



ECONOMIC ANALYSIS OF
CRITICAL HABITAT
DESIGNATION FOR THE COMAL
SPRINGS DRYOPID BEETLE,
COMAL SPRINGS RIFFLE
BEETLE, AND PECK'S CAVE
AMPHIPOD

Final Report | June 19, 2013

prepared for:

U.S. Fish and Wildlife Service

4401 N. Fairfax Drive

Arlington, VA 22203

prepared by:

Industrial Economics, Incorporated

2067 Massachusetts Avenue

Cambridge, MA 02140

TABLE OF CONTENTS

EXECUTIVE SUMMARY

CHAPTER 1 INTRODUCTION AND BACKGROUND

- 1.1 Introduction *1-1*
- 1.2 Economic Activities Considered in this Analysis *1-9*
- 1.3 Overview of the Framework for the Analysis *1-10*
- 1.4 Geographic Scope of the Analysis *1-15*
- 1.5 Analytic Time Frame *1-15*
- 1.6 Information Sources *1-15*
- 1.7 Presentation of Results *1-16*

CHAPTER 2 ANALYSIS OF CRITICAL HABITAT DESIGNATION FOR THE THREE COMAL SPRINGS INVERTEBRATES

- 2.1 Summary of Results of the Incremental Impact Analysis *2-7*
- 2.2 Section 7 Consultation Forecast *2-2*
- 2.3 Economic Benefits of Critical Habitat Designation for the Invertebrates *2-9*
- 2.4 Key Assumptions *2-10*

REFERENCES

APPENDIX A FRAMEWORK FOR THE ANALYSIS

APPENDIX B SMALL BUSINESS AND ENERGY IMPACTS ANALYSES

APPENDIX C INCREMENTAL EFFECTS MEMORANDUM FOR THE ECONOMIC ANALYSIS FOR THE COMAL SPRINGS DRYOPID BEETLE, COMAL SPRINGS RIFFLE BEETLE, AND PECK'S CAVE AMPHIPOD

EXECUTIVE SUMMARY

1. The purpose of this report is to evaluate the potential economic impacts associated with the designation of revised critical habitat for the Comal Springs dryopid beetle, the Comal Springs riffle beetle, and Peck's cave amphipod. This report was prepared by Industrial Economics, Incorporated (IEc), under contract to the U.S. Fish and Wildlife Service (Service). The information contained in this report is intended to assist the Secretary of the U.S. Department of the Interior (DOI) in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.¹
2. On October 19, 2012, the Service published a Proposed Rule designating revised critical habitat for the three invertebrate species under the Endangered Species Act (ESA).² The proposed critical habitat designation includes two units in Comal County, Texas and two units in Hays County, Texas. As described in the Proposed Rule, all units proposed for designation are occupied by at least one of the three invertebrate species.³
3. This final economic analysis analyzes the proposed designation as described in the Proposed Rule. This analysis does not reflect changes to the proposed critical habitat designation made in the Final Rule. Consequently, description of the habitat designation in the Final Rule may differ from maps and figures presented in this analysis.⁴
4. This analysis first qualitatively describes protections provided by Federal, State and local statutes and regulations afforded to these species due to the listing of the species under the ESA, without critical habitat designation. These protections are not generated by or affected by critical habitat designation for the three invertebrates; they are "baseline" protections afforded the species regardless of the designation of critical habitat. Thus the analysis will not quantify the associated impacts, but will describe them qualitatively.
5. The discussion of the baseline protections for the three species provides context for the evaluation of the economic impacts of critical habitat designation, which are the focus of this analysis. These "incremental" economic impacts are those that are not expected to occur absent the designation of critical habitat. This analysis considers both direct and indirect incremental costs. Direct incremental costs are associated with additional effort

¹ 16 U.S.C. §1533(b)(2).

² 2012 Proposed Critical Habitat Rule, 77 FR 64272.

³ *Ibid.*

⁴ For a detailed description of the public comments received on the draft economic analysis and the associated responses, refer to the responses to public comment section of the Final Rule.

for consultations, reinitiated consultations, new consultations occurring specifically because of the designation, and additional conservation efforts that would not have been requested under the jeopardy standard. Indirect costs are those that may result from the influence of critical habitat designation on the decisions of regulators and decision-makers other than the Service (e.g., State agencies and land managers). Because the Service believes that the direct benefits of the Proposed Rule are best expressed in biological terms, this analysis does not quantify or monetize benefits. However, we provide a qualitative discussion of economic benefits at the end of this report.

OVERVIEW OF THE PROPOSED CRITICAL HABITAT AND STUDY AREA

6. The Service has proposed approximately 169 acres of subsurface and surface habitat across four critical habitat units. This acreage represents the total acreage proposed for all three species. Critical habitat for each individual species is defined separately and overlaps in the Comal Springs unit.⁵ Our analysis evaluates impacts of critical habitat designation on activities within or affecting the proposed critical habitat area. This includes activities affecting hydrologic conditions in the Edwards Aquifer, the source of the spring systems being proposed for critical habitat designation. Costs provided in this analysis are presented by critical habitat unit.
7. Proposed critical habitat is owned by a combination of private, municipal, and State entities. The Hueco Springs and Fern Bank Springs Units are located entirely on private lands. The San Marcos Unit is located entirely on State lands. Within the Comal Springs Unit, the surface water and bottom of Landa Lake are owned by the State. The City of New Braunfels maintains ownership of approximately 40 percent of the riparian land adjacent to the lake, and private landowners own approximately 60 percent.

SUMMARY OF KEY FINDINGS

8. **The types of conservation efforts requested by the Service during section 7 consultation regarding the three invertebrate species are not expected to change due to critical habitat designation.** As stated in a memorandum on incremental effects of the proposed critical habitat designation, the Service believes that “in order to reach a conclusion of jeopardy under section 7 consultation, a proposed Federal action would have to make their habitat unsuitable for the invertebrates. The ability of these species to persist is very closely tied to the quality of their habitats. These species are very reliant upon aquatic habitat conditions for their physiological and behavioral functions (e.g., breeding and feeding). They have limited ability to move beyond their immediate locations. Therefore, any action that substantially reduces habitat quality (by altering either the quality or quantity of water or the stream banks and associated vegetation) will reduce the number of individuals and populations. We can foresee no future actions that could significantly impact the individuals of the species independent of the habitat. Conversely, we can foresee no future actions that could substantially impact the habitat without also appreciably reducing survival and recovery of the species. Thus, we assume

⁵ 2012 Proposed Critical Habitat Rule, 77 FR 64272.

that if these conditions (adequate water quality and quantity) are impacted severely, the species chances of survival will decrease and their opportunity for recovery will decrease as well. Therefore, any proposed Federal activity that is likely to severely impact the water quality or spring flow quantities could result in jeopardy.”⁶

9. All four proposed critical habitat units are occupied by at least one of the three invertebrate species. Because the survival of the species is directly dependent on the quality of habitat, we expect that any action resulting in adverse modification of critical habitat would have already resulted in a conclusion of jeopardy even absent designation.
10. The Service has indicated that critical habitat designation may trigger re-initiation of section 7 consultation for many existing incidental take permits for habitat conservation plans. This analysis estimates incremental impacts associated with programmatic re-initiation of section 7 consultation related to re-initiation of five incidental take permits for Habitat Conservation Plans (HCP). We assume that these re-initiations will occur in 2013 immediately following the designation of critical habitat. In addition, this analysis has identified the following new section 7 consultations. Department of Defense operations (two consultations), and several construction-related activities in the Comal Springs Unit and San Marcos Springs Unit which may require a section 404 permit over the next 20 years (six consultations). The present value of total incremental costs of critical habitat designation is \$71,000 over the next 20 years assuming a seven percent discount rate, or \$6,300 on an annualized basis.⁷ Present value impacts are \$80,000, or \$5,200 on an annualized basis, assuming a three percent discount rate. The distribution of projected incremental costs across critical habitat units is provided in Exhibit ES-1. As highlighted in the exhibit, the Comal Springs Unit is likely to be subject to the greatest incremental impacts, but these are expected to be limited to \$28,000 over the next 20 years.
11. **Incremental impacts of critical habitat designation are limited to additional administrative costs of consultations.** Once critical habitat is designated, some additional effort is likely to be required as part of section 7 consultation to describe the potential for projects to result in adverse modification. This is reflected in additional hours spent in communication with the Service and on activities such as report-writing and project documentation.
12. **Indirect incremental impacts are unlikely to result from the designation of critical habitat for the invertebrate species.** Communication with State and municipal entities indicates that the designation of critical habitat is not expected to directly influence management practices related to water quality regulations above and beyond the level of

⁶ U.S. Fish and Wildlife Service. October 15, 2012. *Incremental Effects Memorandum for the Economic Analysis for the Proposed Revision of Critical Habitat for the Endangered Comal Springs Dryopid Beetle, Comal Springs Riffle Beetle, and Peck's Cave Amphipod*. See Appendix D.

⁷ To calculate present value and annualized impacts, guidance provided by U.S. Office of Management and Budget (OMB) specifies the use of a real annual discount rate of seven percent. In addition, OMB recommends conducting a sensitivity analysis using other discount rates, such as three percent. Throughout this report, all impacts are reported using discount rates of both seven and three percent.

conservation already required by the presence of the species. Therefore, we assume that indirect impacts from the designation will be negligible.

13. The Service believes that the direct benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking. In addition, management actions undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as increased recreational opportunities in a region. While these ancillary benefits are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat. As no changes in management practices are expected due to this proposed critical habitat designation, the analysis does not anticipate any direct or ancillary economic benefits.
14. The analyses of impacts to small entities and the energy industry rely on the estimated incremental impacts resulting from the proposed critical habitat designation. Estimated incremental impacts that have the potential to be borne by small entities are limited to the administrative costs of Section 7 consultation related to future activity within or affecting the proposed critical habitat units. Critical habitat designation for the three invertebrates is not expected to affect energy production, distribution, or supply, thus no significant adverse effects of designation on the energy industry are expected.
15. The analysis forecasts future activity in the study area based on information on expected water withdrawal and other activities from the Service, the EAA, municipal planning and development departments, and state contacts. We assume that this information is complete and that no other projects will occur in the study area during the timeframe of this analysis. The degree of future activity in the study area will depend, in large part, on the future development pressure and maintenance requirements in this area, which are uncertain. Based on input from the Service, we assume that the Service will not request additional project modifications to address adverse modification beyond what is requested to avoid jeopardy.

EXHIBIT ES-1. TOTAL INCREMENTAL IMPACTS (2013-2032, 2013 \$)

PROPOSED CRITICAL HABITAT UNIT	PRESENT VALUE (7%)	ANNUALIZED (7%)	PRESENT VALUE (3%)	ANNUALIZED (3%)
Unit 1 (Comal Springs)	\$28,000	\$2,500	\$34,000	\$2,200
Unit 2 (Hueco Springs)	\$14,000	\$1,200	\$15,000	\$950
Unit 3 (Fern Bank Springs)	\$12,000	\$1,100	\$13,000	\$840
Unit 4 (San Marcos Springs)	\$17,000	\$1,500	\$18,000	\$1,200
TOTAL	\$71,000	\$6,300	\$80,000	\$5,200
Note: The level of effort per consultation and the potential costs of project modifications represent approximate averages based on the best available cost information. The cost estimates in this report are accordingly rounded to two significant digits to reflect this imprecision. The cost estimates may therefore not sum to the total costs reported due to rounding.				

CHAPTER 1 | INTRODUCTION AND BACKGROUND

1.1 INTRODUCTION

16. This chapter provides an overview of the proposed critical habitat for the Comal Springs dryopid beetle, Comal Springs riffle beetle, and Peck's cave amphipod. This chapter also includes a summary of past legal actions that relate to the current proposal, a description of the area proposed for designation, a discussion of threats to the proposed critical habitat, and a brief discussion of the framework used for analysis of impacts. This information provides context for the analysis contained in Chapter 2 of this report. A detailed discussion of the analytic framework is included in Appendix A. All official definitions and proposed critical habitat boundaries are provided in the Proposed Rule.⁸
17. This final economic analysis analyzes the proposed designation as described in the Proposed Rule. This analysis does not reflect changes to the proposed critical habitat designation made in the Final Rule. Consequently, description of the habitat designation in the Final Rule may differ from maps and figures presented in this analysis.⁹

1.1.1 ORGANIZATION OF THE REPORT

18. This report proceeds through two chapters and several appendices. Chapter 1 discusses the rule background and an overview of the framework employed in the analysis. Chapter 2 describes the baseline protections currently afforded the three invertebrates and their habitat, and the expected incremental impacts of critical habitat designation for the three species. In addition, the report includes four appendices: Appendix A describes in detail the analytic methods used to estimate impacts of critical habitat designation; Appendix B considers potential impacts on small entities and the energy industry; and Appendix C provides the Service's memorandum to IEc describing potential changes in conservation recommendations for these species due to critical habitat designation.

1.1.2 PREVIOUS FEDERAL ACTIONS

19. The Service first published a rule listing the Comal Springs dryopid beetle, Comal Springs riffle beetle, and Peck's cave amphipod as endangered species on December 18, 1997 under the Endangered Species Act of 1973 (ESA). Critical habitat was not designated at the time of listing due to determination that designation would not provide benefits to the three invertebrate species beyond listing and evaluation of activities required under section 7 of the ESA. The Center for Biological Diversity subsequently

⁸ 2012 Proposed critical habitat, 77 FR 64280.

⁹ For a detailed description of the public comments received on the draft economic analysis and the associated responses, refer to the responses to public comment section of the Final Rule.

challenged the lack of designated critical habitat for these species in the U.S. District Court for the District of Columbia.¹⁰ The Service proposed critical habitat for the three Comal Springs invertebrates on July 17, 2006, and designated critical habitat for the species on July 17, 2007.¹¹ On January 14, 2009, The Center for Biological Diversity, Citizens Alliance for Smart Expansion, and Aquifer Guardians in Urban Areas filed suit in Federal Court against the Service, alleging that the Service failed to use the best available science in the final critical habitat rule. On December 18, 2009, the parties filed a settlement agreement in which the Service agreed to submit a revised proposed critical habitat determination.¹² The Service published the proposed rule revising critical habitat for the three invertebrates in the Federal Register on October 19, 2012.¹³ This economic analysis will inform the final critical habitat designation for the three invertebrate species.

1.1.3 PROPOSED CRITICAL HABITAT DESIGNATION

20. The proposed critical habitat designation is presented as four units, totaling approximately 169 acres of subsurface and surface habitat. This acreage represents the total acreage proposed for all three species. Critical habitat for each individual species is defined separately and overlaps in the Comal Springs unit. Proposed surface acres overlap subsurface habitat in areas where subsurface habitat is proposed. Hence a simple sum of the proposed acreages by species will double count some proposed areas.
21. The geographic range of the three Comal Springs invertebrate species is limited to Comal and Hays Counties in central Texas. Units 1 and 2 are located in Comal County, Texas, and Units 3 and 4 are located in Hays County, Texas. The proposed critical habitat encompasses the known historic range for these species in the United States.¹⁴ All units proposed to be revised as critical habitat designation are currently occupied by one or more of the three invertebrate species and contain the primary constituent elements sufficient to support the life history needs of the species.¹⁵
22. Proposed critical habitat is owned by a combination of private, city, and State entities. The Hueco Springs and Fern Bank Springs Units are located entirely on private lands. The San Marcos Unit is located entirely on State of Texas lands.¹⁶ Within the Comal Springs Unit, the surface water and bottom of Landa Lake are owned by the State. The City of New Braunfels maintains ownership of approximately 40 percent of the riparian land adjacent to the lake, and private landowners own approximately 60 percent.

¹⁰ 2012 Proposed critical habitat 77 FR 64274.

¹¹ 2012 Proposed critical habitat 77 FR 64274.

¹² 2012 Proposed critical habitat 77 FR 64274.

¹³ 2012 Proposed critical habitat 77 FR 64274.

¹⁴ 2012 Proposed critical habitat 77 FR 64280.

¹⁵ 2012 Proposed critical habitat 77 FR 64278.

¹⁶ 2012 Proposed critical habitat 77 FR 64281.

23. Exhibits 1-1 through 1-4 map the four units proposed for critical habitat that constitute the study area for this analysis. Surface and subsurface critical habitat boundaries are identified in units where both exist. Exhibit 1-5 through 1-7 list area of proposed surface and subsurface critical habitat for the Comal Springs dryopid beetle, Comal Springs riffle beetle, and Peck's cave amphipod respectively. The study area for this economic analysis is defined by the boundaries of the proposed critical habitat areas. The analysis also considers activities occurring outside the study area with the potential to modify habitat features within the critical habitat boundaries, such as groundwater withdrawals or adjacent construction projects. Exhibit 1-8 provides information on land ownership within the four proposed critical habitat units. The analysis considers land use and ownership within the study area. Approximately half of the land within proposed critical habitat is privately owned.

EXHIBIT 1-1. PROPOSED CRITICAL HABITAT DESIGNATION FOR THE COMAL SPRINGS INVERTEBRATES - COMAL SPRINGS UNIT

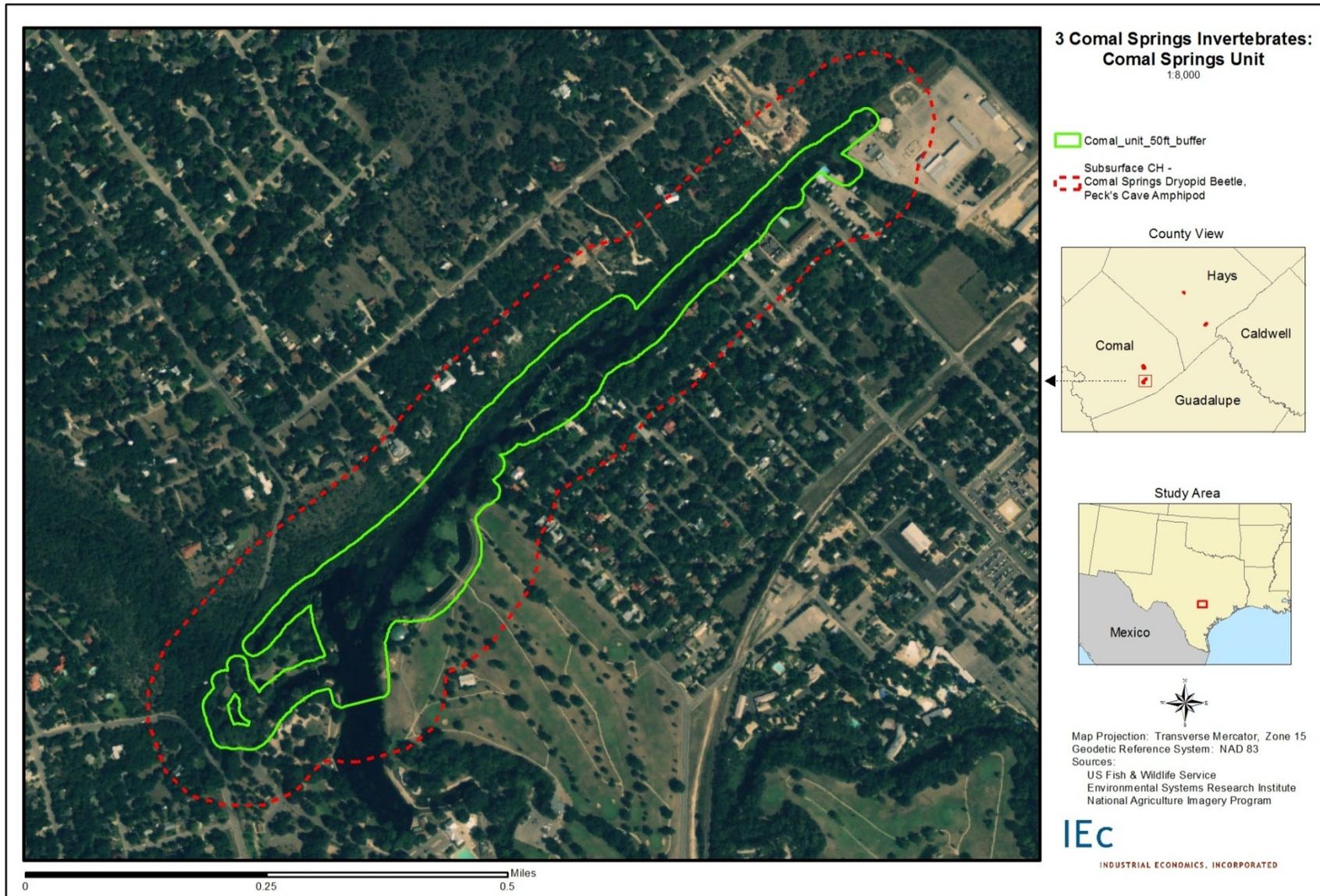


EXHIBIT 1-2. PROPOSED CRITICAL HABITAT DESIGNATION FOR THE COMAL SPRINGS INVERTEBRATES - HUECO SPRINGS UNIT



EXHIBIT 1-3. PROPOSED CRITICAL HABITAT DESIGNATION FOR THE COMAL SPRINGS INVERTEBRATES - FERN SPRINGS UNIT

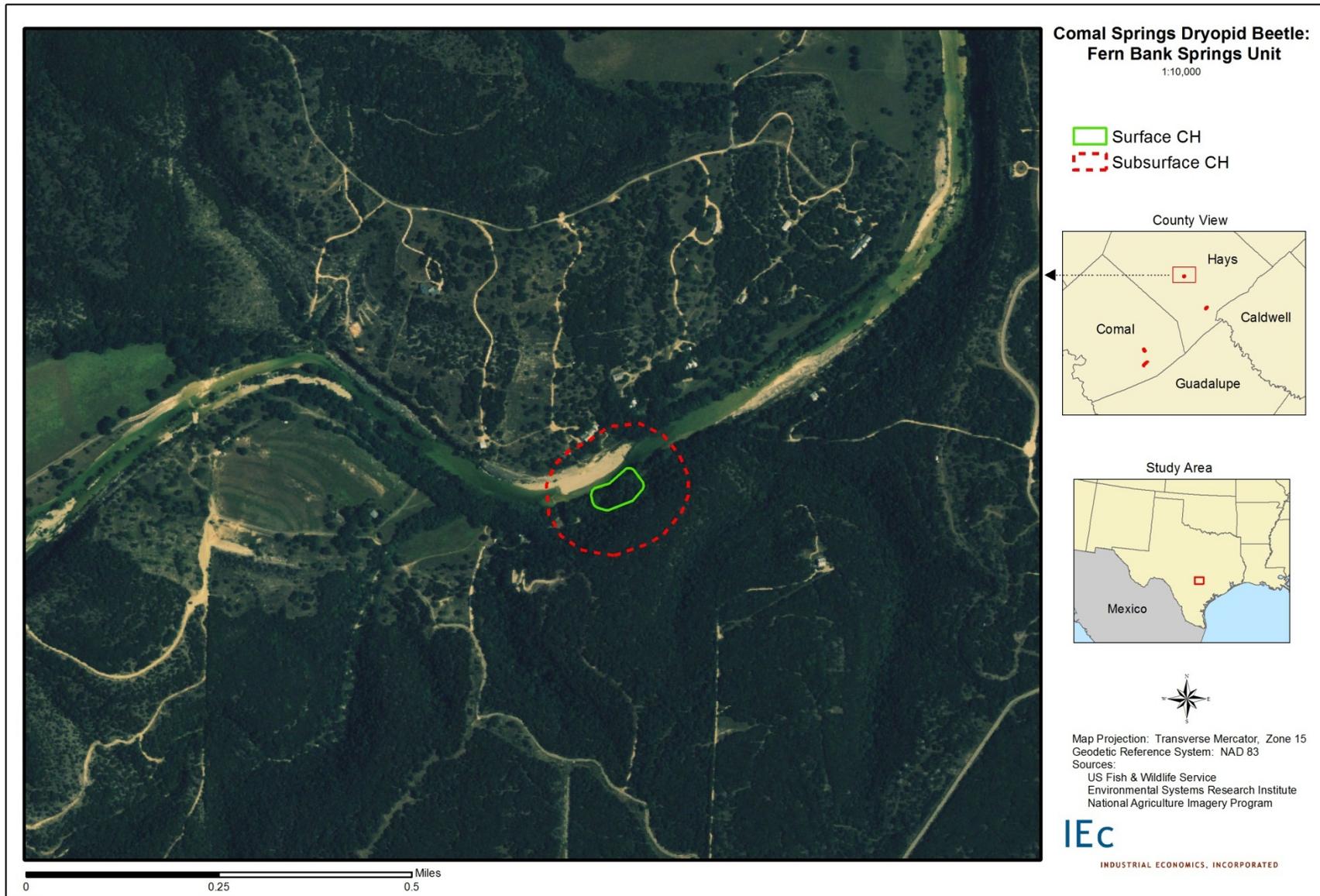


EXHIBIT 1-4. PROPOSED CRITICAL HABITAT DESIGNATION FOR THE COMAL SPRINGS INVERTEBRATES - SAN MARCOS SPRINGS UNIT



EXHIBIT 1-5. PROPOSED CRITICAL HABITAT FOR COMAL SPRINGS DRYOPID BEETLE, BY UNIT (ACRES)

UNIT	UNIT NAME	SUBSURFACE	SURFACE
1	Comal Springs Unit*	124	38
2	Hueco Springs Unit	0	0
3	Fern Bank Springs Unit*	15	1.4
4	San Marcos Springs Unit	0	0
TOTAL ACRES		139	39.4
Source: 2012 Proposed critical habitat 77 FR 64281. *Acres of proposed subsurface critical habitat are inclusive of surface acres.			

EXHIBIT 1-6. PROPOSED CRITICAL HABITAT FOR COMAL SPRINGS RIFFLE BEETLE, BY UNIT (ACRES)

UNIT	UNIT NAME	SUBSURFACE	SURFACE
1	Comal Springs Unit	0	38
2	Hueco Springs Unit	0	0
3	Fern Bank Springs Unit	0	0
4	San Marcos Springs Unit	0	16
TOTAL ACRES		0	54
Source: 2012 Proposed critical habitat 77 FR 64281.			

EXHIBIT 1-7. PROPOSED CRITICAL HABITAT FOR THE PECK'S CAVE AMPHIPOD, BY UNIT (ACRES)

UNIT	UNIT NAME	SUBSURFACE	SURFACE
1	Comal Springs Unit*	124	38
2	Hueco Springs Unit*	14	0.4
3	Fern Bank Springs Unit	0	0
4	San Marcos Springs Unit	0	0
TOTAL ACRES		138	38.4
Source: 2012 Proposed critical habitat 77 FR 64281. *Acres of proposed subsurface critical habitat encompass surface acres.			

EXHIBIT 1-8. LAND OWNERSHIP WITHIN CRITICAL HABITAT UNITS

UNIT	UNIT NAME	LAND AREA IN ACRES (PERCENT OF TOTAL)			
		STATE	CITY	PRIVATE	TOTAL
1	Comal Springs Unit	30 (24%)	37 (30%)	57 (46%)	124 (100%)
2	Hueco Springs Unit	0 (0%)	0 (0%)	14 (100%)	14 (100%)
3	Fern Bank Springs Unit	0 (0%)	0 (0%)	15 (100%)	15 (100%)
4	San Marcos Springs Unit	16 (100%)	0 (0%)	0 (0%)	16 (100%)
TOTAL		46 (27%)	37 (22%)	86 (51%)	169 (100%)
Sources:					
1. 2012 Proposed critical habitat 77 FR 64281.					
2. Comal County Engineer's Office. "Comal County Parcels." Geospatial data.					

1.2 ECONOMIC ACTIVITIES CONSIDERED IN THIS ANALYSIS

24. Threats to the three invertebrates, as identified in the Proposed Rule, include physical habitat destruction, modification, and contamination resulting from a variety of human-induced activities. Specifically, the Service identifies the following impacts of human activity as potentially threatening to the three species: changes to existing flow regimes, introduction or augmentation of nonnative species, and physical, biological, or chemical changes to current habitat conditions.¹⁷ We will address these threats as potential consequences of the identified land and water use activities described below.
25. In reviewing the Proposed Rule and the incremental effects memorandum provided by the Service (Appendix D), we identified the following economic activities as potential threats to invertebrates and their habitat within the boundaries of the study area.
- **Water Withdrawals.** The Service states in the proposed rule that "threats to adequate water quantity and quality include alterations to the natural flow regimes affecting the aquifer recharge system and its associated springs, streams, and riparian areas."¹⁸ Actions that would change existing flow regimes have potential to significantly and detrimentally alter the primary constituent elements necessary for conservation of the three species. These actions include water withdrawals from the Edwards Aquifer, impoundment, water diversions, or any other actions leading to permanent changes in flow regime.
 - **Other Economic Activities.** Construction or development projects, water quality-related projects, and other miscellaneous projects with the potential to affect the physical, biological, or hydrologic conditions of proposed critical

¹⁷ 2012 Proposed Critical Habitat Rule, 77 FR 64283.

¹⁸ *Ibid.*

habitat may undergo section 7 consultations. Actions potentially resulting in such changes to invertebrate habitat include development of roads, bridges or facilities on or adjacent to habitat, channelization, impoundment, deprivation of substrate source, destruction and alteration of riparian vegetation, excessive sedimentation, and other watershed disturbances.¹⁹

1.3 OVERVIEW OF THE FRAMEWORK FOR THE ANALYSIS

26. The purpose of this report is to estimate the economic impact of actions taken to protect the Comal Springs dryopid beetle, Comal Springs riffle beetle, the Peck's cave amphipod and their habitat. This analysis examines the impacts of restricting or modifying specific land uses or activities for the benefit of the species and their habitat within the proposed critical habitat area. This analysis employs "without critical habitat" and "with critical habitat" scenarios. The "without critical habitat" scenario represents the baseline for the analysis, considering protections afforded the invertebrate species absent critical habitat designation, including listing under the ESA and other Federal, State, and local regulations. The "with critical habitat" scenario describes the incremental impacts associated specifically with the designation of critical habitat for the species. The incremental conservation efforts and associated impacts are those not expected to occur absent the designation of critical habitat for the three invertebrates.
27. According to section 4(b)(2) of the ESA, the Service must consider the economic impacts, impacts to national security, and other relevant impacts of designating any particular area as critical habitat. An area may be excluded from designation as critical habitat if the benefits of exclusion (i.e., the impacts that would be avoided if an area were excluded from the designation) outweigh the benefits of designation so long as exclusion of the area will not result in extinction of the species. **The purpose of the economic analysis is to provide information to assist the Secretary of the DOI in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.**²⁰ In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).²¹
28. This analysis: 1) identifies those economic activities most likely to threaten the three invertebrate species and their habitat; 2) describes the baseline regulation protection for the species; and 3) monetizes the incremental economic impacts to avoid adverse modification of the proposed critical habitat study area. Appendix A provides a detailed description of the methods used to separately identify baseline protections from the incremental impacts stemming from the proposed designation of critical habitat for the three invertebrates. This evaluation of impacts in a "with critical habitat designation"

¹⁹ 2012 Proposed Critical Habitat Rule, 77 FR 64283.

²⁰ 16 U.S.C. §1533(b)(2).

²¹ Executive Order 12866, Regulatory Planning and Review, September 30, 1993; Executive Order 13563, Improving Regulation and Regulatory Review, January 18, 2011; 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.

versus a “without critical habitat designation” framework effectively measures the net change in economic activity associated with the proposed rulemaking.

1.3.1 EXISTING BASELINE REGULATIONS

29. The baseline for this analysis is the existing state of regulation, absent the designation of critical habitat, including the listing of the species under the ESA, as well as protection under other Federal, State and local laws and guidelines. Baseline protections include sections 7, 9, and 10 of the ESA, and economic impacts resulting from these protections to the extent that they are expected to occur absent the designation of critical habitat for the species. This analysis describes these baseline regulations. The primary focus, however, is not on baseline costs, since these will not be affected by the proposed regulation. Instead, the focus of this analysis is on monetizing the incremental impacts forecast to result from the proposed critical habitat designation.
30. Below we summarize key Federal, State, and local statutes and regulations that may provide some protections to proposed critical habitat for the Comal Springs dryopid beetle, Comal Springs riffle beetle, and Peck’s cave amphipod under the baseline.

Clean Water Act

31. Section 404 of the Clean Water Act requires parties to obtain a permit from the Corps prior to discharging dredge or fill material into “waters of the United States.”²² Jurisdictional waters of the United States are determined by: (1) in the absence of adjacent wetlands, jurisdiction extends to the ordinary high water mark; or (2) when adjacent wetlands are present, jurisdiction extends beyond the ordinary high water mark to the limit of the adjacent wetlands; or (3) when the water of the United States consists only of wetlands, jurisdiction extends to the limit of the wetland.
32. Corps review of projects for the issuance of section 404 permits requires section 7 consultation with the Service to the extent that the project may affect listed species or critical habitat. As part of the section 404 permit process, the Corps reviews the potential effects of the proposed action on plant and animal populations and recommends efforts to avoid adverse effects to these populations and their habitat. In general, conservation efforts for plants and animals include:
- Selecting sites or manage discharges to ensure that habitat remains suitable for indigenous species;
 - Avoiding sites having unique habitat or other value, including habitat of threatened or endangered species;
 - Utilizing habitat development and restoration techniques to minimize adverse impacts and compensate for destroyed habitat;
 - Timing discharge to avoid biologically critical time periods; and

²² U.S. Code. Title 33, 1344.

- Avoiding the destruction of remnant natural sites within areas already affected by development.²³

33. These conservation efforts would be required by the Corps for section 404 permits regardless of critical habitat designation.²⁴ Accordingly, impacts of implementing these conservation efforts are considered baseline impacts of invertebrate conservation.
34. The Service has indicated that it is not aware of pending or planned actions that would require Clean Water Act permits in the areas proposed for critical habitat designation. Costs related to conservation efforts required by the Corps to avoid impacts to the three invertebrate species under the listing of the species as part of the section 404 permit process are considered baseline impacts. Section 2.1 discusses why additional project changes are not expected due to the proposed critical habitat designation.

Protections under the ESA for Other Listed Species/Candidate Species

35. The aquatic habitat in which the three Comal Springs invertebrates are found also encompass habitat for other species listed as threatened or endangered under the ESA. The Fountain darter, listed as endangered in 1970, has critical habitat designated in the Comal Springs and San Marcos Springs units. The San Marcos salamander, listed as threatened in 1980, has critical habitat designated in the San Marcos Springs unit. The Texas blind salamander was listed as endangered in 1967 but has no critical habitat designated. Texas wild-rice, designated as endangered in 1978, has critical habitat designated in the San Marcos Springs unit. The three invertebrate species, therefore, may benefit from the conservation efforts already in place for these species.²⁵

State Wildlife Laws

36. All three Comal Springs invertebrates species are listed as endangered by the state of Texas. These species are therefore accorded additional protection from take and possession under Chapters 68 of the Texas Parks and Wildlife (TPW) Code and Sections 65.171 – 65.176 of Title 31 of the Texas Administrative Code (TAC).²⁶

Edwards Aquifer Environmental Quality Rules

37. Activities affecting water quality in the Edwards Aquifer are regulated under Title 30 of the TAC. The intended purpose of the regulations is to protect existing and potential uses of groundwater and maintain Texas Surface Water Quality Standards. All regulated activities with potential to pose a threat to water quality in the Edwards Aquifer are addressed by these regulations.²⁷

²³ 40 CFR Part 230.75.

²⁴ *Ibid.*

²⁵ U.S. Fish and Wildlife Service. October 15, 2012. *Incremental Effects Memorandum for the Economic Analysis for the Proposed Revision of Critical Habitat for the Endangered Comal Springs Dryopid Beetle, Comal Springs Riffle Beetle, and Peck's Cave Amphipod.*

²⁶ U.S. Fish and Wildlife Service. October 15, 2012. *Incremental Effects Memorandum for the Economic Analysis for the Proposed Revision of Critical Habitat for the Endangered Comal Springs Dryopid Beetle, Comal Springs Riffle Beetle, and Peck's Cave Amphipod.*

²⁷ Texas Administrative Code, Title 30, Part 1, Chapter 213.

Edwards Aquifer Authority Act

38. A 1993 court decision addressed impacts of groundwater withdrawals from the Edwards Aquifer on five listed species: Texas wild-rice, fountain darter, San Marcos gambusia, Texas blind salamander, and San Marcos salamander.²⁸ The decision specifically addressed streamflow issues at two critical habitat units in the aquifer: Comal Springs and San Marcos Springs. The Comal Springs invertebrates were not listed at the time of the court decision. Following this decision, the State of Texas formed the Edwards Aquifer Authority (EAA) to manage, enhance, and protect the aquifer. Under the terms of the Edwards Aquifer Authority Act, groundwater withdrawals must be permitted and strictly controlled. The Service was also directed by the court to develop minimum flow guidelines for the five listed species. These guidelines have been incorporated into the EAA's Demand Management/Critical Period Management Trigger Levels, which determine aquifer-wide pumping reductions necessary during periods of reduced springflow. Thus, a number of regulatory initiatives are ongoing in the Edwards aquifer that aim to protect endangered species in the aquifer, including development of the Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan described below and in detail in Chapter 2.

1.3.2 ONGOING AND PLANNED CONSERVATION ACTIVITIES

Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan (EARIP-HCP)

39. The Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan (EARIP-HCP) is intended to further address the issue of groundwater withdrawals from the Edwards Aquifer, and includes other listed species in addition to the three Comal Springs invertebrates. The permit area outlined in this EARIP-HCP encompasses Uvalde County, Medina County, Bexar County, and portions of Comal County, Hays County, Guadalupe County, and Caldwell County. In order to mitigate the conflict between the Federal mandate to protect listed species in the Edwards Aquifer and the region's dependence on the same aquifer as a primary water source, the EARIP-HCP describes actions to be undertaken by stakeholders in the region to minimize impacts to relevant listed species. The conservation measures proposed in the EARIP-HCP will provide additional protection for the three invertebrate species in the Comal Springs Unit. These measures may also provide protection for the Comal Springs riffle beetle at the San Marcos Springs Unit and for the Peck's cave amphipod at the Hueco Springs Unit due to the similarity in hydrogeologic settings for these springs. Although all four proposed critical habitat units fall within the Permit Area for the EARIP-HCP, the Comal Springs dryopid beetle population at the Fern Bank Springs Unit is not likely to benefit directly from the EARIP-HCP, as conservation measures included in the EARIP-HCP are focused on protecting conditions at the Comal and San Marcos Springs.²⁹ The provisions included

²⁸ Sierra Club v. Lujan, No. MO-91-CA-069, 1993 WL 151353 (W.D. Tex. Feb. 1, 1993).

²⁹ Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan. November 2012. Available at http://www.eahcp.org/index.php/documents_publications/habitat_conservation_plan_and_appendices, accessed on January 29, 2013.

in the EARIP-HCP, as well as the impacts of proposed critical habitat on the EARIP-HCP development and permitting process, are discussed in detail in Chapter 2.

Comal County Regional Habitat Conservation Plan (CC-RHCP)

40. Comal County is developing an HCP in order to describe conservation measures to be implemented in order to receive a permit for incidental take of species listed under the ESA. The three Comal Springs invertebrates are not currently included the CC-RCHP due to existing regulations preventing adverse impacts to the groundwater on which these species depend, and because levels of take would be difficult to substantiate or quantify for these species.³⁰ Existing regulations cited by the CC-HCP include: the Edwards Aquifer Rules (30 Texas Administrative Code, Chapter 213); Texas state water quality standards for streams, effluent, and drinking water; the Texas Pollution Discharge Elimination System permitting program; the City of New Braunfels' drainage and erosion control ordinances; and the Edwards Aquifer Authority's groundwater pumping regulations. Nonetheless, conservation measures implemented for other species may indirectly offer additional protection for the three Comal Springs invertebrates.³¹

Hays County Regional Habitat Conservation Plan (HC-RHCP)

41. Hays County has developed an HCP in order to describe conservation measures to be implemented in order to receive a permit for incidental take of species listed under the ESA. The Comal Springs dryopid beetle and Comal Springs riffle beetle exist in Hays County, but the activities covered under the HC-HCP are not anticipated to affect these species. Therefore, the Comal Springs dryopid beetle and Comal Springs riffle beetle are not currently covered for incidental take by the HC-RCHP. However, conservation measures implemented for other species may indirectly offer additional protection for the Comal Springs dryopid beetle and Comal Springs riffle beetle.³²

South Edwards Plateau Habitat Conservation Plan (SEP-HCP)

42. Bexar County and the City of San Antonio are developing the SEP-HCP in order to address conflicts resulting from the growth of the greater San Antonio region and requirements for listed species under the ESA. Although the three Comal Springs invertebrate species exist in the SEP-HCP Plan Area, the activities covered by the SEP-HCP are not anticipated to affect the species. The three invertebrate species could, however, indirectly benefit from additional protections accorded to other species under the SEP-HCP.³³

³⁰ Draft Comal County Regional Habitat Conservation Plan. April, 2010.

³¹ Draft Comal County Regional Habitat Conservation Plan. April, 2010.

³² Hays County Regional Habitat Conservation Plan. June, 2010.

³³ Draft Southern Edwards Plateau Habitat Conservation Plan. December, 2011.

Environmental Assessment/Habitat Conservation Plan For a Portion of the Cibolo Canyon Property, Bexar County, Texas (CCP-HCP)

43. The Lumbermen’s Investment Corporation developed the CCP-HCP to cover incidental take of the endangered golden-cheeked warbler during the construction and operation of a mixed-use community in Bexar County, Texas. The Plan Area for this HCP covers parts of the Edwards Aquifer, and impacts to the water quality or hydrologic conditions from development in or near the aquifer have the potential to modify habitat for the three Comal Springs invertebrate species. The three species could also indirectly benefit from additional protections accorded to the golden-cheeked warbler under the CCP-HCP.³⁴

1.4 GEOGRAPHIC SCOPE OF THE ANALYSIS

44. This analysis evaluates impacts of critical habitat designation on activities within or affecting the proposed critical habitat area. The study area for each of the three species is delineated by the boundaries of proposed critical habitat units, as well as areas outside of the proposed areas on which economic activities occur that may affect habitat conditions within proposed critical habitat units. All costs provided in this analysis are presented by critical habitat unit.

1.5 ANALYTIC TIME FRAME

45. Ideally, the time frame of this analysis would be based on the expected time period over which the critical habitat regulation is expected to be in place. Specifically, the analysis would forecast impacts of implementing this rule through species recovery (i.e., when the rule is no longer required). Recent guidance from OMB indicates that “if a regulation has no predetermined sunset provision, the agency will need to choose the endpoint of its analysis on the basis of a judgment about the foreseeable future.”³⁵ The “foreseeable future” for this analysis includes, but is not limited to, activities that are currently authorized, permitted, or funded, or for which proposed plans are currently available to the public. Forecasted impacts will be based on the planning periods for potentially affected projects and will look out over a 20-year time horizon for most activities. OMB supports this time frame stating that “for most agencies, a standard time period of analysis is ten to 20 years, and rarely exceeds 50 years.”³⁶ Therefore, this analysis considers economic impacts to activities over a 20-year period from 2013 (expected year of final critical habitat designation) through 2032.

1.6 INFORMATION SOURCES

46. The primary sources of information for this report are communications with, and data provided by, personnel from the Service, State and local government agencies, and other stakeholders. In particular, this analysis relies on the incremental effects memorandum provided by the Service (see Appendix C), existing Habitat Conservation Plans, and communications with the City of New Braunfels, City of San Marcos, Texas State

³⁴ Final Cibolo Canyon Master Phase II EA/HCP. January, 2006.

³⁵ U.S. Office of Management and Budget, February 7, 2011. “Regulatory Impact Analysis: Frequently Asked Questions (FAQs).” Accessed on May 3, 2011 at http://www.whitehouse.gov/sites/default/files/omb/circulars/a004/a-4_FAQ.pdf.

³⁶ *Ibid.*

University, Edwards Aquifer Authority, and Hays County.³⁷ In addition, this analysis relies upon the Service's section 7 consultation record for the invertebrate species. A complete list of references is provided at the end of this document.

1.7 PRESENTATION OF RESULTS

47. Impacts are described in present value and annualized terms applying a discount rate of seven percent and three percent throughout the body of the report. Present value and annualized impacts are calculated according to the methods described in Appendix A.

³⁷ In addition, we attempted to contact planners at Comal County, but have not received a response.

CHAPTER 2 | ANALYSIS OF CRITICAL HABITAT DESIGNATION FOR THE THREE COMAL SPRINGS INVERTEBRATES

48. This chapter evaluates the potential for critical habitat designation to result in additional (“incremental”) conservation for the three invertebrate species. Section 2.1 summarizes the results of the incremental analysis. Section 2.2 discusses, by activity, forecast consultations and projects subject to Service review with respect to invertebrate conservation. Section 2.3 concludes with a description of key assumptions and caveats that generate uncertainty regarding the estimated incremental impacts.

2.1 SUMMARY OF RESULTS OF THE INCREMENTAL IMPACT ANALYSIS

49. The types of conservation efforts requested by the Service during section 7 consultation regarding the three invertebrate species are not expected to change due to critical habitat designation. As stated in the incremental effects memorandum, the Service believes that “in order to reach a conclusion of jeopardy under section 7 consultation, a proposed Federal action would have to make their habitat unsuitable for the invertebrates. The ability of these species to persist is very closely tied to the quality of their habitats. These species are very reliant upon aquatic habitat conditions for their physiological and behavioral functions (e.g., breeding and feeding). They have limited ability to move beyond their immediate locations. Therefore, any action that substantially reduces habitat quality (by altering either the quality or quantity of water or the stream banks and associated vegetation) will reduce the number of individuals and populations. We can foresee no future actions that could significantly impact the individuals of the species independent of the habitat. Conversely, we can foresee no future actions that could substantially impact the habitat without also appreciably reducing survival and recovery of the species. Thus, we assume that if these conditions (adequate water quality and quantity) are impacted severely, the species chances of survival will decrease and their opportunity for recovery will decrease as well. Therefore, any proposed Federal activity that is likely to severely impact the water quality or spring flow quantities could result in jeopardy.”³⁸

50. All four proposed critical habitat units are occupied by at least one of the three invertebrate species. Because the survival of the species is so closely tied to the quality of habitat, we expect that absent critical habitat designation, any action resulting in adverse modification of critical habitat would have resulted in a conclusion of jeopardy. We

³⁸ U.S. Fish and Wildlife Service. October 15, 2012. *Incremental Effects Memorandum for the Economic Analysis for the Proposed Revision of Critical Habitat for the Endangered Comal Springs Dryopid Beetle, Comal Springs Riffle Beetle, and Peck’s Cave Amphipod*. See Appendix D.

therefore expect that incremental impacts of critical habitat designation will be limited to additional administrative costs to the Service, Federal agencies and private third parties of considering critical habitat as part of section 7 consultation.

KEY ISSUES AND CONCLUSIONS OF THE INCREMENTAL ANALYSIS

Incremental Impacts of Critical Habitat Designation

- Incremental impacts of critical habitat designation are limited to additional administrative costs of consultations. The Service expects that conservation measures implemented to avoid jeopardy to the species (anticipated to be undertaken regardless of critical habitat designation) are sufficiently protective to avoid adverse modification of critical habitat. Thus no additional conservation measures are likely to be requested due to critical habitat designation for the species.
- The present value impacts of critical habitat designation in areas proposed for designation over the next 20 years (2013 through 2032) are \$71,000, or \$6,300 on an annualized basis, assuming a seven percent discount rate. Present value impacts are \$80,000, or \$5,200 on an annualized basis, assuming a three percent discount rate.

Incremental Impacts by Activity

- Water Withdrawals: Four formal consultations are expected to occur relating to the withdrawal of water from the Edwards Aquifer and development of the Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan (EARIP) over the next 20 years. These consultations are associated with both known future reviews of the EARIP, and historical levels of activity relating to water withdrawals not covered by the EARIP.
- Other Economics Activities: Six formal consultations are expected to occur within the study area over the next 20 years on activities not related to water withdrawal. In addition, four re-initiations of consultations on Habitat Conservation Plans (HCPs) may occur. These consultations are associated with both known future development projects as well as with expected activity based on historical consultation rates.

Key Uncertainties

- The Service will not request additional project modifications to address adverse modification beyond what is requested to avoid jeopardy.

2.2 SECTION 7 CONSULTATION FORECAST

51. As discussed in Chapter 1, this analysis focuses on the threats of water withdrawals and other economic activity to critical habitat. This analysis applies the best available information in order to forecast the likely frequency and geographic distribution of projects subject to section 7 consultation within the study area that fall into these activity categories. Future activity levels within proposed critical habitat units are based primarily on communication with Federal, State and local agencies.
52. In some cases, specific information on the location and frequency of future projects was not available. In these instances, we relied on historical information describing activity levels in combination with discussions with the relevant permitting or regulatory agency. For example, a number of the activities evaluated in this analysis have undergone section 7 consultation in the past due to CWA section 404 permitting in recent years. In these cases, the frequency of consultation over the 16 years since the three invertebrates were

listed under the ESA was projected forward to estimate the frequency of future consultation.

53. The remainder of this section describes the consultation forecasts for the affected activities. Direct incremental impacts associated with these forecast consultations are assumed to be limited to administrative costs because the Service does not anticipate recommending additional conservation efforts to avoid adverse modification over and above those recommended to avoid jeopardy to the species, as described in Chapter 1. **Once critical habitat is designated, some additional effort is likely to be required as part of section 7 consultation to describe the potential for projects to result in adverse modification. This is reflected in additional hours spent in communication with the Service and on activities such as report-writing and project documentation.**
54. In addition to the direct incremental impacts of critical habitat designation, potential exists for indirect impacts: that is, impacts of the designation that may occur outside of the section 7 consultation process. For example, State or local regulations may require conservation of the three invertebrates based on the presence of critical habitat. According to conversations with representatives from the New Braunfels Parks and Recreation Department and Planning Services Department, the San Marcos Planning and Development Services Department, the Hays County Development Services Department, and the Texas State University Meadows Center for Water and the Environment, the designation of critical habitat does not directly influence management practices related to water quality regulations above the level of conservation required by the presence of the species.³⁹ Therefore, we assume that indirect impacts from the designation will be negligible.

2.2.1 WATER WITHDRAWALS

55. As described in the Proposed Rule, the four spring systems proposed as critical habitat for the invertebrates—Comal, San Marcos, Hueco, and Fern Bank—are fed by discharge of aquifer water from the Edwards Aquifer, also known as the Edwards Balcones Fault Zone Aquifer, which lies within the Balcones Fault Zone at the edge of the Edwards Plateau in central Texas.^{40,41} The Edwards Aquifer is the primary water source for approximately 2 million people in south central Texas.⁴² It is also an aquatic ecosystem that supports 40

³⁹ Personal communication with City of New Braunfels Park and Recreation Department and Planning Services Department on January 30, 2013; Personal communication with City of San Marcos Planning and Development Services Department on January 31, 2013; Personal communication with Hays County Development Services Department on February 1, 2013; Personal communication with Texas State University Meadows Center for Water and the Environment on February 5, 2013.

⁴⁰ 2012 Proposed Critical Habitat Rule, 77 FR 64274

⁴¹ As described in the Proposed Rule, the source of water flows for Comal Springs and San Marcos Springs is the San Antonio segment of the Edwards Aquifer. Hueco Springs is recharged by the local watershed basin and possibly by the San Antonio segment of the Edwards Aquifer. The source of water for Fern Bank Springs has not been determined, but it is speculated that it could be drainage from the nearby Edwards Aquifer Recharge Zone, water lost from the Blanco River, or a combination of these possible sources (77 FR 64274).

⁴² Edwards Aquifer Authority. *Discover the Edwards Aquifer*. Available at http://data.edwardsaquifer.org/display_education_portal_m.php?pg=education_history_aquifer, accessed on January 29, 2013.

known species, eight of which (including the three invertebrates) have been designated as either threatened or endangered by the Service. Consequently, water withdrawal from the Edwards Aquifer may result in depletion or failure of spring flow and represents a significant threat to the three invertebrates and their proposed critical habitat.⁴³ In addition, any alteration to the natural flow regimes affecting the aquifer recharge system and its associated springs, streams, and riparian areas may pose a threat to the species.⁴⁴ Such alterations include withdrawals, excavation, impoundments, diversions, and other impediments to flow.⁴⁵

Regulatory Background

56. Groundwater production from the Edwards Aquifer is regulated by the Edwards Aquifer Authority (EAA), a special groundwater district established by the Edwards Aquifer Authority Act (hereafter, “Act”).⁴⁶ Under the Act, EAA is responsible for groundwater management in a jurisdictional area that spans 8,800 square miles across eight counties, including portions of Comal and Hays Counties.⁴⁷ The Act prohibits water withdrawal from the aquifer without obtaining a permit from EAA, except under certain circumstances.⁴⁸ In addition, the Act establishes specific withdrawal caps, stating that withdrawals must be limited such that they “protect aquatic and wildlife habitat” and “protect species that are designated as threatened or endangered under applicable federal or state law,” among other things.⁴⁹ The Act also directs EAA to implement management practices that ensure the continuous minimum springflows of the Comal Springs and San Marcos Springs to protect endangered and threatened species.⁵⁰
57. In response to the Act, the Service initiated the Edwards Aquifer Recover Implementation Program (EARIP), a collaborative effort to develop a plan to contribute to the recovery of listed species dependent on the aquifer.⁵¹ The resulting plan is the EARIP-HCP, which is currently under review by the Service.⁵² The applicants of the EARIP-HCP include EAA, City of San Antonio, acting by and through San Antonio Water System (SAWS), City of San Marcos, City of New Braunfels, and Texas State University. The applicants seek an incidental take permit for a variety of activities, including those involving regulation and pumping of groundwater from the aquifer within the jurisdictional boundaries of the

⁴³ 2012 Proposed Critical Habitat Rule, 77 FR 64274

⁴⁴ *Ibid.*

⁴⁵ *Ibid.*

⁴⁶ Act of May 30, 1993, 73rd Leg., R.S., ch 626, 1993, Tex. Gen. Laws 2350, as amended.

⁴⁷ Edwards Aquifer Authority. *Edwards Aquifer Authority Mission*. Available at http://www.edwardsaquifer.org/index.php/the_authority/mission/, accessed on January 29, 2013.

⁴⁸ Wells that produce no more than 25,000 gallons of water a day or less for domestic or livestock use are exempt from EAA permitting and metering requirements, as are wells located on and operated by, or for the benefit of, a Federal facility.

⁴⁹ Act of May 30, 1993, 73rd Leg., R.S., ch 626, 1993, Tex. Gen. Laws 2350, as amended, § 1.14

⁵⁰ *Ibid.*

⁵¹ Edwards Aquifer Authority. *Background of EARIP*. Available at http://www.eahcp.org/index.php/about_eahcp/history/background_of_earip, accessed on January 29, 2013.

⁵² Personal communication from the Service on January 30, 2013.

EAA. Proposed critical habitat Units 1, 2, and 4 fall within this jurisdictional area, but Unit 3 (Fern Bank Springs) falls just outside of the boundary.⁵³

58. The EARIP-HCP outlines specific measures intended to minimize and mitigate effects on covered species associated with the aquifer, including the Comal Springs dryopid beetle, Comal Springs riffle beetle, and Peck's cave amphipod and their habitat at Comal, San Marcos, and Hueco Springs:⁵⁴
- **Comal Springs Unit:** For all three species, the EARIP-HCP sets specific water flow management objectives for Comal Springs to achieve a long-term average total discharge of 225 cubic feet per second (cfs) (daily average) at Comal Springs and a minimum total discharge of 30 cfs (daily average). There are also specific management objectives for the species, including maintaining water quality and restoring riparian habitat adjacent to spring openings.
 - **San Marcos Springs Unit:** For the Comal Springs riffle beetle, the EARIP-HCP does not provide specific long-term habitat-based biological goals due to paucity of data. However, it does establish flow-related goals for San Marcos Springs that are believed to be protective of the species until additional information is available. The water flow management objectives for San Marcos Springs are to achieve a long-term average total discharge of 140 cfs (daily average) and a minimum total discharge of 45 cfs (daily average).
 - **Hueco Springs Unit:** According to the EARIP-HCP, Peck's cave amphipod at Hueco Springs will likely benefit from the minimization and mitigation measures at Comal Springs because the hydrogeologic setting of Hueco Springs is similar to that of Comal Springs. Specifically, the measures implemented to maintain sufficient spring flow and water quality at Comal Springs is expected to maintain adequate habitat for the species at Hueco Springs.

Because the applicants for the EARIP-HCP do not own or have jurisdiction over Fern Bank Springs or the surrounding ecosystems, the EARIP-HCP does not include any measures specifically intended to benefit this area. In addition, these springs flow from a significantly different hydrogeologic setting than Comal and San Marcos Springs. Therefore, it is unlikely that measures included in the EARIP-HCP will guarantee continuous flow at Fern Bank Springs.

59. It is important to note that the applicants of the EARIP-HCP do not seek incidental take coverage for any Federal facility which withdraws groundwater from the aquifer, as such activities are not regulated by EAA. In particular, U.S. Department of Defense (DOD) operations are excluded.

⁵³ Edwards Aquifer Authority. *Edwards Aquifer Authority GIS*. Available at http://data.edwardsaquifer.org/display_technical_m.php?pg=qjs, accessed on January 29, 2013.

⁵⁴ Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan. November 2012. Available at http://www.eahcp.org/index.php/documents_publications/habitat_conservation_plan_and_appendices, accessed on January 29, 2013.

Incremental Impacts of Proposed Critical Habitat

- 60. The EARIP-HCP is currently under review by the Service, and the incidental take permit duration is expected to be 15 years. Therefore, for the 20-year timeframe of the analysis, we estimate that the incremental impacts of the designation are equal to the costs of considering critical habitat in two formal section 7 consultations, one in 2013 and one in 2027. We assume these costs will be divided evenly across the three proposed critical habitat units that fall within the jurisdictional area of the EAA (Units 1, 2, and 4).
- 61. The Service is currently conducting a section 7 consultation with the DOD to consider the potential impacts of water withdrawal from the aquifer for use by the following military installations in San Antonio: Randolph Air Force Base (AFB), Lackland AFB, and Fort Sam Houston.⁵⁵ When the Service issues its Biological Opinion (BO), it will likely be valid for 15 years and then the Service will likely enter into a new consultation. Therefore, for the 20-year timeframe of the analysis, we estimate that the incremental impacts of the designation are equal to the costs of considering adverse modification of critical habitat in two formal section 7 consultations with DOD, one in 2013 and one in 2027. Because they could affect any unit in the proposed critical habitat area, we assume these costs will be divided evenly across the four proposed critical habitat units.
- 62. Exhibit 2-1 presents the total estimated incremental impacts associated with water use activities for the four consultations described above.

EXHIBIT 2-1. INCREMENTAL IMPACTS TO WATER USE (2013-2032, 2013 \$)

PROPOSED CRITICAL HABITAT UNIT	PRESENT VALUE (7%)	ANNUALIZED (7%)	PRESENT VALUE (3%)	ANNUALIZED (3%)
Unit 1 (Comal Springs)	\$3,900	\$340	\$4,600	\$300
Unit 2 (Hueco Springs)	\$3,900	\$340	\$4,600	\$300
Unit 3 (Fern Bank Springs)	\$2,200	\$200	\$2,900	\$190
Unit 4 (San Marcos Springs)	\$3,900	\$340	\$4,600	\$300
TOTAL	\$14,000	\$1,200	\$17,000	\$1,100

Note: The level of effort per consultation and the potential costs of project modifications represent approximate averages based on the best available cost information. The cost estimates in this report are accordingly rounded to two significant digits to reflect this imprecision. The cost estimates may therefore not sum to the total costs reported due to rounding.

2.2.2 OTHER ECONOMIC ACTIVITIES

- 63. The four spring systems proposed as critical habitat are distributed across a mix of State, municipal, and private lands. In addition to impacts from water withdrawals, various other economic activities in the proposed critical habitat area have the potential to adversely modify constituent elements of critical habitat. In particular, activities of concern are those that may pose a threat to adequate water quantity and quality within proposed critical habitat, or that affect the food supply for the three invertebrate species.⁵⁶

⁵⁵ Personal communication with the Service on February 1, 2013.

⁵⁶ 2012 Proposed Critical Habitat Rule, 77 FR 64278

These activities may include dredging, channelization, and damming, development and maintenance activities, water quality maintenance and restoration, or other activities. Alteration to natural flow regimes, water quality, and food supply resulting from these activities has the potential to adversely modify proposed critical habitat for the three invertebrates.

Regulatory Background

64. Activities occurring in proposed critical habitat units are subject to a suite of local, State, and Federal regulations designed to minimize impacts to water quality, including other ESA requirements, as well as Clean Water Act requirements, as discussed in Chapter 1.

Incremental Impacts of Proposed Critical Habitat

65. To examine the incremental impacts of proposed critical habitat for activities other than water withdrawals, we analyze the extent of economic activities expected to occur in each of the four proposed critical habitat units.
66. The Comal Springs Unit is composed primarily of Landa Lake and the riparian habitat surrounding the lake, including the confluence of the lake and Spring Run Number One. The southern portion of the lake, including the areas that contain the primary springs where the three invertebrates are found, is managed by the City of New Braunfels as a public park. Land ownership for the unit is a mix of private, municipal, and State holdings. Since 1997, two formal section 7 consultations with the Corps have occurred for the Comal Springs invertebrates relating to dam and retaining wall repair at Landa Lake. Additional projects in the area surrounding Landa Lake may require CWA 404 permits in the future, as residential development is expanding in the area and funding for development and maintenance projects has increased relative to past years.⁵⁷ The timeframe and spatial extent of these projects are currently unknown. Based on past consultation history and communication with the City of New Braunfels Parks and Recreation Department and Planning Services Department, we forecast five formal section 7 consultations relating to development, construction, and maintenance in the Comal Springs Unit during the 20 year timeframe of the analysis. Because the timeframe of future projects is unknown, the costs of these consultations are distributed evenly across the 20-year period of analysis.
67. The San Marcos Springs Unit includes the surface area of Spring Lake in Hays County, as well as surrounding riparian habitat. The unit is entirely state-owned as part of the Texas Rivers Center's Aquarena Center, owned and operated by Texas State University as a non-profit nature center. Because Spring Lake is a protected area that serves a public function to educate the public about spring systems and endangered species, few active land uses of the area currently appear to threaten the three invertebrate species or their habitat. Proposed development projects, including road construction and residential development in the area surrounding Spring Lake, are outside of the boundary of proposed critical habitat, including the subsurface area. These projects are not expected to

⁵⁷ Personal communication with City of New Braunfels Park and Recreation Department and Planning Services Department on January 30, 2013.

affect critical habitat.⁵⁸ Since 1997, one formal consultation has occurred with the Corps in the unit for aquatic ecosystem restoration in Spring Lake, in which infrastructure was removed from the Lake and the site was restored to a natural state. Based on the consultation history, communication with the City of San Marcos Planning and Development Services Department, and communication with the Texas State University Meadows Center for Water and the Environment, we forecast one formal section 7 consultation occurring in the San Marcos Springs Unit during the 20 year timeframe of the analysis.⁵⁹ Due to uncertainty about when consultation will occur, the costs of this consultation are distributed evenly throughout the period of analysis.

68. The Hueco Springs Unit in Comal County and the Fern Bank Springs Unit in Hays County are both located on private lands. Both units are located away from urban development centers, and no consultations have occurred relating to activity in these units since the species were listed under the ESA in 1997. Communication with the Hays County Development Services Department indicates that no plans are known to exist that would further develop or expand activity in the Fern Banks Unit.⁶⁰ Because no projects are known, and whether, in any case, a Federal nexus is present, we do not attribute any costs to future actions in these units.
69. In addition to the forecast activities listed above, re-initiation of several incidental take permits for HCPs in the region may occur as a result of critical habitat designation for the three invertebrate species. Re-initiation of intraservice section 7 consultation for existing HCPs is not automatic and would likely only occur when an incidental take permit holder seeks amendment of the incidental take permit. Each of these HCPs manages activity within the Edwards Aquifer and thus may choose to consider impacts to critical habitat for all listed species within their designated HCP Areas. Consultation for the EARIP-HCP is discussed above in Section 2.2.1. If re-initiation of section 7 consultation does happen, Service expects this to occur in 2013 for the HC-RHCP, the CC-RHCP, the SEP-HCP, and the CCP-HCP. To avoid understating costs, we conservatively assume that each HCP will undergo re-initiation of programmatic section 7 consultation. The costs of re-initiated consultations are assumed to be distributed equally across the four proposed critical habitat units.
70. Exhibit 2-2 presents the total estimated incremental impacts to other activities associated with the expected consultations described above.

⁵⁸ Personal communication with City of San Marcos Planning and Development Services Department on January 31, 2013; Personal communication with Texas State University Meadows Center for Water and the Environment on February 5, 2013.

⁵⁹ Personal communication with City of San Marcos Planning and Development Services Department on January 31, 2013; Personal communication with Texas State University Meadows Center for Water and the Environment on February 5, 2013.

⁶⁰ Personal communication with Hays County Development Services Department on February 1, 2013

EXHIBIT 2-2. INCREMENTAL IMPACTS TO OTHER ACTIVITIES (2013-2032, 2013 \$)

PROPOSED CRITICAL HABITAT UNIT	PRESENT VALUE (7%)	ANNUALIZED (7%)	PRESENT VALUE (3%)	ANNUALIZED (3%)
Unit 1 (Comal Springs)	\$24,000	\$2,100	\$29,000	\$1,900
Unit 2 (Hueco Springs)	\$10,000	\$880	\$10,000	\$650
Unit 3 (Fern Bank Springs)	\$10,000	\$880	\$10,000	\$650
Unit 4 (San Marcos Springs)	\$13,000	\$1,100	\$14,000	\$900
TOTAL	\$57,000	\$5,000	\$63,000	\$4,100
Note: The level of effort per consultation and the potential costs of project modifications represent approximate averages based on the best available cost information. The cost estimates in this report are accordingly rounded to two significant digits to reflect this imprecision. The cost estimates may therefore not sum to the total costs reported due to rounding.				

2.3 ECONOMIC BENEFITS OF CRITICAL HABITAT DESIGNATION FOR THE INVERTEBRATES

71. As discussed in the previous chapters, this analysis does not anticipate that the designation of critical habitat will result in project modifications or additional conservation measures for the three invertebrate species. As a result, no changes in economic activity or land or water management are expected to result from critical habitat designation. Absent changes in land or water management, no incremental economic benefits are forecast to result from designation of critical habitat for the invertebrates. The information in this section is therefore provided to offer context for the analysis.
72. The primary intended benefit of critical habitat is to support the conservation of threatened and endangered species. Thus, attempts to develop monetary estimates of the benefits of critical habitat designation would focus on the public's willingness to pay to achieve the conservation benefits to the species, in this case the three invertebrate species, resulting from the designation. The published economics literature provides multiple examples of species and habitat valuation studies.⁶¹ No studies were identified, however, that evaluated conservation of any of the three invertebrate species.
73. Quantification and monetization of species conservation benefits requires information on the incremental change in the probability of conservation or increase in species populations that is expected to result from the designation. As described in this report, modifications to future projects are unlikely beyond the baseline given the extensive

⁶¹ See, for example: Giraud, Kelly, Branka Turcin, John Loomis, and Joseph Cooper. 2002. Economic Benefit of the Protection Program for the Stellar Sea Lion. *Marine Policy* 26: 451-458; Jakobsson, Kristin M. and Andrew K. Dragun. 2001. The Worth of a Possum: Valuing Species with the Contingent Valuation Method. *Environmental and Resource Economics* 19:211-227; Kotchen, Matthew J. and Stephen D. Reiling. 2000. Environmental Attitudes, Motivations, and Contingent Valuation of Nonuse Values: A Case Study Involving Endangered Species. *Ecological Economics* 32: 93-107; Loomis, John and Earl Ekstrand. 1997. Economic Benefits of Critical Habitat for the Mexican Spotted Owl: A Scope Test Using a Multiple-Bounded Contingent Valuation Survey. *Journal of Agricultural and Resource Economics* 22(2): 356-366; Richardson, Leslie and John Loomis. 2009. The Total Economic Value of Threatened, Endangered and Rare Species: An Updated Meta-Analysis. *Ecological Economics* 68: 1535-1548; Stanley, Denise L. 2005. Local Perception of Public Goods: Recent Assessments of Willingness-to-Pay for Endangered Species. *Contemporary Economic Policy* 23(2): 165-179.

baseline protections already provided to the species and the characteristics of the specific projects projected to occur over the 20-year timeframe of the analysis.

74. As a result of actions taken to preserve endangered and threatened species, such as habitat management, various other benefits may accrue to the public. Species conservation efforts may result in improved environmental quality, which in turn may have collateral human health or recreational use benefits. In addition, conservation efforts undertaken for the benefit of a threatened or endangered species may enhance shared habitat for other wildlife. Such benefits may result from modifications to projects, or may be collateral to such actions. For example, critical habitat designation may change water quality standards in a habitat area. This in turn may generate improvements in human or ecological health. In the case of critical habitat designation for the three invertebrate species, however, changes in species and habitat conservation efforts are not expected. Ancillary benefits are therefore unlikely given that no changes in behavior to protect such resources are anticipated to result from the designation. The Service does anticipate that the rule will result in educational benefits to the public associated with increased awareness of habitat locations.

2.4 KEY ASSUMPTIONS

75. The economic impacts presented in this chapter are based on a number of assumptions that may affect the estimates. This section presents the key assumptions and the extent to which they may lead to under- or over-estimates of the potential incremental impacts of the proposed critical habitat designation. Exhibit 2-3 presents the key assumptions made and the potential bias they introduce in the analysis.

EXHIBIT 2-3. KEY ASSUMPTIONS ASSOCIATED WITH THE ESTIMATED INCREMENTAL IMPACTS OF CRITICAL HABITAT DESIGNATION FOR THE THREE INVERTEBRATES

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
<p>The Service will not request additional project modifications to address adverse modification beyond what is requested to avoid jeopardy.</p>	<p>May underestimate incremental impacts.</p>	<p>Unknown. To the extent that the Service requests additional project modifications to avoid adverse modification, additional incremental impacts may be incurred with some future section 7 consultation that are not captured in this analysis.</p>
<p>We predict future consultations based on information on expected water withdrawal and other activities from the Service, the EAA, municipal planning and development departments, and State contacts. We assume that this information is complete and that no other projects will occur in the study area during the timeframe of this analysis. The degree of future activity in the study area will depend, in large part, on the future development pressure and maintenance requirements in this area, which is unknown.</p>	<p>May result in an underestimate of costs.</p>	<p>Probably minor. This assumption affects only the estimated administrative consultation costs, which are expected to be small.</p>

REFERENCES

- 16 U.S.C. § 1532.
- 16 U.S.C. §1533(b)(2).
- 2012 Proposed critical habitat 77 FR 64281.
- 2012 Proposed Critical Habitat Rule, 77 FR 64274
- 2012 Proposed Critical Habitat Rule, 77 FR 64278
- 2012 Proposed Critical Habitat Rule, 77 FR 64283.
- 2012 Proposed critical habitat, 77 FR 64280.
- 40 CFR Part 230.75.
- 5 U.S.C. § 601 *et seq.*
- Act of May 30, 1993, 73rd Leg., R.S., ch 626, 1993, Tex. Gen. Laws 2350, as amended.
- Arizona Cattle Growers v. Salazar, 606 F. 3d 1160 (9th Cir. 2010), cert. denied, 179 L. Ed. 2d 300, 2011 U.S. Lexis 1362, 79 U.S.L.W. 3475 (2011).
- Center for Biological Diversity v. United States Bureau of Land Management*, 422 F. Supp.2d 1115 (N.D. Cal. 2006).
- Comal County Engineer's Office. "Comal County Parcels." Geospatial data.
- Director, U.S. Fish and Wildlife Service, Memorandum to Regional Directors and Manager of the California-Nevada Operations Office, Subject: Application of the "Destruction or Adverse Modification" Standard under Section 7(a)(2) of the Endangered Species Act, dated December 9, 2004.
- Draft Comal County Regional Habitat Conservation Plan. April, 2010.
- Draft Southern Edwards Plateau Habitat Conservation Plan. December, 2011.
- Edwards Aquifer Authority. *Background of EARIP*. Available at http://www.eahcp.org/index.php/about_eahcp/history/background_of_earip, accessed on January 29, 2013.
- Edwards Aquifer Authority. *Discover the Edwards Aquifer*. Available at http://data.edwardsaquifer.org/display_education_portal_m.php?pg=education_history_aquifer, accessed on January 29, 2013.

- Edwards Aquifer Authority. *Edwards Aquifer Authority GIS*. Available at http://data.edwardsaquifer.org/display_technical_m.php?pg=gis, accessed on January 29, 2013.
- Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan. November 2012. Available at http://www.eahcp.org/index.php/documents_publications/habitat_conservation_plan_and_appendices, accessed on January 29, 2013.
- 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.
- Executive Order 13563, Improving Regulation and Regulatory Review, January 18, 2011.
- Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, 378 F.3d 1059 (9th Circuit 2004).
- Giraud, Kelly, Branka Turcin, John Loomis, and Joseph Cooper. 2002. Economic Benefit of the Protection Program for the Stellar Sea Lion. *Marine Policy* 26: 451-458.
- Gramlich, Edward M., *A Guide to Benefit-Cost Analysis* (2nd Ed.), Prospect Heights, Illinois: Waveland Press, Inc., 1990.
- Hays County Regional Habitat Conservation Plan. June, 2010.
- Home Builders Association of Northern California v. United States Fish and Wildlife Service*, 616 F.3d 983 (9th Cir. 2010), cert. denied, 179 L. Ed 2d 301, 2011 U.S. Lexis 1392, 79 U.S.L.W. 3475 (2011).
- Jakobsson, Kristin M. and Andrew K. Dragan. 2001. The Worth of a Possum: Valuing Species with the Contingent Valuation Method. *Environmental and Resource Economics* 19:211-227.
- Kotchen, Matthew J. and Stephen D. Reiling. 2000. Environmental Attitudes, Motivations, and Contingent Valuation of Nonuse Values: A Case Study Involving Endangered Species. *Ecological Economics* 32: 93-107.
- Loomis, John and Earl Ekstrand. 1997. Economic Benefits of Critical Habitat for the Mexican Spotted Owl: A Scope Test Using a Multiple-Bounded Contingent Valuation Survey. *Journal of Agricultural and Resource Economics* 22(2): 356-366.
- New Mexico Cattle Growers Assn. v. United States Fish and Wildlife Service*, 248 F.3d 1277 (10th Cir. 2001).
- Office of Personnel Management. 2013. Federal Government Schedule Rates.
- Personal communication from the Service on January 30, 2013.
- Personal communication with City of New Braunfels Park and Recreation Department and Planning Services Department on January 30, 2013.

- Personal communication with City of San Marcos Planning and Development Services Department on January 31, 2013.
- Personal communication with Hays County Development Services Department on February 1, 2013.
- Personal communication with Texas State University Meadows Center for Water and the Environment on February 5, 2013.
- Personal communication with the Service on February 1, 2013.
- Pub Law No. 104-121.
- Richardson, Leslie and John Loomis. 2009. The Total Economic Value of Threatened, Endangered and Rare Species: An Updated Meta-Analysis. *Ecological Economics* 68: 1535-1548.
- Sierra Club v. Lujan, No. MO-91-CA-069, 1993 WL 151353 (W.D. Tex. Feb. 1, 1993).
- Stanley, Denise L. 2005. Local Perception of Public Goods: Recent Assessments of Willingness-to-Pay for Endangered Species. *Contemporary Economic Policy* 23(2): 165-179.
- Texas Administrative Code, Title 30, Part 1, Chapter 213.
- U.S. Code. Title 33, 1344.
- 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>.
- U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," August 6, 2002, accessed at <http://endangered.fws.gov/hcp/>.
- U.S. Fish and Wildlife Service. October 15, 2012. *Incremental Effects Memorandum for the Economic Analysis for the Proposed Revision of Critical Habitat for the Endangered Comal Springs Dryopid Beetle, Comal Springs Riffle Beetle, and Peck's Cave Amphipod.*
- U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a004/a-4.pdf>.
- U.S. Office of Management and Budget, February 7, 2011. "Regulatory Impact Analysis: Frequently Asked Questions (FAQs)." Accessed on May 3, 2011 at http://www.whitehouse.gov/sites/default/files/omb/circulars/a004/a-4_FAQ.pdf.

APPENDIX A | FRAMEWORK FOR THE ANALYSIS

76. According to section 4(b)(2) of the ESA, the Service must consider the economic impacts, impacts to national security, and other relevant impacts of designating any particular area as critical habitat. An area may be excluded from designation as critical habitat if the benefits of exclusion (i.e., the impacts that would be avoided if an area were excluded from the designation) outweigh the benefits of designation so long as exclusion of the area will not result in extinction of the species. **The purpose of the economic analysis is to provide information to assist the Secretary of the DOI in determining whether the benefits of excluding particular areas from the designation outweigh the benefits of including those areas in the designation.**⁶² In addition, this information allows the Service to address the requirements of Executive Orders 12866 and 13211, and the Regulatory Flexibility Act (RFA), as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA).⁶³
77. This chapter describes the framework for this analysis. The chapter first provides a background of case law that led to the selection of the framework applied in this report. We then describe in economic terms the general categories of economic effects that are the focus of the impact analysis, including a discussion of both efficiency and distributional effects. This chapter then defines the analytic framework used to measure these impacts in the context of critical habitat regulation and the consideration of benefits. It concludes with a description of the information sources relied upon in the analysis and notes on the presentation of the results.

A.1 BACKGROUND

78. This analysis examines the impacts of restricting or modifying specific land uses or activities for the benefit of the species and their habitat within the proposed critical habitat area. The U.S. Office of Management and Budget's (OMB) guidelines for conducting economic analysis of regulations direct Federal agencies to measure the costs of a regulatory action against a baseline, which it defines as the "best assessment of the way the world would look absent the proposed action."⁶⁴ In other words, the baseline includes the existing regulatory and socio-economic burden imposed on landowners, managers, or other resource users potentially affected by the designation of critical

⁶² 16 U.S.C. §1533(b)(2).

⁶³ Executive Order 12866, Regulatory Planning and Review, September 30, 1993; Executive Order 13563, Improving Regulation and Regulatory Review, January 18, 2011; 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.

⁶⁴ OMB, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a004/a-4.pdf>.

habitat. Impacts that are incremental to that baseline (i.e., occurring over and above existing constraints) are attributable to the proposed regulation. Significant debate has occurred regarding whether assessing the impacts of the Service's proposed regulations using this baseline approach is appropriate in the context of critical habitat designations.

79. In 2001, the U.S. Court of Appeals for the Tenth Circuit instructed the Service to conduct a full analysis of all of the economic impacts of proposed critical habitat, regardless of whether those impacts are attributable co-extensively to other causes.⁶⁵ Specifically, the court stated,

The statutory language is plain in requiring some kind of consideration of economic impact in the CHD [critical habitat designation] phase. Although 50 C.F.R. 402.02 is not at issue here, the regulation's definition of the jeopardy standard as fully encompassing the adverse modification standard renders any purported economic analysis done utilizing the baseline approach virtually meaningless. We are compelled by the canons of statutory interpretation to give some effect to the congressional directive that economic impacts be considered at the time of critical habitat designation.... Because economic analysis done using the FWS's [Fish and Wildlife Service's] baseline model is rendered essentially without meaning by 50 C.F.R. § 402.02, we conclude Congress intended that the FWS conduct a full analysis of all of the economic impacts of a critical habitat designation, regardless of whether those impacts are attributable co-extensively to other causes. Thus, we hold the baseline approach to economic analysis is not in accord with the language or intent of the ESA [Endangered Species Act].⁶⁶

80. Since that decision, however, courts in other cases have held that an incremental analysis of impacts stemming solely from the critical habitat rulemaking is proper.⁶⁷ For example, in the March 2006 ruling that the August 2004 critical habitat rule for the Peirson's milk-vetch was arbitrary and capricious, the United States District Court for the Northern District of California stated,

The Court is not persuaded by the reasoning of *New Mexico Cattle Growers*, and instead agrees with the reasoning and holding of *Cape Hatteras Access Preservation Alliance v. U.S. Dep't of the Interior*, 344 F. Supp 2d 108 (D.D.C. 2004). That case also involved a challenge to the Service's baseline approach and the court held that the baseline approach was both consistent with the language and purpose of the ESA and that it

⁶⁵ *New Mexico Cattle Growers Assn. v. United States Fish and Wildlife Service*, 248 F.3d 1277 (10th Cir. 2001).

⁶⁶ *Ibid.*

⁶⁷ In explanation of their differing conclusion, later decisions note that in *New Mexico Cattle Growers*, the U.S. Tenth Circuit Court of Appeals relied on a Service regulation that defined "destruction and adverse modification" in the context of section 7 consultation as effectively identical to the standard for "jeopardy." Courts had since found that this definition of "adverse modification" was too narrow. For more details, see the discussion of *Gifford Pinchot Task Force v. United States Fish and Wildlife Service* provided later in this section.

was a reasonable method for assessing the actual costs of a particular critical habitat designation *Id* at 130. ‘To find the true cost of a designation, the world with the designation must be compared to the world without it.’⁶⁸

81. More recently, in 2010, the U.S. Court of Appeals for the Ninth Circuit came to similar conclusions during its review of critical habitat designations for the Mexican spotted owl and 15 vernal pool species.⁶⁹ In order to address the divergent opinions of the courts and provide the most complete information to decision-makers, this economic analysis will employ “without critical habitat” and “with critical habitat” scenarios:

- The "**without critical habitat**" scenario represents the **baseline** for the analysis, considering protections already afforded the three invertebrates. The baseline for this analysis is the state of regulation, absent designation of critical habitat that provides protection to the species under the ESA, as well as under other Federal, State and local laws and conservation plans. The baseline includes sections 7, 9, and 10 of the ESA to the extent that they are expected to apply absent the designation of critical habitat for the species. The analysis will qualitatively describe how baseline conservation for the three invertebrates is currently implemented across the proposed designation in order to provide context for the incremental analysis (Chapter 2).
- The "**with critical habitat**" scenario describes and monetizes the **incremental** impacts due specifically to the designation of critical habitat for the species. The incremental impacts are those impacts that are not expected to occur absent the designation of critical habitat. This report focuses on the incremental analysis (Chapter 2).

82. Incremental effects of critical habitat designation are determined using the Service's December 9, 2004, interim guidance on “Application of the ‘Destruction or Adverse Modification’ Standard Under Section 7(a)(2) of the Endangered Species Act” and information from the Service regarding what potential consultations and project modifications may be imposed as a result of critical habitat designation over and above those associated with the listing.⁷⁰ Specifically, in *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, the U.S. Court of Appeals for the Ninth Circuit invalidated the Service’s regulation defining destruction or adverse modification of critical habitat, and the Service no longer relies on this regulatory definition when analyzing whether an action is likely to destroy or adversely modify critical habitat.⁷¹ Under the statutory provisions of the ESA, the Service determines destruction or adverse

⁶⁸ *Center for Biological Diversity v. United States Bureau of Land Management*, 422 F. Supp.2d 1115 (N.D. Cal. 2006).

⁶⁹ *Home Builders Association of Northern California v. United States Fish and Wildlife Service*, 616 F.3d 983 (9th Cir. 2010), cert. denied, 179 L. Ed 2d 301, 2011 U.S. Lexis 1392, 79 U.S.L.W. 3475 (2011); *Arizona Cattle Growers v. Salazar*, 606 F. 3d 1160 (9th Cir. 2010), cert. denied, 179 L. Ed. 2d 300, 2011 U.S. Lexis 1362, 79 U.S.L.W. 3475 (2011).

⁷⁰ Director, U.S. Fish and Wildlife Service, Memorandum to Regional Directors and Manager of the California-Nevada Operations Office, Subject: Application of the “Destruction or Adverse Modification” Standard under Section 7(a)(2) of the Endangered Species Act, dated December 9, 2004.

⁷¹ *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, 378 F.3d 1059 (9th Circuit 2004).

modification on the basis of whether, with implementation of the proposed Federal action, the affected critical habitat would remain functional to serve its intended conservation role for the species.

83. A detailed description of the methods used to define baseline and incremental impacts is provided in Section A.3.

A.2 CATEGORIES OF POTENTIAL ECONOMIC EFFECTS OF SPECIES CONSERVATION

84. This economic analysis considers both the economic efficiency and distributional effects that may result from efforts to protect the Comal Springs dryopid Beetle, Comal Springs riffle beetle, the Peck's cave amphipod and their habitat (hereinafter referred to collectively as "invertebrate conservation efforts"). Economic efficiency effects generally reflect "opportunity costs" associated with the commitment of resources required to accomplish species and habitat conservation. For example, if the set of activities that may take place on a parcel of land is limited as a result of the designation or the presence of the species, and thus the market value of the land is 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 invertebrate conservation efforts.
85. This analysis also addresses the distribution of impacts associated with the designation, including an assessment of any local or regional impacts of habitat conservation and the potential effects of conservation efforts on small entities and the energy industry. This information may be used by decision-makers to assess whether the effects of species conservation efforts unduly burden a particular group or economic sector. For example, while conservation efforts may have a small impact relative to the national economy, individuals employed in a particular sector of the regional economy may experience relatively greater impacts. The differences between economic efficiency effects and distributional effects, as well as their application in this analysis, are discussed in greater detail below.

A.2.1 EFFICIENCY EFFECTS

86. At the guidance of 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. In the context of regulations that protect habitat for the three invertebrates, these efficiency effects represent the opportunity cost of resources used or benefits foregone by society as a result of the regulations. Economists generally characterize opportunity costs in terms of changes in producer and consumer surpluses in affected markets.⁷²

⁷² 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>.

87. In some instances, compliance costs may provide a reasonable approximation for the efficiency effects associated with a regulatory action. For example, a Federal land manager may 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 is 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. 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.
88. Where habitat protection measures are expected to significantly impact a market, it may be necessary to estimate changes in producer and consumer surpluses. For example, protection measures that reduce or preclude 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 (i.e., social welfare) can be measured by considering changes in producer and consumer surplus in the market.
89. This analysis begins by measuring impacts associated with invertebrate conservation efforts. As noted above, in some cases, compliance costs can provide a reasonable estimate of changes in economic efficiency. However, if the cost of conservation efforts is expected to significantly impact markets, the analysis will consider potential changes in consumer and/or producer surplus in affected markets. As described in Chapter 3, in the case of the Comal Springs dryopid beetle, Comal Springs riffle beetle, and Peck's cave amphipod, conservation efforts are not anticipated to significantly affect markets; therefore, this report focuses on compliance costs.

A.2.2 DISTRIBUTIONAL AND REGIONAL ECONOMIC EFFECTS

90. Measurements of changes in economic efficiency focus on the net impact of conservation efforts, without consideration of how certain economic sectors or groups of people are affected. Thus, a discussion of efficiency effects alone may miss important distributional considerations. OMB encourages Federal agencies to consider distributional effects separately from efficiency effects.⁷³ This analysis considers several types of distributional effects, including impacts on small entities; impacts on energy supply, distribution, and use; 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 and Energy Supply, Distribution, and Use

91. This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the RFA, might be affected by future species conservation

⁷³ U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a004/a-4.pdf>.

efforts.⁷⁴ In addition, in response to Executive Order 13211 "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," this analysis considers the future impacts of conservation efforts on the energy industry and its customers.⁷⁵

Regional Economic Effects

92. Regional economic impact analysis can provide an assessment of the potential localized effects of conservation efforts. 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 represent the relationship between a change in one sector of the economy (e.g., expenditures by recreators) and the effect of that change on economic output, income, or employment in other local industries (e.g., suppliers of goods and services to recreators). These economic data provide a quantitative estimate of the magnitude of shifts of jobs and revenues in the local economy.
93. The use of regional input/output models in an analysis of the impacts of species and habitat conservation efforts 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 or other adaptive responses by impacted businesses. In addition, the flow of goods and services across the regional boundaries defined in the model may change as a result of the regulation, compensating for a potential decrease in economic activity within the region.
94. 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. Thus, these types of distributional effects are reported separately from efficiency effects (i.e., not summed). In addition, measures of regional economic impact cannot be compared with estimates of efficiency effects, but should be considered as distinct measures of impact.
95. Impacts associated with invertebrate conservation efforts reflect increased administrative effort to participate in section 7 consultations. As described in the remainder of this report, critical habitat designation is not expected to affect the levels of economic activity occurring within the region. Therefore, measurable impacts of the type typically assessed with input-output models are not anticipated.

⁷⁴ 5 U.S.C. § 601 *et seq.*

⁷⁵ Executive Order 13211, "Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use," May 18, 2001.

A.3 ANALYTIC FRAMEWORK AND SCOPE OF THE ANALYSIS

96. This analysis: 1) identifies those economic activities most likely to threaten the three invertebrate species and their habitat; 2) describes the baseline regulation protection for the species; and 3) monetizes the incremental economic impacts to avoid adverse modification of the proposed critical habitat study area. Appendix A provides a detailed description of the methods used to separately identify baseline protections from the incremental impacts stemming from the proposed designation of critical habitat for the three invertebrates. This evaluation of impacts in a "with critical habitat designation" versus a "without critical habitat designation" framework effectively measures the net change in economic activity associated with the proposed rulemaking.

A.3.1 IDENTIFYING BASELINE IMPACTS

97. The baseline for this analysis is the existing state of regulation, absent the designation of critical habitat, including the listing of the species under the ESA, as well as protection under other Federal, State and local laws and guidelines. This "without critical habitat designation" scenario also considers a wide range of additional factors beyond the compliance costs of regulations that provide protection to the listed species. As recommended by OMB, the baseline incorporates, as appropriate, trends in market conditions, implementation of other regulations and policies by the Service and other government entities, and trends in other factors that have the potential to affect economic costs and benefits, such as the rate of regional economic growth in potentially affected industries.

98. Baseline protections include sections 7, 9, and 10 of the ESA, and economic impacts resulting from these protections to the extent that they are expected to occur absent the designation of critical habitat for the species. This analysis describes these baseline regulations and, where possible, provides examples of the potential magnitude of the costs of these baseline protections. The primary focus, however, is not on baseline costs, since these will not be affected by the proposed regulation. Instead, the focus of this analysis is on monetizing the incremental impacts forecast to result from the proposed critical habitat designation.

- Section 7 of Act, even absent critical habitat designation, 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. Consultations under the jeopardy standard result in administrative costs, as well as impacts of conservation efforts resulting from consideration of this standard.
- Section 9 defines the actions that are prohibited by the ESA. In particular, it prohibits the "take" of endangered wildlife, where "take" means to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct."⁷⁶ The economic impacts associated with this section manifest themselves in sections 7 and 10.

⁷⁶ 16 U.S.C. § 1532.

- Under section 10(a)(1)(B) of the ESA, an entity (e.g., a landowner or local government) may develop a habitat conservation plan (HCP) for a listed animal species in order to meet the conditions for issuance of an incidental take permit in connection with a land or water use activity or project.⁷⁷ The requirements posed by the HCP may have economic impacts associated with the goal of ensuring that the effects of incidental take are adequately avoided or minimized. The development and implementation of HCPs is considered a baseline protection for the species and habitat unless the HCP is determined to be precipitated by the designation of critical habitat, or the designation influences stipulated conservation efforts under HCPs.

Enforcement actions taken in response to violations of the ESA are not included in this analysis.

99. The protection of listed species and habitat is not limited to the ESA. Other Federal agencies, as well as State and local governments, may also seek to protect the natural resources under their jurisdiction. If compliance with the Clean Water Act (CWA) or State environmental quality laws, for example, protects habitat for the species, such protective efforts are considered to be baseline protections and costs associated with these efforts are categorized accordingly. These are discussed in Chapter 1.

A.3.2 IDENTIFYING INCREMENTAL IMPACTS

100. This analysis quantifies the potential incremental impacts of this rulemaking. The focus of the incremental analysis is to determine the impacts on land uses and activities from the designation of critical habitat that are above and beyond those impacts resulting from existing required or voluntary conservation efforts being undertaken due to other Federal, State, and local regulations or guidelines.
101. When critical habitat is designated, section 7 requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat (in addition to considering whether the actions are likely to jeopardize the continued existence of the species). The added administrative costs of including consideration of critical habitat in section 7 consultations, and the additional impacts of implementing conservation efforts (i.e., reasonable and prudent alternatives) resulting from the protection of critical habitat are the direct compliance costs of designating critical habitat. These costs are not in the baseline and are considered incremental impacts of the rulemaking.

Direct Impacts

102. The direct, incremental impacts of critical habitat designation stem from the consideration of the potential for destruction or adverse modification of critical habitat during section 7 consultations. The two categories of direct, incremental impacts of critical habitat designation are: 1) the administrative costs of conducting section 7 consultation; and 2)

⁷⁷ U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," August 6, 2002, accessed at <http://endangered.fws.gov/hcp/>.

implementation of any conservation efforts requested by the Service through section 7 consultation to avoid potential destruction or adverse modification of critical habitat.

103. Section 7(a)(2) of the ESA requires Federal agencies to consult with the Service whenever activities that they undertake, authorize, permit, or fund may affect a listed species or designated critical habitat. In some cases, consultations will involve the Service and another Federal agency only, such as the Corps. Often, they will also include a third party involved in projects that involve a permitted entity, such as the recipient of a CWA section 404 permit.
104. During a consultation, the Service, the Action agency, and the entity 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, and the potential effects to the species and designated critical habitat associated with the proposed activity, the Federal agency, and whether there is a private applicant involved.
105. Section 7 consultations with the Service may be either informal or formal. *Informal consultations* consist 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, and are 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.

Administrative Section 7 Consultation Costs

106. Parties involved in section 7 consultations include the Service, a Federal "action agency," and in some cases, a private entity involved in the project or land use activity. The action agency (i.e., the Federal nexus necessitating the consultation) serves as the liaison with the Service. While consultations are required for activities that involve a Federal nexus and may affect a species regardless of whether critical habitat is designated, the designation may increase the effort for consultations in the case that the project or activity in question may adversely modify critical habitat. Administrative efforts for consultation may therefore result in both baseline and incremental impacts.
107. In general, three different scenarios associated with the designation of critical habitat may trigger incremental administrative consultation costs:

1. **Additional effort to address adverse modification in a new consultation -**
New consultations taking place after critical habitat designation may require additional effort to address critical habitat issues above and beyond the listing issues. In this case, only the additional administrative effort required to consider critical habitat is considered an incremental impact of the designation.
 2. **Re-initiation of consultation to address adverse modification -** Consultations that have already been completed on a project or activity may require re-initiation to address critical habitat. In this case, the costs of re-initiating the consultation, including all associated administrative and project modification costs are considered incremental impacts of the designation.
 3. **Incremental consultation resulting entirely from critical habitat designation**
Critical habitat designation may trigger additional consultations that may not occur absent the designation (e.g., for an activity for which adverse modification may be an issue, while jeopardy is not, or consultations resulting from the new information about the potential presence of the species provided by the designation). Such consultations may, for example, be triggered in critical habitat areas that are not occupied by the species. All associated administrative and project modification costs of incremental consultations are considered incremental impacts of the designation.
108. The administrative costs of these consultations vary depending on the specifics of the project. One way to address this variability is to show a range of possible costs of consultation, as it may not be possible to predict the precise outcome of each future consultation in terms of level of effort. Review of consultation records and discussions with Service field offices resulted in a range of estimated administrative costs of consultation.
109. Exhibit A-1 provides the incremental administrative consultation costs applied in this analysis. To estimate the fractions of the total administrative consultation costs that are baseline and incremental, the following assumptions are applied.
- The greatest effort will be associated with consultations that consider both jeopardy and adverse modification. Depending on whether the consultation is precipitated by the listing or the critical habitat designation, part or all of the costs, respectively, will be attributed to the proposed rule to designate critical habitat.
 - Efficiencies exist when considering both jeopardy and adverse modification at the same time (e.g., in staff time saved for project review and report writing), and therefore incremental administrative costs of considering adverse modification in consultations precipitated by the listing result in the least incremental effort, roughly 25 percent of the cost of the entire consultation.⁷⁸ The remaining 75 percent of the costs are attributed to consideration of the jeopardy standard in the baseline scenario. This latter amount also represents the cost of a consultation that

⁷⁸ *Ibid.*

only considers adverse modification (e.g., an incremental consultation for activities in unoccupied critical habitat) and is attributed wholly to critical habitat.

- Incremental costs of the re-initiation of a previously completed consultation because of the critical habitat designation are assumed to be approximately half the cost of a consultation considering both jeopardy and adverse modification. This assumes that re-initiations are less time-consuming as the groundwork for the project has already been considered in terms of its effect on the species. However, because the previously completed effort must be re-opened, they are more costly than simply adding consideration of critical habitat to a consultation already underway.

EXHIBIT A-1. INCREMENTAL ADMINISTRATIVE CONSULTATION COSTS (2013 DOLLARS)

INCREMENTAL ADMINISTRATIVE COSTS OF CONSULTATION					
CONSULTATION TYPE	SERVICE	FEDERAL AGENCY	THIRD PARTY	BIOLOGICAL ASSESSMENT	TOTAL COSTS
NEW CONSULTATION RESULTING ENTIRELY FROM CRITICAL HABITAT DESIGNATION (TOTAL COST OF A CONSULTATION CONSIDERING BOTH JEOPARDY AND ADVERSE MODIFICATION)					
Informal	\$2,500	\$3,100	\$2,100	\$2,000	\$9,600
Formal	\$5,500	\$6,200	\$3,500	\$4,800	\$20,000
Programmatic	\$17,000	\$14,000	n/a	\$5,600	\$36,000
RE-INITIATION OF CONSULTATION TO ADDRESS ADVERSE MODIFICATION					
Informal	\$1,200	\$1,600	\$1,000	\$1,000	\$4,800
Formal	\$2,800	\$3,100	\$1,800	\$2,400	\$10,000
Programmatic	\$8,300	\$6,900	n/a	\$2,800	\$18,000
ADDITIONAL EFFORT TO ADDRESS ADVERSE MODIFICATION IN A NEW CONSULTATION					
Informal	\$620	\$780	\$510	\$500	\$2,400
Formal	\$1,400	\$1,600	\$880	\$1,200	\$5,000
Programmatic	\$4,200	\$3,500	n/a	\$1,400	\$9,000
Source: IEC analysis of full administrative costs is based on data from the Federal Government Schedule Rates, Office of Personnel Management, 2013, and a review of consultation records from several Service field offices across the country conducted in 2002.					
Notes:					
1. Estimates are rounded to two significant digits and may not sum due to rounding.					
2. Estimates reflect average hourly time required by staff.					

Section 7 Conservation Effort Impacts

110. Section 7 consultation considering critical habitat may also result in additional conservation effort recommendations specifically addressing potential destruction or adverse modification of critical habitat. For forecast consultations considering jeopardy and adverse modification, and for re-initiations of past consultations to consider critical

habitat, the economic impacts of conservation efforts undertaken to avoid adverse modification are considered incremental impacts of critical habitat designation. For consultations that are forecast to occur specifically because of the designation (incremental consultations), impacts of all associated conservation efforts are assumed to be incremental impacts of the designation. This is summarized below.

1. **Additional effort to address adverse modification in a new consultation:** Only project modifications above and beyond what would be requested to avoid or minimize jeopardy are considered incremental.
2. **Re-initiation of consultation to address adverse modification:** Only project modifications above and beyond what was requested to avoid or minimize jeopardy are considered incremental.
3. **Incremental consultation resulting entirely from critical habitat designation:** Impacts of all project modifications are considered incremental.

A.3.3 IDENTIFYING INCREMENTAL IMPACTS

111. This analysis quantifies the potential incremental impacts of this rulemaking. The focus of the incremental analysis is to determine the impacts on land uses and activities from the designation of critical habitat that are above and beyond those impacts resulting from existing required or voluntary conservation efforts being undertaken due to other Federal, State, and local regulations or guidelines.
112. When critical habitat is designated, section 7 requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat (in addition to considering whether the actions are likely to jeopardize the continued existence of the species). The added administrative costs of including consideration of critical habitat in section 7 consultations, and the additional impacts of implementing conservation efforts (i.e., reasonable and prudent alternatives) resulting from the protection of critical habitat are the direct compliance costs of designating critical habitat. These costs are not in the baseline and are considered incremental impacts of the rulemaking.
113. To inform the economic analysis, the Service provided a memorandum describing its expected approach to conservation for the three invertebrate species following critical habitat designation.⁷⁹ Specifically, this memorandum provides information on how the Service intends to address projects that might lead to adverse modification of critical habitat as distinct from projects that pose jeopardy to the species.
114. From this memorandum, we conclude that incremental project modifications are unlikely to be recommended within proposed critical habitat units. As the survival of these three species is so closely tied to the quality of their habitat, any conservation efforts the

⁷⁹ U.S. Fish and Wildlife Service. October 15, 2012. *Incremental Effects Memorandum for the Economic Analysis for the Proposed Revision of Critical Habitat for the Endangered Comal Springs Dryopid Beetle, Comal Springs Riffle Beetle, and Peck's Cave Amphipod*. See Appendix D.

Service requests to avoid adverse modification of critical habitat will most likely already be requested to avoid jeopardy. Specifically, the Service states:

We can foresee no future actions that could significantly impact the individuals of the species independent of the habitat. And, conversely, we can foresee no future actions that could substantially impact the habitat without also appreciably reducing survival and recovery of the species. Thus, we assume that if these conditions (adequate water quality and quantity) are impacted severely, the species chances of survival will decrease and their opportunity for recovery will decrease as well.

Therefore, any proposed Federal activity that is likely to severely impact the water quality or spring flow quantities could result in jeopardy.⁸⁰

115. Accordingly, since all proposed critical habitat is occupied by the species, we do not expect critical habitat designation will generate requests for project modification above and beyond those requested to avoid jeopardy. We therefore conclude that, within occupied habitat, incremental impacts will be limited to additional administrative costs of consultation (i.e., additional time spent to address adverse modification during section 7 consultation).
116. Exhibit A-2 summarizes the decision framework employed to support the conclusion that critical habitat designation is unlikely to generate additional conservation for the invertebrates. As described above, incremental project modifications due to the designation of critical habitat for the invertebrates are not expected.

⁸⁰ *Ibid.*

EXHIBIT A-2. FRAMEWORK FOR DETERMINING BASELINE AND INCREMENTAL IMPACTS

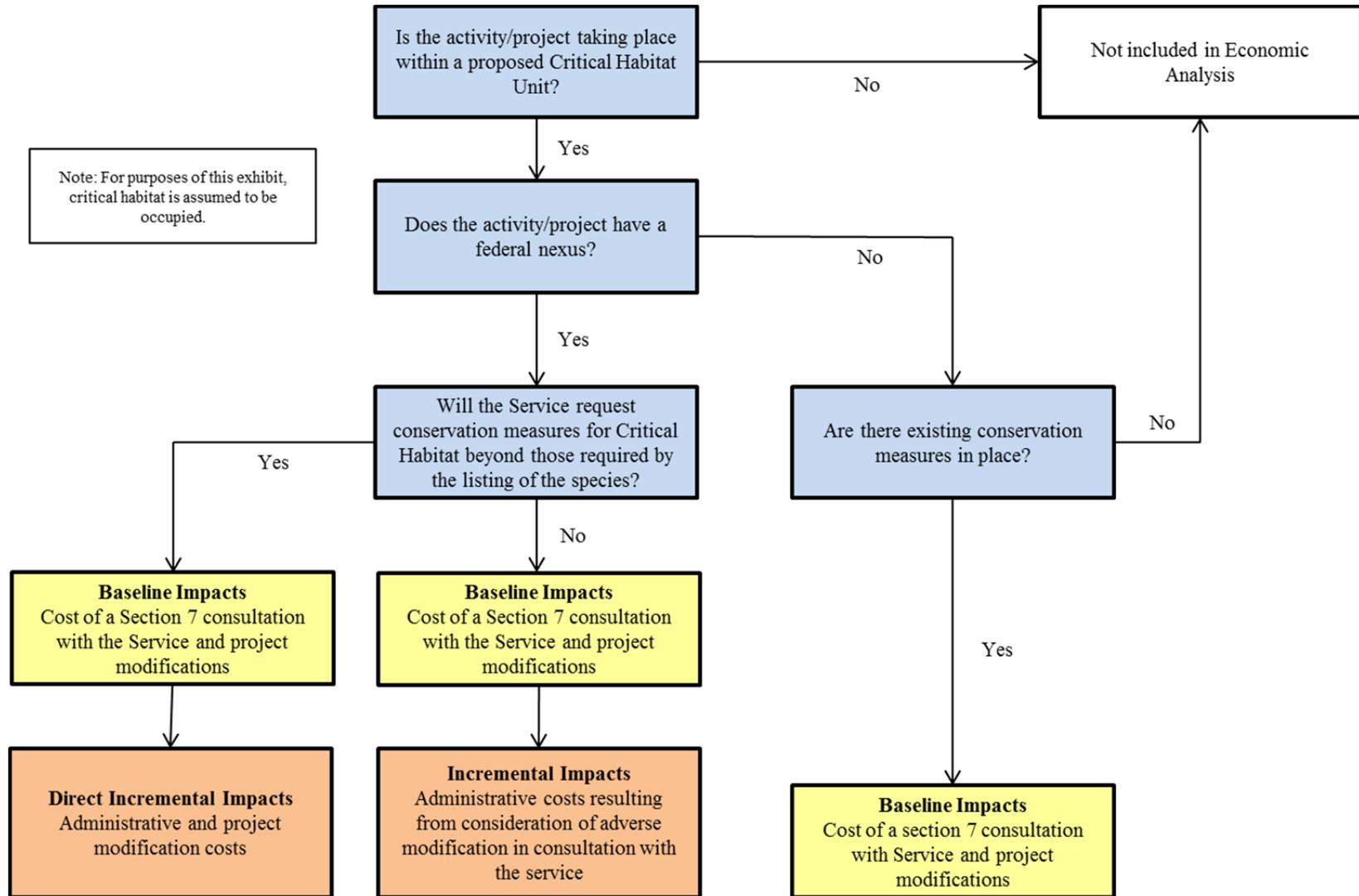


EXHIBIT A-3. CALCULATING PRESENT VALUE AND ANNUALIZED IMPACT

This analysis compares economic impacts incurred in different time periods in present value terms. The present value represents the value of a payment or stream of payments in common dollar terms. That is, it is the sum of a series of past or future cash flows expressed in today's dollars. Translation of economic impacts of past or future costs to present value terms requires the following: a) past or projected future costs of critical habitat designation; and b) the specific years in which these impacts have been or are expected to be incurred. With these data, the present value of the past or future stream of impacts (PV_c) from year t to T is measured in 2012 dollars according to the following standard formula:^a

$$PV_c = \sum_t^T \frac{C_t}{(1+r)^{t-2011}}$$

C_t = cost of critical habitat conservation efforts in year t

r = discount rate^b

Impacts for each activity are also expressed as annualized values. Annualized values are calculated to provide comparison of impacts across activities with varying forecast periods (T). For this analysis, development activities employ a forecast period of 20 years, 2012 through 2031. Annualized future impacts (APV_c) are calculated by the following standard formula:

$$APV_c = PV_c \left[\frac{r}{1 - (1+r)^{-N}} \right]$$

N = number of years in the forecast period (in this analysis, 29 years)

^a To derive the present value of future impacts to development activities, t is 2012 and T is 2031.

^b To discount and annualize costs, guidance provided by the OMB specifies the use of a real rate of seven percent. In addition, OMB recommends sensitivity analysis using other discount rates such as three percent, which some economists believe better reflects the social rate of time preference. (U.S. Office of Management and Budget, Circular A-4, September 17, 2003 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.)

Indirect Impacts

117. The designation of critical habitat may, under certain circumstances, affect actions that do not have a Federal nexus and thus are not subject to the provisions of section 7 under the ESA. Indirect impacts are those unintended changes in economic behavior that may occur outside of the ESA, through other Federal, State, or local actions, and that are caused by the designation of critical habitat. This section identifies common types of indirect impacts that may be associated with the designation of critical habitat. Importantly, these

types of impacts are not always considered incremental. In the case that these types of conservation efforts and economic effects are expected to occur regardless of critical habitat designation, they are appropriately considered baseline impacts in this analysis.

Habitat Conservation Plans (HCPs)

118. Under section 10 of the ESA, landowners seeking an incidental take permit must develop an HCP to counterbalance the potential harmful effects that an otherwise lawful activity may have on a species. As such, the purpose of the habitat conservation planning process is to ensure that the effects of incidental take are adequately avoided or minimized. Thus, HCPs are developed to ensure compliance with section 9 of the ESA and to meet the requirements of section 10 of the ESA.
119. Application for an incidental take permit and completion of an HCP are not required or necessarily recommended by a critical habitat designation. However, in certain situations the new information provided by the proposed critical habitat rule may prompt a landowner to apply for an incidental take permit. For example, a landowner may have been previously unaware of the potential presence of the species on his or her property, and expeditious completion of an HCP may offer the landowner regulatory relief in the form of exclusion from the final critical habitat designation. In this case, the effort involved in creating the HCP and undertaking associated conservation actions are considered an incremental effect of designation. Furthermore, revisions to existing HCPs may occur to consider effects of the HCP on newly designated critical habitat. No specific plans to prepare new HCPs in response to this proposed designation were identified. However, two existing HCPs, and three HCPs in draft stages, cover activities with potential to affect the proposed critical habitat. The EARIP-HCP includes incidental take coverage for the three invertebrate species under certain water use activities. Re-initiations of consultation for these five HCPs to consider impacts to proposed critical habitat are considered incremental effects of designation.

Other State and Local Laws

120. Under certain circumstances, critical habitat designation 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 impacts would not have been triggered absent critical habitat designation, they are considered indirect, incremental impacts of the designation. In the case of critical habitat for the three invertebrate species, no indirect, incremental effects are anticipated in association with State and local regulation.

Additional Indirect Impacts

121. In addition to the indirect effects of compliance with other laws or triggered by the designation, project proponents, land managers and landowners may face additional indirect impacts, including the following:

- **Time Delays** - Both public and private entities may experience incremental time delays for projects and other activities due to requirements associated with the need to reinitiate the section 7 consultation process and/or compliance with other

laws triggered by the designation. To the extent that delays result from the designation, they are considered indirect, incremental impacts of the designation.

- **Regulatory Uncertainty** - 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 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. Where information suggests that this type of regulatory uncertainty stemming from the designation may affect a project or economic behavior, associated impacts are considered indirect, incremental impacts of the designation.
- **Stigma** - In some cases, the public may perceive that critical habitat designation may result in limitations on private property uses above and beyond those associated with anticipated project modifications and regulatory uncertainty described above. Public attitudes about the limits or restrictions that critical habitat may impose can cause real economic effects to property owners, regardless of whether such limits are actually imposed. All else equal, a property that is designated as critical habitat may have a lower market value than an identical property that is not adjacent to a stream designated as critical habitat due to perceived limitations or restrictions. As the public becomes aware of the true regulatory burden imposed by critical habitat, the impact of the designation on property markets may decrease. To the extent that potential stigma effects on markets are probable and identifiable, these impacts are considered indirect, incremental impacts of the designation.

Indirect impacts may also result from critical habitat providing new information regarding where project proponents should consult regarding potential impacts on the species or habitat. However, as described above, critical habitat designation for the three invertebrates is not likely to provide new information about the presence of the species and will not lead to additional consultations in areas where project proponents would not consult absent critical habitat.

A.3.3 BENEFITS

122. Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.⁸¹ OMB's Circular A-4 distinguishes two types of economic benefits: direct benefits and ancillary benefits. Ancillary benefits are defined as favorable impacts of a rulemaking that are typically unrelated, or secondary, to the statutory purpose of the rulemaking.⁸²

⁸¹ Executive Order 12866, Regulatory Planning and Review, September 30, 1993.

⁸² U.S. Office of Management and Budget, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a004/a-4.pdf>

123. In the context of critical habitat, the primary purpose of the rulemaking (i.e., the direct benefit) is the potential to enhance conservation of the species. The published economics literature has documented that social welfare benefits can result from the conservation and recovery of endangered and threatened species. In its guidance for implementing Executive Order 12866, OMB acknowledges that it may not be feasible to monetize, or even quantify, the benefits of environmental regulations due to either an absence of defensible, relevant studies or a lack of resources on the implementing agency's part to conduct new research.⁸³ Rather than rely on economic measures, the Service believes that the direct benefits of the proposed rule are best expressed in biological terms that can be weighed against the expected cost impacts of the rulemaking.
124. Critical habitat designation may also generate ancillary benefits. Critical habitat aids in the conservation of species specifically by protecting the primary constituent elements on which the species depends. To this end, critical habitat designation can result in maintenance of particular environmental conditions that may generate other social benefits aside from the preservation of the species. That is, management actions undertaken to conserve a species or habitat may have coincident, positive social welfare implications, such as increased recreational opportunities in a region. While they are not the primary purpose of critical habitat, these ancillary benefits may result in gains in employment, output, or income that may offset the direct, negative impacts to a region's economy resulting from actions to conserve a species or its habitat. As no changes in management practices are expected due to this proposed critical habitat designation, the analysis does not anticipate any direct or ancillary economic benefits.

⁸³ *Ibid.*

APPENDIX B | SMALL BUSINESS AND ENERGY IMPACTS ANALYSES

125. This appendix considers the extent to which incremental impacts from critical habitat designation may be borne by small entities and the energy industry. The analysis presented in Section B.1 is conducted pursuant to the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA) of 1996. The energy analysis in Section B.2 is conducted pursuant to Executive Order No. 13211.
126. The analyses of impacts to small entities and the energy industry rely on the estimated incremental impacts resulting from the proposed critical habitat designation. The incremental impacts of the rulemaking are most relevant for the small business and energy impacts analyses because they reflect costs that may be avoided or reduced based on decisions regarding the composition of the final rule.

B.1 SBREFA ANALYSIS

127. When a Federal agency proposes regulations, the RFA requires the agency to prepare and make available for public comment an analysis that describes the effect of the rule on small entities (i.e., small businesses, small organizations, and small government jurisdictions as defined by the RFA).⁸⁴ No initial regulatory flexibility analysis is required if the head of an agency certifies that the rule will not have a significant economic impact on a substantial number of small entities. SBREFA amended the RFA to require Federal agencies to provide a statement of the factual basis for certifying that a rule will not have significant economic impact on a substantial number of small entities. To assist in this process, this appendix provides a screening level analysis of the potential for proposed critical habitat to affect small entities.
128. To ensure broad consideration of impacts on small entities, the Service has prepared this small business analysis without first making the threshold determination in the proposed rule regarding whether the proposed critical habitat designation could be certified as not having a significant economic impact on a substantial number of small entities. This small business analysis will therefore inform the Service's threshold determination.

⁸⁴ 5 U.S.C. § 601 et seq.

B.1.1 OVERVIEW OF RFA APPLICABILITY

129. This analysis is intended to improve the Service's understanding of the potential effects of the proposed rule on small entities and to identify opportunities to minimize these impacts in the final rulemaking. The ESA requires the Service to designate critical habitat for threatened and endangered species to the maximum extent prudent and determinable. Section 4(b)(2) of the ESA requires that the Service designate critical habitat "on the basis of the best scientific data available and after taking into consideration the economic impact, the impact on national security, and any other relevant impacts, of specifying any particular area as critical habitat." This section grants the Secretary [of the Interior] discretion to exclude any area from critical habitat if (s)he determines "the benefits of such exclusion outweigh the benefits of specifying such area as part of the critical habitat." However, the Secretary may not exclude an area if it "will result in the extinction of the species."
130. Three types of small entities are defined in the RFA:
- **Small Business** - Section 601(3) of the RFA defines a small business as having the same meaning as small business concern under section 3 of the Small Business Act. This includes any firm that is independently owned and operated and is not dominant in its field of operation. The SBA has developed size standards to carry out the purposes of the Small Business Act, and those size standards can be found in 13 CFR 121.201. The size standards are matched to NAICS industries. The SBA definition of a small business applies to a firm's parent company and all affiliates as a single entity.
 - **Small Governmental Jurisdiction** - Section 601(5) defines small governmental jurisdictions as governments of cities, counties, towns, townships, villages, school districts, or special districts with a population of less than 50,000. Special districts may include those servicing irrigation, ports, parks and recreation, sanitation, drainage, soil and water conservation, road assessment, etc. When counties have populations greater than 50,000, those municipalities of fewer than 50,000 can be identified using population reports. Other types of small government entities are not as easily identified under this standard, as they are not typically classified by population.
 - **Small Organization** - Section 601(4) defines a small organization as any not-for-profit enterprise that is independently owned and operated and not dominant in its field. Small organizations may include private hospitals, educational institutions, irrigation districts, public utilities, agricultural co-ops, etc.
131. The courts have held that the RFA/SBREFA requires Federal agencies to perform a regulatory flexibility analysis of forecast impacts to small entities that are directly regulated. In the case of *Mid-Tex Electric Cooperative, Inc., v. Federal Energy Regulatory Commission (FERC)*, FERC proposed regulations affecting the manner in which generating utilities incorporated construction work in progress in their rates. The generating utilities that expected to be regulated were large businesses; however, their customers -- transmitting utilities such as electric cooperatives -- included numerous

small entities. In this case, the court agreed that FERC simply authorized large electric generators to pass these costs through to their transmitting and retail utility customers, and FERC could therefore certify that small entities were not directly impacted within the definition of the RFA.⁸⁵

132. Similarly, *American Trucking Associations, Inc. v. Environmental Protection Agency* addressed a rulemaking in which EPA established a primary national ambient air quality standard for ozone and particulate matter.⁸⁶ The basis of EPA's RFA/SBREFA certification was that this standard did not directly regulate small entities; instead, small entities were indirectly regulated through the implementation of State plans that incorporated the standards. The court found that, while EPA imposed regulation on States, it did not have authority under this rule to impose regulations directly on small entities and therefore small entities were not directly impacted within the definition of the RFA.
133. The SBA in its guidance on how to comply with the RFA recognizes that consideration of indirectly affected small entities is not required by the RFA, but encourages agencies to perform a regulatory flexibility analysis even when the impacts of its regulation are indirect.⁸⁷ "If an agency can accomplish its statutory mission in a more cost-effective manner, the Office of Advocacy [of the SBA] believes that it is good public policy to do so. The only way an agency can determine this is if it does not certify regulations that it knows will have a significant impact on small entities even if the small entities are regulated by a delegation of authority from the Federal agency to some other governing body."⁸⁸
134. The regulatory mechanism through which critical habitat protections are enforced is section 7 of the ESA, which directly regulates only those activities carried out, funded, or permitted by a Federal agency. By definition, Federal agencies are not considered small entities, although the activities they may fund or permit may be proposed or carried out by small entities. Given the SBA guidance described above, this analysis considers the extent to which this designation could potentially affect small entities, regardless of whether these entities would be directly regulated by the Service through the proposed rule or by a delegation of impact from the directly regulated entity.
135. This screening analysis focuses on small entities that may bear the incremental impacts of this rulemaking quantified in Chapter 2 of this economic analysis. As discussed in greater detail in Chapters 1 and 2, incremental impacts of the designation of critical habitat are likely to be limited to administrative costs of section 7 consultations. Small entities may participate in section 7 consultation as a third party (the primary consulting parties being the Service and the Federal action agency). It is therefore possible that the small entities

⁸⁵ *Mid-Tex Electric Cooperative, Inc., v. Federal Energy Regulatory Commission*, 773 F. 2d 327 (D.C. Cir. 1985).

⁸⁶ *American Trucking Associations, Inc. v. Environmental Protection Agency*, 175 F. 3d 1027, 1044 (D.C. Cir. 1999).

⁸⁷ Small Business Administration, Office of Advocacy. May 2003. *A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act*, pg. 20.

⁸⁸ *Ibid.*, pg. 21.

may spend additional time considering critical habitat during section 7 consultation for the three invertebrates. Additional incremental costs of consultation that would be borne by the Federal action agency and the Service are not relevant to this screening analysis as these entities (Federal agencies) are not small.

B.1.2 ANALYSIS OF IMPACTS TO SMALL ENTITIES

136. As described in Chapter 2, activities that may be affected by the designation include water withdrawals, water quality management, residential and commercial development, and any other economic activities occurring within the proposed critical habitat units.
137. Estimated incremental impacts that have the potential to be borne by small entities are limited to the administrative costs of section 7 consultation related to reinitiation of HCPs (six consultations), Department of Defense (DOD) operations (two consultations), as well as miscellaneous construction-related activities in the Comal Springs and San Marcos Springs units which may require a section 404 permit over the next 20 years (six consultations). The potential impacts to small entities related to these actions are as follows:
- The DOD consultations are not expected to involve small entities;
 - Reinitiated consultations related to HCPs are typically conducted internally to the Service, and thus may not require a third party. Although a third party such as the Edwards Aquifer Authority, Comal County, Hays County, or Bexar County could take part in the anticipated HCP re-initiations, none of these entities are small entities;
 - One consultation in San Marcos Springs is anticipated to involve the State of Texas as a third party. The State is not a small entity;
 - Five miscellaneous consultations are anticipated in the Comal Springs unit related to construction-related activities. The majority of these administrative costs are expected to be borne by Federal entities, but some costs would be borne by third parties participating in section 7 consultations. These entities may include the City of New Braunfels (population of 59,600), as well as developers. The City of New Braunfels is not considered a small government, as its population exceeds 50,000. It is possible that up to five developers could be included as third parties in these consultations. The total costs of these five actions together are estimated to be \$1,900 to \$2,100 annually, including Federal costs.

B.2 POTENTIAL IMPACTS TO GOVERNMENTS

138. Title II of UMRA requires agencies to assess the effects of their regulatory actions on State, local, and Tribal governments and the private sector.⁸⁹ Under Section 202 of UMRA, the Service must prepare a written statement, including a cost-benefit analysis, for rules that may result in the expenditure by State, local, and Tribal governments, in the

⁸⁹ 2 U.S.C. 1531 et seq.

aggregate, or by the private sector, of \$100 million or more in any one year. If a written statement is needed, Section 205 of UMRA requires the Service to identify and consider a reasonable number of regulatory alternatives. The Service must adopt the least costly, most cost-effective or least burdensome alternative that achieves the objectives of the rule, unless the Secretary publishes an explanation of why that alternative was not adopted. The provisions of Section 205 do not apply when they are inconsistent with applicable law.

139. As stated in the Proposed Rule, “the designation of critical habitat does not impose a legally binding duty on non-Federal Government entities or private parties. Under the Act, the only regulatory effect is that Federal agencies must ensure that their actions do not destroy or adversely modify critical habitat under section 7. While non-Federal entities that receive Federal funding, assistance, or permits, or that otherwise require approval or authorization from a Federal agency for an action, may be indirectly impacted by the designation of critical habitat, the legally binding duty to avoid destruction or adverse modification of critical habitat rests squarely on the Federal agency.”⁹⁰ Therefore, this rule does not place an enforceable duty upon State, local, or Tribal governments, or the private sector.

B.3 TAKINGS

140. Executive Order 12630, “Governmental Actions and Interference with Constitutionally Protected Property Rights,” issued March 15, 1988, requires agencies to adhere to certain principals in rulemakings that have takings implications and provide certain information to OMB for any actions with identified takings implications. Section 2(a) of the Executive Order defines takings implications to include any “regulations that propose or implement licensing, permitting, or other requirements or limitations on private property use, or that require dedications or exactions from owners of private property.”
141. As described in Chapter 2, the incremental effects of the proposed designation are largely limited to additional administrative costs of consultation. Thus, the proposed rulemaking is unlikely to have takings implications.

⁹⁰ 2012 Proposed critical habitat 77 FR 64274.

B.4 POTENTIAL IMPACTS TO THE ENERGY INDUSTRY

142. 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.”⁹¹
143. The Office of Management and Budget provides guidance for implementing this Executive Order, outlining nine outcomes that may constitute “a significant adverse effect” when compared with the regulatory action under consideration:
- Reductions in crude oil supply in excess of 10,000 barrels per day (bbls);
 - 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 (1,000 cubic feet) per year;
 - Reductions in electricity production in excess of 1 billion kilowatts-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;
 - Increases in the cost of energy distribution in excess of one percent; or
 - Other similarly adverse outcomes.⁹²
144. As described in Chapter 2, critical habitat designation for the three invertebrates is not expected to affect energy production, distribution, or supply. Thus, none of the nine threshold levels of impact listed above is exceeded.

⁹¹ 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>.

⁹² *Ibid.*

APPENDIX C | INCREMENTAL EFFECTS MEMORANDUM FOR THE ECONOMIC ANALYSIS FOR THE COMAL SPRINGS DRYOPID BEETLE, COMAL SPRINGS RIFFLE BEETLE, AND PECK'S CAVE AMPHIPOD



United States Department of the Interior

FISH AND WILDLIFE SERVICE

10711 Burnet Road, Suite 200
Austin, Texas 78758
512 490-0057
FAX 490-0974



AESO/SE

OCT 15 2012

Memorandum
Email Transmission

TO: Industrial Economics, Inc.

FROM: Field Supervisor, Austin Ecological Services Office, Texas 

SUBJECT: Incremental Effects Memorandum for the Economic Analysis for the Proposed Revision of Critical Habitat for the Endangered Comal Springs Dryopid Beetle, Comal Springs Riffle Beetle, and Peck's Cave Amphipod

Introduction

The purpose of this memorandum is to provide information to serve as a basis for conducting an economic analysis of the proposed revision of critical habitat for the endangered Comal Springs dryopid beetle (*Stygoparnus comalensis*), Comal Springs riffle beetle (*Heterelmis comalensis*), and Peck's cave amphipod (*Stygobromus pecki*). This information will fulfill the request as identified in the November 30, 2010, Memorandum, *Guidance for Preparing Incremental Effects Memo* (from Jennifer Baxter, Industrial Economics, Inc., to Douglas Krofta, U.S. Fish and Wildlife Service (Service)).

Section 4(b)(2) of the Endangered Species Act (Act) requires the U.S. Fish and Wildlife Service (Service) to consider the economic, national security, and other impacts of designating critical habitat. The Service may exclude an area from critical habitat if it determines that the benefits of exclusion outweigh the benefits of including the area as critical habitat, unless the exclusion will result in the extinction of the species. To support its weighing of the benefits of excluding versus including an area as critical habitat, the Service prepares an economic analysis for each proposed critical habitat rule describing and, where possible, estimating the economic impacts (costs and benefits) of the proposed regulation.

Determining the economic impacts of critical habitat designation involves evaluating the "without critical habitat" baseline versus the "with critical habitat" scenario. Economic impacts of a designation equal the difference, or the increment, between these two scenarios. Measured differences between the baseline (without critical habitat) and the designated critical habitat (with critical habitat) may include, but are not limited to, changes in land or resource use,



environmental quality, or time and effort expended on administrative and other activities by Federal landowners or action agencies, and in some instances, State and local governments or private third parties where there is a Federal nexus. These are the “incremental effects” that serve as the basis for the economic analysis.

There are a number ways that designation of critical habitat could influence activities, but one of the important functions of this memorandum is to provide detailed information about the differences between actions required to avoid jeopardy, versus actions that may be required to avoid adverse modification. The Service is working to update the regulatory definition of adverse modification since it was invalidated by a prior court ruling. In the meantime, we will rely on guidance provided by the Director’s December 9, 2004, Memorandum, *Application of the “Destruction or Adverse Modification” Standard under Section 7(a)(2) of the Endangered Species Act*. This memo explains that the conclusion for a section 7 analysis of a Federal action is to determine if the “critical habitat would remain functional (or retain the current ability for the primary constituent elements to be functionally established) to serve the intended conservation role of the species...” (p. 3). The information provided below is intended to identify the possible incremental effects of critical habitat designations for the three endangered Comal Springs invertebrates under the different section 7 standards.

Background

This is a proposed rule to revise critical habitat for the endangered Comal Springs dryopid beetle, Comal Springs riffle beetle, and Peck’s cave amphipod. With this rule, we are proposing to revise critical habitat as follows:

- Comal Springs dryopid beetle: 39.4 acres (ac) (15.56 hectares (ha)) of surface and 139 ac (56 ha) of subsurface critical habitat. The original designation was surface critical habitat of 39.5 ac (16.0 ha) without subsurface;
- Comal Springs riffle beetle: 54 ac (22 ha) of surface critical habitat only. The original designation was surface critical habitat of 30.3 ac (12.3 ha) ; and
- Peck’s cave amphipod: 38.4 ac (15.16 ha) surface and 138 ac (56 ha) of subsurface critical habitat. The original designation was surface critical habitat of 38.5 ac (15.6 ha) without subsurface.

Threats include inadequate water quantity and poor water quality, associated with water withdrawals, impoundment, and diversions; hazardous material spills; stormwater drainage pollutants including soaps, detergents, pharmaceuticals, heavy metals, fertilizer nutrients, petroleum hydrocarbons, and semi-volatile compounds such as industrial cleaning agents; pesticides and herbicides associated with pathogenic organisms or invasive species; invasive species altering the surface habitat; excavation and construction surrounding the springs and in the watershed ; and climate change.

Table 1. Proposed critical habitat units for the Comal Springs dryopid beetle. Area estimates reflect all land within critical habitat unit boundaries.

Critical Habitat Unit for the Comal Springs dryopid beetle	Land Ownership by Type	Size of Unit in Acres (Hectares) (subsurface critical habitat)	Size of Unit in Acres (Hectares) (surface critical habitat)

1. Comal Springs	State, City, Private	124 (50)	38 (15)
2. Fern Bank Springs	Private	15 (6)	1.4 (0.56)
Total		139 (56)	39.4 (15.56)

Table 2. Proposed critical habitat units for the Comal Springs riffle beetle. Area estimates reflect all land within critical habitat unit boundaries.

Critical Habitat Unit for the Comal Springs riffle beetle	Land Ownership by Type	Size of Unit in Acres (Hectares) (surface critical habitat)
1. Comal Springs	State, City, Private	38 (15)
2. San Marcos Springs	State	16 (6)
Total		54 (22)

Table 3. Proposed critical habitat units for the Peck's cave amphipod. Area estimates reflect all land within critical habitat unit boundaries.

Critical Habitat Unit for the Peck's cave amphipod	Land Ownership by Type	Size of Unit in Acres (Hectares) (subsurface critical habitat)	Size of Unit in Acres (Hectares) (surface habitat)
1. Comal Springs	State, City, Private	124 (50)	38 (15)
2. Hueco Springs	Private	14 (6)	0.4 (0.16)
Total		138 (56)	38.4 (15.16)

Baseline Analysis (without Critical Habitat)

The following discussion describes the existing regulatory circumstances that are anticipated without critical habitat designation. In the baseline scenario, section 7 of the Act 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 the listed species.

How is jeopardy defined and determined for these species?

“Jeopardize the continued existence of” means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species (50 CFR 402.02). Jeopardy requires that both the likelihood of survival and recovery in the wild be appreciably reduced.

Because of the biology and life history characteristics of the three Comal Springs invertebrates, in order to reach a conclusion of jeopardy under section 7 consultation, a proposed Federal action would have to make their habitat unsuitable for the invertebrates. The ability of these species to persist is very closely tied to the quality of their habitats. These species are very reliant upon aquatic habitat conditions for their physiological and behavioral functions (e.g., (e.g., breeding and feeding). They have limited ability to move beyond their immediate locations. Therefore, any action that substantially reduces habitat quality (by altering either the quality or quantity of water or the stream banks and associated vegetation) will reduce the number of individuals and populations. We can foresee no future actions that could significantly impact the individuals of the species independent of the habitat. And, conversely, we can foresee no future actions that could substantially impact the habitat without also appreciably reducing survival and recovery of the species. Thus, we assume that if these conditions (adequate water quality and quantity) are impacted severely, the species chances of survival will decrease and their opportunity for recovery will decrease as well. Therefore, any proposed Federal activity that is likely to severely impact the water quality or spring flow quantities could result in jeopardy.

There are no known threats at this time that would affect just the individuals of the species because they are so closely tied to their aquatic habitat. All of the threats to the species that have been identified in the proposed rule are related to impacts to the aquatic habitat.

Conservation plans and regulatory mechanisms that provide protection to the species and its habitat without critical habitat designation

The three Comal Springs invertebrates have been listed as endangered under the Act since December 18, 1997(62FR 66295). Listing provides opportunity for conservation and protection under sections 6, 7, 9, and 10 of the Act. These include cooperative actions with States (Section 6), consultation with Federal agencies for actions that may affect the species (Section 7(a)(2)); protection against the removal or reduction to possession from areas under Federal jurisdiction, or for any act that would damage or destroy any endangered plant species in knowing violation of any state laws without a Federal permit (Section 9(a)(2)(B)); and lastly, cooperative actions with other entities and landowners for the purpose of scientific or enhancement of survival activities involving the removal and reduction to possession from Federal lands (Section 10(a)(1)(A) permit).

Conservation Plans

The issue of groundwater withdrawals is a much larger issue being addressed by the Draft Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan (HCP) which includes other listed species along with the three Comal Springs invertebrates. The HCP is intended to resolve the longstanding conflict between the federal mandate to protect threatened and endangered species associated with the Edwards Aquifer and the region's dependence on the same aquifer as its primary water resource. Through the HCP, the Edwards Aquifer Authority, San Antonio Water System, City of New Braunfels, City of San Marcos, and Texas State University will be implementing actions to minimize and mitigate the effects of pumping, to conserve the Aquifer-dependent spring ecosystems, and contribute to the recovery of the covered species. The applicants are seeking incidental take coverage for four categories of activities: (1)

the regulation and use of the aquifer; (2) recreational activities in the Comal and San Marcos spring and river ecosystems; (3) other activities in, and related to, the Comal and San Marcos springs and river ecosystems; and (4) activities involved in and related to the implementation of minimization and mitigation measures associated with the impacts resulting from the anticipated incidental take in these ecosystems. They have identified long-term biological goals and management objectives for each of the three Comal Springs invertebrates that include: 1) maintaining silt-free habitat conditions through continued springflow, riparian zone protection, and recreational controls; 2) maintaining historic water quality conditions; 3) maintaining historic population densities; and 4) restoring riparian habitat.

There is not as clear of a connection between the conservation measures proposed in the HCP and the benefits to the species located at Hueco and Fern Bank Springs. Although, the proposed measures identified in the HCP for maintaining springflow and water quality at Comal Springs are likely to maintain adequate habitat at Hueco Springs for the Peck's cave amphipod given the similarity in the hydrogeologic settings for these springs. Fern Bank Springs flows from a much different hydrogeologic setting than Comal and San Marcos Springs, and it is unlikely that conservation measures included in the HCP will guarantee water will continue to flow at Fern Bank Springs. Therefore, the Comal Springs dryopid beetle population located at Fern Bank Springs does not appear to benefit directly from the conservation measures proposed in the HCP.

The Notice of Availability for the Draft Environmental Impact Statement and Draft HCP was published in the federal register on July 20, 2012, and the public comment period remains open until October 18, 2012. Once the public comment period is closed and any substantive comments are addressed, the Service will make a decision on the issuance of an Incidental Take Permit under section 10 of the Act.

State or Local Protections

All three of the Comal Springs invertebrates are listed by the state of Texas as endangered and are provided additional protection from take and possession under Chapters 68 of the Texas Parks and Wildlife (TPW) Code and Sections 65.171 - 65.176 of Title 31 of the Texas Administrative Code (TAC). The proposed rule also discusses local groundwater regulations and State regulations for oil and gas activities; however, neither provides any substantive protections from the identified threats to the species. In addition, neither of these activities have a Federal nexus that would trigger section 7 consultation, and neither can be shown to cause take of the species such that a section 10 permit and HCP would be pursued.

Federal Regulations and Acts

There are no Federal laws and regulations that are known to provide benefits to these aquatic invertebrates. The Clean Water Act and its implementing regulations provide protections for some aquatic habitats, but there are no known likely proposed actions that are expected to trigger Clean Water Act permits in the areas proposed for designation as critical habitat.

A number of species listed as threatened or endangered under the Act also occur within the aquatic habitats where the Comal Springs invertebrates are found (Table 4). As a result, these aquatic invertebrates receive some benefits from actions intended to protect the other listed species.

Table 4. Other listed species co-occurring in habitats of the proposed Comal Springs invertebrates.

Other Listed Species	Status*	Listed Since	Species Occurrence (San Marcos Springs or Comal Springs)
Fountain darter (fish)	E w/CH	1970	San Marcos and Comal Springs
San Marcos salamander	T w/CH	1980	San Marcos Springs
Texas blind salamander	E	1967	San Marcos Springs
Texas wild-rice	E w/CH	1978	San Marcos Springs

* E=endangered; T=threatened; w/CH=with designated critical habitat

San Marcos Springs currently has critical habitat designated for the fountain darter, San Marcos salamander, Texas blind salamander, and Texas wild-rice. Comal Springs has critical habitat designated for the fountain darter.

Federal agencies and other project proponents that are likely to consult with the Service under section 7 without critical habitat

In the baseline scenario, section 7 of the Act 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 the Comal Springs invertebrates.

We project that there are very few Federal activities in the area that are likely to trigger section 7 consultation. Since these species have been listed since 1997, we can use their consultation history as an indication of possible future consultations.

Ten formal section 7 consultations in the past have included an analysis of at least one of the Comal Springs invertebrates (Table 4), and none of them resulted in a jeopardy determination. Of those ten, five of the consultations were related to the withdrawal of water from the Edwards Aquifer. These included two intra-Service consultations on the withdrawal of water for use at the San Marcos National Fish Hatchery and Technology Center and the Uvalde National Fish Hatchery. The other three consultations on water withdrawal from the Edwards Aquifer were for the continued operation of Department of Defense installations within Bexar County, Texas. Two additional consultations were related to dam and wall repairs or replacement at Landa Lake (Comal Springs) through the U.S. Army Corps of Engineer's authorization under section 404 of the Clean Water Act (33 U.S.C. 1251 – 1376). One intra-Service consultation was for the issuance of a Section 10(a)(1)(B) permit for the Hays County Regional Habitat Conservation Plan (RHCP) to minimize and mitigate adverse effects to the endangered golden-cheeked warbler (*Dendroica chrysoparia*) and black-capped vireo (*Vireo atricapilla*) from activities

described in the RHCP. The Comal Springs invertebrates were included in the HCP as additional species; however, take for these species was not covered under the permit. One consultation was for the authorization by the U.S. Environmental Protection Agency of the assumption by the State of Texas of the Texas Pollution Discharge Elimination System. The remaining consultation was on the U.S. Army Corps of Engineers funding of a proposed aquatic ecosystems restoration project at Spring Lake, Hays County, Texas.

TABLE 5. Section 7 formal consultations for the Comal Springs invertebrates.

Fiscal Year	Activity Code	Activity Title	Lead Agency
1997	21450-1997-F-0039	Water Withdrawal at Kelly Air Force Base	Department of Defense
1998	21450-1998-F-0227	Texas Assumption of TPDES Operation	Environmental Protection Agency
1998	21450-1998-F-0759	DoD 4 Base Water Withdrawal	Department of Defense
1998	21450-1998-F-1392	San Marcos and Uvalde National Fish Hatcheries Water Withdrawal	Fish and Wildlife Service
2001	21450-2001-F-0615	Landa Lake Dam and Wall Repair	Army Corps of Engineers
2005	21450-2005-F-0087	Spring Lake Aquatic Ecosystem Restoration	Army Corps of Engineers
2007	21450-2007-F-0056	DoD Edwards Aquifer Water Withdrawal	Department of Defense
2010	21450-2010-F-0066	San Marcos and Uvalde National Fish Hatcheries Water Withdrawal	Fish and Wildlife Service
2010	21450-2010-F-0173	Hays County RHCP Biological Opinion	Fish and Wildlife Service
2012	24150-2012-F-0021	Landa Park Retaining Wall Replacement	Army Corps of Engineers

Some of the Federal agencies and projects that may go through the section 7 consultation process in the future whether or not critical habitat is designated include the following:

- (1) Department of Defense withdrawal of water from the Edwards Aquifer (continued operation of installations in Bexar County).
- (2) U.S. Fish and Wildlife Service (recovery actions; issuance of section 10 enhancement of survival permits, habitat conservation plans, and safe harbor agreements).
- (3) U.S. Army Corps of Engineers (issuance of permits under section 404 of the Clean Water Act).

We anticipate future consultations with the Department of Defense and intra-Service consultations for ongoing and future water withdrawals from the Edwards Aquifer. We do not anticipate further consultation with the U.S. Environmental Protection Agency.

Service administrative effort for section 7 consultations without critical habitat

As a result of the very low number of formal consultations (10) that have taken place for these listed species in the past (the past 15 years), we anticipate a very small amount of administrative effort will be expended in the future for conducting section 7 consultations under the baseline without critical habitat.

What types of project modifications are currently recommended or will likely be recommended by the Service to avoid jeopardy (i.e., the continued existence of the species)?

To date, there have been no consultations that resulted in a determination of jeopardy for any of the Comal Springs invertebrates. If we encounter one in the future, we may recommend project modifications to reduce the effect of the action to a level where it would not impact the species numbers, reproduction or distribution so that the likelihood of the species survival in the wild would not be appreciably reduced. Recommended modifications could include: (1) moving the location of the impact outside of occupied habitat; (2) ensuring the project impacts do not reduce the availability of foraging resources; or (3) preventing impacts to water quality and water quantity of the springs associated with these species.

Incremental Effects Analysis (with Critical Habitat)

The following discussion describes the regulatory circumstances that are anticipated with designation of critical habitat, as proposed, for the three Comal Springs invertebrates. Once critical habitat is designated, section 7 of the Act requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat. The key factor related to the adverse modification is whether, with implementation of the proposed Federal action, the affected critical habitat will continue to have the capability to serve its intended conservation role for the species. From section 3(3) of the Act: "The terms "conserve," "conserving," and "conservation" means to use and the use of all methods and procedures which are necessary to bring any endangered species or threatened species to the point at which the measures provided under the Endangered Species Act are no longer necessary". Thus, designation of critical habitat helps ensure that proposed project actions will not result in the adverse modification of habitat to the point that the species will be unable to recover.

How is adverse modification defined and determined for these species?

These species are very reliant upon aquatic habitat conditions for their physiological and behavioral functions (e.g., breeding and feeding). They have limited ability to move beyond their immediate locations. Therefore, any action that substantially reduces habitat quality (by altering either the quality or quantity of water or the stream banks and associated vegetation) will reduce the number of individuals and populations. Therefore, any action that substantially reduces habitat quality (by altering either the quality or quantity of water or the stream banks and associated vegetation) in any of the proposed designated critical habitat units may reach an adverse modification under section 7 consultation. With a total of four proposed critical habitat units for the Comal Springs invertebrates and only two critical habitat units for each of the three species, substantial impacts to any of the four units may constitute adverse modification.

We can reasonably assume that if these conditions (adequate water quality and quantity, stream banks, and vegetation) are impacted severely, the intended conservation function of the critical habitat unit could be lost, resulting in adverse modification. Also, as stated above under the Baseline discussion, because the biology and life-history characteristics of these species are so closely tied to their habitat, it seems highly unlikely to reach a conclusion of adverse

modification without also reaching jeopardy under section 7 consultation for a proposed Federal action that substantially impacted habitat conditions in the springs.

What Federal agencies or project proponents are likely to consult with the Service under section 7 with designation of critical habitat? What kinds of additional activities are likely to undergo consultation with critical habitat?

We can foresee no likely Federal activities in the future that would result in section 7 consultations with the designation of critical habitat beyond those that would occur with the listing of the species (see explanation above, "*How is adverse modification defined and determined for these species?*"). The same agencies and project proponents may possibly consult under adverse modification as those that would under the baseline conditions. We believe the agencies that might undergo consultation will be the same agencies that have already consulted on projects in these areas due to the presence of the Comal Springs invertebrates. We anticipate no new project proponents or additional activities that would require consultation due to critical habitat designation. This is because all of the proposed critical habitat areas are currently occupied by the species, the species is very closely dependent upon its aquatic habitat, and there are very few Federal actions expected in the area where the critical habitat is proposed.

How much administrative effort does or will the Service expend to address adverse modification in its section 7 consultations with critical habitat? Estimate the difference compared to baseline.

Because these species are so closely tied to the specific aquatic habitat conditions associated with the outflow from springs, and because all of the significant threats they face are related to potential impacts to habitat, we can forecast only very small additional administrative efforts to address critical habitat beyond those that might occur as part of the baseline for listing the species.

What project proponents are likely to pursue HCPs under section 10 after the designation of critical habitat?

The Comal Springs invertebrates have been listed since 1997. It is unlikely that any additional entities will pursue HCPs after critical habitat is designated. As described above in *Conservation Plans and Efforts*, the Edwards Aquifer Recovery Implementation Program Habitat Conservation Plan (HCP) will likely be finalized by January 2013. This HCP is meant to resolve the conflict between the protection of threatened and endangered species associated with the Edwards Aquifer and the region's dependence on the same aquifer as its primary water resource.

What types of project modifications might the Service make during a section 7 consultation to avoid destruction or adverse modification of critical habitat that are different than those for avoiding jeopardy?

Although we do not currently have a regulatory definition of adverse modification, we rely on the statutory definition in light of the *Gifford Pinchot* ruling that provides some guidance in distinguishing different standards for determination of jeopardy and adverse modification.

Adverse modification is considered a higher standard of preventing substantial loss of the conservation value of the critical habitat segment to help achieve recovery of the species. In the case of these invertebrates, no additional project modifications as a result of designating critical habitat are predictable because:

- (1) All areas proposed for critical habitat are occupied by the species;
- (2) The invertebrates are intimately tied to their aquatic habitats such that any potential project modifications to avoid adverse modification of critical habitat are most likely also going to be required to avoid jeopardizing the species; and
- (3) There are no future Federal actions envisioned at this time that are likely to have substantial impacts to either the individuals of the species or their proposed critical habitat, which is supported by the lack of Federal actions in the consultation history regarding the co-occurring, already listed species.

Conclusion

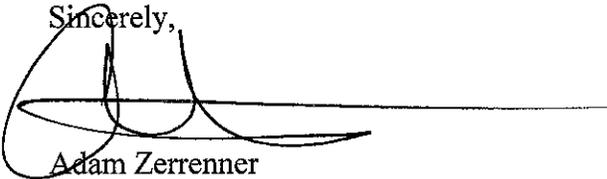
In summary, it is likely that the incremental effects of the proposed designated critical habitat for the three Comal Springs invertebrates will be very limited because:

- (1) There are very few possible future Federal actions that would require section 7 consultation for these species or their critical habitat, as indicated by the past record of consultations ;
- (2) None of the section 7 consultations for these species resulted in jeopardy or adverse modification determinations;
- (3) We have no information indicating that there will be an increase in the number or nature of future section 7 consultations following the designation of critical habitat; and
- (4) For any future section 7 consultations, no additional conservation measures are likely to be required to avoid adverse modification beyond any measures that would be required to avoid jeopardy because:
 - (a) All proposed critical habitat areas are occupied by the species; and
 - (b) We cannot foresee a difference between future actions that could result in jeopardy and those that could result in adverse modification of critical habitat. This is because the three Comal Springs invertebrate species are so closely associated with their aquatic habitat.

Therefore, we anticipate the incremental effects of critical habitat are likely to be limited to a small increase in administrative costs to the Service while conducting section 7 consultations required for any applicable future actions.

We appreciate the opportunity to provide this information for you. If you have any questions or request clarification of any the items described here, please do not hesitate to call Timothy Breen at 512-490-0057, extension 240.

Sincerely,

A handwritten signature in black ink, appearing to read 'Adam Zerrenner', with a long horizontal line extending to the right.

Adam Zerrenner
Field Supervisor