



ECONOMIC ANALYSIS OF CRITICAL  
HABITAT DESIGNATION FOR NINE  
BEXAR COUNTY, TEXAS,  
INVERTEBRATES

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prepared for:

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**TABLE OF CONTENTS****LIST OF ACRONYMS AND ABBREVIATIONS****EXECUTIVE SUMMARY** *ES-1***CHAPTER 1 INTRODUCTION AND BACKGROUND** *1-1*

- 1.1 Introduction *1-1*
  - 1.1.1 Previous Federal Actions *1-1*
  - 1.1.2 Proposed Revised Critical Habitat Designation *1-2*
- 1.2 Economic Activities Considered in this Analysis *1-7*
- 1.3 Organization of the Report *1-9*

**CHAPTER 2 FRAMEWORK FOR THE ANALYSIS** *2-1*

- 2.1 Differences Between the 2003 and 2011 Economic Analyses *2-2*
- 2.2 Background *2-3*
- 2.3 Categories of Potential Economic Effects of Species Conservation *2-6*
  - 2.3.1 Efficiency Effects *2-6*
  - 2.3.2 Distributional and Regional Economic Effects *2-7*
- 2.4 Analytic Framework and Scope of the Analysis *2-9*
  - 2.4.1 Identifying Baseline Impacts *2-9*
  - 2.4.2 Identifying Incremental Impacts *2-10*
  - 2.4.3 Benefits *2-17*
  - 2.4.4 Geographic Scope of the Analysis *2-18*
  - 2.4.5 Analytic Time Frame *2-18*
- 2.5 Information Sources *2-19*
- 2.6 Presentation of Results *2-19*

**CHAPTER 3 BASELINE CONSERVATION FOR NINE BEXAR COUNTY INVERTEBRATES WITHIN PROPOSED CRITICAL HABITAT** *3-1*

- 3.1 Government Canyon State Natural Area (GCSNA) *3-4*
- 3.2 La Cantera HCP *3-4*
- 3.3 Highlands Dominion, L.L.C. Conservation Easement *3-5*
- 3.4 San Antonio Parks Development and Expansion Venue Project *3-6*
- 3.5 Texas Cave Management Association *3-7*
- 3.6 Water Quality Protection Measures *3-7*
  - 3.6.1 Edwards Aquifer Protections *3-7*
  - 3.6.2 Clean Water Act *3-8*
- 3.7 Endangered Species Act *3-9*
  - 3.7.1 Development Activities *3-10*
  - 3.7.2 Transportation Projects *3-16*

3.7.3 Utility Projects 3-18

3.8 Draft Southern Edwards Plateau Habitat Conservation Plan (SEP-HCP) 3-20

**CHAPTER 4 INCREMENTAL IMPACTS OF CRITICAL HABITAT DESIGNATION FOR NINE BEXAR COUNTY INVERTEBRATES 4-1**

4.1 Summary of Results 4-1

4.2 Development 4-7

4.3 Transportation 4-20

4.4 Other Activities 4-22

4.5 Key Assumptions 4-23

**CHAPTER 5 POTENTIAL ECONOMIC BENEFITS 5-1**

5.1 Introduction 5-1

5.2 Quantifying Direct Economic Benefits of Critical Habitat Designation for the Invertebrates 5-1

5.3 Potential Incremental Benefits of Invertebrate Conservation Efforts 5-3

**REFERENCES R-1**

**APPENDIX A SMALL BUSINESS ANALYSIS AND ENERGY IMPACTS ANALYSIS A-1**

A.1 SBREFA Analysis A-1

A.2 Potential Impacts to the Energy Industry A-7

**APPENDIX B THREE PERCENT DISCOUNT RATE EXHIBITS B-1**

**APPENDIX C UNDISCOUNTED IMPACTS BY ECONOMIC ACTIVITY C-1**

**APPENDIX D INFORMATION FROM THE U.S. FISH AND WILDLIFE SERVICE REGARDING POTENTIAL CHANGES IN CONSERVATION FOR NINE BEXAR COUNTY INVERTEBRATES FOLLOWING DESIGNATION OF CRITICAL HABITAT D-1**

**LIST OF ACRONYMS AND ABBREVIATIONS**

Capital Foresight	Capital Foresight Limited Partnership and Valencia Enclave, LLC
CWA	Clean Water Act
DOI	U.S. Department of the Interior
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
GCSNA	Government Canyon State Natural Area
HCP	Habitat Conservation Plan
HUD	Department of Housing and Urban Development
IEc	Industrial Economics, Incorporated
IFRUEA	Interim Feasibility Report and Integrated Environmental Assessment
invertebrates	nine Bexar County invertebrate species
KFA	kaust fauna area
KFR	karst fauna region
KMMP	Karst Management and Maintenance Plan
MSA	Metropolitan Statistical Area
NAICS	North America Industry Classification System
OMB	U.S. Office of Management and Budget
PAA	Preliminary Alternative Analysis
PID	Public Improvement District
RFA	Regulatory Flexibility Act
RMA	Risk Management Association
SBA	Small Business Administration
SBREFA	Small Business Regulatory Enforcement Fairness Act

SEP-HCP	Southern Edwards Plateau Habitat Conservation Plan
Service	U.S. Fish and Wildlife Service
SSA	Sole Source Aquifer
TAILS	Tracking and Integrated Logging System
TCMA	Texas Cave Management Association
TPWD	Texas Parks and Wildlife Department
TxDOT	Texas Department of Transportation
USACE	US Army Corps of Engineers
UTSA	University of Texas San Antonio

## EXECUTIVE SUMMARY

1. The purpose of this report is to evaluate the potential economic impacts associated with the designation of critical habitat for nine Bexar County invertebrate species - *Rhadine exilis* (ground beetle, no common name), *Rhadine infernalis* (ground beetle, no common name), Helotes mold beetle, Cokendolpher Cave harvestman, Robber Baron Cave meshweaver, Madla Cave meshweaver, Braken Bat Cave meshweaver, Government Canyon Bat Cave meshweaver, and Government Canyon Bat Cave spider (hereafter, “invertebrates”). This report was prepared by Industrial Economics, Incorporated (IEc), under contract to the U.S. Fish and Wildlife Service (Service).
2. The U.S. Fish and Wildlife Service (Service) listed the nine Bexar County invertebrates as endangered on December 26, 2000.<sup>1</sup> On August 27, 2002, the Service proposed that 25 units encompassing approximately 9,516 acres be designated as critical habitat for the species.<sup>2</sup> Approximately 1,063 acres in 22 units were ultimately designated as critical habitat for the species on April 8, 2003.<sup>3</sup> On January 14, 2009, the Center for Biological Diversity, Citizens Alliance for Smart Expansion, and Aquifer Guardians in Urban Areas filed a lawsuit against the Service, alleging that the Service “failed to use the best available science and incorrectly made exclusions according to sections 3(5)(A) and 4(b)(2) of the Act.”<sup>4</sup> In response, the Service published a revised proposed rule on February 22, 2011. This revised proposed critical habitat is the subject of this economic analysis.<sup>5</sup>
3. This analysis first describes existing plans and regulations that provide protection for the invertebrates and their habitat: for example, multiple land management plans, Habitat Conservation Plans (HCPs), and water quality regulations currently prescribe land management and conservation practices that protect the invertebrates within the proposed critical habitat area. These are “baseline” protections accorded the invertebrates even absent the designation of critical habitat.
4. The discussion of the regulatory baseline 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 not expected to occur absent the

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<sup>1</sup> 65 FR 81419.

<sup>2</sup> 67 FR 55063.

<sup>3</sup> 68 FR 17155.

<sup>4</sup> 76 FR 9881.

<sup>5</sup> 76 FR 9871.

designation of critical habitat for the invertebrates. This information 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.<sup>6</sup>

#### **OVERVIEW OF THE PROPOSED CRITICAL HABITAT**

5. The nine invertebrates are obligate troglobites, cave-dwelling species, of local distribution in karst terrain in north and northwest Bexar County, Texas. “Karst” is a terrain that is formed by the slow dissolution of calcium carbonate from limestone bedrock by mildly acidic groundwater. The primary constituent elements of critical habitat required by these species include: 1) karst-forming rock containing subterranean spaces with stable temperatures, extremely high humidity and suitable substrates; 2) surface water free of pollutants that flows directly into the cave entrances or water that flows through associated features (e.g., sinkholes and fractures known to connect to the karst features; and 3) a healthy surface community of native plants and animals living near the karst features to provide nutrients and protect the karst ecosystem from adverse effects.<sup>7</sup>
6. The Service has proposed 6,729 acres for critical habitat designation for the invertebrates. In addition, the Service is considering 179 acres for exclusion from critical habitat designation.<sup>8</sup> We refer to these 6,908 acres collectively as the “study area” for this analysis.<sup>9</sup> The study area is organized into 35 “units” as shown in Exhibit ES-1 and occurs within the greater San Antonio metropolitan area, primarily right outside of a major city highway surrounding the center of the City of San Antonio. Due to its proximity to the metropolitan area, some of the units (e.g., proposed Units 20 and 25) are already fully developed.<sup>10</sup> Other units, such as Units 1a through 1f, occur on relatively undisturbed State Natural Area land. As such, the quality of the proposed units varies significantly across the region.

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<sup>6</sup> 16 U.S.C. §1533(b)(2).

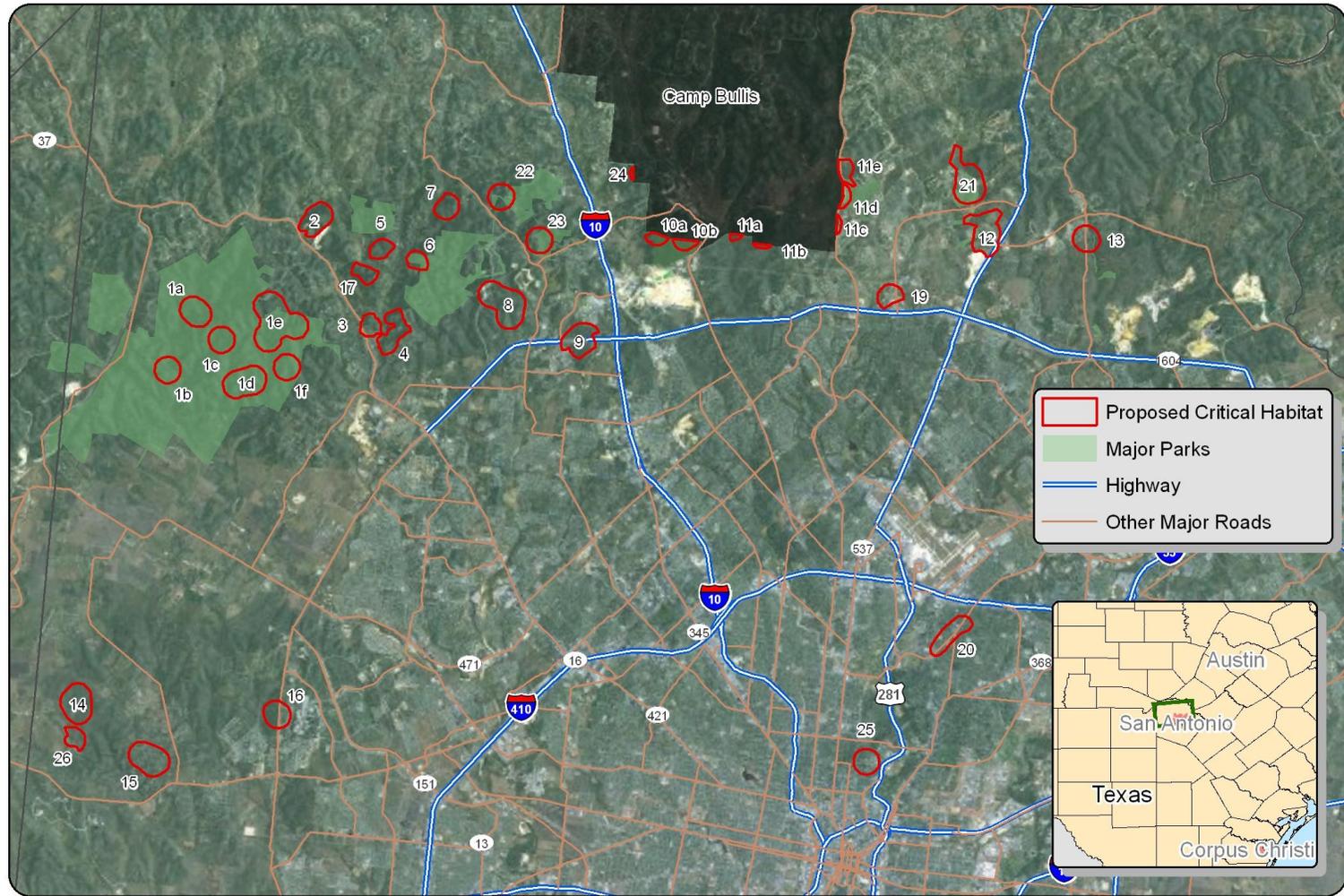
<sup>7</sup> 76 FR 9887.

<sup>8</sup> These areas being considered for exclusion under the “other relevant factor” provisions of section 4(b)(2) of the Act. These areas are preserved as part of the La Cantera Habitat Conservation Plan and “their value for conservation will be preserved for the foreseeable future by existing protective actions” (76 FR 9900 - 9901).

<sup>9</sup> Another 4,104 acres of invertebrate habitat are located on the Camp Bullis Training Reservation. The Service has, however, exempted these areas from critical habitat designation under section 4(a)(3) of the Act and they are not considered in this analysis.

<sup>10</sup> 76 FR 9896-9897.

EXHIBIT ES-1. OVERVIEW OF BEXAR COUNTY INVERTEBRATES PROPOSED CRITICAL HABITAT



Sources:  
 1. US Fish and Wildlife Service, Austin, TX, USA  
 2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA  
 3. City of San Antonio, TX

1:189,974

0 2.5 5 Miles

IEc



INDUSTRIAL ECONOMICS, INCORPORATED

7. The greatest share of the proposed critical habitat area, 58.7 percent, is owned by private landowners.<sup>11</sup> The State of Texas owns another 18.7 percent, including proposed units within the Government Canyon State Natural Area and University of Texas, San Antonio. The City of San Antonio and Federal government owns approximately 15.6 percent and 2.6 percent of the total critical habitat area, respectively. In addition, Bexar County owns approximately one acre of land within the study area. Land ownership is unknown for approximately 323 acres (4.7 percent of the total) of the proposed critical habitat. These areas include parcels where the land owner was not identified, or areas, such as roads and their right-of-ways, where parcel data do not exist.
8. Review of the proposed rule, consultation history, and existing conservation plans identified the following economic activities as potential threats to the invertebrates and their habitat within the boundaries of proposed critical habitat. We therefore focus this analysis of potential impacts of invertebrate conservation on these activities.
  - **Development.** The potential for future residential and commercial development constitutes a primary threat to invertebrate habitat. A healthy surface community of native plants and animals and surface water free of pollutants are primary constituent elements for the species that can be adversely affected by development activity.
  - **Transportation projects.** Road construction and improvement projects may negatively affect surface animal and plant communities and surface water quality within the habitat area.
  - **Utility projects.** Utility projects including pipeline, water system, and transmission line construction/maintenance may affect critical habitat by degrading the karst-forming rock where the species live.
  - **Species/habitat management.** The invertebrates and their habitat are currently afforded some level of protection under various management plans, including the La Cantera HCP, Government Canyon State Natural Area (GCSNA) Karst Management and Maintenance Plan, and Robber Baron Preserve Management Plan.

#### KEY FINDINGS

9. Baseline protection for the invertebrates addresses a broad range of habitat threats within a significant portion of the proposed critical habitat area. One Habitat Conservation Plan, one conservation easement, as well as various Federal, State, and local regulations currently provide protection for the invertebrates within the proposed critical habitat area. Eleven of the 35 proposed units are at least partially currently managed for invertebrate conservation, as described in Chapter 3 of this analysis. This translates to approximately 26.2 percent of the proposed critical habitat area.
10. Exhibit ES-2 summarizes total present value, incremental impacts of critical habitat designation for the invertebrate species. Per unit impacts are summarized in Exhibit ES-3. Present value impacts are broken out into two time periods: 1) the first 20 years post

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<sup>11</sup> 2010 Bexar County Appraisal District Parcel GIS Data. Received from the Service on April 29, 2011.

critical habitat designation (2012 through 2031); and 2) years 2032 through 2040. This presentation reflects the differing analytic time frames for the activities evaluated. The time frames for the analysis are based on the best available information regarding future activity. For transportation, utility and species and habitat management activities, data were not available to determine the location and frequency of activity beyond a 20 year time frame. For development activities, however, recent projects were available for the critical habitat activity through 2040 (a 29 year time frame).

**EXHIBIT ES-2. TOTAL PRESENT VALUE INCREMENTAL IMPACTS (DISCOUNTED AT SEVEN PERCENT)**

AREA	PRESENT VALUE 20-YEAR IMPACTS (2012-2031)		PRESENT VALUE IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
Areas Proposed for Designation	\$1,620,000	\$35,600,000	\$24,100	\$86,400
Areas Considered for Exclusion	\$7,790	\$7,790	\$0	\$0
Note: Values rounded to three significant digits.				

11. A key factor in the incremental analysis is that the types of conservation efforts requested by the Service during section 7 consultation regarding the invertebrates are not expected to change with critical habitat designation due to the fact that the Service uses “habitat as a proxy for the number of species taken because it is not possible to determine the population size at a particular location.”<sup>12</sup> In other words, the Service anticipates that conservation efforts recommended to avoid jeopardy to the species also effectively avoid the destruction or adverse modification of critical habitat. As a result, critical habitat designation will not change the *types* of invertebrate conservation efforts recommended by the Service.
12. In some geographic areas, however, potential adverse modification from land use threats may be an issue where jeopardy is not. Critical habitat is therefore expected to broaden the scope of projects to which the invertebrate conservation efforts are applied. Specifically, the designation of critical habitat will affect the number of projects subject to invertebrate conservation efforts in two ways:
  1. **Critical habitat designation results in recommendations for invertebrate conservation efforts for projects in Karst Zones 1 and 2 that may reduce habitat quality to “medium.”** As described in the listing rule, the Service notifies project proponents in Karst Zones 1 and 2 that they should be consulting for the invertebrate species even absent critical habitat designation.<sup>13</sup> Where the

<sup>12</sup> U.S. Fish and Wildlife Service to Industrial Economics, Inc. April 21, 2011. Incremental Effects Memorandum for the Economic Analysis of the Proposed Rule to Designate Critical habitat for the Nine Bexar County Invertebrates.

<sup>13</sup> 65 FR 81419.

proposed project reduces habitat quality from high or medium to low, jeopardy is likely to be an issue and therefore invertebrate conservation efforts will be recommended regardless of critical habitat designation. Where the proposed project reduces habitat quality from high to medium, however, jeopardy is unlikely to be an issue but the project has the potential to adversely modify critical habitat. Impacts of invertebrate conservation efforts on projects in Karst Zones 1 and 2 that reduce habitat quality from high to medium are incremental impacts of the critical habitat designation.

2. **Critical habitat designation generates consultations on projects within Karst Zone 3.** Projects within Karst Zone 3 have not historically undertaken section 7 consultation regarding impacts on the invertebrate species. Critical habitat designation within Karst Zone 3 likely provides new information to project-proponents regarding the need to consult with the Service. We therefore assume that projects with a Federal nexus within critical habitat units in Karst Zone 3 will consult with the Service and apply the recommended invertebrate conservation efforts. The administrative and project modification costs of these consultations are incremental impacts of the critical habitat designation.

13. Thus, the incremental impacts described in Exhibit ES-2 are either associated with projects occurring within Karst Zone 3 or with projects in Karst Zones 1 and 2 that may reduce habitat quality from high to medium. The broad range in impacts in areas proposed for designation is due to uncertainty regarding how future development projects may affect habitat quality in Karst Zones 1 and 2 (i.e., reducing it to medium versus low). Consequently, this analysis considers two scenarios:

- **Low-end Scenario:** All development projects in Karst Zones 1 and 2 are assumed to reduce quality to low and thus project modifications requested during consultation are considered baseline.
- **High-end Scenario:** All development projects in Karst Zones 1 and 2 are assumed to reduce quality to medium and thus project modifications requested during consultation are considered incremental.

In both scenarios all costs associated with consultations occurring in Karst Zone 3 are considered incremental.

#### Impacts to Development Activities

14. Impacts to development activities represent approximately 92 to 99 percent (low and high end scenarios, respectively) of the overall impacts to areas proposed for designation during the first 20 years. Between years 21 and 29, all incremental impacts are associated with development activities (as the timeframe for the analysis of impacts to other activities extends only through 20 years).
15. For section 7 consultation regarding the impact of development activities on the invertebrates and their habitat, the Service anticipates recommending “minimum

conservation criteria” as described in the following text box. These criteria are similar to the recovery criteria for the species as described in the Service’s draft Recovery Plan.<sup>14</sup>

#### 1. MINIMUM CONSERVATION CRITERIA

The minimum conservation criteria recommended for section 7 consultations on development projects are preservation of:

1. At least one high quality critical habitat unit per KFR;
2. At least three total high or medium quality critical habitat units per KFR; and
3. A minimum of six high or medium quality critical habitat units rangewide *per species*.

Source: U.S. Fish and Wildlife Service, March 2008. “Bexar County Karst Invertebrates Draft Recovery Plan.”

16. In units where development projects are proposed and the minimum conservation criteria have not been met for a species, the Service will recommend the project avoid invertebrate habitat.<sup>15</sup> In units where development projects are proposed and the minimum conservation criteria have been met, the analysis assumes that development projects will proceed with the following project modifications to avoid impacts to the species and/or critical habitat:
  - Create on-site and/or off-site preserves; and
  - Manage and monitor these preserves in perpetuity.<sup>16</sup>
17. Whether avoidance of the habitat area (where minimum conservation criteria have not been met) or implementation of project modifications (where minimum conservation criteria have been met) are baseline due to jeopardy concerns, or incremental due to designation of critical habitat depends on the location of the project, and the potential effect on habitat quality, as described above. That is, economic impacts of implementing invertebrate conservation efforts are incremental for projects occurring within Karst Zone 3, and for projects in Karst Zones 1 and 2 that may reduce habitat quality from high to medium.
18. The majority of the impacts to development activities are land value losses due to restrictions on future development (86 percent of low end development impacts, and 95 percent of high end development value impacts). The costs of implementing the minimum conservation criteria are decreased land values due to limiting the potential future use of the land for development. That is, land values are reduced by precluding the

<sup>14</sup> U.S. Fish and Wildlife Service, March 2008. “Bexar County Karst Invertebrates Draft Recovery Plan.”

<sup>15</sup> U.S. Fish and Wildlife Service to Industrial Economics, Inc. April 21, 2011. “Incremental Effects Memorandum for the Economic Analysis of the Proposed Rule to Designate Critical habitat for the Nine Bexar County Invertebrates.”

<sup>16</sup> U.S. Fish and Wildlife Service, Biological Opinion for La Cantera Development Company 10(a)(1)(B) Permit TE-044512-0 in San Antonio, Bexar County, Texas.

option for future development. Development impacts also include incremental administrative costs of consultation.

#### Impacts to Transportation Projects

19. The present value incremental impact to transportation activities in the areas proposed for designation range from \$13,400 in the low-end scenario to \$2,770,000 in the high-end scenario (assuming a seven percent discount rate). These figures represent an annualized impact of approximately \$1,270 to \$262,000.
20. These impacts are associated with consultation on three major transportation projects expected to occur within the next 20 years within the proposed critical habitat area. Project modifications requested for transportation projects include elevating the roadway, as well as other more minor engineering changes such as spread footings for bridges instead of footings that bore into the ground. In addition, project proponents will adhere to best management practices such as collecting and filtering run-off in critical habitat areas.<sup>17</sup>
21. All three forecast transportation projects occur within Karst Zones 1 and 2. One project, however, occurs in high quality habitat and therefore may experience incremental impacts of critical habitat designation (as described above, projects occurring in medium or low quality habitat will be subject to invertebrate conservation regardless of critical habitat designation due to jeopardy concerns). In the case that the one project in high quality habitat reduces the habitat quality to low, the Service would request project modifications to avoid jeopardy and associated costs would be baseline. In the low-end estimate of incremental impacts, we therefore assume that the project reduces habitat quality to low and therefore project modifications are requested to avoid jeopardy. If the project reduces habitat quality from high to medium, project modifications would be requested to avoid adverse modification of critical habitat and would be incremental impacts. As a high-end estimate, we therefore assume that the project reduces habitat quality to medium and costs associated with project modifications are incremental impacts. Incremental administrative costs of consultation for all three transportation projects are included in both the low and high end scenarios.

#### Impacts to Other Activities

22. No incremental impacts are expected to utility project and species and habitat management. No utility projects are currently planned within the proposed critical habitat area. Based on the frequency of past consultations and technical assistance efforts on utility projects (i.e., one to two efforts per year), however, it is likely that other projects will be proposed within critical habitat in the future. To date, however, Service review of these projects has primarily been technical assistance efforts that have determined the projects were not likely to affect the species or habitat. We therefore anticipate that any incremental impacts on unknown future utility projects would be minor administrative impacts.

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<sup>17</sup> Personal Communication with J. Krejca, Zara Environmental, June 3, 2011.

23. A number of species and habitat management plans exist for the invertebrates. These management plans provide baseline protection for the species and are discussed in detail in Chapter 3. Because management plans are developed to protect the species and their habitat, critical habitat designation is not expected to change the invertebrate conservation efforts prescribed through these plans. Therefore, no incremental impacts are anticipated.

#### Impacts by Proposed Critical Habitat Unit

24. Exhibit ES-3 describes incremental impacts of critical habitat designation by unit. In the first 20 years, we anticipate Units 26 and 4 will experience the greatest incremental impacts in our low-end impact scenario (40 percent and 18 percent, respectively). These two units include the greatest areas subject to development restrictions due to critical habitat designation in the low end scenario.
25. In the high-end scenario, Units 21 and 26 experience the greatest incremental impacts (34 percent and 18 percent, respectively). The land values in these units are among the greatest within critical habitat on a per acre basis, and a significant area within the units is forecast to experience development restrictions in our high end scenario.
26. More than half (19) of the proposed units are not expected to experience incremental impacts. For some units, this is because the proposed critical habitat area is subject to existing HCPs or land management plans that incorporate invertebrate conservation, as described in Chapter 3. For other units, this is because no future land use threats (e.g., development or transportation projects) are forecast to occur.
27. The present value impacts of critical habitat designation in areas proposed for designation over the first 20 years (2012 through 2031) range from \$1.62 million to \$35.6 million (\$153,000 to \$3,360,000 on an annualized basis), assuming a seven percent discount rate. Present value impacts of critical habitat designation from years 21 to 29 (2032 through 2040) range from \$24,100 to \$86,400 (\$3,700 to \$13,300 on an annualized basis), assuming a seven percent discount rate.
28. Incremental impacts in areas considered for exclusion from critical habitat designation are \$7,790 over 29 years (present value assuming a seven percent discount rate). These impacts are limited to incremental administrative costs of reinitiating a consultation regarding an existing HCP that covers the units being considered for exclusion.

**EXHIBIT ES-3. TOTAL ESTIMATED INCREMENTAL IMPACTS BY UNIT AND KARST ZONE (DISCOUNTED AT SEVEN PERCENT)**

UNIT	20-YEAR IMPACTS (2012-2031)		IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
<b>AREAS PROPOSED FOR DESIGNATION IN KARST ZONES 1 AND 2</b>				
1a	\$0	\$0	\$0	\$0
1b	\$0	\$0	\$0	\$0
1c	\$0	\$0	\$0	\$0
1d	\$0	\$0	\$0	\$0
1e	\$0	\$770,000	\$0	\$1,450
1f	\$0	\$0	\$0	\$0
2	\$0	\$3,140,000	\$0	\$5,810
3	\$0	\$0	\$0	\$0
4	\$0	\$0	\$0	\$0
5	\$0	\$0	\$0	\$0
6	\$0	\$1,310,000	\$0	\$2,610
7	\$0	\$0	\$0	\$0
8	\$0	\$5,590,000	\$0	\$17,100
9	\$3,010	\$3,010	\$0	\$0
10a	\$0	\$0	\$0	\$0
10b	\$0	\$0	\$0	\$0
11a	\$0	\$0	\$0	\$0
11b	\$0	\$0	\$0	\$0
11c	\$0	\$0	\$0	\$0
11d	\$0	\$0	\$0	\$0
11e	\$0	\$0	\$0	\$0
12	\$4,670	\$4,670	\$0	\$0
13	\$0	\$0	\$0	\$0
14	\$2,180	\$3,250,000	\$0	\$1,160
15	\$0	\$0	\$0	\$0
16	\$1,460	\$1,460	\$0	\$0
17	\$0	\$1,120,000	\$0	\$3,480
19	\$1,460	\$1,460	\$0	\$0
20	\$0	\$0	\$0	\$0
21	\$0	\$12,000,000	\$0	\$20,900

UNIT	20-YEAR IMPACTS (2012-2031)		IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
22	\$0	\$908,000	\$0	\$7,720
23	\$0	\$0	\$0	\$0
24	\$0	\$0	\$0	\$0
25	\$0	\$0	\$0	\$0
26	\$2,180	\$5,900,000	\$0	\$2,030
<i>Subtotal</i>	<i>\$15,000</i>	<i>\$34,000,000</i>	<i>\$0</i>	<i>\$62,300</i>
<i>Annualized</i>	<i>\$1,410</i>	<i>\$3,210,000</i>	<i>\$0</i>	<i>\$9,560</i>
<b>AREAS PROPOSED FOR DESIGNATION IN KARST ZONE 3</b>				
1a	\$0	\$0	\$0	\$0
1b	\$0	\$0	\$0	\$0
1c	\$0	\$0	\$0	\$0
1d	\$0	\$0	\$0	\$0
1e	\$0	\$0	\$0	\$0
1f	\$0	\$0	\$0	\$0
2	\$202,000	\$202,000	\$2,320	\$2,320
3	\$144,000	\$144,000	\$2,320	\$2,320
4	\$284,000	\$284,000	\$3,480	\$3,480
5	\$12,100	\$12,100	\$0	\$0
6	\$95,300	\$95,300	\$5,810	\$5,810
7	\$0	\$0	\$0	\$0
8	\$0	\$0	\$0	\$0
9	\$0	\$0	\$0	\$0
10a	\$0	\$0	\$0	\$0
10b	\$0	\$0	\$0	\$0
11a	\$0	\$0	\$0	\$0
11b	\$0	\$0	\$0	\$0
11c	\$0	\$0	\$0	\$0
11d	\$0	\$0	\$0	\$0
11e	\$0	\$0	\$0	\$0
12	\$0	\$0	\$0	\$0
13	\$0	\$0	\$0	\$0
14	\$0	\$0	\$0	\$0
15	\$0	\$0	\$0	\$0

UNIT	20-YEAR IMPACTS (2012-2031)		IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
16	\$0	\$0	\$0	\$0
17	\$119,000	\$119,000	\$2,320	\$2,320
19	\$0	\$0	\$0	\$0
20	\$0	\$0	\$0	\$0
21	\$0	\$0	\$0	\$0
22	\$99,500	\$99,500	\$6,700	\$6,700
23	\$0	\$0	\$0	\$0
24	\$0	\$0	\$0	\$0
25	\$0	\$0	\$0	\$0
26	\$645,000	\$645,000	\$1,160	\$1,160
<i>Subtotal</i>	<i>\$1,600,000</i>	<i>\$1,600,000</i>	<i>\$24,100</i>	<i>\$24,100</i>
<i>Annualized</i>	<i>\$151,000</i>	<i>\$151,000</i>	<i>\$3,700</i>	<i>\$3,700</i>
<b>TOTAL</b>	<b>\$1,620,000</b>	<b>\$35,600,000</b>	<b>\$24,100</b>	<b>\$86,400</b>
<b>ANNUALIZED</b>	<b>\$153,000</b>	<b>\$3,360,000</b>	<b>\$3,700</b>	<b>\$13,300</b>
<b>AREAS CONSIDERED FOR EXCLUSION</b>				
1e	\$1,560	\$1,560	\$0	\$0
3	\$1,560	\$1,560	\$0	\$0
6	\$1,560	\$1,560	\$0	\$0
8	\$1,560	\$1,560	\$0	\$0
17	\$1,560	\$1,560	\$0	\$0
<b>TOTAL</b>	<b>\$7,790</b>	<b>\$7,790</b>	<b>\$0</b>	<b>\$0</b>
<b>ANNUALIZED</b>	<b>\$735</b>	<b>\$735</b>	<b>\$0</b>	<b>\$0</b>

#### Key Uncertainties

29. The economic costs presented in this Exhibit ES-3 are based on a series of assumptions that may affect the impact estimates. Exhibit ES-4 presents the key assumptions applied and information on the extent to which they may lead to under- or over-estimates of the potential incremental impacts of the proposed revised critical habitat designation.

**EXHIBIT ES-4. KEY UNCERTAINTIES ASSOCIATED WITH THE ESTIMATED INCREMENTAL IMPACTS OF  
CRITICAL HABITAT DESIGNATION FOR THE INVERTEBRATES**

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
We apply the current assessed land value of vacant, developable land as a proxy for the option value of future development on the land.	Likely leads to an <b>overestimate</b> of incremental impacts	<b>Potentially major.</b> The option value for future development, which is what is lost when development is precluded on a parcel, is unknown for these lands. The option value for development is most likely some fraction of the total market value of the land. For parcels with high development pressure and little opportunity for other land use, the option value for development is likely the majority of the total market land value. For parcels for which other land uses may substitute for development, the option value for development is a smaller fraction of the total value. Absent more specific information on the future uses of these undeveloped parcels, we assume the option for future development is the first and best use of these lands and therefore accounts for the majority of the market value.
All currently undeveloped land parcels within proposed critical habitat that are designated for potential future development will be developed within the next 29 years.	Likely leads to an <b>overestimate</b> of incremental impacts	<b>Potentially major.</b> Two key issues with this assumption are: 1) some units may not be developed in the next 29 years; and 2) the type of development occurring may avoid potential effects on the invertebrates and their habitat. A recent development projection by Loomis Partners, Inc. as part of a proposed HCP estimated that 78 percent of available lands in this region of Bexar County would be developed within the timeframe of the analysis. We therefore anticipate that, while this assumption may overstate impacts, there is the potential for close to full development of these areas.
All future development projects within the proposed critical habitat area will be subject to a Federal nexus and therefore section 7 consultation regarding the invertebrates.	Likely leads to an <b>overestimate</b> of incremental impacts	<b>Potentially major.</b> Smaller development projects, such as single residential development, may not be subject to the Federal permitting or funding opportunities described in Section 4.2.1. In these cases, consultation would not occur and development may proceed absent invertebrate conservation.
Assessed values used to estimate land value losses are representative of market values.	<b>Unknown.</b> May overestimate or underestimate incremental impacts.	<b>Probably minor.</b> Assessed values are likely to be a good indicator of fair market value, but could differ from market value depending on when a parcel was last assessed and real estate market conditions in the area.
Absent information on the effect of future development projects on habitat quality, we estimate a range of incremental impacts in Karst Zones 1 and 2.	N/A	<b>Probably minor.</b> Because some development projects will reduce habitat quality to medium and some to low, total impacts are within the range described, but unlikely to be either at the extreme low or high end of the range.

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
In areas where the minimum conservation criteria are met, the Service will request that preserves be created at a ratio of 0.18:1.	<b>Unknown.</b> May overestimate or underestimate incremental impacts.	<b>Probably minor.</b> The minimum conservation criteria have only been met in one unit (Unit 22) affected by the proposed designation. This assumption impacts project modification costs in this unit.
Timing of development will effect which critical habitat units are subject to recommendations to avoid development.	<b>Unknown.</b> May overestimate or underestimate incremental impacts.	<b>Probably minor.</b> The minimum conservation criteria prescribe only the number of high and medium quality caves per KFR that should be preserved. They do not define which high and medium quality caves should be preserved. Thus, there is uncertainty regarding which units will be developed and which preserved within each KFR. To the extent that more valuable land parcels are subject to development restrictions than assumed in this analysis, impacts may be underestimated. To the extent that less valuable land parcels are subject to development restrictions, impacts are overestimated. As the number of high and medium quality caves within each KFR are limited, however, we were not required to make assumptions regarding where development would be precluded in most regions. The UTSA KFR is the only KFR where assumptions were made. List the KFRs where this is an issue.
Development projects are spread evenly over 20-year period of this analysis.	<b>Unknown.</b> May overestimate or underestimate incremental impacts.	<b>Minor.</b> This assumption effects only the estimated administrative consultation costs. As described in Section 4.2, land value losses occur upon designation of critical habitat and are not sensitive to the timing of development. Because the consultation costs are minor compared to the land value losses, this assumption does not materially reflect the results of the analysis.
One consultation will occur per developable parcel.	<b>Unknown.</b> May overestimate or underestimate incremental impacts.	<b>Minor.</b> This assumption effects only the estimated administrative consultation costs. As described in Section 4.2, land value losses are estimated on a per acre basis. Because the consultation costs are minor compared to the land value losses, this assumption does not materially reflect the results of the analysis.

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
Incremental impacts on any future utility projects within the critical habitat area will likely be minor and administrative.	May <b>underestimate</b> incremental impacts	<b>Minor.</b> The frequency and location of future utility projects within the proposed critical habitat area are unknown. To date, however, Service review of these projects have primarily been low level technical assistance efforts and have not resulted in recommendations for invertebrate conservation. We therefore expect that any incremental impacts to these activities would be minor and administrative. To the extent that future utility projects are more disruptive to invertebrate habitat than they have been in the past, we underestimate potential incremental impacts.

### ORGANIZATION OF THIS REPORT

30. This report is organized into five chapters. Chapter 1 provides background on the proposed critical habitat rule. Chapter 2 discusses the framework employed in the analysis. Chapter 3 describes the baseline protections currently afforded the invertebrates and their habitat, while Chapter 4 discusses the potential incremental economic impacts of critical habitat designation for the invertebrates. Chapter 5 provides a brief discussion of potential benefits of the designation. Finally, four appendices to this report highlight the distributional impacts, summarize results at a three percent discount rate and undiscounted impacts, and provide information from the Service related to the potential for changes in conservation following critical habitat designation.

## CHAPTER 1 | INTRODUCTION AND BACKGROUND

### 1.1 INTRODUCTION

1. This chapter provides an overview of the proposed critical habitat for the nine Bexar County invertebrate species - *Rhadine exilis* (ground beetle, no common name), *Rhadine infernalis* (ground beetle, no common name), Helotes mold beetle, Cokendolpher Cave harvestman, Robber Baron Cave meshweaver, Madla Cave meshweaver, Braken Bat Cave meshweaver, Government Canyon Bat Cave meshweaver, and Government Canyon Bat Cave spider (hereafter, “invertebrates”). It includes a summary of past legal actions that relate to the current proposal, a description of the area proposed for designation, and a discussion of threats to the proposed critical habitat. The chapter also describes the differences between this economic analysis of critical habitat designation (“2011 Economic Analysis”) and the previous economic analysis (“2003 Economic Analysis”), which was developed concurrent with the 2003 critical habitat designation for these species. The information contained in this chapter provides context for the analysis. All official definitions and proposed critical habitat boundaries are provided in the Proposed Rule.<sup>1</sup>

#### 1.1.1 PREVIOUS FEDERAL ACTIONS

2. The U.S. Fish and Wildlife Service (Service) listed the nine Bexar County invertebrates as endangered on December 26, 2000.<sup>2</sup> On August 27, 2002, the Service proposed that 25 units encompassing approximately 9,516 acres be designated as critical habitat for the species.<sup>3</sup> Approximately 1,063 acres in 22 units were ultimately designated as critical habitat for the species on April 8, 2003.<sup>4</sup>
3. On January 14, 2009, the Center for Biological Diversity, Citizens Alliance for Smart Expansion, and Aquifer Guardians in Urban Areas filed a lawsuit against the Service, alleging that the Service “failed to use the best available science and incorrectly made exclusions according to sections 3(5)(A) and 4(b)(2) of the Act.”<sup>5</sup> In response, the

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<sup>1</sup> 76 FR 9871.

<sup>2</sup> 65 FR 81419.

<sup>3</sup> 67 FR 55063.

<sup>4</sup> 68 FR 17155.

<sup>5</sup> 76 FR 9881.

Service published a revised proposed rule on February 22, 2011. This revised proposed critical habitat is the subject of this economic analysis.<sup>6</sup>

#### 1.1.2 PROPOSED REVISED CRITICAL HABITAT DESIGNATION

4. The Service proposes to designate 6,906 acres across 35 units as critical habitat for the invertebrates, of which 179 acres is considered for exclusion.<sup>7</sup> The revised proposed critical habitat is smaller than the area originally proposed for designation in 2002, but larger than the area ultimately designated in the 2003 final rule.<sup>8</sup> All units are known to be currently occupied by one or more of the nine invertebrates. The units contain a mix of private, State, county, city and Federal land. Approximately 179 acres of proposed critical habitat owned by the La Cantera Development Company across five units are being considered for exclusion under section 4(b)(2) of the Act.<sup>9</sup> Approximately 4,104 acres of invertebrate habitat are located on the Camp Bullis Training Reservation and are exempt from critical habitat designation under section 4(a)(3) of the Act.<sup>10</sup> The areas on Camp Bullis are therefore not considered in this economic analysis.
5. The “study area” for this analysis is defined as all lands proposed for critical habitat designation and considered for exclusion. Exhibit 1-1 provides a breakdown of proposed critical habitat land ownership and acreage by unit. The largest share of land, 4,056 acres (approximately 58.7 percent of total), is owned by private landowners.<sup>11</sup> The State of Texas owns 1,271 acres (18.7 percent of total) of the proposed critical habitat, primarily located within the six units that make up Government Canyon State Natural Area and one unit that includes University of Texas-San Antonio property. The City of San Antonio owns 1,079 acres (15.6 percent of total) spread across thirteen units. The Federal government owns approximately 176 acres (2.6 percent of total) in three units and Bexar County owns approximately one acre of land spread across two units. Land ownership is unknown in approximately 323 acres (4.7 percent of the total) of the proposed critical habitat. These areas include parcels where the land owner was not identified, or areas, such as roads and their right-of-ways, where parcel data do not exist. The 179 acres (2.6

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<sup>6</sup> 76 FR 9871.

<sup>7</sup> 76 FR 9887.

<sup>8</sup> The 6,906 acres across 35 units that the Service is now proposing for critical habitat designation compares to 9,516 acres across 25 units originally proposed for designation in 2002. The primary difference between the two proposals is that the 2011 proposed rule exempts 4,104 acres within the Camp Bullis Training Reservation under section 4(a)(3) of the Act. The 2003 Final Rule ultimately designated 1,063 acres across 22 units. This 2011 proposed designation expands and consolidates the 22 units from the 2003 final rule and adds seventeen additional units.

<sup>9</sup> These areas being considered for exclusion under the “other relevant factor” provisions of section 4(b)(2) of the Act. These areas are preserved as part of the La Cantera Habitat Conservation Plan and “their value for conservation will be preserved for the foreseeable future by existing protective actions” (76 FR 9900 - 9901).

<sup>10</sup> 76 FR 9899.

<sup>11</sup> 2010 Bexar County Appraisal District Parcel GIS Data. Received from the Service on April 29, 2011.

percent of total) of proposed critical habitat considered for exclusion are broken out separately in Exhibit 1-1.

EXHIBIT 1-1. LANDOWNERSHIP WITHIN PROPOSED CRITICAL HABITAT BY SUBUNIT

CRITICAL HABITAT UNIT	FEDERAL (ACRES)	STATE OF TEXAS (ACRES)	CITY OF SAN ANTONIO (ACRES)	PRIVATE (ACRES)	UNKNOWN * (ACRES)	TOTAL ACREAGE
1a		238				238
1b		178				178
1c		178				178
1d		343	6			349
1e		36	462	192		690
1f		178				178
2				250	2	252
3				92	9	100
4			<1	241	14	255
5				116	1	117
6			73	27	1	101
7				141	17	158
8			154	222	24	401
9		114		132	40	286
10a	37			30		67
10b	66					66
11a		1		19		21
11b		<1		15		16
11c				17	5	21
11d		4	25	17	7	53
11e			27**	62	13	102
12	73		29	242	28	371
13			10**	161	16	187
14				330		330
15				310	30	340
16				162	32	194
17				110		110
19				133	9	142
20			<1	203	43	247
21			139	256	<1	396

CRITICAL HABITAT UNIT	FEDERAL (ACRES)	STATE OF TEXAS (ACRES)	CITY OF SAN ANTONIO (ACRES)	PRIVATE (ACRES)	UNKNOWN * (ACRES)	TOTAL ACREAGE
22			58	120		178
23			93	78	7	178
24				11		11
25			4	148	25	177
26				117		117
<b>Subtotal</b>	<b>176 (2.6%)</b>	<b>1,271 (18.4%)</b>	<b>1,080** (15.6%)</b>	<b>3,877 (56.1%)</b>	<b>323 (4.7%)</b>	<b>6,729 (97.4%)</b>
<b>LANDS CONSIDERED FOR EXCLUSION</b>						
1e				75		75
3				25		25
6				4		4
8				70		70
17				5		5
<b>Subtotal</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>179 (2.6%)</b>	<b>0</b>	<b>179 (2.6%)</b>
<b>Total</b>	<b>176 (2.6%)</b>	<b>1,271 (18.4%)</b>	<b>1,080** (15.6%)</b>	<b>4,056 (58.7%)</b>	<b>323 (4.7%)</b>	<b>6,908</b>
<p>Sources: Acreage estimates are derived from the proposed critical habitat GIS shape files provided by the Service on February 26, 2011 and 2010 Bexar County parcel data published by the Bexar County Appraisal District and provided by the Service on April 29, 2011.</p> <p>Notes: Acreages may not sum due to rounding, and may differ slightly from those provided in the proposed rule.</p> <p>* Unknown ownership areas include areas where there was no parcel data coverage (typically roads and their right-of-ways), and properties where the landowner is unknown.</p> <p>** Includes less than or equal to one acre of land owned by Bexar County, Texas</p>						

6. Exhibit 1-2 provides an overview map of the study area. The majority of the proposed critical habitat is located on the suburban edge of the rapidly expanding San Antonio Metropolitan Area. Of the 35 critical habitat units, 25 occur at least partially within San Antonio city limits. The remaining ten units are located primarily within unincorporated parts of Bexar County, although portions of Units 3, 4, 5, 6 and 17 fall within the small incorporated communities of Helotes and Grey Forest. The entire area has been subject to significant development pressure over the past few decades, and further development is expected.<sup>12, 13</sup> In the case of a few units, such as Units 20 and 25, the proposed critical habitat area is already fully developed.<sup>14</sup> Regional development is primarily characterized by residential subdivisions, although commercial development is also anticipated.

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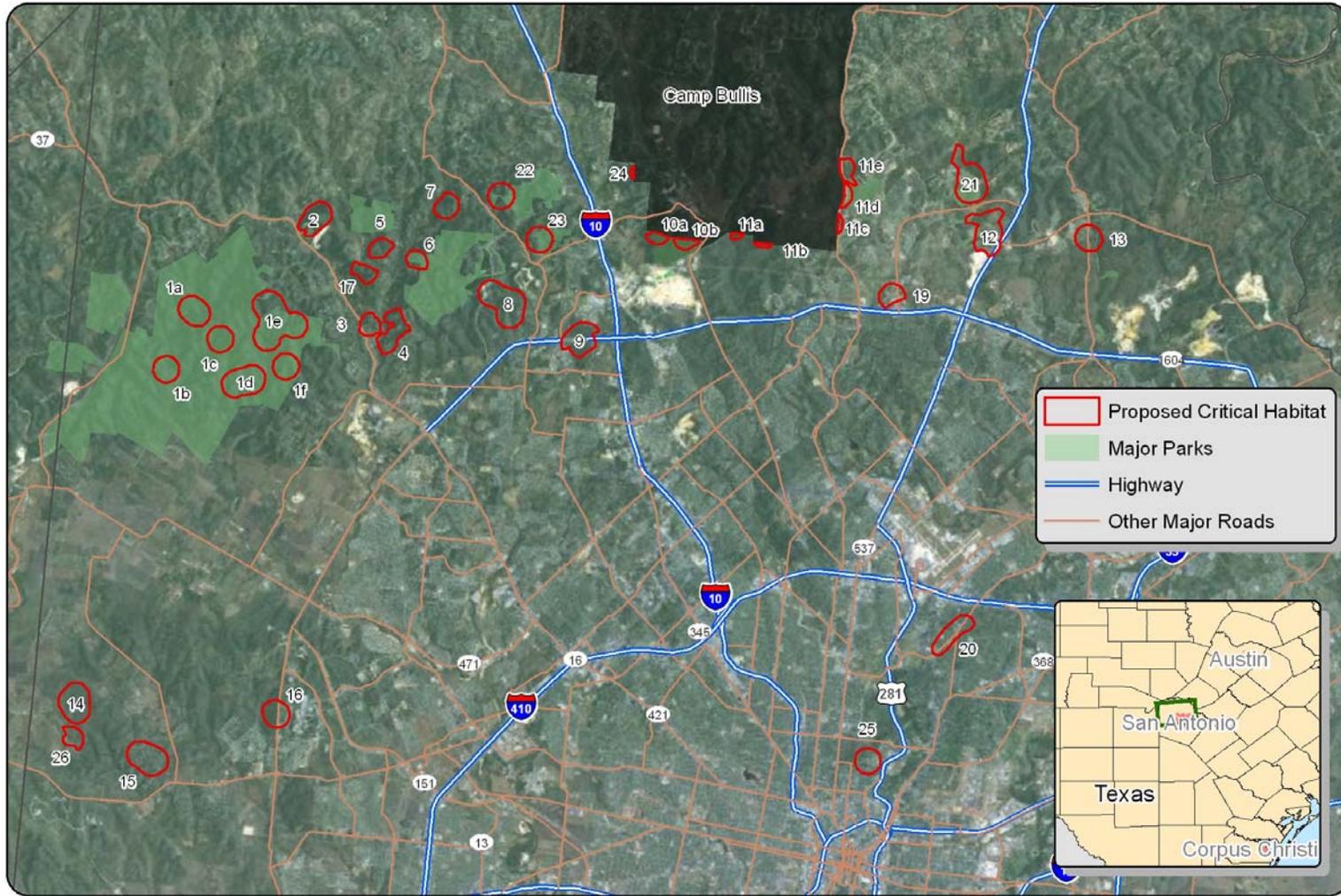
<sup>12</sup> Personal Communication with Bexar County, Texas. April 26, 2011.

<sup>13</sup> County of Bexar, Infrastructure Services Department. April 1, 2011. Draft Southern Edwards Plateau Habitat Conservation Plan. Accessed by <http://www.sephcp.com/documents.html> on April 14, 2011. p. 3, 18.

<sup>14</sup> 76 FR 9896-9897.

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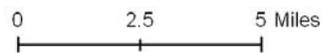
EXHIBIT 1-2. OVERVIEW OF BEXAR COUNTY INVERTEBRATES PROPOSED CRITICAL HABITAT



Sources:

1. US Fish and Wildlife Service, Austin, TX, USA
2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA
3. City of San Antonio, TX

1:189,974



IEc

INDUSTRIAL ECONOMICS, INCORPORATED



## 1.2 ECONOMIC ACTIVITIES CONSIDERED IN THIS ANALYSIS

7. The proposed rule, consultation history, and the Bexar County Karst Invertebrates Draft Recovery Plan identify the following activities as potential habitat threats to the invertebrates.<sup>15,16</sup> This analysis focuses on quantifying the effect of critical habitat designation on these activities.
- (1) **Development.** The potential for future residential and commercial development constitutes a primary threat to invertebrate habitat. A healthy surface community of native plants and animals and surface water free of pollutants are primary constituent elements for the species that can be adversely affected by development. Section 3.8.1 and Section 4.2 of this analysis consider the potential effects of critical habitat on regional development activities.
  - (2) **Transportation projects.** Road construction and improvement projects may negatively affect surface animal and plant communities and surface water quality within the habitat area. Multiple past consultations for State and Federal highway projects have considered impacts on the invertebrates.<sup>17</sup> Section 3.8.2 and Section 4.3 of this analysis consider the potential effects of critical habitat on transportation projects.
  - (3) **Utility projects.** The Service has conducted section 7 consultations to address impacts to the Bexar County invertebrates for multiple utility projects including pipeline, water system, and transmission line construction/maintenance.<sup>18</sup> These projects may affect critical habitat by degrading the karst-forming rock where the species live. Section 3.8.3 of this analysis considers the potential effects of critical habitat on utility projects.
  - (4) **Species/habitat management.** The invertebrates and their habitat are currently afforded some level of protection under various management plans, including the La Cantera HCP, GCSNA Karst Management and Maintenance Plan, and Robber Baron Preserve Management Plan. Sections 3.1, 3.2, 3.3, and 3.5 of this analysis consider the potential effects of critical habitat on these species and habitat management activities.
8. The Proposed Rule also identifies recreation as a threat to the invertebrates and their habitat. Specifically, hiking along trails has been identified as a threat within Eisenhower Park (Units 10a and 10b) and on other city-owned lands purchased with Parks Development and Expansion Venue Project funds.<sup>19</sup> Recreational access to the cave

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<sup>15</sup> Email Communication with U.S. Fish and Wildlife Service Biologist, February 7, 2011. Tracking and Integrated Logging System (TAILS) database.

<sup>16</sup> U.S. Fish and Wildlife Service, March 2008. "Bexar County Karst Invertebrates Draft Recovery Plan."

<sup>17</sup> U.S. Fish and Wildlife Service Bexar County Invertebrates consultation record, including 21450-2007-F-0144 Federal Highway Administration; and 21450-2009-I-0173 Texas Department of Transportation.

<sup>18</sup> U.S. Fish and Wildlife Service Bexar County Invertebrates consultation record, including: 2-15-1996-0090 City Public Service of San Antonio; and 2-15-04-I-0109 W.F. Castella & Associates, Inc.

<sup>19</sup> Personal Communication with the U.S. Fish and Wildlife Service, April 27, 2011.

managed by the Texas Cave Management Association (Unit 20) has also been identified as a threat.<sup>20</sup> While recreation activities constitute a threat to the invertebrates, the Service has not consulted on recreation activities in the past, and a Federal nexus triggering consultation for these activities is unlikely.<sup>21</sup> Therefore, we do not anticipate critical habitat designation for the invertebrates to affect recreation activities.

9. Similarly, the Proposed Rule identifies quarry operations as a threat to the species.<sup>22</sup> Existing quarries located in or adjacent to invertebrate habitat can adversely impact surface plant and animal communities, surface water quality, and the karst-forming rock which constitute all three of the primary constituent elements for the species. The Service lists quarry management as a threat in Units 2, 12, 13, 16 and 21, but no consultations have occurred for quarry operations in the past.<sup>23,24</sup> Critical habitat is unlikely to result in new consultations on existing quarry operations, and no new quarry construction is forecast. Therefore, we do not anticipate that critical habitat designation will affect quarry operations.
10. Chapter 3 of this analysis discusses the ongoing management of species and habitat threats within the study area. Approximately 1,809 acres (26.2 percent of the total proposed critical habitat) fall within State and private lands that are already managed for conservation through formal management plans, HCPs, and conservation easements. Furthermore, additional units include city-owned park lands that are also managed for overall biological health, and are therefore unlikely to support activities that threaten the invertebrates or their habitat. Land use activities that do occur within these proposed critical habitat areas are managed such that they incorporate a significant level of protection for the invertebrates even absent critical habitat designation. We expect these ongoing management activities will continue in the foreseeable future regardless of the critical habitat designation. The specific species and habitat conservation efforts associated with these baseline protections are described in Chapter 3.
11. Chapter 4 of this analysis evaluates potential changes in conservation for the invertebrates following critical habitat designation. Thus, Chapter 4 focuses on the incremental impacts of critical habitat designation.

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<sup>20</sup> 76 FR 9872.

<sup>21</sup> A Federal nexus may occur if the City of San Antonio Parks and Recreation Department receives Federal funding for trail work. At this time the Service is unaware of any Federal funding that has been allotted or received (Personal Communication with the U.S. Fish and Wildlife Service, April 27, 2011).

<sup>22</sup> 76 FR 9872.

<sup>23</sup> *Ibid.*

<sup>24</sup> Email Communication with U.S. Fish and Wildlife Service Biologist, February 7, 2011. Tracking and Integrated Logging System (TAILS) database.

**1.3 ORGANIZATION OF THE REPORT**

12. The remainder of this report proceeds through four additional chapters. Chapter 2 discusses the framework employed in the analysis. Chapters 3 and 4 describe the baseline protections currently afforded the invertebrates and their habitat, and the incremental impacts of critical habitat designation for the invertebrates, respectively. Chapter 5 discusses potential benefits of critical habitat designation. In addition, the report includes four appendices: Appendix A considers potential impacts on small entities and the energy industry; Appendix B provides information on the sensitivity of the economic impact estimates to alternative discount rates; Appendix C provides undiscounted impacts by economic activity; and Appendix D provides the Service's incremental effects memorandum to IEC as well as follow-on communication between the Service and economic analysts.

- **Chapter 2** – Framework for the Analysis
- **Chapter 3** – Baseline Conservation for Nine Bexar County Invertebrates within Proposed Critical Habitat
- **Chapter 4** – Incremental Impacts of Critical Habitat Designation for Nine Bexar County Invertebrates
- **Chapter 5** – Potential Benefits of Critical Habitat Designation for Nine Bexar County Invertebrates
- **Appendix A** – Small Business and Energy Impacts Analyses
- **Appendix B** – Sensitivity of Results to Discount Rate Assumption
- **Appendix C** – Undiscounted Impacts by Economic Activity
- **Appendix D** – Information from the U.S. Fish and Wildlife Service Regarding Potential Changes in Conservation for Nine Bexar County Invertebrates Following Designation of Critical Habitat

## CHAPTER 2 | FRAMEWORK FOR THE ANALYSIS

13. The purpose of this report is to estimate the economic impact of actions taken to protect the Bexar invertebrates 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 invertebrates absent critical habitat designation; for example, under the Federal listing 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 invertebrates.
14. According to section 4(b)(2) of the Endangered Species Act (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.**<sup>25</sup> 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).<sup>26</sup>
15. This chapter describes the framework for this analysis. The chapter first discusses the differences in the analytic framework between the 2003 and 2011 Economic Analyses. We then provide background on the case law that led to the selection of the framework applied in this report. Next, the chapter describes 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

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<sup>25</sup> 16 U.S.C. §1533(b)(2).

<sup>26</sup> 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.

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.

**2.1 DIFFERENCES BETWEEN THE 2003 AND 2011 ECONOMIC ANALYSES**

16. This analysis (2011 Economic Analysis) applies a fundamentally different analytical approach from that applied in the 2003 Economic Analysis.<sup>27</sup> Exhibit 2-1 summarizes how the 2011 Economic Analysis reflects new framework and policy decisions that the Service has adopted since the 2003 Economic Analysis.
17. The 2011 Economic Analysis considers and estimates the impacts of the rule as currently proposed and as if the existing 2003 critical habitat designation does not exist. In other words, this analysis considers and estimates the impacts associated with designating areas as critical habitat versus not designating these areas. This analysis is intended 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. These particular areas include those already designated as critical habitat under the 2003 designation and subject to re-examination by the Secretary. As a result, costs incurred as a result of the 2003 designation are not separately documented in this analysis.

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<sup>27</sup> Industrial Economics, Inc., "Economic Analysis of Critical Habitat Designation for Nine Bexar County, Texas Invertebrate Species," prepared for the U.S. Fish and Wildlife Service, March 14, 2003.

## EXHIBIT 2-1. DIFFERENCES BETWEEN THE 2003 AND 2011 ECONOMIC ANALYSES

CHANGE IN ANALYTICAL APPROACH
<ul style="list-style-type: none"> <li>• The 2011 Economic Analysis distinguishes the <i>incremental</i> costs of designation from baseline costs whereas the 2003 Economic Analysis evaluated all invertebrate conservation costs collectively. That is, the impacts estimated in the 2003 Economic Analysis captured costs of invertebrate conservation regardless of whether they resulted specifically from critical habitat designation. This 2011 Economic Analysis instead characterizes all potential future invertebrate conservation as either baseline (i.e., expected to occur absent the designation of critical habitat) or incremental (i.e., expected to occur as a result of critical habitat designation). This analysis qualitatively discusses baseline invertebrate conservation. The quantitative analysis focuses on incremental impacts of the designation. The Service provided guidance on distinguishing the incremental costs of the designation, as described later in this chapter.</li> <li>• As described in Chapters 3 and 4 of this report, the Service has adopted a new conservation and recovery strategy for the invertebrates since the 2003 critical habitat designation. As a result, the conservation efforts discussed and impacts quantified within the 2011 Economic Analysis differ from the 2003 Economic Analysis.</li> <li>• The 2011 Economic Analysis reflects a change in geographic scope. The revised proposed critical habitat designation is smaller than that proposed in 2002 (6,906 acres currently proposed versus 9,516 acres proposed in 2002). This is in large part due to the exemption of 4,104 acres within the Camp Bullis Training Reservation under section 4(a)(3) of the Act. Although the overall area of the proposed revised designation is smaller than the 2002 proposed critical habitat area, a number of the proposed revised units are larger and several new units are included.</li> <li>• The 2003 Economic Analysis considered activities that were likely to occur within a ten-year time horizon. This 2011 Economic Analysis considers activities that are "reasonably foreseeable" over a 29-year time horizon.</li> </ul>

## 2.2 BACKGROUND

18. 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."<sup>28</sup> 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 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

<sup>28</sup> OMB, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a004/a-4.pdf>.

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.

19. In 2001, the U.S. Tenth Circuit Court of Appeals 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.<sup>29</sup> 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].”<sup>30</sup>

20. 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.<sup>31</sup> 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 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

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<sup>29</sup> *New Mexico Cattle Growers Assn v. United States Fish and Wildlife Service*, 248 F.3d 1277 (10th Cir. 2001).

<sup>30</sup> *Ibid.*

<sup>31</sup> *Cape Hatteras Access Preservation Alliance v. Department of Interior*, 344 F. Supp. 2d 108 (D.D.C.); *Center for Biological Diversity v. United States Bureau of Land Management*, 422 F. Supp. 2d 1115 (N.D. Cal. 2006).

designation, the world with the designation must be compared to the world without it.”<sup>32</sup>

21. More recently, in 2010, the U.S. Ninth Circuit Court of Appeals came to similar conclusions during its review of critical habitat designations for the Mexican spotted owl and 15 vernal pool species.<sup>33</sup> Plaintiffs in both cases requested review by the Supreme Court, which declined to hear the cases in 2011.
22. 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 accorded the invertebrates. The baseline for this analysis is the state of regulation, absent designation of critical habitat that provides protection to the species under the Act, as well as under other Federal, State and local laws and conservation plans. The baseline includes sections 7, 9, and 10 of the Act 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 invertebrates is currently implemented across the proposed designation in order to provide context for the incremental analysis (Chapter 3).
  - The "**with critical habitat**" scenario describes and monetizes the **incremental** impacts due specifically to the designation of critical habitat for the species. The incremental invertebrate conservation efforts and associated impacts are those not expected to occur absent the designation of critical habitat. This report focuses on the incremental analysis (Chapter 4).
23. 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.<sup>34</sup> Specifically, in *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, 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

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<sup>32</sup> *Center for Biological Diversity et al, Plaintiffs, v. United States Bureau of Land Management et. al, Defendants and American Sand Association, et al, Defendant Intervenors*. Order re: Cross Motions for Summary Judgment, Case 3:03-cv-02509 Document 174 Filed 03/14/2006, pages 44-45.

<sup>33</sup> *Home Builders Association of Northern California v. United States Fish and Wildlife Service*, 616 F.3d 983 (9<sup>th</sup> 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 (9<sup>th</sup> Cir. 2010), cert. denied, 179 L. Ed. 2d 300, 2011 U.S. Lexis 1362, 79 U.S.L.W. 3475 (2011).

<sup>34</sup> 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.

or adversely modify critical habitat.<sup>35</sup> Under the statutory provisions of the Act, the Service determines destruction or adverse 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.

24. A detailed description of the methodology used to define baseline and incremental impacts is provided in Section 2.4.

### 2.3 CATEGORIES OF POTENTIAL ECONOMIC EFFECTS OF SPECIES CONSERVATION

25. This economic analysis considers both the economic efficiency and distributional effects that may result from efforts to protect the invertebrates 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.
26. 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.

#### 2.3.1 EFFICIENCY EFFECTS

27. 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 Bexar invertebrate habitat, 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.<sup>36</sup>

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<sup>35</sup> *Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, No. 03-35279 (9th Circuit 2004).

<sup>36</sup> 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>.

28. 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.
29. 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.
30. This analysis begins by measuring impacts associated with efforts undertaken to protect the invertebrates and their habitat. 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. In the case of the invertebrates, conservation efforts are not anticipated to significantly affect markets; therefore, this report focuses solely on compliance costs.

### 2.3.2 DISTRIBUTIONAL AND REGIONAL ECONOMIC EFFECTS

31. 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.<sup>37</sup> 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.

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<sup>37</sup> 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>.

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

32. This analysis considers how small entities, including small businesses, organizations, and governments, as defined by the RFA, might be affected by future species conservation efforts.<sup>38</sup> 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.<sup>39</sup>

#### Regional Economic Effects

33. 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.
34. 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.
35. 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.
36. Impacts associated with invertebrate conservation efforts largely include reductions in existing land values; the quantity of housing supplied in the broader region is not

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<sup>38</sup> 5 U.S.C. §§601 *et seq.*

<sup>39</sup> Executive Order 13211, Actions Concerning Regulations That Significantly Affect Energy Supply, Distribution, or Use, May 18, 2001.

anticipated to be affected. Therefore, measurable impacts of the type typically assessed with input-output models are not anticipated.

#### 2.4 ANALYTIC FRAMEWORK AND SCOPE OF THE ANALYSIS

37. This analysis: 1) identifies those economic activities most likely to threaten the invertebrates 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 area. This section provides a description of the methodology used to separately identify baseline protections from the incremental impacts stemming from the proposed designation of critical habitat for the 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.

##### 2.4.1 IDENTIFYING BASELINE IMPACTS

38. The baseline for this analysis is the existing state of regulation, prior to the designation of critical habitat, which provides protection to the species under Act, as well as 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.
39. Baseline protections include sections 7, 9, and 10 of the Act, 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, 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 Act. 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."<sup>40</sup> The economic impacts associated with this section manifest themselves in sections 7 and 10.

- Under section 10(a)(1)(B) of the Act, an entity (e.g., a landowner or local government) may develop a 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.<sup>41</sup> 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 Act are not included in this analysis.

40. The protection of listed species and habitat is not limited to the Act. 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 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. Of note, however, is that such efforts may not be considered baseline in the case that they would not have been triggered absent the designation of critical habitat. In these cases, they are considered incremental impacts and are discussed below.

#### 2.4.2 IDENTIFYING INCREMENTAL IMPACTS

41. 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.
42. 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.

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<sup>40</sup> 16 U.S.C. 1532.

<sup>41</sup> U.S. Fish and Wildlife Service, "Endangered Species and Habitat Conservation Planning," August 6, 2002, accessed at <http://endangered.fws.gov/hcp/>.

43. To inform the economic analysis, the Service has provided a memorandum describing its expected approach to conservation for the invertebrates following critical habitat designation.<sup>42</sup> 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. The Service's memorandum and follow on communication between the Service and economic analysts are provided in Appendix D. Based on the information provided in Appendix D, the designation of critical habitat will not lead to additional types of invertebrate conservation efforts, but will affect the number of projects to which the suite of conservation efforts is applied. In other words, the Service anticipates recommending the same conservation efforts to avoid adverse modification as are recommended to avoid jeopardy. We anticipate the frequency of consultations resulting in these conservation efforts, however, will increase following critical habitat designation for the invertebrates. Information regarding how critical habitat will increase the frequency of conservation efforts for the invertebrates is detailed in Section 4.2.1.

#### Direct Impacts

44. 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) implementation of any conservation efforts requested by the Service through section 7 consultation to avoid potential destruction or adverse modification of critical habitat.
45. Section 7(a)(2) of the Act 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 U.S. Army Corps of Engineers. Often, they will also include a third party involved in projects that involve a permitted entity, such as the recipient of a Clean Water Act section 404 permit.
46. 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.
47. 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

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<sup>42</sup> U.S. Fish and Wildlife Service to Industrial Economics, Inc. April 21, 2011. "Incremental Effects Memorandum for the Economic Analysis of the Proposed Rule to Designate Critical habitat for the Nine Bexar County Invertebrates."

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

48. 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.
49. 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.

50. 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. For simplicity, the average of the range of costs in each category is applied in this analysis.
51. Exhibit 2-2 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.
  - 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 10 percent of the cost of the entire consultation.<sup>43</sup> The remaining 90 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 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.

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<sup>43</sup> *Ibid.*

## EXHIBIT 2-2. RANGE OF INCREMENTAL ADMINISTRATIVE CONSULTATION COSTS (2011 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	\$2,450	\$3,100	\$2,050	\$2,000	\$9,500
Formal	\$5,500	\$6,200	\$3,500	\$4,800	\$20,000
Programmatic	\$16,700	\$13,900	n/a	\$5,600	\$36,100
RE-INITIATION OF CONSULTATION TO ADDRESS ADVERSE MODIFICATION					
Informal	\$1,230	\$1,550	\$1,030	\$1,000	\$4,750
Formal	\$2,750	\$3,100	\$1,750	\$2,400	\$10,000
Programmatic	\$8,330	\$6,930	n/a	\$2,800	\$18,100
ADDITIONAL EFFORT TO ADDRESS ADVERSE MODIFICATION IN A NEW CONSULTATION (ADDITIVE WITH BASELINE COSTS OF CONSIDERING JEOPARDY)					
Informal	\$613	\$775	\$513	\$500	\$2,380
Formal	\$1,380	\$1,550	\$875	\$1,200	\$5,000
Programmatic	\$4,160	\$3,460	n/a	\$1,400	\$9,030
Source: IEC analysis of full administrative costs is based on data from the Federal Government Schedule Rates, Office of Personnel Management, 2011, and a review of consultation records from several Service field offices across the country conducted in 2002.					
Notes:					
1. Estimates are rounded to three significant digits and may not sum due to rounding.					
2. Estimates reflect average hourly time required by staff.					

Section 7 Conservation Effort Impacts

52. 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.

- 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.
- 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.

53. In the case of the Bexar invertebrates, the Service uses habitat as a proxy for the number of species taken. As described in Section 3.8, development projects that reduce habitat quality from high to low may both jeopardize the continued existence of the species and result in the destruction or adverse modification of critical habitat.<sup>44</sup> We anticipate that critical habitat designation will not affect the outcome of consultations on these projects because the same conservation efforts would be recommended to avoid jeopardy to the species regardless of critical habitat designation. For development projects anticipated to reduce habitat quality from high to low, we therefore quantify only incremental administrative costs of consultation (as described in Exhibit 2-2).
54. Development projects that may reduce habitat quality from high to medium, however, are likely to destroy or adversely modify critical habitat but are not likely to result in jeopardy to the species.<sup>45</sup> We therefore expect that critical habitat designation triggers recommendations for conservation efforts for these consultations. For projects that reduce habitat quality from high to medium, critical habitat results in both incremental administrative costs of consultation as well as the costs of implementing recommended project modifications (as described in Section 4.2).

#### Indirect Impacts

55. 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 Act. Indirect impacts are those unintended changes in economic behavior that may occur outside of the Act, 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

56. Under section 10 of the Act, 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 Act and to meet the requirements of section 10 of the Act.
57. One existing HCP includes the Bexar invertebrates as covered species. The La Cantera HCP is a development HCP established in 2001 that manages karst preserves located

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<sup>44</sup> Habitat quality definitions of high, medium, and low are used as defined in the Bexar County Karst Invertebrates Draft Recovery Plan (U.S. Fish and Wildlife Service, March 2008. "Bexar County Karst Invertebrates Draft Recovery Plan.")

<sup>45</sup> Personal Communication with the U.S. Fish and Wildlife Service, April 27, 2011.

within Units 1e, 3, 6, 8 and 17.<sup>46</sup> These karst preserves were created in 2001 to mitigate development activities undertaken by La Cantera Development Company in proposed critical habitat Unit 9. The preserves are being monitored and managed for the benefit of the invertebrates. The Service is proposing to exclude the 179 acres of La Cantera HCP preserves from critical habitat designation under section 4(b)(2) of the Act.<sup>47</sup>

58. 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 efforts are considered an incremental effect of designation. No specific plans to prepare new HCPs in response to this proposed designation were identified for the Bexar invertebrates.

#### Other State and Local Laws

59. 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. No other State or local laws will be triggered by designation of critical habitat for the invertebrates.

#### Additional Indirect Impacts

60. 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.

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<sup>46</sup> 76 FR 9888

<sup>47</sup> FR 76 9901

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 within the boundaries of 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. As described in Section 3.8, critical habitat designation for the invertebrates likely provides new information about the presence of the species and will lead to additional consultations in areas where project proponents would not consult absent critical habitat.

#### 2.4.3 BENEFITS

61. Under Executive Order 12866, OMB directs Federal agencies to provide an assessment of both the social costs and benefits of proposed regulatory actions.<sup>48</sup> 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.<sup>49</sup>
62. 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

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<sup>48</sup> Executive Order 12866, Regulatory Planning and Review, September 30, 1993.

<sup>49</sup> 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>

conduct new research.<sup>50</sup> *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.*

63. 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. The potential ancillary benefits of critical habitat designation are described qualitatively in a separate chapter at the end of this report.

#### 2.4.4 GEOGRAPHIC SCOPE OF THE ANALYSIS

64. Economic impacts of invertebrate conservation are considered across the entire area proposed for revised critical habitat designation, as defined in Chapter 1. Results are presented for each of the 35 units of proposed critical habitat.

#### 2.4.5 ANALYTIC TIME FRAME

65. 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."<sup>51</sup> 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."<sup>52</sup> For development activities, projections are available through 2040 in the Draft Southern Edwards Plateau HCP.<sup>53</sup> For consistency, this analysis will look out over the same time horizon for development

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<sup>50</sup> *Ibid.*

<sup>51</sup> The U.S. Office of Management and Budget, February 7, 2011. "Regulatory Impact Analysis: Frequently Asked Questions (FAQs)." Accessed on May 3, 2011 by [http://www.whitehouse.gov/sites/default/files/omb/circulars/a004/a-4\\_FAQ.pdf](http://www.whitehouse.gov/sites/default/files/omb/circulars/a004/a-4_FAQ.pdf).

<sup>52</sup> *Ibid.*

<sup>53</sup> County of Bexar, Infrastructure Services Department. April 1, 2011. Draft Southern Edwards Plateau Habitat Conservation Plan. Accessed by <http://www.sephcp.com/documents.html> on April 14, 2011.

activities. Therefore, this analysis considers economic impacts to activities over a 29-year period from 2012 (expected year of final critical habitat designation) through 2040.

## 2.5 INFORMATION SOURCES

66. The primary sources of information for this report are communications with, and data provided by, personnel from the Service, local governments and other stakeholders. In particular, the Incremental Effects Memorandum provided by the Service and follow-on communication with economic analysts (see Appendix D). In addition, this analysis relies upon the Service's section 7 consultation record, the Bexar County Karst Invertebrates Draft Recovery Plan, and existing habitat management and conservation plans that consider the invertebrates. Data on baseline land use were obtained from regional planning authorities. Finally, this analysis also relies on still pertinent information and data from the economic analysis prepared in support of the 2003 critical habitat rule.<sup>54</sup> A complete list of references is provided at the end of this document.

## 2.6 PRESENTATION OF RESULTS

67. Impacts are described in present value and annualized terms applying discount rates of seven percent throughout the body of the report. Additionally, Appendix B provides the present and annualized value of impacts in each unit applying a three percent discount rate for comparison with values calculated at seven percent.<sup>55</sup> Appendix C presents undiscounted annual impact values by activity and subunit. Present value and annualized impacts are calculated according to the methods described in Exhibit 2-3.

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<sup>54</sup> Industrial Economics, Incorporated, "Economic Analysis of Critical Habitat Designation for Nine Bexar county, Texas Invertebrate Species," prepared for the U.S. Fish and Wildlife Service, March, 2003.

<sup>55</sup> The U.S. Office of Management and Budget (OMB) requires Federal agencies to report results using discount rates of three and seven percent (see OMB, Circular A-4, 2003).

## EXHIBIT 2-3. CALCULATING PRESENT VALUE AND ANNUALIZED IMPACTS

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 2011 dollars according to the following standard formula:<sup>a</sup>

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

$C_t$  = cost of invertebrate critical habitat conservation efforts in year  $t$

$r$  = discount rate<sup>b</sup>

Impacts for each activity in each unit 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 29 years, 2012 through 2040. 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)

<sup>a</sup> To derive the present value of future impacts to development activities,  $t$  is 2012 and  $T$  is 2040.

<sup>b</sup> 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.)

### CHAPTER 3 | BASELINE CONSERVATION FOR NINE BEXAR INVERTEBRATES WITHIN PROPOSED CRITICAL HABITAT

68. This chapter discusses the baseline state of invertebrate conservation absent designation of critical habitat. The species and habitat protections described in this chapter result from implementation of the Act, as well as other Federal, State and local regulations and conservation plans. These protections are not generated or affected by critical habitat designation for the invertebrates, and thus we do not quantify the associated impacts in this report. The qualitative discussion of baseline protections provides context for the incremental analysis in Chapter 4. Specifically, this chapter discusses existing invertebrate conservation, while Chapter 4 focuses on how invertebrate conservation may change as a result of critical habitat designation. The text box below summarizes the key issues and conclusions of the baseline analysis.

#### KEY ISSUES AND CONCLUSIONS OF THE BASELINE ANALYSIS

- Baseline protection for the invertebrates addresses a broad range of habitat threats. One Habitat Conservation Plan, one conservation easement, as well as various Federal, State, and local regulations currently provide protection for the invertebrates within the proposed critical habitat area.
- Eleven of the 35 proposed units are at least partially currently managed for invertebrate conservation. This translates to approximately 26.2 percent of the proposed critical habitat area. Units 1a, 1b, 1c, 1d, 1e, and 1f overlap the Government Canyon State Natural Area, which is subject to a Karst Management and Maintenance Plan providing invertebrate conservation. Units 1e, 3, 6, 8, and 17 are partially managed according to the La Cantera Habitat Conservation Plan, which includes conservation measures for the invertebrates. The entirety of Unit 24 is subject to a conservation easement.
- Through section 7 consultation for development projects, we assume the Service will recommend avoidance of invertebrate habitat where the minimum conservation criteria (as described in Section 3.8.1) have not been met for a species. Where the minimum conservation criteria have been met, we assume development projects will proceed and will implement project modifications.
- For development projects within Karst Zones 1 and 2 that may reduce habitat quality to low, avoidance of invertebrate habitat and implementation of other project modifications recommended through section 7 consultation will occur regardless of critical habitat designation. Impacts of invertebrate conservation recommended through section 7 consultation on these projects are therefore considered baseline impacts.

69. Exhibit 3-1 frames the discussion of baseline protections by summarizing the various plans and regulations that currently provide protection for the invertebrates. Some of these plans and regulations provide direct protection to the invertebrates and their habitat; others may not fully protect the species, but provide some conservation benefit. Sections 3.1 through 3.8 of this chapter provide a detailed discussion of each protection described in Exhibit 3-1, specifying the invertebrate conservation efforts associated with each. Section 3.9 describes a draft HCP, the Southern Edwards Plateau HCP, currently under development that may address conservation for the invertebrates in some critical habitat areas in the future.

**EXHIBIT 3-1. INVERTEBRATE CONSERVATION PROVIDED BY EXISTING PLANS AND REGULATIONS**

BASELINE PROTECTION	TYPE	COVERAGE
Government Canyon State Natural Area Karst Management and Maintenance Plan	Management Plan	<ul style="list-style-type: none"> <li>• All activities on GCSNA property</li> <li>• Units 1a, 1b, 1c, 1d, 1e, and 1f</li> </ul>
La Cantera Habitat Conservation Plan	Habitat Conservation Plan	<ul style="list-style-type: none"> <li>• All activities taking place on La Cantera HCP preserve lands</li> <li>• Units 1e, 3, 6, 8, 17</li> </ul>
Highlands Dominion Conservation Easement	Conservation Easement Agreement	<ul style="list-style-type: none"> <li>• All activities taking place within the easement area</li> <li>• Unit 24</li> </ul>
San Antonio City Parks	Informal Conservation Management	<ul style="list-style-type: none"> <li>• Activities located on land owned by the City of San Antonio Parks and Recreation Department</li> <li>• Units 1e, 6, 8, 10a, 10b, 11d, 11e, 12, 13, 21, 22, 23</li> </ul>
Texas Cave Management Association Robber Baron Preserve Management Plan	Management Plan	<ul style="list-style-type: none"> <li>• All activities within TCMA-owned land in Unit 20, including Robber Baron Cave</li> </ul>
Sole Source Aquifer Protection Program	Federal Regulation	<ul style="list-style-type: none"> <li>• Federally-funded activities affecting water quality in the recharge zone of the Edwards Aquifer</li> <li>• Units 1a-1f, 4, 8, 9, 10b, 11a-e, 12, 13, 19, 21</li> </ul>
Edwards Aquifer Authority Rules	Regional Regulation	<ul style="list-style-type: none"> <li>• Activities affecting water quality within the recharge and contributing of the Edwards Aquifer</li> <li>• Units 1a-1f, 2, 3, 4, 5, 6, 7, 8, 9, 10a-b, 11a-e, 12, 13, 17, 19, 21, 22, 23, 24</li> </ul>
Clean Water Act	Federal Regulation	<ul style="list-style-type: none"> <li>• Activities affecting waters of the United States</li> <li>• All proposed units</li> </ul>
Endangered Species Act listing provisions	Federal Regulation	<ul style="list-style-type: none"> <li>• Endangered Species Act listing provisions cover a broad range of land use activities that may result in take of the species or jeopardize their continued existence</li> <li>• All proposed units within Karst Zones 1 and 2.</li> </ul>

70. As highlighted in Exhibit 3-1, many proposed units and land use activities are already subject to invertebrate conservation even absent critical habitat designation. Exhibit 3-2 lists critical habitat units and portions of units that are unlikely to be affected by critical habitat designation due to the existing species and habitat conservation measures. That is, the baseline conservation afforded invertebrate habitat through existing plans and regulations sufficiently avoids potential adverse modification of critical habitat in these areas. We therefore do not anticipate that critical habitat designation will generate incremental economic impacts in these units outside of potential incremental administrative costs of addressing the adverse modification standard during section 7 consultation (as described in Exhibit 2-2 and quantified in Chapter 4). Overall, we expect that, due to baseline conservation being implemented for the invertebrates and their habitat, projects within 26.2 percent of the proposed critical habitat area will not be subject to incremental invertebrate conservation efforts.

**EXHIBIT 3-2. PROPOSED CRITICAL HABITAT UNITS UNLIKELY TO EXPERIENCE SIGNIFICANT INCREMENTAL IMPACTS DUE TO CRITICAL HABITAT DESIGNATION**

CRITICAL HABITAT UNIT	BASELINE PROTECTION	ACREAGE COVERED	TOTAL UNIT ACREAGE	PERCENT OF UNIT COVERED
Unit 1a	Government Canyon State Natural Area	238	238	100%
Unit 1b	Government Canyon State Natural Area	178	178	100%
Unit 1c	Government Canyon State Natural Area	178	178	100%
Unit 1d	Government Canyon State Natural Area	349	349	100%
Unit 1e	Government Canyon State Natural Area	498	691	82.9%
	La Cantera HCP	75		
Unit 1f	Government Canyon State Natural Area	178	178	100%
Unit 3	La Cantera HCP	25	125	20.0%
Unit 6	La Cantera HCP	4	105	3.8%
Unit 8	La Cantera HCP	70	471	14.9%
Unit 17	La Cantera HCP	5	115	4.4%
Unit 24	Conservation Easement	11	11	100%
<b>Total</b>	<b>1,809 acres (26.2% of total proposed critical habitat)</b>			
Sources: Acreage estimates are derived from the proposed critical habitat GIS shape files provided by the Service on February 26, 2011 and 2010 Bexar County parcel data published by the Bexar County Appraisal District and provided by the Service on April 29, 2011. Note: Acreages may not sum due to rounding, and may differ slightly from those provided in the proposed rule.				

### 3.1 GOVERNMENT CANYON STATE NATURAL AREA (GCSNA)

71. The Bexar invertebrates occur within caves in the 8,622 acre GCSNA, owned and operated by the Texas Parks and Wildlife Department (TPWD).<sup>56</sup> These caves occur within six critical habitat units: Units 1a, 1b, 1c, 1d, 1e, and 1f. In 2002, GCSNA published a Karst Management and Maintenance Plan addressing conservation for the listed invertebrates. The document, revised in 2003, outlines plans for fire ant management, fence and gate construction, and cave monitoring within karst preserves located on GCSNA property.<sup>57</sup> The primary objective of the plan is to allow the caves and surrounding areas to remain in an undisturbed state, and to protect federally-listed species, including the Bexar invertebrates and their habitat, in perpetuity.<sup>58</sup> Specific baseline conservation activities for the invertebrates in the karst preserve include:
- Limiting development to a trail system and primitive campsites;
  - Fire ant management;
  - Monitoring of listed species, cave crickets, vegetation, and caves;
  - Prohibition of pesticides and herbicides; and
  - Cave fence and gate construction.<sup>59</sup>
72. Due to budgetary constraints, GCSNA land managers plan to renegotiate their management plan in the near future regardless of critical habitat designation. According to land managers, the current plan is too prescriptive, and resources should be reallocated to provide better and more cost-effective protection for the invertebrates.<sup>60</sup> Land managers will discuss with the Service effective conservation strategies for the area. The technical assistance effort between the Service and GCSNA to discuss changes to the management plan will occur absent critical habitat designation. Because the management of the GCSNA is structured, and will continue to be structured, so as to avoid effects on the invertebrates and their habitat, land use activities in GCSNA are unlikely to jeopardize the species or result in adverse modification of critical habitat.<sup>61</sup>

### 3.2 LA CANTERA HCP

73. The La Cantera HCP, established in 2001, includes management of karst preserves located within Units 1e, 3, 6, 8 and 17.<sup>62</sup> These karst preserves were created to mitigate development activities undertaken by the La Cantera Development Company in proposed critical habitat Unit 9. Since that time, the preserves have been monitored and managed

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<sup>56</sup> 76 FR 9890.

<sup>57</sup> Karst Management and Maintenance Plan (KMMP) For Government Canyon State Natural Area. Revised February 14, 2003.

<sup>58</sup> *Ibid.*

<sup>59</sup> *Ibid.*

<sup>60</sup> *Ibid.*

<sup>61</sup> Email Communication with Texas Parks and Wildlife Department, Government Canyon State Natural Area, June 8, 2011.

<sup>62</sup> 76 FR 9888

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for the benefit of the invertebrates under Karst Management and Monitoring Plans (KMMPs). Under the La Cantera HCP, the company is “required to protect and manage these areas in perpetuity in accordance with the conservation needs of the species.”<sup>63</sup> The KMMPs for the preserves include the following management and monitoring procedures:

- Periodic site inspections and monitoring;
- Vegetation/habitat management, including fire management activities and periodic quantitative vegetation surveys;
- Fire ant management;
- Fencing, signage, access point maintenance and cave gating; and
- Prohibition of certain activities (unless approved by the Service), including grazing; use of fertilizers, herbicides, and pesticides; road construction; development; motorized vehicle access; and public access.<sup>64</sup>

74. The Service is proposing to exclude the 179 acres of La Cantera HCP preserves from critical habitat designation under section 4(b)(2) of the Act.<sup>65</sup> Because the preserve area will be managed for the conservation of the species regardless of critical habitat designation, management of these areas is considered a baseline protection and critical habitat is not expected to result in additional conservation recommendations.
75. A public comment submitted on behalf of the La Cantera Development Company regarding the proposed critical habitat asserted that designating critical habitat on La Cantera HCP lands would lead to a duplicative regulatory burden and trigger the HCP’s reinitiation clause.<sup>66</sup> In the case that critical habitat is designated in this area, incremental administrative costs would be incurred during reinitiation of the consultation; however, we do not anticipate critical habitat designation will change the invertebrate conservation efforts being implemented in these areas as part of the HCP.

### 3.3 HIGHLANDS DOMINION, L.L.C. CONSERVATION EASEMENT

76. On February 11, 2011, Highlands Dominion L.L.C. established a conservation easement for the Golden-cheeked Warbler through a consultation with the Service’s Austin Field Office.<sup>67</sup> While the easement was established for the benefit of another endangered

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<sup>63</sup> *Ibid*

<sup>64</sup> U.S. Fish and Wildlife Service. “Environmental Assessment/Habitat Conservation Plan for Issuance of an Endangered Species Act Section 10(a)(1)(B) Permit for the Incidental Take of Two Troglitic Ground Beetles (*Rhadine exilis* and *Rhadine infernalis*) and Madla Cave Meshweaver (*Cicurina madla*) During the Construction and Operation of Commercial Development on the Approximately 1,000-Acre La Cantera Property, San Antonio, Bexar County, Texas.” October, 2011.

<sup>65</sup> FR 76 9901

<sup>66</sup> SWCA Environmental Consultants, April 25, 2011. La Cantera Development Company, San Antonio, Texas Comments on Critical Habitat Proposed Rule, Public Comment submitted on behalf of La Cantera Development Company FWS-R2-ES-2010-0091-0037.1.

<sup>67</sup> Highlands Dominion LLC, April 19, 2011. Comment on Proposed Critical Habitat Unit 24 Ref Proposed Critical Habitat Listing, Public Comment FWS-R2-ES-2010-0091-0005.1.

species and no caves are present in the unit, the easement is also expected to benefit the listed karst invertebrate species by protecting cave cricket foraging habitat and buffering a nearby occupied cave located on Camp Bullis. The conservation easement covers the entire eleven acres of proposed critical habitat in Unit 24. Managed by the Nature Conservancy, the easement will be preserved in perpetuity, precluding any development threats within the proposed critical habitat that may destroy the cave cricket foraging vegetation.<sup>68</sup>

### 3.4 SAN ANTONIO PARKS DEVELOPMENT AND EXPANSION VENUE PROJECT

77. On May 6, 2000, voters in San Antonio passed a “Parks Development and Expansion Venue Project Proposition” (Proposition 3) to raise \$65 million through a temporary tax increase for the acquisition of open space over the Edwards Aquifer recharge zone.<sup>69</sup> The tax increase was extended by voters in 2005 and 2010, continuing funding for parks expansion through at least 2015.<sup>70</sup> Some of the properties acquired by this funding include caves occupied by listed species. These caves include Robber’s Cave (Unit 8), Breathless Cave (Unit 22), and Crownridge Canyon Cave (Unit 23). An additional city tract protects the surface drainage basin for John Wagner Ranch Cave No. 3 (Unit 6).
78. City of San Antonio owned parkland is located in portions of Units 1e, 6, 8, 10a, 10b, 11d, 11e, 12, 13, 21, 22, and 23.<sup>71</sup> These city parks currently serve as open space, providing conservation benefits to the invertebrates. The City of San Antonio Parks and Recreation Department actively manages all properties for general biological health, including monitoring for negative human impacts on habitat and managing fire ants.<sup>72</sup>
79. Some recreational development, such as trail creation, is expected. For example, the city shared specific plans to develop trails on the Crownridge Canyon (Unit 23) property with the Service. The Service determined that the trails would not affect the invertebrates and their habitat as they would be located a suitable distance away from the caves.<sup>73</sup>
80. Park managers do not anticipate these lands will be subject to significant development activity in the foreseeable future. However, the likelihood of development in these areas is uncertain as no official management plan is in place. Additionally, many of the city’s parks are zoned for other uses, such as residential development.<sup>74</sup> We consider the

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<sup>68</sup> Ibid.

<sup>69</sup> U.S. Fish and Wildlife Service to Industrial Economics, Inc. April 21, 2011. Incremental Effects Memorandum for the Economic Analysis of the Proposed Rule to Designate Critical Habitat for the Nine Bexar County Invertebrates.

<sup>70</sup> City of San Antonio. “Edwards Aquifer Protection”. From <http://www.sanantonio.gov/edwards/background.asp> April 4, 2011.

<sup>71</sup> City of San Antonio Park Boundaries GIS Layer. Published April 14, 2010. Downloaded from <https://gis.sanantonio.gov/GIS/DownloadData.aspx> on March 24, 2011.

<sup>72</sup> Personal Communication with City of San Antonio Parks and Recreation Department. May 13, 2011.

<sup>73</sup> Ibid.

<sup>74</sup> City of San Antonio Department of Planning and Community Development, “City of San Antonio Zoning GIS Data”. Updated May 12, 2011. Provided by the City of San Antonio on June 6, 2011.

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potential incremental impacts of critical habitat designation of development of these lands in Section 4.2 of this analysis.

### 3.5 TEXAS CAVE MANAGEMENT ASSOCIATION

81. The Texas Cave Management Association (TCMA) owns and manages Robber Baron Cave and 0.5 acres surrounding its opening.<sup>75</sup> The cave is the only known location for the Cokendolpher cave harvestman, and one of the two known locations of the Robber Baron Cave meshweaver. The cave is located in Unit 20. In 2008, TCMA published a Robber Baron Preserve Management Plan.<sup>76</sup> The plan outlines steps for monitoring the cave, undertaking biological surveys, providing erosion and nonnative plant management, and managing the cave for educational and recreational purposes. Because the property will continue to be managed as a preserve regardless of whether critical habitat is designated, we do not expect any land use threats to occur within this property in the foreseeable future.<sup>77</sup>

### 3.6 WATER QUALITY PROTECTION MEASURES

82. The Service identifies actions that negatively affect water quality as threats to the invertebrates and their habitat.<sup>78</sup> These actions include impacts to natural drainage patterns or destruction of surface vegetation. This section summarizes existing water quality protections within the proposed critical habitat area. These protections provide some conservation benefit to invertebrate habitat, but do not necessarily cover all the habitats' conservation needs.

#### 3.6.1 EDWARDS AQUIFER PROTECTIONS

83. Areas within proposed critical habitat that overlap the Edwards Aquifer recharge zone are subject to Federal, state, and city regulations focused on aquifer protection. These programs include the Federal Sole Source Aquifer Protection Program, the City of San Antonio Code of Ordinances, and the Edwards Aquifer Authority Rules.

84. Much of the proposed critical habitat area lies within karst fauna areas above the Edwards Aquifer. The Aquifer is the primary source of drinking water for the City of San Antonio and surrounding areas.<sup>79</sup> The majority (56.5 percent) of the proposed critical habitat lies within the recharge zone of the Aquifer, an area where limestone is heavily faulted and where most groundwater flows into the aquifer. Units 1a-1f, 8, 9, 11a-e, 12, 13, 19, and 21 lie entirely or primarily on the recharge zone of the Aquifer, while portions of Proposed Units 4 and 10b also lie within the recharge zone. An additional 23.2 percent of the proposed critical habitat (Units 2, 3, 5, 6, 7, 17, 22, 23, 24, and the remaining portions

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<sup>75</sup> 76 FR 9896.

<sup>76</sup> Texas Cave Management Association. "Robber Baron Preserve Management Plan". From <http://www.tcmacaves.org/PDF/management/Robber-Baron-Preserve-Management-Plan.pdf> April 20, 2011.

<sup>77</sup> Personal Communication with Robber Baron Preserve Manager, June 6, 2011.

<sup>78</sup> 76 FR 9898

<sup>79</sup> Eckhardt, Gregg. "Introduction to the Edwards Aquifer". [The Edwards Aquifer Website](http://www.edwardsaquifer.net/intro.html). <http://www.edwardsaquifer.net/intro.html>. Accessed June 6, 2011.

of Units 4 and 10b) lie within the aquifer's contributing zone. Limestone in these zones is less likely to be faulted and fractured; however, caves and sinkholes do occur in some areas.

**Sole Source Aquifer Protection Program (Federal)**

85. The Sole Source Aquifer (SSA) Protection Program is authorized by section 1424(e) of the Safe Drinking Water Act of 1974.<sup>80</sup> An aquifer can be designated an SSA if it supplies over 50 percent of the drinking water for an area and if there is no reasonable alternative source should the aquifer be contaminated. The Edwards Aquifer was the first aquifer designated as a SSA in 1975.<sup>81</sup> As part of the program, the U.S. Environmental Protection Agency (EPA) reviews proposed federally-funded projects that may constitute a threat to the Aquifer. Federal funding can be denied if the project is not modified to address threats to the aquifer. The projects must lie in the Aquifer's recharge zone, the surface area connected to the recharge zone, or the watershed area which contributes to the surface water flowing across the Aquifer. Proposed critical habitat Units 1a-1f, 2, 3, 4, 5, 6, 7, 8, 9, 10a, 10b, 11a-11e, 12, 13, 17, 19, 21, 22, 23, and 24 lie at least partially on the recharge or contributing zones of the Aquifer, and therefore meet the criteria for project review under the Aquifer's sole source designation. Units 14, 15, 16, 20, 25 and 26 are the only proposed critical habitat units that do not fall under the SSA designation. Although the SSA Protection Program does not offer provisions that specifically target endangered species, by minimizing the flow of contaminants through the caves and into the Aquifer, the program may offer some protection to the invertebrates.

**The Edwards Aquifer Authority Rules (State)**

86. The Edwards Aquifer Authority was created by the Texas Legislature in 1993 as a regulatory agency for the preservation and protection of the Edwards Aquifer. The Authority has established rules governing the storage and release of chemicals on the recharge and contributing zones of the Edwards Aquifer. The Authority is currently drafting a set of Proposed Rules which would strengthen water quality standards regulating activities in the recharge zone.<sup>82</sup> If implemented, these regulations may provide baseline protection to the endangered invertebrates.

**3.6.2 CLEAN WATER ACT**

87. The Clean Water Act (CWA) establishes the basic structure for regulating discharges of pollutants into the waters of the United States. It gives EPA the authority to implement pollution control programs such as setting wastewater standards for industry. The CWA also continued requirements to set water quality standards for all contaminants in surface

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<sup>80</sup> U.S. Environmental Protection Agency, "Sole Source Aquifer Protection Program." From <http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/solesourceaquifer.cfm>, April 20, 2011

<sup>81</sup> U.S. Environmental Protection Agency, "Sole Source Aquifer Protection Program". From <http://www.epa.gov/region6/water/swp/ssa/effects.htm>, April 20, 2011.

<sup>82</sup> Edwards Aquifer Authority. From <http://www.edwardsaquifer.org/files/Water%20Quality%20Reg%20Concept%20Memo%20Board%20Approved.pdf>, Accessed April 20, 2011

waters. Sections 401, 402, and 404 of the CWA may offer protection to the invertebrates by enhancing water quality, and preventing or limiting the discharge of dredge or fill materials. In particular, Section 404 of the CWA requires parties to obtain a permit from the US Army Corps of Engineers (USACE) prior to discharging dredge or fill material into “waters of the United States.”<sup>83</sup> As part of the section 404 permit process, the USACE reviews the potential effects of the proposed action on plant and animal populations and recommends efforts to avoid adverse effects to these populations in addition to the wetlands themselves.<sup>84</sup> Any costs related to conservation measures required by the USACE as part of the section 404 permit process, either for the invertebrates specifically or for wetlands in general, that may benefit the invertebrates and their habitat, are considered baseline impacts.

88. This permitting process also represents a Federal nexus for purposes of section 7 consultation. Since the species were listed in 2000, the Service has conducted eight informal section 7 consultations for the invertebrates with the USACE.<sup>85</sup> These consultations have considered potential impacts to invertebrates that may result from utility installation, bridge construction, and other infrastructure projects. Baseline impacts associated with consultation under section 7 of the Act are discussed in more detail in the following section.

### 3.7 ENDANGERED SPECIES ACT

89. This section discusses baseline protection afforded the invertebrates under the Act. Baseline protections include sections 7, 9, and 10 of the Act, 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. As is described in Section 2.3, absent critical habitat designation, Federal agencies are required 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.
90. Currently, the Service notifies project proponents of the need to consult on the impacts of activities with a Federal nexus on the invertebrate species within Karst Zones 1 and 2 (see Exhibit 4.3). During consultation, the Service anticipates that a jeopardy finding is likely where habitat is destroyed or reduced to a “low” quality.<sup>86</sup> In units that are currently low quality, jeopardy is likely if the project further reduces the quality. Projects that would further reduce quality include those that fill a cave entrance or those that further reduce

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<sup>83</sup> U.S. Code. Title 33, 1344.

<sup>84</sup> 40 CFR Part 230.75.

<sup>85</sup> Tracking and Integrated Logging System (TAILS) database, provided by U.S. Fish and Wildlife Service Biologist, February 7, 2011.

<sup>86</sup> Habitat quality definitions of high, medium, and low are used as defined in the Bexar County Karst Invertebrates Draft Recovery Plan (U.S. Fish and Wildlife Service, March 2008. “Bexar County Karst Invertebrates Draft Recovery Plan.”)

the cave cricket foraging area.<sup>87</sup> Therefore, baseline impacts of section 7 consultation (administrative and project modification costs) are anticipated in:

- Areas within Karst Zones 1 and 2 in high quality units where quality is reduced to low,
- Areas within Karst Zones 1 and 2 in medium quality units where quality is reduced to low, and
- Areas within Karst Zones 1 and 2 in low quality units where the quality is further reduced.

91. For projects occurring in Karst Zone 3, or that reduce habitat quality from high to medium (as opposed to low) in Karst Zones 1 and 2, critical habitat designation is likely generate recommendations for invertebrate conservation efforts. In these situations, costs of consultations and project modifications are quantified as incremental impacts in Chapter 4 of this analysis.
92. Since the species were listed in 2000, the Service has conducted five formal consultations, 120 informal consultations, and 31 technical assistance efforts for the species. These consultations consider a range of economic activities, including development, transportation, and utility projects.<sup>88</sup> In the future the Service expects to continue consulting on similar activities. Future consultations and invertebrate conservation efforts recommended by the Service through consultation are described below by activity.

### 3.7.1 DEVELOPMENT ACTIVITIES

93. For section 7 consultation regarding the impact of development activities on the invertebrates and their habitat, the Service anticipates recommending the preservation of three karst fauna areas (KFAs) per karst fauna region (KFR) with a minimum of six KFAs rangewide and at least one high quality KFA per KFR, for each species. These “minimum conservation criteria” recommendations are similar to the recovery criteria for the species as described in the Service’s draft Recovery Plan.<sup>89</sup>
94. The draft Recovery Plan for the invertebrates states that a KFA “is a geographic area known to support one or more locations of an endangered species and is distinct in that it acts as a system that is separate from other KFAs by geologic and hydrologic features and/or processes that create barriers to movement of water, contaminants, and troglobitic fauna.”<sup>90</sup> The Service has indicated that each proposed critical habitat unit represents an

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<sup>87</sup> Personal Communication with U.S. Fish and Wildlife Service Biologist, June 2, 2011.

<sup>88</sup> Tracking and Integrated Logging System (TAILS) database, provided by U.S. Fish and Wildlife Service Biologist, February 7, 2011.

<sup>89</sup> U.S. Fish and Wildlife Service, March 2008. “Bexar County Karst Invertebrates Draft Recovery Plan.”

<sup>90</sup> *Ibid.*

individual KFA.<sup>91</sup> The minimum conservation criteria recommended for section 7 consultations on development projects are summarized in the text box below.

#### MINIMUM CONSERVATION CRITERIA

The minimum conservation criteria recommended for section 7 consultations on development projects are preservation of:

1. At least one high quality critical habitat unit per KFR;
2. At least three total high or medium quality critical habitat units per KFR; and
3. A minimum of six high or medium quality critical habitat units rangewide *per species*.

Source: U.S. Fish and Wildlife Service, March 2008. "Bexar County Karst Invertebrates Draft Recovery Plan."

95. While the Recovery Plan is not final and is not a regulation, the Service has recommended these conservation efforts as part of section 7 consultation on past development projects. In addition, the Service anticipates making these recommendations to future projects that may jeopardize the species.<sup>92,93</sup> The costs of implementing the minimum conservation criteria are decreased land values due to limiting the potential future use of the land for development. That is, land values are reduced by precluding the option for future development.
96. As described above, for development projects in Karst Zones 1 and 2 where development projects may reduce the quality of a proposed critical habitat unit to low, these reduced land value costs are considered baseline impacts as the minimum conservation criteria would be recommended to avoid jeopardy to the species.
97. In Karst Zone 3, and for projects in Karst Zones 1 and 2 for which quality of habitat may be reduced from high to medium, implementation of the minimum conservation criteria would be due to the designation of critical habitat. The methods applied to estimate these incremental impacts are described in Section 4.2 of this analysis.
98. Where the minimum conservation criteria have been met within a Karst Fauna Region (see text box above), the analysis assumes that development projects may occur but will incorporate project modifications to avoid impacts to the species and/or critical habitat. Possible project modifications include:
- Contribute monetarily toward outreach efforts and future research;

<sup>91</sup> Email Communication with U.S. Fish and Wildlife Service Biologist, May 6, 2011.

<sup>92</sup> The conservation measures outlined in the draft Recovery Plan were analyzed as part of the biological opinion for the La Cantera development (U.S. Fish and Wildlife Service, "Biological Opinion for La Cantera Development Company 10(a)(1)(B) Permit TE-044512-0 in San Antonio, Bexar County, Texas").

<sup>93</sup> U.S. Fish and Wildlife Service to Industrial Economics, Inc. April 21, 2011. "Incremental Effects Memorandum for the Economic Analysis of the Proposed Rule to Designate Critical habitat for the Nine Bexar County Invertebrates."

- Create on-site and/or off-site preserves; and
- Manage and monitor karst preserves.<sup>94</sup>

99. Exhibit 3-3 presents the areas in which development projects may be subject to minimum conservation criteria or other project modification recommended by the Service regardless of the designation of critical habitat. These are all of the units in Karst Zones 1 and 2 that contain undeveloped land with the potential for future development. In medium and low quality units, all impacts associated with habitat avoidance and other project modifications are baseline as any further reductions in habitat quality due to development activity will generate concerns regarding jeopardy to the species even absent critical habitat designation.
100. In high quality units where development reduces quality to low, impacts associated with development restrictions are considered baseline (this is the low-end scenario of the incremental analysis). If development reduces quality to medium in high quality units, impacts associated with development restrictions are considered incremental impacts of the critical habitat designation. Absent information on how future development projects may affect habitat quality, we estimate a range of incremental impacts in high quality Units within Karst Zones 1 and 2. At the low end, impacts of implementing species conservation efforts are baseline (assuming projects reduce habitat quality to low and therefore generate concerns regarding jeopardy). At the high end, impacts of implementing species conservation efforts are incremental (assuming projects reduce habitat quality to medium and species conservation efforts are associated with potential adverse modification). Incremental impacts are quantified in Chapter 4.<sup>95</sup>

**EXHIBIT 3-3. BASELINE AREAS AFFECTED AND ASSOCIATED PROJECT MODIFICATIONS**

UNIT	ACRES AFFECTED	CURRENT QUALITY	PROJECT MODIFICATION
1e	118	High	Avoid invertebrate habitat
2	201	High	Avoid invertebrate habitat
3	38.8	Medium	Avoid invertebrate habitat
4	77.3	Low	Avoid invertebrate habitat
5	82.3	Low	Avoid invertebrate habitat
6	81.6	High	Avoid invertebrate habitat
7	88.0	Low	Develop with project modifications

<sup>94</sup> Biological Opinion for La Cantera Development Company 10(a)(1)(B) Permit TE-044512-0 in San Antonio, Bexar County, Texas.

<sup>95</sup> A more detailed description of how the analysis determines affected acres is provided in Section 4.2.

UNIT	ACRES AFFECTED	CURRENT QUALITY	PROJECT MODIFICATION
8	299.5	High	Avoid invertebrate habitat
9	156.9	Medium	Avoid invertebrate habitat
10a	28.8	Low	Develop with project modifications
11a	20.5	Low	Develop with project modifications
11b	15.5	Low	Develop with project modifications
11c	0.4	Low	Develop with project modifications
11d	31.3	Low	Develop with project modifications
11e	40.8	Low	Develop with project modifications
12	199.9	Low	Avoid invertebrate habitat
13	100.6	Low	Avoid invertebrate habitat
14	329.7	High	Avoid invertebrate habitat
15	82.0	Low	Avoid invertebrate habitat
16	140.3	Low	Avoid invertebrate habitat
17	76.4	High	Avoid invertebrate habitat
19	22.8	Low	Avoid invertebrate habitat
20	25.4	Low	Avoid invertebrate habitat
21	295.4	High	Avoid invertebrate habitat
22	166.7	High	Develop with project modifications
23	164.1	Low	Develop with project modifications
25	39.2	Low	Avoid invertebrate habitat
26	97.0	High	Avoid invertebrate habitat
<p>Note: Habitat quality definitions of high, medium, and low are used as defined in the Bexar County Karst Invertebrates Draft Recovery Plan (U.S. Fish and Wildlife Service, March 2008. "Bexar County Karst Invertebrates Draft Recovery Plan.") and based on discussions with U.S. Fish and Wildlife Service biologists (Email Communication with U.S. Fish and Wildlife Service Biologist, May 5, 2011 and Personal Communication with U.S. Fish and Wildlife Service Biologist, May 9, 2010.)</p>			

101. A number of development projects within the proposed critical habitat are currently in the early planning stages. Where a Federal nexus is present, project proponents will need to consult with the Service and invertebrate conservation may be implemented as described above (i.e., either the project would need to avoid invertebrate habitat or, where minimum

conservation criteria are met, development could occur with project modifications). The known projects are described briefly below.

#### Trinity University Expansion

102. Trinity University has plans to purchase and develop land within proposed critical habitat Unit 25 for use first as an athletic field and eventually low-impact student housing.<sup>96</sup> The project proponents are in talks with the Service about developing an HCP to receive an incidental take permit under Section 10 of the Act. The draft HCP presented to the Service includes establishment of a half-acre preserve around the three karst features, preserve management and monitoring, funding for research of caves within the Alamo Heights KFR, and funding for peer reviewed revisions of the species within the genus *Cicurina*.<sup>97</sup> Development of this HCP is still in the preliminary stages. Because Unit 25 is within Karst Zones 1 and 2 and is low quality habitat, impacts associated with this consultation would be baseline due to concerns regarding jeopardy to the invertebrates. If consultation occurs the Service would recommend avoidance of invertebrate habitat. Incremental impacts would be limited to the additional administrative cost of considering adverse modification during consultation. Incremental impacts are quantified in Chapter 4.

#### Cedar Creek (Sonoma Verde) Development

103. The Cedar Creek (Sonoma Verde) proposed single-family development is part of a master planned community that is in various stages of development. The property is located within proposed critical habitat Unit 8. A master plan for the property has been filed and vested with the City of San Antonio, trees have been cleared, and preliminary grading of the property has occurred.<sup>98</sup> If this project has a Federal nexus, the action agency will consult with the Service absent critical habitat because Unit 8 is within Karst Zones 1 and 2. If the project reduces habitat quality from high to low, the Service will recommend that the project proponent avoids critical habitat due to jeopardy concerns. In this circumstance, impacts associated with consultation and avoidance of invertebrate habitat would be baseline. If the project reduces habitat quality to medium, however, jeopardy would not occur, but adverse modification of critical habitat may be a concern. In this case, costs associated with avoidance of invertebrate habitat would be incremental.
104. Chapter 4 estimates incremental impacts of critical habitat designation on this project according to two alternative scenarios. At the low end, incremental impacts are limited to administrative costs assuming the project reduces habitat quality to low and invertebrate conservation efforts would occur regardless of critical habitat designation. At the high end, incremental impacts include administrative costs and decreased land values

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<sup>96</sup> SWCA Environmental Consultants, April 20, 2011. Technical Review and Comment on Proposed Critical Habitat Unit 25, Bexar County Texas, Public Comment submitted on behalf of Trinity University and the Oblates of Mary Immaculate FWS-R2-ES-2010-0091-0009.1.

<sup>97</sup> *Ibid.*

<sup>98</sup> D. Kelly, April 25, 2011. Public Comment FWS-R2-ES-2010-0091-0015.

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assuming critical habitat is the reason for implementing the invertebrate conservation effort (i.e., the project reduces habitat quality to medium). These impacts are quantified in Chapter 4.

#### Northeast School District - Middle School

105. The Northeast School District owns 80 acres within proposed critical habitat Unit 13. The school district has proposed construction of a middle school on this land.<sup>99</sup> If a Federal nexus exists, the action agency will consult with the Service. Because Unit 13 is within Karst Zones 1 and 2 and is low quality, all impacts associated with this consultation would be baseline due to jeopardy concerns. During consultation the Service would recommend avoidance of invertebrate habitat because the minimum conservation criteria have not been met (see Exhibit 3-3). Incremental impacts are therefore limited to the additional administrative cost of considering adverse modification during consultation, as quantified in Chapter 4.

#### Capital Foresight Development

106. The Capital Foresight Limited Partnership and Valencia Enclave, LLC (Capital Foresight) own or control two parcels of land situated within proposed critical habitat Unit 13. Capital Foresight has entered into a contract to sell their land, which would be developed for residential use. Homes are expected to be built on 92 lots within Capital Foresight's property.<sup>100</sup> If there is a Federal nexus for the residential development, the action agency will consult with the Service regarding this project. Because Unit 13 is within Karst Zones 1 and 2 and is low quality, impacts associated with this consultation would be baseline due to jeopardy concerns. During consultation the Service would recommend avoidance of critical habitat, as described in Exhibit 3-3. Incremental impacts are therefore limited to the additional administrative cost of considering adverse modification during consultation, as quantified in Chapter 4.

#### University of Texas San Antonio

107. The University of Texas San Antonio has a history of consultation with the Service. Part of the main campus and a parking lot are located on the west side of Unit 9.<sup>101</sup> Because Unit 9 is located within Karst Zones 1 and 2 and is medium quality, any future consultations would result from the listing of the species and impacts associated with consultation would be baseline due to jeopardy concerns. If consultation occurs, the

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<sup>99</sup> RMG Attorneys, April 22, 2011. Endangered and Threatened Wildlife and Plants, Designation of Critical Habitat for Nine Bexar County, Texas Invertebrates, Critical Habitat Unit-13, Public Comment submitted on behalf of the Northeast School District FWS-R2-ES-2010-0091-0032.1.

<sup>100</sup> SWCA Environmental Consultants, April 25, 2011. The Capital Foresight Limited Partnership and Valencia Enclave, LLC Comments on Critical Habitat Proposed Rule. Public Comment submitted on behalf of Capital Foresight FWS-R2-ES-2010-0091-0039.1,

<sup>101</sup> Pape-Dawson Engineers, April 25, 2011. Public Comments re Endangered and Threatened Wildlife and Plants; Designation of Critical Habitat for Nine Bexar County, Texas Invertebrates, Critical Habitat Unit-9, Public Comment submitted on behalf of University of Texas San Antonio FWS-R2-ES-2010-0091-0013.3.

Service would recommend avoidance of invertebrate habitat. Incremental impacts would be limited to the additional administrative cost of considering adverse modification during consultation.

### 3.7.2 TRANSPORTATION PROJECTS

108. A number of major roadways run through or adjacent to the proposed revised critical habitat. This analysis has identified three major transportation projects that are expected to occur within the next 20 years.

#### Loop 1604

109. Significant operational and safety improvements are planned along Loop 1604 from Potranco Road (Farm to Market (FM) 1957) to IH 35. The project is being undertaken by the Alamo Regional Mobility Authority, which is an independent government agency created by the Texas Transportation Commission and the Bexar County Commissioners Court to accelerate needed transportation projects in Bexar County.<sup>102</sup> Work began on an Environmental Impact Statement (EIS) for these improvements in 2009 and is expected to be completed in 2012.<sup>103</sup> Contracts for these improvements are scheduled to be awarded in 2013, 2014, and 2018 and construction will begin soon thereafter.<sup>104</sup> The Loop 1604 improvements will cross proposed critical habitat Units 9 and 16 and will come within 500 feet of Unit 19.<sup>105</sup> These improvements will be partially funded by the Federal Highway Administration (FHWA) and therefore consultation with the Service will occur. The affected units are all within Karst Zones 1 and 2. Units 16 and 19 are low quality and Unit 9 is medium quality. Therefore, any project modifications requested during consultation are expected to be baseline impacts due to jeopardy concerns. Project modifications that may be requested for transportation projects are similar to those listed above for development projects, but may also include re-alignment and/or elevation of the roadway.<sup>106</sup>

#### US 281

110. The Alamo Regional Mobility Authority is also planning to undertake capacity improvements to US 281 north of Loop 1604 to Borgfeld Road. In 2008 FHWA and the Texas Department of Transportation (TxDOT) withdrew all prior environmental clearances for these improvements. Therefore, a new EIS is currently under development.<sup>107</sup> The US 281 improvements will cross proposed critical habitat Unit 12.<sup>108</sup> Federal funding is expected for these improvements and therefore consultation

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<sup>102</sup> Alamo Regional Mobility Authority, accessed by <http://www.alamorma.org/> on June 15, 2011.

<sup>103</sup> More For Loop 1604, accessed by <http://www.morefor1604.com/> on June 15, 2011.

<sup>104</sup> Email communication with S. Robertson, Texas Department of Transportation, June 14, 2011.

<sup>105</sup> Personal Communication with J. Krejca, Zara Environmental, June 3, 2011.

<sup>106</sup> U.S. Fish and Wildlife Service, May 18, 2011. Consultation with Federal Highway Administration, 21450-2006-F-0132.

<sup>107</sup> Get the 411 on 281, accessed by <http://www.411on281.com> on June 15, 2011.

<sup>108</sup> Personal Communication with J. Krejca, Zara Environmental, June 3, 2011.

with the Service will be required. Unit 12 is within Karst Zones 1 and 2 and is low quality. Therefore, any project modifications requested during consultation are expected to be baseline impacts as they will be recommended regardless of critical habitat designation due to jeopardy concerns.

#### SH 211

111. Bexar County has plans to extend State Highway (SH) 211 from Potranco Road (FM 1957) to Culebra Road (FM 471). The planned extension will cross proposed critical habitat Units 14 and 26. This project is being funded by the Westside 211 Public Improvement District (PID) through a pass-through financing agreement with TxDOT.<sup>109</sup> Pass-through financing is meant to accelerate transportation projects that are not scheduled to occur for several years in the future. Taxes levied within the PID are used to pay for the project and then the county is reimbursed by TxDOT in the future.<sup>110</sup> A contract for this work is scheduled to be awarded in 2013 and construction is expected to be completed in 2015 or 2016.<sup>111</sup> The PID is planning to develop an HCP to cover the SH 211 extension. Areas within proposed critical habitat Units 14 and 26 are planned for protection as part of this HCP. These lands will be preserved, monitored, and managed using PID funds.<sup>112</sup> Development of this HCP is still in the preliminary stages. The HCP application has not yet been submitted to the Service.<sup>113</sup> Therefore, this analysis assumes that the SH 211 extension will result in consultation and project modifications.
112. Unit 14 is within Karst Zones 1 and 2 and is high quality. Unit 26 lies partially within Karst Zones 1, 2, and 3 and is high quality. Because the SH 211 expansion project is mostly located in Karst Zones 1 and 2, this analysis assumes that the project proponents will consult absent critical habitat. If the project reduces habitat quality from high to low in Karst Zones 1 and 2, the Service would request project modifications to avoid jeopardy and associated costs would be baseline. If the project reduces habitat quality from high to medium in Karst Zones 1 and 2, project modifications would be requested to avoid adverse modification of critical habitat and therefore considered incremental.
113. Due to the uncertainty regarding how the project may affect habitat quality, Chapter 4 estimates incremental impacts of critical habitat designation on this project according to two alternative scenarios. At the low end, incremental impacts are limited to administrative costs assuming the project reduces habitat quality to low and invertebrate

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<sup>109</sup> Pape-Dawson Engineers, April 25, 2011. Public Comments re Endangered and Threatened Wildlife and Plans; Designation of Critical Habitat for Nine Bexar County, Texas Invertebrates, Critical Habitat Unit-14, Public Comment submitted on behalf of Stevens Ranch FWS-R2-ES-2010-0091-0012.3.

<sup>110</sup> Bexar County, Engineering Services & Public Works, September 2010. Pass Through Financing Program.

<sup>111</sup> Email communication with S. Robertson, Texas Department of Transportation, June 14, 2011.

<sup>112</sup> Pape-Dawson Engineers, April 25, 2011. Public Comments re Endangered and Threatened Wildlife and Plans; Designation of Critical Habitat for Nine Bexar County, Texas Invertebrates, Critical Habitat Unit-14, Public Comment submitted on behalf of Stevens Ranch FWS-R2-ES-2010-0091-0012.3.

<sup>113</sup> *Ibid.*

conservation efforts would occur regardless of critical habitat designation due to jeopardy concerns. At the high end, incremental impacts include administrative costs and project modification costs assuming critical habitat is the reason for implementing the invertebrate conservation effort (i.e., the project reduces habitat quality to medium). The range of incremental impacts is quantified in Chapter 4.

**Blanco Road (FM 2696)**

114. TxDOT is planning to expand Blanco Road north of Loop 1604 from two lanes to four lanes and make improvements to sidewalks and bike lanes. This project would overlap proposed critical habitat Units 11c, 11d, and 11e. Currently contracts for these improvements are not scheduled to be awarded until 2060, but if funds become available the project could be completed within the next 10 to 20 years.<sup>114</sup> If funds do become available, TxDOT would need to consult with the Service. This project is not currently planned within the time frame of this analysis. However, if funds do become available and TxDOT consults with the Service on this project in the future, impacts associated with consultation would be baseline because the units affected by the project are located within Karst Zones 1 and 2 and are low quality. As a result the project would generate concerns regarding jeopardy to the species.

**3.7.3 UTILITY PROJECTS**

115. Since the species were listed in 2000, the Service has conducted one to two informal consultations or technical assistance efforts on utility projects per year.<sup>115</sup> To date, no project modifications have resulted from these efforts.
116. We identified one utility project that may occur within the proposed critical habitat area. Final plans for this project are not available, however, it may occur within or in the vicinity of Units 11d and 11e. Specifically, CPS Energy, owned by the City of San Antonio, provides both natural gas and electric service to a 1,514-square-mile service area, including Bexar County.<sup>116</sup> CPS Energy plans to construct a new electric substation in the north central area of San Antonio, near Blanco Road north of Loop 1604. The substation will require a minimum of five acres and construction is proposed to start in mid-2012.<sup>117</sup> Although a proposed site has not yet been identified, the new substation will be supplied from an existing high-voltage transmission line that runs adjacent to proposed critical habitat Units 11d and 11e.<sup>118</sup> If this project is located within critical habitat, all costs except for a portion of the administrative costs of consultation would be

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<sup>114</sup> Email communication with S. Robertson, Texas Department of Transportation, June 14, 2011.

<sup>115</sup> Tracking and Integrated Logging System (TAILS) database, provided by U.S. Fish and Wildlife Service Biologist, February 7, 2011.

<sup>116</sup> CPS Energy, Who We Are, accessed by [http://www.cpsenergy.com/About\\_CPS\\_Energy/Who\\_We\\_Are/](http://www.cpsenergy.com/About_CPS_Energy/Who_We_Are/) on June 22, 2011.

<sup>117</sup> CPS Energy, New Infrastructure, accessed by [http://www.cpsenergy.com/Developers\\_Builders/New\\_Infrastructure/](http://www.cpsenergy.com/Developers_Builders/New_Infrastructure/) on June 16, 2011.

<sup>118</sup> CPS Energy, Panther Springs Substation Project, accessed by [http://www.cpsenergy.com/files/Panther\\_Springs\\_brochure.pdf](http://www.cpsenergy.com/files/Panther_Springs_brochure.pdf) on June 16, 2011.

considered baseline because the units are low quality and located within Karst Zones 1 and 2. No other transmission line or substation projects were identified within the proposed critical habitat.<sup>119</sup>

117. The frequency and location of additional utility projects are uncertain. The frequency of past consultation on these projects indicates that additional utility projects may occur. Based on the historic low levels of effort for consultation on these projects, and the lack of recommendations for project modifications, however, we anticipate negligible economic impacts (baseline or incremental) on these projects.
118. In 2009, two flood control project alternatives within GCSNA were considered in the USACE draft Interim Feasibility Report and Integrated Environmental Assessment (IFRUEA) and draft Preliminary Alternative Analysis (PAA) for Leon Creek in Bexar County, Texas. The two alternatives would place flood abatement impoundments within GCSNA. The Service was asked to provide comments on the proposed alternatives. In their comments, the Service expresses concern that the proposed alternatives may significantly impact the Bexar invertebrates and their habitat.<sup>120,121</sup> The Service notes that “Flood water impounded by a detention structure in the area could directly adversely affect the cave itself and/or surrounding surface community upon which the cave fauna depends...Because of the limited distribution of these species, inundation of habitat could result in the Service making a determination of jeopardy to the species.”<sup>122</sup>
119. Since 2009, USACE has discontinued consideration of the project, but local interest continues. The City of San Antonio and Bexar County continue to conduct surveys needed to construct a dam. Currently there are four possible dam locations being considered along Government Canyon Creek.<sup>123</sup> If this project moves forward in the future, a Federal nexus is likely as multiple USACE and EPA permits may be required, therefore the project proponents will have to consult with the Service. As the Service indicated previously, a jeopardy determination would be the likely outcome of this consultation. Because all proposed critical habitat units within GCSNA are within Karst Zones 1 and 2 and because a project that results in inundation of habitat will reduce the quality to low, consultation and recommended modifications to this project would occur regardless of critical habitat designation due to jeopardy concerns.

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<sup>119</sup> CPS Energy, New Infrastructure, accessed by [http://www.cpsenergy.com/Developers\\_Builders/New\\_Infrastructure/](http://www.cpsenergy.com/Developers_Builders/New_Infrastructure/) on June 16, 2011.

<sup>120</sup> U.S. Fish and Wildlife Service, March 12, 2009. Letter to Colonel Christopher W. Martin, District Engineer, U.S. Army Corps of Engineers.

<sup>121</sup> U.S. Fish and Wildlife Service, November 13, 2009. Letter to Colonel Richard J. Muraski, Jr., District Engineer, U.S. Army Corps of Engineers.

<sup>122</sup> *ibid.*

<sup>123</sup> Email Communication with N. Lake, GCSNA Resource Specialist, Texas Parks and Wildlife Department, June 15, 2011.

- 3.8 DRAFT SOUTHERN EDWARDS PLATEAU HABITAT CONSERVATION PLAN (SEP-HCP)**
120. The Southern Edwards Plateau Habitat Conservation Plan (SEP-HCP) is a regional HCP currently being developed to conserve eleven endangered species, including the nine invertebrates.<sup>124</sup> The plan as currently drafted would cover incidental take from participating projects for all nine invertebrate species. The draft plan is still in the development stage, however, and an alternative proposal also described in the draft HCP would only cover incidental take for the relatively common three “Category 1” species: *Rhadine exilis*, *Rhadine infernalis*, and the Madla Cave Meshweaver.<sup>125</sup> Thus, the specific scope of the plan is currently uncertain.
121. Non-federal landowners in over four million acres in seven Texas counties— including all of Bexar County—would be eligible to apply to be a party to the HCP. The governments of Bexar County and the City of San Antonio are serving as the primary partners for the HCP. Activities covered by the plan include development projects, transportation projects, utility projects, public services and infrastructure, quarry management, and species management. Both private and public (city and county) land, would be eligible for the plan, although participation by landowners would be voluntary.
122. The Draft SEP-HCP was released to the public for comment on April 1, 2011. The plan calls for participants with lands located on Karst Zones 1 through 4 to purchase conservation credits or offer karst preserves in order to enroll in the plan and receive incidental take authorization. Lands occupied by any of the nine invertebrates cannot be covered by the plan unless either of the following two conditions is met:
- The enrollee provides one high quality or two medium quality karst preserves; or
  - The recovery criteria (similar to the “minimum conservation criteria” described above) have been achieved in the karst fauna region covered by the property, for all affected species.<sup>126</sup>
- Projects located within critical habitat for the invertebrates would not be covered by the plan unless two times the recovery criteria have been achieved in the karst fauna region where the property is located.
123. The SEP-HCP is currently still in draft form and the ultimate scale and scope are uncertain. Currently, project located within critical habitat would not be covered by the plan unless two times the recovery criteria have been achieved. This standard is stricter than that required by section 7 of the Act (as described in Section 3.8). In other words, projects in units where the recovery criteria have been achieved, but two times the recovery criteria has not, would not be covered by the HCP, but would be allowed to

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<sup>124</sup> County of Bexar, Infrastructure Services Department. April 1, 2011. Draft Southern Edwards Plateau Habitat Conservation Plan. Accessed by <http://www.sephcp.com/documents.html> on April 14, 2011.

<sup>125</sup> *Ibid.*

<sup>126</sup> The recovery criteria as defined in the Bexar County Karst Invertebrates Draft Recovery Plan (U.S. Fish and Wildlife Service, March 2008. “Bexar County Karst Invertebrates Draft Recovery Plan”) include the preservation of three KFAs per KFR with a minimum of six KFAs rangewide and at least one high quality KFA per KFR, for each species.

develop with project modifications under section 7. It is therefore significantly uncertain whether landowners would choose to become a party to the HCP.

124. In the case that landowners do participate in the HCP, the costs of participation would be similar to the costs of project modifications recommended during section 7 consultation (as described in Section 3.8). If the HCP is finalized and landowners participate regardless of critical habitat designation, these costs would be considered baseline. However, in the case that landowners participate in the HCP specifically because of critical habitat designation in order to minimize regulatory uncertainty, costs of implementing the HCP would be considered incremental impacts of the designation.
125. The ultimate scope and scale of the HCP, the number of landowners that may participate, and their reason for participating are all uncertain. For the purposes of this analysis, we therefore do not make assumptions regarding participation in this HCP in the future. Instead, we forecast baseline and incremental conservation for the invertebrates absent the implementation of this potential HCP.

## CHAPTER 4 | INCREMENTAL IMPACTS OF CRITICAL HABITAT DESIGNATION FOR NINE BEXAR COUNTY INVERTEBRATES

126. This chapter evaluates the potential for critical habitat designation to result in additional (“incremental”) conservation for the invertebrates. First, a summary of the results of the incremental analysis is provided. Sections 4.2 and 4.3 then detail the methods and assumptions applied to estimate incremental impacts to development and transportation activities, respectively. We do not anticipate critical habitat designation will generate additional economic impacts on other land use activities. This chapter concludes with a description of key assumptions that may generate uncertainty regarding the estimated incremental impacts.

### 4.1 SUMMARY OF RESULTS

127. As described in Section 1.2 of this analysis, we assessed the potential for critical habitat designation for the invertebrates to affect development activities, transportation and utility projects, and general species and habitat management activities. These are the key land use threats occurring within the critical habitat region for which section 7 consultation regarding critical habitat may generate incremental economic impacts.

128. A key factor in the incremental analysis is that the types of conservation efforts requested by the Service during section 7 consultation regarding the invertebrates are not expected to change with critical habitat designation. The Service uses “habitat as a proxy for the number of species taken because it is not possible to determine the population size at a particular location.”<sup>127</sup> In other words, the Service anticipates that conservation efforts recommended to avoid jeopardy to the species also effectively avoid the destruction or adverse modification of critical habitat. As a result, critical habitat designation will not change the types of invertebrate conservation efforts recommended by the Service.

129. In some geographic areas, however, potential adverse modification from land use threats may be an issue where jeopardy is not. Critical habitat is therefore expected to broaden the scope of projects to which the invertebrate conservation efforts are applied. Specifically, the designation of critical habitat will affect the number of projects subject to invertebrate conservation efforts in two ways:

1. **Critical habitat designation results in recommendations for invertebrate conservation efforts for projects in Karst Zones 1 and 2 that may reduce habitat quality to “medium.”** As described in the listing rule, the Service

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<sup>127</sup> U.S. Fish and Wildlife Service to Industrial Economics, Inc. April 21, 2011. Incremental Effects Memorandum for the Economic Analysis of the Proposed Rule to Designate Critical habitat for the Nine Bexar County Invertebrates.

notifies project proponents in Karst Zones 1 and 2 that they should be consulting for the invertebrate species even absent critical habitat designation.<sup>128</sup> Where the proposed project reduces habitat quality from high or medium to low, jeopardy is likely to be an issue and therefore invertebrate conservation efforts will be recommended regardless of critical habitat designation. Where the proposed project reduces habitat quality from high to medium, however, jeopardy is unlikely to be an issue but the project has the potential to adversely modify critical habitat. Impacts of invertebrate conservation efforts on projects in Karst Zones 1 and 2 that reduce habitat quality from high to medium are incremental impacts of the critical habitat designation.

2. **Critical habitat designation generates consultations on projects within Karst Zone 3.** Projects within Karst Zone 3 have not historically undertaken section 7 consultation regarding impacts on the invertebrate species. Critical habitat designation within Karst Zone 3 likely provides new information to project-proponents regarding the need to consult with the Service. We therefore assume that projects with a Federal nexus within critical habitat units in Karst Zone 3 will consult with the Service and apply the recommended invertebrate conservation efforts. The administrative and project modification costs of these consultations are incremental impacts of the critical habitat designation.

130. Thus, the incremental impacts quantified in this analysis are either associated with projects occurring within Karst Zone 3, or with projects in Karst Zones 1 and 2 that may reduce habitat quality, but not to such a level (i.e., to “low” quality) that jeopardy is an issue.

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<sup>128</sup> 65 FR 81419.

## KEY ISSUES AND CONCLUSIONS OF THE INCREMENTAL ANALYSIS

### Incremental Impacts of Critical Habitat Designation

- The present value impacts of critical habitat designation in areas proposed for designation over the first 20 years (2012 through 2031) range from \$1.62 million to \$35.6 million (\$153,000 to \$3,360,000 on an annualized basis), assuming a seven percent discount rate. Present value impacts of critical habitat designation from years 21 to 29 (2032 through 2040) range from \$24,100 to \$86,400 (\$3,700 to \$13,300 on an annualized basis), assuming a seven percent discount rate.
- Incremental impacts in areas considered for exclusion from critical habitat designation are \$7,790 over 29 years (present value assuming a seven percent discount rate). These impacts are limited to incremental administrative costs of reinitiating a consultation regarding an existing HCP that covers the units being considered for exclusion.
- The broad range in impacts is due to uncertainty regarding how future development projects may affect habitat quality in Karst Zones 1 and 2 (i.e., reducing it to medium versus low). As a result, low end incremental impacts reflect the assumption that projects in these areas reduce habitat quality to low and therefore invertebrate conservation efforts are undertaken regardless of critical habitat designation. High end incremental impacts reflect the assumption that projects in these areas reduce habitat quality to medium and invertebrate conservation efforts are undertaken because of critical habitat designation.

### Incremental Impacts by Activity

- Impacts to development activities represent approximately 92 to 99 percent of the overall impacts to areas proposed for designation during the first 20 years. Between years 21 and 29, all incremental impacts are associated with development activities (as the timeframe for the analysis of impacts to other activities extends only through 20 years). The majority of the impacts to development activities are land value losses due to restrictions on future development (86 percent of low end development impacts, and 95 percent of high end development value impacts).
- No incremental impacts are expected for utility projects and species and habitat management activities. No utility projects are identified within areas where incremental impacts are forecast (within Karst Zone 3 or within high quality habitat units within Karst Zones 1 and 2) and critical habitat designation is not expected to change ongoing species and habitat management activities undertaken as part of existing HCPs and land management plans.

### Incremental Impacts by Unit

- In the first 20 years, we anticipate Units 26 and 4 will experience the greatest incremental impacts in our low-end impact scenario (40 percent and 18 percent, respectively). These two units include the greatest areas subject to development restrictions due to critical habitat designation in the low end scenario. In the high-end scenario, Units 21 and 26 experience the greatest incremental impacts (34 percent and 18 percent, respectively). The land values in these units are among the greatest within critical habitat on a per acre basis, and a significant area within the units is forecast to experience development restrictions in our high end scenario.
- More than half (19) of the proposed units are not expected to experience incremental impacts. In some of these units, the proposed critical habitat area is subject to existing HCPs or land management plans that incorporate invertebrate conservation, as described in Chapter 4. For other units, no future land use threats (e.g., development or transportation projects) are forecast to occur.

### Key Uncertainties

- A number of assumptions regarding development potential of critical habitat areas and the value of the option for future development of these areas contribute uncertainty to the incremental impact estimates (Exhibit 4-8 provides a complete list).

131. Exhibit 4-1 describes incremental impacts of critical habitat designation by critical habitat unit and Karst Zone. In the first 20-years, the present value of total incremental costs in the areas proposed for designation range from \$1.62 million in the low-end scenario to

\$35.6 million in the high-end scenario (assuming a seven percent discount rate). These figures represent an annualized impact of approximately \$153,000 to \$3,360,000. Present value impacts after 20 years range from \$24,100 to \$86,400 (assuming a seven percent discount rate), or \$3,700 to \$13,300 on an annualized basis. Impacts to areas considered for exclusion are \$7,790 or \$725 on an annualized basis, assuming a seven percent discount rate. We apply two time frames in this analysis as additional information (through 2040) is available for development activities outside the 20-year time frame that is considered reasonably foreseeable for the other activities.

**EXHIBIT 4-1. TOTAL ESTIMATED INCREMENTAL IMPACTS BY UNIT AND KARST ZONE (\$2011, DISCOUNTED AT SEVEN PERCENT)**

UNIT	20-YEAR IMPACTS (2012-2031)		IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
<b>AREAS PROPOSED FOR DESIGNATION IN KARST ZONES 1 AND 2</b>				
1a	\$0	\$0	\$0	\$0
1b	\$0	\$0	\$0	\$0
1c	\$0	\$0	\$0	\$0
1d	\$0	\$0	\$0	\$0
1e	\$0	\$770,000	\$0	\$1,450
1f	\$0	\$0	\$0	\$0
2	\$0	\$3,140,000	\$0	\$5,810
3	\$0	\$0	\$0	\$0
4	\$0	\$0	\$0	\$0
5	\$0	\$0	\$0	\$0
6	\$0	\$1,310,000	\$0	\$2,610
7	\$0	\$0	\$0	\$0
8	\$0	\$5,590,000	\$0	\$17,100
9	\$3,010	\$3,010	\$0	\$0
10a	\$0	\$0	\$0	\$0
10b	\$0	\$0	\$0	\$0
11a	\$0	\$0	\$0	\$0
11b	\$0	\$0	\$0	\$0
11c	\$0	\$0	\$0	\$0
11d	\$0	\$0	\$0	\$0
11e	\$0	\$0	\$0	\$0
12	\$4,670	\$4,670	\$0	\$0
13	\$0	\$0	\$0	\$0

UNIT	20-YEAR IMPACTS (2012-2031)		IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
14	\$2,180	\$3,250,000	\$0	\$1,160
15	\$0	\$0	\$0	\$0
16	\$1,460	\$1,460	\$0	\$0
17	\$0	\$1,120,000	\$0	\$3,480
19	\$1,460	\$1,460	\$0	\$0
20	\$0	\$0	\$0	\$0
21	\$0	\$12,000,000	\$0	\$20,900
22	\$0	\$908,000	\$0	\$7,720
23	\$0	\$0	\$0	\$0
24	\$0	\$0	\$0	\$0
25	\$0	\$0	\$0	\$0
26	\$2,180	\$5,900,000	\$0	\$2,030
<i>Subtotal</i>	<i>\$15,000</i>	<i>\$34,000,000</i>	<i>\$0</i>	<i>\$62,300</i>
<i>Annualized</i>	<i>\$1,410</i>	<i>\$3,210,000</i>	<i>\$0</i>	<i>\$9,560</i>
<b>AREAS PROPOSED FOR DESIGNATION IN KARST ZONE 3</b>				
1a	\$0	\$0	\$0	\$0
1b	\$0	\$0	\$0	\$0
1c	\$0	\$0	\$0	\$0
1d	\$0	\$0	\$0	\$0
1e	\$0	\$0	\$0	\$0
1f	\$0	\$0	\$0	\$0
2	\$202,000	\$202,000	\$2,320	\$2,320
3	\$144,000	\$144,000	\$2,320	\$2,320
4	\$284,000	\$284,000	\$3,480	\$3,480
5	\$12,100	\$12,100	\$0	\$0
6	\$95,300	\$95,300	\$5,810	\$5,810
7	\$0	\$0	\$0	\$0
8	\$0	\$0	\$0	\$0
9	\$0	\$0	\$0	\$0
10a	\$0	\$0	\$0	\$0
10b	\$0	\$0	\$0	\$0
11a	\$0	\$0	\$0	\$0
11b	\$0	\$0	\$0	\$0
11c	\$0	\$0	\$0	\$0

UNIT	20-YEAR IMPACTS (2012-2031)		IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
11d	\$0	\$0	\$0	\$0
11e	\$0	\$0	\$0	\$0
12	\$0	\$0	\$0	\$0
13	\$0	\$0	\$0	\$0
14	\$0	\$0	\$0	\$0
15	\$0	\$0	\$0	\$0
16	\$0	\$0	\$0	\$0
17	\$119,000	\$119,000	\$2,320	\$2,320
19	\$0	\$0	\$0	\$0
20	\$0	\$0	\$0	\$0
21	\$0	\$0	\$0	\$0
22	\$99,500	\$99,500	\$6,700	\$6,700
23	\$0	\$0	\$0	\$0
24	\$0	\$0	\$0	\$0
25	\$0	\$0	\$0	\$0
26	\$645,000	\$645,000	\$1,160	\$1,160
<i>Subtotal</i>	<i>\$1,600,000</i>	<i>\$1,600,000</i>	<i>\$24,100</i>	<i>\$24,100</i>
<i>Annualized</i>	<i>\$151,000</i>	<i>\$151,000</i>	<i>\$3,700</i>	<i>\$3,700</i>
<b>TOTAL</b>	<b>\$1,620,000</b>	<b>\$35,600,000</b>	<b>\$24,100</b>	<b>\$86,400</b>
<b>ANNUALIZED</b>	<b>\$153,000</b>	<b>\$3,360,000</b>	<b>\$3,700</b>	<b>\$13,300</b>
<b>AREAS CONSIDERED FOR EXCLUSION</b>				
1e	\$1,560	\$1,560	\$0	\$0
3	\$1,560	\$1,560	\$0	\$0
6	\$1,560	\$1,560	\$0	\$0
8	\$1,560	\$1,560	\$0	\$0
17	\$1,560	\$1,560	\$0	\$0
<b>TOTAL</b>	<b>\$7,790</b>	<b>\$7,790</b>	<b>\$0</b>	<b>\$0</b>
<b>ANNUALIZED</b>	<b>\$735</b>	<b>\$735</b>	<b>\$0</b>	<b>\$0</b>
Note: Estimates are rounded to three significant digits and may not sum due to rounding.				

#### 4.2 DEVELOPMENT

132. The proposed critical habitat occurs within the greater San Antonio metropolitan area where development pressure is high.<sup>129,130</sup> The proposed units lie primarily in the northern part of Bexar County, with the majority lying just outside of a major City highway—Loop 1604—that encircles the heart of the City of San Antonio. North Bexar County is generally a high middle-income area subject to rapid residential development—single family homes and apartment complexes, although some commercial development occurs, particular adjacent to the City. Due to its proximity to the San Antonio metropolitan area, some of the units (e.g., proposed Units 20 and 25) are already fully developed.<sup>131</sup>
133. Protecting and preserving these caves, and the surface habitat that supports the karst ecosystem, are conservation challenges for the Service. Residential and commercial development of the surface is the primary threat to the invertebrate species.
134. As is described in Section 3.8.1, the Service will make recommendations through section 7 consultation regarding how development projects should implement invertebrate conservation based on “minimum conservation criteria.” If the minimum conservation criteria have not been met for a species, the Service will recommend the project avoid invertebrate habitat.<sup>132</sup> Where the minimum conservation criteria have been met, the analysis assumes that development projects will proceed with project modifications to avoid impacts to the species and/or critical habitat.
135. Whether avoidance of the habitat area or implementation of project modifications are baseline due to jeopardy concerns, or incremental due to designation of critical habitat depends on the location of the project, and the potential effect on habitat quality. As described in Chapter 3 and Section 4.1, economic impacts of implementing invertebrate conservation efforts are incremental for projects occurring within Karst Zone 3, and for projects in Karst Zones 1 and 2 that may reduce habitat quality from high to medium.

#### Analytic Method to Quantify Incremental Impacts to Development Activities

136. To estimate the incremental impacts associated with section 7 consultation the following approach is used:
1. Determine whether minimum conservation criteria have been met for each proposed critical habitat unit.

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<sup>129</sup> Personal Communication with Bexar County, Texas. April 26, 2011.

<sup>130</sup> County of Bexar, Infrastructure Services Department. April 1, 2011. Draft Southern Edwards Plateau Habitat Conservation Plan. Accessed by <http://www.sephcp.com/documents.html> on April 14, 2011. p. 3, 18

<sup>131</sup> 76 FR 9896-9897

<sup>132</sup> U.S. Fish and Wildlife Service to Industrial Economics, Inc. April 21, 2011. “Incremental Effects Memorandum for the Economic Analysis of the Proposed Rule to Designate Critical habitat for the Nine Bexar County Invertebrates.”

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2. Determine overlap of proposed revised critical habitat and projected land development in areas where incremental impacts may occur (i.e., high quality units in Karst Zones 1 and 2 and all areas in Karst Zone 3).
  3. For developable lands within units where minimum conservation criteria have not been met, estimate costs of avoiding development of critical habitat.
  4. For developable lands within units where minimum conservation criteria have been met, quantify costs associated with project modifications requested of future development projects.
  5. Evaluate potential effects on regional real estate market. This step determines the significance of implementation of the minimum conservation criteria relative to regional real estate demand and supply dynamics.
137. Exhibit 4-2 details the first two steps in the process outlined above, describing how the minimum conservation criteria are applied in this analysis. The determinations regarding whether avoidance of critical habitat will be recommended in a given unit are based on assumptions regarding existing habitat quality as understood by the Service, and the recovery criteria laid out in the draft recovery plan. The units in which incremental impacts are forecast are highlighted in Exhibit 4-2; incremental impacts occur in Karst Zone 3 and in Karst Zones 1 and 2 where the habitat quality is reduced from high to medium. Exhibit 4-3 highlights the delineation of the proposed critical habitat units within respective Karst Zones and KFRs.
138. Importantly, the application of the minimum conservation criteria in determining whether development should be avoided in a given unit is sensitive to assumptions regarding the timing and location of potential future developments. This is because the minimum conservation criteria prescribe the number of high and medium quality units required for each species in each KFR and rangewide, but do not specify preference for *which* high and medium quality units should be avoided. In other words, which units are subject to recommendations to avoid development depends on which units are developed first. This analysis therefore requires assumptions regarding in which units development is most likely to be avoided due to compliance with the minimum conservation criteria. For example, in the University of Texas San Antonio (UTSA) KFR, the minimum conservation criteria may not be met in Unit 7 if three KFAs containing *R. exilis* have not already been preserved.

**EXHIBIT 4-2. IDENTIFICATION OF UNITS WITH POTENTIAL FOR INCREMENTAL IMPACTS AND DETERMINATION OF WHETHER MINIMUM CONSERVATION CRITERIA ARE MET**

UNIT	DEVELOPABLE AREAS IN KARST ZONES 1/2 (ACRES) <sup>A,B,C</sup>	DEVELOPABLE AREAS IN KARST ZONE 3 (ACRES) <sup>A,B,C</sup>	QUALITY	KFR	R. EXILIS	R. INFERNALIS	B. VENYIVI	T. COKENDOLPHERI	N. MICROPS	C. BARONIA	C. MADLA	C. VENII	C. VESPERA	MINIMUM CONSERVATION CRITERIA MET? <sup>D</sup>
1a	0	0	High	Government Canyon		Y					Y			N/A
1b	0	0	High	Government Canyon	Y	Y			Y				Y	N/A
1c	0	0	High	Government Canyon							Y			N/A
1d	0	0	High	Government Canyon	Y	Y					Y			N/A
1e	118	0	High	Government Canyon	Y	Y	Y				Y			No
1f	0	0	High	Government Canyon		Y								N/A
2	201	12.1	High	Helotes	Y	Y					Y			No
3	38.8	3.2	Medium	Helotes	Y	Y	Y				Y			No
5	82.3	1.1	Low	Helotes	Y	Y	Y				Y			No
17	76.4	7.3	High	Helotes		Y					Y			No
4	77.3	15.3	Low	UTSA	Y	Y								No
6	81.6	3.7	High	UTSA	Y	Y					Y			No
7	88.0	5.0	Low	UTSA	Y									Yes
8	299.5	0	High	UTSA	Y	Y					Y			No
9	156.9	0	Medium	UTSA	Y						Y			No
22	166.7	11.2	High	UTSA							Y			Yes
23	164.1	3.7	Low	UTSA		Y								Yes
10a	28.8	0	Low	Stone Oak		Y								N/A
10b	0	0	Low	Stone Oak		Y								N/A
11a	20.5	0	Low	Stone Oak	Y									N/A
11b	15.5	0	Low	Stone Oak	Y									N/A
11c	0.4	0	Low	Stone Oak	Y									N/A
11d	31.3	0	Low	Stone Oak	Y									N/A
11e	40.8	0	Low	Stone Oak	Y									N/A
12	199.9	0	Low	Stone Oak	Y									No
13	100.6	0	Low	Stone Oak	Y									No

UNIT	DEVELOPABLE AREAS IN KARST ZONES 1/2 (ACRES) <sup>A,B,C</sup>	DEVELOPABLE AREAS IN KARST ZONE 3 (ACRES) <sup>A,B,C</sup>	QUALITY	KFR	R. EXILIS	R. INFERNALIS	B. VENYIVI	T. COKENDOLPHERI	N. MICROPS	C. BARONIA	C. MADLA	C. VENII	C. VESPERA	MINIMUM CONSERVATION CRITERIA MET? <sup>D</sup>
19	22.8	0	Low	Stone Oak		Y								No
21	295.4	0	High	Stone Oak	Y									No
24	0	0	Low	Stone Oak	Y									N/A
14	329.7	0	High	Culebra Anticline		Y								No
15	82.0	0	Low	Culebra Anticline		Y						Y		No
16	140.3	0	Low	Culebra Anticline		Y								No
26	97.0	19.8	High	Culebra Anticline		Y								No
20	25.4	0	Low	Alamo Heights				Y		Y				No
25	39.2	0	Low	Alamo Heights						Y				No

Sources: 76 FR 9872; Bexar County Appraisal District, 2010 Bexar County parcel data, provided by U.S. Fish and Wildlife Service on April 29, 2011; Bexar County, Infrastructure Services Department. April 1, 2011. Draft Southern Edwards Plateau Habitat Conservation Plan, Accessed by <http://www.sephcp.com/documents.html> on April 14, 2011; Email Communication with U.S. Fish and Wildlife Service Biologist, May 6, 2011 and May 26, 2011; Highlands Dominion LLC, April 19, 2011. Public Comment on FR Doc # 2011-03038: FWS-R2-ES-2010-0091-0005.1; Personal Communication with U.S. Fish and Wildlife Service Biologist, May 9, 2011.

Notes:

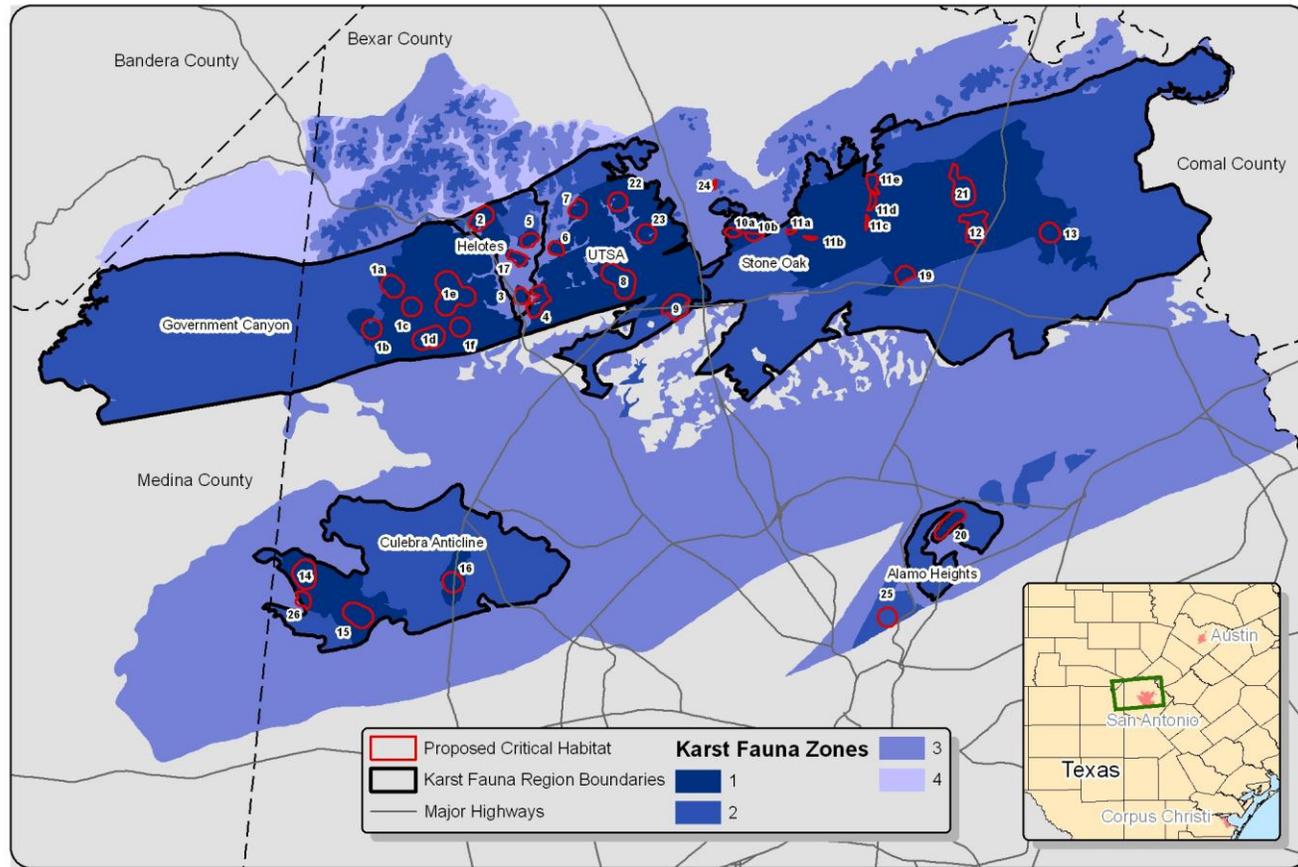
(A) Developable areas are defined as lands designated by the county appraisal district as vacant platted lots, unoccupied residential lots in builder inventory, agricultural lands, and land with farm and ranch-related improvements. They correspond to properties classified with State Property Tax Board codes of C, D, E, or O. This methodology follows that recently applied by Loomis Partners, Inc. in the Draft Southern Edwards Plateau HCP (County of Bexar, Infrastructure Services Department. April 1, 2011. Draft Southern Edwards Plateau Habitat Conservation Plan. Accessed by <http://www.sephcp.com/documents.html> on April 14, 2011).

(B) Areas within GCSNA in Units 1a, 1b, 1c, 1d, 1e, and 1f are excluded from developable areas. Areas acquired as part of La Cantera HCP in Units 1e, 3, 6, 8, and 17 are excluded from developable areas. Areas within conservation easement in Unit 24 excluded from developable areas.

(C) Unit 11c contains less than one acres of developable land in Karst Zone 1/2. Units 9, 10a, and 20 contain less than one acres of developable land in Karst Zone 3.

(D) The Units bordering Camp Bullis (10a, 10b, 11a, 11b, 11c, 11d, 11e and 24) do not contribute toward the recovery of the species, therefore the minimum conservation criteria are not applied to these units. Because these units are in Karst Zones 1/2 and are low quality any impacts to projects within these units would be considered baseline.

EXHIBIT 4-3. MAP OF KARST ZONES, KARST FAUNA REGIONS, AND PROPOSED CRITICAL HABITAT UNITS<sup>133</sup>



Sources:  
 1. US Fish and Wildlife Service, Austin, TX, USA  
 2. Environmental Systems Research Institute, Inc. (ESRI), Redlands, California, USA



<sup>133</sup> Note that Unit 24 has been placed in the Stone Oak KFR and Unit 25 has been placed in the Alamo Heights KFR (Email Communication with U.S. Fish and Wildlife Service Biologist, May 27, 2011).

139. The affected acres identified in Exhibit 4-2 include all “developable” acres (acres subject to potential future development based on available information regarding land use designations). Our analysis assumes that all of these parcels are developed within the 29-year time frame of the development analysis. While this assumption may overstate the amount of development occurring, available information regarding development pressure in this region of Bexar County indicates that the area is developing rapidly and fully. Specifically, a development analysis for the Draft SEP-HCP projected 51 percent population growth in the region, and development of 78 percent of the total area available for future development in the northern Bexar County region within the 29-year time frame of our analysis.<sup>134</sup> Development pressure is likely to be greatest in those units that are adjacent to other development.
140. Incremental impacts are expected in Karst Zones 1 and 2 for projects that reduce the unit’s quality from high to medium. The characteristics of a project that would reduce quality from high to medium, as opposed to low, are uncertain. Consequently, this analysis considers two scenarios:
- **Low-end Scenario:** All development projects in Karst Zones 1 and 2 are assumed to reduce quality to low and thus project modifications requested during consultation are considered baseline.
  - **High-end Scenario:** All development projects in Karst Zones 1 and 2 are assumed to reduce quality to medium and thus project modifications requested during consultation are considered incremental.

In both scenarios all costs associated with consultations occurring in Karst Zone 3 are considered incremental.

141. This analysis assumes that one development project will occur on each developable parcel within the proposed critical habitat.<sup>135</sup> Development projects will have a Federal nexus if Federal funding or permitting is required. In the study areas development projects may be subject to one or more of the following Federal nexuses:
- Permitting under section 404 of the Clean Water Act by USACE;
  - Funding from the Department of Housing and Urban Development (HUD);
  - Permitting/funding by/from the Federal Emergency Management Agency (FEMA); and
  - Permitting for incidental take by the Service through development of an HCP.

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<sup>134</sup> County of Bexar, Infrastructure Services Department. April 1, 2011. Draft Southern Edwards Plateau Habitat Conservation Plan. Accessed by <http://www.sephcp.com/documents.html> on April 14, 2011.

<sup>135</sup> Developable areas are defined as lands designated by the county appraisal district as vacant platted lots, unoccupied residential lots in builder inventory, agricultural lands, and land with farm and ranch-related improvements. They correspond to properties classified with State Property Tax Board codes of C, D, E, or O.

142. For development projects with a Federal nexus, consultation with the Service under section 7 of the Act is required if the project may affect the species or its habitat. This analysis assumes that all future development projects will have a Federal nexus. As smaller development projects may not be subject to Federal funding or permitting, however, this assumption likely results in an overestimate of impacts to development projects.
143. Exhibit 4-4 presents the areas in which incremental impacts to development activities are expected, the number of consultation that will occur, and the project modifications likely to be recommended by the Service for each scenario.

EXHIBIT 4-4. INCREMENTAL AREAS AFFECTED AND ASSOCIATED PROJECT MODIFICATIONS

UNIT	LOW END			HIGH END			PROJECT MODIFICATION
	ACRES AFFECTED	NUMBER OF CONSULTATIONS KARST ZONE 1/2	NUMBER OF CONSULTATIONS KARST ZONE 3	ACRES AFFECTED	NUMBER OF CONSULTATIONS KARST ZONE 1/2	NUMBER OF CONSULTATIONS KARST ZONE 3	
1e	0	0	0	118	5	0	Avoid designated critical habitat
2	12.1	0	2	213.1	20	2	Avoid designated critical habitat
3	3.2	0	2	42	17	2	Avoid designated critical habitat
4	15.3	0	3	92.6	22	3	Avoid designated critical habitat
5	1.1	0	0	83.4	6	0	Avoid designated critical habitat
6	3.7	0	4	85.3	10	4	Avoid designated critical habitat
8	0	0	0	299.5	59	0	Avoid designated critical habitat
14	0	0	0	329.7	4	0	Avoid designated critical habitat
17	7.3	0	2	83.7	12	2	Avoid designated critical habitat
21	0	0	0	295.4	72	0	Avoid designated critical habitat
22	11.2	0	5	177.9	25	5	Develop with project modifications
26	19.8	0	1	116.8	7	1	Avoid designated critical habitat

#### Consultation Costs

144. Exhibit 2-2 summarizes incremental administrative consultation costs per consultation effort. These costs represent the time and effort necessary to consider the potential for the proposed project to result in adverse modification of critical habitat. The first category includes the full cost to consider both jeopardy and adverse modification for consultations precipitated by critical habitat designation. The full costs are considered incremental for these consultations because the consultation would not have occurred (and, therefore, the costs incurred) but for the designation of critical habitat. These costs are incurred for consultations in Karst Zone 3.
145. The second category considers incremental costs associated with a re-initiated consultation. In this case, the consultation is precipitated by critical habitat designation but is less costly than the previous category. This is due to the groundwork of the previously completed consultation regarding the same project. This analysis assumes that there will be one re-initiation of consultation for the La Cantera HCP. Critical habitat was not designated at the time that the HCP was developed, so the intra-Service consultation will need to be re-initiated to consider impacts to critical habitat. This consultation is assumed to occur in the year that critical habitat is finalized (2012) and is spread across the six units that include area within the La Cantera property (Units 1e, 3, 6, 8, 9, and 17). Note that areas within five of these units (1e, 3, 6, 8, and 17) are being considered for exclusion.
146. The final category considers the incremental effort to consider critical habitat designation as part of a future section 7 consultation that considers both adverse modification and jeopardy. This category is the least costly as efficiencies exist when considering both jeopardy and adverse modification at the same time (e.g., in staff time for project review and report writing). These costs are incurred for consultations in Karst Zones 1 and 2 and will be incurred in both the low and high scenarios (i.e., regardless of whether incremental project modifications apply). Because no information is available on the timing of development projects, consultation costs are spread evenly across the 29-year time frame of the development analysis.

#### Project Modification Costs

147. To evaluate the effect of avoiding future development in units where the minimum conservation criteria have not been met, we estimate the change in land value due to restricting the option for future development. To estimate lost land values, we apply data collected from the Bexar County Appraisal District.<sup>136</sup> Our estimate of economic impacts to potentially developable parcels assumes a complete loss of market value of the land.<sup>137</sup> Our development analysis focuses on parcels of land for which future

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<sup>136</sup> Bexar County Appraisal District, 2010 Bexar County parcel data, provided by U.S. Fish and Wildlife Service on April 29, 2011.

<sup>137</sup> We assume assessed values are representative of market value.

development is foreseeable based on land designation code. As developable lands, the assessed value therefore incorporates the future development potential of the parcels.

148. Assuming a full loss in land value is likely to overstate the true losses associated with restricting development. Some of these parcels may be used for other productive land use (e.g., agriculture, ranching, or parkland) that hold some value and do not threaten habitat quality. Absent information on the potential other uses of these lands, however, we assume their first and best future use is for development and therefore quantify a loss in value associated with precluding that development.
149. Exhibit 4-5 presents the average per-acre land value losses within proposed critical habitat units subject to incremental impacts. These per acre values reflect the average value of unimproved, developable lands within each unit. The values are adjusted to 2011 dollars using the not seasonally-adjusted home price index for the San Antonio-New Braunfels Metropolitan Statistical Area (MSA) and the Consumer Price Index “All Items Less Shelter” series.<sup>138,139</sup>
150. The range in land values across the units reflects the relative development pressure and types of development likely to occur in the units. As described above, development ranges from dense commercial development to large, high-end residential developments. On average, the units that fall outside the City of San Antonio limits have a per-acre land value of \$18,800, while the units within or primarily within City limits have a per-acre land value of \$29,000.

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<sup>138</sup> Federal Housing Finance Agency, Home Price Index, accessed at <http://www.fhfa.gov/Default.aspx?Page=87> on June 17, 2011.

<sup>139</sup> Bureau of Labor Statistics, Consumer Price Index - All Urban Consumers, All items less shelter, accessed at <http://www.bls.gov/cpi/data.htm> on June 17, 2011. Note that the home price index does not adjust for inflation; the consumer price index is therefore used to adjust for inflation.

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**EXHIBIT 4-5. AVERAGE PER-ACRE LAND VALUE FOR UNITS WITH INCREMENTAL IMPACTS (2011 DOLLARS)**

UNIT	AVERAGE PER-ACRE DEVELOPMENT VALUE
1e	\$6,900
2	\$16,500
3	\$43,300
4	\$18,300
5	\$11,700
6	\$17,000
8	\$19,600
14	\$10,500
17	\$15,400
21	\$43,100
26	\$34,500

Source: Bexar County Appraisal District, 2010 Bexar County parcel data, provided by U.S. Fish and Wildlife Service on April 29, 2011.  
Note: Values are rounded to three significant digits.

151. Where the minimum conservation criteria have been met, the analysis assumes that development projects will proceed with project modifications to avoid impacts to the species and/or critical habitat. This analysis assumes that project proponents are asked to:

- Create on-site and/or off-site preserves; and
- Manage and monitor these preserves in perpetuity.

These project modifications were included in the La Cantera HCP, which is the only HCP that has been developed for the Bexar invertebrates.<sup>140</sup> Purchase of open space land in the karst region of Bexar County to create preserves is estimated to cost \$30,400 per acre.<sup>141</sup> This analysis assumes that for every one acre developed, 0.18 acres will need to be preserved.<sup>142</sup> Karst preserve management and monitoring, which may include routine inspections; vegetation/habitat management; fire ant control; fencing, signage, and access

<sup>140</sup> U.S. Fish and Wildlife Service, Biological Opinion for La Cantera Development Company 10(a)(1)(B) Permit TE-044512-0 in San Antonio, Bexar County, Texas.

<sup>141</sup> Personal Communication with La Cantera Development Company, October 2002. Land values are adjusted to 2011 dollars using the not seasonally-adjusted home price index for the San Antonio-New Braunfels MSA (<http://www.fhfa.gov/Default.aspx?Page=87>) and the Consumer Price Index "All Items Less Shelter" series (<http://www.bls.gov/cpi/data.htm>).

<sup>142</sup> Based on 181-acre preserved created for construction on 1,000 acres of property for the La Cantera development (U.S. Fish and Wildlife Service, Biological Opinion for La Cantera Development Company 10(a)(1)(B) Permit TE-044512-0 in San Antonio, Bexar County, Texas).

point management; and cave-access gating is estimated to cost \$265 per acre.<sup>143</sup> The preserve will need to be managed and monitored in perpetuity. Because the timing of development is unknown, this analysis conservatively assumes that preserves are created in 2012 and must then be managed and monitored for the next 29 years.

152. Exhibit 4-6 provides the incremental impacts to development activities by unit and Karst Zone. In the first 20-years, the present value incremental impact to development activities in the areas proposed for designation range from \$1.6 million in the low-end scenario to \$32.9 million in the high-end scenario (assuming a seven percent discount rate). These figures represent an annualized impact of approximately \$151,000 to \$3,100,000. Present value impacts after 20 years range from \$24,100 to \$86,400 (assuming a seven percent discount rate), or \$3,700 to \$13,300 on an annualized basis. Impact to areas considered for exclusion are \$7,790 or \$725 on an annualized basis, assuming a seven percent discount rate.

**EXHIBIT 4-6. TOTAL ESTIMATED INCREMENTAL IMPACTS TO DEVELOPMENT BY UNIT AND KARST ZONE (\$2011, DISCOUNTED AT SEVEN PERCENT)**

UNIT	20-YEAR IMPACTS (2012-2031)		IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
<b>AREAS PROPOSED FOR DESIGNATION IN KARST ZONES 1 AND 2</b>				
1e	\$0	\$770,000	\$0	\$1,450
2	\$0	\$3,140,000	\$0	\$5,810
6	\$0	\$1,310,000	\$0	\$2,610
8	\$0	\$5,590,000	\$0	\$17,100
9	\$1,560	\$1,560	\$0	\$0
14	\$0	\$3,250,000	\$0	\$1,160
17	\$0	\$1,120,000	\$0	\$3,480
21	\$0	\$12,000,000	\$0	\$20,900
22	\$0	\$908,000	\$0	\$7,720
26	\$0	\$3,140,000	\$0	\$2,030
<i>Subtotal</i>	<i>\$1,560</i>	<i>\$31,300,000</i>	<i>\$0</i>	<i>\$62,300</i>
<i>Annualized</i>	<i>\$147</i>	<i>\$2,950,000</i>	<i>\$0</i>	<i>\$9,560</i>
<b>AREAS PROPOSED FOR DESIGNATION IN KARST ZONE 3</b>				
2	\$202,000	\$202,000	\$2,320	\$2,320
3	\$144,000	\$144,000	\$2,320	\$2,320

<sup>143</sup> Personal Communication with La Cantera Development Company, October 2002. Adjusted for inflation using the Consumer Price Index "All Items Less Shelter" series (<http://www.bls.gov/cpi/data.htm>).

UNIT	20-YEAR IMPACTS (2012-2031)		IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
4	\$284,000	\$284,000	\$3,480	\$3,480
5	\$12,100	\$12,100	\$0	\$0
6	\$95,300	\$95,300	\$5,810	\$5,810
17	\$119,000	\$119,000	\$2,320	\$2,320
22	\$99,500	\$99,500	\$6,700	\$6,700
26	\$645,000	\$645,000	\$1,160	\$1,160
<i>Subtotal</i>	<i>\$1,600,000</i>	<i>\$1,600,000</i>	<i>\$24,100</i>	<i>\$24,100</i>
<i>Annualized</i>	<i>\$151,000</i>	<i>\$151,000</i>	<i>\$3,700</i>	<i>\$3,700</i>
<b>TOTAL</b>	<b>\$1,600,000</b>	<b>\$32,900,000</b>	<b>\$24,100</b>	<b>\$86,400</b>
<b>ANNUALIZED</b>	<b>\$151,000</b>	<b>\$3,100,000</b>	<b>\$3,700</b>	<b>\$13,300</b>
<b>AREAS CONSIDERED FOR EXCLUSION</b>				
1e	\$1,560	\$1,560	\$0	\$0
3	\$1,560	\$1,560	\$0	\$0
6	\$1,560	\$1,560	\$0	\$0
8	\$1,560	\$1,560	\$0	\$0
17	\$1,560	\$1,560	\$0	\$0
<b>TOTAL</b>	<b>\$7,790</b>	<b>\$7,790</b>	<b>\$0</b>	<b>\$0</b>
<b>ANNUALIZED</b>	<b>\$735</b>	<b>\$735</b>	<b>\$0</b>	<b>\$0</b>
Note: Estimates are rounded to three significant digits and may not sum due to rounding.				

153. The impact of land-use restrictions or other regulations that limit the future development potential of a property affect the market value of the property at the time the regulation is imposed regardless of when development of the property might have taken place absent critical habitat. In addition to the reduction in land value, the results described in Exhibit 4-5 include administrative section 7 consultation costs (one per land parcel subject to potential future development) and project modification costs (for development that occurs but is subject to modification due to critical habitat). The analysis assumes that for each developable land parcel within critical habitat a consultation would occur and the outcome of that consultation is that the Service either recommends avoidance of critical habitat or suggests other project modifications. It may also be that critical habitat only overlaps a portion of the project site, thus the project proponent would consult on the larger project, but must only apply the Service's recommendations in the area overlapping critical habitat. The administrative costs of consultation and project modification costs represent 14 percent of the overall impacts to development in the low-

end and five percent in the high end. These impacts are small relative to the estimated land value loss impacts.

154. We do not expect that implementation of the minimum conservation criteria will have a significant impact on regional real estate demand and supply dynamics. The economic impacts are likely to extend beyond the regulated landowners and affect the real estate market, real estate consumers, and the regional economy if: (1) the amount of land not developed as a result of invertebrate protection is high relative to the total developable land in the region; or (2) other project modification costs are high relative to real estate development value and cover a significant proportion of developable land. In these cases, landowners and developers may pass on the costs to real estate consumers in the form of high prices.
155. Conversely, if project modification costs are low or if invertebrate protection only affects a small fraction of the total developable land supply in a region, then economic effects are likely to be limited to that subset of individual landowners or projects. This analysis estimates that up to 1,739 acres of developable land will be affected by the critical habitat designation. These acres represent 1.6 percent of the total land area projected for development within the next 29 years within the northern portion of Bexar County containing the proposed critical habitat, as described in the SEP-HCP developed by Bexar County.<sup>144</sup> As the critical habitat designation affects a relatively small percentage of total development within the County, we expect a reduction in the regional supply of housing is unlikely.

#### **4.3 TRANSPORTATION**

156. Section 3.8.2 describes the three major transportation projects expected to occur within the next 20 years that fall within the proposed critical habitat. The Loop 1604 project is expected to begin construction in 2013 and will affect proposed critical habitat Units 9 and 16. The US 281 project is assumed to begin construction in 2012 and will affect proposed critical habitat Unit 12. These two projects affect units that are within Karst Zones 1 and 2 and are of low quality. Therefore, any project modifications requested during consultation on this project will occur regardless of critical habitat designation due to concerns regarding jeopardy. As a result, incremental impacts to these projects are limited to additional administrative consultation costs. Consultation costs are expected to occur during the first year of construction and are spread evenly over the affected units.
157. The SH 211 extension project will likely begin construction in 2013 and could affect proposed critical habitat Units 14 and 26. Unit 14 is within Karst Zones 1 and 2 and is high quality. Unit 26 is partially within Karst Zones 1, 2, and 3 and is high quality. Because the SH 211 expansion project is partially located in Karst Zones 1 and 2, this analysis assumes that the project proponents will consult absent critical habitat

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<sup>144</sup> County of Bexar, Infrastructure Services Department. April 1, 2011. Draft Southern Edwards Plateau Habitat Conservation Plan. Accessed by <http://www.sephcp.com/documents.html> on April 14, 2011, p. 17.

designation. We quantify the administrative consultation cost associated with addressing the adverse modification standard as an incremental impact on this project.

158. The current plans for the rural highway extension run through areas of Karst Zones 1 and 2 in proposed critical habitat Unit 26. The planned highway does not seem to cross Unit 14, but will run adjacent to the Unit.<sup>145</sup> Project modifications requested for transportation projects include elevating the roadway, as well as other more minor engineering changes such as spread footings for bridges instead of footings that bore into the ground. In addition, project proponents will adhere to best management practices such as collecting and filtering run-off in critical habitat areas.<sup>146</sup> This analysis conservatively assumes that the roadway is elevated over proposed critical habitat Unit 26. An elevated roadway will cost \$40 per square foot more to construct than a traditional roadway.<sup>147</sup> The project involves the elevation of 78,900 square feet of roadway over Unit 26.<sup>148</sup>
159. If the project reduces habitat quality from high to low, the Service would request project modifications to avoid jeopardy and associated costs would be baseline. In the low-end estimate of incremental impacts, we assume that the project reduces habitat quality to low and therefore elevation is requested as a project modification to avoid jeopardy. If the project reduces habitat quality from high to medium, project modifications would be requested to avoid adverse modification of critical habitat and would be incremental impacts. As a high-end estimate, we assume that the project reduces habitat quality to medium and costs associated with elevating the roadway are considered incremental impacts.
160. Exhibit 4-7 provides the incremental impacts to transportation activities by unit and Karst Zone. The present value incremental impact to transportation activities in the areas proposed for designation range from \$13,400 in the low-end scenario to \$2,770,000 in the high-end scenario (assuming a seven percent discount rate). These figures represent an annualized impact of approximately \$1,270 to \$262,000. Note that the reasonably foreseeable future for transportation activities is limited to the next 20 years. Therefore, no impacts are estimated after 20 years.

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<sup>145</sup> Bexar County Appraisal District, 2010 Bexar County parcel data, provided by U.S. Fish and Wildlife Service on April 29, 2011.

<sup>146</sup> Personal Communication with J. Krejca, Zara Environmental, June 3, 2011.

<sup>147</sup> Email Communication with J. Krejca, Zara Environmental, June 16, 2011.

<sup>148</sup> Based on the assumption that the two-lane highway will be 24 feet wide and 3,290 feet long.

**EXHIBIT 4-7. TOTAL ESTIMATED INCREMENTAL IMPACTS TO TRANSPORTATION BY UNIT AND KARST ZONE (\$2011, DISCOUNTED AT SEVEN PERCENT)**

UNIT	20-YEAR IMPACTS (2012-2031)	
	LOW END	HIGH END
<b>AREAS PROPOSED FOR DESIGNATION IN KARST ZONES 1 AND 2</b>		
9	\$1,460	\$1,460
12	\$4,670	\$4,670
14	\$2,180	\$2,180
16	\$1,460	\$1,460
19	\$1,460	\$1,460
26	\$2,180	\$2,760,000
<b>TOTAL</b>	<b>\$13,400</b>	<b>\$2,770,000</b>
<b>ANNUALIZED</b>	<b>\$1,270</b>	<b>\$262,000</b>
Note: Estimates are rounded to three significant digits and may not sum due to rounding.		

**4.4 OTHER ACTIVITIES**

161. No incremental impacts are expected to utility project and species and habitat management. Utility projects are discussed in more detail in Section 3.8.3. One project was identified with the potential to be located within proposed critical habitat Units 11d and 11e. A site for this project has not yet been established and thus it is currently uncertain whether the project will be located within critical habitat. If this project is located within critical habitat, all costs except for a portion of the administrative costs of consultation would be considered baseline because the units are low quality and located within Karst Zones 1 and 2. No other utility projects are currently proposed within the proposed critical habitat area. Based on the frequency of past consultations and technical assistance efforts on utility projects (i.e., one to two efforts per year), however, it is likely that other projects will be proposed within critical habitat in the future. To date, however, Service review of these projects have primarily been technical assistance efforts that have determined the projects were not likely to affect the species or habitat. We therefore anticipate that any incremental impacts on unknown future utility projects would be minor administrative impacts.
162. A number of species and habitat management plans exist for the invertebrates. These management plans provide baseline protection for the species and are discussed in detail in Chapter 3. Because management plans are developed to protect the species and their habitat, critical habitat designation is not expected to change the invertebrate conservation efforts prescribed through these plans. Therefore, no incremental impacts are anticipated.

#### 4.5 KEY ASSUMPTIONS

163. The economic costs presented in this chapter are based on a series of assumptions that may affect the impact estimates. This section presents the key assumptions used and the extent to which they may lead to under- or over-estimates of the potential incremental impacts of the proposed revised critical habitat designation. Exhibit 4-8 presents they key assumptions made and the potential bias they introduce in the analysis.

**EXHIBIT 4-8. KEY UNCERTAINTIES ASSOCIATED WITH THE ESTIMATED INCREMENTAL IMPACTS OF CRITICAL HABITAT DESIGNATION FOR THE INVERTEBRATES**

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
We apply the current assessed land value of vacant, developable land as a proxy for the option value of future development on the land.	Likely leads to an <b>overestimate</b> of incremental impacts	<b>Potentially major.</b> The option value for future development, which is what is lost when development is precluded on a parcel, is unknown for these lands. The option value for development is most likely some fraction of the total market value of the land. For parcels with high development pressure and little opportunity for other land use, the option value for development is likely the majority of the total market land value. For parcels for which other land uses may substitute for development, the option value for development is a smaller fraction of the total value. Absent more specific information on the future uses of these undeveloped parcels, we assume the option for future development is the first and best use of these lands and therefore accounts for the majority of the market value.
All currently undeveloped land parcels within proposed critical habitat that are designated for potential future development will be developed within the next 29 years.	Likely leads to an <b>overestimate</b> of incremental impacts	<b>Potentially major.</b> Two key issues with this assumption are: 1) some units may not be developed in the next 29 years; and 2) the type of development occurring may avoid potential effects on the invertebrates and their habitat. A recent development projection by Loomis Partners, Inc. as part of a proposed HCP estimated that 78 percent of available lands in this region of Bexar County would be developed within the timeframe of the analysis. We therefore anticipate that, while this assumption may overstate impacts, there is the potential for close to full development of these areas.
All future development projects within the proposed critical habitat area will be subject to a Federal nexus and therefore section 7 consultation regarding the invertebrates.	Likely leads to an <b>overestimate</b> of incremental impacts	<b>Potentially major.</b> Smaller development projects, such as single residential development, may not be subject to the Federal permitting or funding opportunities described in Section 4.2.1. In these cases, consultation would not occur and development may proceed absent invertebrate conservation.

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
Assessed values used to estimate land value losses are representative of market values.	<b>Unknown.</b> May overestimate or underestimate incremental impacts.	<b>Probably minor.</b> Assessed values are likely to be a good indicator of fair market value, but could differ from market value depending on when a parcel was last assessed and real estate market conditions in the area.
Absent information on the effect of future development projects on habitat quality, we estimate a range of incremental impacts in Karst Zones 1 and 2.	N/A	<b>Probably minor.</b> Because some development projects will reduce habitat quality to medium and some to low, total impacts are within the range described, but unlikely to be either at the extreme low or high end of the range.
In areas where the minimum conservation criteria are met, the Service will request that preserves be created at a ratio of 0.18:1.	<b>Unknown.</b> May overestimate or underestimate incremental impacts.	<b>Probably minor.</b> The minimum conservation criteria have only been met in one unit (Unit 22) affected by the proposed designation. This assumption impacts project modification costs in this unit.
Timing of development will effect which critical habitat units are subject to recommendations to avoid development.	<b>Unknown.</b> May overestimate or underestimate incremental impacts.	<b>Probably minor.</b> The minimum conservation criteria prescribe only the number of high and medium quality caves per KFR that should be preserved. They do not define which high and medium quality caves should be preserved. Thus, there is uncertainty regarding which units will be developed and which preserved within each KFR. To the extent that more valuable land parcels are subject to development restrictions than assumed in this analysis, impacts may be underestimated. To the extent that less valuable land parcels are subject to development restrictions, impacts are overestimated. As the number of high and medium quality caves within each KFR are limited, however, we were not required to make assumptions regarding where development would be precluded in most regions. The UTSA KFR is the only KFR where assumptions were made. List the KFRs where this is an issue.
Development projects are spread evenly over 20-year period of this analysis.	<b>Unknown.</b> May overestimate or underestimate incremental impacts.	<b>Minor.</b> This assumption effects only the estimated administrative consultation costs. As described in Section 4.2, land value losses occur upon designation of critical habitat and are not sensitive to the timing of development. Because the consultation costs are minor compared to the land value losses, this assumption does not materially reflect the results of the analysis.
One consultation will occur per developable parcel.	<b>Unknown.</b> May overestimate or underestimate incremental impacts.	<b>Minor.</b> This assumption effects only the estimated administrative consultation costs. As described in Section 4.2, land value losses are estimated on a per acre basis. Because the consultation costs are minor compared to the land value losses, this assumption does not materially reflect the results of the analysis.

ASSUMPTION/SOURCE OF UNCERTAINTY	DIRECTION OF POTENTIAL BIAS	LIKELY SIGNIFICANCE WITH RESPECT TO ESTIMATED IMPACTS
Incremental impacts on any future utility projects within the critical habitat area will likely be minor and administrative.	May <b>underestimate</b> incremental impacts	<b>Minor.</b> The frequency and location of future utility projects within the proposed critical habitat area are unknown. To date, however, Service review of these projects have primarily been low level technical assistance efforts and have not resulted in recommendations for invertebrate conservation. We therefore expect that any incremental impacts to these activities would be minor and administrative. To the extent that future utility projects are more disruptive to invertebrate habitat than they have been in the past, we underestimate potential incremental impacts.

**CHAPTER 5 | POTENTIAL ECONOMIC BENEFITS****5.1 INTRODUCTION**

164. The primary goal of designating critical habitat for a species is to support its long-term conservation and recovery. Various economic benefits, measured in terms of social welfare or regional economic performance, may also result from species and habitat conservation. The benefits of species and habitat conservation can be placed into two broad categories: (1) those associated with the primary goal of species conservation (i.e. direct benefits), and (2) those that derive from the habitat conservation measures to achieve this primary goal (i.e., ancillary benefits).
165. Because a purpose of the ESA is to provide for the conservation of endangered and threatened species, the benefits of actions taken under ESA are often measured in terms of the value placed by the public on species preservation (e.g., avoidance of extinction, and/or increase in a species' population). Such social welfare values for a species may reflect both use and non-use values for the species. Use values derive from a direct use for a species, such as commercial harvesting or recreational wildlife-viewing opportunities. Non-use values are not derived from direct use of the species, but instead reflect the utility the public derives from knowledge that a species continues to exist (e.g., existence or bequest values).
166. As a result of actions taken to preserve endangered and threatened species, such as habitat management, various other benefits may accrue to the public. Conservation measures for species and habitat may result in improved environmental quality, which in turn may have collateral human health or recreational use benefits. In addition, conservation measures 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, a section 7 consultation may result in avoiding the use of pesticides or herbicides within the habitat area. A reduction in the release of the chemicals may benefit water quality, and may also provide collateral benefits of preserving habitat for other species occupying these areas.

**5.2 QUANTIFYING DIRECT ECONOMIC BENEFITS OF CRITICAL HABITAT DESIGNATION FOR THE INVERTEBRATES**

167. Economists apply a variety of methodological approaches in estimating both use and nonuse values for species and for habitat improvements, including stated preference and revealed preference methods. Stated preference techniques include the contingent valuation method and conjoint analysis or contingent ranking methods. In simplest terms,

these methods employ survey techniques, asking respondents to state what they would be willing to pay for a resource or for programs designed to protect that resource. A substantial literature has developed that describes the application of this technique to the valuation of natural resource assets.

168. More specific to use values for species or habitats, revealed preference techniques examine individuals' behavior in markets in response to changes in environmental or other amenities (i.e., people "reveal" their value by their behavior). For example, travel cost models are frequently applied to value access to recreational opportunities, as well as to value changes in the quality and characteristics of these opportunities. Basic travel cost models are rooted in the idea that the value of a recreation resource can be estimated by analyzing the travel and time costs incurred by individuals visiting the site. Another revealed preference technique is hedonic analysis, which is often employed to determine the effect of specific site characteristics on property values.
169. Numerous published studies estimate individuals' willingness to pay to protect endangered species.<sup>149</sup> The economic values reported in these studies reflect various groupings of benefit categories (including both use and non-use values). For example, these studies assess public willingness to pay for wildlife-viewing opportunities, for the option for seeing or experiencing the species in the future, to assure that the species will exist for future generations, and simply knowing a species exists, among other values. This literature, however, addresses a relatively narrow range of species and circumstances compared to the hundreds of species and habitats that are the focus of the Act. Specifically, existing studies focus primarily on large mammal, bird, and fish species, and generally do not report values for incremental changes in the probability of species conservation and recovery. Importantly for this analysis, we are not aware of any published studies that estimate the value the public places on preserving invertebrate species.
170. An ideal study for use in valuing the use and non-use values that may derive from critical habitat designation for the invertebrates would be specific to the species, the policy question at hand (economic benefits specifically of the critical habitat designation), and the relevant population holding such values (e.g., citizens of Texas or of the U.S.). No such study has been undertaken to date, however.
171. Absent primary research specific to the policy question, resource management decisions can often be informed by applying the results of existing valuation research to a new policy question – a process known to economists as benefit transfer. Benefit transfer involves the application of unit value estimates, functions, data, and/or models from existing studies to estimate the benefits associated with the resource under consideration.
172. OMB has written guidelines for conducting credible benefit transfers. The important steps in the OMB guidance are: (1) specify the value to be estimated for the rulemaking;

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<sup>149</sup> See, for example, Richardson, L. and J. Loomis. March 2009. The Total Economic Value of Threatened, Endangered, and Rare Species: An Updated Meta-Analysis. *Ecological Economics* 68(5): 1535-1548.

and (2) identify appropriate studies to conduct benefits transfer based on the following criteria:

- The selected studies should be based on adequate data, sound and defensible empirical methods and techniques.
- The selected studies should document parameter estimates of the valuation function.
- The study and policy contexts should have similar populations (e.g., demographic characteristics). The market size (e.g., target population) between the study site and the policy site should be similar.
- The good, and the magnitude of change in that good, should be similar in the study and policy contexts.
- The relevant characteristics of the study and policy contexts should be similar.
- The distribution of property rights should be similar so that the analysis uses the same welfare measure (i.e., If the property rights in the study context support the use of willingness-to-accept measures while the rights in the rulemaking context support the use of willingness-to-pay measures, benefits transfer is not appropriate).
- The availability of substitutes across study and policy contexts should be similar.

173. According to these criteria, no existing studies are available for transfer of value estimates to the current policy question in order to quantify the value the public would place on actions taken to enhance probability of conservation and recovery of the invertebrate species.

### 5.3 POTENTIAL INCREMENTAL BENEFITS OF INVERTEBRATE CONSERVATION EFFORTS

174. This section describes the categories of benefits potentially resulting from incremental invertebrate conservation efforts within the study area. Exhibit 5-1 summarizes potential benefits associated with the specific invertebrate conservation efforts described in Chapter 4 of this report. The first column summarizes the invertebrate conservation efforts by land use activity. The second column identifies potential categories of ancillary benefits that may derive from implementation of these conservation efforts. A description of these categories of benefits is provided below. The final column of the exhibit identifies the units in which incremental benefits may occur.

175. The categories of economic benefit that may derive from incremental invertebrate conservation efforts described in this report include:

- **Property value benefits:** Open space or decreased density of development resulting from invertebrate conservation may increase adjacent or nearby property values.

- **Aesthetic benefits:** Social welfare gains may be associated with enhanced aesthetic quality of habitat. Preferences for aesthetic improvements may be measured through increased willingness-to-pay to visit a habitat region for recreation or increased visitation.
- **Improved water quality:** Managing economic activities that occur adjacent to riparian and aquatic habitats (e.g., agriculture, construction, and timber harvests) may improve water quality by reducing chemical runoff, erosion, and sedimentation. Water quality improvements may in turn have human health and human use (e.g., recreation) benefits, as well as facility maintenance cost benefits.<sup>150</sup>
- **Educational benefits:** Monitoring of karst preserves for the invertebrates confers educational benefits in that more is known about the species and where populations exist. This knowledge could help direct future conservation efforts.

176. Economists have conducted research on the economic value of open space. As described above, open space can provide aesthetic benefits, with subsequent positive impacts on property values in the surrounding community. Such benefits are not the purpose of critical habitat designation. In addition, applying this literature would involve transferring research results from other parts of the country and other contexts to the San Antonio area and the specific context of this rulemaking. Open space preservation is not the goal of the designation, and it is not possible to determine the probability that open space will generate property value or tourism benefits specifically within the critical habitat region absent primary research. Thus, the Service has decided not to include such estimates in the Economic Analysis.
177. In addition, a significant economics literature focuses on quantifying water quality improvements. In order to quantify this benefit, however, information is required on the specific change in water quality (e.g., change in pollutant loadings) associated with the invertebrate conservation efforts. Absent this information, the Service has decided not to include such estimates in the Economic Analysis.
178. Finally, the extent to which the education value of critical habitat designation improves the efficacy of future conservation effort for the species is significantly uncertain. The value of these educational benefits would in turn be improved probability of conservation and recovery for these species. For the reasons described above, available data are not available to monetize this educational benefit.
179. In addition to these categories of potential benefit, all of the conservation efforts described in Exhibit 5-1 are related to the broader conservation and recovery of the species. All conservation efforts therefore relate to the maintenance or enhancement of the use and non-use value (e.g., existence value) that the public may hold specifically for the invertebrates. Further, many of the conservation efforts undertaken for the invertebrates may also result in improvements to ecosystem health that are shared by

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<sup>150</sup> Moore, Walter B. and Bruce A. McCarl. 1987. Off-Site Costs of Soil Erosion: A Case Study in the Willamette Valley. *Western Journal of Agricultural Economics*. 12(1): 42-29.

other, coexisting species. The maintenance or enhancement of use and non-use values for these other species, or for biodiversity in general, may also result from these invertebrates conservation efforts.

**EXHIBIT 5-1. INVERTEBRATE CONSERVATION EFFORTS AND POTENTIAL ASSOCIATED ANCILLARY BENEFITS**

CONSERVATION EFFORT	POTENTIAL ASSOCIATED INCREMENTAL BENEFITS	UNITS APPLIED
<b>DEVELOPMENT</b>		
Avoidance of critical habitat	<ul style="list-style-type: none"> <li>• Property value benefits</li> <li>• Aesthetic benefits</li> <li>• Improved water quality</li> </ul>	Units 1e, 2, 3, 4, 5, 6, 8, 14, 17, 21, and 26
Creation of on- and/or off-site preserves	<ul style="list-style-type: none"> <li>• Property value benefits</li> <li>• Aesthetic benefits</li> <li>• Improved water quality</li> </ul>	Unit 22
Management and monitoring of preserves	<ul style="list-style-type: none"> <li>• Education benefits</li> </ul>	Unit 22
<b>TRANSPORTATION</b>		
Elevation of roadway	<ul style="list-style-type: none"> <li>• Improved water quality</li> </ul>	Units 14 and 26

**REFERENCES**

16 U.S.C. §1533(b)(2).

16 U.S.C. 1532.

175 F. 3d 1027, 1044 (D.C. Cir. 1999).

40 CFR Part 230.75.

5 U.S.C. §§601 *et seq.*

65 FR 81419.

67 FR 55063.

68 FR 17155.

76 FR 9871.

76 FR 9872.

76 FR 9881.

76 FR 9887.

76 FR 9888

76 FR 9890.

76 FR 9896.

76 FR 9896-9897

76 FR 9898

76 FR 9899.

76 FR 9900 - 9901.

773 F. 2d 327 (D.C. Cir. 1985).

Alamo Regional Mobility Authority, accessed by <http://www.alamorma.org/> on June 15, 2011.

Arizona Cattle Growers v. Salazar, 606 F. 3d 1160 (9<sup>th</sup> Cir. 2010), cert. denied, 179 L. Ed. 2d 300, 2011 U.S. Lexis 1362, 79 U.S.L.W. 3475 (2011).

Bexar County, Engineering Services & Public Works, September 2010. Pass Through Financing Program.

Bexar County, Infrastructure Services Department. April 1, 2011. Draft Southern Edwards Plateau Habitat Conservation

Biological Opinion for La Cantera Development Company 10(a)(1)(B) Permit TE-044512-0 in San Antonio, Bexar County, Texas.

- Bureau of Labor Statistics, Consumer Price Index – All Urban Consumers, All items less shelter, accessed at <http://www.bls.gov/cpi/data.htm> on June 17, 2011.
- Cape Hatteras Access Preservation Alliance v. Department of Interior*, 344 F. Supp. 2d 108 (D.D.C.).
- Center for Biological Diversity et al, Plaintiffs, v. United States Bureau of Land Management et al., Defendants and American Sand Association, et al, Defendant Intervenors*. Order re: Cross Motions for Summary Judgment, Case 3:03-cv-02509 Document 174 Filed 03/14/2006, pages 44-45.
- Center for Biological Diversity v. United States Bureau of Land Management*, 422 F. Supp. 2d 1115 (N.D. Cal. 2006).
- City of San Antonio Department of Planning and Community Development, “City of San Antonio Zoning GIS Data”. Updated May 12, 2011. Provided by the City of San Antonio on June 6, 2011.
- City of San Antonio Park Boundaries GIS Layer. Published April 14, 2010. Downloaded from <https://gis.sanantonio.gov/GIS/DownloadData.aspx> on March 24, 2011.
- City of San Antonio. “Edwards Aquifer Protection”. From <http://www.sanantonio.gov/edwards/background.asp> April 4, 2011.
- County of Bexar, Infrastructure Services Department. April 1, 2011. Draft Southern Edwards Plateau Habitat Conservation Plan. Accessed by <http://www.sephcp.com/documents.html> on April 14, 2011.
- CPS Energy, New Infrastructure, accessed by [http://www.cpsenergy.com/Developers\\_Builders/New\\_Infrastructure/](http://www.cpsenergy.com/Developers_Builders/New_Infrastructure/) on June 16, 2011.
- CPS Energy, Panther Springs Substation Project, accessed by [http://www.cpsenergy.com/files/Panther\\_Springs\\_brochure.pdf](http://www.cpsenergy.com/files/Panther_Springs_brochure.pdf) on June 16, 2011.
- CPS Energy, Who We Are, accessed by [http://www.cpsenergy.com/About\\_CPS\\_Energy/Who\\_We\\_Are/](http://www.cpsenergy.com/About_CPS_Energy/Who_We_Are/) on June 22, 2011.
- D. Kelly, April 25, 2011. Public Comment FWS-R2-ES-2010-0091-0015.
- Dialog search of File 516, Dun and Bradstreet, "Duns Market Identifiers," on June 24, 2011.
- 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.
- Eckhardt, Gregg. “Introduction to the Edwards Aquifer”. The Edwards Aquifer Website. <http://www.edwardsaquifer.net/intro.html>. Accessed June 6, 2011.

- Edwards Aquifer Authority. From <http://www.edwardsaquifer.org/files/Water%20Quality%20Reg%20Concept%20Memo%20Board%20Approved.pdf>, Accessed April 20, 2011
- Email Communication with J. Krejca, Zara Environmental, June 16, 2011.
- Email Communication with N. Lake, GCSNA Resource Specialist, Texas Parks and Wildlife Department, June 15, 2011.
- Email communication with S. Robertson, Texas Department of Transportation, June 14, 2011.
- Email Communication with Texas Parks and Wildlife Department, Government Canyon State Natural Area, June 8, 2011.
- Email Communication with U.S. Fish and Wildlife Service Biologist, February 7, 2011, May 5, 2011, May 6, 2011, May 26, 2011, and May 27, 2011.
- 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.
- Federal Government Schedule Rates, Office of Personnel Management, 2011
- Federal Housing Finance Agency, Home Price Index, accessed at <http://www.fhfa.gov/Default.aspx?Page=87> on June 17, 2011.
- FR 76 9901
- Get the 411 on 281, accessed by <http://www.411on281.com> on June 15, 2011.
- Gifford Pinchot Task Force v. United States Fish and Wildlife Service*, No. 03-35279 (9th Circuit 2004).
- Gramlich, Edward M., *A Guide to Benefit-Cost Analysis* (2nd Ed.), Prospect Heights, Illinois: Waveland Press, Inc., 1990.
- Highlands Dominion LLC, April 19, 2011. Comment on Proposed Critical Habitat Unit 24 Ref Proposed Critical Habitat Listing, Public Comment FWS-R2-ES-2010-0091-0005.1.
- Home Builders Association of Northern California v. United States Fish and Wildlife Service, 616 F.3d 983 (9<sup>th</sup> Cir. 2010), cert. denied, 179 L. Ed 2d 301, 2011 U.S. Lexis 1392, 79 U.S.L.W. 3475 (2011).
- Industrial Economics, Inc., “Economic Analysis of Critical Habitat Designation for Nine Bexar County, Texas Invertebrate Species,” prepared for the U.S. Fish and Wildlife Service, March 14, 2003.
- Karst Management and Maintenance Plan (KMMP) For Government Canyon State Natural Area. Revised February 14, 2003.

- 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>.
- Moore, Walter B. and Bruce A. McCarl. 1987. Off-Site Costs of Soil Erosion: A Case Study in the Willamette Valley. *Western Journal of Agricultural Economics*. 12(1): 42-29.
- More For Loop 1604, accessed by <http://www.morefor1604.com/> on June 15, 2011.
- New Mexico Cattle Growers Assn v. United States Fish and Wildlife Service*, 248 F.3d 1277 (10th Cir. 2001).
- OMB, "Circular A-4," September 17, 2003, available at <http://www.whitehouse.gov/sites/default/files/omb/assets/omb/circulars/a004/a-4.pdf>.
- Pape-Dawson Engineers, April 25, 2011. Public Comments re Endangered and Threatened Wildlife and Plans; Designation of Critical Habitat for Nine Bexar County, Texas Invertebrates, Critical Habitat Unit-9, Public Comment submitted on behalf of University of Texas San Antonio FWS-R2-ES-2010-0091-0013.3.
- Pape-Dawson Engineers, April 25, 2011. Public Comments re Endangered and Threatened Wildlife and Plans; Designation of Critical Habitat for Nine Bexar County, Texas Invertebrates, Critical Habitat Unit-14, Public Comment submitted on behalf of Stevens Ranch FWS-R2-ES-2010-0091-0012.3.
- Personal Communication with Bexar County, Texas. April 26, 2011.
- Personal Communication with City of San Antonio Parks and Recreation Department. May 13, 2011.
- Personal Communication with J. Krejca, Zara Environmental, June 3, 2011.
- Personal Communication with La Cantera Development Company, October 2002.
- Personal Communication with Robber Baron Preserve Manager, June 6, 2011.
- Personal Communication with the U.S. Fish and Wildlife Service, April 27, 2011.
- Personal Communication with U.S. Fish and Wildlife Service Biologist, May 9, 2011 and June 2, 2011.
- Pub Law No. 104-121.
- Richardson, L. and J. Loomis. March 2009. The Total Economic Value of Threatened, Endangered, and Rare Species: An Updated Meta-Analysis. *Ecological Economics* 68(5): 1535-1548.
- Risk Management Association, Annual Statement Studies: Financial Ratio Benchmarks 2010 to 2011, 2010.

- RMG Attorneys, April 22, 2011. Endangered and Threatened Wildlife and Plants, Designation of Critical Habitat for Nine Bexar County, Texas Invertebrates, Critical Habitat Unit-13, Public Comment submitted on behalf of the Northeast School District FWS-R2-ES-2010-0091-0032.1.
- Small Business Administration, Office of Advocacy. May 2003. A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act, pg. 20.
- Small Business Administration, Office of Advocacy. May 2003. A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act, pg. 21.
- SWCA Environmental Consultants, April 20, 2011. Technical Review and Comment on Proposed Critical Habitat Unit 25, Bexar County Texas, Public Comment submitted on behalf of Trinity University and the Oblates of Mary Immaculate FWS-R2-ES-2010-0091-0009.1.
- SWCA Environmental Consultants, April 25, 2011. La Cantera Development Company, San Antonio, Texas Comments on Critical Habitat Proposed Rule, Public Comment submitted on behalf of La Cantera Development Company FWS-R2-ES-2010-0091-0037.1.
- Texas Cave Management Association. “Robber Baron Preserve Management Plan”. From <http://www.tcmacaves.org/PDF/management/Robber-Baron-Preserve-Management-Plan.pdf> April 20, 2011.
- Tracking and Integrated Logging System (TAILS) database, provided by U.S. Fish and Wildlife Service Biologist, February 7, 2011.
- U.S. Code. Title 33, 1344.
- U.S. Environmental Protection Agency, “Sole Source Aquifer Protection Program.” From <http://water.epa.gov/infrastructure/drinkingwater/sourcewater/protection/solesourceaquifer.cfm>, April 20, 2011
- 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 Bexar County Invertebrates consultation record, including 21450-2007-F-0144 Federal Highway Administration; and 21450-2009-I-0173 Texas Department of Transportation.
- U.S. Fish and Wildlife Service Bexar County Invertebrates consultation record, including: 2-15-1996-0090 City Public Service of San Antonio; and 2-15-04-I-0109 W.F. Castella & Associates, Inc.
- U.S. Fish and Wildlife Service to Industrial Economics, Inc. April 21, 2011. “Incremental Effects Memorandum for the Economic Analysis of the Proposed Rule to Designate Critical habitat for the Nine Bexar County Invertebrates.”

- U.S. Fish and Wildlife Service, “Biological Opinion for La Cantera Development Company 10(a)(1)(B) Permit TE-044512-0 in San Antonio, Bexar County, Texas”.
- 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, March 12, 2009. Letter to Colonel Christopher W. Martin, District Engineer, U.S. Army Corps of Engineers.
- U.S. Fish and Wildlife Service, March 2008. “Bexar County Karst Invertebrates Draft Recovery Plan.”
- U.S. Fish and Wildlife Service, May 18, 2011. Consultation with Federal Highway Administration, 21450-2006-F-0132.
- U.S. Fish and Wildlife Service, November 13, 2009. Letter to Colonel Richard J. Muraski, Jr., District Engineer, U.S. Army Corps of Engineers.
- U.S. Fish and Wildlife Service. “Environmental Assessment/Habitat Conservation Plan for Issuance of an Endangered Species Act Section 10(a)(1)(B) Permit for the Incidental Take of Two Troglotic Ground Beetles (*Rhadine exilis* and *Rhadine infernalis*) and Madla Cave Meshweaver (*Cicurina madla*) During the Construction and Operation of Commercial Development on the Approximately 1,000-Acre La Cantera Property, San Antonio, Bexar County, Texas.” October, 2011.
- 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, “Draft 2003 Report to Congress on the Costs and Benefits of Federal Regulations; Notice,” 68 *Federal Register* 5492, February 3, 2003.
- U.S. Office of Management and Budget, February 7, 2011. “Regulatory Impact Analysis: Frequently Asked Questions (FAQs).” Accessed on May 3, 2011 by [http://www.whitehouse.gov/sites/default/files/omb/circulars/a004/a-4\\_FAQ.pdf](http://www.whitehouse.gov/sites/default/files/omb/circulars/a004/a-4_FAQ.pdf).

## APPENDIX A | SMALL BUSINESS ANALYSIS AND ENERGY IMPACTS ANALYSIS

1. 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 A.1 is conducted pursuant to the Regulatory Flexibility Act (RFA) as amended by the Small Business Regulatory Enforcement Fairness Act (SBREFA). Information for this analysis was gathered from the Small Business Administration (SBA), the Service, and from interviews with stakeholders contacted in the development of the economic analysis. The energy analysis in Section A.2 is conducted pursuant to Executive Order No. 13211.
2. The analyses of impacts to small entities and the energy industry rely on the estimated incremental impacts resulting from the proposed revised 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. Any baseline impacts associated with the listing of the invertebrates and other Federal, State, and local regulations and policies are expected to occur regardless of the outcome of this rulemaking.

### A.1 SBREFA ANALYSIS

3. When a Federal agency proposes a regulation, 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).<sup>1</sup> 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 invertebrate critical habitat designation to affect small entities.
4. 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 revised 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.

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<sup>1</sup> 5 U.S.C. § 601 et seq.

**A.1.1 DESCRIPTION AND TYPES OF SMALL ENTITIES TO WHICH THE RULE WILL APPLY**

5. 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 Act 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 Act 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 impact, of specifying any particular areas as critical habitat.” The Secretary’s discretion is limited as (s)he may not exclude areas if so doing “will result in the extinction of the species.”
6. 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 North American Industry Classification System (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.
7. The courts have held that the RFA/SBREFEA 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.<sup>2</sup>

8. 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.<sup>3</sup> 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.
9. 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.<sup>4</sup> “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.”<sup>5</sup>
10. The regulatory mechanism through which critical habitat protections are enforced is section 7 of the Act, 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. Although businesses affected indirectly are considered, this analysis considers only those entities for which impact would not be measurably diluted.
11. This screening analysis is based on the estimated incremental impacts associated with the proposed rulemaking as described in Chapter 4. Incremental costs of critical habitat designation quantified in this analysis are due to:
  - Reductions in land value due to development restrictions following the designation of critical habitat for the invertebrates;

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<sup>2</sup> 773 F. 2d 327 (D.C. Cir. 1985).

<sup>3</sup> 175 F. 3d 1027, 1044 (D.C. Cir. 1999).

<sup>4</sup> Small Business Administration, Office of Advocacy. May 2003. A Guide for Government Agencies: How to Comply with the Regulatory Flexibility Act, pg. 20.

<sup>5</sup> *Ibid.*, pg. 21.

- Project modifications associated with development that does occur;
  - Project modifications associated with one transportation project located within critical habitat; and
  - Consultation costs related to development and transportation projects.
12. The affected transportation agencies (Federal Highway Administration, Texas Department of Transportation, Westside 211 Public Improvement District, and the Alamo Regional Mobility Authority) are Federal and State agencies that, by definition, are not small entities. Thus this screening analysis focuses on impacts to development activities, which may be experienced by small entities.

#### A.1.2 POTENTIAL IMPACTS TO RESIDENTIAL AND COMMERCIAL DEVELOPMENT ACTIVITIES

13. This analysis expects invertebrate conservation efforts to affect the current landowners of the parcels subject to development restrictions. This is because restrictions on the use of the land due to critical habitat designation will likely be reflected in the price paid for the parcel. The costs of the development restrictions are therefore ultimately borne by the current landowner in the form of reduced land values.
14. Landowners may be private individuals (i.e., families), private business (e.g., farm or other commercial property owners), Federal, State, or local government entities. As such, not all landowners are businesses and therefore relevant to the analysis of impacts to small entities. No NAICS code exists for landowners, and SBA does not provide a definition of a small landowner. To narrow the suite of potentially affected landowners to those that may be small businesses, we focus our analysis only on private landowners. The Federal, State of Texas, Bexar County, and City of San Antonio governments are not small entities and therefore land value losses experienced by these landowners are not relevant to the analysis of impacts to small entities.
15. Exhibit A-1 highlights the number of private landowners of parcels for which our analysis forecasts development impacts (as described in Chapter 4) according to our low and high end incremental impact scenarios. Overall, we expect that 20 to 218 private landowners in 12 proposed critical habitat units may experience impacts of land value losses due to development restrictions. This assumes that each developable parcel subject to development restrictions because of critical habitat is owned by a unique landowner (i.e., no landowner owns, and therefore experiences land value loss impacts of, more than one parcel).

EXHIBIT A-1. ESTIMATED NUMBER OF LANDOWNERS EXPERIENCING IMPACTS OF CRITICAL HABITAT DESIGNATION

UNIT	LOW END		HIGH END	
	ACRES OF DEVELOPABLE LAND SUBJECT TO INCREMENTAL IMPACTS	NUMBER OF AFFECTED LANDOWNERS	ACRES OF DEVELOPABLE LAND SUBJECT TO INCREMENTAL IMPACTS	NUMBER OF AFFECTED LANDOWNERS
1e	0	0	117	5
2	12	2	213	22
3	3	2	3	2
4	15	3	15	3
5	1	0	1	0
6	2	5	13	11
8	0	0	152	52
14	0	0	330	4
17	7	2	84	13
21	0	0	157	70
22	8	5	120	28
26	20	1	117	8
<b>Total</b>	<b>68</b>	<b>20</b>	<b>1,322</b>	<b>218</b>

Source: Bexar County Appraisal District, 2010 Bexar County parcel data, provided by U.S. Fish and Wildlife Service on April 29, 2011.

Notes:

- (a) Only units with incremental development impacts are included.
- (b) Among these units, only parcels available for development are analyzed.
- (c) Federal, state, city, and county-owned land are excluded.
- (d) Lands considered for exclusion are not included in this analysis.
- (e) Number of affected landowners is the number of parcels associated with the lost development values reflecting the assumption that each parcel is owned by a unique landowner.

16. As noted above, it is likely that not all of these landowners are small business. However, the extent to which landowner are not business (e.g., individuals or family landowners) is unknown. Because all of the parcels experiencing impacts in this analysis are characterized as developable lands, one type of landowner that may be a small business is developers. Developers may own parcels of vacant, developable land in order to develop the parcels in the future.
17. Absent information regarding the extent to which landowners are developers, we conservatively assume that all private landowners subject to development restrictions in this analysis are developers. Exhibit A-2 considers the extent to which these developers may be small entities, describing the total number of developers, and the number and percent of the developers that are small businesses, as defined by the SBA, within Bexar County. Based on these data, nearly all developers within the County are considered small businesses. Specifically, of the total number of entities engaged in single-family construction, multi-family construction, new housing operative builders, and land subdivision, 98 percent are small.

EXHIBIT A-2. TOTAL ENTITIES AND SMALL ENTITIES IN THE DEVELOPMENT INDUSTRY IN BEXAR COUNTY

NAICS CODE	DESCRIPTION	SMALL BUSINESS THRESHOLD (AVERAGE ANNUAL RECEIPTS)*	NUMBER OF ENTITIES IN BEXAR COUNTY	NUMBER OF SMALL ENTITIES IN BEXAR COUNTY	PERCENT SMALL ENTITIES
236115	New Single-Family Housing Construction	< \$33,500,000	2,841	2,811	99%
236116	New Multifamily Housing Construction	< \$33,500,000	226	219	97%
236117	New Housing Operative Builders	< \$33,500,000	47	24	51%
237210	Land Subdivision	< \$7,000,000	265	254	96%
<b>TOTAL</b>			<b>3,379</b>	<b>3,308</b>	<b>98%</b>
Source: Dialog search of File 516, Dun and Bradstreet, "Duns Market Identifiers," on June 24, 2011. *Small business thresholds are defined by the Small Business Administration.					

18. As described above, we assume that one developer is associated with each affected land parcel. Therefore a maximum of 218 small developers may be affected by critical habitat designation for the invertebrates. This equates to about 6.6 percent of the total small developers (3,308 as described in Exhibit A-1) within Bexar County. This assumption likely overstates the number of affected small developers for two reasons:
1. Some fraction of the affected landowners are most likely not developers; and
  2. Individual developers may own more than one of the potentially affected parcels.
19. Exhibit A-3 describes the potential average annualized impacts of critical habitat designation per small developer. These impacts are then compared to average annual sales per small business in the development sector. **On average, annualized incremental impacts per small developer represent 0.10 to 0.14 percent of small developers' annual average sales.**
20. In summary, 20 to 218 small developers annually may be affected by the proposed rule and annualized per entity impacts range from \$6,400 to \$8,660. This compares to average annual sales of small developers of \$6.36 million. Importantly, these estimates reflect average per company impacts of critical habitat designation. In the case that one small developer owns more than one parcel forecast to experience land value losses, impacts to that developer are underestimated. To the extent that a number of the landowners are not small developers, per developer impacts are overestimated.

EXHIBIT A-3. ESTIMATED PRIVATE LANDOWNER INCREMENTAL IMPACTS IN PROPOSED INVERTEBRATE CRITICAL HABITAT

SCENARIO	ANNUALIZED IMPACTS TO SMALL BUSINESS SECTOR <sup>A</sup>	ANNUALIZED IMPACT PER DEVELOPER <sup>B</sup>	AVERAGE ANNUAL SALES PER SMALL BUSINESS <sup>C</sup>	ANNUALIZED IMPACT PER DEVELOPER AS A PERCENT OF TOTAL SALES
Low-End	\$128,000	\$6,400	\$6,360,000	0.10%
High-End	\$1,890,000	\$8,660	\$6,360,000	0.14%
<p>Notes:</p> <p>(a) Annualized (seven percent discount rate) incremental impacts to privately-owned parcels in Karst Zones 1, 2, and 3 over 29-year time period.</p> <p>(b) Analysis assumes that 20 developers will be affected in the low-end and 218 will be affected in the high-end.</p> <p>(c) Average annual sales are estimated using Risk Management Association (RMA), <i>Annual Statement Studies: Financial Ratio Benchmarks 2010 to 2011</i>, 2010. For each NAICS code, RMA provides the net sales and the number of entities falling within several sales categories: \$0 to \$500,000, \$500,000 to \$2 million, \$2 to \$10 million, or \$10 to \$50 million. Based on the number of entities and total net sales falling within each sales category, we developed an estimate of average net sales (revenues) per small entity. Specifically, the analysis averages data for the sales categories at or below the small business threshold for each industry.</p>				

**A.2 POTENTIAL IMPACTS TO THE ENERGY INDUSTRY**

21. 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.”<sup>6</sup>
22. 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;
  - 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 thousand cubic feet per year;

<sup>6</sup> 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>.

- 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.<sup>7</sup>

23. As described in Chapter 4, critical habitat designation for the invertebrates is anticipated to impact development and transportation activities. Resource extraction, energy production and/or distribution are not expected to be affected. Because none of the above criteria are relevant to this analysis, energy-related impacts within the proposed critical habitat designation are not anticipated.

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<sup>7</sup> *Ibid.*

**APPENDIX B | THREE PERCENT DISCOUNT RATE EXHIBITS**

1. This appendix summarizes the costs of invertebrate conservation efforts quantified in Chapter 4 of this report applying an alternative real discount rate of three percent (the main text of the report applies a real discount rate of seven percent). This analysis employs standard discounting techniques to calculate the present value of economic impacts that are expected to occur at different points in time. Consistent with the main analysis, this appendix focuses on quantified estimates of economic impacts to development and transportation activities within the proposed revised critical habitat area.
2. Exhibit B-1 summarizes the estimated incremental economic impacts by unit and Karst Zone. Exhibits B-2 and B-3 provides the incremental impacts to development and transportation activities by unit and Karst Zone, respectively.

EXHIBIT B-1. TOTAL ESTIMATED INCREMENTAL IMPACTS BY UNIT AND KARST ZONE (\$2011, DISCOUNTED AT THREE PERCENT)

UNIT	20-YEAR IMPACTS (2012-2031)		IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
AREAS PROPOSED FOR DESIGNATION IN KARST ZONES 1 AND 2				
1a	\$0	\$0	\$0	\$0
1b	\$0	\$0	\$0	\$0
1c	\$0	\$0	\$0	\$0
1d	\$0	\$0	\$0	\$0
1e	\$0	\$803,000	\$0	\$3,720
1f	\$0	\$0	\$0	\$0
2	\$0	\$3,280,000	\$0	\$14,900
3	\$0	\$0	\$0	\$0
4	\$0	\$0	\$0	\$0
5	\$0	\$0	\$0	\$0
6	\$0	\$1,370,000	\$0	\$6,690
7	\$0	\$0	\$0	\$0
8	\$0	\$5,840,000	\$0	\$43,900
9	\$3,190	\$3,190	\$0	\$0
10a	\$0	\$0	\$0	\$0
10b	\$0	\$0	\$0	\$0
11a	\$0	\$0	\$0	\$0
11b	\$0	\$0	\$0	\$0
11c	\$0	\$0	\$0	\$0
11d	\$0	\$0	\$0	\$0
11e	\$0	\$0	\$0	\$0
12	\$4,850	\$4,850	\$0	\$0
13	\$0	\$0	\$0	\$0
14	\$2,360	\$3,380,000	\$0	\$2,970
15	\$0	\$0	\$0	\$0
16	\$1,570	\$1,570	\$0	\$0
17	\$0	\$1,170,000	\$0	\$8,920
19	\$1,570	\$1,570	\$0	\$0
20	\$0	\$0	\$0	\$0
21	\$0	\$12,500,000	\$0	\$53,500

UNIT	20-YEAR IMPACTS (2012-2031)		IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
22	\$0	\$961,000	\$0	\$19,800
23	\$0	\$0	\$0	\$0
24	\$0	\$0	\$0	\$0
25	\$0	\$0	\$0	\$0
26	\$2,360	\$6,240,000	\$0	\$5,200
<b>Subtotal</b>	<b>\$15,900</b>	<b>\$35,600,000</b>	<b>\$0</b>	<b>\$159,000</b>
<b>Annualized</b>	<b>\$1,070</b>	<b>\$2,390,000</b>	<b>\$0</b>	<b>\$20,500</b>
<b>AREAS PROPOSED FOR DESIGNATION IN KARST ZONE 3</b>				
1a	\$0	\$0	\$0	\$0
1b	\$0	\$0	\$0	\$0
1c	\$0	\$0	\$0	\$0
1d	\$0	\$0	\$0	\$0
1e	\$0	\$0	\$0	\$0
1f	\$0	\$0	\$0	\$0
2	\$215,000	\$215,000	\$5,950	\$5,950
3	\$155,000	\$155,000	\$5,950	\$5,950
4	\$303,000	\$303,000	\$8,920	\$8,920
5	\$12,500	\$12,500	\$0	\$0
6	\$112,000	\$112,000	\$14,900	\$14,900
7	\$0	\$0	\$0	\$0
8	\$0	\$0	\$0	\$0
9	\$0	\$0	\$0	\$0
10a	\$0	\$0	\$0	\$0
10b	\$0	\$0	\$0	\$0
11a	\$0	\$0	\$0	\$0
11b	\$0	\$0	\$0	\$0
11c	\$0	\$0	\$0	\$0
11d	\$0	\$0	\$0	\$0
11e	\$0	\$0	\$0	\$0
12	\$0	\$0	\$0	\$0
13	\$0	\$0	\$0	\$0
14	\$0	\$0	\$0	\$0
15	\$0	\$0	\$0	\$0
16	\$0	\$0	\$0	\$0

UNIT	20-YEAR IMPACTS (2012-2031)		IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
17	\$129,000	\$129,000	\$5,950	\$5,950
19	\$0	\$0	\$0	\$0
20	\$0	\$0	\$0	\$0
21	\$0	\$0	\$0	\$0
22	\$119,000	\$119,000	\$17,200	\$17,200
23	\$0	\$0	\$0	\$0
24	\$0	\$0	\$0	\$0
25	\$0	\$0	\$0	\$0
26	\$673,000	\$673,000	\$2,970	\$2,970
<b>Subtotal</b>	<b>\$1,720,000</b>	<b>\$1,720,000</b>	<b>\$61,800</b>	<b>\$61,800</b>
<b>Annualized</b>	<b>\$116,000</b>	<b>\$116,000</b>	<b>\$7,930</b>	<b>\$7,930</b>
<b>TOTAL</b>	<b>\$1,730,000</b>	<b>\$37,300,000</b>	<b>\$61,800</b>	<b>\$221,000</b>
<b>ANNUALIZED</b>	<b>\$117,000</b>	<b>\$2,510,000</b>	<b>\$7,930</b>	<b>\$28,400</b>
<b>AREAS CONSIDERED FOR EXCLUSION</b>				
1e	\$1,620	\$1,620	\$0	\$0
3	\$1,620	\$1,620	\$0	\$0
6	\$1,620	\$1,620	\$0	\$0
8	\$1,620	\$1,620	\$0	\$0
17	\$1,620	\$1,620	\$0	\$0
<b>TOTAL</b>	<b>\$8,090</b>	<b>\$8,090</b>	<b>\$0</b>	<b>\$0</b>
<b>ANNUALIZED</b>	<b>\$544</b>	<b>\$544</b>	<b>\$0</b>	<b>\$0</b>

EXHIBIT B-2. TOTAL ESTIMATED INCREMENTAL IMPACTS TO DEVELOPMENT BY UNIT AND KARST ZONE (\$2011, DISCOUNTED AT THREE PERCENT)

UNIT	20-YEAR IMPACTS (2012-2031)		IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
<b>AREAS PROPOSED FOR DESIGNATION IN KARST ZONES 1 AND 2</b>				
1e	\$0	\$803,000	\$0	\$3,720
2	\$0	\$3,280,000	\$0	\$14,900
6	\$0	\$1,370,000	\$0	\$6,690
8	\$0	\$5,840,000	\$0	\$43,900

UNIT	20-YEAR IMPACTS (2012-2031)		IMPACTS AFTER 20 YEARS (2032-2040)	
	LOW END	HIGH END	LOW END	HIGH END
9	\$1,620	\$1,620	\$0	\$0
14	\$0	\$3,380,000	\$0	\$2,970
17	\$0	\$1,170,000	\$0	\$8,920
21	\$0	\$12,500,000	\$0	\$53,500
22	\$0	\$961,000	\$0	\$19,800
26	\$0	\$3,270,000	\$0	\$5,200
<b>Subtotal</b>	<b>\$1,620</b>	<b>\$32,600,000</b>	<b>\$0</b>	<b>\$159,000</b>
<b>Annualized</b>	<b>\$109</b>	<b>\$2,190,000</b>	<b>\$0</b>	<b>\$20,500</b>
<b>AREAS PROPOSED FOR DESIGNATION IN KARST ZONE 3</b>				
2	\$215,000	\$215,000	\$5,950	\$5,950
3	\$155,000	\$155,000	\$5,950	\$5,950
4	\$303,000	\$303,000	\$8,920	\$8,920
5	\$12,500	\$12,500	\$0	\$0
6	\$112,000	\$112,000	\$14,900	\$14,900
17	\$129,000	\$129,000	\$5,950	\$5,950
22	\$119,000	\$119,000	\$17,200	\$17,200
26	\$673,000	\$673,000	\$2,970	\$2,970
<b>Subtotal</b>	<b>\$1,720,000</b>	<b>\$1,720,000</b>	<b>\$61,800</b>	<b>\$61,800</b>
<b>Annualized</b>	<b>\$116,000</b>	<b>\$116,000</b>	<b>\$7,930</b>	<b>\$7,930</b>
<b>TOTAL</b>	<b>\$1,720,000</b>	<b>\$34,300,000</b>	<b>\$61,800</b>	<b>\$221,000</b>
<b>ANNUALIZED</b>	<b>\$116,000</b>	<b>\$2,310,000</b>	<b>\$7,930</b>	<b>\$28,400</b>
<b>AREAS CONSIDERED FOR EXCLUSION</b>				
1e	\$1,620	\$1,620	\$0	\$0
3	\$1,620	\$1,620	\$0	\$0
6	\$1,620	\$1,620	\$0	\$0
8	\$1,620	\$1,620	\$0	\$0
17	\$1,620	\$1,620	\$0	\$0
<b>TOTAL</b>	<b>\$8,090</b>	<b>\$8,090</b>	<b>\$0</b>	<b>\$0</b>
<b>ANNUALIZED</b>	<b>\$544</b>	<b>\$544</b>	<b>\$0</b>	<b>\$0</b>

**EXHIBIT B-3. TOTAL ESTIMATED INCREMENTAL IMPACTS TO TRANSPORTATION BY UNIT AND KARST ZONE (\$2011, DISCOUNTED AT THREE PERCENT)**

UNIT	20-YEAR IMPACTS (2012-2031)	
	LOW END	HIGH END
AREAS PROPOSED FOR DESIGNATION IN KARST ZONES 1 AND 2		
9	\$1,570	\$1,570
12	\$4,850	\$4,850
14	\$2,360	\$2,360
16	\$1,570	\$1,570
19	\$1,570	\$1,570
26	\$2,360	\$2,980,000
<b>TOTAL</b>	<b>\$14,300</b>	<b>\$2,990,000</b>
<b>ANNUALIZED</b>	<b>\$960</b>	<b>\$201,000</b>

**APPENDIX C | UNDISCOUNTED IMPACTS BY ECONOMIC ACTIVITY**

1. This appendix summarizes undiscounted impacts by year for each economic activity. These details are provided in accordance with OMB guidelines for developing benefit and cost estimates. OMB directs the analysis to: “include separate schedules of the monetized benefits and costs that show the type and timing of benefits and costs, and express the estimates in this table in constant, undiscounted dollars.”<sup>1</sup> Exhibit C-1 and C-2 summarize potential undiscounted incremental impacts to development and transportation activities (as described in Chapter 4).

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<sup>1</sup> Office of Management and Budget, Circular A-4, September 17, 2003, p. 18). The reference to “constant” dollars indicates that the effects of general price level inflation (the tendency of all prices to increase over time) should be removed through the use of an inflation adjustment index.

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**EXHIBIT C-1 UNDISCOUNTED INCREMENTAL IMPACTS TO DEVELOPMENT ACTIVITIES BY UNIT, YEAR, AND IMPACT SOURCE (2012-2040, 2011 DOLLARS)**

UNIT	YEAR(S)	LOW END	HIGH END	DESCRIPTION
<b>AREAS PROPOSED FOR DESIGNATION IN KARST ZONES 1 AND 2</b>				
1e	2012	\$0	\$814,000	Loss of development value
2		\$0	\$3,320,000	
3		\$0	\$0	
4		\$0	\$0	
5		\$0	\$0	
6		\$0	\$1,390,000	
8		\$0	\$5,860,000	
14		\$0	\$3,470,000	
17		\$0	\$1,170,000	
21		\$0	\$12,700,000	
26		\$0	\$3,340,000	
22	2012	\$0	\$912,000	Creation of on-site and/or off-site preserves
22	All years, 2012 through 2040	\$0	\$7,950	Karst Preserve Management and Monitoring
1e	All years, 2012 through 2040	\$0	\$862	Administrative cost of consultation
2		\$0	\$3,450	
3		\$0	\$0	
4		\$0	\$0	
5		\$0	\$0	
6		\$0	\$1,550	
8		\$0	\$10,200	
14		\$0	\$690	
17		\$0	\$2,070	
21		\$0	\$12,400	
22		\$0	\$4,310	
26	\$0	\$1,210		
9	2012	\$1,670	\$1,670	Administrative Cost of reinitiating consultation on La Cantera HCP
<b>AREAS PROPOSED FOR DESIGNATION IN KARST ZONE 3</b>				
1e	2012	\$0	\$0	Loss of development value
2		\$200,000	\$200,000	
3		\$138,000	\$138,000	
4		\$280,000	\$280,000	
5		\$12,900	\$12,900	

UNIT	YEAR(S)	LOW END	HIGH END	DESCRIPTION
6		\$62,800	\$62,800	
8		\$0	\$0	
14		\$0	\$0	
17		\$112,000	\$112,000	
21		\$0	\$0	
26		\$683,000	\$683,000	
22	2012	\$61,300	\$61,300	Creation of on-site and/or off-site preserves
22	All years, 2012 through 2040	\$534	\$534	Karst Preserve Management and Monitoring
1e	All years, 2012 through 2040	\$0	\$0	Administrative cost of consultation
2		\$1,380	\$1,380	
3		\$1,380	\$1,380	
4		\$2,070	\$2,070	
5		\$0	\$0	
6		\$3,450	\$3,450	
8		\$0	\$0	
14		\$0	\$0	
17		\$1,380	\$1,380	
21		\$0	\$0	
22		\$3,450	\$3,450	
26		\$690	\$690	
<b>AREAS CONSIDERED FOR EXCLUSION</b>				
1e	2012	\$1,670	\$1,670	Administrative Cost of reinitiating consultation on La Cantera HCP
3				
6				
8				
17				

**EXHIBIT C-2 UNDISCOUNTED INCREMENTAL IMPACTS TO TRANSPORTATION ACTIVITIES BY UNIT, YEAR, AND IMPACT SOURCE (2012-2031, 2011 DOLLARS)**

UNIT	YEAR(S)	LOW END	HIGH END	DESCRIPTION
AREAS PROPOSED FOR DESIGNATION IN KARST ZONES 1 AND 2				
9	2013	\$1,670	\$1,670	Administrative cost of consultation on Loop 1604 project
16				
19				
12	2012	\$5,000	\$5,000	Administrative cost of consultation on US 281 project
14	2013	\$2,500	\$2,500	Administrative cost of consultation on US 211 project
26				
26	2013	\$0	\$3,160,000	Cost of elevating roadway over critical habitat

APPENDIX D | INFORMATION FROM THE U.S. FISH AND WILDLIFE SERVICE REGARDING POTENTIAL CHANGES IN CONSULTATION FOR NINE BEXAR COUNTY INVERTEBRATES FOLLOWING DESIGNATION OF CRITICAL HABITAT



# United States Department of the Interior

## FISH AND WILDLIFE SERVICE

10711 Burnet Road, Suite 200  
Austin, Texas 78758  
(512) 490-0057  
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APR 21 2011

TO: Industrial Economics, Incorporated, Cambridge, Massachusetts 02106

FROM: *Acting* *Olivia Skuff*  
Field Supervisor, Austin Ecological Services Field Office, Austin, Texas 78758

SUBJECT: Incremental Effects Memorandum for the Economic Analysis of the Proposed Rule to Designate Critical Habitat for Nine Bexar County Invertebrates

### Introduction

This document provides information for an economic analysis of the proposed critical habitat designation for nine Bexar County invertebrates - *Rhadine exilis* (ground beetle, no common name), *Rhadine infernalis* (ground beetle, no common name), Helotes mold beetle, Cokendolpher Cave harvestman, Robber Baron Cave meshweaver, Madla Cave meshweaver, Braken Bat Cave meshweaver, Government Canyon Bat Cave meshweaver, and Government Canyon Bat Cave spider. (76 FR 9872, Feb. 22, 2011).

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 a particular area as 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 designation.

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 critical habitat 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. 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 information provided below is intended to identify the possible differences for the nine Bexar County invertebrates under the different section 7 standards.

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## **Background**

We are proposing to designate approximately 6,906 acres (ac) (2,795 hectares (ha)) of critical habitat in 35 units. These units are all occupied by one or more of the nine Bexar County invertebrates. This total does not include 4,049 ac (1639 ha) of land exempted from designation that is associated with the Camp Bullis Military Reservation's Integrated Natural Resource Management Plan. The proposed critical habitat designation includes lands under State, City, and private ownership. Parts of these lands are subject to residential and commercial development, recreational use, mining, livestock grazing, and transportation projects. The areas proposed for designation include the footprint of the occupied karst feature, connected mesocaverns, its surface and subsurface drainage area, the cave cricket foraging area, and a distance from the cave cricket area to protect against edge effects. We tried to include at least 100 ac (40 ha) of native vegetation in each proposed unit.

## **Baseline Analysis (without Critical Habitat)**

The following discussion describes the existing regulatory circumstances that are in effect or anticipated without critical habitat. In the baseline scenario, section 7 of the Endangered Species 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 any of the nine Bexar County invertebrates.

### *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 survival and recovery in the wild be appreciably reduced.

Because of the nature of these species' habitat, various locations are isolated from other locations and could not be re-colonized if the species was lost there. Therefore, loss of a species at any site that is isolated from other known occupied locations will result in some decline in the likelihood of species survival. How significant that loss is overall to the species will depend on such things as the total number, size, and distribution of occupied locations. When enough populations of an adequate size and distribution remain and are protected, then the probability of the species surviving is high. When a location is lost or reduced in size and quality to the point where species survival at that site is low and where that loss occurs in an area where remaining numbers, size, and distribution of protected locations is not enough to provide for recovery, then the action has jeopardized the listed species in the wild.

### *What types of project impacts could potentially result in jeopardy?*

In the case of the nine Bexar County invertebrates, we use habitat as a proxy for the number of species taken because it is not possible to determine the population size at a particular location. It is difficult to survey for these species because they are small, elusive, and often retreat into

mesocaverns where they cannot be seen or collected. The concept of using habitat as a proxy for species numbers was upheld in *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, No. 03-35279. Actions that could potentially result in a jeopardy determination for any of the nine Bexar County invertebrates are those that result in the loss of a location or the reduction in size and quality of a location to the point where species survival at that location is low and where that loss occurs in an area where remaining numbers, size, and distribution of protected locations is not enough to provide for recovery. If this occurs, then the action may very well have jeopardized the species. Examples include significant reduction of the water quality entering the surface and/or subsurface drainage area of an occupied location, removal of a substantial amount of karst from the core habitat area, and/or removal of substantial amounts of vegetation from the cave cricket foraging or core vegetation areas.

*What types of project modifications are currently recommended or will likely be recommended by the Service to avoid jeopardy?*

To date, no consultations have resulted in a determination of jeopardy for any of the Bexar County karst invertebrates. If we encounter one in the future, we may recommend project modifications to reduce the effect of the proposed action to a level where it would not impact the species' numbers, reproduction, or distribution so that the likelihood of survival and recovery in the wild would not be appreciably reduced. Recommended modifications could include, but are not limited to, the following: (1) move the development area outside of the surface and subsurface drainage basin; (2) move the development area outside the cave cricket foraging area (115 yards (105 meters) from cave); (3) halt construction if any voids are hit during excavation activities and have a permitted biologist assess the feature for potential karst invertebrate habitat; (4) ensure that vegetated areas of adequate sizes are left intact; and/or (5) set up protected preserve(s) to offset impacts.

*Federal agencies and other project proponents that are likely to consult with the Service under section 7 without Critical Habitat*

Federal agencies and projects that would likely go through the section 7 consultation process without critical habitat include Federal Highway Administration for federally funded highway projects, the U.S. Corps of Engineers when they issue Section 404 permits for developments (including stream crossings) in wetland areas, Department of Defense when their actions on Camp Bullis may affect these species, and U.S. Fish & Wildlife Service when we consider issuing section 10(a)(1)(B) permit applications.

*Service administrative effort for section 7 consultations without critical habitat*

We estimate that without critical habitat, we would conduct approximately 75 informal and 5 formal consultations per year.

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

Government Canyon State Natural Area -- Some of the listed species have been verified from seven caves in the 8,622-ac (3489-ha) Government Canyon State Natural Area (GCSNA). An

additional three caves potentially have listed species; the specimens are either a sight record or awaiting verification. Four more caves (see below) containing listed species on the adjoining Lowder Tract (acquired by section 6 funding) are also managed by GCSNA. Most of these caves receive management under a Karst Management and Maintenance Plan to protect surface and groundwater quality, in addition to terrestrial and subterranean ecosystems. The current and anticipated land use and management activities in GCSNA provide substantial voluntary conservation benefits.

Camp Bullis Management of Karst Species - Camp Bullis Training Site is a 43.7-mile (mi)<sup>2</sup> (113.3-kilometer (km)<sup>2</sup>) facility under the command of Fort Sam Houston (U.S. Army), Texas. It contains 26 caves with listed karst invertebrates (Madla Cave meshweaver, *Rhadine exilis*, and *R. infernalis*). These caves receive management to eliminate, and prevent harm to these and other rare karst species on Camp Bullis. While Camp Bullis is currently providing significant conservation benefit to the listed species, national security interests could override the endangered species protections in the future according to section 7(j) of the Act.

Texas Cave Management Association - The Texas Cave Management Association (TCMA) owns and manages Robber Baron Cave, which is the single locality for Cokendolpher Cave harvestman and one of the two known locations of Robber Baron Cave meshweaver. Previously, a concrete bunker was over the cave entrance and prevented cave cricket access. The TCMA received a grant from the Service's Partners for Fish and Wildlife Program and have replaced the old gate with one that allows adequate movement of cave crickets, moisture, and air. Since the gate installation, in-cave air quality and habitat conditions have steadily improved. In July 2008, Dr. George Veni documented more observations of Robber Baron Cave meshweaver and cave crickets than in the previous 32 years that he has visited the cave. Although TCMA owns and voluntarily manages a small area around the cave entrance and controls access, these actions provide little protection against destruction or adverse modification of habitat from activities on the surface and subsurface drainage area and overlying karst that is already largely developed.

Proposition 3 - On May 6, 2000, the citizens of San Antonio passed a "Parks Development and Expansion Venue Project Proposition" (Proposition 3) to raise \$65 million through a temporary tax increase for the acquisition of open space over the Edwards Aquifer recharge zone. Some of the acquired areas are the Medallion, Crownridge Canyon, and Woodland Hills properties. Robber's Cave, a Madla Cave meshweaver location, is located on the Medallion property. Crownridge Canyon Cave, a locality for *R. infernalis*, is located on the Crownridge property. Breathless Cave, located on the Woodland Hills property, is known to contain Madla Cave meshweaver. In addition, purchase of the Thrift tract added protection to the surface drainage basin for John Wagner Ranch Cave No. 3. Much of the Proposition 3 land remains uninvestigated for caves, and therefore has additional potential to contribute to species recovery. Ownership of these tracts for water quality protection makes commercial and residential development unlikely and provides some conservation benefit to the species. However, the full protection necessary to provide for karst invertebrate survival and recovery may not be provided. For example, treatment to control fire ants may not be provided, and it is our understanding that under Proposition 3 the properties could be used for some recreational uses, such as soccer fields, that may not be consistent with protection of the karst invertebrates.

La Cantera Habitat Conservation Plan (HCP) - Three listed karst invertebrate species, Madla Cave meshweaver, *Rhadine. exilis*, and *R. infernalis*, are known to occur on the approximately 1,000-acre (405-ha) La Cantera development property. The HCP was developed in association with a request for an incidental take permit to develop the property. The La Cantera HCP resulted in the establishment of two one-ac (0.4-ha) development setbacks around two on-site caves known to contain listed species and five off-site preserves, totaling 179 ac (72 ha). In addition, the La Cantera HCP called for continued management and monitoring of all of these preserves, development of an outreach program, funding for a molecular study of *Cicurina* taxonomy, and establishment of Karst Management and Monitoring Plans for all off-site preserves. The protection and management of these preserve areas provide substantial long-term protection and conservation benefits for these species.

Texas Commission on Environmental Quality - The Texas Commission on Environmental Quality (TCEQ) developed optional water quality measures that, if implemented, should provide protection from water quality related impacts to some karst features that may contain listed species. These measures are voluntary and are meant to streamline the compliance with the Act for development activities above the Edwards Aquifer. The measures do not apply to development projects that are within the Contributing Zone of the Edwards Aquifer and that disturb less than five ac (2 ha), or those that are not part of a larger development that may disturb five or more acres. The measures are expected to provide some conservation benefit; however, they are not mandatory and do not apply to all areas where endangered karst invertebrates occur in Bexar County. Because of the limited use of these measures, we anticipate they would have little effect on securing the survival or recovery of these karst species.

### Adverse Modification Analysis

The following discussion describes the regulatory circumstances that are anticipated with the proposed designation of critical habitat for the nine Bexar County invertebrates. Once critical habitat is designated, section 7 of the Act also requires Federal agencies to ensure that their actions will not result in the destruction or adverse modification of critical habitat.

*How is adverse modification defined and determined for these species?*

The Service is working to update the regulatory definition of adverse modification since it was invalidated by a prior court ruling, *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, No. 03-35279. 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*. The Director's 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 for the species..." (p. 3).

Drawing from *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, No. 03-35279, Director's December 2004 memo, and *Butte Environmental Council v. U.S. Army Corps of Engineers et al.*, No. 09-15363, we have developed the following working definition for adverse modification when considering the nine Bexar County invertebrates. Adverse modification of

critical habitat means an action that, directly or indirectly, adversely alters the PCEs or habitat quality (or the ability of PCEs to be functionally established) such that the ability of the critical habitat unit to function and serve its conservation (recovery) role is appreciably reduced. For these species, the role of each critical habitat unit depends on the quality of the unit as well as the quality, distribution, and protected status of the other critical habitat units.

From section 3(3) of the Act the terms "conserve," "conserving," and "conservation" mean to use, and the use of, all methods and procedures necessary to bring any endangered species or threatened species to the point where the measures provided under the Act are no longer necessary. A court ruling under *Gifford Pinchot Task Force v. U.S. Fish and Wildlife Service*, No. 03-35279 states, "...the Act was enacted not merely to forestall the extinction of species (i.e., promote a species survival), but to allow a species to recover to the point where it may be delisted." 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 potential to achieve recovery will be appreciably reduced.

*What types of project impacts could we potentially call adverse modifications?*

Regarding critical habitat for Bexar County invertebrates, we may call adverse modification when an action has an effect that would appreciably diminish the functionality of an area to meet recovery. The 2008 Draft Bexar County Invertebrates Recovery Plan contains recovery criteria that identify a specific arrangement of habitat quality, quantity, configuration, and distribution in order to meet recovery. Therefore, we might call adverse modification if the quality, quantity, or configuration of habitat is impacted to a point that would appreciably reduce its ability to meet recovery criteria. An adverse modification analysis would take into account the role of the critical habitat based on the quality and distribution of other critical habitat areas that are already protected, in relation to habitat needed for the species' recovery. Taking into consideration habitat that is "already protected" is appropriate because only habitat that is protected is guaranteed to serve its continued conservation role for the species as called for in the draft recovery plan's recovery criteria.

Actions that may result in adverse modification of critical habitat may occur when the effects of the proposed action:

- (1) Would reduce the quality of the critical habitat unit, degrade the quality of the PCEs, or preclude the ability of the PCEs to be established, and
- (2) Where the given unit's role or ability to contribute to recovery or maintain the survival of the species is precluded by the action when taking into consideration the environmental baseline of protected critical habitat units (including their quality and distribution) and finding that they are insufficient to meet recovery without additional protected critical habitat.

*What would we ask people to do to avoid adverse modification?*

With the previous critical habitat designation for seven of the nine Bexar County invertebrates, there have been no consultations that resulted in a determination of adverse modification. If we determine that an action adversely modifies critical habitat in the future, recommended project modifications could include the following to reduce the effect of the action to critical habitat to a

level that would not destroy or adversely modify it: 1) Reduce the size or configuration of the proposed project to avoid, reduce, or eliminate the effects to critical habitat; 2) Mitigate the effects to the species in critical habitat by permanently protecting and managing lands for the species in other areas; and/or 3) Move the project completely outside designated critical habitat.

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

We expect that the same agencies and types of projects would go through the section 7 consultation process with or without critical habitat, except for DOD because they are exempt from critical habitat in the proposed rule. Because of the size of the critical habitat units proposed for designation, we believe that more projects would likely undergo consultation with critical habitat than without due to the increased awareness of where activities may affect the species. In addition, we anticipate that five percent more housing and commercial developments would engage in the section 10(a)(1)(B) permitting process (HCPs) as compared to less than 1 percent without critical habitat. We anticipate this increase because of an expected increase in public awareness associated with critical habitat designation, which will cause more developers to want comply with the Act. Currently, only one HCP covers "take" for three of the nine Bexar County invertebrates. Some of the increase in participation in HCPs is likely to include participation in a planned regional HCP (the Southern Edwards Plateau Regional HCP). Such a regional plan would reduce the administrative burden and cost to the Service for participation.

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

We expect an increase in administrative costs associated with the critical habitat designation. This increase will likely result from more consultations where projects could potentially impact critical habitat areas that project proponents may not have been aware of before. Specifically, we estimate that it would take both a GS-12 and GS-9 biologist about 8 hours per week each to address adverse modification with critical habitat as compared to approximately 4 hours per week without critical habitat during the life of a consultation (up to 135 days). In addition, we expect more personnel time will be needed to address additional work associated with an increase in HCPs although this time may be reduced if a regional HCP is completed as discussed above.

## **Conclusion**

*What is the difference between jeopardy and adverse modification for the nine Bexar County invertebrates?*

A jeopardy analysis for any of the nine Bexar County invertebrates would analyze the magnitude of a proposed project's impacts relative to the population(s) across the species' entire range, including areas inside and outside critical habitat. In contrast, an adverse modification analysis would focus on the effects of a proposed project's impacts to the physical features, PCEs, or other

habitat characteristics determined by the Secretary to be essential for the conservation of the species in areas designated as critical habitat.

In addition, in an adverse modification analysis, we would analyze impacts to the capability of the critical habitat unit to maintain its conservation (recovery) role and function for the species. This analysis takes into account the effects of a direct or indirect alteration that appreciably diminishes the value of critical habitat for either the survival or recovery of a listed species. In the case of these species, reduction in quality of the core habitat (the surface and subsurface drainage area, cave cricket foraging area, subsurface karst habitat, and surface native vegetation surrounding the feature in an area of at least 100 ac) or in the extended mesocavern areas out from the core area and up to 0.3 mi (0.5 km) from the feature and through contiguous karst could result in an adverse modification determination. However, effects on the extended mesocavern area, without adverse effects to the core area might not likely result in a jeopardy determination.

*What types of actions might the Service recommend pursuant to a section 7 consultation to avoid destruction or adverse modification of critical habitat that are different than those for avoiding jeopardy?*

The types of actions we might recommend to avoid jeopardy are similar to those we might recommend to avoid adverse modification except that recommendations for adverse modification might include reducing impacts to the extended mesocavern area farther from the feature and in areas needed for recovery. Specific recommendations include avoiding or reducing the amount of development over that area or protecting of other areas of critical habitat to offset these effects.

*To U.S. Fish and Wildlife Service, Austin Field Office from IEC:*

Sent: Wednesday, April 27, 2011 5:29 PM  
Subject: Points from Today's Bexar Inverts Call

Thanks to those who were able to participate on the call today. Below is a summary of the main points discussed on the call. These points clarify and add to the incremental memorandum sent on April 21<sup>st</sup>. Please let me know if you have any questions about, additions to, or modifications of the points below.

- The designation of the proposed revised critical habitat is expected to have two effects on the ground:
  1. Increase the number of consultations
    - As described in the listing rule, the Service notifies project proponents in Karst Zones 1 and 2 that they should be consulting for the invertebrate species even absent critical habitat designation. Therefore, the economic analysis will assume that consultations in critical habitat units within Karst Zones 1 and 2 would occur absent critical habitat designation (i.e., in the baseline).
    - Projects in critical habitat within Karst Zone 3, however, may not be aware of the need to consult on the species. Therefore, the economic analysis will assume that consultations in critical habitat units within Karst Zone 3 would not occur absent critical habitat designation. All administrative and project modification costs for consultations on projects in Karst Zone 3 will be considered incremental impacts of the designation.
  2. Lead to project modifications where adverse modification of critical habitat occurs, but jeopardy does not
    - The Service uses habitat as a proxy for the number of species taken in the case of the invertebrates. Jeopardy may therefore occur where habitat is destroyed or reduced to a "low" quality.
    - An adverse modification finding may be reached when jeopardy is not for projects that reduce the quality of a karst fauna area from high to medium, but do not destroy it or reduce it to low quality. Administrative and project modification costs associated with these consultations will be considered incremental impacts of the critical habitat designation
- In an adverse modification analysis, the Service will analyze impacts to the capability of the critical habitat **as a whole** to maintain its conservation (recovery) role and function for the species. This statement is a clarification of the one made on pages 6 and 8 of the incremental memorandum which indicate that the adverse modification analysis would be done at the critical habitat **unit** level.
- The incremental memorandum states that five percent more HCPs would be developed due to critical habitat designation. While some increase in HCP development may occur, the Service did not see an increase in HCP's after the designation of critical habitat in 2003. In addition, the development of the multi-County South Edwards Plateau HCP (SEP-HCP) could lead to an increase in HCP participation regardless of critical habitat designation. Due to uncertainty over whether critical habitat would lead to an increase in HCPs and the confounding effect of the

SEP-HCP, the economic analysis will not apply the five percent increase assumption described in the incremental memo, but will discuss with stakeholders the likelihood of HCP development in the future.