSA), U.S. Environmental Protection Agency (EPA), the Tennessee Valley Authority (TVA), and the U.S. Forest Service (USFS).
- **Road and Bridge Construction or Maintenance.** State DOTs and the USACE are expected to engage in 141 to 151 informal and 17 formal section 7 consultations regarding road/bridge construction and maintenance projects at a total cost of approximately \$4.8 million to \$10.1 million over the next ten years. Modifications to these projects may include such measures as increasing standards for erosion and sedimentation control, restricting in-stream construction, surveying for species, and relocating species for the duration of the project period. It is difficult to predict where these costs will occur throughout the designation. This analysis assumes that the third party (i.e., the local government) will absorb these increased costs.
 - **Hydropower.** Operation and maintenance of hydropower projects is anticipated to result in one informal and three formal consultations over the next ten years. Two of the formal consultations stem from the relicensing of hydro dams by FERC. One of these consultations at Weiss Dam is anticipated to result in recommendation to augment minimum flow from the dam. This change in flow regime may result in \$276,000 to \$2.84 million per year in lost power production. This broad range is dependent upon the assumption made regarding recommended minimum flow rate. Currently, a broad range of flow rates are being negotiated. This cost is ultimately passed on to the consumer in the form of increased rates. The informal and remaining formal consultation will engage FERC and the USACE in discussion regarding the operation of a third proposed hydropower project, Carters Reregulation Dam. Any changes to flow regime at Carters Reregulation Dam will further impact power production at Carters Dam, 1.5

miles upstream. Decreased power generation and lost dependable capacity at Carters Dam stemming from the flow changes at Carters Reregulation Dam may result in costs up to \$794,000 per year.⁷ The total section 7 costs stemming from hydropower consultations may be up to \$109 million over the next thirty years.

- **Water Supply Dams.** Although it is unclear whether water supply dams will be permitted or constructed within the proposed critical habitat area within the next ten years, it is possible that the Service will consult formally on two proposals for such infrastructure. For the dam proposed at Locust Fork in Unit 12, it is possible that the project will have to be relocated in order to avoid adverse modification to critical habitat. Relocating the dam to the next best location is anticipated to result in costs up to \$154 million over the next 25 years. Consultations regarding water supply projects are anticipated to account for 51 percent of the total designation costs.
- **Utilities Construction/Maintenance.** Construction or maintenance of in-stream pipelines, transmission lines and other utility infrastructure is anticipated to result in ten informal and six formal consultations with the USACE and TVA, at a total cost of \$1.6 million to \$4.9 million over the next ten years. This cost estimate is driven by the potential project modifications associated with USACE permitting of utility construction projects including bridging of utility pipelines in order to avoid stream habitat.
- **Activities in National Forests.** This analysis anticipates that land disturbance activities in national forests, such as silviculture, or trail construction and maintenance, may result in 63 informal and four formal consultations over the next ten years. As consultations associated with such activities are not expected to result in project modifications, the total estimated costs of these consultations range from \$238,000 to \$965,000.
- **Agriculture or Ranching-Related Activities.** Agricultural or ranching activities that involve a Federal nexus will result in 35 to 38 informal and 6 formal consultations at a total cost of \$239,000 to \$748,000 over the next ten years.

⁷ Changes in flow regimes at a dam affects water levels above and below the dam. This change in water level can in turn affect usage of the water body for recreational or other purposes. For example, USACE in its comment provided information concerning how changes in flow at Carter's Dam could affect recreational use of the reservoir. Consumer surplus values of lost recreational opportunities in that example totaled \$65,600 per year. USACE, "Carters Lake Economic Impact Analysis," received on February 6, 2004 as amended on February 18, 2004.

- Water Quality Activities.** EPA engages in section 7 consultation with the Service regarding water quality standards, to ensure that they are appropriately protective of endangered and threatened species. Specifically, this analysis anticipates 17 to 29 informal consultations and 20 formal consultations with the EPA related to water quality activities, at a total cost of \$455,000 to \$1,250,000 over the next ten years. Further, the Service may provide technical assistance for review of NPDES permits 400 to 460 times over the next ten years, adding \$260,000 to \$713,000 in administrative costs.
- Recreation and Conservation Activities.** Recreation and conservation activities on private land may involve a Federal nexus through Federal funding from the Service's Partners for Fish and Wildlife program or other beneficial activities, including funding of fish stocking programs. The USACE also anticipated accelerating its habitat restoration programs over the next ten years. This analysis accordingly anticipates 145 to 152 informal and one formal consultation with respect to conservation projects at a total cost of \$506,000 to \$2,500,000 over the next ten years. Although these activities are federally operated and therefore a cost of critical habitat due to the requirements of section 7, such activities are intended to be beneficial to the species and habitat in the long run.
- Dredging and Clearing.** The USACE anticipates engaging in eight formal and six informal consultations regarding dredging activities over the next ten years. Two of the formal consultations are associated with dredging of the Federal navigation channel on the Alabama River. One of these consultations may bear project modification costs of up to \$8,245,000 depending upon whether the Service will recommend purchase of upland disposal sites for dredge material. Due to potentially harmful geomorphic effects to mussels, however, the Service has stated that it does not intend to recommend upland disposal of dredge material in the Alabama River within the foreseeable future. In this case, project modification costs for dredging would be reduced by \$8 million, and the nominal high-end cost associated with the proposed designation would be reduced to \$293 million, a three percent reduction in total estimated costs. Further, six formal consultation are anticipated with respect to general maintenance of the tributaries in Units 1, 3, and 4, and 120 to 180 informal consultations are anticipated associated with clearing and desnagging of the tributaries of the East Fork Tombigee River.

- **Coal Mining.** One informal consultation will occur regarding BLM lease of land for the purpose of extending a coal mine site. Costs associated with coal mining consultation are anticipated to be up to approximately \$22,900. Further 12 technical assistance efforts associated with review of State issued coal mining permits in Alabama are anticipated to result in a cost of up to \$20,000.

15. The mussel critical habitat area is characterized by mostly private rural, and some suburban, lands. Agriculture and ranching are common land uses in the region. Based on extensive review of the consultation history and interviews with Federal and State agencies, however, economic impacts to farmers and ranchers are anticipated to be minimal. Agricultural and ranching-related consultations primarily involve Federal assistance for conservation programs (i.e., the Environmental Quality Incentives Program) and are unlikely to result in project modifications. Similarly, although coal mining and silviculture occur within the designation, these activities are already expected to follow best management practices (BMPs) required by the States or Action agencies, independent of section 7. Additionally, in the geographic region considered in this analysis, these activities generally lack a Federal nexus. As such, the designation of critical habitat is not anticipated to impact these activities.

Exhibit ES-2

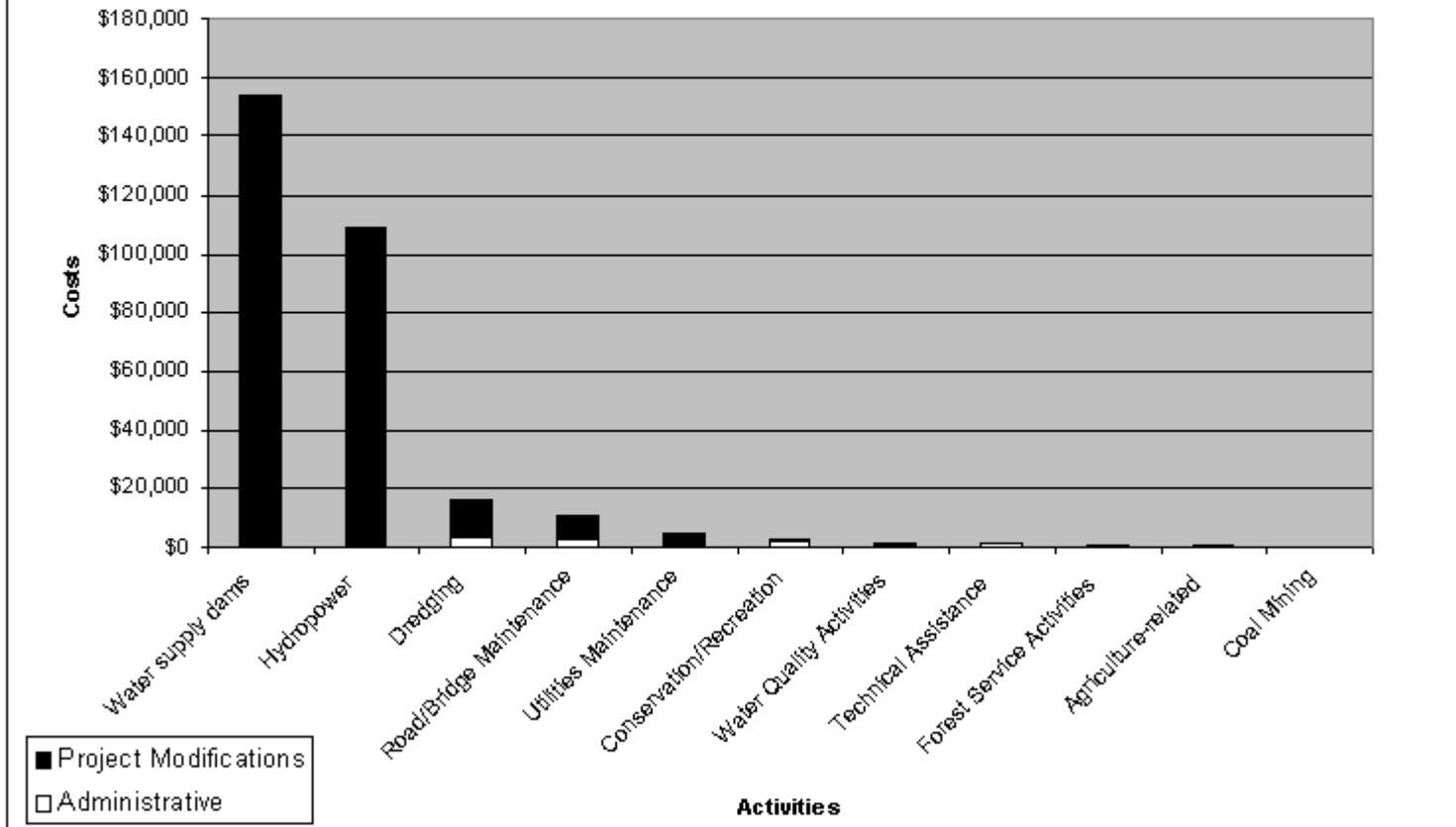
ESTIMATED TOTAL ECONOMIC COSTS OF ASSOCIATED ACTIVITIES

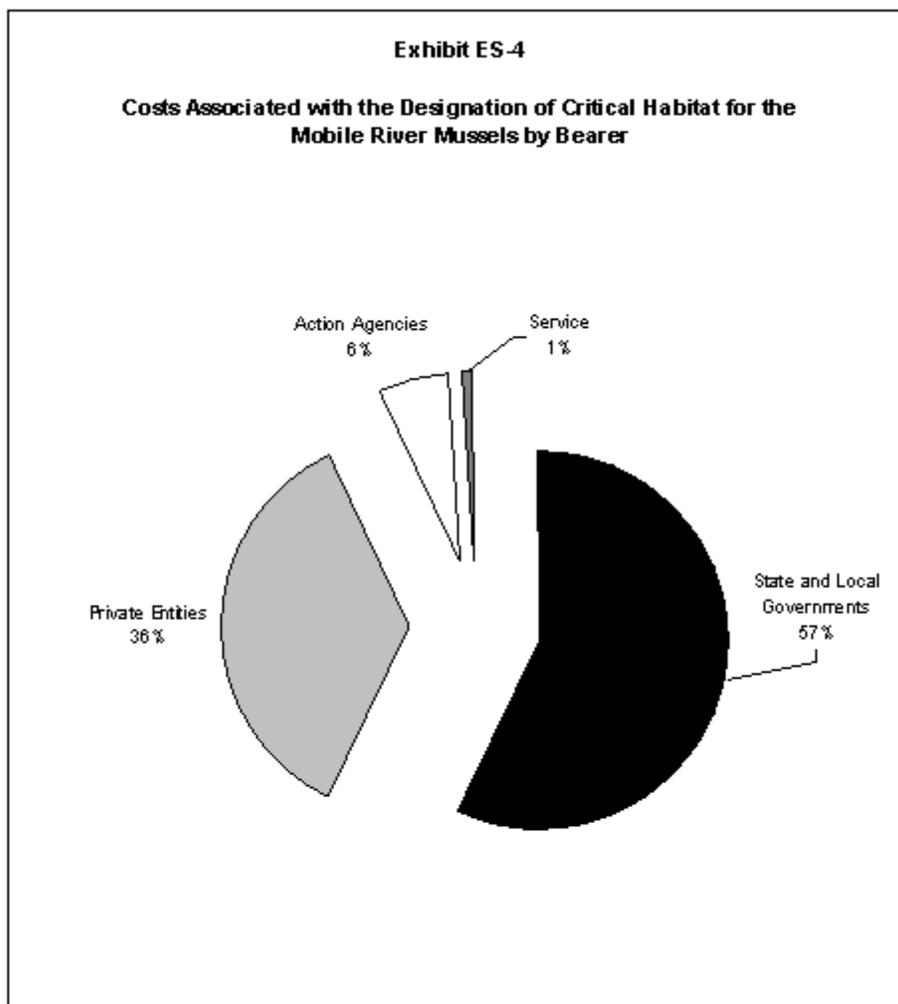
Activity	No. of Consultations		Nominal Costs (thousands)				Approximate % of Total Cost
	Informal	Formal	Informal Consultation	Formal Consultation	Project Modifications	Total Costs	
Road and bridge construction/ maintenance	141 - 151	17	\$411 - \$2,100	\$238 - \$388	\$4,190 - \$7,650	\$4,800 - \$10,100	3
Hydropower facilities	1	3	\$2.9 - \$13.9	\$134 - \$155	\$32,000 - \$109,000	\$32,200 - \$109,000	36
Water supply dams	0	2	\$0	\$31.2 - \$61.6	\$0 - \$154,000	\$31.2 - \$154,000	51
Utilities construction/maintenance	10	6	\$34.6 - \$153	\$93.6 - \$185	\$1,460 - \$4,540	\$1,590 - \$4,880	2
Forest Service activities	63	4	\$183 - \$876	\$55.6 - \$89.2	\$0	\$238 - \$965	> 1
Agriculture and ranching	35 - 38	6	\$104 - \$535	\$90.2 - \$168	\$44.9	\$239 - \$748	> 1
Water Quality	17 - 29	20	\$50 - \$405	\$278 - \$446	\$127 - \$395	\$455 - \$1,250	> 1
Conservation and Recreation	145 - 152	1	\$468 - \$2,228	\$15.6 - \$30.8	\$21.8 - \$245	\$506 - \$2,500	> 1
Dredging and Clearing	126 - 186	14	\$454 - \$2,900	\$218 - \$431	\$436 - \$12,900	\$1,110 - \$16,200	5
Coal Mining	1	0	\$2.9 - \$13.9	\$0	\$9	\$11.9 - \$22.9	> 1
Technical Assistance						\$417 - \$1,120	> 1
TOTAL	539 -631	73	\$1,710 - \$9,230	\$1,150 - \$1,950	\$38,300- \$289,000	\$41,600- \$301,000	100

Note: Numbers may not sum due to rounding. Percentages are calculated based on high-end estimate of cost range. Technical assistance efforts include private landowner assistance and interactions with non-Federal entities regarding designation of critical habitat, for example, Service review of state-issued NPDES permits. Costs of lost power generation are assumed to be incurred annually over 30 years. Costs associated with relocation of the Locust Fork Reservoir in Unit 12 are assumed to be spread over 25 years. All remaining consultations costs are assumed to be evenly spread across the ten years. The broad range in costs stems from the inclusion at the high end, of the costs associated with relocating Locust Fork Reservoir from Unit 12 of the proposed designation. The relocation costs may be up to \$154 million in nominal terms. Section 7 consideration for the mussels represent one of many factors in the decision of whether to relocate the reservoir. It is unclear which of these factors may serve as the precipitating reason for the relocation of the reservoir. Source: Based on past consultation records and conversations with Federal agencies and other parties potentially affected by the proposed critical habitat designation.

Exhibit ES-3

Per Activity Costs Associated with the Designation of Critical Habitat for the Mobile River Basin Mussels (high end estimate)





Costs By Unit

16. Exhibits ES-5 and ES-6 provide a per unit summary of the consultation, technical assistance, and project modification costs likely to be associated with the proposed critical habitat over a ten year period. A more detailed exhibit of unit costs by activity, unit, type of entity, and category is provided in Appendix C of this report. Note that insufficient information currently exists to associate all costs with explicit units. In instances where certain costs cannot be associated with specific units, the exhibit aggregates these costs across the relevant set of units (e.g., costs attributable jointly to units 18, 19, 20, and 22), or states (e.g., certain costs projected to be incurred across all units in Alabama, Mississippi, Georgia, or Tennessee). The check marks in Exhibit ES-6 indicate what category of cost (i.e., administrative consultation costs, project modifications, or technical assistance) is forecast to be incurred in each unit.

Exhibit ES-5

Per Unit Costs Associated with the Designation of Critical Habitat for the Mobile River Mussels
(high end estimate)

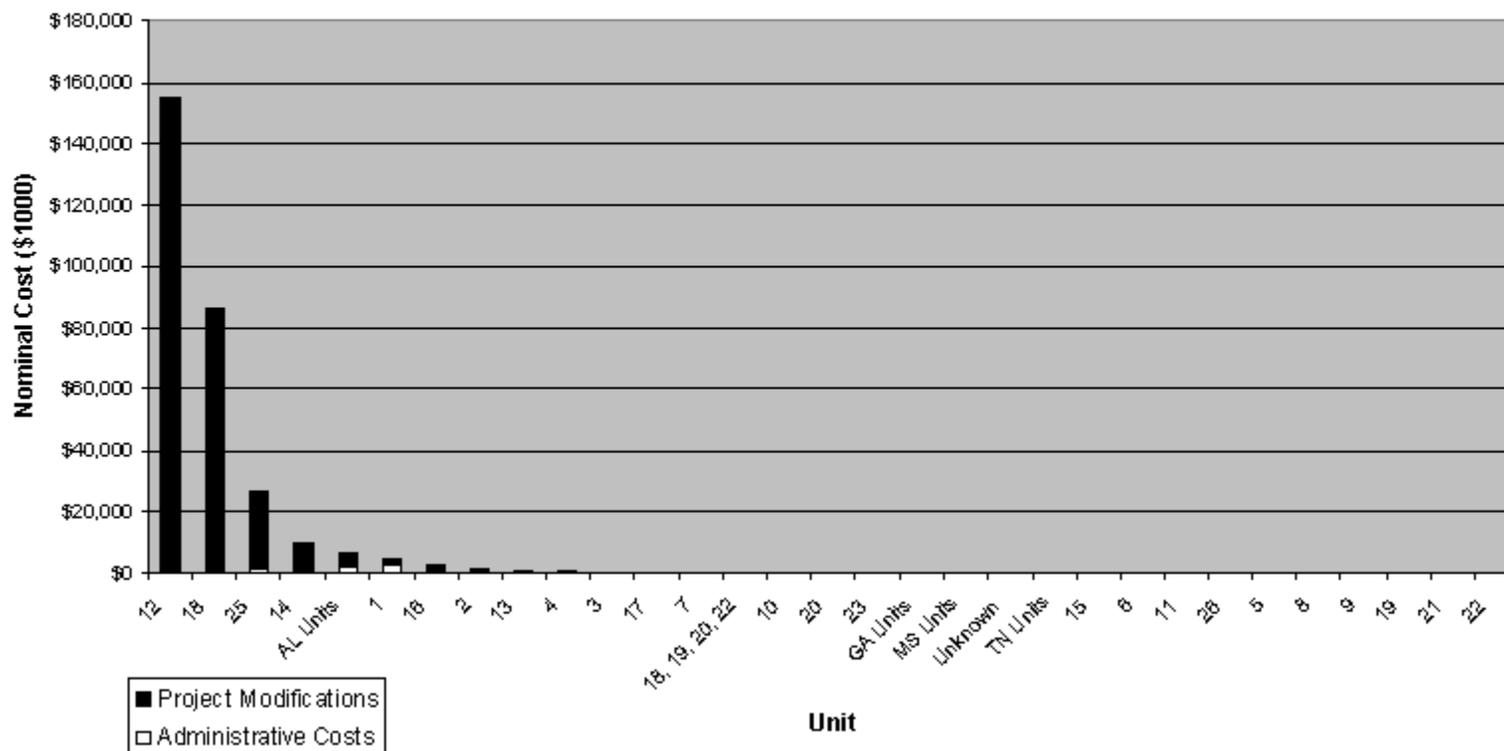


Exhibit ES-6

SUMMARY OF SECTION 7 AND TECHNICAL ASSISTANCE COSTS FOR THE MUSSELS

Unit	Consultations	Project Modifications	Technical Assistance	Estimated Range of Total Cost (Nominal \$)
Allocated Costs				
1	✓	✓	✓	\$714,000 to \$4,640,000
2	✓	✓	✓	\$291,000 to \$1,640,000
3	✓		✓	\$194,000 to \$847,000
4	✓	✓	✓	\$228,000 to \$1,340,000
5	✓			\$10,100 to \$45,100
6	✓			\$17,300 to \$76,300
7	✓	✓		\$42,700 to \$337,000
8	✓			\$10,100 to \$45,100
9	✓			\$10,100 to \$45,100
10	✓			\$76,200 to \$318,000
11	✓	✓	✓	\$23,300 to \$71,100
12	✓	✓	✓	\$698,000 to \$155,000,000
13	✓	✓	✓	\$710,000 to \$1,460,000
14	✓	✓		\$269,000 to \$10,200,000
15	✓			\$20,200 to \$90,200
16	✓	✓	✓	\$2,240,000 to \$2,800,000
17	✓	✓		\$66,800 to \$411,000
18	✓	✓		\$8,400,000 to \$86,300,000
19	✓			\$10,100 to \$45,100
20	✓	✓		\$35,500 to \$306,000
21	✓			\$10,100 to \$45,100
22	✓			\$10,100 to \$45,100
23	✓	✓		\$35,500 to \$306,000
24	✓			\$10,100 to \$45,100
25	✓	✓	✓	\$25,200,000 to \$26,500,000

Exhibit ES-6

SUMMARY OF SECTION 7 AND TECHNICAL ASSISTANCE COSTS FOR THE MUSSELS

Unit	Consultations	Project Modifications	Technical Assistance	Estimated Range of Total Cost (Nominal \$)
26	✓			\$24,000 to \$67,400
Unallocated Costs				
Units 18, 19, 20, 22	✓			\$88,700 to \$337,000
AL Units	✓	✓	✓	\$1,860,000 to \$6,500,000
MS Units	✓		✓	\$57,500 to \$277,000
GA Units	✓		✓	\$50,600 to \$283,000
TN Units	✓			\$ 11,600 to \$97,300
Multiple Units	✓	✓		\$147,000 to \$217,000
TOTAL SECTION 7 COSTS (ALL UNITS)				\$41,600,000 to \$301,000,000
<p>Notes: "Allocated Costs" are associated with projects anticipated to occur within specific units where as "Unallocated Costs" are anticipated to occur with a subset of units, though specific location is not available. Costs anticipated within "Multiple Units" refer to anticipated costs that may occur anywhere within the proposed designation. These estimates include all section 7 costs, including those associated with the species listing and designation of critical habitat for the mussels. Technical assistance efforts include private landowner assistance and interactions with non-Federal entities regarding designation of critical habitat, for example, Service review of state-issued NPDES permits. Totals are rounded to three significant digits and may not sum due to rounding.</p> <p>Costs of lost power generation are assumed to be incurred annually over 30 years. Costs associated with relocation of the Locust Fork Reservoir in Unit 12 are assumed to be spread over 25 years. All remaining consultations costs are assumed to be evenly spread across the ten years.</p> <p>The broad range in costs stems from the inclusion at the high end, of the costs associated with relocating Locust Fork Reservoir from Unit 12 of the proposed designation. The relocation costs may be up to \$154 million in nominal terms. Section 7 consideration for the mussels represent one of many factors in the decision of whether to relocate the reservoir. It is unclear which of these factors may serve as the precipitating reason for the relocation of the reservoir.</p> <p>A more detailed outline of these section 7 costs is provided in Appendix C.</p>				

Benefits Associated with the Designation

17. Various categories of benefit may derive from the listing of the mussels and the designation of critical habitat. For example, survival and recovery of the species may lead to enhanced existence values. In addition, protection of mussel habitat may produce benefits such as water filtration, preservation of habitat suitable for recreational uses, improved water quality, and habitat improvement for other species.
18. Insufficient information exists to quantify the benefits of habitat protection, particularly on a unit-by-unit basis. Several studies published in the economics literature, however, have attempted to estimate the public's willingness to pay for the designation of critical habitat for endangered species. While these studies do not predict the "willingness to pay" individuals would have for the protections afforded to the mussels' habitat through critical habitat designation, they support the notion that preservation of mussel habitat may generate benefits to the public.

Key Uncertainties

19. Exhibit ES-7 presents the key assumptions of this economic analysis, as well as the potential direction of bias introduced by the assumptions. In addition, issues regarding allocation of costs may change. For example, certain consultations are anticipated to occur within a range of units (i.e., critical habitat units within Alabama), but cannot be accurately applied to any one specific unit. This caveat does not have an effect on the total costs anticipated from the designation, but rather the allocation of that cost across units.

Exhibit ES-7

CAVEATS TO THE ECONOMIC ANALYSIS

Key Assumption	Effect on Cost Estimate
Historic administrative consultation costs and specific project modifications are good predictors of future consultation costs.	+/-
The causative factor for the relocation of the Locust Fork Dam is section 7 consultation regarding the mussels despite the existence of public opposition to the project in the past, and the presence of other Federally-listed species.	+
The high end estimate of minimum flows that may be recommended for Weiss Dam is 2000 cfs (negotiations are ongoing). While the USACE considers the 2000 cfs to be a potential recommendation, the Service anticipates that this level of flow may be too great at this location for the mussels. Further, the tristate ACT water compact calls for interstate water resource planning in Alabama, Georgia, and Florida, including at Weiss Dam. While a final allocation formula has yet to be determined, current proposals address water quality, biodiversity, adequate instream flow regimes, monitoring programs, and water conservation. As flow requirements according to the ACT Compact are not yet established, this analysis includes the impact of increasing the current minimum flow levels at Weiss Dam to adequately provide for the mussels.	+
This analysis extrapolates lost power generation and dependable capacity costs at Weiss Dam and Carters Dam over 30 years. This forecast horizon is due to the standard FERC relicensing schedules for hydropower projects of 30 to 50 years. This may overstate the real annual impacts, however, as is it likely that changes to rate structures will be brought about through broader market adjustments in the long term.	+
The USACE dredging of the Federal navigation channel on the Alabama River in Unit 14 will require purchase of upland disposal sites for dredge material.	+
Action agency Best Management Practices are baseline protections that are practiced consistently and as such, do not introduce additional costs to section 7 consultations.	-
- : This assumption may result in an underestimate of real costs. + : This assumption may result in an overestimate of real costs. +/- : This assumption has an unknown effect on estimates.	

20. On March 26, 2003, the U.S. Fish and Wildlife Service (Service) proposed to designate 26 river and stream segments (units), totaling approximately 1,760 kilometers (km) (1,093 miles (mi)) as critical habitat for 11 mussels in the Mobile River basin in the States of Alabama, Georgia, Mississippi, and Tennessee. The purpose of this report is to identify and analyze potential economic impacts associated with the designation of critical habitat for the mussels.
21. This analysis is consistent with the designation as described in the proposed rule. As such, this analysis does not reflect potential changes to the proposed units in the final rule. Description of the habitat designation in the final rule may consequently differ from that presented in this analysis.
22. Section 4(b)(2) of the Endangered Species Act (the Act) requires the Service to designate critical habitat on the basis of the best scientific data available, after taking into consideration the economic impact, and any other relevant impact, of specifying any particular area as critical habitat. The Service may exclude areas from critical habitat designation when the benefits of exclusion outweigh the benefits of including the areas within critical habitat, provided the exclusion will not result in extinction of the species.
23. Under the listing of a species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, permit, or carry out are not likely to jeopardize the continued existence of the species. The Service defines jeopardy as any action that would appreciably reduce the likelihood of both the survival and recovery of the species. For designated critical habitat, section 7(a)(2) also requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or carry out do not result in destruction or adverse modification of critical habitat. Adverse modification of critical habitat is currently construed as any direct or indirect alteration that appreciably diminishes the value of critical habitat for conservation of a listed species.

1.1 Description of Species and Habitat⁸

24. The 11 mussels are in the family Unionidae, and are typically found embedded in the bottom of rivers and streams within the Mobile River Basin. These species siphon water into their shells and across their gills, which are specialized for respiration and food collection. Mussel larvae (glochidia) require a parasitic stage on the fins, gills, or skin of host fish species in order to change into juvenile mussels.⁹ The following list provides the common and scientific names of the 11 mussels.

- d. Fine-lined pocketbook (*Lampsilis altilis*)
- Orange-nacre mucket (*Lampsilis perovalis*)
- Alabama moccasinshell (*Medionidus acutissimus*)
- Coosa moccasinshell (*Medionidus parvulus*)
- Ovate clubshell (*Pleurobema perovatum*)
- Southern clubshell (*Pleurobema decisum*)
- Dark pigtoe (*Pleurobema furvum*)
- Southern pigtoe (*Pleurobema georgianum*)
- Triangular kidneyshell (*Ptychobranhus greenii*)
- Upland combshell (*Epioblasma metastriata*)
- Southern acornshell (*Epioblasma othcaloogensis*)

25. Historically, the mussels were widespread and abundant throughout the Mobile River Basin. Available suitable habitat for these species, however, has been substantially reduced. Three of the species were listed as threatened, and eight as endangered under the Act on March 17, 1993. The species now primarily exist in isolated populations due to impacts from habitat degradation and modification from dams, dredging, mining, and

⁸ Information on the mussels and their habitat is taken from the Proposed Designation of Critical Habitat for Three Threatened Mussels and Eight Endangered Mussels in the Mobile River Basin, published in the *Federal Register* on March 26, 2003 (68 FR 14752).

⁹ Specific physical descriptions of each of the 11 mussels are available in the Proposed Designation of Critical Habitat for Three Threatened Mussels and Eight Endangered Mussels in the Mobile River Basin, published in the *Federal Register* on March 26, 2003 (68 FR 14752).

pollution. Habitat loss, fragmentation, and modification resulting from siltation, reduced water quality, tributary impoundment, stream channelization, and changes in stream hydrology continue to threaten the species.

26. In determining which areas to propose as critical habitat, the Service must focus on those physical and biological features that are essential to the conservation of the species and that may require special management consideration or protection. These essential features are referred to as the species' primary constituent elements (PCEs). The following are the PCEs that the Service has identified as essential to the conservation of the 11 mussels.

- Geomorphically stable stream and river channels and banks;
- A flow regime (i.e., the magnitude, frequency, duration, and seasonality of discharge over time) necessary for normal behavior, growth, and survival of all life stages of mussels and their fish hosts in the river environment;
- Water quality, including temperature, pH, hardness, turbidity, oxygen content, and other chemical characteristics, necessary for normal behavior, growth, and viability of all life stages;
- Sand, gravel, and/or cobble substrates with low to moderate amounts of fine sediment, low amounts of attached filamentous algae, and other physical and chemical characteristics necessary for normal behavior, growth, and viability of all life stages;
- Fish hosts with adequate living, foraging, and spawning areas; and
- Few or no competitive nonnative species present.

The Service considers these PCEs to facilitate delineation of potential critical habitat units for the mussels. One or more of the primary constituent elements must exist in the proposed areas for the units to be included in the designation.

1.2 Proposed Critical Habitat

27. The Service has proposed to designate 26 stream and river segments (units), representing approximately 1,760 kms (1,093 mi) of rivers and streams in the States of Alabama, Georgia, Mississippi, and Tennessee as critical habitat for the 11 mussels. The proposed designation includes portions of the Tombigbee River drainage in Mississippi and Alabama; Black Warrior River drainage in Alabama; Alabama River drainage in Alabama; Tallapoosa River drainage in Alabama and Georgia; and Coosa River drainage in Alabama, Georgia, and Tennessee.

28. Lands proposed as critical habitat are under Federal, State, local government, and private ownership. Approximately 897 miles (1,440 km), or 82 percent of the proposed critical habitat is bordered by privately-owned lands. The critical habitat units run through portions of 36 counties in the four states (Autauga, Bibb, Blount, Calhoun, Cherokee, Clay, Cleburne, Coosa, Dallas, Elmore, Fayette, Greene, Jefferson, Lamar, Lawrence, Lee, Lowndes, Macon, Pickens, St. Clair, Shelby, Sumter, Talladega, Tuscaloosa, and Winston in Alabama; Floyd, Gordon, Haralson, Murray, Paulding, and Whitfield in Georgia, Itawamba, Lowndes, and Monroe in Mississippi; and Bradley and Polk in Tennessee).
29. Within each unit, the Service proposes to designate the stream and river channels within the ordinary high water line. Background information on each critical habitat Unit is provided in Exhibit 1-1, followed by further detailed information describing the units.

Exhibit 1-1

**PROPOSED CRITICAL HABITAT FOR ELEVEN MOBILE RIVER BASIN MUSSELS:
DESCRIPTIONS OF UNITS**

Unit	Drainage and Region	River Miles	Counties	Species for which Unit is Critical Habitat	Unit Landscape
Upper Tombigbee River Drainage					
1	East Fork Tombigbee River	16	Monroe and Itawamba Counties, MS	Alabama moccasinshell, orange-nacre mucket, ovate clubshell, southern clubshell	Mostly private, rural land. Approx. 25% of stream miles runs through federally-owned Canal Section Wildlife Management Area. Silviculture and agriculture present. Habitat for endangered black clubshell mussel.
2	Bull Mountain Creek	21	Itawamba County, MS	Alabama moccasinshell, orange-nacre mucket, ovate clubshell, southern clubshell	Entirely private, rural land. Silviculture present in immediate flood plain.
3	Buttahatchee River and tributary	68	Monroe and Lowndes Counties, MS; Lamar County, AL	Alabama moccasinshell, orange-nacre mucket, ovate clubshell, southern clubshell	Private, rural land. Habitat for endangered southern combshell and heavy pigtoe mussels.
4	Luxapalila Creek and tributary	18	Monroe and Lowndes Counties, MS; Lamar County, AL	Alabama moccasinshell, orange-nacre mucket, ovate clubshell, southern clubshell	Privately-owned. High human population density downstream. Rural, agricultural lands upstream. Power plants and mining for sand/gravel present.
5	Coalfire Creek	20	Pickens County, AL	Alabama moccasinshell, orange-nacre mucket, ovate clubshell, southern clubshell	Privately-owned. 90% forest land.
6	Lubbub Creek	19	Pickens County, AL	Alabama moccasinshell, orange-nacre mucket, ovate clubshell, southern clubshell	Transportation corridor. Several small communities, scattered agricultural lands.

Exhibit 1-1

**PROPOSED CRITICAL HABITAT FOR ELEVEN MOBILE RIVER BASIN MUSSELS:
DESCRIPTIONS OF UNITS**

Unit	Drainage and Region	River Miles	Counties	Species for which Unit is Critical Habitat	Unit Landscape
7	Sipsey River	56	Green, Pickens, and Tuscaloosa Counties, AL	Alabama moccasinshell, orange-nacre mucket, ovate clubshell, southern clubshell	Privately-owned, except approx. 18% of stream miles, which runs through federally-owned Sipsey River Natural Area. Remote, sparsely populated wetlands. Limited commercial development. Habitat for endangered stirrupshell and heavy pigtoe mussels
8	Trussels Creek	13	Greene County, AL	Alabama moccasinshell, orange-nacre mucket, ovate clubshell, southern clubshell	Private, remote forest lands. Portion runs through small community.
9	Sucarnoochee River	56	Sumter County, AL	Alabama moccasinshell, orange-nacre mucket, ovate clubshell, southern clubshell	Remote, sparsely populated. Downstream from several communities.
Black Warrior River Drainage					
10	Sipsey Fork Drainage	91	Winston and Lawrence Counties, AL	Alabama moccasinshell, orange-nacre mucket, dark pigtoe, ovate clubshell, triangular kidneyshell	Approx. 90% of unit is part of federally-owned William B. Bankhead National Forest. Agricultural lands located upstream. Habitat for threatened flat musk turtle and Kral's water plantain.
11	North River and tributary	29	Tuscaloosa and Fayette Counties, AL	Alabama moccasinshell, orange-nacre mucket, dark pigtoe, ovate clubshell, triangular kidneyshell	Mostly sparsely populated, privately-owned lands. Populated community downstream. Impoundment proposed upstream.
12	Locust Fork and tributary	63	Jefferson and Blount Counties, AL	Alabama moccasinshell, orange-nacre mucket, dark pigtoe, ovate clubshell, triangular kidneyshell, upland combshell	Subject to urbanization and industrialization in southern portion. Intensive agricultural lands and poultry farms in northern portion. Habitat for endangered plicate rocksnail, Cahaba shiner, and threatened flat musk turtle.

Exhibit 1-1

**PROPOSED CRITICAL HABITAT FOR ELEVEN MOBILE RIVER BASIN MUSSELS:
DESCRIPTIONS OF UNITS**

Unit	Drainage and Region	River Miles	Counties	Species for which Unit is Critical Habitat	Unit Landscape
Cahaba River Drainage					
13	Cahaba River and tributary	77	Bibb, Jefferson, and Shelby Counties, AL	Alabama moccasinshell, fine-lined pocketbook, orange-nacre mucket, ovate clubshell, southern clubshell, triangular kidneyshell, southern acornshell, upland combshell	Highly urbanized with significant residential and commercial development pressure. Small portions lie within federally-owned Cahaba River National Wildlife Refuge and state-owned Cahaba River Wildlife Management Area. Listed on 303D as impaired waters due to sediment and nutrient overload. Portions designated as Outstanding Alabama Waters. Habitat for endangered Cahaba shiner, cylindrical lioplax snail, flat pebblesnail, and threatened goldline darter and round rocksnail.
Alabama River Drainage					
14	Alabama River	45	Autauga, Dallas, and Lowndes Counties, AL	orange-nacre mucket, southern clubshell	Privately-owned. Runs through one community. Moderate recreational navigation and some hydro power damming present. Habitat for endangered heavy pigtoe.
15	Bogue Chitto Creek	32	Dallas County, AL	Alabama moccasinshell, orange-nacre mucket, southern clubshell	Privately-owned, rural pasture and agricultural land with some forest land.
Tallapoosa River Drainage					
16	Tallapoosa River and tributary	100	Cleburne County, Alabama; Haralson and Paulding Counties, GA	fine-lined pocketbook	Approx. 70% forest land with a few scattered communities. Reservoir proposed for Beech Creek., including extensive withdrawal from the Tallapoosa River.

Exhibit 1-1

**PROPOSED CRITICAL HABITAT FOR ELEVEN MOBILE RIVER BASIN MUSSELS:
DESCRIPTIONS OF UNITS**

Unit	Drainage and Region	River Miles	Counties	Species for which Unit is Critical Habitat	Unit Landscape
17	Uphapee/Choctawhatchee/Chehawatchee Creeks	46	Macon and Lee Counties, AL	fine-lined pocketbook, ovate clubshell, southern clubshell	Approx. 31% lies within federally-owned Tuskegee National Forest. Subject to suburbanization. Two cities downstream. Limestone quarries and coal mining present. Turf farms border the designation.
Coosa River Drainage					
18	Coosa River (Old River Channel) and tributary	48	Calhoun, Cherokee, and Cleburne Counties, AL	fine-lined pocketbook, Coosa moccasinshell, ovate clubshell, southern clubshell, southern pigtoe, triangular kidneyshell, southern acornshell, upland combshell	Runs through medium-sized town, otherwise forest lands. Approx. 19% of stream miles runs through federally-owned Talladega National Forest. Agriculture downstream. Hydro power dam present on river.
19	Hatchet Creek	41	Coosa and Clay Counties, AL	fine-lined pocketbook, Coosa moccasinshell, ovate clubshell, southern clubshell, southern pigtoe, triangular kidneyshell, southern acornshell, upland combshell	Mostly forest lands. Approx. 17% lies within Talladega National Forest. Designated as Outstanding Alabama Waters. Habitat for endangered Tulotoma snail.
20	Shoal Creek	16	Calhoun and Cleburne Counties, AL	fine-lined pocketbook, Coosa moccasinshell, southern pigtoe, triangular kidneyshell	Entirely within Talladega National Forest. Isolated forest land with some recreational use (horse trails and off road vehicle access).
21	Kelly Creek and tributary	21	St. Claire and Shelby Counties, AL	fine-lined pocketbook, Coosa moccasinshell, ovate clubshell, southern clubshell, southern pigtoe, triangular kidneyshell, southern acornshell, upland combshell	Entirely privately-owned, forest land. Close proximity to major city. Subject to suburbanization. Turf farms border the southern portion of designation. Habitat for endangered Tulotoma snail.

Exhibit 1-1

**PROPOSED CRITICAL HABITAT FOR ELEVEN MOBILE RIVER BASIN MUSSELS:
DESCRIPTIONS OF UNITS**

Unit	Drainage and Region	River Miles	Counties	Species for which Unit is Critical Habitat	Unit Landscape
22	Cheaha Creek	17	Talladega and Clay Counties, AL	fine-lined pocketbook, Coosa moccasinshell, southern pigtoe, triangular kidneyshell	Approx. 41% runs through Talladega National Forest. Major transportation corridor, croplands, fallow pasture in southern portion. Habitat for threatened lacy elimia snail.
23	Yellowleaf Creek and tributary	24	Shelby County, AL	fine-lined pocketbook, Coosa moccasinshell, southern pigtoe, triangular kidneyshell	In vicinity of major city. Subject to modernization. Impounded water and one power plant present. Habitat for endangered Tulotoma snail.
24	Big Canoe Creek	18	St. Claire and Etowah Counties, AL	fine-lined pocketbook, Coosa moccasinshell, ovate clubshell, southern clubshell, southern pigtoe, triangular kidneyshell, southern acornshell, upland combshell	Rural, privately-owned lands with some small communities.
25	Oostanaula River/Coosawatee River/ Conasauga River/ Holly Creek	128	Floyd, Murray, Whitfield, and Gordon Counties, GA; Bradley and Polk Counties, TN	Alabama moccasinshell, fine-lined pocketbook, Coosa moccasinshell, ovate clubshell, southern clubshell, southern pigtoe, triangular kidneyshell, southern acornshell, upland combshell	Approx. 9% runs through federally-owned Chattahoochee National Forest (GA)/ Cherokee National Forest (TN). Mostly agricultural land. Subject to some development pressure. Habitat for endangered amber darter and Conasauga logperch, and threatened blue shiner.

Exhibit 1-1

**PROPOSED CRITICAL HABITAT FOR ELEVEN MOBILE RIVER BASIN MUSSELS:
DESCRIPTIONS OF UNITS**

Unit	Drainage and Region	River Miles	Counties	Species for which Unit is Critical Habitat	Unit Landscape
26	Lower Coosa River	8	Elmore County, AL	Alabama moccasinshell, fine-lined pocketbook, Coosa moccasinshell, ovate clubshell, southern clubshell, southern pigtoe, triangular kidneyshell, southern acornshell, upland combshell	Unoccupied habitat, but among the species' historical ranges. Considered an appropriate area for reintroduction. Also habitat for endangered Tulotoma snail.

Source: *Proposed Designation of Critical Habitat for Three Threatened Mussels and Eight Endangered Mussels in the Mobile River Basin*, March 26, 2003 (68 FR 14752).

1.3 Framework and Methodology

30. The primary purpose of this analysis is to estimate the economic impact associated with the designation of critical habitat for the mussels.¹⁰ This information is intended to assist the Secretary in making decisions about whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.¹¹ In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).¹²
31. This chapter provides the framework for this analysis. First, it defines the economic effects considered in the analysis. Second, it establishes the baseline against which these effects are measured. Third, it describes the measurement of direct compliance costs, which include costs associated with, and generated as a result of, section 7 consultations. Fourth, it identifies potential indirect economic effects of the rule resulting from (1) compliance with other parts of the Act potentially triggered by critical habitat, (2) compliance with other laws, and (3) time delays and regulatory uncertainty. Fifth, it discusses the need for an economic assessment of the benefits of critical habitat designation. Finally, the section concludes by discussing the time frame for the analysis and the general steps followed in the analysis.

1.3.1 Types of Economic Effects Considered

32. This economic analysis considers both the economic efficiency and distributional effects. In the case of critical habitat designation, economic efficiency effects generally reflect the “opportunity costs” associated with the commitment of resources required to comply with the Act. For example, if activities on private land are limited as a result of a designation, and thus the market value of the land reduced, this reduction in value represents one measure of opportunity cost or change in economic efficiency. Similarly, the costs incurred by a Federal Action agency to consult with the Service under section 7 represent opportunity costs of the designation.
33. This analysis also addresses how the impacts are distributed, including an assessment of any local or regional economic impacts and the potential effects on small entities, the energy industry, or governments. This information can be used by decision-makers to assess

¹⁰ This analysis considers the effects of the regulatory action as proposed in the Federal Register on March 26, 2003 (68 FR 14752).

¹¹ 16 U.S.C. § 1533(b)(2).

¹² Executive Order 12866, “Regulatory Planning and Review,” September 30, 1993; Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” May 18, 2001; 5 U.S.C. §§ 601 *et seq.*; and Pub Law No. 104-121.

whether the effects of the designation might unduly burden a particular group or economic sector.

34. For example, while the designation may have a relatively small impact when measured in terms of changes in economic efficiency, individuals employed in a particular sector of the economy in the geographic area of the designation may experience relatively greater effects. The difference between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.¹³

Efficiency Effects

35. At the guidance of the Office of Management and Budget (OMB) and in compliance with Executive Order 12866 “Regulatory Planning and Review,” Federal agencies measure changes in economic efficiency in order to understand how society, as a whole, will be affected by a regulatory action.¹⁴ In the context of this regulatory action, these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of critical habitat designation and other co-extensive regulations.¹⁵ Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.¹⁶
36. In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a landowner or manager may need to enter into a consultation with the Service to ensure that a particular activity will not adversely modify critical habitat. The effort required for the consultation represents an economic opportunity cost, because the landowner or manager’s time and effort would have been spent in an alternative activity had the parcel not been included in the designation.

¹³ A comment letter from the Birmingham Water Works Board dated October 1, 2003 states that the draft economic analysis does not explain potential impacts to minorities or special groups as a result of designation. The population has a significant number of minority groups that will be directly affected by resulting water shortages, higher water costs or the inability to develop and expand business. However, minority and low-income populations are not anticipated to be *disproportionately* affected by the relocation of the water supply reservoir. The BWWB stated that each of its customers will be impacted equally. Impacts to private parties that may bear the increased cost of water are considered in the Unfunded Manated Reform Act Analysis in Appendix B.3 of this Analysis. Personal communication with Randy Chafin, Birmingham Water Works Board, November 26, 2003.

¹⁴ Executive Order 12866, “Regulatory Planning and Review,” September 30, 1993; U.S. Office of Management and Budget, “Circular A-4,” September 17, 2003.

¹⁵ The term “co-extensive” is discussed in greater detail in Section 1.3.3 of this analysis.

¹⁶ For additional information on the definition of “surplus” and an explanation of consumer and producer surplus in the context of regulatory analysis, see Gramlich, Edward M., *A Guide to Benefit-Cost Analysis (2nd Ed.)*, Prospect Heights, Illinois: Waveland Press, Inc., 1990; and U.S. Environmental Protection Agency, *Guidelines for Preparing Economic Analyses*, EPA 240-R-00-003, September 2000, available at <http://yosemite.epa.gov/ee/epa/eed.nsf/webpages/Guidelines.html>.

When compliance activity is not expected to significantly affect markets -- that is, not result in a shift in the quantity of a good or service provided at a given price, or in the quantity of a good or service demanded given a change in price -- the measurement of compliance costs can provide a reasonable estimate of the change in economic efficiency.

37. Where a designation is expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, a designation that precludes the development of large areas of land may shift the price and quantity of housing supplied in a region. In this case, changes in economic efficiency can be measured by considering changes in producer and consumer surplus in the real estate market.
38. This analysis begins by measuring reasonably foreseeable compliance costs. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. However, if the designation is expected to significantly impact markets, the analysis will consider potential changes in consumer and/or producer surplus in affected markets.

Distributional and Regional Economic Effects

39. Measurements of changes in economic efficiency focus on the net impact of the regulation, without consideration for how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations concerning groups that may be disproportionately affected. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.¹⁷ This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply distribution and use; impacts on governments; and regional economic impacts. It is important to note that these are fundamentally different measures of economic impact than efficiency effects, and thus cannot be added to or compared with estimates of changes in economic efficiency.

Impacts on Small Entities, Energy Supply, Distribution and Use, and Governments

40. This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the RFA, might be affected by critical habitat designation and other co-extensive regulations.¹⁸ In addition, in response to Executive Order 13211 “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or

¹⁷ Office of Management and Budget, “Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice” 68 *Federal Register* 5492, February 3, 2003.

¹⁸ 5 U.S.C. § 601 *et seq.*

Use,” this analysis considers the impacts of critical habitat on the energy industry and its customers.¹⁹

Regional Economic Effects

41. Regional economic impact analysis provides an assessment of the potential localized effects. Specifically, regional economic impact analysis produces a quantitative estimate of the potential magnitude of the initial change in the regional economy resulting from a regulatory action. Regional economic impacts are commonly measured using regional input/output models. These models rely on multipliers that mathematically represent the relationship between a change in one sector of the economy (e.g., hydroelectric power generation) and the effect of that change on economic output, income, or employment in other local industries (e.g., manufacturers relying on the electricity generated). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.
42. The use of regional input/output models can overstate the long-term impacts of a regulatory change. Most importantly, these models provide a static view of the economy of a region. That is, they measure the initial impact of a regulatory change on an economy but do not consider long-term adjustments that the economy will make in response to this change. For example, these models provide estimates of the number of jobs lost as a result of a regulatory change, but do not consider re-employment of these individuals over time. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the designation, compensating for a potential decrease in economic activity within the region.
43. Despite these and other limitations, in certain circumstances regional economic impact analysis may provide useful information about the scale and scope of localized impacts. It is important to remember that measures of regional economic effects generally reflect shifts in resource use rather than efficiency losses. These types of distributional effects, therefore, should be reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects.

1.3.2 Defining the Baseline

44. The purpose of this analysis is to measure the economic impact of compliance with the protections derived from the designation of critical habitat, including habitat protections that may be co-extensive with the listing of the species. Economic impacts to land use

¹⁹ Executive Order 13211, “Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use,” May 18, 2001.

activities may exist in the absence of co-extensive protections. These impacts may result from, for example:

- Local zoning laws;
- State natural resource laws; and
- Enforceable management plans and best management practices applied by other State and Federal agencies;

Economic impacts that result from these types of protections are not included in this assessment; they are considered to be part of the “baseline.” Existing laws, regulations, and policies are described in greater detail in Appendix A of this analysis.

1.3.3 Direct Compliance Costs Associated With Section 7 of the Act

45. The measurement of direct compliance costs focuses on the implementation of section 7 of the Act. This section requires Federal agencies to consult with the Service to ensure that any action authorized, funded, or carried out will not likely jeopardize the continued existence of any endangered or threatened species or result in the destruction or adverse modification of critical habitat. The administrative costs of these consultations, along with the costs of project modifications resulting from these consultations, represent the direct compliance costs.
46. This analysis does not differentiate between consultations that result from the listing of the species (i.e., the jeopardy standard) and consultations that result from the presence of critical habitat (i.e., the adverse modification standard). Consultations resulting from the listing of the species, or project modifications meant specifically to protect the species as opposed to its habitat, may occur even in the absence of critical habitat. However, in 2001, the U.S. 10th Circuit Court of Appeals instructed the Service to conduct a full analysis of all of the economic impacts of critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes.²⁰ Given the similarity in regulatory definitions between the terms “jeopardy” and “adverse modification,” in practice it can be difficult to pre-determine the standard that drives a section 7 consultation. Consequently, in an effort to ensure that this economic analysis complies with the instructions of the 10th Circuit as well as to ensure that no costs of the proposed designation are omitted, the potential effects associated with all section 7 impacts in or near proposed critical habitat are

²⁰ *New Mexico Cattle Growers Ass'n v. U.S.F.W.S.*, 248 F.3d 1277 (10th Cir. 2001).

fully considered. In doing so, the analysis ensures that any critical habitat impacts that are co-extensive with the listing of the species are not overlooked.²¹

1.3.4 Indirect Costs

47. A designation may, under certain circumstances, affect actions that do not have a Federal nexus or are otherwise not subject to the provisions of section 7 under the Act. The potential exists for several types of such indirect effects: three examples are discussed in this section. First, some landowners may voluntarily elect to complete a habitat conservation plan (HCP) in response to having their land designated as critical habitat. Second, some State laws may require landowners and managers to consider the effects of their actions on sensitive species and habitat. Thus, designation of critical habitat could trigger additional regulatory burden due to new information provided by the designation. Third, the consultation process may result in time delays for upcoming or ongoing projects, and the designation may foster regulatory uncertainty for prospective projects. The three most common categories of indirect effects are discussed further below.

Creation of Habitat Conservation Plans (HCPs)

48. No HCPs are proposed or currently exist within the boundaries of this proposed designation. Therefore, HCP-related costs are not an issue in this analysis. However, such costs may be a factor in other economic analyses of proposed critical habitat designations for other species, so this methodological discussion has been retained.
49. Under section 10(a)(1)(B) of the Act, a non-Federal entity (i.e., a landowner or local government) may develop an HCP for an endangered animal species in order to meet the conditions for issuance of an incidental take permit in connection with the development and management of a property.²² The HCP intends to counterbalance potential harmful effects that a proposed activity may have on a species, while allowing the otherwise lawful activity to proceed. As such, the purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately minimized and mitigated. Thus, HCPs are developed to ensure compliance with section 9 of the Act and to meet the requirements of section 10 of the Act.

²¹ A letter provided during the public comment period for the draft version of this analysis emphasized the importance of recognizing that including co-extensive costs results in an overstatement of the costs due specifically to the designation of critical habitat. Letter from Robert Reid, on behalf of self, Alabama Audubon Council, Alabama Environmental Council, and Alabama Ornithological Society, October 14, 2003.

²² U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning." From: <http://endangered.fws.gov/hcp/>, as viewed on August 6, 2002. Sections 9 and 10(a)(1)(B) of the Act do not apply to plants.

50. However, a connection may exist between the creation of HCPs and the costs these plans impose and the designation of critical habitat. The Service, being a Federal entity, must formally consider whether an HCP will jeopardize a listed species or adversely modify its designated critical habitat before approving the plan. This review process may be a direct impact under section 7 of the Act. However, in certain circumstances, the effort involved in creating the HCP and associated conservation actions may also generate indirect effects associated with the designation of critical habitat. For example, in one past instance, landowners preemptively developed HCPs in an effort to avoid having their property designated as critical habitat.²³ In this case, the effort involved in creating the HCP and undertaking associated conservation actions were considered to be an effect of designation²⁴.

51. The following scenarios regarding HCP creation provide general guidance regarding the degree to which associated costs should be considered within the context of a critical habitat economic analysis:

- In cases in which an HCP existed prior to a proposed designation, the costs of developing the HCP and the added costs of management imposed by the HCP should not be considered in the analysis of the effects of the designation. These costs are appropriately considered to be part of the regulatory baseline, because their creation was driven by the listing of the species and the need to avoid take, which is prohibited under section 9 of the Act. However, in cases where designated critical habitat overlaps with completed HCPs, the economic analysis will need to consider the cost to the Service to re-consult on the plan's impact to critical habitat and whether or not this process may result in additional conservation actions.
- In cases in which an HCP is proposed, or reasonably foreseeable absent the designation of critical habitat, the administrative costs associated with the required internal section 7 consultation should be included in the economic analysis of total section 7 costs, because the Service will need to consider the effects of the plan on designated critical habitat. In addition, if as a result of the designation additional project modifications will be recommended by the Service and incorporated into the HCP in order to avoid adversely modifying critical habitat, the costs of these project modifications should also be included in the economic analysis of critical habitat.²⁵

²³ See Industrial Economics, Incorporated, *Economic Analysis of Critical Habitat Designation for the Nine Bexar County Texas Invertebrate Species*, prepared for the U.S. Fish and Wildlife Service, March 3, 2003.

²⁴ No HCPs are anticipated to be developed as a result of the designation of critical habitat for these 11 mussels.

²⁵ Project modification costs associated with the jeopardy standard are not considered for the following reason. Section 10(a)(2)(B) of the Act requires that for the issuance of an incidental take permit, the HCP must assure that "the taking will not appreciably reduce the likelihood of survival and recovery of the species in the wild." According to the

- In cases in which development of one or more HCPs can be documented as being precipitated by critical habitat designation (i.e., to avoid designation or to reduce the costs of the designation), the costs of development of the HCP and the added costs of management imposed by the HCP should be included in the critical habitat economic analysis. In such cases the analysis should be presented with appropriate caveats as to the uncertainty regarding the extent to which the HCP would have existed absent critical habitat designation.

As previously stated, no current or proposed HCPs are located within the boundaries of this proposed designation.

Other State and Local Laws

52. Under certain circumstances, the designation of critical habitat may provide new information to a community about the sensitive ecological nature of a geographic region, potentially triggering additional economic impacts under other State or local laws. In cases where these costs would not have been triggered “but for” the designation of critical habitat, they are included in this economic analysis.
53. For example, the California Environmental Quality Act (CEQA) requires that lead agencies -- public agencies responsible for project approval -- consider the environmental effects of proposed projects that are considered discretionary in nature and not categorically or statutorily exempt. Among other effects, the CEQA statutes specifically require lead agencies to consider a project’s effects on rare or endangered plant and animal communities. To approve qualifying projects, lead agencies must require applicants, who are not “categorically exempt,” to mitigate effects to less than significant levels for projects that are not granted a “statement of overriding considerations.”²⁶

Service’s *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, “the wording of this criterion is identical to the “jeopardy” definition under the section 7 regulations (50 CFR Part 402.02)...Congress was explicit about this link, stating in the Conference Report on the 1982 ESA amendments that the Services will determine whether or not to grant a permit, “in part, by using the same standard as found in section 7(a)(2) of the ESA, as defined by the [Services’] regulations.”” (U.S. Department of the Interior and U.S. Department of Commerce, *Habitat Conservation Planning and Incidental Take Permit Processing Handbook*, November 4, 1996). As a result, during the HCP process, actions undertaken to meet the jeopardy provision of section 7 are also required under section 10 of the Act. Therefore, in circumstances where an HCP is reasonably foreseeable absent the designation of critical habitat, these actions are considered to be part of the baseline of this economic analysis.

²⁶ Article 19 of CEQA provides a list of categorical exemptions, which are descriptions of types of projects that usually do not have a significant effect on the environment (e.g., replacement or reconstruction of existing facilities, actions taken by regulatory agencies as authorized by State law or local ordinance to assure the maintenance, restoration, or enhancement of a natural resource.) (<http://ceres.ca.gov/ceqa/flowchart/exemptions/categorical.html>, as viewed on April 21, 2003.)

54. In some instances, the designation of critical habitat can have an indirect effect on CEQA-related requirements. This is most likely to occur in areas where the Federal designation provides clearer information on the importance of particular areas as habitat for a listed species. In addition, applicants who were “categorically exempt” from preparing an Environmental Impact Report under CEQA may no longer be exempt once critical habitat is designated. In cases where the designation triggers the CEQA significance test or results in a reduction of categorically exempt activities, associated costs are considered to be an indirect effect of the designation.
55. In these and other cases in which costs are incurred by landowners and managers above and beyond what would be required under State or local law and policy in the absence of the designation, these costs are considered to be an indirect effect of the designation.

Time Delays and Regulatory Uncertainty

56. In addition to the indirect effects of compliance with other laws triggered by the designation, project proponents, land managers and landowners may face additional indirect impacts. These can include costs due to project delays associated with the consultation process or compliance with other regulations, or, in the case of land location within or adjacent to the designation, loss in property values due to regulatory uncertainty, and loss (or gain) in property values resulting from public perceptions regarding the effects of critical habitat. These categories of potential effects may exist, as consultations on grazing permits and other private activities on Federal land may be delayed or face uncertainty because of this proposal. These categories of potential effects are described in greater detail below.

Time Delays

57. Both public and private entities may experience incremental time delays for projects and other activities due to requirements associated with the section 7 consultation process and/or compliance with other laws triggered by the designation. The need to conduct a section 7 consultation will not necessarily delay a project, as often the consultation may be coordinated with the existing baseline regulatory approval process. However, depending on the schedule of the consultation, a project may experience additional delays, resulting in an unanticipated extension in the time needed to fully realize returns from the planned activity. To the extent that delays result from the designation, they are considered in the analysis. Specifically, the analysis considers costs associated with any incremental time delays associated with section 7 consultation or other requirements triggered by the designation above and beyond project delays resulting from baseline regulatory processes.

Regulatory Uncertainty

58. The Service conducts each section 7 consultation on a case-by-case basis and issues a biological opinion on formal consultations based on species-specific and site-specific

information. As a result, government agencies and affiliated private parties who need to consult with the Service under section 7 may face uncertainty concerning whether project modifications will be recommended by the Service and what the nature of these modifications will be. This uncertainty may diminish as consultations are completed and additional information becomes available on the effects of critical habitat on specific activities. However, a degree of regulatory uncertainty may persist. In some cases, this uncertainty may be incorporated by the project proponent into the costs of completing a proposed activity. For example, mining companies uncertain about potential restrictions to their activities in designated areas of critical habitat may lease mining rights at a reduced rate. Where appropriate, the analysis considers the potential costs associated with regulatory uncertainty.

Stigma

59. In some cases, the public may perceive that critical habitat designation may result in incremental changes to private property values, above and beyond those associated with anticipated project modifications and regulatory uncertainty described above. That is, the public may perceive that, all else being equal, a property that is designated as critical habitat will have lower market value than an identical property that is not within the boundaries of critical habitat. Public attitudes about the limits and costs that critical habitat may impose can cause real economic effects to the owners of property, regardless of whether such limits are actually imposed.
60. Conversely, the direction of property value effects resulting from critical habitat may be positive rather than negative. For example, property owners may believe that critical habitat designation will increase property values, if they believe that such designation will slow sprawling development in a given community (i.e., protect the rural character of an area) or increase water quality of neighborhood streams and rivers. This perception alone may result in real increases in land values, even in cases where the economic analysis predicts no additional requirements on activities taking place in the area. In either case, as the public becomes aware of the true regulatory burden imposed by critical habitat, the impact of the designation on property markets should decrease. This analysis considers the implications of public perceptions related to critical habitat on private property values within the proposed designation.

1.3.5 Benefits

61. The published economics literature has documented that real social welfare benefits can result from the conservation and recovery of endangered and threatened species. Such benefits have also been ascribed to preservation of open space and biodiversity, both of which are associated with species conservation. Likewise, regional economies and communities can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.

62. In Executive Order 12866, OMB directs Federal agencies to provide an assessment of costs and benefits of a proposed regulatory actions.²⁷ However, in its guidance for implementing Executive Order 12866, OMB acknowledges that often, it may not be feasible to monetize, or even quantify, the benefits of environmental regulations.²⁸ Where benefits cannot be quantified, OMB directs agencies to describe the benefits of a proposed regulation qualitatively. This report provides insight into the potential economic benefits of critical habitat designation based on information obtained in the course of developing the economic analysis. It is not intended to provide a complete analysis of all of the benefits that could result from the designation. *Given these limitations, the Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

1.3.6 Analytic Time Frame

63. The analysis examines activities taking place both within and adjacent to the proposed designation. It estimates impacts based on activities that are “reasonably foreseeable,” including, but not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Accordingly, the analysis bases estimates on activities that are likely to occur within a ten year time frame, beginning on the day that the current proposed rule becomes available to the public. The ten-year time frame was chosen for the analysis because, as the time horizon for an economic analysis is expanded, the assumptions on which the projected numbers of projects are based become increasingly speculative. As a result, it is difficult to predict not only the numbers of projects, but also the cost estimates for the associated consultations, beyond a ten-year window. Where information is available for particular projects that costs may be incurred over a different period of time, the appropriate time frame is employed. For example, this analysis estimates that the annual costs of lost power generation associated with project modification at hydropower plants may be incurred over a 30 year time horizon.²⁹ Further, costs associated with relocation of the water supply reservoir at Locust Fork are anticipated

²⁷ Executive Order 12866, “Regulatory Planning and Review,” September 30, 1993.

²⁸ U.S. Office of Management and Budget, “Circular A-4,” September 17, 2003.

²⁹ Letter from Balch and Bingham, LLP, on behalf of the Alabama-Tombigbee Rivers Coalition, October 13, 2003; letter from Mac R. Holmes, Professor of Economics and Business, Troy State University, October 13, 2003. The 30 year time horizon is recommended for hydropower plants as licenses for hydropower projects are typically renewed on a 30 to 50 year schedule. Applying the same lost power costs over 30 years, however, may overstate the real annual impacts as is it likely that changes to rate structures will be brought about through broader market adjustments in the long term.

to be incurred over a 25 year time frame as the project is anticipated to take 25 years to complete.³⁰

1.3.7 General Analytic Steps

64. This report relies on a sequential methodology and focuses on distilling the salient and relevant aspects of potential economic impacts. The steps followed in this analysis consist of:

- Describing current and projected economic activity within and around the proposed critical habitat area;
- Identifying whether such activities are likely to involve a Federal nexus;
- For activities with a Federal nexus, evaluating the likelihood that these activities will require consultations under section 7 of the Act and, in turn, result in any modifications to projects.
- Estimating the direct costs of expected section 7 consultations, project modifications and other economic impacts;
- Estimating the likelihood that current or future activities may require additional compliance with other Federal, State, and local laws as a result of new information provided by the proposed designation;
- Estimating the likelihood that projects will be delayed by the consultation process or other regulatory requirements triggered by the designation;
- Estimating the likelihood that economic activity will be affected by regulatory uncertainty, and/or property values affected;
- Estimating the indirect costs of the designation, as reflected in the cost of compliance with State and local laws, project delays, regulatory uncertainty, and effects on property values;
- Assessing the extent to which critical habitat designation and other co-extensive regulations will create costs for small businesses as a result of modifications or delays to projects;

³⁰ O'Brien and Gere Engineers, Inc., *Draft Assessment of Alternative Sources of Supply The Water Works and Sewer Board of The City of Birmingham, Alabama*, July 1993.

- Assessing the effects of administrative costs and project modifications on the supply, distribution, and use of energy; and
- Determining the benefits that may be associated with the designation of critical habitat.

65. As noted above, this analysis considers both efficiency effects and distributional effects. It begins by considering direct compliance costs, as well as potential indirect effects, such as those effects associated with project delays. Impacts on small entities and energy production and consumption are discussed separately, in Appendix B of this analysis. Potential benefits of critical habitat are discussed qualitatively in Section 5.

1.4 Information Sources

66. The primary sources of information for this report were communications with personnel from the Service, affected Federal agencies, State agencies and counties. Specifically, communication with personnel from the following entities.

Alabama Department of Environmental Management (ADEM)
Alabama Forestry Commission
Alabama Power Company
Alabama Surface Mining Commission (ASMC)
Birmingham Water Works Board (BWWB)
Bureau of Land Management (BLM)
Columbus Air Force Base
Departments of Transportation (DOT)
Environmental Protection Agency, Region 4 (EPA)
Farm Services Agency (FSA)
Federal Energy Regulatory Commission (FERC)
Georgia Department of Natural Resources (DNR)
Mississippi Department of Environmental Quality
Mississippi Department of Fisheries, Wildlife, and Parks (DFWP)
Mississippi Forestry Commission
Office of Surface Mining (OSM)
Natural Resource Conservation Service (NRCS)
Southern Appalachian Biodiversity Project (SABP)
Tennessee Department of Environment and Conservation
Tennessee Valley Authority (TVA)
The Nature Conservancy
Tombigbee River Valley Water Management District (TRVWMD)
United States Army Corps of Engineers (USACE), Nashville District
USACE, Savannah, GA District
United States Forest Service (USFS)

United States Fish and Wildlife Service (USFWS), Athens, GA Field Office
USFWS, Cookville, TN Field Office
USFWS, Daphne, AL Field Office
USFWS, Jackson, MS Field Office
United States Forest Service (USFS), Armuchee-Cohutta District Office,
Chattahoochee National Forest
USFS, Bankhead National Forest
USFS, Cherokee National Forest
USFS, National Forests in Alabama
USFS, Talladega National Forest
USFS, Tuskegee National Forest

67. Publicly available data were also used to augment the analysis. This report further addresses issues and new information raised during the public comment period for the draft version of this analysis. A full list of references is provided at page R-1 of this document.

68. This section provides information on the socioeconomic characteristics of areas proposed as critical habitat for the mussels. In addition, this section provides relevant information about regulations and requirements that exist in the baseline (i.e., the "without section 7" scenario).

2.1 Socioeconomic Profile of the Critical Habitat Area

69. This sub-section summarizes key economic and demographic information for the counties containing proposed critical habitat for the mussels, including population characteristics and general economic activity. County level data are presented to provide context for the discussion of potential economic impacts, and to illuminate trends that may influence these impacts. Although county level data may not precisely reflect the socioeconomic characteristics of the areas immediately surrounding the proposed critical habitat for the mussels, as the units comprise rivers and creeks that cross county barriers, these data provide context for the broader analysis.

2.1.1 Population Characteristics

70. The critical habitat designation spans a diverse array of urban and rural areas within the Mobile River Basin. Exhibit 2-1 lists the population size, per capita income, and population density for all the counties that have critical habitat designated within their boundaries and for the states as a whole. With the exception of Jefferson County, Alabama which represents nearly 15 percent of the state's population, each county containing critical habitat represents no more than four percent of its respective statewide populations. Of the 36 counties, 31 have a lower per capita money income and 23 have fewer persons per square mile than their respective statewide averages. Although these measures vary considerably across states, the data suggest that overall the counties are less densely populated, and have a lower than average income per capita, than respective statewide averages.

Exhibit 2-1

**SOCIOECONOMIC PROFILE OF COUNTIES CONTAINING
CRITICAL HABITAT FOR THE MUSSELS**

State	County	Population (2001)	Percent of State	Percent change 1990-2000	Per Capita Money Income (1999)	Persons per square mile (2000)
Alabama	State Total	4,460,000	100%	10.1%	\$18,200	87.6
	Autauga	44,900	1.0%	27.6%	\$18,500	73.3
	Bibb	21,100	0.5%	25.5%	\$14,100	33.4
	Blount	52,200	1.2%	30.0%	\$16,300	79
	Calhoun	111,000	2.5%	-3.3%	\$17,400	185
	Cherokee	24,100	0.5%	22.7%	\$15,500	43.4
	Clay	14,300	0.3%	7.6%	\$13,800	23.6
	Cleburne	14,300	0.3%	10.9%	\$14,800	25.2
	Coosa	12,100	0.3%	10.3%	\$14,800	18.7
	Dallas	46,000	1.0%	-3.7%	\$13,600	47.3
	Elmore	67,500	1.5%	33.9%	\$17,700	106
	Fayette	18,300	0.4%	3.0%	\$14,400	29.5
	Greene	9,920	0.2%	-1.8%	\$13,700	15.4
	Jefferson	660,000	14.8%	1.6%	\$20,900	595
	Lamar	15,600	0.3%	1.2%	\$14,400	26.3
	Lawrence	34,900	0.8%	10.4%	\$16,500	50.2
	Lee	117,000	2.6%	32.1%	\$17,200	189
	Lowndes	13,400	0.3%	6.4%	\$12,500	18.8
	Macon	24,000	0.5%	-3.3%	\$13,700	39.5
	Pickens	20,900	0.5%	1.2%	\$13,700	23.8
Shelby	150,000	3.4%	44.2%	\$27,200	180	
St. Clair	66,400	1.5%	30.0%	\$18,000	102	
Sumter	14,500	0.3%	-8.5%	\$11,500	16.4	
Talladega	80,400	1.8%	8.4%	\$15,700	109	
Tuscaloosa	165,000	3.7%	9.6%	\$19,000	125	
Winston	24,600	0.6%	12.7%	\$15,700	40.4	
Georgia	State Total	8,380,000	100%	26.4%	\$21,200	141.4
	Floyd	91,200	1.1%	11.5%	\$17,800	177
	Gordon	45,600	0.5%	25.8%	\$17,600	124
	Haralson	26,300	0.3%	17.0%	\$15,800	91.1
	Murray	37,700	0.5%	39.6%	\$16,200	106
	Paulding	89,700	1.1%	96.3%	\$20,000	261
	Whitfield	85,200	1.0%	15.3%	\$18,500	288
Mississippi	State Total	2,860,000	100%	10.5%	\$15,900	60.6
	Itawamba	23,000	0.8%	13.8%	\$14,900	42.8
	Lowndes	60,900	2.3%	3.8%	\$16,500	123
	Monroe	38,100	1.3%	3.9%	\$14,100	49.7

Exhibit 2-1						
SOCIOECONOMIC PROFILE OF COUNTIES CONTAINING CRITICAL HABITAT FOR THE MUSSELS						
State	County	Population (2001)	Percent of State	Percent change 1990-2000	Per Capita Money Income (1999)	Persons per square mile (2000)
Tennessee	State Total	5,740,000	100%	16.7%	\$19,400	138
	Bradley	88,900	1.50%	19.3%	\$18,100	268
	Polk	16,200	0.30%	17.6%	\$16,000	36.9
Source: Most recent information available from U.S. Census Bureau, <i>Census 2000 and State & County QuickFacts</i> , accessed at http://quickfacts.census.gov/qfd on February 19, 2004.						

2.1.2 Economic Activity

71. The predominant land-use activities occurring within the vicinity of the mussel critical habitat are agriculture, water-related commerce and recreation, and development-related activity. Understanding the extent of the various land-use activities in areas in or around critical habitat underscores the activities most likely to experience section 7 impacts. Exhibit 2-2 highlights the annual payroll for various industries in the 36 counties containing critical habitat. In all four states, manufacturing and services sectors maintain the largest payroll.³¹

³¹ Services sectors include Professional, scientific & technical services; Management of companies & enterprises; Admin, support, waste mgt, remediation services; Educational services; Health care and social assistance; Arts, entertainment & recreation; Accommodation & food services; and Other services (excluding public administration).

Exhibit 2-2

**ECONOMIC ACTIVITY WITHIN COUNTIES CONTAINING MUSSEL CRITICAL HABITAT:
ANNUAL PAYROLL BY INDUSTRY (2000)**

Industry	Annual Payroll (Thousands)			
	Alabama	Georgia	Mississippi	Tennessee
Agriculture, Forestry, Hunting, and Fishing	\$55,500	\$4,630	\$2,030	\$714
Mining	\$200,000	n/a	\$2,750	\$1,380
Utilities	\$47,900	n/a	\$7,660	n/a
Construction	\$1,510,000	\$146,000	\$97,700	\$45,500
Manufacturing	\$3,770,000	\$1,500,000	\$371,000	\$413,000
Wholesale Trade	\$1,650,000	\$250,000	\$41,700	\$63,800
Retail Trade	\$1,680,000	\$360,000	\$304,000	\$90,400
Transportation and Warehousing	\$562,000	\$116,000	\$29,700	\$18,900
Information	\$887,000	\$62,000	\$12,100	\$12,500
Finance and Insurance	\$1,560,000	\$91,600	\$26,900	\$35,600
Real Estate	\$244,000	\$22,600	\$5,690	\$6,470
Services	\$6,770,000	\$832,000	\$226,000	\$354,000
Auxiliaries	\$29,500	\$26,700	\$1,980	n/a
Unclassified	\$3,350	\$686	\$36	\$11
TOTAL	\$19,000,000	\$3,410,000	\$1,130,000	\$1,040,000

Source: U.S. Census Bureau, *2000 County Business Patterns*, accessed at <http://censtats.census.gov/cbpnaic/cbpnaic.shtml> on December 11, 2004.

Notes: Payroll estimates are in 2000 dollars. These values reflect the combined value of the counties containing critical habitat within these states, and are not statewide totals. "N/a" represents data not reported in the census County Business Patterns.

72. Exhibit 2-3 provides industry and employment data for all 36 counties that contain portions of the designation. The "Number of Establishments" column displays the total number of physical locations at which business activities are conducted with one or more paid employee in the year 2000. Over 50,000 business establishments operate and employ approximately 940,000 individuals in the 36 counties containing proposed critical habitat for the mussels. These figures provide a measure of the average density of commercial and industrial establishments in the region.

Exhibit 2-3

**ECONOMIC ACTIVITY WITHIN COUNTIES CONTAINING MUSSEL CRITICAL HABITAT:
NUMBER OF ESTABLISHMENTS AND EMPLOYEES BY INDUSTRY (2000)**

	Alabama		Georgia		Mississippi		Tennessee	
	Employees	Establishments	Employees	Establishments	Employees	Establishments	Employees	Establishments
Agriculture, Forestry, Hunting, and Fishing	3,230	364	338	33	196	19	37	9
Mining	6,340	116	485	9	280	12	55	5
Utilities	10,500	208	904	19	235	21	198	6
Construction	50,800	4,120	5,280	825	3,740	280	1,600	165
Manufacturing	116,000	1,980	51,100	751	12,000	166	13,300	146
Wholesale Trade	39,000	2,640	7,780	582	1,380	126	2,430	90
Retail Trade	93,900	7,420	17,600	1,540	6,240	594	4,890	442
Transportation and Warehousing	19,700	1,100	5,030	212	978	110	722	71
Information	21,400	651	2,030	89	494	43	557	27
Finance and Insurance	40,500	2,360	2,950	396	932	194	1,300	146
Real Estate	10,600	2,500	1,030	209	317	81	299	74
Services	300,000	16,300	42,200	2,400	13,000	1,000	17,500	930
Auxiliaries	3,160	86	1,430	18	169	10	99	2
Unclassified	1,100	411	121	336	22	15	19	18
TOTAL	716,000	40,200	138,000	7,420	40,000	2,670	43,000	2,130

Source: U.S. Census Bureau, *2000 County Business Patterns*, accessed at <http://censtats.census.gov/cbpnaic/cbpnaic.shtml> on December 11, 2002.

Notes: Numbers may not sum due to rounding. Payroll estimates are in 2000 dollars. These values reflect the combined value of the counties containing critical habitat within these states, and are not statewide totals.

73. Despite the fact that manufacturing and services account for the greatest economic activity, these industries are not as likely to be directly affected by critical habitat for the mussels as those industries dependent upon or limited by water resources. These industries interact more directly with the stream segments proposed for critical habitat and include agriculture, development, hydropower, and recreational fishing.

(a) Agriculture

74. Agriculture, including livestock raising, grazing, aquaculture, and rowcropping accounts for over 25 percent of the land use in the Mobile River Basin.³² The primary crops cultivated in the region include corn, soybeans, cotton, wheat, and sorghum. Soybeans and cotton, with over 2.6 and 4.3 million acres harvested respectively in 2001, are the highest acreage crops in the region.³³ Livestock (including poultry, cattle, and swine), horticulture, (including sod and turf farming), and silviculture also constitute a significant level of agricultural activity in the region.
75. Exhibit 2-4 summarizes the market value of all agricultural products sold within the counties containing proposed critical habitat for the mussels.

³² U.S. Geological Survey, 2002, Environmental Setting and Water-Quality Issues of the Mobile River Basin, Alabama, Georgia, Mississippi, and Tennessee: Water-Resources Investigations Report 02-4162, pp. 26.

³³ USDA, *Agricultural Statistics Database*, accessed at <http://www.nass.usda.gov:81/ipedb/> on December 12, 2002.

Exhibit 2-4

**VALUE OF AGRICULTURE IN COUNTIES CONTAINING
MUSSEL CRITICAL HABITAT (1997)**

State	County	Market Value	Crops (share of Market Value)	Livestock (share of Market Value)
Alabama	State Total	\$3,100,000,000	20%	80%
	Autauga	11,200,000	62%	38%
	Bibb	\$2,150,000	11%	89%
	Blount	\$138,000,000	4%	96%
	Calhoun	\$53,900,000	12%	88%
	Cherokee	\$49,300,000	48%	52%
	Clay	24,700,000	2%	98%
	Cleburne	\$45,900,000	4%	96%
	Coosa	\$1,320,000	20%	80%
	Dallas	\$29,800,000	52%	48%
	Elmore	19,400,000	69%	31%
	Fayette	\$8,150,000	24%	76%
	Greene	\$11,500,000	13%	87%
	Jefferson	\$16,100,000	19%	81%
	Lamar	\$5,390,000	20%	80%
	Lawrence	\$79,900,000	19%	81%
	Lee	19,900,000	86%	14%
	Lowndes	31,000,000	17%	83%
	Macon	\$9,580,000	70%	30%
	Pickens	\$60,600,000	5%	95%
Shelby	\$11,200,000	67%	33%	
St. Clair	\$51,700,000	12%	88%	
Sumter	\$11,200,000	8%	92%	
Talladega	\$40,300,000	15%	85%	
Tuscaloosa	n/a	30%	70%	
Winston	\$59,100,000	0%	100%	
Georgia	State Total	\$5,000,000,000	38%	62%
	Floyd	\$31,000,000	10%	90%
	Gordon	\$88,300,000	5%	95%
	Haralson	\$16,600,000	3%	97%
	Murray	\$43,700,000	3%	97%
	Paulding	\$11,200,000	6%	94%
	Whitfield	\$46,000,000	2%	98%

Exhibit 2-4				
VALUE OF AGRICULTURE IN COUNTIES CONTAINING MUSSEL CRITICAL HABITAT (1997)				
State	County	Market Value	Crops (share of Market Value)	Livestock (share of Market Value)
Mississippi	State Total	\$3,130,000,000	41%	59%
	Itawamba	\$14,500,000	20%	80%
	Lowndes	\$45,300,000	21%	79%
	Monroe	\$16,900,000	61%	39%
Tennessee	State Total	\$2,180,000,000	53%	47%
	Bradley	\$54,900,000	5%	95%
	Polk	\$22,200,000	10%	90%

Source: USDA, National Agriculture Statistics Service, *Census of Agriculture*, 1997, accessed at <http://www.nass.usda.gov/census/> on December 10, 2002.
Notes: Numbers may not sum due to adding. "N/a" indicates data not reported in the 1997 Census of Agriculture.

76. As over 80 percent of the critical habitat designation falls within Alabama, detailed current data on agricultural production within Alabama are provided below. Exhibit 2-5 summarizes the production value of major agricultural commodities in the 25 Alabama counties containing critical habitat. Forestry alone was valued at over \$950 million total in all of the Alabama counties within the proposed designation for the year 2000. Livestock, aquaculture, and poultry production accounted for the second most productive activity at over \$600 million.

Exhibit 2-5

**MAJOR AGRICULTURAL COMMODITIES WITHIN
MUSSELS CRITICAL HABITAT IN ALABAMA (2000)**

County	Value of Cash Receipts from Farm Marketings (Thousands)					
	Livestock, Aquaculture, & Poultry	Greenhouse, Sod, Nursery	Cotton	Fruit, Pecans, & Vegetables	Soybeans	Forestry
Autauga	\$4,900	\$540	\$996	\$1,690	n/a	\$19,100
Bibb	\$2,830	n/a	n/a	\$72	n/a	\$16,400
Blount	\$123,000	\$718	\$485	\$2,910	\$96	\$14,600
Calhoun	\$22,500	\$8,050	n/a	\$168	\$96	\$41,800
Cherokee	\$13,200	\$15,100	\$5,650	\$148	\$282	\$48,500
Clay	\$29,800	\$175	n/a	\$161	n/a	\$41,500
Cleburne	\$32,900	n/a	n/a	\$11	n/a	\$45,800
Coosa	\$2,030	\$88	n/a	\$58	n/a	\$14,600
Dallas	\$21,900	n/a	\$3,120	\$623	\$220	\$55,800
Elmore	\$8,000	\$1,460	\$3,070	\$461	n/a	\$22,800
Fayette	\$6,440	\$53	\$404	\$133	\$86	\$18,700
Greene	\$18,000	n/a	n/a	\$47	n/a	\$36,700
Jefferson	\$2,500	\$2,950	n/a	\$383	n/a	\$22,200
Lamar	\$5,100	n/a	n/a	\$124	n/a	\$16,600
Lawrence	\$67,000	\$153	\$12,400	\$527	n/a	\$104,000
Lee	\$4,000	n/a	\$619	\$141	n/a	\$27,000
Lowndes	\$32,400	n/a	\$1,290	\$617	n/a	\$52,600
Macon	\$3,630	\$4,170	\$781	\$151	n/a	\$17,300
Pickens	\$66,000	\$401	\$485	\$93	n/a	\$93,900
Shelby	\$5,030	\$4,770	\$1,160	\$97	n/a	\$18,800
St. Clair	\$31,200	\$3,540	n/a	\$1,490	n/a	\$49,700
Sumter	\$15,900	n/a	n/a	\$69	\$77	\$38,600
Talladega	\$20,100	\$665	\$2,640	\$279	n/a	\$36,700
Tuscaloosa	\$15,500	\$2,060	\$1,100	\$124	\$62	\$43,100
Winston	\$72,100	\$33	n/a	\$45	n/a	\$88,200
Counties Total	\$626,000	\$44,900	\$34,200	\$10,600	\$919	\$965,900

Source: *Alabama Agricultural Statistics*, accessed at <http://www.aces.edu/departments/nass/bulletin/2000/pg04.htm> on December 11, 2002.

Notes: Numbers may not sum due to rounding. "N/a" indicates data not reported in Alabama Agricultural Statistics.

77. In 2001, the major agricultural commodities produced within the six Georgia counties containing mussel critical habitat included livestock, horticulture, row/forage crops, and forestry. Livestock, aquaculture, poultry, and egg production were valued at over \$4.6 billion, constituting nearly seven percent of total statewide livestock production. Horticulture production, including greenhouse, sod, and nursery products, represented over four percent (over \$500 million) of total statewide production
78. While county-level data are not readily available for current market and farm gate agricultural values within Mississippi and Tennessee, production figures highlight the major commodities within the five counties containing critical habitat in those states. Rowcropping, livestock raising, and forest-related activities dominate agricultural activity within the relevant counties.
79. Among the four states, Mississippi is the number one producer of soybeans, with over one million acres harvested in 2001. Collectively, Itawamba, Lowndes, and Monroe Counties, Mississippi produced over 36,000 units of livestock (including cattle, swine, chicken, broilers, and eggs), approximately 22.4 million bushels of corn, and 592,000 bushels of soybeans. Within Tennessee, Bradley and Polk Counties produced 40,000 units of livestock, 300,000 bushels of corn, 97,000 bushels of cotton, and harvested over two million acres of forest-related goods.³⁴

(b) Development

80. Commercial and residential growth characterizes recent development activity within a number of counties containing proposed critical habitat, particularly within Alabama and Georgia. Population increases in the past decade have driven economic growth tied to growing real estate markets and infrastructure-related activities, including industrial and water development and road and bridge construction.
81. The Birmingham Metropolitan area within Jefferson County, in which the Cahaba River and the Locust Fork Creek flow, is characterized by concentrated commercial and residential activity (Units 12 and 13). While commercial activities are clustered along highways closer to Birmingham, residential communities are expanding in areas away from the city. In 2000, approximately 288,162 housing units existed in the county and constituted nearly 15 percent of Alabama's total housing units. In 2000, 3,060 additional housing units were authorized by building permits. Construction payroll in Jefferson County amounted to \$950,000,000 in 2000, accounting for 8.4 percent of total county annual payroll.
82. Counties within the Georgia portion of the designation have experienced population growth and suburbanization as metropolitan Atlanta expands outwards. Paulding County,

³⁴ USDA, *Agricultural Statistics Database*, accessed at <http://www.nass.usda.gov:81/ipedb/> on December 11, 2002.

which contains the Tallapoosa River within Unit 16, is considered one of metropolitan Atlanta's hottest growth spots. The county's population and number of housing units constructed nearly doubled in size during the 1990s. In 2000, construction alone accounted for 21.8 percent of Paulding County earnings. Projections indicate that periods of growth still lie ahead, as the county's population is anticipated to increase by 69 percent by 2010.³⁵

83. Murray County, which contains portions of the Conasauga River within Unit 25, also experienced rapid development in the past decade, with both population and the number of housing units constructed growing by 40 percent. The county's population is anticipated to increase an additional 25 percent by 2010. Development pressure also exists within Floyd County within and adjacent to the city of Rome up to the border of Chattooga County.

(c) Water-related Economic Activity

84. Rivers and tributaries within the Mobile River Basin supply a variety of municipal, industrial, and rural water uses, and facilitate hydropower generation, sportfishing, and other water-based recreational activity. This section describes and provides economic data on water-related activities based in and around the waters proposed for critical habitat designation for the mussels.

Hydropower

85. A network of 36 dams and associated reservoirs and locks regulate the surface-water system in all six river drainages within the greater Mobile River Basin. The majority of surface water withdrawn from the basin is used for hydroelectric power generation.³⁶ While coal, natural gas, oil, and nuclear sources fuel the majority of the region's energy needs, the four states within the Mobile River Basin derive a small portion of their overall power supply from hydropower. In 1999, an estimated 80.3 million kilowatt-hours of hydroelectric energy accounted for 6.4 percent of all electric power generated in Alabama. In Georgia, 27 million kilowatt-hours of hydroelectric power represented 2.3 percent of total electric power generated that year. Tennessee's hydropower generation, estimated at 97.2 million kilowatt-hours, constituted 7.4 percent of all electric utilities. Mississippi relied minimally on hydropower generation, which accounted for less than one percent of total electric energy produced.³⁷

³⁵ Georgia's Office of Planning and Budget, accessed at <http://opb.georgia.gov/01/home/0,2167,683151,00.html>.

³⁶ U.S. Geological Survey, 2002, Environmental Setting and Water-Quality Issues of the Mobile River Basin, Alabama, Georgia, Mississippi, and Tennessee: Water-Resources Investigations Report 02-4162, pp. 39.

³⁷ Energy Information Administration, *State Energy Statistics*, accessed at http://www.eia.doe.gov/emeu/states/_states.html on January 15, 2003.

Recreational Fishing

86. The rivers, creeks, lakes, and reservoirs within the Mobile River Basin support a thriving sportfishing and recreational boating industry. These activities, in turn, contribute significantly to the economic and social well-being of the Mobile River basin community. In 2001, over two million anglers participated in recreational fishing in Alabama, Georgia, Mississippi, and Tennessee. Sportfishing also supports various industries that provide goods and services to anglers. In 2001, sportfishing-related expenses, including trip and equipment costs, generated over \$1.9 billion in revenue in all four states.³⁸

2.2 Relevant Baseline Elements

87. “Baseline elements” consist of regulations, guidelines, and/or policies that may afford protection for the mussels in the absence of section 7 implementation. Baseline protections for the mussels include Federal and State laws, including the prohibition against take of the species contained within section 9 of the Act, as well as voluntary environmental programs that provide protection to the mussels in the absence of the protection afforded by the listing and any anticipated additional protection afforded by the proposed critical habitat designation. This discussion focuses on several important regulatory elements that have bearing on this analysis.

88. The following regulations provide environmental protection in the proposed critical habitat areas. Most of these regulations specifically address the maintenance or improvement of water quality. Because the mussels are aquatic species, they benefit from these protections. Although section 7 consultations will take place on activities involving a Federal nexus, measures required to protect the mussels and their habitat are complemented by regulations that serve to protect water quality. Provided these regulations are properly implemented and effective, the presence of mussels’ critical habitat would not be expected to result in incremental project modifications.

2.2.1 Federal Protections

89. This section highlights pertinent information on Federal regulations and policies that may offer protection to the mussels and their habitat absent designation of critical habitat for the species.

³⁸U.S. Fish and Wildlife Service, *2001 National Survey of Fishing, Hunting, & Wildlife -Associated Recreation*, pp.103, 111. Note that this estimate is intended to provide context to the level of fishing activity and includes all fishing licenses, not only licenses of those who fish within the Mobile River Basin.

Recovery Plan³⁹

90. An important component of the regulatory baseline is the Mobile River Basin Aquatic Ecosystem Recovery Plan. The plan establishes a recovery strategy to protect the Basin's native aquatic fauna and flora through ecosystem management. Implemented recovery actions include host fish identification research, laboratory propagation, limited population augmentation, monitoring, watershed planning, encouraging voluntary stewardship, and protection of occupied habitat. The Recovery Plan does not include objectives to enable the mussels to recover to the point of delisting due to the extent of their decline, population isolation, sensitivity to common pollutants, and continued impacts upon their habitat. While the Recovery Plan does not obligate other parties to undertake specific tasks and provides no regulatory power over landowners or managers, it serves as an important information source and incentive tool for conservation initiatives.

Clean Water Act

91. The purpose of the CWA is to restore the physical, biological, and chemical integrity of the waters of the United States using two basic mechanisms: 1) direct regulation of discharges pursuant to permits issued under the National Pollution Discharge Elimination System (NPDES) and Section 404 (discharge of dredge or fill materials); and 2) the Title III water quality program.⁴⁰
92. Under the NPDES program, EPA sets pollutant-specific limits on the point source discharges for major industries and provides permits to individual point sources that apply to these limits. EPA has delegated responsibility for the NPDES permitting program to most states.⁴¹ State-issued NPDES permits are treated as non-Federal actions. As such, the issuance of NPDES permits by State agencies are not subject to the consultation requirements of the Act. The Service consults with the EPA on the triennial review to ensure that endangered species impacts are contemplated in the development of standards.
93. Under the water quality standards program (WQS), EPA has issued water quality criteria to establish limits on the ambient concentration of pollutants in surface waters that will still protect the health of the water body. States issue water quality standards that reflect the Federal water quality criteria and submit the standards to EPA for review. State water quality standards are subject to review every three years (triennial review). States apply the

³⁹ U.S. Fish and Wildlife Service, 2000, *Mobile River Basin Aquatic Ecosystem Recovery Plan*.

⁴⁰ Clean Water Act, 33 U.S.C. §1251 (1987).

⁴¹ Clean Water Act, 33 U.S.C. §402.

standards to NPDES discharge permits to ensure that discharges do not violate the water quality standards.⁴²

94. Under section 401 of the CWA, all applicants for a Federal license or permit to conduct activity that may result in discharge to navigable waters are required to submit a State certification to the licensing or permitting agency. The State certification must ensure that the discharge complies with the requirements of sections 301, 302, 303, 306, and 307 of the CWA. Section 404 of the CWA prescribes a permit program for the discharge of dredged or fill material into navigable waters. Specifically, pursuant to section 404, permit applicants are required to show that they have “taken steps to avoid wetland impacts, where practicable, minimized potential impacts to wetlands, and provided compensation for any remaining, unavoidable impacts through activities to restore or recreate wetlands.”⁴³
95. The CWA will influence activities on or near all 26 of the critical habitat units for the mussels, due to the existence of road/bridge construction, residential development, and hydropower relicensing activities on or near all units. Since water quality is important to the recovery of the mussels, this statute will likely impact the extent, location, and nature of future activities on or near the proposed critical habitat units over the next ten years. As such, the CWA is likely to provide substantial baseline protection to the mussels as limitations to water pollution present more favorable living conditions for the mussels. The development of State water quality standards pursuant to the CWA, however, are subject to consultation under section 7 of the Act.

Fish and Wildlife Coordination Act

96. The purpose of this act is to ensure that fish and wildlife resources are equally considered with other resources during the planning of water resources development projects by: 1) authorizing the Secretaries of Agriculture and Commerce to provide assistance to Federal and State agencies in protecting game species and studying the effects of pollution on wildlife; and 2) requiring consultation with the Service for water impoundment or diversion projects with a Federal nexus.⁴⁴

⁴² Clean Water Act, 33 U.S.C. §303, 305.

⁴³ *Section 404 of the Clean Water Act: An Overview*, accessed at <http://www.epa.gov/owow/wetlands/facts/fact10.html>.

⁴⁴ Fish and Wildlife Coordination Act, 16 U.S.C. 661-666.

Federal Power Act

97. The Federal Power Act (FPA) was established in 1920.⁴⁵ The purpose of the FPA was to establish a regulatory agency, the Federal Power Commission (FPC), for non-federal hydropower generation and to require non-Federal hydropower owners/operators to obtain a license for the operation of the facility. Over the years, the FPC took responsibility for additional national regulatory issues and evolved into the Federal Energy Regulatory Commission (FERC), an independent Federal agency governing approximately 2,500 licenses for non-Federal hydropower facilities.⁴⁶ In 1986 the FPA was amended to, among other things, require FERC to give equal consideration to fish and wildlife concerns affected by hydropower facilities during the relicensing process.
98. Specifically, section 10(j) of the FPA was promulgated to ensure that FERC considers both power and non-power resources during the licensing process. As such, section 10(j) instructs FERC to actively solicit input regarding “adequate and equitable” fish and wildlife measures from Federal and State resource agencies.⁴⁷ FERC must consider these recommendations during the licensing process but does not have to incorporate the recommendations into the license if they “may be inconsistent with the purposes and requirements of the FPA” or if the recommendations are not supported by substantial evidence.
99. Furthermore, section 18 of the FPA states that FERC shall require the construction, operation and maintenance by a licensee at its own expense of a fishway prescribed by the Secretaries of Interior (delegated to the Service) and Commerce (NOAA Fisheries).⁴⁸

National Wild and Scenic Rivers Act (NWSRA)

100. The NWSRA requires that "In all planning for the use and development of water and related land resources, consideration shall be given by all Federal agencies involved to

⁴⁵ Federal Power Act, 16 U.S.C. §800 (1986).

⁴⁶ American Rivers Organization, *Federal Power Act Summary*, accessed at <http://www.amrivers.org/hydropowertoolkit/hydroreformtoolkitlawsfpa.htm>.

⁴⁷ Federal Power Act, 16 U.S.C. §803(j) (1986).

⁴⁸ A fishway is a structure constructed at a dam that allows for fish species to pass over the dam without harm or injury. A variety of ways exist to establish a fishway, ranging from a step and pull system (fish swim along a slope with notches that act like stairs) to an elevator (fish swim into a large box that is lifted over the dam where the fish are released). According to Section 1701(b) of the Energy Policy Act of 1992, “[T]he item which may constitute a ‘fishway’ under section 18 for the safe and timely upstream and downstream passage of fish shall be limited to physical structures, facilities, or devices necessary to maintain all life stages of such fish, and project operations and measures related to such structures, facilities, or devices which are necessary to ensure the effectiveness of such structures, facilities, or devices for such fish.”

potential national wild, scenic and recreational river areas." It also requires that "the Secretary of the Interior shall make specific studies and investigations to determine which additional wild, scenic and recreational river areas shall be evaluated in planning reports by all Federal agencies as potential alternative uses of water and related land resources involved."⁴⁹ In partial fulfillment of this requirement, the National Parks Service (NPS) maintains a Nationwide Rivers Inventory (NRI), a register of river segments that potentially qualify as national wild, scenic or recreational river areas.⁵⁰ A presidential directive requires Federal agencies to avoid or mitigate adverse effects on rivers identified in the NRI. In addition, agencies are required to consult with the NPS on actions which could affect the wild, scenic or recreational status of a river on the inventory.

101. The NWSRA will provide baseline protection to one of the 26 critical habitat units for the mussels, the Sipse Fork drainage in proposed Unit 10. Since Federal agencies are required to avoid or mitigate adverse effects on National Wild and Scenic Rivers and those on the NRI, this statute will likely affect the extent, location, and nature of future activities on or near these proposed critical habitat units over the next ten years. As such, the NWSRA is likely to provide baseline protection to the mussels.

Soil and Water Resources Conservation Act of 1977

102. This Soil and Water Resources Conservation Act provides for a continuing appraisal of the Nation's soil, water and related resources, including fish and wildlife habitats, and a soil and water conservation program to assist landowners and land users in furthering soil and water conservation. Specifically, this Act authorizes the Secretary of Agriculture to establish a cooperative conservation program with Federal, State, and local stakeholders for the management of private grazing land to conserve and enhance private grazing land resources.⁵¹

Watershed Protection and Flood Prevention Act

103. This Act authorizes Federal assistance to local organizations for conservation projects in watershed areas. Specifically, the Secretary of Agriculture is authorized to enter into agreements with local organizations and landowners to provide financial and other assistance in the development of plans to conserve and develop the land's soil, water, woodland, wildlife, energy and recreation resources, and enhance water quality.⁵²

⁴⁹ National Wild and Scenic Rivers Act, 16 U.S.C. §1271-1287 (1968).

⁵⁰ The NR I qualifies as a comprehensive plan under section 10(a)(2)(A) of the Federal Power Act.

⁵¹ Soil and Resources Conservation Act, 16 U.S.C. §§ 2001-2009.

⁵² Watershed Protection and Flood Prevention Act, 16 U.S.C. §§ 1001-1009.

Private Stewardship Grants Program

104. The Private Stewardship Program provides grants and other assistance on a competitive basis to individuals and groups engaged in local, private, and voluntary conservation efforts that benefit federally listed, proposed, or candidate species, or other at-risk species.⁵³ Diverse panels of representatives from State and Federal government, conservation organizations, agriculture and development interests, and the science community will assess applications and make recommendations to the Secretary of the Interior, who will award the grants. Typical projects may include managing nonnative, competing species; implementing measures to minimize risk from disease; restoring streams that support imperiled species; or planting native vegetation to restore a rare plant community.

2.2.2 State Statutes and Regulations and Other Voluntary Protection Measures

105. Additional State and other baseline regulatory elements potentially relevant to this analysis are described in Appendix A. As the Appendix shows, a considerable number of State and other regulatory initiatives may provide the mussels with some measure of protection absent section 7 consultation.

2.2.3 Overlap with Other Listed Species

106. Several other Federally listed endangered species may be found within the proposed critical habitat area for the mussels. Further, critical habitat exists for two fish species within the Conasauga River portion of the proposed critical habitat for the mussels. Generally, if a consultation is triggered for any listed species, the consultation process will also take into account all other listed species known or thought to occupy areas on or near the project lands. As such, listing or critical habitat-related protections for other threatened or endangered species may benefit the mussels as well (i.e., provide baseline protection). However, due to the difficulty in apportioning the costs of consultations between various species as well as awareness that a consultation for the mussels would need to be conducted absent consultations for or involving other species, this analysis does not attempt to apportion the consultations and related costs reported by Action agencies between the mussels and other listed species, and assumes that all future section 7 consultations within the extant boundaries of the proposed critical habitat are fully attributable to the presence of the mussels and their habitat. While this may lead to an overestimate of costs, it is likely that adding consideration of mussel critical habitat to a consultation regarding other species or habitats will add an incremental cost to that consultation. The Service has conducted consultations on the mussels in combination with numerous species, as indicated in Exhibit 2-6.

⁵³ U.S. Fish and Wildlife Service, Private Stewardship Program, http://endangered.fws.gov/grants/private_stewardship.html as viewed on May 6, 2003.

Exhibit 2-6

**THREATENED OR ENDANGERED SPECIES THAT MAY BE PRESENT IN MOBILE RIVER BASIN MUSSELS
CRITICAL HABITAT AREA**

Area of Potential Overlap	Category	Common Name	Scientific Name	Status
Mobile River system, in AL and GA	Fish	Alabama sturgeon	<i>Scaphirhynchus suttkusi</i>	Endangered
Conasauga River, Etowah River, Shoal Creek	Fish	Amber darter	<i>Percina antesella</i>	Endangered
Cahaba River, Coosa River and tributaries	Fish	Blue shiner	<i>Cyprinella caerulea</i>	Threatened
Cahaba River in Bibb and Shelby Counties, AL	Fish	Cahaba shiner	<i>Notropis cahabae</i>	Endangered
Upper Conasauga River, TN and GA	Fish	Conasauga logperch	<i>Percina jenkinsi</i>	Endangered
Cahaba and Coosa River Drainage; including Little Cahaba and Coosawatte	Fish	Goldline darter	<i>Percina aurolineata</i>	Threatened
Tombigbee, Black Warrior, and Coosa Rivers, AL	Mussel	Inflated heelsplitter	<i>Potamilus inflatus</i>	Threatened
Tombigbee River	Mussel	Black clubshell	<i>Pleurobema curtum</i>	Endangered
Tombigbee River	Mussel	Flat pigtoe	<i>Pleurobema marshalli</i>	Endangered
Tombigbee River, AL and Cahaba and Coosa Rivers, AL and MS	Mussel	Heavy pigtoe	<i>Pleurobema taitianum</i>	Endangered
Alabama, Cahaba, and Coosa Rivers, AL, Tombigbee River Basin, MS and AL, Black Warrior River, AL	Mussel	Southern combshell	<i>Epioblasma penita</i>	Endangered
Tombigbee River, AL and Black Warrior River, AL and MS	Mussel	Stirrupshell	<i>Quadrula stapes</i>	Endangered
Black Warrior, Cahaba, Alabama, and Coosa Rivers, AL	Snail	Cylindrical lioplax	<i>Lioplax cyclostomaformis</i>	Endangered
Black Warrior, Cahaba, Alabama, Coosa Rivers, AL	Snail	Flat pebblesnail	<i>Lepyrium showalteri</i>	Endangered
Black Warrior, Cahaba, Alabama, Coosa Rivers, AL	Snail	Lacy elimia	<i>Elimia crenatella</i>	Threatened
Black Warrior, Cahaba, Alabama, Coosa Rivers, AL	Snail	Painted rockshell	<i>Leptoxis taeniata</i>	Threatened
Black Warrior, Cahaba, Alabama, Coosa Rivers, AL	Snail	Plicate rocksnail	<i>Leptoxis plicata</i>	Endangered
Black Warrior, Cahaba, Alabama, Coosa Rivers, AL	Snail	Round rocksnail	<i>Leptoxis ampla</i>	Threatened
Coosa River Basin, AL	Snail	Tulotoma snail	<i>Tulotoma magnifica</i>	Endangered
Locust Fork, Sipsey Fork of Black Warrior River, AL	Turtle	Flattened musk turtle	<i>Sternotherus edpressus</i>	Threatened
Sipsey Fork of Black Warrior River, AL	Plants	Kral's water-plantain	<i>Sagittaria secundifolia</i>	Threatened

Source: US Fish and Wildlife Service and US Geological Survey, *Environmental Setting and Water-Quality Issues of the Mobile River Basin, Alabama, Georgia, Mississippi, and Tennessee: Water-Resources Investigations Report 02-4162*, 2002.

107. The previous two sections introduced the geographic areas in which the Service is proposing to designate critical habitat for the mussels, the socioeconomic profile of these areas, and general trends associated with population, economic, and urban growth. These sections also outlined the baseline level of protection afforded the mussels and their habitat. This section identifies the current land and water uses in or near proposed critical habitat that may be affected by section 7 implementation for the mussels. Importantly, these estimates include the effects of section 7 implementation for all activities associated with the proposed critical habitat area. As such, this section does not distinguish impacts that may be attributable co-extensively to the listing of the mussels from those impacts attributable solely to the critical habitat designation.

108. This section begins with a summary of the categories of economic impact associated with section 7 implementation for the mussels. It then provides a general description of the activities and potential Federal nexus affecting the area proposed as critical habitat for the mussels.

3.1 Categories of Economic Impacts Associated with Section 7 Implementation

109. The following discussion provides an overview of the categories of economic impacts that are likely to arise due to the implementation of section 7 in the area proposed as critical habitat.

3.1.1 Technical Assistance

110. The Service may respond to requests for technical assistance from Federal or State agencies, local municipalities, and private landowners and developers with questions regarding whether specific activities may affect a listed species or its critical habitat. Technical assistance costs represent the estimated costs of informational conversations between stakeholders and the Service regarding such potential effects. These technical assistance activities are characteristically low effort voluntary actions between two parties, the Service and the stakeholder. The stakeholder may or may not be a Federal agency, as

opposed to section 7 consultation which by definition involves a Federal nexus with or without private third party involvement.

111. In some instances, technical assistance may involve a request for general review of a project or activity that is not subject to section 7 requirements (e.g., activity on private land without a Federal nexus) as a safeguard to ensure adequate protection for species and habitats of concern. For example, although development of water quality standards within a state requires a section 7 consultation, a State agency may request technical assistance from the Service as an additional precaution to ensure that individual NPDES permits conforming to these standards adequately provide for relevant species and habitat. Although technical assistance is not a direct cost of section 7 of the Act, these costs are incorporated into the cost analysis when they are explicitly propagated by consideration of species and habitat conservation.

3.1.2 Section 7 Consultations

112. Under the listing of a species, section 7(a)(2) of the Act requires Federal agencies to consult with the Service in order to ensure that activities they fund, authorize, permit, or carry out are not likely to jeopardize the continued existence of the species. The Service defines jeopardy as any action that would appreciably reduce the likelihood of both the survival and recovery of the species. For designated critical habitat, section 7(a)(2) also requires Federal agencies to consult with the Service to ensure that activities they fund, authorize, permit, or carry out do not result in destruction or adverse modification of critical habitat. Adverse modification of critical habitat is currently construed as any direct or indirect alteration that appreciably diminishes the value of critical habitat for conservation of a listed species.
113. In some cases, consultations will involve the Service and another Federal agency only, such as the U.S. Army Corps of Engineers (USACE) or the Environmental Protection Agency (EPA). In addition, they may also include a third party, such as State agencies or private landowners involved in projects on non-Federal lands with a Federal nexus.
114. During a consultation, the Service, the Action agency, and the landowner applying for Federal funding or permitting (if applicable) communicate in an effort to minimize potential adverse effects to the species and/or to the proposed critical habitat. Communication between these parties may occur via written letters, phone calls, in-person meetings, or any combination of these. The duration and complexity of these interactions depends on a number of variables, including the type of consultation, the species, the activity of concern, the region where critical habitat has been proposed, and the involved parties.
115. Section 7 consultations with the Service may be either informal or formal. *Informal consultation*, which consists of discussions between the Service, the Action agency, and the applicant concerning an action that may affect a listed species or its designated critical habitat, is designed to identify and resolve potential concerns at an early stage in the planning process. By contrast, a *formal consultation* is required if the Action agency determines that

its proposed action may or will adversely affect the listed species or designated critical habitat in ways that cannot be resolved through informal consultation. The formal consultation process results in the Service's determination in its biological opinion of whether the action is likely to jeopardize a species or adversely modify critical habitat, and recommendations to minimize those impacts. Regardless of the type of consultation or proposed project, section 7 consultations can require substantial administrative effort on the part of all participants.

3.1.3 Project Modifications

116. The section 7 consultation process may involve some modifications to a proposed project. Projects may be modified in response to voluntary conservation measures suggested by the Service during the *informal* consultation process in order to avoid or minimize impact to a species and/or its habitat, thereby removing the need for formal consultation. Alternatively, *formal* consultations may involve modifications that are agreed upon by the Action agency and the third party and included in the project description as avoidance and minimization measures, or included in the Service's biological opinion on the proposed action as reasonable and prudent measures (RPMs) and/or discretionary conservation recommendations to assist the Action agency in meeting its obligations under section 7(a)(1) of the Act.⁵⁴
117. In some cases, the Service may determine that the project is likely to jeopardize the continued existence of the species and/or destroy or adversely modify its designated critical habitat. In these cases the Service will provide the Action agency with reasonable and prudent alternatives (RPAs) that will keep the action below the thresholds of jeopardy and/or adverse modification. An RPA is an alternative that: (1) can be implemented in a manner consistent with the intended purpose of the action; (2) can be implemented consistent with the scope of the Action agency's legal authority and jurisdiction; and (3) is economically and technologically feasible. These RPAs are typically developed by the Service in cooperation with the Action agency and, when applicable, the third party. Alternatively, the Action agency can develop its own RPAs, or seek an exemption for the project. All of these project modifications have the potential to represent some cost to the Action agency and/or the third party. In certain instances, these modifications can lead to broader regional economic impacts.
118. Because of the difficulty generating estimates of potential modifications to specific projects on a case-by-case basis, this analysis models modifications for average or "typical" projects likely to affect the proposed critical habitat of the mussels. Actual modification costs are likely to vary according to the specific characteristics of individual projects and consultation outcomes. Estimated costs of project modifications are detailed following the descriptions of the related activities in Section 4 of this analysis.

⁵⁴ Section 7(a)(1) requires Federal agencies to utilize their authorities to further the purposes of the Act by carrying out programs for the conservation of listed species.

3.1.4 Regional Economic Impacts

119. The consultation process and related project modifications may potentially affect the operations of entities in certain industries (e.g., agriculture producers or residential developers), with secondary impacts on the suppliers of goods and services to these industries, as well as purchasers of production from these industries. For example, modified or decreased grazing and crop harvesting activities may affect businesses providing agricultural equipment and supplies. Thus, project modifications or other restrictions that engender cost and revenue impacts involving commercial enterprises may subsequently effect other sectors of the local economy, particularly where the affected industry is central to the local economy. Industries within a geographic area are interdependent in that they purchase output from other industries and sectors while supplying inputs to other businesses. Direct economic effects on a particular enterprise can therefore affect regional output and employment in multiple industries.
120. Many methods are available for conducting economic impact assessments, depending on the particular policy interests and goals of the economic analysis. Use of an input-output (I-O) model, such as IMPLAN, to gauge the direction and magnitude of regional economic impacts is useful in situations where the critical habitat designation may affect the commercial economy of a specific geographic area. However, I-O modeling is not appropriate for all economic impact analyses associated with critical habitat areas and can result in misinterpretations and biased conclusions if used inappropriately. I-O models are appropriate when the following factors are present: (1) economic impacts of the proposed designation are substantial and clearly defined in the analysis; (2) impacts have a clear effect on one industry or groups of industries prevalent in the geographic region; and (3) substitution possibilities for the focal economic input or activity are not widely available.

3.2 Activities Potentially Affected by Critical Habitat Designation for the Mussels

121. Numerous Action agencies permit and conduct activities and projects in or adjacent to proposed critical habitat areas. These activities may lead to section 7 consultations with the Service, and in some cases specific projects may require modification in order to protect the mussels and/or their habitat. This section provides a list of activities likely to engender section 7 consultation.

- Road/bridge construction and maintenance;
- Hydropower facilities;
- Water supply dams;

- Utilities construction/maintenance;
- Activities in National Forests;
- Agriculture and ranching-related activities;
- Water quality activities;
- Conservation and recreation;
- Dredging and Clearing; and
- Coal Mining.

122. The following list identifies land use activities that occur within the proposed critical habitat designation but are unlikely to incur section 7 impacts.

- Silviculture; and
- Residential Development.

123. The following discussion explores each of these land activities. For activities likely to be affected by section 7 activity, the potential impact on critical habitat and the Federal nexus (i.e., Action agency) involved are described. For activities unlikely to be affected by section 7, justification for the determination of the lack of impact is provided. Specific information on section 7 consultations, project modifications, and related costs anticipated with respect to each activity is detailed in Section 4 of this analysis.

124. The USACE is the primary Action agency conducting activity in the mussel critical habitat area. This agency is responsible for carrying out and permitting a majority of the activities with the potential to affect riverine, estuarine, and marine areas. USACE civil works divisions undertake projects to maintain navigation channels and water infrastructure, conduct environmental restoration, and maintain flood control. USACE regulatory divisions grant permits for private activities in navigable waterways under section 404 of the Clean Water Act and section 10 of the Rivers and Harbors Act. Details of these proposed USACE activities, including the number of anticipated consultations associated with each activity per state are described by activity in Section 4 of this analysis.

3.2.1 Road/Bridge Construction and Maintenance

125. Road and bridge construction activities may pose a risk to the mussels and their habitat as a result of: increased sedimentation from erosion; construction of instream pilings; alteration of channel morphology; elimination of streambank vegetation to filter runoff; and resulting loss of suitable habitat. Thus, major road and bridge construction, maintenance, and improvement projects in areas proposed as critical habitat for the mussels are likely to

require section 7 consultations where a Federal nexus exists. The lead Action agency for road and bridge construction projects may be the USACE, as it has jurisdiction over construction in navigable waterways. The Federal nexus for many DOT activities is the Federal Highway Administration (FHWA) due to its funding of the State DOT projects, though it is the DOT that typically communicates with the Service throughout the consultation process as the designated representative of the FHWA. For non-FHWA funded road projects, the USACE constitutes a Federal nexus if a CWA 404 permit/authorization is required.

3.2.2 Hydropower Facilities

126. Four hydropower dams exist within or adjacent to the proposed critical habitat designation for the mussels species. The Alabama Power Company (APC) owns and operates two hydropower facilities within the proposed critical habitat designation for the mussels, Jordan Dam in Unit 26 and Weiss Dam in Unit 18. Under the Federal Power Act, FERC issues licenses for privately owned hydropower facilities. The Federal permitting of each relicensing therefore requires a section 7 consultation to ensure these actions adequately consider listed species and habitat.
127. FERC hydropower licenses are valid for 30, 40, or 50 years, depending on the extent of proposed new development or environmental mitigation and enhancement measures. The licenses under which Jordan Dam and Weiss Dam operate expire in 2007, and applications for relicensing of both hydroelectric dams must be filed by July 31, 2005.⁵⁵ Jordan Dam's hydropower facility has a capacity of 100 megawatts while Weiss Dam's generating capacity is 87.75 megawatts.⁵⁶ Collectively, the developments represent about 12 percent of APC's hydroelectric generation capacity.⁵⁷ In September 2000, APC requested approval for use of FERC's alternative licensing process (ALP) for both hydroelectric development relicensings. This request was approved in January 2001.⁵⁸ The ALP is intended to facilitate greater collaboration with FERC, the public, and other stakeholders and resource agencies including the Service.
128. The Service's primary concern regarding the relicensing of the dams with respect to the mussels is implementation and maintenance of minimum flows. Upstream of the dams, the increased depth of water, buildup of sediment, decreased levels of dissolved oxygen, and

⁵⁵ Personal communication with Edward Abrams, FERC, February 24, 2003.

⁵⁶ *Coosa/Warrior Relicensing Project, Initial Information Package for the Weiss Development*, FERC No. 2146, November 2000.

⁵⁷ Alabama Power Company, *Hydro Relicensing*, accessed at <http://www.southerncompany.com/alpower/hydro/> on March, 3, 2003.

⁵⁸ Letter from Manager, Alabama Power Company Hydro Licensing to Secretary, Federal Energy Regulatory Commission, September 21, 2000; Letter from Leader Hydro East Group 2, Federal Energy Regulatory Commission to Alabama Power Company, January 29, 2001.

alteration of host fish populations threaten the survival of the mussels. Downstream of the dams, decreased flow, reduced water temperatures, changes in fish assemblage, and isolation of species, further affect the state of the mussels habitat.⁵⁹ Water quality impacts and impingement and entrainment of fish hosts as a result of damming activities may also affect the mussel species.⁶⁰

129. A third FERC- licensed hydropower facility is proposed for construction at Carter's Reregulation Dam, on the Coosawattee River in Murray County, Georgia. In 2001, Fall Line Hydro Company was licensed by FERC to construct a powerhouse facility at the existing dam with a total installed generating capacity of 4.5 MW. Dam flow and releases at this site are under jurisdiction of the Mobile District USACE.
130. In a letter provided during the public comment period, the USACE noted that changes in flows at Carter's Reregulation Dam will likely result in changes in power production at the main dam of Carters Project (Carters Dam). The Reregulations Dam's primary function is to provide a lower pool to support pumping operations and, accordingly, the output of Carters Dam is heavily dependent on the capacity of the reregulation pool.⁶¹ Carters Dam has a total installed capacity of 500 MW.⁶² This represents "approximately 45 percent of the USACE Mobile District's generation capacity and is a major component in meeting power contracts of the Department of Energy's Power Marketing Agency, Southeastern Power Authority that markets the energy produced by this plant."⁶³ Impacts to energy production at Carters Dam associated with changes in flows at Carters Reregulation Dam constitute an indirect impact of the consultation at the Reregulation Dam.
131. The fourth hydropower dam, the Robert F. Henry lock and dam located in Autauga County in proposed critical habitat Unit 14, is overseen by USACE. The Mobile District's Black Warrior and Tombigbee/Alabama-Coosa Rivers Project Management Office maintains and operates the dam while the Southeastern Power Administration, an agency within the Department of Energy, markets hydropower generated from the affiliated R. E. "Bob" Woodruff Lake. The Bob Woodruff Lake has a hydro generating capacity of 68 megawatts

⁵⁹ Neves, R.J., A.E. Bogan, J.D. Williams, S.A. Ahlstedt, and P.W. Hartfield. 1997. "Status of Aquatic Mollusks in the Southeastern United States: A Downward Spiral of Diversity." Aquatic Fauna in Peril: The Southeastern Perspective. Ed. G.W. Benz and D.E. Collins. Southeast Aquatic Research Institute: Special Publication 1.

⁶⁰ Personal communication with Fish and Wildlife Service, Daphne Field Office, March 6, 2003.

⁶¹ Comment letter from U.S. Army Corps of Engineers, Mobile District Coastal Environment Team, October 14, 2003.

⁶² U.S. Army Corps of Engineers, "Carters Dam, Coosawattee River, Georgia: Pertinent Data," accessed at <http://water.sam.usace.army.mil/cart-pert.htm> on December 4, 2003.

⁶³ Comment letter from U.S. Army Corps of Engineers, Mobile District Coastal Environment Team, October 14, 2003.

and produces electricity to serve approximately 45,000 homes.⁶⁴ As both the dam and hydropower generating facilities are federally operated, the R. F. Henry Dam is not subject to FERC jurisdiction and relicensing, although it is subject to the requirements of section 7.⁶⁵

3.2.3 Water Supply Dams

132. Construction of water supply dams in or adjacent to critical habitat for the mussels is a potential threat to the species. None of the 11 mussels are known to survive in impounded waters. Construction of impoundments has historically resulted in fragmentation of species habitat, and induces the accretion of sediment behind the dam that may result in direct habitat alteration and potential suffocation of the species. Fish species that serve as hosts for the glochidia may also be affected by the introduction of dams into habitat.⁶⁶ Pumping of water from designated streams to fill water supply reservoirs may also negatively affect the species by decreasing duration, magnitude, and timing of high and low flows.⁶⁷ Parties such as county governments intending to develop water supply dams must apply for an individual 404 permit from the USACE pursuant to the Clean Water Act.
133. The Birmingham Water Works Board (BWVB) in Birmingham, AL commented that the critical habitat designation for the mussels may impact future water supplies in the Birmingham metropolitan area.⁶⁸ The Black Warrior River Headwaters Basin and the areas of St. Clair and Shelby Counties are served by the BWVB. Based on existing demands, water shortages would occur in this region if a drought were to occur.⁶⁹ By 2040, with a 0.5 percent annual growth rate, the region is likely to experience water supply shortages of 130 to 210 million gallons per day (mdg) (depending on location of the gage). As a result, BWVB has considered constructing a water supply reservoir in the Locust Fork area, within Unit 12 of the proposed designation for the mussels.
134. The Tombigbee River Valley Water Management District (TRVWMD) is currently working to form the six county (including Chickasaw, Clay, Kemper, Lowndes, Monroe, and Noxubee Counties) "Prairie Regional Water Supply and Sewer District (PRWSSD) to

⁶⁴ U.S. Army Corps of Engineers, Mobile District, *Black Warrior Tombigbee/Alabama-Coosa Project Management Office*, accessed at <http://www.sam.usace.army.mil/op/tu/tuscInk3.htm> on February 27, 2003.

⁶⁵ Federal Power Act, 1920.

⁶⁶ *Proposed Designation of Critical Habitat for Three Threatened Mussels and Eight Endangered Mussels in the Mobile River Basin*, March 26, 2003 (68 FR 14752).

⁶⁷ Personal communication with U.S. Fish and Wildlife Service, Athens, GA Field Office, January 8, 2003.

⁶⁸ Public comment from R. Randall Chafin, Assistant General Manager, Birmingham Water Works Board, October 14, 2003.

⁶⁹ U.S. Army Corps of Engineers, *Section 22 Report Planning and Assistance to States Black Warrior River Headwaters Basin Water Supply Study*, October 1999.

provide water to industrial users and provide safe disposal of waste water.” The PRWSSD is expected to be formed soon as five of the counties have completed the process and the last remaining county is expected to complete the process soon.⁷⁰ The purpose of the PRWSSD is to join together to develop surface water supplies and grow economically.⁷¹ The formation of the PRWSSD indicates that these six counties may be developing new water supplies in the future; however, no plans for specific water supply projects are available at this time. As discussed in the proposed rule, impounded waters may constitute an adverse impact to critical habitat. Out of the six counties, Lowndes and Monroe contain critical habitat for the mussels.

3.2.4 Utilities Construction/Maintenance

135. Construction or maintenance of in-stream pipelines may result in direct disturbance of the sediment habitat for the species or increased siltation from upstream construction. FERC regulates the rates and transport of natural gas, oil, and electricity under the Department of Energy Organization Act.⁷² Such activity may also require a 404 Clean Water Act permit from the USACE. As such, either FERC or USACE may be the lead Action agency throughout the section 7 consultation with the Service. Further, the Tennessee Valley Authority (TVA) owns and operates transmission systems within the northern Georgia and southern Tennessee portions of the proposed critical habitat and may also consult with the Service.⁷³

3.2.5 Activities in National Forests

136. The U.S. Forest Service (USFS) engages in consultation with the Service regarding activities that occur adjacent to or within the drainages of rivers and creeks that provide habitat for the mussels. Five National Forests are located within the proposed critical habitat designation for the mussels: Tuskegee, Talladega, and Bankhead National Forests in Alabama, and Chattahoochee-Oconee National Forest in Georgia and Cherokee National Forest in Tennessee. These forests are managed for multiple uses including recreation, wildlife habitat, and timber harvest. Future activities on which the USFS may initiate section 7 consultation regarding the mussels and habitat include recreation facility construction, trail building, and timber harvest.

⁷⁰ Personal communication with Jimmie Mills, Executive Director Tombigbee River Valley Water Management District, November 11, 2003, and December 5, 2003.

⁷¹ Personal communication with Jimmie Mills, Executive Director Tombigbee River Valley Water Management District, November 11, 2003.

⁷² Department of Energy Organization Act, 42 U.S.C. §7112.

⁷³ *TVA's Transmission System*, accessed at <http://www.tva.gov/power/xmission.htm> on February 4, 2002.

3.2.6 Agriculture and Ranching-Related Activities

137. Much of the lands adjacent to the critical habitat area for the mussels are privately-owned and devoted to agriculture, principally rowcropping of cotton and soybeans. Such activities on private land generally do not involve a Federal nexus. In some instances however, agricultural activities on private lands may be supported by voluntary landowner participation in any of a number of programs sponsored by Federal agencies including the Natural Resources Conservation Service (NRCS), and the Farm Services Agency (FSA). Additionally, certain agricultural activities are regulated and/or permitted by Federal agencies, such as USACE permitting of water diversion activities. These agencies provide funding or technical assistance for agriculture-related initiatives.
138. The FSA provides technical and financial assistance to farmers under the Farm Bill. Initiatives typically involve agricultural operation improvements to assist in conserving land and water resources, providing credit to new or disadvantaged farmers and ranchers, helping farmers and ranchers recover from disasters, or stabilizing farm income. The NRCS provides cost-share and other Federal assistance to private ranchers and farmers for the establishment of environmentally sustainable land use practices. Typical conservation activities in the proposed critical habitat area include streambank stabilizations and fencing of livestock. The NRCS may provide funding through voluntary partnership with private landowners under conservation programs such as the Environmental Quality Incentives Program (EQIP) which provides technical and financial assistance for the installation or implementation of structural and management conservation practices on agricultural land to farmers and ranchers who face particular land and water quality threats.

3.2.7 Water Quality Activities

139. The Environmental Protection Agency (EPA) may engage in section 7 consultations with the Service regarding water quality standards to ensure that they are appropriately protective of endangered and threatened species. EPA typically considers listed species when consulting with the Service on the following categories of water quality program activities:
- **Total maximum daily load (TMDL) approvals.** Assignment of TMDL levels falls under section 303 (d) of the Clean Water Act. Consultations on TMDLs arise when the combination of point and non-point source pollutants causes a noncompliance in a body of water, which is then listed in the state's section 303d list of impaired waters.⁷⁴ The EPA consults with the Service regarding TMDLs on 303 (d) streams that are listed due to aquatic life criteria impairments. Impairments that effect the mussel habitat streams include:

⁷⁴ Clean Water Act, § 131.10.

nutrients, sediments, low dissolved oxygen, and pesticides.⁷⁵ Six 303 (d) listed streams occur in the mussels proposed critical habitat area that are listed for such impairments.

- **State 303 (d) lists.** State agencies must provide EPA with a proposed list of 303 (d) river segments for approval. Historically, the EPA has consulted with the Service every other year regarding review of these lists. In July of 1991, however, the EPA engaged in a programmatic consultation to streamline review of 303 (d) lists for all Region 4 States, including Alabama, Georgia, Mississippi, and Tennessee. The new process contemplates potential impact to endangered species and habitat and therefore avoids consulting as frequently as in the past regarding 303 (d) list review.
- **State Water Quality Standards.** The EPA reviews water quality standards within each state approximately every three years.
- **Special Appropriation Projects (SPAPs).** The EPA funds water improvement projects such as increasing capacity of drinking water facilities, or construction or improvement of wastewater facilities.⁷⁶

140. EPA's National Pollutant Discharge Elimination System (NPDES) permit program regulates point source pollution. Although development and implementation of State water quality standards are subject to a section 7 consultation between the Service and the EPA, as an added precaution, the Service may review each individual NPDES permit application to confirm that listed species are not adversely affected by water quality impacts. If the proposed permit does not appear to meet State water quality standards, the Service may object to issuance of the permit, and the State may ask the applicant to alter the permit to meet the standards. According to a 2001 Memorandum of Agreement between the EPA, National Marine Fisheries Service (NMFS), and the Service, the EPA has provided States and tribes authority over their Clean Water Act permitting when appropriate.⁷⁷ Accordingly, NPDES permitting may generate a technical assistance effort between the Service and the

⁷⁵ Personal communication with Duncan Powell, Environmental Protection Agency, Region 4, February 26, 2003.

⁷⁶ Personal communication with Duncan Powell, Environmental Protection Agency, Region 4, February 26, 2003.

⁷⁷ U.S. Environmental Protection Agency, Department of the Interior, and the Department of Commerce, *Memorandum of Agreement Between the Environmental Protection Agency, Fish and Wildlife Service and National Marine Fisheries Service Regarding Enhanced Coordination Under the Clean Water Act and Endangered Species Act; Notice*, Federal Register Vol. 66, No. 36, February 22, 2001.

designated representative of the EPA (i.e., the respective State agencies) for review of the permit to ensure it appropriately considers the mussels and their habitat.⁷⁸

3.2.8 Conservation and Recreation

141. Partners for Fish and Wildlife (PFW) is a voluntary partnership program between the Service and landowners interested in restoring streamlands, wetlands and other important fish and wildlife habitats on their own lands. The program provides various types of support ranging from technical assistance to private landowners through voluntary cooperative agreements, to funding restoration projects on private lands. Voluntary habitat restoration on private lands usually involves dollar-for-dollar cost share through working with private landowners and Federal, State, and local entities. Landowners sign agreements to keep the restoration projects for the life of the agreement and otherwise retain full control of their land.⁷⁹ As the projects are funded and/or carried out by the Service, internal consultation may take place for each project.
142. The USACE may engage in habitat restoration projects as well. Section 206 of the Water Resources Development Act of 1996 provides authority for the USACE to undertake restoration projects in aquatic ecosystems such as rivers, lakes and wetlands. These projects are intended to benefit the environment through restoring, improving, or protecting aquatic habitat for plants, fish and wildlife.⁸⁰ Further, Section 1135 of the Water Resources Development Act provides authority for the USACE to plan, design and construct fish and wildlife habitat restoration measures through modification of USACE structures or operations, or modification of an off-project site when it is found that a USACE project has contributed to habitat degradation.⁸¹ The USACE must consult with the Service when these projects directly impact mussel habitat. The consultations, however are anticipated to be informal in nature as the projects are intended to benefit the species and habitat.
143. The Mississippi Department of Wildlife, Fisheries, and Parks oversees an active fish stocking program within the State. Under the Sport Fishing Restoration Act, the Service

⁷⁸ A comment letter provided by International Paper on June 23, 2003 noted that International Paper operates two large integrated pulp and paper mills on the Alabama River in or around the vicinity of proposed critical habitat Unit 14. Both mills discharge treated effluent into the Alabama River in compliance with their State authorized NPDES permits issued by the Alabama Department of Environmental Management. This economic analysis captures any impacts at facilities such as these in its quantification of technical assistance efforts associated with the issuance of NPDES permits and through such consultations as those regarding the development of State water quality standards.

⁷⁹ U.S. Fish and Wildlife Service, *Partners for Fish and Wildlife Program*, accessed at <http://www.fws.gov> on July 2002.

⁸⁰ US Army Corps of Engineers, Aquatic Ecosystem Restoration - Section 206, accessed at <http://www.mvp.usace.army.mil/environment/default.asp?pageid=113>.

⁸¹ US Army Corps of Engineers, Habitat Restoration - Section 1135, accessed at <http://www.mvp.usace.army.mil/environment/default.asp?pageid=115>.

assists with funding for this program.⁸² The game fish raised for stocking, including the Alabama walleye and the Florida Bass, are grown in federally-funded hatcheries. Due to Service funding, the fish stocking program in Mississippi is subject to statewide internal section 7 consultation to ensure that the stocking of the fish does not jeopardize present endangered species such as the mussels, or adversely modify their habitat.

3.2.9 Dredging and Clearing

144. Gravel dredging and excavating activities require a section 404 CWA permit from the USACE when there will be a discharge of dredge materials. Gravel dredging and excavation also requires State permitting and State water quality/401 certification before the activities can proceed. Further, the Alabama River and Conasauga River, are designated as section 10 waters under the Rivers and Harbors Act and consequently require a section 10 permit from the USACE for dredging.⁸³
145. The USACE also issues 404 permits for projects focused on the maintenance of waterways to avoid flooding and to allow clear pathways for flow. The Tombigbee River Valley Water Management District (TRVWMD) has commented that the designation of critical habitat for the mussels could “cripple or unnecessarily delay” future water-related projects for member counties and will preclude future flood prevention measures.⁸⁴ These comments stem from an ongoing consultation, initiated in 1988 by the USACE, regarding five mussels species listed in 1987 (Marshall’s mussel (*Pleurobema marshalli*), Judge Tait’s mussel (*Pleurobema taitianum*), the stirrup shell (*Quadrula stapes*), and the penitent mussel (*Epioblasma (Dysnomia) penita*) for operation and maintenance of flood control activities on the Tombigbee River.⁸⁵ According to the Service and USACE, this consultation, although never formally concluded, has been resolved to the point where the USACE was able to satisfactorily carry out its operation and maintenance activities without affecting other flood

⁸² Personal communication with Bubba Hubbard, Mississippi Department of Wildlife, Fisheries, and Parks, March 14, 2003.

⁸³Section 10 of the Rivers and Harbors Act of 1899 provides for the protection of navigable waters. This Act controls the dredging and filling of all US waterways and makes it unlawful to construct any structure in or over these waters without authorization from the USACE. List of Navigable Waters of the United States within the Nashville District, accessed at <http://www.orn.usace.army.mil/cof/nav.htm> on May 6, 2003. Personal communication with William James, Permits Branch, USACE Nashville District East Office, Nashville, Tennessee, March 10 and 12, 2003.

⁸⁴ Jimmie D. Mills for the Tombigbee River Valley Water Management District, Mississippi, October 8, 2003.

⁸⁵ Under the Flood Control Act of 1941 the USACE is authorized to implement channel improvements and related works for flood control on the Tombigbee River and tributaries above the mouth and including the Noxubee River. Personal communication with Fish and Wildlife Service personnel, Mississippi Field Office, December 4, 2003; Personal communication with Brian Peck, Ken Klasman, Mike Eubank, Hugh McClellan, and Leon Cromartie, Army Corps of Engineers personnel, December 5, 2003; Personal communication with Jimmie Mills, Executive Director Tombigbee River Valley Water Management District, November 11, 2003, and December 5, 2003.

control projects.⁸⁶ TRVWMD concerns regarding completing future projects on a timely schedule grew from what they consider to be a 15 year time frame of the 1988 consultation. This consultation is anomalous in the manner in which it was resolved, and it is anticipated that future consultations are likely to be in accordance with the timeline for a formal consultation set forth in the section 7(b)(1)(A)(a)(2) of the Act of 90 days for the consultation.

3.2.10 Coal Mining

146. Coal mining, while not a prevalent activity within the proposed critical habitat for the mussels, may occasionally occur in areas adjacent to the critical habitat units. All coal mines require a surface coal mining permit issued under authority of the Federal Surface Mining Control and Reclamation Act (SMCRA). Under SMCRA, states with Office of Surface Mining (OSM) approved programs act as “Primacy States”, or designated Federal representatives, for regulating surface coal mining.⁸⁷
147. The State of Tennessee does not have regulatory authority (“primacy”), and OSM issues all surface mining permits in this State. The OSM issued permit is the nexus for a section 7 consultation with the Service.⁸⁸ The proposed critical habitat designation within the State of Tennessee, however, is comprised of only 17 miles (27 km) of stream that largely flows through National Forest and no coal mining consultations are anticipated. In 1983 the State of Georgia relinquished primacy to OSM to regulate its coal mining industry. Although coal mining did exist in the northeastern portion of the State in the late 1970's and early 1980's, there is currently no active coal mining within the State. As such, no consultations are expected regarding coal mining in Georgia.⁸⁹
148. The OSM has granted the States of Alabama and Mississippi primacy to issue surface coal mining permits. Because these states maintain regulatory authority, there is typically no Federal nexus regarding coal mining activities within these states.⁹⁰ The designated Federal representative to issue mining permits within Mississippi is the Mississippi Office of

⁸⁶ Personal communication with Fish and Wildlife Service personnel, Mississippi Field Office, December 4, 2003; Personal communication with Army Corps of Engineers personnel, December 5, 2003.

⁸⁷ To be delegated primacy, State surface mining laws and regulations must be as effective and no less stringent than Federal surface mining laws and regulations. Memorandum dated September 24, 1996, from Assistant Director, Ecological Services, to Acting Director, Office of Surface Mining Reclamation and Enforcement, re. “Formal Section 7 Biological Opinion and Conference Report on Surface Coal Mining and Reclamation Operations Under the Surface Mining Control and Reclamation Act of 1977.”

⁸⁸ Office of Surface Mining, *Office of Surface Mining Reclamation and Enforcement*, accessed at <http://www.doiu.nbc.gov/orientation/osm2.cfm> on March 14, 2003.

⁸⁹ Office of Surface Mining, *Georgia*, accessed at <http://www.osmre.gov/pdf/georgia.pdf> on March 14, 2003.

⁹⁰ Office of Surface Mining, *Office of Surface Mining Reclamation and Enforcement*, accessed at <http://www.doiu.nbc.gov/orientation/osm2.cfm> on March 14, 2003.

Geology (MOG), and in Alabama it is the Alabama Surface Mining Commission (ASMC). There are no current or anticipated coal mining activities within the proposed critical habitat for the mussels in Mississippi.⁹¹ The ASMC may confer with the Service regarding its permitting activities in the case that a mine site is within or abutting the proposed critical habitat in Alabama. As there is no Federal nexus, and issuance of permits has not in the past involved a formal Biological Assessment (BA), consideration of critical habitat may be considered a technical assistance effort.⁹²

149. In one instance in Alabama, the Bureau of Land Management (BLM) is planning to lease land in order to expand an existing mine.⁹³ As this land falls within the boundaries of proposed critical habitat and the BLM constitutes a Federal nexus, this effort may involve section 7 consultation.

3.2.11 Silviculture

150. Alabama's Best Management Practices (BMPs) for Forestry and the Master Logger Program provide guidelines and education on timber harvesting near streams. The BMPs are intended to maintain and protect water quality. Examples of protections afforded the mussels include the establishment of streamside management zones, implementation of erosion control measures, and prohibitions of skid trails, logging roads, and logging landings in streams and streamside management zones. These guidelines are not mandated by law, with the exception of restrictions on road and stream crossing construction and maintenance within wetlands and other waters of the United States, as outlined in the USACE baseline BMPs. These guidelines are mandatory in order to retain exemption status from 404 permits.⁹⁴
151. As stated in Alabama's BMPs for Forestry, silviculture operations are exempt from Section 404 Corps of Engineers permit requirements when the activities meet certain conditions.⁹⁵ The Alabama Forestry Commission reported that the majority of timber harvesters and landowners follow BMPs. Thus, they meet the above specified conditions, and are exempt from 404 permit requirements. Further, according to the Forest Statistics for Alabama, 2000, over seventy-five percent of the timberland in Alabama is non-industrial private land. Because no federal nexus exists and implementation of BMPs minimizes

⁹¹ Letter from Arthur W. Abbs, Office of Surface Mining, June 24, 2003.

⁹² Personal communication with Randy Johnson, Alabama Surface Mining Commission, November 25, 2003.

⁹³ Letter from Sid Vogelpohl, Bureau of Land Management, April 9, 2003.

⁹⁴ Alabama Forestry Commission, *Alabama's Best Management Practices for Forestry*. 1999.

⁹⁵ Alabama Forestry Commission, *Alabama's Best Management Practices for Forestry*. 1999. pp 16-17.

impacts on the mussels and habitat, consultations associated with silviculture are not foreseeable.⁹⁶

152. Similarly, Mississippi Forestry BMPs and the logger certification program provide guidelines and education on timber harvesting near streams. The main focus of the MS Forestry BMPs is to protect water quality. Examples of baseline protections afforded the mussels include the establishment of streamside management zones, implementation of erosion control measures, and restrictions on stream crossings, skid trails, logger loading decks, and road and recreational trail construction.⁹⁷ Although BMPs are not mandated by law, a recent survey reported a ninety percent participation rate in BMPs statewide.⁹⁸

153. Although silviculture occurs within portions of the proposed critical habitat for the mussels, the Mississippi Forestry Commission contends that silviculture will not result in section 7 activities as the majority of the silviculture practiced in the areas surrounding the proposed critical habitat designation is on private non-industrial land, and does not constitute a federal nexus.⁹⁹

3.2.12 Residential and Related Development

154. Reductions in property value may occur through public perception that the designation will restrict land uses, inhibit private development, or cause project delays. Such loss in property value can be experienced for as long as such perception persists. Thus, any potential reduction in property value would primarily be due to the regulatory uncertainty, engendered by critical habitat designation, concerning land use within critical habitat areas. No additional, significant, development-related effects are anticipated, however, for the following reasons:

- While uncertainties about the impacts of the proposed critical habitat designation and the perception that the designation will impose land use restrictions can cause reduction in property value, this effect is likely to be temporary in nature as the uncertainties and perceptions dissipate and/or become clarified over time;
- Consultation under section 7 only applies to activities that are carried out, permitted, or funded by a Federal agency. As such, the designation of critical

⁹⁶ Personal communication with Jim Hyland, Alabama Forestry Commission, March 13, 2003.

⁹⁷ Personal communication with James MacLellan, Mississippi Department of Environmental Quality, March 11, 2003.

⁹⁸ Personal communication with Allen VanValkeenburg, Mississippi Forestry Commission, March 5, 2003.

⁹⁹ Personal communication with Allen VanValkeenburg, Mississippi Forestry Commission, March 5, 2003.

habitat will not afford any additional protections for species with respect to strictly private activities; and

- Some or all of the units may additionally experience increases in property value due to the same perceptions of restricted development activities as preservation of open space often has a positive effect on property value.

155. Commenters have suggested that the designation of critical habitat for the mussels will devalue land.¹⁰⁰ The consult history for these species does not include any consultations for private activities on private lands and no such consultations are anticipated for the future. No Federal nexus exists for activities on private lands that do not require a Federal permit. Further, streams and river channels within the ordinary high water line are being proposed for designation. No private land areas are being proposed. In addition, development activities with the greatest potential to affect the mussels and habitat revolve around the increased construction of pipelines, water supply and wastewater infrastructure, and roads and bridges within the proposed critical habitat. Increased costs of these activities due to the presence of species and habitat is captured through the anticipated consultations and project modifications as quantified within this analysis. As a result, this analysis does not anticipate any direct section 7 impacts regarding private activities on private lands.

156. One comment provided during the public comment period for the draft version of this analysis stated that the designation of critical habitat “could have a detrimental impact on future growth and development in and around Columbus, Mississippi.”¹⁰¹ In the specific case of Columbus, Mississippi region, Lowndes County population grew 3.8 percent from 1990 to 2000 but decreased one percent from 2000 to 2001.¹⁰² The unemployment rate was 7.2 percent in 2001 and increased to 9.5 percent in 2002, compared to the State average of 5.5 percent in 2001 and 6.8 percent in 2002.¹⁰³

157. With the exception of cases in which critical habitat designation excludes a portion of available land from development, and where substitutes are limited, designation is unlikely to substantially affect the course of regional economic development.¹⁰⁴ However,

¹⁰⁰ Public comment letters were received from Ricardo Davis (October 14, 2003), Patricia Moyers (October 13, 2003), and Jerald Moyers (October 14, 2003).

¹⁰¹ Public comment letter received from Mayor Jeffery Rupp for the City of Columbus, Mississippi (September 23, 2003).

¹⁰² U.S. Census Bureau, *Census 2000 and State & County QuickFacts*, accessed at <http://quickfacts.census.gov/qfd> on December 10, 2002.

¹⁰³ Mississippi Employment Security Commission, Labor Market Information Department, Mississippi Guide to Labor Market Information. Accessed at <http://www.mesc.state.ms.us/lmi/files/urates/urate.pdf> on December 5, 2003.

¹⁰⁴ Meyer, Stephen M. 1998. “The Economic Impact of the Endangered Species Act on the Housing and Real Estate Markets.” *New York University Environmental Law Journal*. 6(450):1-13.

the city of Columbus and Lowndes County are attempting to attract industrial businesses.¹⁰⁵ In the case that an industry requires the direct use of the natural resources of mussel habitat (e.g., large volume of water for cooling or discharge) the presence of the mussels or critical habitat may impact the decision to locate in that area. Environmental regulations such as critical habitat designation likely constitute some fraction of the many factors involved in the decision to locate a facility. This analysis recognizes, but does not quantify, impacts to the future growth and development of the Columbus, Mississippi region as it is unclear what impact the designation may contribute to the decision-making process of potential future industries to locate facilities.

158. Under section 10(a)(1)(B) of the Act, a non-Federal entity (i.e., a landowner or local government) may develop a Habitat Conservation Plan (HCP) in order to meet the conditions for issuance of an incidental take permit from the Service in connection with the development and management of a property.¹⁰⁶ Development of such a plan within critical habitat would require an internal section 7 consultation in the Service. It is rare, however, to develop a HCP for aquatic species.¹⁰⁷ No HCPs have been developed regarding these 11 species in the past and the Service does not anticipate that any will be developed in the future.¹⁰⁸

3.3 Summary of Results

159. Exhibit 3-1 summarizes the potential level of consultation and technical assistance activity affected by the proposed critical habitat designation for the mussels with respect to each activity in each proposed critical habitat unit. These estimates reflect the total consultation and technical assistance profiles associated with the proposed designation, regardless of whether these consultations or assistance efforts can be attributed co-extensively to the listing of these species. As a result, these estimates reflect an upper-bound measure of impact likely to be associated with this designation. The costs for these consults and the project modifications they engender are discussed in Section 4.

¹⁰⁵ Columbus-Lowndes Economic Development Association, *Industrial Property*, accessed at <http://www.cleda.com/industrial.html> on December 8, 2003.

¹⁰⁶ U.S. Fish and Wildlife Service, *Endangered Species and Habitat Conservation Planning*, accessed at <http://endangered.fws.gov/hcp/> on August 6, 2002.

¹⁰⁷ Personal communication with U.S. Fish and Wildlife Service, Cookville, TN Field Office, February 12, 2003.

¹⁰⁸ Personal communication with U.S. Fish and Wildlife Service, Jackson, MS Field Office, December 6, 2002.

Exhibit 3-1

**CONSULTATION AND TECHNICAL ASSISTANCE EFFORTS ANTICIPATED
WITHIN THE PROPOSED CRITICAL HABITAT FOR THE MUSSELS (TEN YEARS)**

Unit	Anticipated Activity	Federal Nexus	Technical Assistance	Formal Consults	Informal Consults
1	Road and bridge construction	MS DOT		2	3
	Utilities construction/maintenance	USACE		4	
	Conservation and recreation activities	USACE			4
		FWS			2
	Dredging and Clearing	USACE		2	120 - 180
	Private landowner assistance	None	1		
2	Road and bridge construction	MS DOT		2	4
	Road and bridge construction	USACE			1
	TMDL reviews	EPA		4	
	Conservation and recreation activities	USACE			4
		FWS			2
	Dredging and Clearing	USACE		4	
	Private landowner assistance	None	1		
3	Road and bridge construction	MS DOT		2	3
	TMDL review	EPA		4	
	Conservation and recreation activities	USACE			4
		FWS			4
	Dredging and Clearing	USACE		2	
	Private landowner assistance	None	1		
4	Road and bridge construction	MS DOT			4
	TMDL review	EPA		4	
	Conservation and recreation activities	USACE		1	4
		FWS			3
	Dredging and Clearing	USACE		2	1
5	Conservation and recreation activities	USACE			2
		FWS			1
6	Conservation and recreation activities	USACE			4
		FWS			1
7	Conservation and recreation activities	USACE			4
		FWS			1
	Dredging and Clearing	USACE			1
8	Conservation and recreation activities	USACE			2
		FWS			1

Exhibit 3-1

**CONSULTATION AND TECHNICAL ASSISTANCE EFFORTS ANTICIPATED
WITHIN THE PROPOSED CRITICAL HABITAT FOR THE MUSSELS (TEN YEARS)**

Unit	Anticipated Activity	Federal Nexus	Technical Assistance	Formal Consults	Informal Consults
9	Conservation and recreation activities	USACE			2
		FWS			1
10	Activities in Bankhead National Forest	USFS		1	18
	Conservation and recreation activities	USACE			2
		FWS			1
11	Coal Mining	BLM			1
		None	2		
	Conservation and recreation activities	USACE			2
		FWS			1
12	Water Supply Dam	USACE		1	
	Utilities Construction/Maintenance	USACE		1	
	TMDL review	EPA		2	
	Conservation and recreation activities	USACE			2
		FWS			1
	Dredging and Clearing	USACE			1
	Coal Mining	None	6		
13	Utilities construction/maintenance	USACE		1	2
	TMDL review	EPA		2	
	Conservation and recreation activities	USACE			2
		FWS			2
	Coal Mining	None	4		
14	Road and bridge construction	USACE			1
	Utilities construction/maintenance	USACE			1
	Conservation and recreation activities	USACE			4
		FWS			1
	Dredging and Clearing	USACE		4	2
15	Conservation and recreation activities	USACE			4
		FWS			2

Exhibit 3-1

**CONSULTATION AND TECHNICAL ASSISTANCE EFFORTS ANTICIPATED
WITHIN THE PROPOSED CRITICAL HABITAT FOR THE MUSSELS (TEN YEARS)**

Unit	Anticipated Activity	Federal Nexus	Technical Assistance	Formal Consults	Informal Consults
16	Road and bridge construction	GA DOT			20-30
	Water supply dam	USACE		1	
	Utilities construction/maintenance	TVA			1
	Agriculture and ranching activities	NRCS			2
		FSA			1
	TMDL review	EPA		1	
	Conservation and recreation activities	USACE			2
		FWS			4-6
Private landowner assistance	None	30-40			
17	Tuskegee National Forest activities	USFS		1	6
	Water Quality Activities	USACE			1
	Conservation and recreation activities	USACE			2
		FWS			1
18	Hydropower dam relicensing	FERC		1	
	Utilities construction/maintenance	USACE			4
	Conservation and recreation activities	USACE			2
		FWS			1
19	Conservation and recreation activities	USACE			2
		FWS			1
20	Utilities construction/maintenance	USACE			1
	Conservation and recreation activities	USACE			2
		FWS			1
21	Conservation and recreation activities	USACE			2
		FWS			1
22	Conservation and recreation activities	USACE			2
		FWS			1
23	Conservation and recreation activities	USACE			2
		FWS			1
	Dredging and Clearing	USACE			1
24	Conservation and recreation activities	USACE			2
		FWS			1

Exhibit 3-1

**CONSULTATION AND TECHNICAL ASSISTANCE EFFORTS ANTICIPATED
WITHIN THE PROPOSED CRITICAL HABITAT FOR THE MUSSELS (TEN YEARS)**

Unit	Anticipated Activity	Federal Nexus	Technical Assistance	Formal Consults	Informal Consults
25	Road and bridge construction	GA DOT			10
		TN DOT			4
		USACE		1	1
	Hydropower	USACE		1	
		FERC			1
	Utility construction	TVA			1
	Chattahoochee National Forest activities	USFS	20		13
	Cherokee National Forest activities	USFS	20		5
	Agriculture and ranching activities	NRCS		1	21
		FSA			1
USACE			4	4	
	Conservation and recreation activities	USACE			2
		FWS			30-35
	Private landowner assistance	None	30-40		
26	Hydropower dam relicensing	FERC		1	
	Conservation and recreation activities	USACE			2
		FWS			1
Units 18 19, 20, 22	Talladega National Forest activities	USFS		2	21
AL Units	Road and bridge construction	AL DOT		10	90
	Agriculture and ranching activities	NRCS		1	6-9
	Review of statewide 303(d) lists and water quality standards	EPA			4-7
	Review of NPDES permits	EPA	320		
	Private landowner assistance	None	120		
MS Units	Review of statewide 303(d) lists and water quality standards	EPA			4-7
	Fish stocking activities	FWS			10
	Review of NPDES permits	EPA	20		
	Power Company certifications	None	6		
GA Units	Review of statewide 303(d) lists and water quality standards	EPA			4-7
	Review of NPDES permits	EPA	60-120		

Exhibit 3-1

**CONSULTATION AND TECHNICAL ASSISTANCE EFFORTS ANTICIPATED
WITHIN THE PROPOSED CRITICAL HABITAT FOR THE MUSSELS (TEN YEARS)**

Unit	Anticipated Activity	Federal Nexus	Technical Assistance	Formal Consults	Informal Consults
TN Units	Review of statewide 303(d) lists and water quality standards	EPA			4-7
Multiple Units	EPA Special Appropriation Projects	EPA		3	
TOTAL EFFORTS			641-721	73	539-631

160. Section 3 of this analysis described the variety of activities likely to take place within the boundaries of this proposed designation that will require technical assistance or consultation with the Service, and then provides an overview of the frequency of consultations regarding these activities. This section of the analysis details the specific impact species listing and designation of critical habitat for the mussels is anticipated to have on these activities, including project modifications that may result from consultation.

161. First, this section quantifies the costs of the anticipated consultations, associated project modifications, and technical assistance by activity. Importantly, these estimates include all section 7-related consultations and technical assistance efforts associated with the proposed critical habitat area. As such, this analysis does not distinguish impacts that may be attributable co-extensively to the listing of the mussels from those impacts attributable solely to the designation. This section also provides a detailed description of each anticipated consultation and technical assistance effort by activity. Exhibit 4-4 summarizes the resulting total costs associated with section 7 activity by activity in the geographic area proposed for critical habitat designation for the mussels. Further detailed costs of each activity according to unit and activity are provided in Appendix C. Exhibit 4-6 highlights the major assumptions made throughout this analysis, and offers information on the potential direction of cost bias generated by these assumptions.

4.1 Estimated Total Costs of Section 7

162. This section quantifies low and high end cost estimates of the total technical assistance efforts, informal and formal consultations, and project modifications based on the section 7 efforts characterized in Sections 4.2 and 4.3 of this analysis. Estimates of the costs of individual consultations were developed from a review and analysis of historical section 7 files from a number of Service field offices around the country. These files addressed consultations conducted for both listings and critical habitat designations. The resulting estimates are based on an average level of effort for consultations of low, medium, or high complexity, multiplied by the appropriate labor rates for staff from the Service and other Federal agencies.

163. Estimates take into consideration the level of effort of the Service, the Action agency, and the applicant during both formal and informal consultations, as well as the varying complexity of consultations. Informal consultations are assumed to involve a low to medium level of complexity. Formal consultations are assumed to involve a medium to high level of complexity. Costs associated with these consultations include the administrative costs associated with conducting the consultation, such as the cost of time spent in meetings, preparing letters, and the development of a biological opinion.
164. Per-effort costs associated with formal consultations, informal consultations, and technical assistance efforts are presented in Exhibit 4-1.¹⁰⁹ The low and the high scenarios represent a range of costs for each type of interaction. The Action agency or the third party may bear the costs of a Biological Assessment (BA), depending on the specifics of the consultation. For consultations with the USACE, administrative costs of the BA are assumed to be borne by that agency. This exhibit is used to develop total administrative costs for consultations associated with activities within proposed critical habitat for the mussels.¹¹⁰

¹⁰⁹ In their comment letter dated October 13, 2003 authored by Balch and Bingham, LLP, the Alabama-Tombigbee Rivers Coalition state that the assumption that consultation will continue into the future at the same rate and costs as in the past leads to an understatement of potential economic impact. This letter notes that in the next ten years, governmental employees will receive raises, costs of dredging and electric power will increase, etc., and calls for employment of appropriate forecasting methods. This analysis does not assume that future consultations will occur at the same rate as in the past. The estimated future consultations are based on conversations with action agencies and third parties and reflect, where appropriate, trends in consultation rates. As a result, the analysis forecasts a much greater rate of consultation in the future than has occurred historically. This may be due in part to economic growth and expansion, and in part due to education on the specific locations of the species, and on activities that require consultation. This analysis does assume that future costs of section 7 consultations will be similar on a real basis to those occurring in the past. In addition, appropriate standard discount rates are applied that account for the rate of time preference in determining the present value of total costs.

¹¹⁰ A comment letter from Mac R. Holmes, Professor of Economics and Business, Troy State University, states that it is unclear how “average costs” of consultations (administrative costs) were determined and whether these averages are truly representative. Professor Holmes further states that by using average costs, the draft economic analysis ignores that in some geographic areas costs may be much higher than in others. The Economic Analysis employs a consultation cost analysis to estimate the likely range of administrative costs of informal and formal consultations, and technical assistance efforts associated with the designation of critical habitat. This cost model is based on anticipated administrative effort at a number of USFWS Field Offices across the country, including those Field Offices relevant to this designation. The administrative effort is typically defined in number of hours spent, and then translated into cost applying the appropriate average government salary rates. Further, administrative costs to action agencies are estimated based on a similar survey of agencies across the country. In interviewing the agencies relevant to this analysis, the representatives were asked if the estimated administrative costs seemed reasonable. In the case that the agency anticipated a different range of costs for their particular activities within the proposed designation, that cost range was applied to the relevant consultations.

Exhibit 4-1						
ESTIMATED ADMINISTRATIVE COSTS OF CONSULTATION AND TECHNICAL ASSISTANCE EFFORTS FOR THE MUSSELS (per effort)						
Critical Habitat Impact	Scenario	Service	Action Agency	Third Party ^a	Biological Assessment ^c	
Technical Assistance Effort	<i>Low</i>	\$50	N/A	\$600	\$0	
	<i>High</i>	\$50	N/A	\$1,500	\$0	
Informal Consultation ^b	<i>Low</i>	\$400	\$1,600	\$1,200	\$0	
	<i>High</i>	\$3,100	\$4,600	\$2,900	\$4,000	
Formal Consultation ^d	<i>Low</i>	\$3,100	\$4,500	\$2,900	\$4,000	
	<i>High</i>	\$6,100	\$9,400	\$4,100	\$5,600	
Sources: IEC analysis based on data from the Federal Government General Schedule Rates, Office of Personnel Management, 2002, a review of consultation records from several Service field offices across the country, and communications with Biologists in the Daphne, AL FWS Field Office and the Mobile District USACE.						
Notes:						
Low and high estimates primarily reflect variations in staff wages and time involvement by staff reported in 2002 dollars. The high-end estimate for informal consultations, and all formal consultation estimates, include the cost of a Biological Assessment.						
^a Third parties may be State agencies.						
^b Internal consultations are approximately the same cost as informal consultations, unless indicated otherwise. For internal consultations, the Service bears the costs normally borne by both the Service and the Action Agency.						
^c A third party is assumed to bear the cost of a Biological Assessment. When no third party is involved, the Action Agency bears the cost, and the bearing of this cost varies from agency to agency.						
^d The formal consultation regarding flow regime changes at Carter's Reregulation Dam on the Coosa River in Unit 25 are anticipated to result in administrative costs to the USACE of \$100,000. This is due to the controversy surrounding appropriate flow rates and implementing the requirements for public involvement in revising the water control plan.						

165. Exhibit 4-2 summarizes the administrative costs of the consultations and technical assistance efforts involving the proposed critical habitat designation for the mussels. The administrative cost estimates in Exhibit 4-2 were calculated by multiplying the number of expected consultations or technical assistance calls (Exhibit 3-1) by the per effort cost of these actions (Exhibit 4-1). Based on this analysis, the estimated total section 7 administrative costs for the mussels range from \$3.28 million to \$12.3 million. The high end estimate of administrative costs represents approximately 4.1 percent of the total section 7 costs associated with proposed critical habitat for the mussels. Approximately 57 percent of total section 7 costs will be borne by State and local governmental agencies. Of the remaining costs, approximately 36 percent will be borne by private parties, one percent will be borne by the Service, and six percent by other Federal agencies.

Exhibit 4-2

**ESTIMATED ADMINISTRATIVE CONSULTATION AND TECHNICAL ASSISTANCE COSTS
ASSOCIATED WITH CRITICAL HABITAT FOR THE MUSSELS (Nominal Costs)**

Action	Range	Costs to the Service	Costs to Action Agencies	Costs to Third Parties	Total Costs
Technical Assistance	<i>Low</i>	\$32,100	\$24,000	\$361,000	\$417,000
	<i>High</i>	\$36,100	\$60,000	\$1,022,000	\$1,120,000
Informal Consultation	<i>Low</i>	\$316,000	\$823,000	\$571,000	\$1,710,000
	<i>High</i>	\$2,280,000	\$4,110,000	\$2,840,000	\$9,230,000
Formal Consultation	<i>Low</i>	\$226,000	\$568,000	\$360,000	\$1,150,000
	<i>High</i>	\$445,000	\$1,000,000	\$507,000	\$1,710,000
Total	<i>Low</i>	\$574,000	\$1,420,000	\$1,290,000	\$3,280,000
	<i>High</i>	\$2,770,000	\$5,170,000	\$4,360,000	\$12,300,000

Sources: IEc analysis based on data from the Federal Government General Schedule Rates, Office of Personnel Management, 2002, a review of consultation records from several Service field offices across the country, and communications with Biologists in the Daphne, AL FWS Field Office.

Notes: Third parties are defined as State agencies, local municipalities, and private parties. Estimates are reported in 2003 dollars. Estimates are rounded to three significant digits and may not sum due to rounding.

Costs of lost power generation are assumed to be incurred annually over 30 years. Costs associated with relocation of the Locust Fork Reservoir in Unit 12 are assumed to be spread over 25 years. All remaining consultations costs are assumed to be evenly spread across the ten years.

166. Exhibit 4-3 presents estimates of per effort and total project modification costs associated with activities affecting proposed critical habitat for the mussels. The cost estimates were calculated by multiplying the number of anticipated consultations likely to require modification as detailed in Section 4.2 of this analysis by the per effort cost of these actions. Based on this analysis, the range in cost of modifications for projects affecting the mussels is estimated to be approximately \$38.3 million to \$289 million on a nominal dollar basis. The large range in costs results from the uncertainty surrounding whether section 7 considerations for the mussels represent the precipitating factor concerning the alternative location of a potential reservoir at Locust Fork. As discussed in Section 4.2.3 of this analysis, many factors may influence the construction decision.¹¹¹ Approximately 53 percent of the project modification costs are related to the opportunity cost of using an alternative site rather than Locust Fork. Another 37 percent of the project modification costs are the costs of lost power generation and decreased dependable capacity associated with changes in operations at hydropower dams. That is, 90 percent of the total project modification costs are associated with three consultations, the Locust Fork Water Supply Reservoir project (Unit

¹¹¹ As noted previously, the reason for relocation of this dam is uncertain due to a variety of factors, including potential mussel concerns. As such, this upper bound estimate may significantly overstate the impacts of critical habitat designation as described in Section 4.2.3 of this analysis.

12), the Weiss Dam Relicensing consultation (Unit 18), and the Carters Reregulation Dam consultation regarding flow changes (Unit 25).

Exhibit 4-3

ESTIMATED COSTS ASSOCIATED WITH ANTICIPATED PROJECT MODIFICATIONS

Affected Activity (Action agency)	Possible Project Modifications	Nominal Per Effort Cost (\$)	No. of Consults	Total Nominal Cost (\$)
Road and bridge construction (AL DOT)	<ul style="list-style-type: none"> • Project timing restrictions • Restricting construction of in-stream infrastructure • Survey for species • Relocating species 	\$113,000 - \$409,000	10	\$1,130,000 - \$4,090,000
Road and bridge construction (GA DOT)	<ul style="list-style-type: none"> • Restricting construction of in-stream infrastructure • Avoiding in-stream work 	\$300,000	10	\$3,000,000
Road and bridge construction (TN DOT)	<ul style="list-style-type: none"> • Relocating species 	\$1,800 - \$15,000	4	\$7,200 - \$60,000
Road and Bridge Construction (USACE)	<ul style="list-style-type: none"> • Implementing BMPs • Pre-construction surveys • Mussel relocation • Habitat restoration 	\$21,800 - \$245,000	2	\$43,600 - \$490,000
Road and bridge construction (USACE)	<ul style="list-style-type: none"> • Increased sedimentation measures 	\$100	1	\$100
Road and bridge construction (USACE)	<ul style="list-style-type: none"> • Construction of coffer dam 	\$10,000	1	\$10,000
Hydropower operations at Weiss Dam (USACE)	<ul style="list-style-type: none"> • Establishing minimum flows (annual cost over 30 years) 	\$8,280,000 - \$85,200,000 ¹	1	\$8,280,000 - \$85,200,000 ¹
Hydropower operations at Carters Reregulation Dam	<ul style="list-style-type: none"> • Establishing minimum flows (annual cost over 30 years) • NEPA documentation and public involvement for changes to water control plan 	\$23,700,000	1	\$23,700,000
Water Supply Dams (USACE)	<ul style="list-style-type: none"> • Dam Relocation 	\$0 - \$154,000,000	1	\$0 - \$154,000,000
Utilities construction/maintenance (USACE)	<ul style="list-style-type: none"> • Implementing BMPs • Pre-construction surveys • Mussel relocation • Habitat restoration 	\$21,800 - \$245,000	12	\$262,000 - \$2,940,000
Utilities construction/maintenance (USACE)	<ul style="list-style-type: none"> • Bridging large pipelines across river to avoid habitat 	\$600,000 - \$800,000	2	\$1,200,000 - \$1,600,000
Agriculture and Ranching (NRCS)	<ul style="list-style-type: none"> • Restrict in-stream construction 	\$4,460	1	\$4,460
Agriculture and Ranching (USACE)	<ul style="list-style-type: none"> • Increased sedimentation measures 	\$100	4	\$400

Exhibit 4-3

ESTIMATED COSTS ASSOCIATED WITH ANTICIPATED PROJECT MODIFICATIONS

Affected Activity (Action agency)	Possible Project Modifications	Nominal Per Effort Cost (\$)	No. of Consults	Total Nominal Cost (\$)
Agriculture and Ranching (USACE)	<ul style="list-style-type: none"> Species surveying Increased sedimentations measures 	\$10,000	4	\$40,000
Water Quality Activities (USACE)	<ul style="list-style-type: none"> Implementing BMPs Pre-construction surveys Mussel relocation Habitat restoration 	\$21,800 - \$245,000	1	\$21,800 - \$245,000
EPA Special Appropriation Projects (SPAPs) (EPA)	<ul style="list-style-type: none"> Species surveying Project redesign 	\$35,000 - \$50,000	3	\$105,000 - \$150,000
Conservation and Recreation (USACE)	<ul style="list-style-type: none"> Implementing BMPs Pre-construction surveys Mussel relocation Habitat restoration 	\$21,800 - \$245,000	1	\$21,800 - \$245,000
Dredging and maintenance of waterways (USACE)	<ul style="list-style-type: none"> Implementing BMPs Pre-construction surveys Mussel relocation Habitat restoration 	\$21,800 - \$245,000	19	\$414,000 - \$4,660,000
Dredging (USACE)	<ul style="list-style-type: none"> Implementing BMPs Pre-construction surveys Mussel relocation Habitat restoration Acquiring and operating upland disposal sites 	\$21,800 - \$8,250,000 ³	1	\$21,800 - \$8,250,000
Coal Mining (BLM)	<ul style="list-style-type: none"> Species Surveys Water quality assessment 	\$9,000	1	\$9,000
TOTAL PROJECT MODIFICATION COSTS				\$38,300,000 - \$289,000,000
<p>Note: Estimates are reported to three significant digits and may not sum due to rounding. Costs of lost power generation are assumed to be incurred annually over 30 years. Costs associated with relocation of the Locust Fork Reservoir in Unit 12 are assumed to be spread over 25 years. All remaining consultations costs are assumed to be evenly spread across the ten years.</p> <p>¹ The costs associated with annual losses in power production at Weiss Dam are based on a recommended flow regime of 200 to 2,000 cfs.</p> <p>² The project modification cost for the Locust Fork Reservoir assumes that section 7 consultation for the mussels will be the trigger for alternative location of the proposed reservoir.</p> <p>³ The high end cost estimate for project modifications to dredging activities includes an \$8 million cost of purchasing upland disposal sites for dredge material as estimated by the USACE. The Service has stated that it does not intend to recommend upland disposal of dredge material.</p> <p>The broad range in costs stems from the inclusion at the high end, of the costs associated with using an alternative site to the potential Locust Fork Reservoir in Unit 12 of the proposed designation. The opportunity costs of the alternative site may be up to \$154 million in nominal terms. Section 7 consideration for the mussels represent one of many factors in the decision of whether to relocate the reservoir. It is unclear which of these factors may serve as the precipitating reason for the relocation of the reservoir.</p>				

167. Based on this analysis, the nominal value of total section 7 costs associated with the proposed critical habitat designation for the mussels (i.e., administrative costs as quantified in Exhibit 4-2 plus project modification costs as quantified in Exhibit 4-3) are likely to range from \$41.6 million to \$301 million.¹¹² Exhibit 4-4 describes the contribution of the various land use activities to this total. More detailed unit and activity-specific cost estimates are presented in Appendix C of this analysis.

¹¹² The broad range in costs stems from the inclusion at the high end, of the costs associated with relocating Locust Fork Reservoir from Unit 12 of the proposed designation. The relocation costs may be up to \$154 million in nominal terms. Section 7 consideration for the mussels represent one of many factors in the decision of whether to relocate the reservoir. It is unclear which of these factors may serve as the precipitating reason for the relocation of the reservoir.

Exhibit 4-4

ESTIMATED TOTAL ECONOMIC COSTS OF ASSOCIATED ACTIVITIES

Activity	No. of Consultations		Nominal Costs (thousands)				Approximate % of Total Cost
	Informal	Formal	Informal Consultation	Formal Consultation	Project Modifications	Total Costs	
Road and bridge construction/maintenance	141 - 151	17	\$411 - \$2,100	\$238 - \$388	\$4,190 - \$7,650	\$4,800 - \$10,100	3
Hydropower facilities	1	3	\$2.9 - \$13.9	\$134 - \$155	\$32,000 - \$109,000	\$32,200 - \$109,000	36
Water supply dams	0	2	\$0	\$31.2 - \$61.6	\$0 - \$154,000	\$31.2 - \$154,000	51
Utilities construction/maintenance	10	6	\$34.6 - \$153	\$93.6 - \$185	\$1,460 - \$4,540	\$1,590 - \$4,880	2
Forest Service activities	63	4	\$183 - \$876	\$55.6 - \$89.2	\$0	\$238 - \$965	> 1
Agriculture and ranching	35 - 38	6	\$104 - \$535	\$90.2 - \$168	\$44.9	\$239 - \$748	> 1
Water Quality	17 - 29	20	\$50 - \$405	\$278 - \$446	\$127 - \$395	\$455 - \$1,250	> 1
Conservation and Recreation	145 - 152	1	\$468 - \$2,228	\$15.6 - \$30.8	\$21.8 - \$245	\$506 - \$2,500	> 1
Dredging and Clearing	126 - 186	14	\$454 - \$2,900	\$218 - \$431	\$436 - \$12,900	\$1,110 - \$16,200	5
Coal Mining	1	0	\$2.9 - \$13.9	\$0	\$9	\$11.9 - \$22.9	> 1
Technical Assistance						\$417 - \$1,120	> 1
TOTAL	539 - 631	73	\$1,710 - \$9,230	\$1,150 - \$1,950	\$38,300 - \$289,000	\$41,600 - \$301,000	100

Note: Numbers may not sum due to rounding. Percentages are calculated based on high-end estimate of cost range. Technical assistance efforts include private landowner assistance and interactions with non-Federal entities regarding designation of critical habitat, for example, Service review of state-issued NPDES permits. Costs of lost power generation are assumed to be incurred annually over 30 years. Costs associated with relocation of the Locust Fork Reservoir in Unit 12 are assumed to be spread over 25 years. All remaining consultations costs are assumed to be evenly spread across the ten years. The broad range in costs stems from the inclusion at the high end, of the costs associated with relocating Locust Fork Reservoir from Unit 12 of the proposed designation. The relocation costs may be up to \$154 million in nominal terms. Section 7 consideration for the mussels represent one of many factors in the decision of whether to relocate the reservoir. It is unclear which of these factors may serve as the precipitating reason for the relocation of the reservoir. Source: Based on past consultation records and conversations with Federal agencies and other parties potentially affected by the proposed critical habitat designation.

168. Exhibit 4-5 provides an overview of the present value of total section 7 costs associated with the listing and designation of critical habitat for the mussels over a ten year period. To discount and annualize costs, guidance provided by the Office of Management and Budget (OMB) specifies the use of a real rate of seven percent. In addition, OMB recommends sensitivity analysis using other discount rates. One commonly applied rate is three percent, which some economists believe better reflects the social rate of time preference.¹¹³ This analysis presents results using both of these rates.

Exhibit 4-5	
SECTION 7 AND TECHNICAL ASSISTANCE COSTS ASSOCIATED WITH THE LISTING AND DESIGNATION OF CRITICAL HABITAT FOR THE MUSSELS	
	Total Estimated Section 7 Costs
Nominal value of total section 7 costs	\$41.6 million to \$301 million
Present Value (7% discount rate)	\$19.9 million to \$143 million
Annualized Costs (ten years)*	\$2 million to \$13.6 million
Present Value (3% discount rate)	\$29.1 million to \$211 million
Annualized Costs (ten years)*	\$2 million to \$13.6 million

Notes: Estimates are rounded to three significant digits. Costs may not add up due to rounding. These estimates include all section 7 costs, including both those associated with the species listing and designation of critical habitat for the mussels. Consultations costs known to occur in specific years are discounted accordingly. The broad range in costs stems from the inclusion, at the high end, of the incremental costs associated with identifying and constructing at an alternative site a water supply reservoir that is currently proposed to be constructed at Locust Fork Reservoir in Unit 12. The relocation costs may be up to \$154 million in nominal terms. Section 7 consideration for the mussels represent one of many factors in the decision of whether to relocate the reservoir. It is unclear which of these factors may serve as the precipitating reason for the relocation of the reservoir.

Costs of lost power generation are assumed to be incurred annually over 30 years. Costs associated with alternative siting of the proposed Locust Fork Reservoir in Unit 12 are assumed to be spread over 25 years. All remaining consultations costs are assumed to be evenly spread across the ten years.

*The annualized costs represent the estimated average annual cost anticipated over the first ten years. It is possible that these annual costs may be incurred over the first 30 years.

169. Approximately 57 percent of total section 7-related costs will be borne by local and State government agencies. Further, 36 percent will be borne by the private entities, one percent by the Service, and six percent by other Federal agencies. The driving factor in this expected allocation of costs is the fact that third parties (such as State and local government

¹¹³ U.S. Office of Management and Budget, "Guidelines to Standardize Measures of Costs and Benefits and the Format of Accounting Statements," *Appendix 4: Report to Congress on the Costs and Benefits of Federal Regulations*, March 22, 2000.

agencies) are most likely to bear the cost of project modifications, which constitute about 96 percent of the total section 7 costs. The estimated cost of the potential relocation of the Locust Fork reservoir from Unit 12, which may cost up to \$154 million, is anticipated to be born by the local water board, the Birmingham Water Works Board. Private parties, power consumers, are anticipated to bear the annual cost of lost power generation from changes in hydropower operations. In only four instances are project modification costs expected to be absorbed by the Action agency as opposed to the third party: 1) for USACE habitat restoration projects and maintenance of tributaries; 2) for USACE dredging of the Federal navigation channel and small boat access channels on the Alabama River; 3) for implementation of NEPA documentation and public involvement associated with flow negotiations at Carter's Reregulation Dam; and 4) for EPA SPAP projects.

170. Exhibit 4-6 presents the key assumptions of this economic analysis, as well as the potential direction of bias introduced by the assumption.¹¹⁴

¹¹⁴ A comment letter authored by Balch and Bingham LLP, on behalf of the Alabama-Tombigbee Rivers Coalition, October 13, 2003, states, "FWS readily admits in the economic analysis that its estimates are mere guesses. Specifically, the economic analysis lists 'caveats' concerning Units 18, 25, and 11 which could readily and substantially affect the cost estimates." The letter further states that the solicitation of specific information during the public comment period further belies uncertainty in the analysis. The draft version of this analysis as published constituted a draft version of the Final Economic Analysis, which is based on the best information identified and made available to the Service. As such, solicitation of additional information ensures that the Final Analysis incorporates the best available information, including any improvements to the previously identified data, regarding economic impacts of the designation.

Exhibit 4-6	
CAVEATS TO THE ECONOMIC ANALYSIS	
Key Assumption	Effect on Cost Estimate
Historic administrative consultation costs and specific project modifications are good predictors of future consultation costs.	+/-
The causative factor for the using an alternative location for the water supply reservoir currently proposed to be located on Locust Fork in Unit 12 is section 7 consultation regarding the mussels.	+
The high end estimate of minimum flows that may be recommended for Weiss Dam is 2000 cfs (negotiations are ongoing). While the USACE considers the 2000 cfs to be a potential recommendation, the Service anticipates that this level of flow may be too great at this location for the mussels. Further, the tristate ACT water compact calls for interstate water resource planning in Alabama, Georgia, and Florida, including at Weiss Dam. While a final allocation formula has yet to be determined, current proposals address water quality, biodiversity, adequate instream flow regimes, monitoring programs, and water conservation. As flow requirements according to the ACT Compact are not yet established, this analysis includes the impact of increasing the current minimum flow levels at Weiss Dam to adequately provide for the mussels.	+
This analysis extrapolates lost power generation and dependable capacity costs at Weiss Dam and Carters Dam over 30 years. This forecast horizon is due to the standard FERC relicensing schedules for hydropower projects of 30 to 50 years. This may overstate the real annual impacts, however, as is it likely that changes to rate structures will be brought about through broader market adjustments in the long term.	+
The USACE dredging of the Federal navigation channel on the Alabama River in Unit 14 will require purchase of upland disposal sites for dredge material.	+
Action agency Best Management Practices are baseline protections that are practiced consistently and as such, do not introduce additional costs to section 7 consultations.	-
- : This assumption may result in an underestimate of real costs. + : This assumption may result in an overestimate of real costs. +/- : This assumption has an unknown effect on estimates.	

4.2 Section 7 Activity Details Within Proposed Critical Habitat

171. This section provides context to the results presented in Section 4.1. Each land use activity is discussed with reference to: the particular baseline protections that commonly benefit the mussels in carrying out these activities; the number and specifics of each anticipated consultation effort; and the project modification types and costs that may result from each consultation.

4.2.1 Road/Bridge Construction and Maintenance

Baseline

172. In addition to CWA regulations and FHWA best management practices (BMPs) for erosion and sediment control, road and bridge projects are bound by various State regulations that may provide baseline protections to the mussels.¹¹⁵
173. The best management practices (BMPs) applied to Alabama Department of Transportation (ALDOT) projects are based on those outlined by the Alabama Department of Environmental Management (ADEM), and the Alabama Forestry Commission.¹¹⁶ Relevant practices that provide baseline protections to the mussels include:
- Implementation of streamside management zones of at least 35 feet (11 meters) from the streambank;
 - Revegetation and restoration of impacted area to minimize erosion; and
 - Avoiding discharge into areas of concentrated shellfish production.¹¹⁷
174. The Georgia Department of Transportation (GDOT) tailors “Special Conditions” for each road and bridge project to ensure that it adequately provides for potential environmental impacts, including threatened and endangered species. Examples of such conditions include erosion control measures, limitations on in stream equipment, and frequent monitoring of water quality.¹¹⁸
175. Prior to construction, the Mississippi Department of Transportation (MDOT) typically works closely with the Service in implementing best management practices including sediment control, installation of stormwater diversion structures to keep runoff

¹¹⁵ Federal Highway Administration. 1995. *Best Management Practices for Erosion and Sediment Control - Final Report October 1988- June 1995*. Federal Highway Administration, Washington, D.C. Eastern Federal Lands Highway Design. FHWA/FLP-94/005.

¹¹⁶ Personal communication with John Shill, Alabama DOT, February 21, 2003.

¹¹⁷Alabama Forestry Commission, *Alabama’s Best Management Practice’s for Forestry*, 1999; and Alabama Soil and Water Conservation Committee, *Alabama Handbook For Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas*, July 2002.

¹¹⁸ State of Georgia Department of Transportation, *Special Provision: Section 107.23 Environmental Considerations*, August 5, 2002.

from entering stream channels, and shifting locations of proposed bridges to avoid impact on aquatic species.¹¹⁹

176. The Tennessee Department of Transportation (TDOT) is currently drafting BMPs that will consider environmental impacts, including endangered species and habitat concerns. In the past, TDOT has worked with the Service to tailor special conditions to each project, including sediment and erosion control.¹²⁰

Future Consultations

177. ALDOT anticipates engaging in approximately 100 section 7 consultations with the Service over the next ten years on bridge construction, replacement, and maintenance projects. **Ninety informal consultations** are estimated for road or bridge maintenance, and **ten formal consultations** regarding road or bridge construction and replacement.¹²¹ These consultation costs are applied broadly to all Alabama units within the designation as ALDOT is unable to determine in which stream segments the consultations may occur.¹²²
178. GDOT anticipates participating in approximately **30 to 40 informal consultations** regarding bridge construction and maintenance along the Conasauga and Tallapoosa Rivers within or adjacent to mussel habitat over the next ten years. These consultations may stem from bridge maintenance such as the widening of existing structures. All future consultations are expected to remain informal due to the current level of protection afforded to the mussels by clean water regulations and the presence of other listed species (i.e. the Conasauga logperch and amber darter). Ten of the 40 consultations are likely to occur in proposed critical habitat Unit 25 along the Conasauga River, and the remaining 20 to 30 consultations are expected to occur in Unit 16 along the Tallapoosa River.¹²³
179. The Mississippi Department of Transportation (MDOT) anticipates approximately **14 informal and six formal section 7 consultations** in consideration of road and bridge construction and maintenance along the East Fork Tombigbee River, Bull Mountain Creek, Buttahatchee River, and Luxapalila Creek over the next ten years. As no past consultations have occurred with MDOT in past years, the increased rate in expected consultation activity may be attributable to increased awareness of the species or their habitat boundaries brought

¹¹⁹ Written communication with Cecil Vick, Mississippi Department of Transportation, February 14, 2003.

¹²⁰ Personal communication with Lilah Miller, Tennessee DOT, February 20, 2003; personal communication with Charles Bush, Tennessee DOT, February 27, 2003.

¹²¹ Personal communication with John Shill, Alabama DOT, February 21, 2003.

¹²² Personal communication with John Shill, Alabama DOT, March 7, 2003.

¹²³ Personal communication with Susan Knudson, Georgia DOT, January 23, 2003.

about by designation of critical habitat. The majority of these consultations are anticipated to remain informal due to the current level of protection afforded to the mussels because of the presence of other listed aquatic species as well as MDOT's implementation of BMPs. A major project that will likely result in a formal consultation is the bridging of Bull Mountain Creek in proposed critical habitat Unit 2.¹²⁴

180. As a relatively small portion of the critical habitat designation for the mussels lies within Tennessee, TDOT anticipates that no more than **four informal consultations** will take place in the Tennessee portion of Unit 25. These projects are expected to involve small bridge maintenance or road repair activities.¹²⁵
181. The Mobile District USACE foresees **two informal consultations** over the next ten years associated with issuance of 404 permits for the placement of abutment fill for bridge and road crossings.¹²⁶
182. Also in the Tennessee portion of Unit 25, the USACE anticipates engaging in **one informal consultation** regarding bridge maintenance and **one formal consultation** regarding bridge replacement activity over the next ten years.¹²⁷

Project Modifications

183. ALDOT informal consultations are not anticipated to result in project modifications due to the implementation of the aforementioned BMPs.¹²⁸ For the ten anticipated formal consultations for bridge construction activities, ALDOT anticipates that the Service will request the following project modifications.
- **Timing Restrictions.** ALDOT may be restricted from in-stream construction from April to October 1st. The ALDOT does not anticipate additional project costs associated with timing restrictions.
 - **Restriction on In-Stream Infrastructure.** ALDOT anticipates being restricted from constructing culverts because these projects are likely to

¹²⁴ Personal communication with Cecil Vick, Mississippi Department of Transportation, February 14, 2003.

¹²⁵ Personal communication with Charles Bush, Tennessee DOT, February 27, 2003.

¹²⁶ Written communication with Brian Peck and Davis Findley, USACE, Mobile District, April 17, 2003.

¹²⁷ Personal communication with William James, USACE, Nashville, TN District, January 24, 2003.

¹²⁸ ALDOT's best management practices are derived from both Alabama Forestry Commission Best Management Practices and ADEM construction measures, as seen in the *Alabama Handbook For Erosion Control, Sediment Control, and Stormwater Management on Construction Sites and Urban Areas*.

negatively impact the mussels and their habitat. The Service has stated that it is unlikely that culverts would be an issue in the streams proposed for critical habitat.¹²⁹ Bridge construction, however, may require that the bridge span the river and avoid in-stream pilings which may result in an incremental cost. This modification may cost \$100,000 per project.¹³⁰

- **Surveys.** The ALDOT anticipates conducting surveys for the presence of the mussels, typically ranging from \$3,000 to \$9,000 per project.
- **Relocating Mussels.** Costs associated with relocating mussels range from \$10,000 to \$300,000 depending on the size of the project and the amount of habitat affected.¹³¹

184. Accordingly, this analysis ascribes an additional cost of \$113,000 to \$409,000 to all ten formal consultations related ALDOT projects.

185. GDOT anticipates that the Service will request the following project modifications for road/bridge construction and maintenance projects to avoid/minimize impact on the mussels and their habitat.

- **Restriction on In-Stream Infrastructure.** Avoidance of in-stream infrastructure necessitates the construction of bridges that span streams, which may pose additional costs of up to \$300,000 per project. Approximately 25 percent, or ten, of the anticipated consultations are anticipated to require the avoidance of in-stream infrastructure.¹³²
- **Avoiding In-Stream Work.** GDOT anticipates being required to keep all equipment out of streams and on platforms during construction to avoid the entrance of waste into the stream channel. No additional significant costs are expected due to this project modification.

186. Accordingly, this analysis attributes an additional cost of \$300,000 per project for ten GDOT projects, three within proposed critical habitat Unit 25, and seven within Unit 16.

¹²⁹ Personal communication with U.S. Fish and Wildlife Service, Jackson, MS Field Office, Daphne, AL Field Office, and Region 4 Office, April 24, 2003.

¹³⁰ Personal communication with John Shill, Alabama Department of Transportation, February 18, 2003.

¹³¹ Cost information for road/bridge construction and maintenance projects was obtained through personal communication with John Shill, Alabama Department of Transportation, February 21, 2003.

¹³² Personal communication with Susan Knudson, Georgia DOT, January 23, 2003.

187. As MDOT has not consulted with the Service regarding the mussels in the past, it is unsure what types of project modifications may be recommended. Due to the communication with the Service regarding development and implementation of BMPs, however, MDOT does not anticipate there will be significant additional costs due to project modification recommendations on road and bridge projects within the mussel habitat.

188. TDOT is currently drafting a list of BMPs to apply to all projects that will be tailored to minimize impacts to any endangered species and habitat. Projects can usually be planned in the early stages to avoid species impacts. TDOT anticipates that it will need to relocate mussels on each of the four informal consultations.¹³³ This may result in an additional cost of \$1,800 to \$15,000 to each consultation.¹³⁴

189. The USACE in Alabama anticipates the following project modification recommendations associated with the two section 7 consultations regarding issuance of 404 permits.¹³⁵

- **Implementation of BMPs.** This is typically done on every project and is not expected to result in an incremental cost to the project.
- **Pre-construction species surveys.** Species surveys may add an additional cost of \$20,000 to \$30,000 depending on the scope of the project.¹³⁶
- **Mussel relocation.** Relocation of mussels for the project construction period may result in a cost of \$1,800 to \$15,000 to each project.
- **Habitat restoration.** Habitat protection, restoration, and enhancement projects may be conducted to help offset the impact to habitat associated with the project construction. The Service estimates that these modifications may cost from \$0 to \$200,000 per project.¹³⁷

¹³³ Personal communication with Charles Bush, Tennessee DOT, February 27, 2003.

¹³⁴ Mussel relocation may cost \$1800 to \$5000 per day, and take from one to three days. Personal communication with Third Rock Consultants, February 19, 2003. Personal communication with Charles Nicholson, John Jenkinson, and Peggy Shute, Meeting with the Tennessee Valley Authority, January 30, 2003.

¹³⁵ Written communication with Brian Peck and Davis Findley, USACE, Mobile District, April 17, 2003.

¹³⁶ Personal communication with Brian Peck, and Diane Findley, USACE, Mobile District, May 7, 2003.

¹³⁷ Based on information gathered regarding habitat restoration activities for the Appalachian elktoe. U.S. Fish and Wildlife Service and Industrial Economics, Inc. April 2002. *Draft Economic Analysis of Critical Habitat for the Appalachian Elktoe.*

190. Accordingly, this analysis ascribes a cost of \$21,800 to \$245,000 to project modifications regarding issuance of USACE 404 permit for road and bridge projects.
191. The USACE in Tennessee expects a broad range of potential modification costs regarding bridge maintenance activities. The informal consultation anticipated in proposed critical habitat Unit 25 is expected to bear additional project modification costs of approximately \$100 to ensure that correct sedimentation measures and restrictions on construction take place. The formal consultation regarding bridge replacement, however, may bear an additional cost of up to \$10,000 in the case that the recommendation is made to construct a coffer dam, a temporary watertight enclosure that is pumped dry in order to expose the bottom of a body of water and facilitate construction, in order to avoid deposition of waste into the stream.¹³⁸

4.2.2 Hydropower Facilities

Baseline

192. The operations of four hydropower dams may be impacted by the designation of critical habitat. These are Jordan Dam (Unit 26), Weiss Dam (Unit 18), Carters Dam (upstream of Unit 25), and Carters Reregulation Dam (Unit 25). Section 3.2.2 of this analysis details the current state of operations at each of these dams. Each hydropower dam within proposed critical habitat is subject to the requirements of the Federal Power Act, the Clean Water Act, and the Dam Safety Control Act. Pursuant to the Federal Power Act, relicensing projects will include proposing protection, mitigation, and enhancement measures that will give consideration to recreation, fisheries, wildlife, water quality, wetlands, cultural resources, as well as threatened and endangered species.¹³⁹ For the relicensing of both Weiss and Jordan Dams, APC intends to submit an environmental assessment under FERC's Alternative Licensing Procedure, thereby presenting any issues encountered, including an analysis of cumulative environmental affects of the projects in 2005.¹⁴⁰
193. The mussel critical habitat area adjacent to Jordan Dam also provides habitat for other endangered species, including the Tulotoma snail. As a result, the hydropower facility owners/operators have modified operations in the past in consideration of dam impacts on endangered species. The success of the Tulotoma snail in the area around Jordan Dam

¹³⁸ Personal communication with William James, USACE, Nashville, TN District, January 24, 2003.

¹³⁹ Personal communication with Edward Abrams, FERC, February 24, 2003.

¹⁴⁰ Letter from Manager, Alabama Power Company Hydro Licensing to Secretary, Federal Energy Regulatory Commission, September 21, 2000.

signals that the current operations at Jordan Dam may provide for favorable habitat conditions for the mussels in this area.¹⁴¹

194. The draft Alabama-Coosa-Tallapoosa (ACT) Allocation Formula Agreement between Alabama and Georgia stipulates that the Allatoona and Carters projects must operate in a manner necessary to provide a flow at the Coosa River near Rome, Georgia (Mayo's Bar) that equals or exceeds 1,500 cfs on a Weekly Average basis or 1,000 cfs on a Daily Average basis. Currently, the USACE operates under a minimum flow requirement of 240 cfs.¹⁴² Modeling and evaluation of this draft proposal, however, are ongoing. Once the States of Alabama and Georgia have agreed to an allocation formula for the ACT basin, however, the USACE may be required to conduct implementation studies and obtain congressional approval before altering reservoir operations.¹⁴³

Future Consultations

195. As FERC relicensing of both Jordan Dam and Weiss Dam will occur by 2007, **two formal section 7 consultations** are anticipated over the next ten years related to hydropower activities within proposed critical habitat for the mussels.
196. Operations at Carters Reregulation Dam on the Coosawattee are anticipated to incur **one informal and one formal section 7 consultation** over ten years. The proposed hydropower facility at the reregulation dam is licensed by FERC, and USACE oversees flows. This analysis anticipates that FERC will informally consult with the Service regarding the measures taken in order to comply with the State standards for dissolved oxygen.¹⁴⁴ Additionally, one formal consultation with USACE regarding flow requirements at Carters Reregulation Dam is anticipated.¹⁴⁵
197. The R. F. Henry Dam is not subject to FERC jurisdiction and relicensing as both the dam and hydropower generating facilities are federally operated by the USACE.¹⁴⁶ Further,

¹⁴¹ Personal communication with Fish and Wildlife Service, Daphne, AL Field Office, February 28, 2003.

¹⁴² State of Alabama and State of Georgia. ACT Allocation Formula Agreement: Draft. May 1, 2003.

¹⁴³ Comment letter from the U.S. Army Corps of Engineers, October 14, 2003.

¹⁴⁴ Personal communication with Alan Mitchnick, FERC, May 1, 2003 and Fish and Wildlife Service, Athens, GA Field Office, May 2, 2003.

¹⁴⁵ Comment letter from U.S. Army Corps of Engineers, Mobile District Coastal Environment Team, October 14, 2003.

¹⁴⁶ Federal Power Act, 1920.

the Service has not engaged in any section 7 activity regarding this dam in the past and does not foresee any issues with its operation that may result in section 7 activity in the future.¹⁴⁷

Project Modifications

198. APC has not proposed any changes in operation to either Jordan or Weiss Dam for the 2005 relicensing proposals.

Unit 26: Jordan Dam

199. The Service has stated that it does not anticipate recommending any changes to the operations strategy at Jordan Dam, as it currently provides favorable habitat conditions for the mussels.¹⁴⁸ Minimum flows were previously established in Jordan Dam for the protection and enhancement of the Coosa River fish populations. FERC anticipates that flow criteria at Jordan dam will be reevaluated during the relicensing process.¹⁴⁹ The Service asserts, however, that it is unlikely they will request additional minimum flows for the mussels as the area appears to provide exceptional habitat for the mussels under the current flow regime.¹⁵⁰ This analysis therefore does not estimate any project modification costs associated with the formal consultation for the relicensing of Jordan Dam.

Unit 18: Weiss Dam

200. Operations at Weiss Dam are currently being reviewed and the Service anticipates potential recommendations, particularly with regard to minimum flows, for the relicensing consultation. In past FERC hydro relicensing projects, the Service has recommended the following project modifications for freshwater mussels.¹⁵¹

- **Establishing Minimum Flows.** For the Weiss development, which currently does not operate under minimum flow criteria, the Service anticipates requesting increased flows through the dam's bypass channel to improve fish habitat, the recreational fishery, and habitat for listed mussels. Current monthly average flows at Weiss Dam are 50 cubic feet per second

¹⁴⁷ Personal communication with Fish and Wildlife Service, Daphne, AL Field Office, February 28, 2003.

¹⁴⁸ Personal communication with U.S. Fish and Wildlife Service, Daphne, AL Field Office, February 28, 2003, and March 5, 2003.

¹⁴⁹ Personal communication with Alan Mitchnick, FERC, March 3, 2003.

¹⁵⁰ Personal communication with U.S. Fish and Wildlife Service, Daphne, AL Field Office, February 28, 2003.

¹⁵¹ Personal communication with Alan Mitchnick, FERC, March 3, 2003.

(cfs). Further complicating the flow issues at Weiss Dam is the location of release. Two flow outlets exist at Weiss Dam, one through the powerhouse and one that lies midway across the reservoir and marks the historical stream channel. The latter outlet currently only allows leakage flows and is the outlet at which the Service would request increased flows. Methods for establishing minimum flows have not been determined but may be achieved by releasing water via the bypass channel's trash gate.¹⁵² The direct spill method means that this water would not be usable for power generation as it will not pass through the turbines. While no flow recommendation for Weiss Dam from the Service has been finalized, discussions concerning appropriate flow level are ongoing. Modification to flow regime at Weiss Dam is to be based on recreating historical stream flows.

- **Erosion and Sediment Control Measures.** Alabama Power Company will likely need to implement erosion and sediment controls to aid in protection of the mussels.

201. The Service notes that water allocation issues are currently being negotiated in this region regardless of the presence of the mussels or critical habitat.¹⁵³ Congressionally authorized in 1997, the tristate water compact calls for interstate water resource planning in Alabama, Georgia, and Florida, including at Weiss Dam. Within Georgia and Alabama, the Compact extends to all waters arising within the drainage basin of the Alabama, Coosa, and Tallapoosa Rivers and their respective tributaries. The ACT Basin Commission, an interstate administrative agency, was created to establish an allocation formula for apportioning the surface waters of the ACT basin among Alabama and Georgia. Objectives include minimizing adverse impacts of floods and droughts, improving water quality, water supply, and conservation. Several Federal agencies are engaged in the process, including the EPA, the Service, and USACE (Mobile District). While a final allocation formula has yet to be determined, current proposals address water quality, biodiversity, adequate instream flow regimes, monitoring programs, and water conservation. Current action includes studies to address point and nonpoint source pollution, water flow requirements for aquatic habitat, and protection of fisheries with the river basins.¹⁵⁴ As flow requirements according to the ACT Compact are not yet established, this analysis quantifies the impact of increasing the current minimum flow levels at Weiss Dam to adequately provide for the mussels.

202. Potential costs of specific project modifications for the relicensing of Weiss Dam are uncertain at this early stage of the process. The Service indicated that they are currently

¹⁵² Personal communication with U.S. Fish and Wildlife Service, Daphne, AL Field Office, March 5, 2003.

¹⁵³ Written communication with U.S. Fish and Wildlife Service, GA Field Office, December 19, 2003.

¹⁵⁴ Public Law 105105-Nov. 20, 1997.

considering recommendations based on some percentage of average annual stream flow of the Coosa River near Rome, Georgia.¹⁵⁵ The average annual stream flow for years 1899 through 2001 at this site is 6,689 cfs.¹⁵⁶ The spill scenarios as defined in Exhibit 4-7 are all being considered for recommendation at Weiss Dam.

Exhibit 4-7	
Potential Recommendations for Flow Regime for Weiss Dam	
Percent of Natural Stream Flow	Approximate Average Annual Flow at Weiss Dam Recommended (cfs)
3%	200
6%	400
15.5%	1000
25%	1700

Sources: United States Geological Survey, Data for Gage No. 02397000, Coosa River Near Rome, GA, accessed at http://nwis.waterdata.usgs.gov/ga/nwis/annual/?site_no=02397000&agency_cd=USGS; personal communication with U.S. Fish and Wildlife Service, Daphne Alabama Field Office, November 26, 2003.

203. Multiple comment letters provided during the public comment period for the draft version of this analysis state that Service may request flows as high as 2000 cfs at Weiss Dam.¹⁵⁷ The Service stated that in its most recent conversations with stakeholders, it has determined that flows of this level would not be appropriate at this particular stream channel, and that the flow recommendations will more likely be close to 500 cfs, with 1000 cfs representing a conservative foreseeable estimate.¹⁵⁸ The Alabama Power Company agrees that it is unlikely that minimum flows as high as 2000 cfs will be recommended. However, the Company further notes that as this potential for recommendation has not been formally

¹⁵⁵ Written communication with U.S. Fish and Wildlife Service, Daphne, AL Field Office, November 26, 2003.

¹⁵⁶ United States Geological Survey, Data for Gage No. 02397000, Coosa River Near Rome, GA, accessed at http://nwis.waterdata.usgs.gov/ga/nwis/annual/?site_no=02397000&agency_cd=USGS.

¹⁵⁷ Comment letter from Balch and Bingham LLP, on behalf of the Alabama-Tombigbee Rivers Coalition, October 13, 2003; comment letter from Mac R. Holmes, Professor of Economics and Business, Troy State University, October 13, 2003.

¹⁵⁸ Personal communication with U.S. Fish and Wildlife Service, Daphne, AL Field Office, November 26, 2003.

rejected, that 2000 cfs in minimum flows at Weiss represents the most conservative estimate.¹⁵⁹

204. Exhibit 4-8 summarizes the anticipated lost energy production and the associated cost according to four scenarios for average minimum flow at Weiss Dam.

Exhibit 4-8		
Impacts to Power Generation at Weiss Dam Associated with Varying Minimum Flows		
Minimum Flow Rate (cfs)	Decrease in Average Annual Production (1000 kilowatt-hours)	Annual Costs of Decrease in Power Production (\$)
500	13,100	\$686,000
1000	26,329	\$1,350,000
1300	34,380	\$1,790,000
2000	53,336	\$2,840,000

Source: Letter from Mac Holmes, Professor of Economics and Business, Troy State University, October 13, 2003; letter from Balch and Bingham LLP, on behalf of the Alabama-Tombigbee Rivers Coalition, October 13, 2003; personal communication with John D. Grogan, Manager of Environmental Compliance, Alabama Power Company, December 11, 2003.
 Note: Cost estimates are rounded to three significant digits.

205. Importantly, these costs include only the costs of decreased power generation. The costs of decreased power generation are directly passed on to the consumers of the power through rate structure as “fuel adjustment” costs. In addition, it is possible that there may be impacts to dependable capacity at Weiss Dam. Further, the drawdown of the upstream reservoir may result in impacts to recreation. Estimates of these indirect impacts are not quantified in this analysis as it is unclear what level of impact, if any, the change in flow regime will have on these activities. In addition, however, the power market will likely adjust to this change in supply, mitigating social costs to the flow regimes to some extent over time. As such, this analysis employs these annual cost estimates as a representative proxy for total effects.

206. Due to the fact that flow regime at Weiss Dam is still under negotiation, this analysis assumes that three percent of natural stream flow, 200 cfs, represents the low end estimate of change in flows. The most conservative estimate is assumed to be 2000 cfs as noted by the Alabama Power Company. This estimate is also close to the high end estimate as

¹⁵⁹ Personal communication with John D. Grogan, Manager of Environmental Compliance, Alabama Power Company, December 11, 2003.

anticipated by the Service, of 1700 cfs. Accordingly this analysis applies a cost range of \$276,000 to \$2.84 million per year associated with decreased power generation at Weiss Dam.¹⁶⁰

Unit 25: Carters Reregulation Dam

207. The hydropower project at Carters Reregulation Dam, though licensed, has not yet been constructed. Inadequate dissolved oxygen levels and flow levels are the two issues of concern with respect to federally-listed aquatic species, including the mussels, at this site. The Service has reviewed Fall Line Hydro's Operations and Water Quality Management Plan and determined that increased water sampling will be necessary to detect potential low oxygen levels. Additionally, the Service has recommended that FERC and the licensee further discuss the implementation of higher minimum flows with USACE.
208. This analysis does not anticipate any project modifications will be requested with respect to the informal consultation at Carters Dam with FERC and Fall Line Hydro as this consultation will focus on compliance with State water quality standards guiding dissolved oxygen levels which should provide adequate protections for the mussels.¹⁶¹
209. For the anticipated formal consultation regarding flow regime, the Service has indicated that it will likely request increased flows at Carters Reregulation Dam (Rereg Dam). The Service informed the USACE by letter on June 19, 2003, that the operations agreement between the USACE and Fall Line Hydro allowing the retrofit of the reregulation dam at the proposed facility may affect multiple endangered species in the area and must involve consultation for these species. One such species is one of the 11 mussels, the triangular kidneyshell. Other species that are present are the Federally-listed goldline darter and State-listed trispot darter. This consultation request letter noted that the minimum flows at the reregulation dam of 240 cfs constitute a drought event and have "been associated with catastrophic reductions in available habitat for aquatic life." Of concern to the Service are the ramping rates at the dam, or the fluctuation in level of flow from the dam. The Service

¹⁶⁰ The cost estimate for a flow regime of 2000 cfs was derived from the lost power generation and associated costs as provided by the Alabama Power Company in Exhibit 4-8. Upon examination, the lost power generation estimates are roughly linear. The estimated flow rate multiplied by approximately 26.4 represents the annual decreased power generation in kilowatt-hours. The lost power generation estimate multiplied by 52.2 approximates the associated cost in dollars. The costs associated with lost power generation at Weiss Dam are anticipated to occur annually for 30 years. Applying the same lost power costs over 30 years, however, may overstate the real annual impacts as it is likely that changes to rate structures will be brought about through broader market adjustments in the long term.

¹⁶¹ Personal communication with the U.S. Fish and Wildlife Service, Athens, GA Field Office, May 7, 2003.

states, “Extreme, repeated fluctuations have no natural analogue in freshwater systems and represent a harsh environment of frequent, unpredictable flow.”¹⁶²

210. The USACE has stated that any change in flow regime at the Rereg Dam will have an impact on energy production at Carters Dam (1.5 miles upstream).¹⁶³ The Rereg Dam’s primary function is to provide a lower pool to support pumping operations and, accordingly; the output of Carters Dam is heavily dependent on the capacity of the reregulation pool. The impact to Carters Dam operations resulting from the project modification concerning flow rates at the Rereg Dam is considered an additional impact of the formal consultation concerning the operation of the Rereg Dam.

211. Although the draft version of this analysis identified the potential for affecting flow regimes and related energy production at Carter's Dam upstream, insufficient information was available at that time to explicitly model impacts. During the comment period for the proposed designation, however, the USACE employed a hydropower model to illustrate operational impacts under alternative flow scenarios.

212. The estimation of decreased energy production resulting from the change in flow regime for the mussels is based on the recommendation for the change in flows. While specific flow targets have not been identified, the Service indicated in its June 19, 2003 letter to the USACE that ramping rates at the Rereg Dam “could be reduced and used to mimic a more natural flow regime, using data from the upstream United States Geologic Survey gage (Gage No. 02380500, Coosawattee River near Ellijay) as a model.¹⁶⁴ According to this source, the monthly mean flows for water years 1939 through 1999 are summarized in Exhibit 4-9. Specifically, and as noted in its comment submission, USACE employed the computer program HEC-5, Simulation of Flood Control and Conservation Systems, to simulate the changes in power plant operations under these alternative flow scenarios.¹⁶⁵

¹⁶² Letter from U.S. Fish and Wildlife Service, Athens, GA Field Office to Colonel Robert B. Keyser, U.S. Army Corps of Engineers, Re: FWS Log NG-02-181-MURR Carter’s Reregulation Dam, FERC No. 11301, June 19, 2003.

¹⁶³ Letter from Coastal Environment Team, U.S. Army Corps of Engineers, Mobile District, October 14, 2003; letter from Robert Claussen, Southeastern Federal Power Customers, Inc., October 14, 2003.

¹⁶⁴ Letter from U.S. Fish and Wildlife Service, Athens, GA Field Office to Colonel Robert B. Keyser, U.S. Army Corps of Engineers, Re: FWS Log NG-02-181-MURR Carter’s Reregulation Dam, FERC No. 11301, June 19, 2003.

¹⁶⁵ Under this simulation, the baseline scenario represents operation of the project with historical flow data to make up a project requirement for 2318.40 MWh of energy from weekday on-peak generation while meeting current flow targets. Incremental changes in operations were simulated using alternative monthly flow scenarios, while meeting the same project requirement for 2318.40 MWh of energy during weekday on-peak operation. USACE, “Economic Analysis of Power Impacts at Carters Powerhouse for Critical Habitat Designation for Eleven Mobile River Basin Mussels,” received February 6, 2004.

Exhibit 4-9	
Mean Monthly Flows (1939-1999) of the Coosawattee River Near Ellijay, GA	
Month	Mean Flow Rate (cfs)
October	275
November	349
December	465
January	658
February	790
March	864
April	770
May	620
June	478
July	401
August	324
September	254

Source: United States Geological Survey, Data for Gage No. 02380500, Coosawattee River Near Ellijay, GA, accessed at <http://ga.water.usgs.gov/publications/wdr99-1/summary/sp03280500.pdf> on December 2, 2003.

213. The results of this assessment are reproduced in Exhibit 4-10 below. As the exhibit shows, estimated impacts related to energy value are approximately \$9,189 per year, while capacity value impacts average \$715,317 per year.¹⁶⁶ This results in a total cost of \$21.7 million over the next 30 years, 99 percent of which is due to capacity impacts.¹⁶⁷ Note that the average annual impacts are dependent upon relatively high modeled impacts in drought years. Although these results are subject to limitations with respect to the modeling exercise

¹⁶⁶ The energy value is the measure of the system's energy production cost; the capacity value reflects the greater reliability and operating flexibility of the hydropower plant.

¹⁶⁷ The costs associated with lost power generation and decreased dependable capacity at Carters Dam are anticipated to occur annually for 30 years. Applying the same lost power and capacity costs over 30 years, however, may overstate the real annual impacts as is it likely that changes to rate structures will be brought about through broader market adjustments in the long term.

and the flow regime assumptions, this analysis employs them as reasonable approximations of the potential magnitude of impacts that could result from consultation.¹⁶⁸ A further review of the model results and methodology is provided below.

Exhibit 4-10				
Hydropower Impacts at Carter's Dam				
Year	Energy Impacts		Dependable Capacity Impacts	
	Average Annual	Annual (specific years)	Average Annual	Annual (specific years)
Period of Record	(\$9,189)	-	(\$715,317)	-
1981	-	(\$31,041)	-	(\$908,476)
1986	-	(\$115,658)	-	(\$12,275,817)
1988	-	(\$84,260)	-	(\$9,672,094)

Source: USACE, "Economic Analysis of Power Impacts at Carters Powerhouse for Critical Habitat Designation for Eleven Mobile River Basin Mussels," received February 6, 2004.

214. According to the Energy Information Administration's (EIA) database, the Carters Powerhouse facility consists of two conventional hydro units and two pump storage units. Each unit has a nameplate capacity rating of 125 MW, and EIA reports summer peak capacity of 137 MW for the conventional units and 143 MW for the pump storage units, confirming the USACE-reported peak capacity rating of 560 MW. The USACE reports that average annual production is either 500 GWh or 644 GWh, implying an annual capacity factor (based on nameplate) of 11.4 to 14.7 percent.
215. Pump storage hydro facilities exist to provide peaking capacity to electric utilities. These facilities consume power to pump water up during low-price, off-peak periods and generate power. Although pumping water uphill consumes more power than it can generate, the economic benefit is derived by producing electric energy when prices are higher during peak periods and consuming electric energy when prices are lower off-peak.
216. Restrictions on the rates of flow of water through the powerhouse and the re-regulation dam can potentially result in economic losses associated with having less generating capacity and energy available during peak periods. The USACE analysis estimates both energy generation and dependable capacity costs of the flow restrictions, by computing both annual energy and peak capacity availability for the facility both "without"

¹⁶⁸ The comment submission and follow-up discussion with USACE officials did not provide sufficient information to comprehensively reconstruct the modeled results; however, the methodology employed by USACE is consistent with generally accepted energy impacts assessment. In addition, the computer program HEC-5, is regularly used to simulate the operation of reservoirs for hydropower production.

and "with" the critical habitat designation.¹⁶⁹ The USACE analysis computes impacts for 62 years (1939 to 2000), and presents results on average for those 62 years as well as specific results for drought years 1981, 1986 and 1988.

217. The estimated economic impacts are heavily capacity-related (which is to be expected for peaking facilities), at an annual average net cost of \$715,000, compared to energy impacts of \$9,200 per year. However, the impacts are concentrated in drought years, with the three drought years' (1981, 1986 and 1988) economic impacts being responsible for over 40 percent of the energy impacts over the 62 years, and over 50 percent of the peak impacts. This analysis anticipates that these costs represent direct decreases in consumer surplus in the form of changes in the rate structure of electricity.
218. The USACE further states that a significant level of secondary economic costs may result from changing the flow regime along the Coosa River. A modification to the water control plan for the basin requires public involvement and National Environmental Policy Act (NEPA) documentation. The study and implementation costs for these efforts is anticipated to be approximately \$2 million. Further, the complexity of the flow issue may require increased administrative effort for the section 7 consultation resulting in administrative costs to the USACE of up to \$100,000.¹⁷⁰
219. The USACE also anticipates that the recreational use of Carter's Lake may be affected by the designation of critical habitat. The issue at stake is the level of this reservoir. In increasing flows down the Coosa, the water level in Carter's Lake may be decreased, resulting in less opportunity for boater-based recreation. There are an estimated 632,000 visitors annually to the lake contributing to the regional economy. The USACE modeled the relationship between pool levels and recreation visitation and determined that the decreased pool levels associated with flow regime changes for the mussels may result in lost opportunity to recreationalists amounting to approximately \$65,600 per year.¹⁷¹ This, however, assumes that demand for recreation is inelastic and that there are no substitute sites for recreation within the region.

¹⁶⁹ The USACE analysis is performed at a "reconnaissance" level. The general approach of measuring energy and demand effects separately is reasonable for this level of analysis. A more detailed level of analysis might need to address hourly and seasonal energy price differentials more carefully, as well as considering any economic impacts on the ancillary services potentially available from this facility.

¹⁷⁰ USACE, Mobile District "Economic Analysis of Power Impacts at Carters Powerhouse for Critical Habitat Designation for Eleven Mobile River Basin Mussels," received on February 6, 2004 and amended on February 18, 2004.

¹⁷¹ The USACE estimates that visitor trip spending results in \$1.64 million in total sales, \$6.15 million in total income, and 301 jobs in the local community. USACE, Mobile District "Economic Analysis of Power Impacts at Carters Powerhouse for Critical Habitat Designation for Eleven Mobile River Basin Mussels," received on February 6, 2004 and amended on February 18, 2004.

220. In summary with respect to Carter’s projects, this analysis quantifies the following economic impacts associated with the designation critical habitat at Carters Rereg Dam:

- One informal consultation with FERC and Fall Line Hydro regarding implementation of State water quality standards.
- One formal consultation with the USACE regarding flow regime at the Rereg Dam. This consultation is anticipated to result in administrative costs of up to \$100,000 by the USACE.
- Changes in energy generation and dependable capacity at Carter’s Dam constituting costs of approximately \$21.7 million over 30 years.
- Costs of NEPA documentation and public involvement of \$2 million regarding changes to water operations in the Coosa River.

4.2.3 Water Supply Dams

Baseline

221. Two proposed water supply projects (Beech Creek and Locust Fork) may be affected by the designation. Potential construction of water supply dams in Alabama and Georgia is bound by the USACE 404 permit special conditions. Prior even to considering listed species and critical habitat impacts, the USACE considers potential impacts to wetlands and other waters of the United States. Reservoir construction in Georgia is subject to State quality standards as outlined in EPD 401 certification, the Georgia Erosion and Sedimentation Control Act of 1975, and guidelines contained within Georgia Soil and Water Conservation Commission’s “Manual for Erosion and Sediment Control”.¹⁷²

Future Consultations

222. Although the proposal for the Beech Creek reservoir in Georgia is in initial stages and the likelihood of construction within ten years is uncertain, this analysis assumes that the USACE permitting process concerning the proposed water supply dam at Beech Creek trigger **one formal section 7 consultations** on the mussels within the next ten years (see Section 3.2.3 for more information).

223. **One formal consultation** is also anticipated regarding the proposed water supply reservoir at Locust Fork in Unit 12 of the proposed designation as detailed in Section 3.2.3 of this report. Mussels currently inhabit the proposed construction site and the development

¹⁷² See Appendix A.

of the reservoir at Locust Fork by Birmingham Water Works Board (BWVB) will adversely impact the habitat for the species. The possibility exists that this proposed reservoir will need to be relocated.¹⁷³

224. No consultations are anticipated regarding a proposed water supply dam at Armuchee Creek in Floyd County, Georgia as this dam is outside of critical habitat and the Service does not anticipate that its construction or operation will impact the mussels or their habitat.¹⁷⁴

225. Further, no consultation is anticipated regarding the permitted, but not yet constructed Tom Beville water supply dam on the North River in Fayette County, AL. The Tom Beville Reservoir Management Authority (TBRMA) and the Fayette County Commission proposed to construct a 2,800 foot (853 meters) earthen dam on the North River which would inundate approximately 1,994 acres. The dam is designed such that water may be spilled or released from the reservoir by incorporating a spillway weir and a system of release gates and valves. A formal section 7 consultation regarding the impact of the reservoir construction on two of the endangered mussels resulted in a biological opinion which concluded on October 3, 1994.¹⁷⁵ The Reservoir was subsequently permitted but has not yet been constructed. The permit for this impoundment was renewed in 2000 and is currently in effect.¹⁷⁶

226. At the time of the proposed rule, the Service believed that this structure fell within the proposed critical habitat Unit 11. Upon receiving a public comment letter from Almon on behalf of the Fayette County Commission and the TBRMA, the Service revisited the issue and determined that the dam site is approximately 2.4 miles above the uppermost limit of Unit 11. The footprint of the dam therefore falls outside of the critical habitat area. As long as the dam is constructed pursuant to the 1994 biological opinion agreed upon by the Service and the USACE, the Service does not anticipate that any further consultation will be required at this site according to improved information on the location of the dam site.¹⁷⁷

¹⁷³ Comment letter from Birmingham Water Works Board, October 14, 2003; personal communication with the U.S. Fish and Wildlife Service, November 6, 2003.

¹⁷⁴ Personal communication with U.S. Fish and Wildlife Service, Jackson, MS Field Office, April 24, 2003.

¹⁷⁵ Letter from U.S. Fish and Wildlife Service, Daphne, AL Field Office to District Engineer, U.S. Army Corps of Engineers, Mobile District, October 3, 1994.

¹⁷⁶ Letter from Almon Associates on behalf of the Fayette County Commission and The Tom Beville Reservoir Management Authority, October 10, 2003.

¹⁷⁷ Letter from Almon Associates on behalf of the Fayette County Commission and The Tom Beville Reservoir Management Authority, October 10, 2003. This comment letter notes that the Tom Beville Reservoir had an original design capacity of 31.65 million gallons per day. Following consultation with the Service in 1994, the TBRMA and the USACE agreed to decrease the capacity of the Reservoir by 45 percent, to 17.5 million gallons per day. The letter from Almon Associates estimates a \$1.5 million cost per million gallon per day capacity decrease bringing the cost of this reduced capacity to \$21.23 million. Further modification would defeat the purpose of the project. Upon revisiting the

227. Proposed water supply dams may therefore affect the following areas proposed as critical habitat for the mussels.

Unit 16: Beech Creek, Haralson County, GA

228. The West Georgia Regional Water Authority has proposed constructing a pump-diversion reservoir wherein water will be pumped from the Tallapoosa River into a 2,300-acre lake on Beech Creek. Within the Tallapoosa basin, total municipal and industrial water demand is projected to increase from 16.7 millions of gallons per day (MGD) in 1995 to 25.3 MGD in 2050, with residential water demand representing 50 percent of total projected demand.¹⁷⁸ Demand projections are anticipated to surpass regional surface water withdrawal capabilities and new methods for securing water resources have been evaluated. The West Georgia Regional Water Authority has performed an alternative water supply analysis and determined that the Beech Creek reservoir is the preferred water supply source. In addition, the Georgia Department of Natural Resources has approved the issuance of bonds to finance reservoir construction. If constructed, the reservoir is anticipated to supply water to Haralson, Carroll, and portions of Paulding and Polk Counties until 2050.¹⁷⁹
229. The applicant submitted an application for a 404 permit from USACE in 2002 and USACE is currently awaiting additional information prior to proceeding. The permitting process may be complicated or impeded for reasons other than the presence of proposed critical habitat. West Georgia Regional Water Authority is currently seeking opportunities for mitigation land purchases to present in coordination with the Beech Creek water supply dam proposal. The USACE has stated that the need for mitigation lands is not directly related to potential impacts on mussels but instead to mitigate for impacts to wetlands, streamlands, fisheries, and recreation. Because of the various issues surrounding the disparate potential impacts, it is unclear whether the water supply dam will be constructed at this location.¹⁸⁰ This analysis assumes that a permit will be issued for construction at this location, thereby triggering one formal section 7 consultation with the Service on the mussels.

location of the dam, the Service agrees that implementation of the 1994 biological opinion will sufficiently provide for the mussels and habitat. Personal communication with Jackson, MS Field Office, November 6, 2003.

¹⁷⁸ Georgia Department of Natural Resources, Environmental Protection Division, *Tallapoosa River Basin Plan 1998*, Section 3, Water Quantity, p. 3-5, accessed at http://www.state.ga.us/dnr/environ/plans_files/plans/tallapoosa-pdf/tallapoosa.pdf on February 28, 2003.

¹⁷⁹ Raper, M., Boldt D., and Dole, C., *West Georgia Regional Outlook*, Department of Economics, Richards College of Business, State University of West Georgia, October 2002, p. 32.

¹⁸⁰ Personal communication with Richard Morgan, U.S. Army Corps of Engineers, Savannah, GA District, February 21, 2003.

Unit 12: Locust Fork, Blount County, AL

230. Based on existing demands, municipal water shortages may occur in this region if a drought were to occur.¹⁸¹ As detailed in Section 3.2.3, without augmentation of the current water supply, the region is likely to experience water supply shortages by the year 2040. As a result, BWWB has compared alternative locations for construction of a water supply reservoir to meet the growing demand, including the Locust Fork area within Unit 12 of the proposed designation for the mussels.
231. Although Locust Fork is the preferred alternative for the BWWB, there are two issues that have yet to be resolved regarding the implementation of this project at this site. The first is the presence of multiple endangered species, and proposed critical habitat for the mussels. The second is the level of local opposition to the plan.
232. In addition to the mussels, two federally endangered species also occur in this area, the plicate rocksnail (*Leptoxis plicata*) and the cahaba shiner (*Notropis cahabae*). Plicate rocksnails inhabit riffles and shoals in rivers or streams with flowing currents, and hard, clean bottoms (e.g., bedrock, boulder gravel).¹⁸² Impounded waters have historically contributed to the plicate rocksnails decline. Habitat for the Cahaba shiner is characterized by large shoal areas.¹⁸³ The Cahaba shiner does not occupy deep water habitats and requires water quality in compliance with standards. The 1993 Assessment of Alternative Sources of Supply states:

“It should be noted that two of the environmental resource categories are potentially fatal flow issues. If it is found, with any potential site, that there are impacts to threatened or endangered species, significant wetlands, or highly valued habitat; the project will most probably not be permitted. Although our assessment assumed equal weight to each of the categories, clearly additional emphasis should be placed on sites with the lowest ranking in the threatened and endangered species and wetland categories. Rice Creek, Locust Fork and Crooked Creek are ranked lowest (best) over all in these two critical categories.”¹⁸⁴

¹⁸¹ U.S. Army Corps of Engineers, *Section 22 Report Planning and Assistance to States Black Warrior River Headwaters Basin Water Supply Study*, October 1999.

¹⁸² As described in the Final Rule Determining the Endangered Status for Three Aquatic Snails, and Threatened Status for Three Aquatic Snails in the Mobile River Basin of Alabama as appeared in the Federal Register on October 28, 1998 (63 FR 57610).

¹⁸³ As described in the Final Rule Determining the Endangered Status for the Fish Cahaba Shiner (*Notropis Cahabae*) as appeared in the Federal Register on October 25, 1990 (55 FR 42961).

¹⁸⁴ O’Brien and Gere Engineers, Inc., *Draft Assessment of Alternative Sources of Supply The Water Works and Sewer Board of The City of Birmingham, Alabama*, July 1993.

233. In 1998, after the engineering study comparing impacts of alternative reservoir sites, the Geological Survey of Alabama biologists discovered a population of federally endangered Cahaba shiner in the Locust Fork. In addition, the plicate rocksnail, also found in the Locust Fork, was listed as endangered since the time of engineering study.¹⁸⁵ Because of these new discoveries, it is possible that the engineering study underestimated the potential environmental impact imposed by construction of the reservoir at Locust Fork as compared to the other alternatives.
234. The Locust Fork project has been halted in the past due to public opposition. The area was first considered as a reservoir site in the early 1990s.¹⁸⁶ As mentioned above, in 1993 the Locust Fork project was identified as the preferred alternative to meet existing future water supply needs.¹⁸⁷ Local government, citizens, and environmental groups opposed the plan (e.g., the Alabama Rivers Alliance, Friends of the Locust Fork River, and Blount County government) upon its proposal in 1993.¹⁸⁸ The opposition to the reservoir site centered around two main issues, first that the project would result in impoundment of one of the regions few remaining free flowing rivers that is valued for its aesthetic and recreational contributions. Second, the local government believed that there were better alternatives for the project and that they would prefer the reservoir not be constructed at Locust Fork. Accordingly, BWWB temporarily withdrew the project plans and began investigating a pipeline to the Coosa River as an alternative water supply source. This option has since been determined to be too expensive. Many of the same groups who opposed the original proposal in 1993 have stated they will challenge any future Locust Fork Reservoir proposals.
235. Regardless of the project alternative chosen, the BWWB will need to acquire 30 permits for construction and implementation. This permitting process will take five to ten years, and allow time for public comments.¹⁸⁹ Each of the alternative projects would take

¹⁸⁵ Shepard, Thomas E., Patrick E. O'Neil, Stuart W. McGregor, and Maurice F. Mettee. 1998. Biomonitoring in the Locust Fork Watershed, 1997-1998. Geological Survey of Alabama; Final Rule Determining the Endangered Status for Three Aquatic Snails, and Threatened Status for Three Aquatic Snails in the Mobile River Basin of Alabama as published in the Federal Register on October 28, 1998 (63 FR 57610).

¹⁸⁶ Personal communication with Randall Chafin and Cary Prather, Birmingham Water Works Board, November 20, 2003.

¹⁸⁷ O'Brien and Gere Engineers, Inc., *Draft Assessment of Alternative Sources of Supply The Water Works and Sewer Board of The City of Birmingham, Alabama*, July 1993.

¹⁸⁸ Katherine Bouma, *Advocates Vow to Guard Wildlife Haven*, Birmingham News, November 27, 2002.

¹⁸⁹ Personal communication with Randall Chafin and Cary Prather, Birmingham Water Works Board, November 20, 2003.

multiple years to construct. The new water supply reservoir, therefore, will likely not be in service until 2025, and is expected to meet demand for 50 to 60 years.

Project Modifications

236. The proposed West Georgia Regional Reservoir will require the impoundment of Beech Creek. Because the Beech Creek Reservoir is not within critical habitat, the impact to mussels habitat is associated with the pumping of water from the Tallapoosa River during high flow periods into a 27 billion gallon lake. The Service has stated that as long as the timing of the construction, water withdrawal, and water releases considers the sensitive spawning periods for the mussels, that this will not be a concern. It is unlikely that these timing considerations will add an incremental cost to the design, construction and operation of the dam.¹⁹⁰ This analysis, therefore, does not anticipate any project modification costs associated with the permitting of the Beech Creek Reservoir.

237. BWWB considered six sites to host their proposed water supply reservoir. An engineering cost analysis conducted in 1993 determined that the Locust Fork Reservoir project is the preferred alternative of the BWWB.¹⁹¹ The next best alternatives include Crooked Creek Pumped Storage Reservoir, Rice Creek Pumped Storage Reservoir, and the Blackwater Creek Reservoir. Following is a brief comparison of each of the alternatives.

- **Locust Fork Reservoir.** As designed, this reservoir would provide 12.4 billion gallons of storage, a safe yield of 88 mgd, and a maximum capacity of 132 mgd. This water supply reservoir project in conjunction with other BWWB plans is expected to supply the raw water needs of the area for the next 50 years. Site preparation and construction of this reservoir is anticipated to cost approximately \$250 million.¹⁹²
- **Crooked Creek Pumped Storage Reservoir.** As designed this reservoir produces up to 150 mgd safe yield. It is considered the second best alternative, following Locust Fork. The estimated project cost is on the low

¹⁹⁰ Personal communication with U.S. Fish and Wildlife Service, Jackson, MS Field Office, Daphne, AL Field Office, and Region 4 Office, April 24, 2003.

¹⁹¹ O'Brien and Gere Engineers, Inc., *Draft Assessment of Alternative Sources of Supply The Water Works and Sewer Board of The City of Birmingham, Alabama*, July 1993.

¹⁹² Public comment from R. Randall Chafin, Assistant General Manager, Birmingham Water Works Board, October 14, 2003.

end of the alternatives with total costs of up to \$404 million.¹⁹³ The 1993 study states, “Crooked Creek’s estimated project costs per mgd for these greater development levels are still considered very reasonable.”

- **Rice Creek Pumped Storage Reservoir.** As designed this reservoir provides up to 150 mgd safe yield. This site is considered the third best alternative following Crooked Creek, and tied with Blackwater Creek. Construction of the reservoir at this site is expected to result in the lowest level of environmental impact. The area is undeveloped, and by virtue of topography, results in a minimal inundation area compared to a sizeable reservoir volume. The estimated costs of implementing the project are the highest of the alternatives, up to \$619 million.
- **Blackwater Creek Reservoir.** As designed, this reservoir will produce up to 112 mgd safe yield. This constitutes the third best alternative following Crooked Creek, tied with Rice Creek. Development at this site, however, is expected to result in a high environmental impact. The estimated project costs per mdg are less than those projected at Rice Creek. The costs of implementing the project are estimated to be up to \$307 million.

Exhibit 4-11			
Summary of Potential Birmingham Water Works Board Water Supply Projects			
Project	Safe Yield (MGD)	Total Costs (millions)	Cost Per MGD (millions)
Locust Fork Reservoir	88	\$250	\$2.8
Crooked Creek Pumped Storage Reservoir	150	\$404	\$2.7
Rice Creek Pumped Storage Reservoir	150	\$619	\$4.1
Blackwater Creek Reservoir	112	\$307	\$2.7

Sources: Costs associated with Locust Fork Reservoir are from the public comment letter from R. Randall Chafin, Assistant General Manager, Birmingham Water Works Board, October 14, 2003; Costs associated with Crooked Creek, Rice Creek and Blackwater Creek are from: O’Brien and Gere Engineers, Inc., *Draft Assessment of Alternative Sources of Supply The Water Works and Sewer Board of The City of Birmingham, Alabama*, July 1993; “Construction Cost Index History (1914-2003)”, *Engineering News-Record: Quarterly Issue*, March 31, 2003, pg. 43.

Project costs for Crooked Creek, Rice Creek and Blackwater Creek Reservoirs were converted from 1993 to 2003 dollars using the Construction Cost Index. The total costs include the impoundment structure, raw water transmission facilities, existing structure and utility relocations, environmental mitigation, and land acquisition.

¹⁹³ Project costs for Crooked Creek, Rice Creek and Blackwater Creek Reservoirs were converted from 1993 to 2003 dollars using the Construction Cost Index. “Construction Cost Index History (1914-2003)”, *Engineering News-Record: Quarterly Issue*, March 31, 2003, pg. 43.

238. To evaluate the potential economic impact of critical habitat for the mussels on the Locust Fork Reservoir, this analysis estimates the opportunity cost of relocating the reservoir outside of the critical habitat area. That is, this analysis estimates the incremental costs associated with the next best project alternative as identified, siting the reservoir at Crooked Creek. No endangered species exist at Crooked Creek.¹⁹⁴
239. The total implementation costs of the Crooked Creek Reservoir alternative may be up to \$154 million more than the Locust Fork Project. There may also be increased operation and maintenance costs associated with this reservoir alternative. In addition to these increased project costs the BWWB has already purchased 3,240 acres of land at a cost of about \$3 million for construction of the reservoir at Locust Fork.¹⁹⁵ The cost of relocating the reservoir at Crooked Creek is assumed to be incurred over the 25 year period, beginning immediately through the anticipated completion of the project in 25 years.
240. None of the Federally listed species inhabiting the Locust Fork region, the mussels, the Cahaba shiner, and the plicate rocksnail, can survive in impounded waters. Further, the aforementioned local opposition to the project may play a role in its relocation. It is not clear, however, which of these issues may serve as the main causative factor for relocating the project. This analysis does not offer an opinion regarding whether the project may be constructed absent the designation of critical habitat for the mussels, and conservatively assigns the total cost of project relocation to the mussels.

4.2.4 Utilities Construction/Maintenance

Baseline

241. USACE 404 permit special conditions apply to the permitting of any pipeline construction or maintenance permits as outlined in Section 2.2.1 of this analysis. FERC complies with USACE 404 permit guidelines and also encourages erosion and sediment control measures and post-construction restoration activities.¹⁹⁶
242. TVA policy concerning environmental impacts revolves around the minimization of effects of operations on the environment, and compliance with all relevant environmental

¹⁹⁴ Personal communication with U.S. Fish and Wildlife Service, Jackson, MS Field Office, December 10, 2003.

¹⁹⁵ Public comment from R. Randall Chafin, Assistant General Manager, Birmingham Water Works Board, October 14, 2003.

¹⁹⁶ Federal Energy Regulatory Commission, *Wetland and Waterbody Construction and Mitigation Procedures*, January 2003.

laws and regulations.¹⁹⁷ TVA standard procedures for transmission line construction and maintenance activities include erosion and sediment control measures including planning considerations, site revegetation, equipment use limitations, slope restrictions, and herbicide use restrictions.¹⁹⁸ State water quality standards also provide some baseline protection. For example, the Tennessee Water Control Board requires permit applicants to evaluate practical alternatives and conduct avoidance, minimization, and/or mitigation for activities impacting water.¹⁹⁹

Future Consultations

243. The Mobile District USACE expects **eight informal and four formal consultations** over the next ten years associated with issuance of 404 permits for pipeline crossing and intake structures. The four formal consultations are associated with excavation and backfill for a pipeline/intake structure for water withdrawal for the City of Tupelo, Mississippi.²⁰⁰
244. In addition to the consultations estimated by the USACE, the BWWB anticipates participating in at least **two formal consultations** regarding USACE permits for BWWB utility line crossings.²⁰¹
245. Based on current and proposed transmission lines in the region, the TVA anticipates a maximum of **two informal section 7 consultations** over the next ten years regarding the mussels and their habitat.²⁰² As TVA only has jurisdiction over projects within proposed critical habitat Units 16 and 25 in Georgia and Tennessee, this analysis assumes that one formal consultation will occur in each of these units.

¹⁹⁷ Tennessee Valley Authority, *Principles and Practices Manual*, Revised 2002, accessed at <http://www.tva.com/foia/readroom/policy/prinprac/index.htm> on February 19, 2003.

¹⁹⁸ Austin, Chris, Chris Brewster, Alicia Lewis, Kenton Smithson, Tina Broyles, and Tom Wojtalik, *A guide for Environmental Protection and Best Management Practices for Tennessee Valley Authority Transmission Construction and Maintenance Activities*, Tennessee Valley Authority, Transmission/Power Supply Group, 1999.

¹⁹⁹ Tennessee. Code Ann., §69-3-101.

²⁰⁰ Written communication with Brian Peck and Diane Findley, USACE, Mobile District, April 17, 2003.

²⁰¹ Public comment from R. Randall Chafin, Assistant General Manager, Birmingham Water Works Board, October 14, 2003; personal communication with Randall Chafin and Cary Prather, Birmingham Water Works Board, November 20, 2003.

²⁰² Personal communication with John Jenkinson, Tennessee Valley Authority, Norris office, January 29, 2003; Personal communication with Anita Masters, Tennessee Valley Authority, January 30, 2003.

Project Modifications

246. The USACE in Alabama anticipates the same project modification recommendations associated with each of the informal and formal consultations as for the 404 permits regarding road and bridge projects as described in Section 4.2.1 of this analysis. These project modifications include implementation of BMPs, pre-construction species surveys, mussel relocation, and habitat restoration and are estimated to add an incremental cost of \$21,800 to \$245,000 to each of the eight informal and four formal consultations.²⁰³
247. The BWWB anticipates that project modification recommendations will include bridging the river rather than using more conventional methods of placing the utility pipelines instream or under the stream because the topography in the region and physical characteristics of the pipeline make directional drilling infeasible. The incremental costs of bridging a utility line crossing range from \$600,000 to \$800,000 for each of the formal consultations.²⁰⁴
248. The TVA typically follows environmental quality protection specifications for transmission line construction and works with project engineers to avoid and minimize impacts to threatened and endangered species. As a result, future consultations with respect to the mussels are expected to remain informal with no project modifications.²⁰⁵

4.2.5 Activities in National Forests

Baseline

249. Amendment 14 of the Forest Land and Resource Management Plan of the National Forests in Alabama (1986) provides guideline standards specifically related to the protection of aquatic species and habitats for activities within the National Forests. Protections afforded the mussels include the establishment of streamside management zones (SMZ) and riparian buffer areas with provisions for logging and woody debris removal requirements; mineral soil exposure limitations; restrictions on stream crossings and mechanical equipment use in

²⁰³ Written communication with Brian Peck and Diane Findley, USACE, Mobile District, April 17, 2003; Personal communication Brian Peck and Diane Findley, USACE, Mobile District, May 7, 2003.

²⁰⁴ Personal communication with Randall Chafin and Cary Prather, Birmingham Water Works Board, November 20, 2003.

²⁰⁵ Personal communication with John Jenkinson, Tennessee Valley Authority, Norris office, January 29, 2003; Personal communication with Anita Masters, Tennessee Valley Authority, January 30, 2003.

streams; silviculture guidelines; plowed fire-lines; and limited applications of pesticides and fertilizers.²⁰⁶

250. Further, the USFS is currently engaged in a programmatic consultation with the Service regarding the 2003 revision of the Alabama Forest Land and Resource Management Plan. The draft revised Plan incorporates Amendment 14 of the previous plan and further strengthens provisions for aquatic and riparian habitat and threatened and endangered species. Accordingly, the estimates of anticipated consultations within Alabama National Forests considers that the implementation of mutually agreed upon standards will reduce the number of programmatic and project related consultations, particularly for routine Forest management activities, such as establishment of appropriate project buffer zones related to prescribed burning, silviculture, recreation, and construction and other maintenance projects within the forests. The National Forests, however, have a back log of projects that have been delayed while waiting on the Plan revision and also due to budgetary constraints. Consequently, within the next ten years, overall numbers of project consultations will likely remain stable or slightly increase over the numbers of the previous decade.

Future Consultations

251. Portions of two districts of the Talladega National Forest lie within the proposed critical habitat Units 18, 19, 20, and 22 in Alabama, the Talladega District and Shoal Creek District.²⁰⁷ The two districts of the Talladega National Forest together anticipate up to **21 informal and two formal** section 7 consultations associated with forest service activities over the next ten years. These consultations are expected to correlate with the following activities taking place within the forests.

- **Prescribed burnings.** The USFS anticipates one informal consultation regarding prescribed burnings over the next ten years.
- **Special uses.** Special uses include projects that improve or establish access to private land or facilitate the construction of utilities, such as power lines. Approximately six informal consultations associated with special uses are likely to occur over the next ten years.
- **Recreation.** Recreational activities at Talladega that lead to section 7 consultations are campground maintenance and re-routing of all-terrain vehicle (ATV) trails. The USFS expects six informal consultations regarding

²⁰⁶ Alabama Forest Land and Resource Management Plan, Amendment 14, *Section 2. Bankhead, Talladega, and Tuskegee National Forests*, I-6 through I-7, July 1995.

²⁰⁷ Personal communication with Sara Chubb, U.S. Forest Service, National Forests in Alabama, May 5, 2003.

campground maintenance and re-routing of ATV trails over the next ten years.

- **Bridge construction or maintenance.** The USFS anticipates two informal consultations regarding bridge construction or maintenance projects over the next ten years.
- **Watershed protection.** Additionally, two informal consultations regarding watershed protection are expected over the next ten years.
- **Wildlife management plans.** The implementation of wildlife habitat management practices, such as the installation of forest openings, are likely to require an informal section 7 consultation. The USFS expects four informal consultations regarding wildlife management plans over the next ten years.²⁰⁸
- **Forest health and restoration.** The USFS foresees two formal consultations regarding forest health and restoration projects over the next ten years, one in each district of the National Forest.²⁰⁹

252. Activities in Bankhead National Forest in Unit 10 of the proposed critical habitat in Alabama are expected to result in **18 informal consultations and one formal consultation** over the next ten years in the following expected activities.

- **Prescribed burnings.** The USFS anticipates one informal consultation regarding prescribed burnings over the next ten years.
- **Special uses.** Special uses include projects that improve or establish access to private land or facilitate the construction of utilities, such as powerlines. Ten informal consultations associated with special uses are likely to occur over the next ten years.
- **Recreation.** Four informal consultations are expected to occur over the next ten years on projects involving trail heads and parking lot construction.

²⁰⁸ Personal communication with Jeff Gainey, Field Biologist, U.S. Forest Service, Talladega National Forest, February 24, 2003; Personal communication with Sara Chubb, U.S. Forest Service, National Forests in Alabama, May 5, 2003.

²⁰⁹ Personal communication with Sara Chubb, U.S. Forest Service, National Forests in Alabama, March 18, 2003 and May 5, 2003.

- **Bridge construction or maintenance.** The USFS anticipates one informal consultation regarding bridge construction or maintenance projects over the next ten years.
- **Forest and wildlife management plans.** The USFS anticipates two informal consultations regarding forest management plans, and wildlife management plans collectively over the next ten years.²¹⁰
- **Forest health and restoration.** The USFS foresees one formal consultation regarding forest health and restoration project over the next ten years.²¹¹

253. The Tuskegee National Forest area in Unit 17 of the proposed critical habitat in Alabama is likely to engage in activities resulting in up to **six informal and one formal** section 7 consultation over the next ten years.

- **Prescribed burnings.** The USFS anticipates one informal consultation regarding prescribed burnings over the next ten years.
- **Special uses.** One informal consultation associated with special uses is likely to occur over the next ten years.
- **Recreation.** Trail relocation projects are expected to lead to two informal consultations over the next ten years.
- **Road construction or maintenance.** The USFS foresees two informal consultations to result from road construction or maintenance projects.
- **Forest health and restoration.** The USFS foresees one formal consultation regarding a forest health and restoration project over the next ten years.²¹²

254. This analysis anticipates up to **13 informal consultations** over ten years with the USFS regarding the following activities and projects within the Chattahoochee-Oconee National Forest in Georgia (proposed critical habitat Unit 25).

²¹⁰ Personal communication with Glen Gaines, U.S. Forest Service, Bankhead National Forest, February 20, 2003; Personal communication with Sara Chubb, U.S. Forest Service, National Forests in Alabama, May 5, 2003.

²¹¹ Personal communication with Sara Chubb, U.S. Forest Service, National Forests in Alabama, March 18, 2003 and May 5, 2003.

²¹² Personal communication with Jorge Hersel, U.S. Forest Service, Tuskegee National Forest, February 21, 2003; Personal communication with Sara Chubb, U.S. Forest Service, National Forests in Alabama, May 5, 2003.

- **Silviculture.** The USFS manages all State and private timber harvests within the boundaries of national forests, ensuring all harvests are conducted in an ecologically sustainable manner. No timber sales harvests within the Chattahoochee National Forest are expected within the next two years. However, contingent on the adoption of the Forest's revised management plan, a maximum of ten harvests will occur within the decade that may result in informal section 7 consultation on the mussels.²¹³
- **Prescribed burns.** The USFS is responsible for conducting prescribed burns to maintain fire-dependent ecosystems and clear forest grounds of dead wood and brush. Prescribed burns are expected to result in two informal section 7 consultations on the mussels over the next ten years.²¹⁴
- **Forest management plan.** The Chattahoochee National Forest is in the process of revising and adopting its Forest Management Plan, which will guide all natural resource management activities for a ten to 15 year period. The plan will be reviewed by the Service to ensure it is appropriately protective of aquatic threatened and endangered species. This analysis anticipates one informal section 7 consultation on Chattahoochee National Forest's forthcoming management plan within the next ten years.

255. Activities conducted and overseen by the Cherokee National Forest within the proposed critical habitat designation Unit 25 in Tennessee are anticipated to result in **five informal section 7 consultations** with the Service over ten years.

- **Silviculture.** Cherokee National Forest expects to consult informally on up to three timber harvests and their impact on the proposed critical habitat for the mussels.²¹⁵
- **Recreation.** The USFS consults on recreational activities such as campground construction that occur in or adjacent to stream and river beds. One informal section 7 consultation related to recreational activities is expected to occur in the next ten years.

²¹³ Personal communication with Jim Wentworth, Forest Service, Cherokee National Forest, January 28, 2003; Personal communication with Keith Wooster, Forest Service, Armuchee-Cohutta District Office, Chattahoochee National Forest, January 29, 2003.

²¹⁴ Personal communication with Keith Wooster, Forest Service, Armuchee-Cohutta District Office, Chattahoochee National Forest, January 29, 2003.

²¹⁵ Personal communication with Jim Herring, Forest Service, Cherokee National Forest, January 7, 2003.

- **Road maintenance and construction.** This analysis anticipates one informal consultation on forest road construction and maintenance projects over the next ten years.²¹⁶

Project Modifications

256. Biologists at Bankhead, Tuskegee, and Talladega National Forests in Alabama maintain that due to the protections afforded the species in Amendment 14 of the Forest Land and Resource Management Plan, additional project modifications on their activities are not likely to be recommended by the Service. Further, no project modifications are expected to result from consultations in Chattahoochee or Cherokee National Forests.²¹⁷

4.2.6 Agriculture and Ranching-Related Activities

Baseline

257. All agricultural activities are bound by State water quality standards as outlined in Appendix A of this analysis. Further, the Natural Resource Conservation Service (NRCS) and Farm Services Agency (FSA) projects are typically designed in order to improve agricultural practices, including minimizing wildlife impacts.

Future Consultations

258. The NRCS in Alabama anticipates **six to nine informal and one formal consultation** over the next ten years. These low numbers can be attributed to the fact that few NRCS projects occur in the units being proposed for critical habitat designation.
- **Flood Control.** One formal consultation is likely to result for a flood control project through the Emergency Watershed Protection division of NRCS.
 - **Conservation Reserve Program (CRP).** NRCS expects four to six informal consultations related to the CRP program. However, this does not include riparian buffer restoration projects. NRCS does not consult with the Service regarding these projects due to the implementation and adherence to CRP guidelines.

²¹⁶ Personal communication with Jim Herrig, Forest Service, Cherokee National Forest, January 7, 2003.

²¹⁷ Personal communication with Jim Herrig, Forest Service, Cherokee National Forest, January 7, 2003; Personal communication with Keith Wooster, Forest Service, Armuchee-Cohutta District Office, Chattahoochee National Forest, January 29, 2003; Personal communication with Glen Gaines, U.S. Forest Service, Bankhead National Forest, February 20, 2003; Personal communication with Jeff Gainey, Field Biologist, U.S. Forest Service, Talladega National Forest, February 24, 2003; and personal communication with Sara Chubb, U.S. Forest Service, National Forests in Alabama, March 18, 2003.

- **Animal Waste Planning.** NRCS anticipates two to three informal consultations regarding animal waste planning projects within the Environmental Quality Incentives Program (EQIP) program.²¹⁸
259. The NRCS in Georgia runs an active EQIP program (see Section 3.2.6 of this analysis) and anticipates engaging in consultation with the Service regarding any EQIP projects within the proposed critical habitat Units 16 and 25. **Three informal and one formal consultations** are likely within these units over the next ten years and may regard activities such as heavy use area protection, upland habitat management, or critical area planning.²¹⁹
260. The NRCS in Tennessee provides technical and financial assistance to private landowners. Projects that may affect the mussels involve the implementation of such conservation practices as streambank stabilization, stream crossing, fencing, forested riparian buffer zones, filter strips, and manure application. The NRCS anticipates **20 informal consultations** regarding the application of streamside conservation practices over the next ten years.²²⁰
261. The FSA in Georgia fulfills farm loan requests from private landowners concerning the purchase of real estate such as farms, or for construction of barns or other livestock facilities that may result in a ground disturbance with the potential to affect the mussels habitat. The FSA anticipates **two informal** consultations in review of such projects within the proposed critical habitat Units 16 and 25 over the next ten years.²²¹
262. The USACE in Tennessee expects approximately **four informal and four formal consultations** related to 404 permitting of private landowner bank stabilization projects within Unit 25 of the proposed critical habitat for the mussels.²²²
263. The NRCS may consult in Southeastern States on their boll weevil eradication program. This program considers multiple threatened and endangered species, including each of the endangered mussels excluding the dark pigtoe. Fifteen different pesticides are utilized throughout the project area which encompasses different lands each year as the boll weevils become extirpated. Eight States are currently considered active in the eradication

²¹⁸ Personal communication with Tommy Counts, Wildlife Biologist, NRCS AL, March 7, 2003.

²¹⁹ Personal communication with Leonard Jordan, State Conservationist, Georgia NRCS, February 21, 2003.

²²⁰ Written communication with James Ford, State Conservationist, Tennessee NRCS, March 11, 2003.

²²¹ Personal communication with Steve Newton, State Director, Georgia FSA, February 20, 2003.

²²² Personal communication with William James, USACE, Nashville, TN, January 24, 2003.

program, including Mississippi and Tennessee.²²³ The Service in Mississippi and Tennessee, however, have commented that they have not consulted on this program in the past and do not anticipate doing so in the future. Cotton fields do not exist within or surrounding the area proposed as critical habitat within Tennessee and are present only in small quantities near critical habitat within Mississippi.²²⁴

264. During the public comment period for the draft version of this analysis, commenters expressed concern that the designation may hamper the ability of farmers, particularly of cotton, to treat their crop with pesticides.²²⁵ These commenters highlight the reliance of farmers on the ability to use chemical treatment on their product and anticipate that the designation will limit their ability to use new products to control pests. They also comment that the designation may result in stricter standards for registration of new products, but also note the increasing practice of conservation tillage and planting of genetically engineered crops to decrease the need for pesticide spraying in the region. The use of pesticide controls, however, has not been a subject of consultation in the past, and this analysis assumes that these consultations will not occur in the next ten years.²²⁶

Project Modifications

265. The anticipated formal consultation associated with a flood control project with the NRCS in Alabama may lead to the following project modifications:
- **Construction Methods.** The Service may restrict the use of mechanical equipment in the stream channel, and require all work to be completed from the bank. Costs associated with working from the bank depend on the width of the stream; therefore, they can range from an increase of ten to twenty percent of the total project cost, resulting in additional costs of \$4,460 to the consultation.²²⁷

²²³ Personal communication with Nancy Sweeny, Mississippi NRCS, February 25, 2003.

²²⁴ Personal communication with U.S. Fish and Wildlife Service, Jackson, MS Field Office, and Cookville, TN Field Office, April 24, 2003.

²²⁵ Comment letter from Alabama Farmers Federation, January 19, 2004; Comment letter from Edgar Farms, January 21, 2004; Comment letter from Ron Holladay, January 23, 2004.

²²⁶ Personal communication with U.S. Fish and Wildlife Service, Jackson, MS Field Office, and Cookville, TN Field Office, April 24, 2003.

²²⁷ A comment letter on the draft version of this analysis expressed concern that restricting the use of mechanical equipment in streams for EQIP and CRP projects may limit the farmers' ability to irrigate. This analysis, however, estimates increased costs of the alternative, requiring work to be done from the streambank, and not the costs of disallowing the activity altogether. Comment letter from Edgar Farms, January 21, 2004.

- **Termination of the project.** The NRCS may terminate the project completely if the Service decides that the project will result in jeopardy or adverse modification to the mussels or habitat. The cost of project cancellation is difficult to quantify as it depends on the planning stage of the project.²²⁸

266. Projects within the EQIP program are intended to positively impact the environment; therefore, consultations remain at the informal level, and are unlikely to lead to significant project modification.²²⁹ Similarly, the FSA in Georgia does not anticipate modification of projects due to section 7 consultation for the mussels.²³⁰

267. The USACE in Tennessee expects there to be a broad range of potential modification costs regarding bank stabilization activities. The four informal consultations are expected to bear additional project modification costs of approximately \$100 to ensure that correct sedimentation measures are in place. The four formal consultations, however, may bear an additional cost of up to \$10,000 to account for potential surveying for the mussels.²³¹

4.2.7 Water Quality Activities

Baseline

268. All water quality-related projects within the proposed critical habitat are subject to the provisions of the CWA and State water quality standards as outlined in Section 2.2.1 and Appendix A of this analysis. State water quality standards, as reviewed by the EPA, must be designed such that the water bodies meet their respective uses, including recreation and providing habitat to wildlife species. As such, State water quality standards intend to meet the needs of the mussels and consultations regarding water quality activities are primarily informal consultations without any recommended project modification.²³²

²²⁸ Personal communication with Tommy Counts, Wildlife Biologist, NRCS AL, March 7, 2003.

²²⁹ Personal communication with Tommy Counts, Wildlife Biologist, NRCS AL, March 7, 2003; Personal communication with Leonard Jordan, State Conservationist, Georgia NRCS, February 21, 2003.

²³⁰ Personal communication with Rick Guffey, The Nature Conservancy, February 21, 2003; Personal communication with Steve Newton, State Director, Georgia FSA, February 20, 2003.

²³¹ Personal communication with William James, USACE, Nashville, TN District, January 24, 2003.

²³² Clean Water Act, 33 U.S.C. § 131.11 and § 130.7.

Future Consultations

269. The EPA must approve Total Maximum Daily Load (TMDLs) levels along 303 (d) designated streams. Six stream segment exist within critical habitat that are on the State 303 (d) list due to water quality criteria impairments. The following list describes these rivers and their listed impairments.

- Unit 2: Bull Mountain Creek
 - pesticides
 - nutrients
 - organic enrichment/low dissolved oxygen
 - sediments/siltation

- Unit 3: Buttahatchee River
 - pesticides
 - nutrients
 - organic enrichment/low dissolved oxygen
 - sediments/siltation

- Unit 4: Yellow Creek
 - pesticides
 - nutrients
 - organic enrichment/low dissolved oxygen
 - sediments/siltation

- Unit 12: Locust Fork
 - nutrients
 - sediments/siltation

- Unit 13: Cahaba River
 - nutrients
 - sediments/siltation

- Unit 16: Tallapoosa River
 - organic enrichment/low dissolved oxygen

The EPA anticipates consulting once per impairment on each of these rivers over the next ten years (e.g., four consultations are anticipated for TMDLs at Yellow Creek over the next ten years).

270. Overall, **17 formal consultations** are anticipated to occur within these six critical habitat units with respect to EPA review of TMDL levels, one consultation for each aquatic life criteria impairment listed. Although such consultations may have been resolved

informally in the past, these informal consultations were particularly lengthy and the costs resulting are more accurately represented by the effort level and associated cost of a formal consultation.²³³

271. EPA further consults with the Service regarding review of State 303 (d) lists and State water quality standards. As these consults follow a standard format resulting from a past programmatic consultation, they are anticipated to remain informal in nature. **One to four informal consultations** are expected within each State in review of 303 (d) lists, and **three informal consultations** are anticipated within each State in review of water quality standards over the next ten years.²³⁴

272. EPA funding of Special Appropriation Projects (SPAPs) regarding water quality improvements may also result in consultations where these projects occur within or adjacent to the proposed critical habitat for the mussels. It is likely that funding of drinking water or wastewater facility improvements will result in **three formal consultations** over the next ten years.²³⁵

273. The Mobile District USACE states that it will likely engage in **one informal consultation** over the next ten years for the issuance of a 404 permit for the placement of fill material in jurisdictional wetlands.²³⁶

Project Modifications

274. Project modifications are not anticipated for approval of TMDLs, 303 (d) lists, or State water quality standards as provisions for the mussels are typically considered and recommendations of protective measures are often redundant with the CWA regulations.

SPAP projects within critical habitat may require the following modifications:

- **Species surveys.** Surveys typically cost anywhere between \$10,000 to \$25,000.

²³³ Personal communication with Duncan Powell, Environmental Protection Agency, Region 4, February 26, 2003 and March 17, 2003.

²³⁴ Personal communication with Duncan Powell, Environmental Protection Agency, Region 4, February 26, 2003 and March 17, 2003.

²³⁵ Personal communication with Duncan Powell, Environmental Protection Agency, Region 4, February 26, 2003.

²³⁶ Written communication with Brian Peck and Diane Findley, USACE, Mobile District, April 17, 2003.

- **Project redesign.** Pipelines and infrastructure may have to be relocated to avoid species habitat. This may introduce a cost of about \$25,000 to the project.

Accordingly, this analysis ascribes an additional cost of \$35,000 to \$50,000 to the three consultations regarding funding of SPAPs.

275. The Mobile District USACE anticipates the same project modification recommendations associated with the anticipated informal consultations as those anticipated for the 404 permits regarding road and bridge projects as described in Section 4.2.1 of this analysis. These project modifications include implementation of BMPs, pre-construction species surveys, mussel relocation, and habitat restoration and are estimated to add an incremental cost of \$21,800 to \$245,000 to each of the consultations.²³⁷

4.2.8 Conservation and Recreation

Baseline

276. Partners for Fish and Wildlife (PFW) projects are partially funded or otherwise supported by the Service. Because the Service is aware of species concerns, projects are designed to be beneficial to present species and habitat.

Future Consultations

277. In coming years, the Mobile District USACE intend to increase habitat restoration activities within the proposed critical habitat area for the mussels. Although in the recent past, the level of activity for such projects has been limited (there has been one consultation over the past eight years), the USACE anticipates up to **68 informal consultations** over the next ten years for Section 206 and 1135 aquatic habitat restoration projects as this program is accelerated (see Section 3.2.8).²³⁸
278. In addition, the USACE in Mobile, AL foresees **one formal** consultation associated with issuance of a 404 permit for the straightening of the channel at Black Creek in Mississippi.²³⁹

²³⁷ Written communication with Brian Peck and Diane Findley, USACE, Mobile District, April 17, 2003. Personal communication with Brian Peck and Diane Findley, USACE, Mobile District, May 7, 2003.

²³⁸ Written communication with Brian Peck and Diane Findley, USACE, Mobile District, April 17, 2003. Personal communication with Brian Peck and Diane Findley, USACE, Mobile District, May 7, 2003.

²³⁹ Written communication with Brian Peck and Davis Findley, USACE, Mobile District, April 17, 2003.

279. Typically PFW projects in Alabama concern wetland restoration activities, such as tree planting, or restoration of riparian forest buffers. Less frequently the projects will be related to agricultural improvements, such as cattle fencing. The Service in Alabama anticipates approximately **25 informal internal consultations** regarding PFW projects over the next ten years, two each in the Cahaba River area (Unit 13) and Bogue Chitto Creek area (Unit 15), and one each in the remaining critical habitat units within Alabama.²⁴⁰
280. The Service in Georgia engages in internal consultations on their PFW projects as well. Such projects most often involve streambank restoration, livestock fencing, vegetation planting, or control of exotic species. **Thirteen to 20 informal consultations** are likely over the next ten years in the Georgia portion of the proposed critical habitat for the mussels.²⁴¹
281. Within Mississippi, PFW activities revolve around bank stabilization and erosion control with small-scale private farms. The majority of the farms in this rural area are dedicated to cotton or soybean production. Approximately **nine informal internal consultations** are expected regarding PFW projects that may affect the mussels in Mississippi over the next ten years, three along the Buttachatchee (Unit 3) and two each around East Fork Tombigbee River (Unit 1), Bull Mountain Creek (Unit 2), and Luxapalila Creek (Unit 4).²⁴²
282. The Tennessee portion of critical habitat for the mussels (Unit 25) may experience up to **20 informal consultations** regarding PFW projects over the next ten years. Such projects typically involve livestock fencing, water sources for livestock, and hardening of stream crossings or bank stabilizations to prevent erosion.²⁴³
283. The Service funds the active fish stocking program that is run through the Mississippi Department of Wildlife, Fisheries, and Parks (DWFP) intended to restore recreational fisheries within the State of Mississippi. Once per year, an internal informal consultation takes place regarding fish stocking plans for the year. Each of the critical habitat streams within Mississippi may be stocked with game fish within the next ten years. Accordingly,

²⁴⁰ Personal communication with U.S. Fish and Wildlife Service, Partners for Fish and Wildlife, Daphne, AL Field Office, February 26, 2003.

²⁴¹ Personal communication with U.S. Fish and Wildlife Service, Partners for Fish and Wildlife, Athens, GA Field Office, February 20, 2003; Written communication with U.S. Fish and Wildlife Service, Athens, GA Field Office, April 17, 2003.

²⁴² Personal communication with U.S. Fish and Wildlife Service, Partners for Fish and Wildlife, Jackson, MS, Field Office, February 28, 2003.

²⁴³ Personal communication with U.S. Fish and Wildlife Service, Partners for Fish and Wildlife, Cookville, TN Field Office, February 21, 2003.

ten informal internal section 7 consultations are anticipated over the next ten years within the Mississippi portion of the critical habitat designation for the mussels.²⁴⁴

Project Modifications

284. The USACE in Alabama anticipates the same project modification recommendations associated the anticipated formal consultations as for the 404 permits regarding road and bridge projects as described in Section 4.2.1 of this analysis. These project modifications include implementation of BMPs, pre-construction species surveys, mussel relocation, and habitat restoration and are estimated to add an incremental cost of \$21,800 to \$245,000 to the consultation regarding channel straightening.²⁴⁵
285. This analysis does not estimate that the USACE aquatic habitat restoration projects will bear additional project modification costs as these projects are intended to be beneficial to the species and habitat and accordingly are not anticipated to have adverse effects. Although these projects will require species surveys, because of the nature of the project to provide adequate habitat for the species, these surveys would be conducted for the projects regardless of the section 7 activity.²⁴⁶
286. As these projects are designed to benefit the mussels and habitat, PFW consultations are not expected to bear any additional project modification costs. Further, the MS DWFP does not anticipate project modifications to their fish stocking program within the State of Mississippi.

4.2.9 Dredging and Clearing

Baseline

287. The required section 10 sand and gravel excavation permit provides baseline protections to the mussels. Some of the special conditions contained in the permit limit the dredging activity as follows: (1) no destruction of a threatened or endangered species or the critical habitat of such species; (2) work restricted to outside the stream flow, “in the dry,” and during low flow conditions from July 15 through October 31; (3) maintenance of a mandatory buffer zone between the excavation site and the stream flow; (4) streamside vegetation must be left undisturbed and intact; and (5) site access is limited to the existing

²⁴⁴ Personal communication with Bubba Hubbard, Mississippi Department of Wildlife, Fisheries, and Parks, January 2, 2003, and March 14, 2003.

²⁴⁵ Written communication with Brian Peck and Diane Findley, USACE, Mobile District, April 17, 2003. Personal communication with Brian Peck and Diane Findley, USACE, Mobile District, May 7, 2003.

²⁴⁶ Personal communication with U.S. Fish and Wildlife Service, Daphne, AL Field Office, May 7, 2003.

road network.²⁴⁷ State water quality permits also provide a level of baseline protection for the mussels.

Future Consultations

288. The Mobile District ACE anticipates **six informal and eight formal consultations** for dredging activities within the proposed critical habitat for the mussels. These dredging events are categorized accordingly.²⁴⁸

- **Maintenance dredging and disposal.** Four formal and five informal consultations may occur over the next ten years regarding issuance of 404 permits associated with this activity. These projects typically involve new excavation and also include debris removal, clearing, and snagging. Two of these informal consultations are associated with new excavation for construction of a marine facility on the Alabama River (Unit 14).
- **Commercial sand and gravel dredging.** One informal consultation is anticipated in Unit 4 of the proposed critical habitat.
- **Dredging for small boat access.** This dredging is limited to the mouths of the sloughs and boat ramps and may be done in conjunction with the dredging of the Federal navigation channel. The USACE, however, foresees up to two formal consultations over the next ten years for dredging of the small boat access channel in the Alabama River (Unit 14) separate from the consultations regarding dredging of the Federal navigation channel.
- **Dredging of Federal navigation channel.** Two formal consultations may occur over the next ten years associated with dredging of the Federal navigation channel on the Alabama River from Gardner's Island to R.F. Henry Lock and Dam. This dredging occurs approximately every five years and there is one ongoing consultation anticipated to be completed in summer 2003. Therefore, one consultation is anticipated to occur in approximately five years, and another in ten years from now.

289. The USACE also anticipates consulting on their Operations and Maintenance Activities in Units 1 through 6 over the next ten years accordingly.

²⁴⁷ Department of the Army Regional Permit 97-RP-2, 3, 4

²⁴⁸ Written communication with Brian Peck, Diane Findley, Davis Findley, and Roger Gerth, USACE, Mobile District, April 17, 2003. Personal communication with Brian Peck and Diane Findley, USACE, Mobile District, May 7, 2003. Personal communication with U.S. Fish and Wildlife Service, Daphne, AL Field Office, May 7, 2003.

- Unit 1, East Fork Tombigbee River- **Two formal consultations** may occur regarding maintenance of the Tennessee Tombigbee Waterway Wildlife Mitigation Feasibility Project.
- Unit 3, Buttahatchee River and tributary- Channel degradation on Unit 3 may require **two formal consultations**
- Unit 4, Luxapalila Creek and tributary- **Two formal consultations** regarding general operations and maintenance activities are anticipated.²⁴⁹

290. The Tombigbee River Valley Water Management District (TRVWMD) anticipates 12 to 18 per year, or **120 to 180 informal consultations** regarding flood prevention projects permitted by the USACE over the next ten years.²⁵⁰ Projects include removing snags, mowing, erosion control, and removing obstructions in the tributaries of the Tombigbee River.

Project Modifications

291. The USACE in Alabama anticipates the same project modification recommendations for each of the six informal and 13 of the 14 formal consultations as for the 404 permits regarding road and bridge projects as described in Section 4.2.1 of this analysis. These project modifications include implementation of BMPs, pre-construction species surveys, mussel relocation, and habitat restoration and are estimated to add an incremental cost of \$21,800 to \$245,000 to these dredging and operations and maintenance projects.²⁵¹

292. The dredging of the Federal navigation channel, however, may result in greater project modification costs as this activity may require establishing 300 foot (91 meter) buffer zones around known mussel beds, and the purchase of upland disposal areas for the dredge material. For the current dredging consultation, the USACE and the Service have agreed that it is best for the dredge material to remain in-stream after dredging.²⁵² The Service has indicated that it intends to make this same recommendation for future dredging consultations.²⁵³ In this case, the project modifications associated channel dredging would

²⁴⁹ Comments from USACE, Mobile District received on February 6, 2004 on the Draft Economic Analysis of Critical Habitat Designation for Eleven Mobile River Basin Mussels.

²⁵⁰ Personal communication with Jimmie Mills, Executive Director Tombigbee River Valley Water Management District, November 11, 2003, and December 5, 2003.

²⁵¹ Written communication with Brian Peck and Diane Findley, USACE, Mobile District, April 17, 2003.

²⁵² Personal communication with U.S. Fish and Wildlife Service, Daphne, AL Field Office, May 6, 2003.

²⁵³ Personal communication with U.S. Fish and Wildlife Service, Daphne, AL Field Office, May 6, 2003.

consist of the same measures as described above at a cost of \$21,800 to \$245,000 per consultation. The USACE, however, has expressed concern that for future consultations the Service may request that dredge material be removed from the stream. This would require purchase of land upstream to serve as a disposal site for the dredge material. Acquiring and establishing such land is anticipated to cost up to \$8,000,000.²⁵⁴ Because of the potentially harmful geomorphic effects to mussels, the Service has stated that it does not intend to recommend upland disposal of dredge material in the Alabama River within the foreseeable future.²⁵⁵

293. The establishment of new upland disposal sites is a one time cost and, consequently, would be associated with only one of the two formal consultations anticipated for dredging of the Federal navigation channel. For the purposes of this analysis, project modification costs for purchase of upland disposal sites are assumed to be associated with the first consultation, and may range from \$21,800 to \$8,245,000. The variation in this range stems from the uncertainty regarding whether or not purchase of upland disposal areas will be recommended. Project modifications associated with the second formal consultation are anticipated to range from \$21,800 to \$245,000, as the one time cost of acquiring disposal sites is assumed to be associated with the first consultation.

294. TRVWMD anticipates that it is possible that the Service may recommend modification for their maintenance activities in the tributaries of the Tombigbee River.²⁵⁶ In the worst case scenario, TRVWMD note a possibility that they will be precluded from conducting these activities. The Service and the USACE, however, do not anticipate that the clearing activities will be interrupted, due to the fact that they occur in the tributaries which are outside of the proposed designation, and further because the clearing of the tributaries allows for more flow to the mainstem Tombigbee River which may benefit the mussels. It is in the best interest of the mussels that the desnagging of the tributaries occur.²⁵⁷ No project modifications are anticipated associated with these activities.

²⁵⁴ Written communication with Brian Peck and Roger Gerth, USACE, Mobile District, April 17, 2003; Personal communication with Brian Peck and Diane Findley, USACE, Mobile District, May 7, 2003.

²⁵⁵ Hartfield, Paul and J. Garner. 1998. Report on Dive Surveys of the Lower Alabama River, 1998. U.S. Fish and Wildlife Service, Jackson, MS.

²⁵⁶ Personal communication with Jimmie Mills, Executive Director Tombigbee River Valley Water Management District, November 11, 2003, and December 5, 2003.

²⁵⁷ Personal communication with Fish and Wildlife Service personnel, Mississippi Field Office, December 4, 2003; Personal communication with Brian Peck, Ken Klasman, Mike Eubank, Hugh McClellan, and Leon Cromartie, Army Corps of Engineers personnel, December 5, 2003.

4.2.10 Coal Mining

Baseline

295. As described in Section 3.2.10 of this analysis, the only State within the designation for which coal mining may experience an incremental economic burden due to the designation of critical habitat for the mussels is Alabama. The Alabama Surface Mining Commission (ASMC) currently has regulatory authority to permit mine sites. The ASMC Administrative Code stipulates that “Habitats of unique or unusually high value for fish, wildlife and other related environmental values and critical habitats of threatened or endangered species identified pursuant to the Endangered Species Act of 1973 shall not be disturbed during coal exploration.”²⁵⁸

Future Consultations

296. The Bureau of Land Management (BLM) plans to lease approximately 3,000 acres in Fayette County, Alabama in order to add additional acreage to an existing underground coal mine operated by Pittsburgh and Midway. This project occurs in a portion of the North River within the boundaries of proposed critical habitat Unit 11. The extended mine will not require new surface facilities, and will extend the life of the underground mine by 20 years.²⁵⁹ In November of 2003, the BLM sent a request for **one informal consultation** regarding this project to the Service with an accompanying Biological Assessment (BA). The BA concluded that the project as proposed will not adversely impact critical habitat.

Project Modifications

297. In development of the BA for the underground mine extension, the Bureau of Land Management spent \$8,850 on a species survey to determine the presence or absence of the mussel species. One live dark pigtoe was found within the North River at the mouth of Cedar Creek. Shells of orange-nacre mucket were found in the lower reaches of Cedar Creek and Tyro Creek in Unit 11. Further, the licensee, Pittsburgh and Midway, spent \$150 on a water quality assessment to examine potential changes in water quality parameters such as pH, total iron, total manganese, total suspended solids, and trace metals. This assessment concluded that the mine extension would not result in a significant impact to surface water quality and that any dewatering would affect only the groundwater. “Overall, flow reductions and impacts to water quality to the North River, proposed critical habitat for five

²⁵⁸ Alabama Surface Mining Commission Administrative Code, Chapter 880-X-10B Performance Standards—Coal Exploration.

²⁵⁹ Letter from Sid Vogelpohl, Bureau of Land Management, April 9, 2003.

unionid mussels, is expected to be negligible.²⁶⁰ This analysis ascribes an incremental cost of \$9,000 associated with the species survey and water quality assessment for the consultation regarding expansion of the North River Mine.

4.3 Estimated Technical Assistance Efforts

298. Although they are not direct section 7 costs, technical assistance efforts are included in the cost analysis when it is determined that they are engendered by consideration of species and habitat protection resulting from the designation of critical habitat. The estimates for the per effort technical assistance costs are based on recent experience at the Service's Daphne, AL Field Office. Costs associated with these efforts include the opportunity cost of Service personnel time, as well as third party staff costs. Per effort costs associated with technical assistance are presented in Exhibit 4-1. On average, technical assistance efforts required approximately an hour of Service personnel time. Therefore, on average technical assistance requests cost approximately \$50 per request.²⁶¹

4.3.1 USFS Technical Assistance

299. The USFS requests technical assistance to inform the Service about various projects and ensure that they abide by State BMPs and criteria within Forest Management Plans. Both the USFS in Chattahoochee and Cherokee National Forests anticipate requesting technical assistance from the Service approximately two times per year.²⁶² Thus, a total of **40 technical assistance** requests are anticipated within the next ten years within Unit 25 of the proposed critical habitat.

4.3.2 NPDES permit review

300. In all four States, the Service is notified and receives copies of draft NPDES permits from State environmental agencies. NPDES permitted activities requiring EPA oversight are for discharges exceeding one million gallons per day (one MGD). Most NPDES activities within proposed critical habitat for the mussels do not meet this criteria and therefore do not require EPA oversight. Consequently, exchanges between State environmental agencies and the Service are classified as technical assistance efforts. These technical assistance efforts generally involve the Service notifying both State agencies and applicants about the presence

²⁶⁰ Bureau of Land Management, Lackson Field Office, *Biological Assessment on the Pittsburgh & Midway Coal Mining Company North River Mine - R-24/Additional Areas Fayette County*, November 2003; personal communication with Faye Winters, Bureau of Land Management, November 25, 2003.

²⁶¹ Personal communication with U.S. Fish and Wildlife Service, Daphne, AL Field Office, February 28, 2003.

²⁶² Personal communication with Jim Herring, Forest Service, Cherokee National Forest, January 7, 2003; Personal communication with Jim Wentworth, Forest Service, Chattahoochee National Forest, January 28, 2003.

of the mussels and ensuring that federal and State water quality standards are addressed. This analysis estimates that approximately 400-460 technical assistance efforts regarding NPDES activities will occur over the next ten years.

301. In Alabama, the Service has commented on NPDES activities permitted by the Alabama Department of Environmental Management (ADEM). Effluent limitations and other restrictions contained in ADEM NPDES permits are consistent with EPA regulations and applicable State water quality standards and are designed to protect indigenous species of fish and wildlife, including endangered species. ADEM also applies guidelines within the Alabama Soil & Water Conservation Committee's Alabama Handbook Best Management Practices.²⁶³ This analysis estimates that approximately **320 technical assistance efforts** between the Service and ADEM regarding NPDES permitted activity over the next ten years.²⁶⁴
302. In Georgia, the Service comments on about 50-100 percent of the draft NPDES permits they receive from the Georgia Environmental Protection Division (EPD) regarding potential impact on threatened and endangered species. Within the counties under consideration for mussel critical habitat in Georgia, on average 12 NPDES permits are issued per year.²⁶⁵ In the past few years, EPD has not had any new or expanding permits meeting the one MGD criteria for the Service to review in the particular counties under consideration.²⁶⁶ This analysis anticipates that a range of **60 to 120 technical assistance efforts** will take place in the next ten years with regard to NPDES permits in the Georgia portion of the proposed designation.
303. NPDES activities within the Mississippi portion of the proposed designation typically relate to wastewater discharge. The Service occasionally sends letters to the Mississippi Department of Environmental Quality (MDEQ) to ensure that pH, chlorine and ammonia levels will not impact the mussels. No discharge facilities within the Mississippi counties in the proposed critical habitat designation meet the one MGD criteria.²⁶⁷ This analysis

²⁶³ Personal communication with Richard Hulcher, Alabama Department of Environmental Management, February 24 and 26, 2003.

²⁶⁴ Personal communication with Larry Goldman, U.S. Fish and Wildlife Service, Daphne Office, March 5, 2003.

²⁶⁵ The Georgia EPD stated that in past years, the Service had supplied technical assistance on 50 to 100 percent of their NPDES permits within the critical habitat designation. Personal communication with Dave Bullard, Georgia EPD, February 24, 2003.

²⁶⁶ Personal communication with David Bullard, Georgia Department of Natural Resources, Environmental Protection Division, February 24 and 27, 2003.

²⁶⁷ Personal communication with Rickey Terry and Leslie Barkley, Mississippi Department of Environmental Quality, February 25, 26, 2003.

estimates approximately **20 technical assistance efforts** will take place over the next ten years regarding NPDES permit review in Mississippi.

304. The Service has reviewed NPDES activities permitted by the Tennessee Department of Environment and Conservation (TDEC). Most of the areas within the Tennessee portion of the proposed designation for the mussels, however, are within Cherokee National Forest and therefore few land use activities require NPDES permits. Moreover, due to the biologically diverse nature of the Conasauga, TDEC is not likely to permit NPDES activity in this region. Accordingly, TDEC does not anticipate any technical assistance or informal consultations with the Service within the next ten years.²⁶⁸

4.3.3 Power Company Certifications

305. Mississippi assists private power companies by providing technical assistance in review of statewide blanket certifications to ensure that activities adequately provide for area wildlife, including the 11 mussel species. Each company requests technical assistance on certifications approximately once per year. Although there are 12 power companies operating within the proposed critical habitat for the mussels, the Service anticipates engaging in **six technical assistance efforts** regarding the review of statewide certifications over the next ten years.

4.3.4 Coal Mining Permits

306. As discussed in Section 3.2.10 of this analysis, all mines require a surface coal mining permit issued under the authority of Surface Mining Control and Reclamation Act SMCRA. The Office of Surface Mining (OSM) has granted primacy to Alabama. The Alabama Surface Mining Commission (ASMC) issues permits according to SMCRA to active mines within the State of Alabama and confers with the Service in order to avoid adverse impacts associated with species and habitats. There are currently six active coal mines within or abutting the proposed critical habitat for the mussels.²⁶⁹ SMCRA permits are issued every five years at each mine. There is no Federal nexus in Alabama associated with review of these permits. Further, the ASMA has stated that these permits in the past have not been determined to impact critical habitat and so review of permits by the Service has not involved changes to permits. This analysis accordingly ascribes **12 technical**

²⁶⁸ Personal communication with Saya Qualls, Tennessee Department of Environment and Conservation, Water Pollution Control, February 27, 2003.

²⁶⁹ Written communication with Randall Johnson, Director, State of Alabama Surface Mining Commission, December 1, 2003.

assistance efforts in review of coal mine site permits within Alabama over the next ten years.²⁷⁰

4.3.5 Boat Ramp Activities

307. The Service in Mississippi also anticipates providing technical assistance to private parties with respect to construction or maintenance of boat ramps within the proposed critical habitat in Mississippi. Proper construction of the ramps avoids negative impact to the species. Approximately one technical assistance effort is expected within Units 1, 2, and 3 of the proposed designation for a total of **three technical assistance efforts** regarding boat ramp activity over the next ten years.

4.3.6 Private Landowner Support

308. Private landowners may request technical assistance from the Service in order to ensure that their activities that are not subject to section 7 consultation adequately provide for the species and habitat. Although this is not a section 7 cost, it is included in the cost analysis where it is determined that the effort is engendered by the designation of critical habitat.
309. The Service in Georgia responds to calls from private landowners regarding the potential impacts of critical habitat designation. Approximately **60 to 80 technical assistance efforts** are anticipated with regard to private landowner support, 30 to 40 within Unit 16 and 30 to 40 within Unit 25.
310. The Service in Alabama likewise responds to private landowner concerns regarding potential or perceived impacts of critical habitat on private lands. Such activities may generate about **120 technical assistance efforts** within the AL portion of the designation over the next ten years.

4.4 Other Regulatory Assessments

Potential Impacts on Small Entities

311. Under the Regulatory Flexibility Act (as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996), whenever a Federal agency is required to publish a notice of rulemaking for any proposed or final rule, it must prepare and make available for public comment a regulatory flexibility analysis that describes the effect of the

²⁷⁰ Letter from Arthur W. Abbs, Office of Surface Mining, June 24, 2003; personal communication with Randy Johnson, Alabama Surface Mining Commission, November 25, 2003 and December 1, 2003.

rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions).²⁷¹ No regulatory flexibility analysis is required, however, if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities.²⁷² SBREFA amended the Regulatory Flexibility Act to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have a significant economic impact on a substantial number of small entities. Accordingly, Appendix B of this analysis provides a screening level analysis of the potential effects of critical habitat designation on small entities to assist the Secretary in making this certification.

Potential Impacts on the Energy Industry

312. Pursuant to Executive Order No. 13211, “Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use,” issued May 18, 2001, Federal agencies must prepare and submit a “Statement of Energy Effects” for all “significant energy actions.” The purpose of this requirement is to ensure that all Federal agencies “appropriately weigh and consider the effects of the Federal Government’s regulations on the supply, distribution, and use of energy.”²⁷³ The Office of Management and Budget has provided guidance for implementing this executive order that outlines nine outcomes that may constitute “a significant adverse effect” when compared without the regulatory action under consideration. Appendix B of this analysis provides an analysis of the potential effects of critical habitat designation on the energy industry.

²⁷¹ Small businesses are defined by the Small Business Administration, most commonly in terms of the number of employees or annual receipts. A small organization is “any not-for-profit enterprise...which is independently owned and operated and is not dominant in its field.” A small government is the government of a city, county, town, school district, or special district with a population of less than 50,000, not including tribal governments. Regulatory Flexibility Act, 5 U.S.C. 601 et. seq.

²⁷² Thus, for a regulatory flexibility analysis to be required, impacts must exceed a threshold for “significant impact” **and** a threshold for a “substantial number of small entities.” See Regulatory Flexibility Act, 5 U.S.C. 605 (b).

²⁷³ Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, <http://www.whitehouse.gov/omb/memoranda/m01-27.html>

313. The published economics literature has documented that real social welfare benefits can result from the conservation and recovery of endangered and threatened species (Bishop (1978, 1980), Brookshire and Eubanks (1983), Boyle and Bishop (1986), Hageman (1985), Samples *et al.* (1986), Stoll and Johnson (1984)). Such benefits have also been ascribed to preservation of open space and biodiversity, both of which are associated with species conservation (see examples in Pearce and Moran (1994) and Fausold and Lillieholm (1999)). Likewise, it is possible that regional economies and communities can benefit from the preservation of healthy populations of endangered and threatened species, and the habitat on which these species depend.
314. However, a purpose of the Act is to provide for the conservation of endangered and threatened species. Thus, the benefits of actions taken under the Act are primarily measured in terms of the value placed by the public on species preservation (e.g., avoidance of extinction, and/or an increase in a species' population). Such social welfare values may reflect both use and non-use (i.e., existence) values. For example, use values might include the potential for recreational use of a species (e.g., viewing opportunities) should recovery be achieved. Non-use values are not derived from direct use of the species, but instead reflect the utility the public derives from knowledge that a species continues to exist.
315. In addition, as a result of actions taken to preserve endangered and threatened species, various other benefits may accrue to the public. Such benefits may be a direct result of modifications to projects made following section 7 consultation, or may be collateral to such actions. For example, a section 7 consultation may result in the conservation of buffer strips along streams, in order to reduce sedimentation due to construction activities. A reduction in sediment load may directly benefit water quality, while the presence of buffer strips may also provide the collateral benefits of preserving habitat for terrestrial species and enhancing nearby residential property values (e.g., preservation of open space).
316. The remainder of this chapter describes the categories of benefits resulting from implementation of section 7 of the Act in the context of areas affected by the proposed designation. First, it qualitatively describes the types of benefits likely to result from section

7 protections. Then, it addresses both the benefits associated with species preservation as well as habitat protection.

317. As discussed below, it is not feasible to fully describe and accurately monetize the benefits of this designation in the context of this economic analysis, particularly on a unit-by-unit basis. During the public comment period for the draft version of this analysis several comments expressed concern over the lack of quantified benefits of the designation. The discussion presented in this report provides insight into the potential benefits of the designation based on qualitative information obtained in the course of developing the economic analysis and feedback from the public comment period. It is not intended to provide a complete analysis of the benefits that could result from section 7 of the Act. *The Service believes that the benefits of critical habitat designation are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.*

5.1 Categories of Benefits

318. Implementation of section 7 of the Act is expected to substantially increase the probability of recovery for the 11 mussels. Such implementation includes both the jeopardy provisions afforded by the listing, as well as the adverse modification provisions provided by the designation. Specifically, the section 7 consultations that address the 11 mussels will assure that actions taken by Federal agencies do not jeopardize the continued existence of the 11 mussels or adversely modify its habitat. Note that these measures are separate and distinct from the section 9 “take” provisions of the Act, which also provide protection to this species.

319. The benefits of critical habitat designation can therefore be placed into two broad categories:(1) those associated with the primary goal of species conservation, and (2) those that derive mainly from the habitat protection required to achieve this primary goal. In the case of the 11 mussels, habitat protection provides for a variety of environmental benefits, including:

- **Decreased sedimentation and decreased turbidity** resulting from erosion control measures, maintenance of minimum flows, and habitat protection, restoration, and enhancement projects.
- **Stable water volume, flow, and depth** resulting from erosion control measures and maintenance of minimum flows.
- **Stable water temperature** resulting from maintenance of minimum flows.
- **Decreased habitat loss** resulting from erosion control measures, maintenance of minimum flows, habitat protection, restoration, and enhancement projects.

- **Decreased chance of isolation of mussel species and fish host species** resulting from increased flows at dam sites and mussel relocation efforts.

320. Exhibit 5-1 details those activities expected to generate section 7 consultations leading to project modifications associated with the proposed critical habitat for the 11 mussels, organized by the category of physical/biological improvement expected to result from the project modification. Specifically, this exhibit identifies the physical/biological improvements expected to result from implementation of section 7 of the Act and existing baseline protections. As discussed, uncertainty exists in appropriately allocating the number and costs of certain project modifications between existing baseline regulations, such as the Federal Power Act, and the implementation of section 7 of the Act.

321. It is expected that 71 consultations will result in project modifications providing for stable water quality, flow and depth. These are expected to result from consultations regarding road and bridge construction (24 consultations), dredging (14 consultations), utilities construction and maintenance (14 consultations), agriculture and ranching improvement projects (nine consultations), hydropower operations (three consultation), water quality activities (four consultations), conservation and recreation projects (one consultation), and water supply dams (one consultation). These consultations will be conducted under both the section 7 listing provisions (i.e., jeopardy), as well as the section 7 critical habitat related provisions (i.e., adverse modification), and thus are not solely attributable to the proposed designation. Note that estimates of future consultations provided in Exhibit 5-1 are conservative (i.e., more likely to overstate than understate the true number of project modifications that could result from section 7 requirements associated with the 11 mussels). For example, forecast modifications to hydro-power projects may, in fact, have been required under the Federal Power Act in the absence of section 7.

322. The physical/biological improvements listed in Exhibit 5-1 may in turn provide for a variety of economic benefits. For example, reduced sedimentation and turbidity may improve fish populations, resulting in improved recreational fishing opportunities. The discussion below provides qualitative descriptions of the economic benefits associated with these environmental improvements. As noted, while it is possible to estimate the number of projects that will generate consultations requiring project modifications, existing data do not allow for quantification or monetization of the ecological or economic implications of these requirements.

Exhibit 5-1

**PHYSICAL/BIOLOGICAL IMPROVEMENTS ANTICIPATED TO
RESULT FROM IMPLEMENTATION OF SECTION 7 CONSULTATIONS FOR THE MUSSELS**

Physical/Biological Improvement	Expected Project Modification	Nexus	Critical Habitat Unit	Number of Expected Consultations
Decreased erosion/sedimentation	Implementation of erosion control measures and limits on in-stream construction activities	FHA/DOT	Units 3-26	20
		USACE	Units 1,2, 3, 4, 7, 11, 12, 13, 14, 17, 18, 20, 23, and 25	50
		FERC	Units 18 and 25	2
		NRCS	Unit 3-26	1
		EPA	Unknown Units	3
Increasing flows through the historical channel of the river (allows for more habitat for multiple species and restoration of fisheries)	Implementation of minimum flows	FERC	Units 18 and 25	2
		USACE	Unit 11	1
Habitat improvements	Post-construction habitat restoration activities	USACE	Units 1,2, 4, 7, 11, 12, 13, 14, 17, 18, 20, 23, and 25	42

5.1.1 Benefits Associated with Species Conservation

323. The primary benefit of designating critical habitat is to increase the chance of conservation for the mussels. Quantifying the benefits associated with improved chance of conservation requires an assessment of the public's value for the designation of critical habitat for species such as the mussels. This may include both a use and non-use (i.e., existence value) component.

Use Value

324. The value that the public holds for species preservation may include a direct use component related to commercial harvesting or viewing opportunities. Commercial harvesters, however, have generally focused on more conspicuous mussel species for the purpose of buttons and pearl nuclei. Below we describe possible human use benefits associated with the recovery of the 11 mussels.
325. Freshwater mussels have historically been used for a variety of commercial purposes. Notably, in the late 19th century mussel shells were harvested to create "pearl buttons" for shirts. This trade ended with the development of synthetic substitutes. In more recent years, freshwater mussels were harvested in the U.S. to provide nuclei for the cultivated pearl industry. Significant numbers of mussels were harvested in the South (including Tennessee and Alabama) to support this export industry; in fact, harvest in some States rose to a level that threatened mussel populations (both those species that were the target of the harvest effort as well as those simply affected by harvest activities). Restrictions on freshwater mussel harvests to protect all mussel species are now in effect in many States, including Georgia, Tennessee, and Alabama.
326. While several species of freshwater mussels provide some commercial economic benefit, the shells of most of the 11 mussels are too thin to be valued by the mussel harvest industry, and were not commercially harvested historically. The heavier shelled of the 11 species, such as the southern clubshell and the triangular kidneyshell, may have occasionally been used in the historic button manufacture industry, however, they have never been target species for commercial mussel harvest.²⁷⁴ Thus, commercial benefits are not expected to result in the foreseeable future from the recovery of the 11 mussels.
327. Mussels also provide potential benefits to humans in their role as filter feeders. Sedell and Sharpe (2000) in their publication on valuing ecosystem services, valued water filtration on U.S. National Forests to be \$3.7 billion annually.²⁷⁵ Multiple municipalities

²⁷⁴ Personal Communication with Paul Hartfield, USFWS, Jackson, MS, Field Office, December 6, 2002, and March 14, 2003.

²⁷⁵ Sedell, J., et. al. *Water and the Forest Service*. Washington, DC: USDA Forest Service, FS 660, page 6. A comment letter provided by the Southern Appalachian Biodiversity Project provided this information to reinforce the positive economic value of filtered water. This estimated value of water filtration was derived using regional average marginal values from willingness-to-pay studies and water market transaction evidence. Importantly, the estimated value

within the designation rely on surface water sources for drinking water. These municipalities operate water filtration facilities in order to ensure the drinking water supply adequately meets human health standards. Several parties commented during the public comment period that it is possible that the economic burden imposed by these facilities may be in part alleviated if the mussels were thriving and therefore able to reduce the nutrient pollution load through filtration.²⁷⁶

Existence Value

328. Existence value reflects the utility the public derives from knowledge that a species continues to exist. A number of published studies have indicated that the public holds values for endangered and threatened species separate and distinct from any expected direct use of these species (i.e., a willingness to pay to simply assure that a species will continue to exist). These studies include Boyle and Bishop (1987), Elkstrand and Loomis (1998), Kotchen and Reiling (2000), and Loomis and White (1996). While none of these studies addresses mussels generally, or these eleven mussels in particular, many commenters believe that the mussels provide intrinsic value, and that this value will be enhanced by their survival and conservation.
329. This analysis attempts to assess the benefits of protections afforded the mussels as a result of designating an additional unit of critical habitat. The existing economics literature does not provide quantitative estimates of these benefits. To accurately quantify the existence value benefits for the mussels would require information regarding the public's marginal willingness to pay for an incremental unit of critical habitat, in terms of the increased probability of conservation or increase in abundance of the species.

5.1.2 Benefits Associated with Habitat Protection

330. As noted above, habitat preservation provides for a range of economic benefits, as discussed below.

Sport Fishing

331. Designation of critical habitat for the 11 mussels may result in improved recreational fishing opportunities, given improved water quality and habitat. That is, recreational anglers may benefit from enhanced catch rates, a broader range of target species, and improved

of \$3.7 billion is intended to reflect the value of water filtration in the entire National Forest system, and can not be used to extrapolate the value of water filtration within the study area of this analysis.

²⁷⁶ Public comment letter from Coosa River Basin Initiative (CRBI), October 14, 2003. CRBI noted in its comment letter that the mussels provide an important ecosystem service in filtering water. The comment letter also highlights that the City of Rome, Georgia plans to spend \$2.5 million to build lagoons in order to contain excess sediment that is filtered out of the Oostanaula River to provide safe drinking water. This letter also emphasizes the importance of recreational benefits associated with habitat conservation.

stream aesthetics. Associated benefits could include an increase in tourism and recreation-industry jobs and expenditures in areas of the designation.

332. In a letter provided during the public comment period, the Southern Appalachian Biodiversity Project highlighted the important economic contribution of recreation within the States containing proposed critical habitat for the mussels. The Project cited one study that evaluated the economic output of fishing, hunting, and wildlife viewing within the National Forests in States containing proposed critical habitat for the mussels. In 1996, this value amounted to \$248 million in Alabama, \$251 million in Georgia, and \$220 million in Tennessee.²⁷⁷ This study underscores the economic importance of providing healthy ecosystems for recreation; however, the dollar estimates may not be considered due entirely to the preservation of mussel habitat as it is unclear to what extent these activities occur within the mussel habitat and by what margin preservation of the habitat as provided by critical habitat designation will impact expenditures on recreational activities.

Other Recreation Benefits

333. In addition to the long-term potential for improvements in regional sport fisheries, protecting critical habitat for this species may result in preservation of habitat suitable for other recreational uses, such as hunting, hiking, boating and swimming. Conservation of various habitats may in turn lead to increased tourism and contribute to the expansion of a tourist economy in certain counties.²⁷⁸ In addition, such activities are likely to generate social welfare benefits to recreators.
334. The Southern Appalachian Biodiversity Project evaluated the importance of nature-based recreation, including hotels, amusement, transit, merchandise, and food, within the counties proposed for designation was valued at approximately \$352 million in the year 2000.²⁷⁹ While these data, as derived from the Bureau of Economic Analysis, Regional Economic Information System, provide context and demonstrate a positive willingness to pay for recreational use of the ecosystems surrounding the proposed designation, information is not available to isolate a portion of these recreational expenditures that may be impacted in the case that critical habitat for these mussel species was not designated. In other words, the incremental safeguarding of the use of these resources that is due to the presence of critical habitat for the mussels is indistinguishable.

²⁷⁷ Maharaj, V. and J. Carpenter. 1999. *The Economic Impacts of Fishing, Hunting, and Wildlife Viewing on National Forest Lands*. Washington, DC: United States Department of Agriculture, Forest Service, Wildlife, Fish, and Rare Plants. This study was cited in a comment letter from the Southern Appalachian Biodiversity Project, October 14, 2003.

²⁷⁸ Of course, if designation of critical habitat somehow constrains these activities these constraints will be manifest as a cost of the designation.

²⁷⁹ Public comment letter from the Southern Appalachian Biodiversity Project, October 14, 2003 as amended on October 27, 2003. Information on the economic contribution of nature-based tourism supplied in this letter is derived from the Bureau of Economic Analysis, Regional Economic Information System (REIS) database.

335. The Southern Appalachian Biodiversity Project also provided information regarding the growing economic importance of white water rafting.²⁸⁰ Quantification of these benefits is limited as it requires an understanding of the extent to which these recreational activities are limited by current flow rates and water quality.

Overall Ecosystem Health

336. Freshwater mussels are an integral part of the ecosystems in which they live. Protecting the primary constituent elements for the 11 mussels, including preserving water quality and natural flow regimes, will benefit other organisms that cohabit these areas. Each one of these organisms may in turn provide some level of direct or indirect benefit to the public and local economies.
337. Understanding the change in aquatic ecosystem health resulting from this designation would entail significant effort to model the likely changes in water quality as well as the ecological benefits of modified flow regimes. While these benefits can be described qualitatively, existing data are not available to quantify the scale of these changes, such as required for monetization. For example, it is widely understood that reduced sedimentation in a river system can benefit various fish, shellfish, and aquatic plant communities. In addition, in some cases reductions in sedimentation may provide direct economic benefit (e.g., reducing the need for, or scale of, dredging operations). Quantifying these changes would, however, require additional information on the extent to which preservation of the mussels' habitat would improve water quality and ecosystem health in general.

Water Quality Benefits

338. Measures undertaken to protect 11 mussels habitat could lead to a variety of water quality benefits including: (1) incremental protection of human drinking water supplies and reduced cost of drinking water treatment; and (2) reduced cost of future stream restoration/maintenance activities.²⁸¹ Again, quantification and monetization of these categories of benefits would require additional, detailed information on the scope and

²⁸⁰ Public comment letter from the Southern Appalachian Biodiversity Project, October 14, 2003 as amended on October 27, 2003. This letter cites a travel cost study (Bowker et. al., 1996) in which estimated total consumer surplus value for guided white water rafting on the Nantahala River ranges from \$19 million to \$41 million annually. It is unclear how this value would be impacted by changes to the ecosystem due to the presence of critical habitat and to what extent the value of white water rafting on this river may be transferable to similar activity on rivers within the proposed designation. Further, many of the rivers within the proposed designation do not support white water rafting.

²⁸¹ A comment letter noted that it is possible to estimate the value of a mile of clean water and that value may be applied across the river miles within the proposed designation to estimate a benefit of the critical habitat designation. Letter from Robert Reid, on behalf of self, Alabama Audubon Council, Alabama Environmental Council, and Alabama Ornithological Society, October 14, 2003. Although the benefits of clean water are real, not enough information is available to determine by what increment the designation contributes to the improved water quality. Assigning the total value of clean water as a benefit due to the designation (as opposed to the Clean Water Act or State water quality standards) is thus inaccurate.

location of expected project modifications. For example, reductions in sediment load may reduce the cost of filtering municipal water supplies. The extent to which this category of benefits will be experienced, however, will depend on the location of the water systems, and the manner in which they operate (e.g., whether they utilize an instream water intake structure, or other system not impacted by sediment load).

Other Benefits

339. Additional benefits of designating critical habitat for the 11 mussels may include educational/informational benefits (increased awareness by the public of the extent of 11 mussels habitat), increased support for existing conservation efforts, and reduced uncertainty regarding the extent of 11 mussels habitat. For example, critical habitat designation will provide a firm legal definition of the extent of 11 mussels habitat, which may reduce regulatory uncertainty. One comment letter submitted during the public comment period for the draft version of this analysis notes the benefits of outlining areas in which the species may be present. “It will promote the east of avoidance of adverse impacts on the already listed species, and those impacts can often be avoided or mitigated. Used in this manner, designation of critical habitat should reduce costs, including developmental costs, and that could result in even positive benefits.”²⁸² Another comment letter noted that where the mussels thrive, they can serve as an important indicator of the quality of the water.²⁸³

²⁸² Letter from Robert Reid, on behalf of self, Alabama Audubon Council, Alabama Environmental Council, and Alabama Ornithological Society, October 14, 2003.

²⁸³ Letter from the League of Women Voters of Tennessee, June 22, 2003.

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Departments of Transportation (DOT)
Environmental Protection Agency, Region 4 (EPA)
Farm Services Agency (FSA)
Federal Energy Regulatory Commission (FERC)
Georgia Department of Natural Resources (DNR)
Mississippi Department of Environmental Quality
Mississippi Department of Fisheries, Wildlife, and Parks (DFWP)
Mississippi Forestry Commission
Office of Surface Mining (OSM)
Natural Resource Conservation Service (NRCS)
Southern Appalachian Biodiversity Project (SABP)
Tennessee Department of Environment and Conservation
Tennessee Valley Authority (TVA)
The Nature Conservancy
Tombigbee River Valley Water Management District (TRVWMD)
United States Army Corps of Engineers (USACE), Nashville District
USACE, Savannah, GA District
United States Forest Service (USFS)
United States Fish and Wildlife Service (USFWS), Athens, GA Field Office
USFWS, Cookville, TN Field Office
USFWS, Daphne, AL Field Office
USFWS, Jackson, MS Field Office
United States Forest Service (USFS), Armuchee-Cohutta District Office,
Chattahoochee National Forest
USFS, Bankhead National Forest
USFS, Cherokee National Forest
USFS, National Forests in Alabama
USFS, Talladega National Forest
USFS, Tuskegee National Forest

Appendix A

BASELINE REGULATORY PROTECTION

State-level Protections: Alabama

1. The following section presents information on relevant State regulations that may offer some baseline protection to the mussels and their habitat within the proposed critical habitat areas in Alabama.

Alabama Mussel Harvest Restrictions

2. The Alabama Division of Wildlife and Freshwater Fisheries prescribes mussel harvesting methods for commercial mussels, which include prohibitions on the harvesting of federally listed threatened and endangered mussels. Regulations also prohibit harvesting commercial mussels in various State waters, including the Cahaba River portion of the critical habitat designation.²⁸⁴

Alabama Water Pollution Control Act

3. This Act authorizes the Alabama Department of Environmental Management (ADEM) to establish and enforce water quality standards, regulations, and penalties in order to implement both State and federal water quality regulations. ADEM administrative code prohibits the deposition of pollutants, including sediment, organic materials, and pesticides into State waters. For non-source pollutants, provisions are limited to recommending best management practices adequate to protect water quality consistent with the ADEM's Nonpoint Source Control Program (see below).²⁸⁵

Alabama Nonpoint Source Program: Alabama Clean Water Partnership

4. Established in 1987, Alabama's Nonpoint Source Program relies on best management practices, education and outreach, monitoring and assessments, and resource assistance to meet the goals of the Clean Water Act. The Alabama Clean Water Partnership, a key component of the program, consists of joint voluntary efforts of public and private stakeholders who strive to restore and protect Alabama's river basins. Clean Water Partnerships currently exist for four river drainages within the boundaries of the proposed designation, including Tombigbee River basin, Coosa River basin, Cahaba River basin, and Black Warrior River basin. Specific actions by partnerships include accepting and managing funding for various activities such as:
 - River, stream, and lake clean-up days;
 - Water quality and watershed evaluation efforts to include the collection and analysis of water quality data;

²⁸⁴ Alabama Wildlife & Freshwater Fisheries, *Alabama Regulations Relating to Game, Fish, and Fur-bearing Animals, 2002-2003*, pp. 76.

²⁸⁵ Alabama Department of Environmental Management, Water Division, §335-6-11, *Water Quality Program*.

- Stream restoration programs; and
- The implementation of Best Management Practices related to water quality in priority areas.²⁸⁶

Cahaba River Land Trust

5. This land conservation organization is dedicated to improving water quality in the Cahaba River watershed. The Land Trust has to date, purchased nearly 700 acres of critical stream-side buffer zones along rivers and streams in the Cahaba River basin for both conservation and recreational purposes.

National Wild and Scenic Rivers Act (NWSRA)

6. The NWSRA requires that "In all planning for the use and development of water and related land resources, consideration shall be given by all Federal agencies involved to potential national wild, scenic and recreational river areas." It also requires that "the Secretary of the Interior shall make specific studies and investigations to determine which additional wild, scenic and recreational river areas.....shall be evaluated in planning reports by all Federal agencies as potential alternative uses of water and related land resources involved."²⁸⁷ In partial fulfillment of this requirement, NPS maintains a Nationwide Rivers Inventory (NRI), a register of river segments that potentially qualify as national wild, scenic or recreational river areas.²⁸⁸ A presidential directive requires Federal agencies to avoid or mitigate adverse effects on rivers identified in the NRI. In addition, agencies are required to consult with the NPS on actions which could affect the wild, scenic or recreational status of a river on the inventory.
7. The NWSRA will provide baseline protection to the Sipsey Fork in Unit 10 of the proposed critical habitat for the mussels. As Federal agencies are required to avoid or mitigate adverse effects on National Wild and Scenic Rivers and those on the NRI, this statute will likely impact the extent, location, and nature of future activities on or near the Unit 10 over the next ten years. As such, the NWSRA is likely to provide substantial baseline protection within this area.

State-level Protections: Georgia

8. This section presents information on relevant State regulations that may offer some level of baseline protection to the mussels and their habitat within the proposed critical habitat areas in Georgia.

Georgia Nongame Wildlife Protected Species Program

9. The Endangered Wildlife Act of 1973 authorizes Georgia's Environmental Protection Division (EPD) to designate as protected any species of animal life within Georgia which may be endangered, threatened, rare or usual. Ten of the 11 Mobile River basin mussels

²⁸⁶ Alabama Department of Environmental Management, *Alabama's Nonpoint Source Management Program 2001 Annual Report*.

²⁸⁷ National Wild and Scenic Rivers Act, 16 U.S.C. §1271-1287 (1968).

²⁸⁸ The NR I qualifies as a comprehensive plan under section 10(a)(2)(A) of the Federal Power Act.

(dark pigtoe is excluded) are listed as protected species in Georgia. Provisions include prohibiting possessing, selling, or purchasing any protected species and activities intended to harass, capture, kill, or directly cause the death of any protected species.²⁸⁹

Georgia Water Quality Control Standards

10. The Georgia Water Quality Control Act provides the Environmental Protection Division (EPD) of the Georgia Department of Natural Resources with the authority to enforce water quality standards. General water quality standards provide for the enhancement of water quality, prevention of pollution, conservation of fish and wildlife, and agricultural, industrial, and recreational uses of the waters. General conservation criteria apply to all water resources and intend to maintain and improve the biological integrity of the State waters. Such criteria include the provision that waters shall be free of municipal or domestic sewage, industrial waste, or other sources of sludge, discharge, caustic substances, and other debris and material that may interfere with legitimate water uses.²⁹⁰

Georgia's Erosion and Sediment Control Program

11. Under the authority of the Erosion and Sediment Control Act (ESCA) (Georgia §391-4), the Erosion and Sediment Control Program, administered by the EPD, protects Georgia's waters from soil erosion and sediment deposition. The program requires buffers between land disturbing activities and waters to minimize adverse impacts of development on water quality. Buffer functions that may afford protection for the mussels include temperature control, streambank stabilization, trapping of sediments, removal of nutrients, heavy metals, pesticides and other pollutants.²⁹¹

Georgia River Basin Management Program - Tallapoosa and Coosa River Basin Management Plans

12. The law requires the EPD to develop river basin management plans for major rivers in Georgia. Plans should include a description of goals, including providing environmental education, improving water quality, reducing pollution at the source, improving aquatic habitat, reestablishing native species of fish, restoring and protecting wildlife habitat, and providing recreational benefits, along with strategies and measures necessary to accomplish these goals.
13. The Tallapoosa River basin and the Coosa River basin management plans are part of the greater Georgia River basin management planning approach to watershed protection. Both plans present and facilitate the implementation of water quality protection efforts in the basins. Specific objectives that may afford protection to the mussels include:
 - Protecting water quality in lakes, rivers and streams through attainment of water quality standards and support for designating uses;

²⁸⁹ Georgia Statutes, §391-4-10, *Rules for Protection of Endangered, Threatened, Rare, or Unusual Species*.

²⁹⁰ Georgia Department of Natural Resources, Environmental Protection Division, §391-3-6, *Rules and Regulations for Water Quality Control*, Revised June 2002.

²⁹¹ Georgia Department of Natural Resources, Environmental Protection Division, §391-3-7, *Erosion and Sediment Control*.

- Providing adequate, high quality water supply for municipal, agricultural, industrial, environmental, and other human activities; and
- Preserving habitat suitable for the support of healthy aquatic and riparian ecosystems.²⁹²

State-level Protections: Mississippi

14. The following section presents information on relevant State regulations that may offer some level of baseline protection for the mussels and their habitat in Mississippi.

Mississippi Nongame and Endangered Species Conservation Act

15. This Act prohibits the taking, possession, transportation, exportation, processing, sale, or shipment within the State of endangered species. Pursuant to this Act, the Mississippi Commission on Wildlife, Fisheries and Parks shall issue regulations establishing limitations related to taking, possession, transportation, and sale of species as necessary to protect the species.²⁹³ Four of the eleven mussel species are listed as endangered by the State of Mississippi.

Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters

16. Mississippi water quality standards establish criteria necessary to protect, upgrade, and enhance water quality in Mississippi. General conditions applicable to all State waters include: State waters should be free from materials attributable to municipal, industrial, agricultural, or other discharges producing color, odor, taste, total suspended solids, or other conditions in such a degree to degrade waters and impact public health, recreation, aquatic life and wildlife. Specifically, criteria for aquatic life use includes standards for toxicity, bacteria, dissolved solids, and phenolic compounds levels.²⁹⁴

Mississippi State Water Management Plan

17. Under authority of Mississippi Legislature the Office of Land and Water Resources of the Mississippi Department of Environmental Quality (MDEQ) is responsible for development and oversight of the “State water management plan.” This plan was developed in order to control the effects of development on the waters of the State through a water withdrawal permitting system and thorough study and reporting regarding:
- Water resources of the State;
 - Methods of conserving and augmenting such waters;

²⁹² Georgia Department of Natural Resources, Environmental Protection Division, *Coosa River Basin Management Plan 1998* and *Tallapoosa River Basin Management Plan*, 1998.

²⁹³ Miss. Code. Ann. §49-5-101 through 49-5-119.

²⁹⁴ State of Mississippi Water Quality Criteria for Intrastate, Interstate, and Coastal Waters, adopted November 16, 1995.

- Existing and contemplated needs and uses for protection and procreation of fish and wildlife and various other uses; and
- Drainage, reclamation, flood-plain or flood-hazard area zoning, and selection of reservoir sites.²⁹⁵

State-level Protections: Tennessee

18. The following section presents information on relevant State regulations that may offer some level of baseline protection to the mussels and their habitat within Tennessee.

Tennessee Threatened and Endangered Species Statutes

19. Eight of the 11 mussels are listed as endangered or threatened by the Tennessee Wildlife Resources Agency. Regulations for endangered and threatened species include prohibition on take, attempt to take, possess, transport, export, process, sell or ship nongame wildlife.²⁹⁶

Tennessee Water Quality Standards

20. Authorized by the Tennessee Water Quality Control Act of 1977 (§69-3-101), the Tennessee Division of Water Pollution Control implements and enforces State water quality standards. Water quality objectives include abating existing pollution of Tennessee waters, reclaiming polluting waters, preventing the future pollution of waters, and planning for the future use of State waters.²⁹⁷

Tennessee Scenic Rivers Program

21. Established in 1968 with the passage of the Tennessee Scenic River Act, this program seeks to preserve valuable selections of rivers in their free-flow natural or scenic conditions and to protect water quality and adjacent lands. The Conasauga River, which flows through Polk County in Tennessee, has been designated as a State Scenic River. Protections afforded to the river habitat include road development control, water level control, erosion control, and vegetation and wildlife management.²⁹⁸

²⁹⁵ Miss. Code. Ann. §51-3-1 through §51-3-5.

²⁹⁶ Tenn. Code Ann., §70-8-104, *Non-game species - promulgation of regulations - Prohibited acts.*

²⁹⁷ Tenn. Code Ann., §69-3-101.

²⁹⁸ Rules of Tennessee Department of Conservation, Division of State Parks, §0400-2-8, *Management of Tennessee Natural Resource Areas.*

Appendix B:

OTHER REGULATORY ASSESSMENTS

B.1 Potential Impacts on Small Entities

1. This analysis is intended to facilitate determination of whether this critical habitat designation potentially affects a “substantial number” of small entities in counties supporting critical habitat areas. It also quantifies the probable number of small businesses and governments likely to experience a “significant effect.” In both tests, this analysis examines the total estimated section 7 costs calculated in Section 4 of this report, including those impacts that may be “attributable co-extensively” with the listing of the mussels. This results in a conservative estimate (i.e., more likely to overstate impacts than understate them), because it utilizes the upper bound impact estimate from the earlier analysis.
2. Federal courts and Congress have indicated that a Regulatory Flexibility Act/SBREFEA analysis should be limited to direct and indirect impacts on entities subject to the requirements of the regulation. As such, entities indirectly impacted by the mussels listing and designation of critical habitat, and, therefore, not directly regulated by the listing or critical habitat designation, are not considered in this screening analysis.

Identifying Activities That May Involve Small Entities

3. Section 3 of this report identifies activities that are within, or will otherwise be affected by, section 7 of the Act for the mussels. Of the projects that are potentially affected by section 7 implementation for the mussels, several do not have third party involvement (i.e. only the Action agency and the Service are expected to be involved) or occur exclusively on Federal lands. Of the projects whose consultations are potentially affected by section 7 implementation for the mussels that do not involve solely the Action agency and the Service, many are known to have no directly-regulated small businesses or governments involved. Thus, small entities should not be directly impacted by section 7 implementation for these affected projects:
 - **Road and bridge construction and maintenance.** DOT consultations on bridge projects could lead to project modifications that include seasonal restrictions on construction activity, restrictions on the placement of in-stream infrastructure, avoidance of in-stream work, surveys for the presence of mussels, and the relocation of mussels. This analysis anticipates that the costs associated with project modification compliance will be borne by the Federal government either directly or through their funding of State DOT projects.
 - **Utilities construction and maintenance.** Utilities consultations may result in project modifications that include rerouting. This analysis anticipates that most costs associated with project modification compliance will either be borne directly by or passed on to the Federal government, which accordingly will ultimately bear the majority of the costs of these modifications.
 - **Activities in National Forests (Forest Service).** These may include special uses, recreation, bridge construction or maintenance, watershed protection, wildlife management plans, silviculture, trail heads and parking lot

construction, and forest health and restoration. These activities are anticipated to be carried out by the Forest Service.

- **Hydropower re-licensing (Federal Energy Regulation Commission).** As described in Section 4 of this analysis, three formal consultations and one informal consultation are expected involving FERC relicensing of hydropower dams. The Alabama Power Company is the third party involved in two of the formal consultations, Jordan and Weiss Dam relicensing. APC reports megawatt hour sales in excess of the SBA threshold of four million megawatt hours.²⁹⁹ In addition, APC is a wholly owned subsidiary of A Southern Company, one of the largest electricity generators in the country.³⁰⁰ The Fall Line Hydro Company is the third party involved in the remaining two consultations at Carters Reregulation Dam. Fall Line reports average annual capacity below the SBA threshold, therefore the potential impact to the company is discussed below. A fourth dam, Carters Dam is anticipated to be impacted by the consultation at Carters Reregulation Dam. Carters Dam is owned and operated by the USACE.
- **Water supply dams (U.S. Army Corps of Engineers (USACE)).** As detailed in Section 4 there are two water supply dam projects within the 36 counties that may affect mussel critical habitat. This analysis assumes that the costs of the consultation process and any project modifications will be borne jointly by the USACE and the county (or counties) which will benefit from the water supply. Two counties potentially involved in water supply dam consultations are considered small– Haralson County, Georgia and Blount County, Alabama. The proposed project in Georgia, however, is part of the West Georgia Regional Water Authority (WGRWA), which represents four counties. The government entity involved in the consultation, WGRWA, is therefore considered above the SBA threshold for small governments.³⁰¹ Similarly, Blount County with a population of 51,000 is above the threshold for small governments. Further, the local agency proposing to construct the reservoir stated that increased costs of construction and implementation are passed on to the end users.³⁰² Accordingly, water supply activities are not anticipated to affect the finances of small governments.³⁰³

²⁹⁹ “Hydroelectric power generation” is identified by NAICS code #221111. U.S. Small Business Administration, “Small Business Size Standards matched to North American Industry Classification System (NAICS),” accessed at <http://www.sba.gov/size/sizetable2002.html> on March 14, 2003. A firm is small if, including its affiliates, it is primarily engaged in the generation, transmission, and/or distribution of electric energy for sale and its total electric output for the preceding fiscal year did not exceed four million megawatt hours.

³⁰⁰ “Alabama Power Company 2001 Annual Report,” accessed at <http://investor.southerncompany.com/annuals/APC-2001.pdf> on March 14, 2003.

³⁰¹ The SBA defines a “small governmental jurisdiction” as “governments of counties with a population of less than fifty thousand.” U.S.C § 601.

³⁰² Personal communication with Randall Chafin, Birmingham Water Works Board, November 26, 2003.

³⁰³ Impacts to private parties, including cost of increased water rates, are considered in the Unfunded Mandates Reform Act Analysis in Section B.3 of this report.

- **Water quality activities (Environmental Protection Agency).** Environmental Protection Agency conducts activities to protect water quality under the CWA. These may include EPA review of TMDL levels with States and review of State water quality standards.
- **Conservation and recreation (Fish and Wildlife Service and USACE).** As stated in Section 4 of this analysis, the Service’s conservation and recreation projects are designed to benefit the mussels and habitat, and are generally carried out by the Service themselves. Therefore, small entities should not be affected by consultations on these activities. Further, costs of USACE habitat conservation projects are anticipated to be borne by agency itself.
- **Dredging activities (USACE).** As detailed in Section 4 of this analysis there are 14 formal and 186 informal dredging or tributary maintenance projects proposed within the 36 counties included in mussel critical habitat. In the case of ten of the formal consultations, this analysis assumes that the costs of the consultation process and any project modifications will be borne solely by the USACE; while the costs of the consultation process and any project modifications in the remaining four formal and all but one of the informal consultations will be borne jointly by the USACE and the states. The remaining informal consultation is for a commercial sand and gravel operation permit for which the costs of the consultation and any project modifications may be borne by a small entity.

4. After excluding the consultations on activities above from the total universe of potential impacts identified in the body of the analysis, the following consultations and Action agencies remain. This subset represents the group of consultations and Action agencies that *may* produce significant impacts on small entities. Specifically, these actions feature activities that do *not* occur exclusively on Federal lands and may directly regulate small entities:

- Agriculture and ranching-related activities (USACE and USDA),
- Hydropower (FERC and USACE),
- Water supply dams (USACE), and
- Dredging activities (USACE).

Description of Affected Small Entities

5. This section describes the industries with small entities that are most likely to be affected by section 7 implementation for the mussels. Potential indirect regional impacts are also discussed. More information about affected projects can be found in Sections 3 and 4 of this analysis.

- **Agriculture and ranching-related activities.** Agriculture and ranching-related activities, such as flood control and bank stabilization, may result in project modifications that include regulation of construction methods, project termination, sedimentation measures, and surveys for the presence of mussels. The SBA sets the small business size standard for “crop production” and “animal production” at \$0.75 million in annual receipts, with the exception of “cattle feedlots” and “chicken egg production” that are

set at \$1.5 million and \$10.5 million respectively.³⁰⁴ There are 1,712 crop and animal production operations within the 36 counties included in mussel critical habitat of which 1,637 are small.³⁰⁵

- **Hydropower re-licensing.** Hydropower re-licensing activities may result in project modifications that control minimum flows, sedimentation and water quality. The SBA sets the small business size standard for “hydroelectric power generation” at four million megawatt hours of total electric output for the preceding fiscal year if, including its affiliates, it is primarily engaged in the generation, transmission, and/or distribution of electric energy for sale. The Fall Line Hydro Company is the third party involved in two of the expected hydropower re-licensing consultations at the Carters Reregulation dam. The company reports average annual megawatt hours of 16,500, falling below the SBA threshold. There are 106 electric services operations within the 36 counties included in mussel critical habitat.³⁰⁶ The costs resulting from project modification regarding minimum flows Carters Reregulation Dam will be passed on to the consumers in the form of adjustments in the rate of power costs.³⁰⁷ The economic impact to the small business are the administrative costs of the consultation and any direct costs of project modifications that may be absorbed by the dam owners.³⁰⁸
- **Dredging activities.** Dredging activities may result in project modifications that include the implementation of BMPs, pre-construction species surveys, mussel relocation, habitat restoration, and purchase of upland disposal sites. The SBA sets the small business size standard for “dredging and surface clean-up activities” at \$17 million in annual receipts.³⁰⁹ There are 223 heavy

³⁰⁴ “Crop production” is identified by NAICS code #111, “animal production” is identified by NAICS code #112, “cattle feedlots” is identified by NAICS code #112112, and “chicken egg production” is identified by NAICS code #112310. U.S. Small Business Administration, “Small Business Size Standards matched to North American Industry Classification System (NAICS),” accessed at <http://www.sba.gov/size/sizetable2002.html> on March 14, 2004.

³⁰⁵ Dun and Bradstreet provide national data on existing facilities by SIC code. This analysis uses SIC #01 “agricultural production - crops” and SIC #02 “livestock and animal specialties.” Duns Market Identifiers, File 516: Dun and Bradstreet, December 2002.

³⁰⁶ Dun and Bradstreet provide national data on existing facilities by SIC code. This analysis uses SIC #4911 “electric services.” Duns Market Identifiers, File 516: Dun and Bradstreet, March 2004.

³⁰⁷ Personal communication with John D. Grogan, Manager of Environmental Compliance, Alabama Power Company, December 11, 2003.

³⁰⁸ Impacts to private parties, including the cost to power purchasers of increased rates, are considered in the Unfunded Mandates Reform Act Analysis in Section B.3 of this report.

³⁰⁹ “Crop production” is identified by NAICS code #111, “animal production” is identified by NAICS code #112, “cattle feedlots” is identified by NAICS code #112112, and “chicken egg production” is identified by NAICS code #112310. U.S. Small Business Administration, “Small Business Size Standards matched to North American Industry Classification System (NAICS),” accessed at <http://www.sba.gov/size/sizetable2002.html> on March 14, 2003.

construction operations within the 36 counties included in mussel critical habitat of which 210 are small.³¹⁰

Estimated Number of Small Entities Affected: The “Substantial Number” Test

6. To be conservative, this analysis assumes that a unique entity will undertake each of the projected consultations in a given year, and so the number of entities affected is equal to the total annual number of consultations (both formal and informal).³¹¹ This analysis also limits the universe of potentially affected entities to include only those within the 36 counties in which critical habitat units lie. This interpretation produces more conservative results than including all entities nationwide.
7. First, the *number* of small entities affected is estimated. As shown in Exhibit B-1, the following calculations yield this estimate:³¹²
 - Estimate the number of entities within the study area affected by section 7 implementation annually (assumed to be equal to the number of annual consultations);
 - Calculate the *percent* of entities in the affected industry that are likely to be small;
 - Calculate the *number* of affected small entities in the affected industry;
 - Calculate the *percent* of small entities likely to be affected by critical habitat.
8. As Exhibit B-1 shows, less than one percent of small businesses in each industry, is anticipated to be affected by the designation of critical habitat.

³¹⁰ Dun and Bradstreet provide national data on existing facilities by SIC code. This analysis uses SIC #1629 heavy construction which includes “dredging and surface clean-up activities.” Duns Market Identifiers, File 516: Dun and Bradstreet, March 2004.

³¹¹ While it is possible that the same entity could consult with the Service more than once, it is unlikely to do so during the one-year time frame addressed in this analysis. However, should such multiple consultations occur, effects of the designation would be concentrated on fewer entities. In such a case, the approach outlined here likely would overstate the number of affected entities.

³¹² Note that because these values represent the probability that small businesses will be affected during a one-year time period, calculations may result in fractions of businesses. These values represent the probability that small businesses will be affected by section 7 implementation of the Act.

Exhibit B-1					
ESTIMATED ANNUAL NUMBER OF SMALL ENTITIES AFFECTED BY CRITICAL HABITAT DESIGNATION: THE "SUBSTANTIAL NUMBER" TEST					
Industry Name		Agriculture and Ranching NAICS 111, 112 (SIC 01, 02)	Hydro-electric Power Generation NAICS 221111 (SIC 4911) ¹	Water Supply activities: Small Government	Heavy Construction NAICS 234990 (SIC 1629)
Annual number of affected entities in industry (Equal to number of annual consultations)	By formal consultation	0.6	0.1	0.1	0.0
	By informal consultation	3.8	0.1	-	0.1
Total number of <i>all</i> entities in industry within study area		1,712	106	36	223
Number of <i>small</i> entities in industry within study area		1,637	-	22	210
Percent of entities that are small (Number of small entities)/(Total Number of entities)		96%	100%	61%	94%
Annual number of small entities affected (Number affected entities)*(Percent of small entities)		4.2	0.2	0.06	0.1
Annual percentage of small entities affected (Number of small entities affected)/(Total number of small entities)		0.3%	0.2%	0.3%	0.04%
¹ Actual estimates of small hydroelectric power generation facilities are not available, therefore this analysis conservatively assumes 100% of hydroelectric power generation facilities in the affected areas to be small.					

Estimated Effects on Small Businesses and Governments: The "Significant Effect" Test

9. As concluded in the previous section, less than one percent of small entities in affected areas will potentially be affected by section 7 implementation for the mussels. Costs of critical habitat designation to individual small businesses consist primarily of the cost of participating in section 7 consultations and the cost of project modifications. To calculate the likelihood that a small business will experience a significant effect from critical habitat designation for the mussels, the following calculations were made:

- Calculate the per-business cost. This consists of the cost to a third party of participating in a section 7 consultation and the cost of associated project modifications. *To be conservative, this analysis uses the high-end estimate for each cost, and includes all project modifications for that activity.* The per business cost for the agriculture and ranching industries is estimated to be \$14,000, the per business cost for the hydroelectric power generation

industry is estimated to be \$4,100, and the per business cost for the heavy construction industry is estimated to be \$248,000.

- Distribute the total number of affected small businesses across revenue levels. This is done by distributing the annual number of affected small businesses across different revenue bins as categorized by RMA Annual Statement Studies: 2001-2002, which provides data on the distribution of annual sales within an industry across the following ranges: \$0-1 million, \$1-3 million, \$3-5 million, \$5-10 million, \$10-25 million, and greater than \$25 million (for some industries, fewer bins are included when revenues are much lower than \$25 million). As stated above, the SBA sets the small business size standard for “crop production” and “animal production” at \$0.75 million in annual receipts, with the exception of “cattle feedlots” and “chicken egg production” that are set at \$1.5 million and \$10.5 million respectively.³¹³ In these industries, 96 percent of small businesses have annual revenues less than \$1 million. The size standard for “hydroelectric power generation” is set at less than four million megawatt hours generated per year.³¹⁴ In the case of the heavy construction industry, the SBA sets the small business size standard at \$17 million in annual receipts.³¹⁵
- Estimate the level of effect on small businesses per bin level. This is calculated by taking the per-business cost and dividing it by the per-business revenue in each bin to determine the percent of revenue represented by the per-business cost.

10. Calculations for costs associated with section 7 implementation for the mussels are provided in Exhibit B-2 below.

³¹³ “Crop production” is identified by NAICS code #111, “animal production” is identified by NAICS code #112, “cattle feedlots” is identified by NAICS code #112112, and “chicken egg production” is identified by NAICS code #112310. U.S. Small Business Administration, “Small Business Size Standards matched to North American Industry Classification System (NAICS),” accessed at <http://www.sba.gov/size/sizetable2002.html> on March 14, 2003.

³¹⁴ “Hydroelectric power generation” is identified by NAICS code #221111. U.S. Small Business Administration, “Small Business Size Standards matched to North American Industry Classification System (NAICS),” accessed at <http://www.sba.gov/size/sizetable2002.html> on March 14, 2003. A firm is small if, including its affiliates, it is primarily engaged in the generation, transmission, and/or distribution of electric energy for sale and its total electric output for the preceding fiscal year did not exceed four million megawatt hours.

³¹⁵ “Heavy construction, nec” which includes “dredging and surface clean-up activities” is identified by NAICS code 234990. U.S. Small Business Administration, “Small Business Size Standards matched to North American Industry Classification System (NAICS),” accessed at <http://www.sba.gov/size/sizetable2002.html> on May 13, 2003.

Exhibit B-2

ESTIMATED ANNUAL EFFECTS ON SMALL BUSINESSES: THE "SIGNIFICANT EFFECT" TEST

Agriculture and Ranching NAICS 111, 112 (SIC 01, 02)

Annual Number of Small Businesses Affected	4.2					
Per-Business Cost	\$14,000					
RMA Revenue Bin	\$0-1M	\$1-3M	\$3-5M	\$5-10M	\$10-25M	\$25+M
Per Business Revenue ¹	\$0.5M ³	\$1M	\$3M	\$5M	\$10M	\$25M
Distribution	96%	2%	1%	2%	-	-
Annual number of affected small businesses	4.0	0.1	0.0	0.1	-	-
Per-Business effect	2.8%	1.4%	0.5%	0.3%	-	-

Hydroelectric Power Generation NAICS 221111 (SIC 4911) ²

Annual Number of Small Businesses Affected	0.2					
Per-Business Cost	\$4,100					
RMA Revenue Bin	\$0-1M	\$1-3M	\$3-5M	\$5-10M	\$10-25M	\$25+M
Per Business Revenue ¹	\$0.5M ³	\$1M	\$3M	\$5M	\$10M	\$25M
Distribution	9%	17%	10%	5%	22%	37%
Annual number of affected small businesses	0.02	0.03	0.02	0.01	0.04	0.07
Per-Business effect	0.8%	0.4%	0.1%	0.08%	0.04%	0.01%

Heavy Construction, nec NAICS 234990 (SIC 1629)

Annual Number of Small Businesses Affected	0.1					
Per-Business Cost	\$248,000					
RMA Revenue Bin	\$0-1M	\$1-3M	\$3-5M	\$5-10M	\$10-25M	\$25+M
Per Business Revenue ¹	\$0.5M ³	\$1M	\$3M	\$5M	\$10M	\$25M
Distribution	4%	26%	16%	41%	13%	-
Annual number of affected small businesses	0.004	0.03	0.02	0.04	0.01	-
Per-Business effect	49.6%	24.8%	8.3%	5.0%	2.5%	-

¹ In order to be conservative, this analysis assumes that the small businesses in each bin have revenue equal to the low end of the range within a bin. Thus, percent of revenue impacts may appear larger than would be likely for that business.

² Actual estimates of small hydroelectric power generation facilities are not available, therefore this analysis conservatively assumes 100% of hydroelectric power generation facilities in the affected areas to be small.

³ Because this bin ranges from \$0 to \$1 million, this analysis uses the mid-point of the range.

11. As presented in Exhibit B-2, of the four agriculture and ranching industries impacted annually by this designation, an average of four businesses with revenues less than \$1 million will experience a 2.8 percent effect on revenues, and less than one business per year with greater than \$1 million in revenues will experience an effect on revenues of less than two percent.
12. This analysis does not anticipate any impacts to small governments as described in the “Identifying Activities That May Involve Small Entities” section of this analysis. It is likely that costs of project modifications may impact residents of counties that are considered small (i.e., have a population below the 50,000 threshold). For example, the proposed water supply dam at Locust Fork may result in project modification costs of up to \$154 million. Although this project is not proposed within a small county, the consumer base of the resulting reservoir may include residents of small counties. Similarly, the costs associated with lost hydropower generation at Weiss Dam and Carters Dam may be passed on to power consumers in small counties.

B.2 Potential Impacts on the Energy Industry

13. Pursuant to Executive Order No. 13211, “Actions Concerning Regulations that Significantly Affect Energy Supply, Distribution, or Use,” issued May 18, 2001, Federal agencies must prepare and submit a “Statement of Energy Effects” for all “significant energy actions.” The purpose of this requirement is to ensure that all Federal agencies “appropriately weigh and consider the effects of the Federal Government’s regulations on the supply, distribution, and use of energy.”³¹⁶ The Office of Management and Budget has provided guidance for implementing this executive order that outlines nine outcomes that may constitute “a significant adverse effect” when compared without the regulatory action under consideration:
- Reductions in crude oil supply in excess of 10,000 barrels per day;
 - Reductions in fuel production in excess of 4,000 barrels per day;
 - Reductions in coal production in excess of 5 million tons per year;
 - Reductions in natural gas production in excess of 25 million mcf;
 - Reductions in electricity production in excess of 1 billion kilowatt-hours per year or in excess of 500 megawatts of installed capacity;
 - Increases in energy use required by the regulatory action that exceed the thresholds above;
 - Increases in the cost of energy production in excess of one percent;

³¹⁶ Memorandum For Heads of Executive Department Agencies, and Independent Regulatory Agencies, Guidance For Implementing E.O. 13211, M-01-27, Office of Management and Budget, July 13, 2001, <http://www.whitehouse.gov/omb/memoranda/m01-27.html>

- Increases in the cost of energy distribution in excess of one percent; or
- Other similarly adverse outcomes.³¹⁷

14. Three of these criteria are relevant to this analysis: 1) reductions in electricity production in excess of 1 billion kilowatt-hours per year or in excess of 500 megawatts of installed capacity; 2) increases in the cost of energy production in excess of one percent; and 3) increases in the cost of energy distribution in excess of one percent. Below, the analysis determines whether the electricity industry, specifically related to hydroelectric production and distribution, is likely to experience “a significant adverse effect” as a result of section 7 implementation for the mussels.

15. The relicensing of hydropower facilities is subject to the requirements of the Clean Water Act, Dam Safety Control Act and the Federal Power Act as well as implementation of section 7 of the Endangered Species Act. Hydropower facility owners/operators are therefore required to consider the impacts of their actions on sensitive species, regardless of the implementation of section 7 of the Act. As it is difficult to separate the economic impacts associated with the baseline regulations from the requirement of section 7, however, the analysis makes the conservative assumption that all of the costs for project modifications to hydropower facilities are attributable to implementation of section 7 of the Act.

Evaluation of Whether Section 7 Implementation will Result in a Reduction in Electricity Production in Excess of 500 Megawatts of Installed Capacity

16. Installed capacity is “the total manufacturer-rated capacity for equipment such as turbines, generators, condensers, transformers, and other system components” and represents the maximum rate of flow of energy from the plant or the maximum output of the plant.³¹⁸ Exhibit B-4 lists the installed capacity of each of the hydropower projects likely to impact proposed critical habitat for the mussels. The Alabama Power Company (APC) owns and operates two hydropower facilities within the proposed critical habitat designation for the mussels, Jordan Dam in Unit 26 and Weiss Dam in Unit 18. The Fall Line Hydro Company has been licensed to operate a hydropower facility at Carters Reregulation Dam on the Coosawattee River in Unit 25. The Fall Line Hydro facility is licensed by FERC, but has not yet been constructed. The USACE owns and operates Carters Dam approximately 1.5 miles upstream of the Carters Reregulation dam on the Coosawattee River.

17. The total installed capacity of the Jordan, Weiss, Carters, and Carters Reregulation dams is 692.25 MW (692,250 KW) of hydroelectricity. The average annual generation at these facilities is 760.3 million KWhr. The impact threshold for installed capacity is 500 MW (500,000 KW) and the threshold for annual generation is one billion KWhr. For this analysis, annual generation is the most appropriate metric for evaluating the impact on energy production as the affected parties provided information on the potential impact of critical habitat in terms of anticipated decreased power generation, and not impact on installed capacity.

18. The APC estimates that a change in minimum flow regime to 2000 cfs at Weiss Dam will result in a reduction in average annual energy production of 53,336,000 KWhr and has

³¹⁷ Id.

³¹⁸ California Power Plants, In-State Installed Capacity and Dependable Capacity, California Energy Commission, <http://www.energy.ca.gov/electricity/capacity.html>.

not estimated potential impact to installed capacity.³¹⁹ The USACE estimates that to meet the Service's suggested monthly flow targets, as shown in Exhibit 4-9, average annual energy production would decrease by 283,000 KWhr.³²⁰ No changes in operations are anticipated at Jordan Dam as the current flow regime provides adequate habitat for the mussels. Accordingly, no decreases in annual power generation are anticipated at Jordan Dam.

19. For the purpose of this screening analysis, the most conservative assumption is applied that both Carters Dam and Carters Reregulation Dam will not be able produce 0.3 million KWhr, and Weiss Dam is unable to produce 53.3 million KWhr. Annual hydropower generation is expected to decrease approximately by a total of 53.6 million KWhr. The impact to hydropower production is therefore not expected to surpass the threshold of one billion KWhr. Exhibit B-4 outlines the installed capacity for all four hydropower projects. Exhibit B-5 outlines the change in average annual production that may result due to the mussels.

Exhibit B-4				
Installed Capacity of Hydropower Projects				
Likely to Impact Proposed Critical Habitat for the Mobile River Basin Mussels				
Name of Facility	Owner	Installed Capacity		Average Annual Generation
		MW	KW	1,000 KWhr
Jordan Dam	Alabama Power Company (APC)	100	100,000	152,600
Weiss Dam	Alabama Power Company (APC)	87.75	87,750	215,500
Carters Dam	USACE	500	500,000	375,700
Carters Reregulation Dam	Fall Line Hydro Company	4.5	4,500	16,500
Total		692.25	692,250	760,300
Source: Federal Energy Regulatory Commission, "Hydroelectric Power Resources of the United States: Developed and Undeveloped," January 1, 1992. Federal Energy Regulatory Records Information System (FERRIS) on-line database, http://www.ferc.gov/Ferris.htm ; Individual Conventional Developed and Undeveloped Hydroelectric Plants and Sites by Geographic Division, State, and Stream, Federal Energy Regulatory Commission; Army Corps of Engineers Pertinent Data on Carters Dam, accessed at http://water.sam.usace.army.mil/cart-pert.htm on December 4, 2003; Public comment letter from U.S. Army Corps of Engineers, Mobile District, October 14, 2003.				

³¹⁹ Personal communication with John D. Grogan, Manager of Environmental Compliance, Alabama Power Company, December 11, 2003.

³²⁰ USACE, "Economic Analysis of Power Impacts at Carters Powerhouse for Critical Habitat Designation for Eleven Mobile River Basin Mussels," received February 6, 2004.

Exhibit B-5			
Average Annual Generation of Hydropower Projects Likely to Impact Proposed Critical Habitat for the Mobile River Basin Mussels			
Name of Facility	Owner	Assumed Project Modification	Decreased Average Annual Generation
			1,000 KWhr
Jordan Dam	Alabama Power Company (APC)	None	0
Weiss Dam	Alabama Power Company (APC)	Increase flow to 2,000 cfs	53,336
Carters Dam	USACE	Natural stream flow	283
Carters Reregulation Dam	Fall Line Hydro Company	Natural stream flow	
Total			53,619
Source: Federal Energy Regulatory Commission, "Hydroelectric Power Resources of the United States: Developed and Undeveloped," January 1, 1992. Personal communication with John D. Grogan, Manager of Environmental Compliance, Alabama Power Company, December 11, 2003. USACE, "Economic Analysis of Power Impacts at Carters Powerhouse for Critical Habitat Designation for Eleven Mobile River Basin Mussels," received February 6, 2004.			

Evaluation of Whether Section 7 Implementation will Result in an Increase in the Cost of Energy Production in Excess of One Percent

20. In order to determine whether implementation of section 7 of the Act will result in an increase in the cost of energy production, this analysis considers the maximum possible increase in energy production costs. Under the high cost scenario, all decreased hydropower generation is substituted with the more expensive gas driven turbine combustion production. Gas driven turbine combustion production has production costs of \$0.07 per kilowatt-hour, \$0.06 greater than the cost of hydropower production. Under this scenario, \$3.1 million in additional production costs will be incurred, an increase in production costs of approximately 0.07 percent. This analysis therefore does not anticipate an increase in the cost of energy production in excess of one percent. Exhibit B-6 summarizes the cost of energy production in Alabama and Georgia according to two scenarios, Scenario I in which there is no change due to critical habitat, and Scenario II in which the lost power generation due to the designation of critical habitat is substituted with gas driven turbine combustion production.

Exhibit B-6				
AVERAGE PRODUCTION AND ASSOCIATED COSTS FOR ENERGY PRODUCERS IN ALABAMA AND GEORGIA				
Fuel Type	Net Generation (1000 KWhrs)	Weighted Average of Total Production	Production Costs (\$/KWhr)	Total Costs
SCENARIO I				
Hydro	3,454,699	1.56%	\$0.01	\$34,536,990
Gas	6,706,320	3.02%	\$0.04	\$268,252,800
Coal	149,336,218	67.31%	\$0.02	\$2,986,726,360
Nuclear	62,371,516	28.11%	\$0.02	\$1,247,410,320
Total	221,866,753	100%		\$4,536,924,470
SCENARIO II				
Hydro	3,400,080	1.353%	\$0.01	\$34,000,800
Gas Powered Turbine Combustion	53,619	0.02%	\$0.07	\$3,608,021
Gas	6,706,320	3.02%	\$0.04	\$268,252,800
Coal	149,336,218	67.31%	\$0.02	\$2,986,724,360
Nuclear	62,370,516	28.11%	\$0.02	\$1,247,410,320
Total	221,866,753	100%		\$4,539,996,301
Sources: Federal Energy Regulatory Commission, "Hydroelectric Power Resources of the United States: Developed and Undeveloped," January 1, 1992. Electric Power Annual 2000: Volume I, Energy Information Administration, U.S. Department of Energy, August 2001, accessed at http://www.eia.doe.gov/cneaf/electricity/epav2/html_tables/epav2t13p.html ; State Electricity Profiles, Alabama and Georgia, Energy Information Administration, U.S. Department of Energy, May 2003; Average Operating Expenses for Major U.S. Investor-Owned Electric Utilities, 1996 Through 2000, http://www.eia.doe.gov/cneaf/electricity/epav2/html_tables/epav2t13p1.html ; New York Mercantile Exchange, Natural Gas Futures accessed at http://nymex.com/jsp/markets/ng_fut_csf.jsp .				

21. The difference in total costs between these two scenarios represents an estimate of the total increased costs of power production in the region, \$3.1 million. This additional production cost represents a high end estimate due to the following conservative assumptions:

- This methodology estimates whether the designation will result in a one percent increase in energy costs within Alabama and Georgia, as opposed to

nationwide. The nationwide change in power production costs, is therefore even less than the 0.07 percent change as estimated.

- This methodology assumes that all lost hydropower production will be replaced by gas-powered turbine combustion, a high cost energy substitute typically used to mitigate losses in peaking power production.³²¹ Where as Carters Dam supplies peaking power, Weiss Dam generates base load power.

Evaluation of Whether Section 7 Implementation will Result in an Increase in the Cost of Energy Distribution in Excess of One Percent

22. As described in Section 4.2.4, TVA anticipates two informal consultations on transmission line construction and maintenance with no project modifications. Thus, the total costs incurred by TVA as a result of section 7 implementation range from \$2,600 to \$7,800. Total operating expenses for TVA in 2002 were \$5.2 billion. The total costs incurred as a result of section 7 are less than one ten-thousandth of one percent of TVAs operating expenses. The impact to energy distribution is therefore not anticipated to exceed the one percent threshold.

Summary

23. Even in the highest cost scenario, where all lost hydropower production is replaced with gas driven combustion turbine facilities, implementation of section 7 for the mussels will not result in “reductions in electricity production in excess of 1 billion kilowatt-hours per year,” an “increase in the cost of energy production in excess of one percent,” or an “increase in the cost of energy distribution in excess of one percent.” Consequently, this rule is not anticipated to have a significant adverse effect on the supply, distribution, or use of energy.

³²¹ Letter from Coastal Environment Team, U.S. Army Corps of Engineers, Mobile District, October 14, 2003. Carters Dam supplies peaking power. Gas powered turbine combustion is therefore a more appropriate substitute than coal for lost hydropower production at Carters Dam.

Appendix C

SECTION 7 COSTS FOR THE MUSSELS PER UNIT AND ACTIVITY

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs
1	Road and Bridge Construction (MS DOT)	2 Formal Consultations	Low	\$6,200	\$7,800	\$13,800	\$0	\$27,800
			High	\$12,200	\$13,000	\$19,400	\$0	\$44,600
	Road and Bridge Construction (MS DOT)	3 Informal Consultations	Low	\$1,200	\$3,900	\$3,600	\$0	\$8,700
			High	\$9,300	\$11,700	\$20,700	\$0	\$41,700
	Utilities Construction/Maintenance (USACE)	4 Formal Consultations	Low	\$12,400	\$38,400	\$11,600	\$87,200	\$150,000
			High	\$24,400	\$82,400	\$16,400	\$980,000	\$1,100,000
	Conservation/Recreation (USACE)	4 Informal Consultations	Low	\$1,600	\$8,000	\$4,800	\$0	\$14,400
			High	\$12,400	\$38,400	\$11,600	\$0	\$62,400
	Conservation/Recreation (PFW)	2 Informal Consultations	Low	\$3,400	\$0	\$2,400	\$0	\$5,800
			High	\$14,000	\$0	\$13,800	\$0	\$27,800
	Dredging and Clearing (USACE)	120 - 180 Informal Consultations	Low	\$48,000	\$240,000	\$144,000	\$0	\$432,000
			High	\$558,000	\$1,728,000	\$522,000	\$0	\$2,810,000
	Dredging and Clearing (USACE)	2 Formal Consultations	Low	\$6,200	\$19,200	\$5,800	\$43,600	\$74,800
			High	\$12,200	\$41,200	\$8,200	\$490,000	\$551,600
Private Landowner Assistance	1 Technical Assistance	Low	\$50	\$0	\$600	\$0	\$650	
		High	\$50	\$0	\$1,500	\$0	\$1,550	
2	Road and Bridge Construction (MS DOT)	2 Formal Consultation	Low	\$6,200	\$7,800	\$13,800	\$0	\$27,800
			High	\$12,200	\$13,000	\$19,400	\$0	\$44,600

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs
	Road and Bridge Construction (MS DOT)	4 Informal Consultations	Low	\$1,600	\$5,200	\$4,800	\$0	\$11,600
			High	\$12,400	\$15,600	\$27,600	\$0	\$55,600
	Road and Bridge Construction (USACE)	1 Informal Consultation	Low	\$400	\$2,000	\$1,200	\$21,800	\$25,400
			High	\$3,100	\$9,600	\$2,900	\$245,000	\$261,000
	Water Quality Activities (EPA)	4 Formal Consultations	Low	\$12,400	\$15,600	\$27,600	\$0	\$55,600
			High	\$24,400	\$26,000	\$38,800	\$0	\$89,200
	Conservation/Recreation (USACE)	4 Informal Consultations	Low	\$1,600	\$8,000	\$4,800	\$0	\$14,400
			High	\$12,400	\$38,400	\$11,600	\$0	\$62,400
	Conservation/Recreation (PFW)	2 Informal Consultations	Low	\$3,400	\$0	\$2,400	\$0	\$5,800
			High	\$14,000	\$0	\$13,800	\$0	\$27,800
	Dredging (USACE)	4 Formal Consultations	Low	\$12,400	\$38,400	\$11,600	\$87,200	\$150,000
			High	\$24,400	\$82,400	\$16,400	\$980,000	\$1,100,000
	Private Landowner Assistance	1 Technical Assistance	Low	\$50	\$0	\$600	\$0	\$650
			High	\$50	\$0	\$1,500	\$0	\$1,550
3	Road and Bridge Construction (MS DOT)	2 Formal Consultation	Low	\$6,200	\$7,800	\$13,800	\$0	\$27,800
			High	\$12,200	\$13,000	\$19,400	\$0	\$44,600
	Road and Bridge Construction (MSDOT)	3 Informal Consultations	Low	\$1,200	\$3,900	\$3,600	\$0	\$8,700
			High	\$9,300	\$11,700	\$20,700	\$0	\$41,700
	Water Quality Activities (EPA)	4 Formal Consultations	Low	\$12,400	\$15,600	\$27,600	\$0	\$55,600
			High	\$24,400	\$26,000	\$38,800	\$0	\$89,200
	Conservation/Recreation (USACE)	4 Informal Consultations	Low	\$1,600	\$8,000	\$4,800	\$0	\$14,400
			High	\$12,400	\$38,400	\$11,600	\$0	\$62,400

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs
	Conservation/Recreation (PFW)	4 Informal Consultations	Low	\$6,800	\$0	\$4,800	\$0	\$11,600
			High	\$28,000	\$0	\$27,600	\$0	\$55,600
	Dredging and Clearing (USACE)	2 Formal Consultations	Low	\$6,200	\$19,200	\$5,800	\$43,600	\$74,800
			High	\$12,200	\$41,200	\$8,200	\$490,000	\$551,600
	Private Landowner Assistance	1 Technical Assistance	Low	\$50	\$0	\$600	\$0	\$650
			High	\$50	\$0	\$1,500	\$0	\$1,550
4	Road and Bridge Construction (MS DOT)	4 Informal Consultations	Low	\$1,600	\$5,200	\$4,800	\$0	\$11,600
			High	\$12,400	\$15,600	\$27,600	\$0	\$55,600
	Water Quality Activities (EPA)	4 Formal Consultations	Low	\$12,400	\$15,600	\$27,600	\$0	\$55,600
			High	\$24,400	\$26,000	\$38,800	\$0	\$89,200
	Conservation/Recreation (USACE)	4 Informal Consultations	Low	\$1,600	\$8,000	\$4,800	\$0	\$14,400
			High	\$12,400	\$38,400	\$11,600	\$0	\$62,400
	Conservation/Recreation (USACE)	1 Formal Consultation	Low	\$3,100	\$9,600	\$2,900	\$21,800	\$37,400
			High	\$6,100	\$20,600	\$4,100	\$245,000	\$276,000
	Conservation/Recreation (PFW)	3 Informal Consultations	Low	\$5,100	\$0	\$3,600	\$0	\$8,700
			High	\$21,000	\$0	\$20,700	\$0	\$41,700
	Dredging and Clearing (USACE)	2 Formal Consultations	Low	\$6,200	\$19,200	\$5,800	\$43,600	\$74,800
			High	\$12,200	\$41,200	\$8,200	\$490,000	\$551,600
	Dredging (USACE)	1 Informal Consultation	Low	\$400	\$2,000	\$1,200	\$21,800	\$25,400
			High	\$3,100	\$9,600	\$2,900	\$245,000	\$261,000
5	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900
			High	\$7,000	\$0	\$6,900	\$0	\$13,900
6	Conservation/Recreation (USACE)	4 Informal Consultations	Low	\$1,600	\$8,000	\$4,800	\$0	\$14,400
			High	\$12,400	\$38,400	\$11,600	\$0	\$62,400
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900
			High	\$7,000	\$0	\$6,900	\$0	\$13,900
7	Conservation/Recreation (USACE)	4 Informal Consultations	Low	\$1,600	\$8,000	\$4,800	\$0	\$14,400
			High	\$12,400	\$38,400	\$11,600	\$0	\$62,400
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900
			High	\$7,000	\$0	\$6,900	\$0	\$13,900
	Dredging (USACE)	1 Informal Consultation	Low	\$400	\$2,000	\$1,200	\$21,800	\$25,400
			High	\$3,100	\$9,600	\$2,900	\$245,000	\$261,000
8	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900
			High	\$7,000	\$0	\$6,900	\$0	\$13,900
9	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900
			High	\$7,000	\$0	\$6,900	\$0	\$13,900
10	Activities in National Forests (USFS)	1 Formal Consultation	Low	\$3,100	\$10,800	\$0	\$0	\$13,900
			High	\$6,100	\$16,200	\$0	\$0	\$22,300

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs
	Activities in National Forests (USFS)	18 Informal Consultations	Low	\$7,200	\$45,000	\$0	\$0	\$52,200
			High	\$55,800	\$194,000	\$0	\$0	\$250,000
	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900
			High	\$7,000	\$0	\$6,900	\$0	\$13,900
11	Coal Mining (BLM)	1 Informal Consultation	Low	\$400	\$1,300	\$1,200	\$9,000	\$11,900
			High	\$3,100	\$7,900	\$2,900	\$9,000	\$22,900
	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900
			High	\$7,000	\$0	\$6,900	\$0	\$13,900
	Coal Mining Permits	2 Technical Assistance	Low	\$100	\$0	\$1,200	\$0	\$1,300
			High	\$100	\$0	\$3,000	\$0	\$3,100

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs
12	Water Supply Dam (USACE)	1 Formal Consultation	Low	\$3,100	\$9,600	\$2,900	\$0	\$15,600
			High	\$6,100	\$20,600	\$4,100	\$154,000,000	\$154,000,000
	Water Quality Activities (EPA)	2 Formal Consultations	Low	\$6,200	\$7,800	\$13,800	\$0	\$27,800
			High	\$12,200	\$13,000	\$19,400	\$0	\$44,600
	Utilities (USACE)	1 Formal Consultation	Low	\$3,100	\$9,600	\$2,900	\$600,000	\$616,000
			High	\$6,100	\$20,600	\$4,100	\$800,000	\$831,000
	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900
			High	\$7,000	\$0	\$6,900	\$0	\$13,900
	Dredging (USACE)	1 Informal Consultation	Low	\$400	\$2,000	\$1,200	\$21,800	\$25,400
			High	\$3,100	\$9,600	\$2,900	\$245,000	\$261,000
Coal Mining Permits	6 Technical Assistance	Low	\$300	\$0	\$3,600	\$0	\$3,900	
		High	\$300	\$0	\$9,000	\$0	\$9,300	
13	Utilities Maintenance/ Construction (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$43,600	\$50,800
			High	\$6,200	\$19,200	\$5,800	\$490,000	\$521,000
	Utilities (USACE)	1 Formal Consultation	Low	\$3,100	\$9,600	\$2,900	\$600,000	\$616,000
			High	\$6,100	\$20,600	\$4,100	\$800,000	\$831,000
	Water Quality Activities (EPA)	2 Formal Consultations	Low	\$6,200	\$7,800	\$13,800	\$0	\$27,800
			High	\$12,200	\$13,000	\$19,400	\$0	\$44,600
	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs
	Conservation/Recreation (PFW)	2 Informal Consultations	Low	\$3,400	\$0	\$2,400	\$0	\$5,800
			High	\$14,000	\$0	\$13,800	\$0	\$27,800
	Coal Mining Permits	4 Technical Assistance	Low	\$200	\$0	\$2,400	\$0	\$2,600
			High	\$200	\$0	\$6,000	\$0	\$6,200
14	Road and Bridge Maintenance (USACE)	1 Informal Consultation	Low	\$400	\$2,000	\$1,200	\$21,800	\$25,400
			High	\$3,100	\$9,600	\$2,900	\$245,000	\$261,000
	Utilities Maintenance/Construction (USACE)	1 Informal Consultation	Low	\$400	\$2,000	\$1,200	\$21,800	\$25,400
			High	\$3,100	\$9,600	\$2,900	\$245,000	\$261,000
	Conservation/Recreation (USACE)	4 Informal Consultations	Low	\$1,600	\$8,000	\$4,800	\$0	\$14,400
			High	\$12,400	\$38,400	\$11,600	\$0	\$62,400
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900
			High	\$7,000	\$0	\$6,900	\$0	\$13,900
	Dredging (USACE)	4 Formal Consultations	Low	\$12,400	\$38,400	\$11,600	\$87,200	\$150,000
			High	\$24,400	\$82,400	\$16,400	\$8,980,000	\$9,100,000
	Dredging (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$43,600	\$50,800
			High	\$6,200	\$19,200	\$5,800	\$490,000	\$521,000
15	Conservation/Recreation (USACE)	4 Informal Consultations	Low	\$1,600	\$8,000	\$4,800	\$0	\$14,400
			High	\$12,400	\$38,400	\$11,600	\$0	\$62,400
	Conservation/Recreation (PFW)	2 Informal Consultations	Low	\$3,400	\$0	\$2,400	\$0	\$5,800
			High	\$14,000	\$0	\$13,800	\$0	\$27,800
16	Road and Bridge Construction (GA DOT)	20-30 Informal Consultations	Low	\$8,000	\$26,000	\$24,000	\$2,100,000	\$2,160,000
			High	\$93,000	\$117,000	\$207,000	\$2,100,000	\$2,520,000

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs
	Water Supply Dam (USACE)	1 Formal Consultation	Low	\$3,100	\$9,600	\$2,900	\$0	\$15,600
			High	\$6,100	\$20,600	\$4,100	\$0	\$30,800
	Utilities (TVA)	1 Informal Consultation	Low	\$400	\$1,300	\$1,200	\$0	\$2,900
			High	\$3,100	\$3,900	\$6,900	\$0	\$13,900
	Agriculture and Ranching (NRCS)	2 Informal Consultation	Low	\$800	\$2,600	\$2,400	\$0	\$5,800
			High	\$6,200	\$7,800	\$13,800	\$0	\$27,800
	Agriculture and Ranching (FSA)	1 Informal Consultation	Low	\$400	\$1,300	\$1,200	\$0	\$2,900
			High	\$3,100	\$3,900	\$6,900	\$0	\$13,900
	Water Quality Activities (EPA)	1 Formal Consultation	Low	\$3,100	\$3,900	\$6,900	\$0	\$13,900
			High	\$6,100	\$6,500	\$9,700	\$0	\$22,300
	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200
	Conservation/Recreation (PFW)	4-6 Informal Consultations	Low	\$6,800	\$0	\$4,800	\$0	\$11,600
			High	\$42,000	\$0	\$41,400	\$0	\$83,400
Private Landowner Assistance	30-40 Technical Assistance	Low	\$1,500	\$0	\$18,000	\$0	\$19,500	
		High	\$2,000	\$0	\$60,000	\$0	\$62,000	
17	Activities in National Forests (USFS)	1 Formal Consultation	Low	\$3,100	\$10,800	\$0	\$0	\$13,900
			High	\$6,100	\$16,200	\$0	\$0	\$22,300
	Activities in National Forests (USFS)	6 Informal Consultations	Low	\$2,400	\$15,000	\$0	\$0	\$17,400
			High	\$18,600	\$64,800	\$0	\$0	\$83,400
	Water Quality Activities (USACE)	1 Informal Consultation	Low	\$400	\$2,000	\$1,200	\$21,800	\$25,400
			High	\$3,100	\$9,600	\$2,900	\$245,000	\$261,000

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs	
	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200	
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200	
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900	
			High	\$7,000	\$0	\$6,900	\$0	\$13,900	
18	Hydropower Facilities	1 Formal Consultation	Low	\$3,100	\$3,900	\$6,900	\$8,280,000	\$8,290,000	
			High	\$6,100	\$6,500	\$9,700	\$85,200,000	\$85,200,000	
	Utilities Construction/Maintenance (USACE)	4 Informal Consultations	Low	\$1,600	\$8,000	\$4,800	\$87,200	\$102,000	
			High	\$12,400	\$38,400	\$11,600	\$980,000	\$1,040,000	
	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200	
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200	
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900	
			High	\$7,000	\$0	\$6,900	\$0	\$13,900	
	19	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200
				High	\$6,200	\$19,200	\$5,800	\$0	\$31,200
Conservation/Recreation (PFW)		1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900	
			High	\$7,000	\$0	\$6,900	\$0	\$13,900	
20	Utilities Construction/Maintenance (USACE)	1 Informal Consultation	Low	\$400	\$2,000	\$1,200	\$21,800	\$25,400	
			High	\$3,100	\$9,600	\$2,900	\$245,000	\$261,000	
	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200	
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200	
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900	
			High	\$7,000	\$0	\$6,900	\$0	\$13,900	

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs
21	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900
			High	\$7,000	\$0	\$6,900	\$0	\$13,900
22	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900
			High	\$7,000	\$0	\$6,900	\$0	\$13,900
23	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900
			High	\$7,000	\$0	\$6,900	\$0	\$13,900
	Dredging (USACE)	1 Informal Consultation	Low	\$400	\$2,000	\$1,200	\$21,800	\$25,400
			High	\$3,100	\$9,600	\$2,900	\$245,000	\$261,000
24	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200
	Conservation/Recreation (PFW)	1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900
			High	\$7,000	\$0	\$6,900	\$0	\$13,900
25	Road and Bridge Maintenance (GA DOT)	10 Informal Consultations	Low	\$4,000	\$13,000	\$12,000	\$900,000	\$929,000
			High	\$31,000	\$39,000	\$69,000	\$900,000	\$1,040,000
	Road and Bridge Maintenance (TN DOT)	4 Informal Consultations	Low	\$1,600	\$5,200	\$4,800	\$7,200	\$18,800
			High	\$12,400	\$15,600	\$27,600	\$60,000	\$116,000

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs
	Road and Bridge Maintenance (USACE)	1 Informal Consultation	Low	\$400	\$2,000	\$1,200	\$100	\$3,700
			High	\$3,100	\$9,600	\$2,900	\$100	\$15,700
	Road and Bridge Maintenance (USACE)	1 Formal Consultation	Low	\$3,100	\$9,600	\$2,900	\$10,000	\$25,600
			High	\$6,100	\$20,600	\$4,100	\$10,000	\$40,800
	Hydropower (USACE)	1 Formal Consultation	Low	\$3,100	\$100,000	\$2,900	\$23,700,000	\$500,000
			High	\$6,100	\$100,000	\$4,100	\$23,700,000	\$515,000
	Hydropower (FERC)	1 Informal Consultation	Low	\$400	\$1,300	\$1,200	\$0	\$2,900
			High	\$3,100	\$3,900	\$6,900	\$0	\$13,900
	Utilities (TVA)	1 Informal Consultation	Low	\$400	\$1,300	\$1,200	\$0	\$2,900
			High	\$3,100	\$3,900	\$6,900	\$0	\$13,900
	Activities in National Forests	18 Informal Consultations	Low	\$7,200	\$45,000	\$0	\$0	\$52,200
			High	\$55,800	\$194,000	\$0	\$0	\$250,000
	Activities in National Forests	40 Technical Assistance	Low	\$2,000	\$24,000	\$0	\$0	\$26,000
			High	\$2,000	\$60,000	\$0	\$0	\$62,000
	Agriculture and Ranching (NRCS)	1 Formal Consultation	Low	\$3,100	\$3,900	\$6,900	\$0	\$13,900
			High	\$6,100	\$6,500	\$9,700	\$0	\$22,300
	Agriculture and Ranching (NRCS)	21 Informal Consultations	Low	\$8,400	\$27,300	\$25,200	\$0	\$60,900
			High	\$65,100	\$81,900	\$145,000	\$0	\$292,000
Agriculture and Ranching (FSA)	1 Informal Consultation	Low	\$400	\$1,300	\$1,200	\$0	\$2,900	
		High	\$3,100	\$3,900	\$6,900	\$0	\$13,900	
Agriculture and Ranching (USACE)	4 Formal Consultations	Low	\$12,400	\$38,400	\$11,600	\$40,000	\$102,000	
		High	\$24,400	\$82,400	\$16,400	\$40,000	\$163,000	

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs	
	Agriculture and Ranching (USACE)	4 Informal Consultations	Low	\$16,000	\$8,000	\$4,800	\$400	\$14,800	
			High	\$12,400	\$38,400	\$11,600	\$400	\$62,800	
	Conservation/Recreation (USACE)	2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200	
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200	
	Conservation/Recreation (PFW)	30-35 Informal Consultations	Low	\$51,000	\$0	\$36,000	\$0	\$87,000	
			High	\$245,000	\$0	\$242,000	\$0	\$487,000	
	Private Landowner Assistance	30-40 Technical Assistance	Low	\$1,500	\$0	\$18,000	\$0	\$19,500	
			High	\$2,000	\$0	\$60,000	\$0	\$62,000	
	26	Hydropower Facilities	1 Formal Consultation	Low	\$3,100	\$3,900	\$6,900	\$0	\$13,900
				High	\$6,100	\$6,500	\$9,700	\$0	\$22,300
Conservation/Recreation (USACE)		2 Informal Consultations	Low	\$800	\$4,000	\$2,400	\$0	\$7,200	
			High	\$6,200	\$19,200	\$5,800	\$0	\$31,200	
Conservation/Recreation (PFW)		1 Informal Consultation	Low	\$1,700	\$0	\$1,200	\$0	\$2,900	
			High	\$7,000	\$0	\$6,900	\$0	\$13,900	
18, 19, 20, 22	Activities in National Forests (USFS)	2 Formal Consultations	Low	\$6,200	\$21,600	\$0	\$0	\$27,800	
			High	\$12,200	\$32,400	\$0	\$0	\$44,600	
	Activities in National Forests (USFS)	21 Informal Consultations	Low	\$8,400	\$52,500	\$0	\$0	\$60,900	
			High	\$65,100	\$227,000	\$0	\$0	\$292,000	
AL UNITS	Road and Bridge Construction (AL DOT)	10 Formal Consultations	Low	\$31,000	\$39,000	\$69,000	\$1,130,000	\$1,270,000	
			High	\$61,000	\$65,000	\$97,000	\$4,090,000	\$4,310,000	
	Road and Bridge Construction (AL DOT)	90 Informal Consultations	Low	\$36,000	\$117,000	\$108,000	\$0	\$261,000	
			High	\$279,000	\$351,000	\$621,000	\$0	\$1,250,000	

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs	
	Agriculture and Ranching (NRCS)	1 Formal Consultation	Low	\$3,100	\$3,900	\$6,900	\$4,460	\$18,400	
			High	\$6,100	\$6,500	\$9,700	\$4,460	\$26,800	
	Agriculture and Ranching (NRCS)	6-9 Informal Consultations	Low	\$2,400	\$7,800	\$7,200	\$0	\$17,400	
			High	\$27,900	\$35,100	\$62,100	\$0	\$125,000	
	Water Quality Activities (EPA)	4-7 Informal Consultations	Low	\$1,600	\$5,200	\$4,800	\$0	\$11,600	
			High	\$21,700	\$27,300	\$48,300	\$0	\$97,300	
	NPDES Permit Review	320 Technical Assistance	Low	\$16,000	\$0	\$192,000	\$0	\$208,000	
			High	\$16,000	\$0	\$480,000	\$0	\$496,000	
	Private Landowner Assistance	120 Technical Assistance	Low	\$6,000	\$0	\$72,000	\$0	\$78,000	
			High	\$6,000	\$0	\$180,000	\$0	\$186,000	
	MS UNITS	Water Quality Activities (EPA)	4-7 Informal Consultations	Low	\$1,600	\$5,200	\$4,800	\$0	\$11,600
				High	\$21,700	\$27,300	\$48,300	\$0	\$97,300
Conservation/Recreation (FWS Internal)		10 Informal Consultations	Low	\$17,000	\$0	\$12,000	\$0	\$29,000	
			High	\$70,000	\$0	\$69,000	\$0	\$139,000	
NPDES Permit Review		20 Technical Assistance	Low	\$1,000	\$0	\$12,000	\$0	\$13,000	
			High	\$1,000	\$0	\$30,000	\$0	\$31,000	
Power Company Certifications		6 Technical Assistance	Low	\$300	\$0	\$3,600	\$0	\$3,900	
			High	\$300	\$0	\$9,000	\$0	\$9,300	
GA UNITS	Water Quality Activities (EPA)	4-7 Informal Consultations	Low	\$1,600	\$5,200	\$4,800	\$0	\$11,600	
			High	\$21,700	\$27,300	\$48,300	\$0	\$97,300	
	NPDES Permit Review	60-120 Technical Assistance	Low	\$3,000	\$0	\$36,000	\$0	\$39,000	
			High	\$6,000	\$0	\$180,000	\$0	\$186,000	

Unit	Activity	Section 7 Impact	Range	Costs to the Service	Costs to the Action Agency	Costs to Third Parties	Project Modifications	Total Section 7 Costs
TN UNITS	Water Quality Activities (EPA)	4-7 Informal Consultations	Low	\$1,600	\$5,200	\$4,800	\$0	\$11,600
			High	\$21,700	\$27,300	\$48,300	\$0	\$97,300
MULTIPLE UNITS	Water Quality Activities (EPA)	3 Formal Consultations	Low	\$9,300	\$11,700	\$20,700	\$105,000	\$147,000
			High	\$18,300	\$19,500	\$29,100	\$150,000	\$217,000
TOTAL SECTION 7 COSTS			Low	\$574,000	\$1,420,000	\$1,290,000	\$38,300,000	\$41,600,000
			High	\$2,770,000	\$5,170,000	\$4,360,000	\$289,000,000	\$301,000,000
Source: Based on conversations with Federal agencies potentially affected by the proposed critical habitat designation.								
Notes: Estimates may not sum due to rounding, have been rounded to three significant digits.								