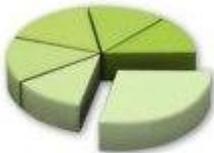


# Third Party Evaluation of the Recovery Credit System Proof of Concept

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## Executive Summary

The Recovery Credit System is a framework for federal agencies to implement recovery measures for threatened and endangered species under which federal agencies may offset adverse effects of agency actions taken elsewhere for that species. The proof of concept was implemented at Fort Hood Military Reservation. Developed by a working group, it allowed the Department of Defense to receive credit for recovery measures implemented by private landowners to offset adverse effects from training activities pertaining to the conservation of the golden-cheeked warbler (*Dendroica chrysoparia*). Model elements tested in the proof of concept were as follows:

- Federal agencies may offset adverse effects of agency activities to a listed species by beneficial effects of actions taken elsewhere for that species. The combined effects of the crediting (beneficial) and debiting (adverse) actions must provide a net benefit to recovery of the species. The biological opinion for debiting (USFWS 3 March 2009) defined the net benefit to recovery for the proof of concept.
- Credits are acquired through conservation and management actions on private lands. In the proof of concept, credits were determined by applying weighting criteria to conservation units (up to 20 acres = one unit) for habitat; a wildlife management plan identified required management actions.
- In the proof of concept, private landowners enrolled their properties through a reverse auction; competitive elements included contract term, cost per recovery credit year (credits determined multiplied by contract term), and landowner cost share.
- Permanent loss of habitat due to federal agency actions will be offset by permanent credits while temporary habitat loss may be offset via term credits. The proof of concept tested term credits (up to 25 years).
- Compliance and effectiveness monitoring, as well as fund and credit accounting, are required through the life of the credit contracts.

The purpose of this evaluation is to provide an objective and thorough evaluation of the three-year proof of concept for both the process and the intended impact and to assess the utility of the Recovery Credit System. To

ensure independence, the evaluation team chosen had no prior relationship with any stakeholder and recruited peer reviewers who were free of conflicts of interest. (See Appendix A for more details).

The evaluation team collected data from six sources to answer the seven evaluation questions: a peer review panel of three independent scientists, all successful and unsuccessful landowner bids, program documents, habitat assessments on eight contracted sites, seventeen interviews with participating landowners, and twenty-four interviews with program operators, military personnel, and other stakeholders. Incorporating six sources ensured that at least three different sources plus relevant literature informed each evaluation question and the findings. The analytic strategy included descriptive statistics for quantitative variables (such as bid documents or site reviews) and a general inductive approach (Thomas 2006) for qualitative data using the guidelines in Miles and Huberman (1995). (See Appendix A for a complete description of the methodology and analytic strategy). The evaluation question, conclusion, and lessons learned are listed below.

**Question 1: What is the Recovery Credit System and how does it differ from other models?**

While the evaluation did not provide an exhaustive comparison to all other conservation strategies, the following strategies were compared on four variables: conservation banking, Environmental Quality Incentives Program, Safe Harbor, Section 7 consultation, and Wildlife Habitat Incentives Program. Interviewees and the peer-review panelists agreed that the model provided important contributions to both conservation and to the military: working toward species recovery, extending conservation beyond the boundaries of the installation by engaging private landowners, formalizing a market-based tool for trading credits, and providing an additional method for removing restrictions on training. With enrolling distributed private lands, the model also allows addressing recovery holistically.

**Question 2: Was the Recovery Credit System implemented as planned?**

Yes, the system was implemented as planned and demonstrated in a real-world environment that the model was viable and feasible. Lessons learned included developing a system for credit and debit determination, identifying and protecting contiguous and supporting habitat, and continuous reporting.

**Question 3: Did the participants perceive that the process was efficient?**

Yes, landowners and other interviewees described the process as efficient. Landowners expressed positive impressions of the program, comparing the program favorably against prior experiences with similar government programs. Process lessons learned included the value of committee structure, the fast pace of the planning, and the benefit of the reverse auction.

**Question 4: Did the Recovery Credit System promote effective federal/nonfederal partnerships for species recovery?**

Yes, the program promoted landowner partnerships; other federal/nonfederal partnerships had both successes and challenges. Lessons learned included establishing trust with landowners, raising awareness among landowners, collaboration among all stakeholders, and ensuring communication.

**Question 5: Did the operation of the Recovery Credit System meet its goals for endangered species conservation?**

Yes, the program met its goals for habitat conservation. More information is needed, however, to assess the biological responses of the golden-cheeked warbler. The model could be enhanced, however, to further address species recovery. Lessons learned included the opportunity for material enhancement of habitat.

**Question 6: Did the Recovery Credit System increase the flexibility of federal agencies to accomplish their mission while meeting their requirement under the Endangered Species Act?**

Yes, the model provided additional flexibility, but there is greater potential. One lesson learned was matching contract lengths to impacts length and recovery periods.

**Question 7: To what degree does the scientific information generated by the Recovery Credit System monitoring and research program provide reliable information likely to lead to more effective conservation and recovery strategies for the species in this and other models?**

To date, 14 papers and 20 conference presentations have been generated. As 11 papers are in press or in preparation, however, it is too early to determine whether the information will lead to more effective conservation and recovery strategies

Recommendations were generated at three levels to meet the information needs for multiple stakeholders: the Recovery Credit System that may be applied in other locations or for other species, the Recovery Credit System as applied to the golden-cheeked warbler, and for the proof of concept applied at Fort Hood Military Reservation.

**Recovery Credit System model:**

- Establish metrics for recovery and action agency results at the onset and establish baselines, if possible.
- Place greater emphasis on materially enhancing habitat and/or addressing additional recovery measures; protection of habitat is important but by itself may not be adequate to meet the net benefit standard.
- Think actively about the length of impacts and recovery of habitat and match contract enrollments accordingly.

**Recovery Credit System for the golden-cheeked warbler:**

- Allow landowners to receive credit for supporting habitat that will be managed to produce higher quality habitat. Considering expanding protected habitat to include a buffer.
- Allow for term contracts beyond 25 years for the golden-cheeked warbler; this will add to the flexibility of federal agencies.
- Establish metrics for conservation and for participating Federal Action Agency activities during the planning process, and develop a clearer link between the wildlife management plan and conservation metrics. Report throughout the project on both process measures and these metrics.
- Develop more refined criteria in the future, particularly with regard to supporting and restorable habitats.
- Incentivize warbler-benefitting practices through scoring during the enrollment competition. The program currently supports management practices that are intended to benefit warblers *and* separate practices that are implemented exclusively to benefit ranching operations.

**Recovery Credit System at Fort Hood Military Reservation:**

- Refine management actions to enhance deciduous recruitment and manage supporting habitat in ways that improve or maintain its suitability to support breeding, feeding, and other activities of the golden-cheeked warbler.
- With a group of stakeholders, implement a formal communication plan to share successes and challenges. The plan should identify stakeholders and their information needs.

- If the proof of concept is continued at Fort Hood Military Reservation, then consider the recommendations under the Recovery Credit System, above.

The remainder of this report first provides an introduction to the evaluation, explores each of the evaluation questions, and concludes with a summary answer to each question, lessons learned, and recommendations. The appendix includes a thorough description of the methodology, peer-review panel biographies, a list of interviewees, and the complete peer-review panel report.

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## Introduction

Federal agencies have a responsibility to further the purposes of the Endangered Species Act, the goal of which is the recovery of threatened and endangered species. The Recovery Credit System is a crediting framework for federal agencies to implement recovery measures for threatened and endangered species. This crediting framework was developed by a working group convened by the Texas Department of Agriculture to allow Fort Hood Military Reservation to receive credit for recovery actions being implemented off-site through conservation and management action on private lands. In December 2005, a three-year proof of concept was initiated for the Recovery Credit System as applied to the golden-cheeked warbler (*Dendroica chrysoparia*).

A proof of concept demonstrates in the real-world that a model or innovative approach is viable, feasible, and capable of solving or diminishing a particular problem. The working group recommended an independent third-party review at the end of the three-year proof of concept to determine needed revisions. This independent third-party review was designed to meet the following needs:

- Provide an objective and thorough evaluation of the three-year proof of concept for both the process and the intended impact.
- Assess the utility of the Recovery Credit System.

## Background

This section first provides background on the Recovery Credit System, including its inception, impactees, and resources allocated. The Recovery Credit System was developed in Texas to allow the U.S. Department of Defense to receive credit for recovery measures being carried out with neighboring landowners in an effort to offset adverse effects that may result from Fort Hood Military Reservation training activities. In 2005, a working group was convened by the Texas Department of Agriculture to design the system. Reported members of the working group included representatives from the following organizations:

- Audubon Texas
- Central Texas Cattlemen's Association
- Environmental Defense Fund
- Leon River Restoration Project
- Texas & Southwestern Cattle Raisers Association
- Texas A&M University System

- Texas Department of Agriculture
- Texas Farm Bureau
- Texas Parks and Wildlife Foundation
- Texas Watershed Management Foundation
- Texas Wildlife Association
- The Nature Conservancy
- U.S. Army Fort Hood
- U.S. Fish and Wildlife Service
- U.S. Department of Agriculture – Natural Resources Conservation Service

The proof of concept designed by the working group included the following elements:

- Federal agencies may offset adverse effects of agency activities to a listed species by beneficial effects of actions taken elsewhere for that species. The combined effects of the crediting and debiting actions must provide a net benefit to recovery of the species. The biological opinion for debiting (USFWS 3 March 2009) defined the net benefit to recovery for the proof of concept.
- Credits are acquired through conservation and management actions on private lands. In the proof of concept, credits were determined by applying weighting criteria to conservation units (up to 20 acres = one unit) for habitat; a wildlife management plan identified required management actions.
- In the proof of concept, private landowners enrolled their properties through a reverse auction; competitive elements included cost per recovery credit year (credits determined multiplied by contract term), contract term, and landowner cost share.
- Permanent loss of habitat due to federal agency actions will be offset by permanent credits while temporary habitat loss may be offset via term credits. The proof of concept tested term credits (up to 25 years).
- Compliance and effectiveness monitoring, as well as fund and credit accounting, are required through the life of the credit contracts.

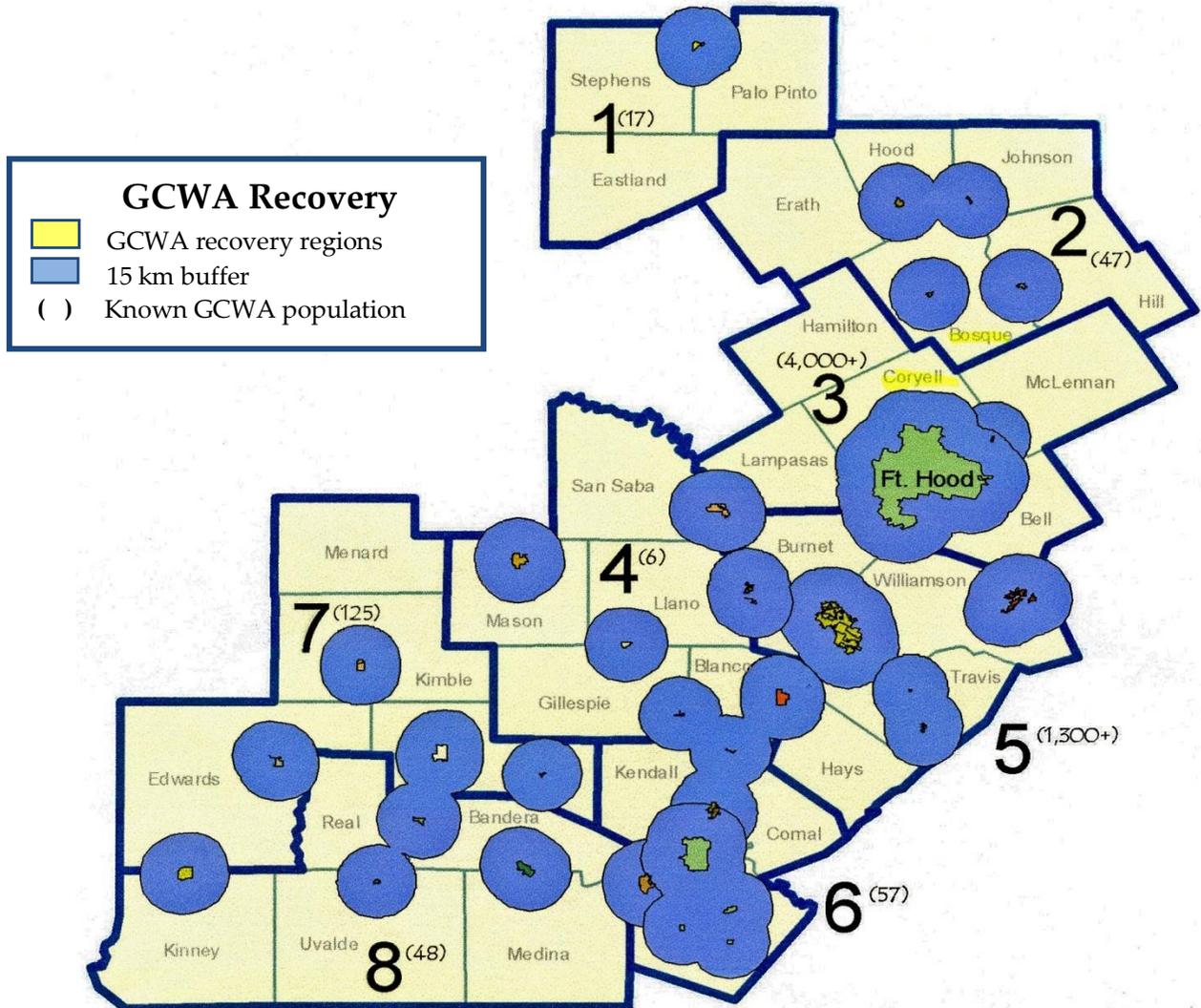
In July 2008, the U.S. Fish and Wildlife Service issued Recovery Crediting Guidance to formalize these elements.

Impactees of the proof of concept included Fort Hood Military Reservation, private landowners, and the golden-cheeked warbler. Fort Hood Military Reservation is the largest active duty armored post in the United States. Today, Fort Hood has nearly 65,000 soldiers and family members and serves as a home for Headquarters III Corps, First Army Division West, the 1st Cavalry Division, 4th Infantry Division's Combat Aviation Brigade, 13th Corps Support Command, 89th Military Police Brigade, 504th Battlefield Surveillance Brigade, 21st Cavalry Brigade (Air Combat), 4th Combat Aviation Brigade, and 31st Air Defense Brigade. Fort Hood specializes in tactical training including live fire and multiple assault scenarios. Fort Hood is home to two endangered species: the golden-cheeked warbler and the black-capped vireo.

The private landowners who participated in the project were predominantly in two counties north of the base, Coryell and Bosque, although some properties included portions of Bell or Hamilton counties. Participating landowner characteristics are described more fully in response to evaluation question 4 (pages 38-44), but Coryell and Bosque Counties are rural counties and the landowners use their land for income, including ranching, ranching leases, and hunting leases.

Finally, golden-cheeked warbler habitat, and therefore the species, was impacted by the proof of concept. Golden-cheeked warblers are confirmed in 27 counties and may occur in another 11 counties; however, the latter counties may have only small amounts of suitable habitat. The majority of the breeding range occurs on private lands that have been either occasionally or never surveyed. Figure 1 presents a map of the region provided by a member of the science committee. As shown, Fort Hood is in recovery region three, Coryell is in region three, and Bosque is in region two.

Figure 1: Map of region.



Source: Recovery Credit System science committee

Figure 2 provides a summary of the funding sources and uses for the three-year proof of concept provided by the program operators. Funding sources included the U.S. Department of Defense, USDA, and the National Fish and Wildlife Foundation; total funding was \$3,442,073. Funding was used for agency overhead, research and monitoring, program costs, and contracts with landowners. Contracts with landowners accounted for \$1,954,666 or 57 percent of total costs.

Figure 2: Funding for the three-year proof of concept.

<b>Funding Sources:</b>	
Department of Defense/U.S. Army	\$2,992,073
USDA-Natural Resource Conservation Service	225,000
National Fish and Wildlife Foundation	225,000
<b>Total Funding</b>	<b>\$3,442,073</b>
<b>Funding Uses*:</b>	
Administrative costs (agency overhead to Texas AgriLife Research and Extension)	\$ 87,294
Research and monitoring conducted by Texas A&M University Institute of Renewable and Natural Resources (IRNR)	975,000
Program costs (habitat assessment, management plan development, attorney fees, Texas Wildlife Management Foundation and IRNR staff, and operating costs)	425,114
Expended landowner contracts (will extend beyond the three-year proof of concept but are funded in full)	1,954,666
<b>Total Uses</b>	<b>\$3,442,074</b>

\*Includes actual to date and budgeted

Source: Recovery Credit System operator

### *Evaluation questions*

Questions and criteria were developed to align with the stated purposes. Using considerations identified by Davidson (2005) and the guidance of the program evaluation standards (Sanders et al. 1994), the following were used to develop the evaluation questions and criteria: review of the U.S. Fish and Wildlife Service Recovery Crediting Guidance (USFWS 31 July 2008), review of program goals, and Department of Defense Conservation Committee input. The evaluation questions were as follows:

1. What is the Recovery Credit System and how does it differ from other models? While the evaluation could not provide an exhaustive comparison to all other models, it did document the differences between similar established models.
2. Was the Recovery Credit System implemented as planned? Data sources included interviews, original planning documents, and project files; analysis identified deviations from the plan, reasons, and actions taken. This report

documents how the pilot was actually implemented in order to describe the Recovery Credit System and provide context for the remaining questions.

3. Did the participants, contractors, and stakeholders perceive that the process was efficient? Data sources included interviews; analysis used the general inductive approach (Thomas 2006). Interviews explored planning, outreach, bidding, negotiation, assessment, management, contracts, credit accounting, and internal and external communication.
4. Did the Recovery Credit System promote effective federal/nonfederal partnerships for species recovery? Data sources included interviews, project documents, and site visits. Interviews explored prior landowner history with conservation and considerations regarding contract length.
5. Did the operation of the Recovery Credit System meet its goals for endangered species conservation? Net benefit to recovery is defined as enhancement of a species' current status by addressing the threats identified at the time of listing or in a current status review (USFWS 31 July 2008). Data sources included site visits, habitat assessment, and species assessment.
6. Did the Recovery Credit System increase the flexibility of federal agencies to accomplish their mission while meeting their requirement under the Endangered Species Act? Interviews solicited current conservation strategies and tools used, perceived benefits and drawbacks of those strategies and tools, how this innovation changed mission abilities (if at all), and what value, if any, was added by this innovation. Benefit prompts included those identified in the literature; impact was quantified where possible.
7. To what degree did the scientific information generated by the Recovery Credit System monitoring and research program provide reliable information likely to lead to more effective conservation and recovery strategies for the species in this and other models? Data sources included project documents and interviews; results can inform future planning.
8. What can lessons learned contribute to aspects of different or new models? This question is a synthesis of the prior questions.

It is assumed that the audiences for this report are members of the working group, federal agencies, and nongovernmental organizations working in conservation.

## *Overview of the methodology*

This section provides a very brief overview of the methodology, including data sources, analysis techniques, and how findings were generated. The following six data sources were used to generate data to determine the evaluation questions:

- A peer review panel process with three independent reviewers to assess model features and species conservation.
- Review of all (21) successful and all (23) unsuccessful bids.
- Review of program documents, such as biological opinions and weighting criteria.
- Review of the habitat on eight contracted sites using purposeful sampling and on one site at Fort Hood.
- Seventeen interviews with participating landowners using convenience sampling for an 85 percent response rate.
- Twenty-three phone and in-person interviews with program operators, military personnel, and stakeholders using purposeful sampling.

As shown in Figure 3, incorporating these six sources ensured that at least three different sources plus relevant literature informed each evaluation question.

Figure 3: Sources of data for evaluation questions.

	Model features	Implemented as planned	Efficient process	Partnership	Increased flexibility	Met conservation goals	Generated scientific information
Interviews with operators, military personnel, and other stakeholders*	X	X	X	X	X	X	X
Landowner interviews	X	X	X	X			X
Site visits		X				X	
Successful and unsuccessful bids	X	X		X			
Peer review panel	X				X	X	
Program documents	X	X	X	X	X	X	X

\*See Appendix A for a breakdown by interview respondent.

The analytic strategy included descriptive statistics for quantitative variables (such as bid documents or site reviews), a general inductive approach (Thomas 2006) for qualitative data using the guidelines in Miles and Huberman (1995), and comparison to defined standards where available. For each data source except the program documents, a compilation report was prepared that summarized the data and identified findings. One of those five reports, the peer review panel report, is included as Appendix D. See Appendix A for a thorough description of the methodology including variables used for sampling, how data sources related to evaluation questions, and a complete list of the interviewees.

Conclusions and lessons learned were generated by comparing data to standards (where applicable) and by synthesizing the six data sources. In order to be included as a lesson learned, at least three data sources had to have generated that finding. For example, bid analysis, multiple stakeholders, and landowner interviewees contributed to findings on the competitive nature of the bid process. Recommendations were considered at three levels: the Recovery Credit System as a model that could be applied in any location or with a variety of species, the Recovery Credit System model as applied to this particular species (the golden-cheeked warbler), and the proof of concept implemented at Fort Hood Military Reservation.

The remainder of this report is in four sections: findings, conclusions, references, and appendices. The findings section provides data on each of the evaluation questions, beginning with model comparisons and how the proof of concept was

implemented to describe and define the model fully. The section next addresses the evaluation questions related to impact – the three objectives identified in the Recovery Crediting Guidance (USFWS 31 July 2008): federal/nonfederal partnerships, species conservation, and federal agency flexibility. In the conclusion section, each question is answered briefly, noting lessons learned, and then recommendations to consider are presented. Finally, after references, the appendices include a complete description of the methodology, peer-review panel biographies, a list of interviewees, and the peer-review panel report.

## Findings

As noted above, this section addresses each evaluation question moving from process to impacts to application. Figure 4 provides a schematic of this section. For example, evaluation questions one, two, and three – process questions of model design, implementation, and efficiency– are presented first.

Figure 4: Question focus

Process	Impacts	Application
<ul style="list-style-type: none"> <li>• Model elements</li> <li>• Implementation</li> <li>• Efficiency</li> </ul>	<ul style="list-style-type: none"> <li>• Federal/nonfederal partnerships</li> <li>• Species conservation</li> <li>• Federal agency flexibility</li> </ul>	<ul style="list-style-type: none"> <li>• Scientific information</li> <li>• Lessons learned</li> </ul>

### 1. *The Recovery Credit System model elements*

While this evaluation did not provide an exhaustive comparison to all other conservation strategies, it did document the differences between selected strategies. Four methods – a strategy typology, the Recovery Crediting Guidance, stakeholder input, and a literature review – were used to select strategies for comparison. Based on the typology, stakeholder input, and literature, the Recovery Credit System is most like conservation banking. Unlike conservation banking, however, the Recovery Credit System is designed to the standard of a net benefit to recovery rather than no net loss, offers term contracts, increases competitiveness, and engages individual private landowners.

In terms of the Recovery Credit System model, there was almost unanimous agreement by interviewees and the peer review process that this model provided important contributions to both conservation and to the military. Interviewees

found that the following were valuable aspects of the model: working toward species recovery, extending conservation beyond the boundaries of the installation, formalizing a market-based tool for trading credits, and providing an additional method for removing restrictions on trading. Finally, although the Recovery Crediting Guidance (USFWS 31 July 2008) allows for permanent credits, the proof of concept used term credits. Two advantages of term credits were perceived: engaging landowners and matching military needs. There are a number of advantages and disadvantages of term contracts; the two mentioned here are those that were relevant to the proof of concept.

SELECTED OTHER MODELS

In order to compare the Recovery Credit System to other models, relevant models were identified. Given that this search was not an exhaustive comparison, four methods were used to identify the most appropriate models for comparison. The first was to place the Recovery Credit System in a typology of conservation strategies (Bean 2000) to narrow potential models for comparison. Bean provides a useful typology of conservation strategies under four broad categories: acquiring ownership, regulating land and water use, influencing land and water use through non-regulatory means, and regulating the use of plants and animals. The categories and some examples are shown in Figure 5. This typology is helpful in identifying the role of Recovery Credit System within the scope of conservation strategies. The Recovery Credit System contains elements of both regulatory strategies and influencing strategies; the system provides a mechanism for mitigation but also includes incentives (non-tax) and cost share.

Figure 5: Conservation strategies by type (Bean 2000).

Category	Conservation Strategy Examples
Acquire	Land ownership Partial interest (conservation easement)
Regulating land and water use (such as the CWA and the ESA)	Habitat conservation plans /Safe harbor Mitigation banking
Influence land and water use	Tax incentives Cost share programs
Regulating the use of wild plants and animals	Authority over hunting and fishing

The second method used to narrow the field for comparison was a review of the Recovery Crediting Guidance that generated several examples. The Recovery

Crediting Guidance identified “examples of innovative conservation tools under the ESA [including] safe harbor agreements, habitat conservation plans, recovery permits, and conservation banks” (USFWS 31 July 2008). The third method was stakeholder input; interviewees reported that federal agencies used Section 7 consultations and, through that consultation, conservation banking and off-site crediting. Conservation banking was the model that the Recovery Credit System was perceived to be most like. In addition, a few interviewees mentioned the Army Compatible Use Buffer (ACUB) program, although noted that “ACUB and REPI [Readiness and Environmental Protection Initiative] primarily are more mission focused in terms of limiting encroachment and developing buffer areas around installations to limit encroachment from private development. It has been used tangentially for compliance purposes also but really it’s more encroachment limiting and more general conservation of species.” Finally, a literature review found similarities to Natural Resources Conservation Service programs.

Figure 6 provides a comparison of the Recovery Credit System to the models identified. The first column lists the conservation strategy (or program name), followed by the purpose of the strategy and benefit to conservation, potential partners, market elements (if any), and whether the strategy includes term or permanent contracts. For example, the Recovery Credit System’s purpose is to lead to a net benefit to recovery by preserving or enhancing habitat, allows for term and permanent contracts, uses a reverse auction to enroll properties, and can include individual private landowners and nonfederal landowners. Following the table, each strategy is defined and then explored through these four variables. The last part of this section provides additional detail on the Recovery Credit System’s features.

Figure 6: Overview of Recovery Credit System and other models.

Strategy or program	Purpose	Partners	Market feature	Credit timing
Recovery Credit System	Preserve or enhance habitat for a net benefit to recovery.	Partner with private and nonfederal landowners; landowners receive financial and technical assistance.	Incentives provided through a reverse auction.	Term or permanent contracts

Strategy or program	Purpose	Partners	Market feature	Credit timing
Conservation banks (mitigation banking)	Offset impacts for no net loss, can include enhancement but does not often occur in practice.	Private commercial, public commercial, or single user.	Price determined by demand.	Permanent
Environmental Quality Incentives Program	Fund conservation practices on working agricultural land to achieve national priorities, which can include species that are threatened or endangered.	Private landowners receive incentive payments and technical assistance.	None, applications are scored based on state or local priority resource concerns.	Term: two- to 10-year contracts
Safe Harbor	Facilitate the conservation of listed species for a net conservation benefit.	Multiple private landowners receive guarantee of no increased regulation; may be combined with technical or financial assistance.	None, application are scored based on competitive ranking.	Term agreements

Strategy or program	Purpose	Partners	Market feature	Credit timing
Section 7 consultation	Collaboratively solve conservation challenges as long as species is not jeopardized.	Consultation between federal agencies and USFWS.	None.	Term: levels of restriction vary by biological opinion.
Wildlife Habitat Incentives Program	Help participants develop habitat for threatened and endangered species (among others).	Private landowners receive financial and technical assistance.	None, applications are scored according to each state's WHIP plan.	Term: 5- to 15-year contracts.

### Conservation banking

This section defines conservation banking and summarizes the purpose, partners, market mechanism, and terms. The USFWS guidance on conservation banks (USDOJ May 2003 p. 2) defines conservation banking as “a parcel of land containing natural resource values that are conserved and managed in perpetuity, through a conservation easement held by an entity responsible for enforcing the terms of the easement, for specified listed species and used to offset impacts occurring elsewhere to the same resource values on non-bank lands.” The purpose of the bank is to offset impacts to natural resource values off-site. In addition, a review of the guidance shows that conservation banking permits may be designed to ensure performance and reward habitat restoration, enhancement, and creation although “credits at these banks are typically fully available as soon as the bank is established and do not depend on the success of habitat restoration or creating efforts” (Bean et al February 2008 p. 31). Bank owners are any public or private entity; and conservation banks may be operated by a private entity for commercial use, by a public entity for commercial use, or for a single user. Conservation banks are not always present, of course, and existing regulations do not allow federal agencies to establish a conservation bank. Species or habitat conservation values are quantified with a credit, and those credits are bought, sold, or traded for the profit of the bank owner. The term of the bank and the credit is permanent. Interviewees report that differences include that

conservation banking does not engage private landowners in conservation, use market-based incentives, or offer term credits.

### **Safe Harbor agreements**

This section defines safe harbor agreements and summarizes the purpose, partners, market mechanism, and terms. In the announcement of final policy USFWS (June 1999 p. 32717) noted that safe harbor agreements “manage habitat for listed species, and provide assurances that additional land, water, and/or natural resource use restrictions will not be imposed as a result of [private landowners’] voluntary conservation actions to benefit covered species.” The purpose, or benefit, of the strategy is that it removes a disincentive for voluntary conservation and provides a net conservation benefit. The property, however, can be returned to agreed upon baseline conditions. Partners include nonfederal landowners. As noted, the agreement removes a disincentive, but does not – unless in conjunction with another program – provide an incentive for participation. Safe Harbor agreements are not market-based. Safe Harbor agreements are not permanent, and terms vary by agreement.

### **Section 7 consultation**

The Endangered Species Act requires all federal agencies to aid in the conservation of listed species. A Section 7 consultation is “to ensure that the actions federal agencies fund, authorize, permit, or otherwise carry out will not jeopardize the continued existence of any listed species or adversely modify designated critical habitats” (USFWS & NMFS March 1988 p. xviii). The U.S. Fish and Wildlife Service uses Section 7 tools in partnership with Federal agencies to collaboratively solve conservation challenges. If incidental take results from the proposed project, provided that the take will not jeopardize the continued existence of the species, the Service may authorize incidental take. Partners are, of course, the U.S. Fish and Wildlife Service and federal agencies. There is no market mechanism. The term of any restrictions is commensurate with the term of the biological opinion.

### **Environmental Quality Incentives Program**

In their study of United States Department of Agriculture (USDA) programs, the Government Accountability Office (GAO November 2006 p. 52) defines the Environmental Quality Incentives Program as a program that provides “...technical and financial assistance to farmers and ranchers to address soil, water, air, and related natural resources concerns, and encourages enhancements on lands to be made in an environmentally beneficial and cost-effective manner.” Partners include the USDA and the private farmers and ranchers. There is no

market mechanism. Eligible applicants submit an application, which is scored based on state or local priority resource concerns. The term of the agreement may last from two to 10 years.

### **Wildlife Habitat Incentives Program**

The Wildlife Habitat Incentives Program (WHIP) is a USDA program similar to the Environmental Quality Incentives Program: “NRCS [Natural Resources Conservation Service] provides technical advice and financial assistance – through cost sharing on conservation projects – to landowners and others to develop upland, riparian, and aquatic habitat areas on their property” (GOA 2006 p. 61). The purpose of WHIP is wildlife and habitat development, and eligible partners are private, federal, state, local, or tribal landowners. There is no market mechanism. Applications are scored according to each state’s WHIP implementation plan. The term of the agreement may last from 5 to 10 years.

Other differences were mentioned by nonlandowner interviewees. For example, in some Farm Service Agency and Natural Resources Conservation Service programs, there are only short-term easements with the goal to convert land use, whereas the Recovery Credit System’s goal is to protect and enhance habitat. The Recovery Credit System also provides a tool for total management of landowner property. One interviewee noted, “We must work with the landowner and inform the landowner that we will do everything possible in order to protect, enhance, maintain the type of habitat. I can see this as definitely another tool that we could, as a federal agency, that we can use working with private landowners.”

### VALUE ADDED BY THIS INNOVATION

This section provides additional detail on the four variables in Figure 6 for the Recovery Credit System, including an emphasis on recovery, partners, market mechanism, and term.

#### **Purpose: recovery**

Interviewees report that the system sets a high standard and focuses on recovery in addition to regulation noting, “To have this pilot project, you have those two prongs: increase recovery and absolute regulatory compliance. It’s kind of neat to have it all in one because the Endangered Species Act separates it into two different areas, but quite frankly, the federal agencies put all or most of their emphasis on the regulatory aspect, and although, at a larger level, they devote funding to recovery programs, it doesn’t get the same attention.” For any species with a current recovery plan, the system could be built around accomplishing

tasks in a recovery plan because “a Recovery Credit System can formalize the process to where now the consultation process in Section 7 has all these actions spelled out and they have credits assigned to them. So now, once a federal agency has bought into the process, a requirement would be to address those actions in the recovery plan. So it’s no longer sort of a voluntary measure. They’ve agreed upon a Recovery Credit System and they take responsibility to complete some of those actions in the recovery plan.” A common comment was that “if you’re doing it right, you’re going to advance toward the recovery objective” and that “we needed to develop a system that engages private landowners in conservation and that in the end in order for it to really work and really be different, it needs to provide a net benefit to recovery when you look at the offsets versus the credit actions.”

Another benefit identified was “the definition of the standard that we came up with which is the net benefit to the recovery of the species. We came up with that standard specific to this thing and it’s pretty well written and so I think that has some value to it.” Others interviewees concurred, “We have a net benefit standard that is explained in the guidance, and that kind of monitoring requires that there be credits sitting in the bank, and that’s very important to us that there are these recovery credits sitting in the banks doing good things for the species.” A third benefit was the opportunity to enroll private lands since the recovery system can be examined holistically. For example, one interviewee stated that a project could “start out by identifying the landscapes of golden-cheeked warbler habitats across the range that would be priorities for a system like this. So do some upfront work in identifying those landscapes regardless of recovery region or county or whatever and just take an ecological view of the full landscape of habitat patches... and then to go ahead and prioritize those based on conservation need and assign relative rankings based on that conservation need.” Another interviewee noted, “This system allows you to look holistically to the entire breeding range of the species and to assign credits relative to the conservation need. But in terms of conservation return, the folks who are concerned about the recovery of the species want conservation action to occur in those places where conservation action is most needed – the threats are highest or where the numbers of known individuals are lowest, or whatever the particular need is – so, this type of system allows you to craft it such that you can assign the most credit in the places where it’s most needed. It allows you to be strategic about where credits are accrued.”

### **Market-based tool for trading credits**

Nonlandowner interviewees stated that formalizing the market-based mechanism was an innovation benefit. Prior to the Recovery Credit System, “it was very loose, and that trading part was never discussed, the credit trading part, but by having guidance and by building a program around it, I think it has gotten other people interested in this in a formal way, and I think that market-based part of recovery credits will certainly take off in the future. I think the ability to trade credits will be huge in time in the future as this becomes more of an acceptable or common practice.” In their guidelines, Scheerer and O’Neil (n.d.) note that credit assessment has been problematic in the past as credits do not often reflect differences in habitat quality, proximity, or relative importance of certain land parcels. They propose that any crediting method should be accurate, repeatable, and objective. By those measures, the crediting and debiting framework was a success. The crediting and debiting framework, however, did not include habitat functionality. In their article, Scheerer and O’Neil (n.d.) also note the importance of assessing habitat functionality and not just acres; their credit scheme includes habitat area, suitability, utility (abundance and proximity), and integrity. Peck et al 2009 also developed guidelines for a recovery credit system in Arkansas that included both habitat area and utility.

### **Credit timing**

Although the Recovery Crediting Guidance allows for permanent credits, the proof of concept used term credits. There were several perceived advantages depending on the term of the contract including engaging landowners and matching federal agency needs. (Matching federal agency needs is discussed in more detail on pages 51 through 54.) It is important to note, however, that the impact on wildlife is dependent on the species and the length of the term. Although some initial landowner contracts were for 10 years, the last seven contracts were for 25 years. The value of term contracts is discussed in the context of 25-year terms.

The ability to offer term credits was seen as important to engage landowners who might not otherwise participate. One interviewee noted, “Sometimes the adjoining landowners don't want to make that commitment. And that's why this actually can be a useful tool if you've got adjoining landowners who want to help but they're not ready to sell; this is a good in-between.” Others noted that “the main emphasis that it has is to try to get some involvement of private landowners and contributing to the conservation of listed species in a way that they probably would not otherwise do, and the easements seemed to be a help there. There seemed to be some interest in allowing easements on land but not

necessarily selling land.” In fact, for landowners the term contract was an important consideration. Only two of the 17 landowners interviewed would consider permanent easements. As one landowner said, “We never did even think about anything with a permanent easement. I know there are some USDA [United States Department of Agriculture] programs that are permanent, but I’m not interested in that.” Another noted, “I probably would not be interested if it was on a permanent basis. I mean, it’s one thing to have a set time limit, but permanent, that [would] put the nail in the coffin.”

An interviewee noted that “if your impacts are temporary, then having temporary offsets makes sense.” Another noted, “I have contended from an economic perspective that when you’re dealing with an endangered species problem like the golden-cheeked warbler where you really don’t know the status of that species, rather than commit money and go permanent – why do you need a permanent solution?” One interviewee said, “If indeed climate change starts to alter and shift habitat on a relatively rapid basis...if their habitat changes and nothing’s going on outside the fence, well, it’s going to be hard for those species to shift and move and adapt as their habitat shifts and moves and adapts, so having another tool which can allow you to shift your priorities over time, whether it’s decades or a few hundred years, I think just makes good long-term conservation sense. I’m all for permanent conservation as well, but I can see the value in shorter term agreements for all the reasons I’ve described.” Finally, one interviewee ascertained that term contracts provide an incentive to minimize impact stating, “When they [the military] pay for take, then they intend to take. Under this system, they figured out a way where they can have minimal impact to meet their mission. They don’t have to pay as much for that. There’s a system now that allows them to only pay for the offsets they need to meet the mission.”

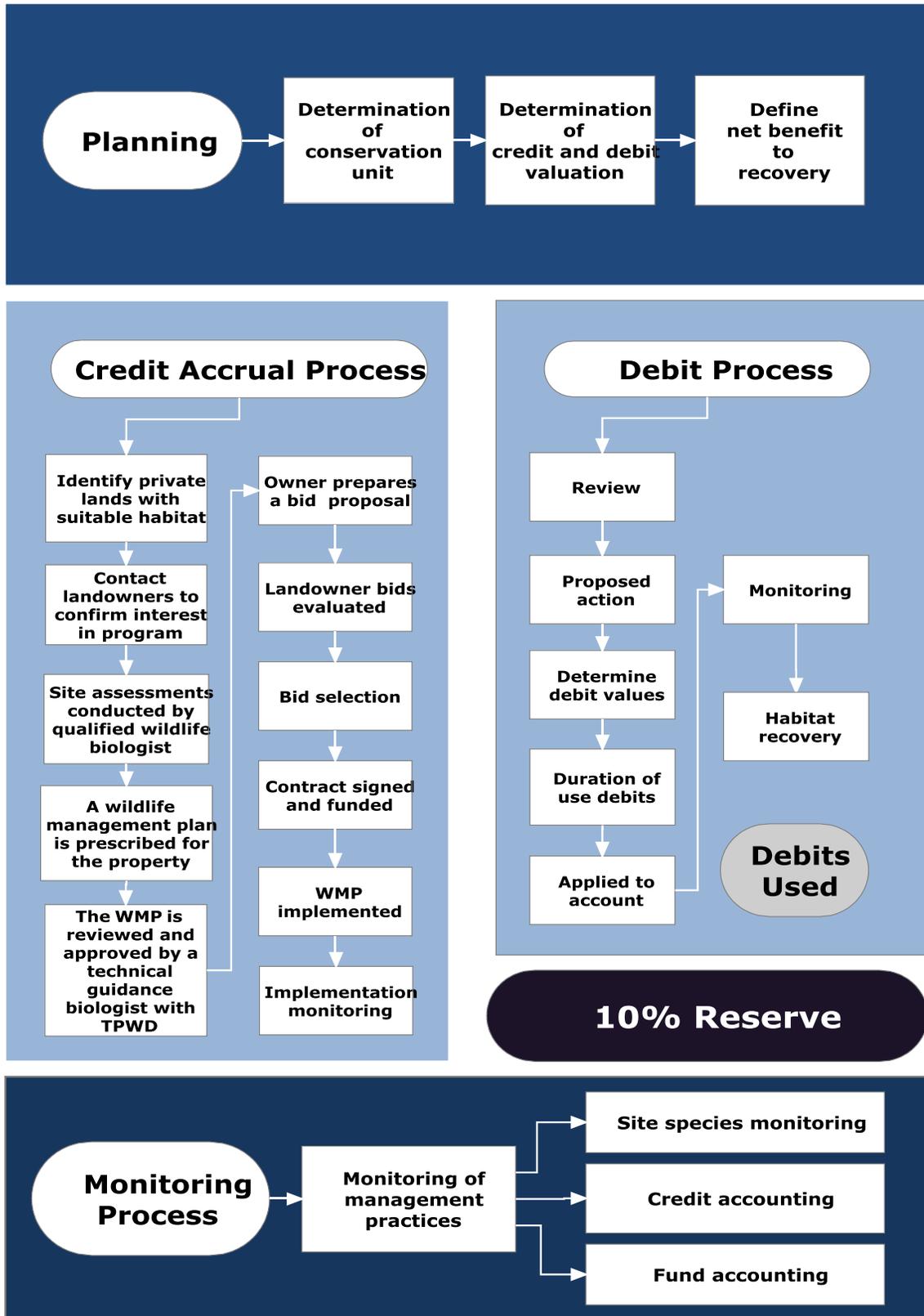
Other interviewees felt that while term contracts were appropriate in some cases, the golden-cheeked warbler needed long-term or permanent credits due to the length of time the habitat might need to recover and the uncertainty regarding what impact the temporary take might have. Program operators report that the program was limited to 25 years for the proof of concept, but that long-term contracts (50 or 60 years) were possible. They noted that “going forward, what would be nice is if Fort Hood were to call...and say, hey, we got a project over here where we’re going to be doing a habitat, and it’s going to be a 60-year take. We’re going to use it for 20 years, and it’s going to take 40 years to grow back. Can you go get us a 60-year contract that’ll cover 200 credits?” There is currently a research project occurring in conjunction with Fort Hood to ascertain the level of impact on the species for a temporary habitat take.

One interviewee summarized the timing as follows: “Well, the advantage of a permanent easement is that it’s permanent. You know what you’re getting, and you know what you’ll have for the indefinite future. The advantage of something less than the permanent easement is, first of all, it’s probably going to be less expensive, although maybe not a lot less expensive, and it may be more flexible in that...it may turn out in the longer term to be not the same need to protect things in the future, so there is more flexibility to – with the long-term permanent arrangements. Plus in the case of Texas, I think the overriding consideration was that we were led to believe at least that very few landowners were interested in permanent arrangements, so there was, as a practical matter, not much opportunity to pursue permanent conservation arrangements.”

## ***2. Proof of concept implementation***

This section presents implementation details on four components: planning, crediting, debiting, and monitoring. Figure 7 presents how the model was designed for the proof of concept. The top row displays the planning activities, the left column presents the flow of how credits were accumulated, and the right column presents the flow of how debiting will occur; as of 21 January 2010, the action has been reviewed and debits determined but the action has not yet been implemented. In the proof of concept, these major phases occurred sequentially. In other applications, crediting and debiting would be continuous and concurrent. Monitoring, represented by the row at the base of the figure, occurred during crediting and will continue to occur during debiting.

Figure 7: Recovery Credit System pilot process flow chart.



Planning was conducted by the working group members and included determining the net benefit to recovery definition (discussed under evaluation question five on pages 44 through 50), determining the conservation unit, and determining how credits and debits would be valued.

Several organizations played a role in credit accrual. Typically, the landowner contacted the program and then the Environmental Defense Fund assessed the habitat, assigned credits, and prepared the wildlife management plan; the wildlife management plan was reviewed and then approved by Texas Parks and Wildlife Department. Next, Texas Watershed Management Foundation (TWMF) worked with the owner to prepare a bid proposal and evaluated the bids. Fort Hood Military Reservation selected bids, and then TWMF managed contracts and supervised management practices. Credits were added to Fort Hood's account.

Fort Hood Military Reservation plans to debit 755 recovery credit years to thin small juniper trees; this will allow dismounted squads, platoons, and companies to conduct force on force maneuver training. As of 21 January 2010, the U.S. Fish and Wildlife Service has approved the proposed action, finding it consistent with the terms and conditions of the Recovery Credit System opinion, although actual thinning has not yet occurred. Once the action has occurred, then the action site will be monitored to assure that treatment standards are appropriately applied and that habitat recovery periods are sufficient. A reserve of 10 percent of credits will be held to ensure net benefit to recovery.

Finally, four types of monitoring occur. The first is monitoring of management practices by TWMF and the Environmental Defense Fund as they are implemented. The second is the site monitoring conducted by Texas A&M University Institute of Renewable and Natural Resources (IRNR). The third is credit accounting, conducted by an accounting firm under contract to TWMF. The fourth is landowner fund accounting, which is also conducted by an accounting firm under contract to TWMF. Although the Army is responsible for accounting for credits accrued, the Army subcontracted monitoring and accounting to Texas A&M University for the proof of concept.

The next sections provide additional details on how the proof of concept was implemented. For each phase – planning, crediting, debiting, and monitoring – definitions are provided (if necessary), and then data from program documents, stakeholder and landowner interviews, and site visits are presented.

## PLANNING

### *Definitions:*

Conservation units were defined as a 20-acre area and must be part of a 250-acre contiguous tract.

Credit valuations were weighted for aggregation of conservation units, units within prioritized recovery regions, and units close to known habitats.

Debit values were determined based on habitat recovery period estimates, site quality tiers, and site development standards.

How habitats were assigned credits and how projects were assigned debits were items mentioned frequently by interviewees as being of great benefit. As one interviewee noted, “One thing that I thought was very clever and I enjoyed learning about, and I’ve been able to kind of work into some other thinking about conservation banking and some other things, is the weighting information that David Wolfe did. He and some of the biologists at Fort Hood had worked out a weighting scenario whereby if habitat is in a certain condition in a certain demographic setting in a region, then those weighting factors would modify the amount of habitat that would be calculated as a credit. I thought the work and thinking that went into that was very clever and useful.” It wasn’t, however, easy. As one interviewee noted, “This is the first system of this type. We were starting from scratch. And for this particular species and for endangered species in Texas in general, there are very little data and information to support decisions like this.” Interviewees also commented on the debiting criteria that was developed and how useful that is and will be in the future.

The science committee, made up of eight experts from various agencies and organizations, first determined a biologically-based unit to which credits could be developed and assigned, and then assigned credit value to that unit. The end result is ranking criteria to establish relative credit value. For example, the criteria provide greater weight for certain recovery regions. Science committee members report that recovery regions where there were fewer known birds and less conservation activity were weighted “to encourage Fort Hood to purchase

credits from some of these places where more conservation attention is needed in order to get closer to recovery rather than to work in a recovery region where there's already a lot of birds."

The science committee both reviewed the system on the ground and solicited feedback from known experts to validate the system. One interviewee described the process: "We would take the science committee out to a number of sites to view and discuss habitat and how the ranking system worked. Probably the most focused attention to that kind of issue was a trip that included a couple of key U.S. Fish and Wildlife Service staff, one of the world experts on the golden-cheeked warbler and their habitat by the name of Chuck Sexton, and we took him onto Fort Hood and onto some private land sites to look at this habitat and discuss the ranking system and get his feedback and input on this. And he actually wasn't a part of the initial development of the program, but he kind of came in during the implementation phase, especially in the part where Fort Hood was figuring out how this whole debiting system would work when habitat was being impacted on Fort Hood, and so he began serving on committees to deal with that question, and so we got his input on the whole system, and so I think that, as well as getting the science committee on site to see how the system would work on the ground, was probably the best validation we could do."

## CREDITING

### **Enrolling landowners**

This section presents information on how landowners heard about the program, what attracted them to participate, and the impact of the contract terms on their participation. The most common method of hearing about the project (12 of 17) was word of mouth from friends or neighbors: "It was a gossipy old thing - neighbor to neighbor. A friend of my cousin talked about having some work done. When they mentioned clearing cedar, I became interested." Of those 12, two were recruited by their neighbors in order to create larger blocks. When asked what made them want to participate, landowners mentioned getting work done on their property as the primary reason: "Frankly, if I didn't want to do as much improvement on the property, I probably wouldn't have enrolled." They did, of course, have multiple reasons. Another nine noted that conservation influenced their decision ("I had a feeling for those little birds."), and eight noted that helping Fort Hood was a contributing reason. Others mentioned that conservation was not at all important to their participation: "You know, I'm not into birds. So, to tell you the truth, the birds didn't make me much difference." Several mentioned that it seemed like a program that had multiple benefits: "It

was a good government program - I hadn't seen anything like this where everybody wins."

## **Bidding**

### *Definitions:*

Recovery Credit Years: recovery credits assigned to the property based on size, location, and other weighting factors multiplied by the years of the contract.

Sponsor Cost: the amount the program puts into the landowner account as determined by recovery credit years and the bid made.

Cost Share Percentage: the percentage that the landowner puts into their account on top of the sponsor cost.

Once the landowner contacted the program operators, the first step was to assess the habitat and assign credit. (The credit valuation process is described in more detail below.) After a landowner contacted program operators about participation, the Environmental Defense Fund assessed the habitat to ensure it met stated guidelines from the Texas Parks and Wildlife Department, assigned the ranking criteria for credit valuation using the science committee recommendations, and wrote a management plan for the warbler in particular. That document was then attached to a larger wildlife management plan. Two of the landowners suggested that the management plans were not customized enough; the peer-review team found that the Texas Parks and Wildlife Department guidelines should be refined and that the prescription and prohibition of management practices should be improved.

Several terms were used to categorize habitat. While the Texas Parks and Wildlife Department guidelines for the golden-cheeked warbler describe habitat that is highly likely to be used and may be used, the management plans and program staff adopted prime, credited, or high quality to denote habitat meeting guidelines for highly likely to be used. In addition, supporting or recovering habitat was adopted to describe habitat that was not credited but was included in the management plan guidelines.

Identifying contiguous habitat and supporting habitat were two issues mentioned. Interviewees noted that one of the lessons learned was to better define an intact 250-acre patch of habitat: "You know, you can have little foot trails through it, and you can have a little farm road where maybe the canopy's not broken but there's a little path through that's big enough for a four-wheel

drive vehicle, and then it gets a little bit bigger and a little bit bigger. Well, what exactly is a break in the habitat?" Over time, the habitat assessments also began to identify supporting habitat. This was adjacent vegetation that did not meet the specific criteria for highly likely to be occupied. While landowners did not receive credit for that habitat, they were restricted from certain activities on that habitat: "We made it clear that it was essential that we ensure that they're only getting credit for habitat that meets specific guidelines as being highly likely to be occupied and used as breeding habitat for the species, and we did not deviate from that." Interviewees reported that a few landowners declined to participate when non-credited habitat was restricted; others chose to in order to obtain the land lease. While the peer review team noted that the designation of supporting habitat was essential and laudable, they also noted greater care be taken in prescribing and prohibiting management practices in those areas to maximize the likelihood that supporting habitat will continue to support credited habitat in the future. Scheerer and O'Neil (n.d.), in their assessment of a conservation bank in Oregon, noted that both habitat area and habitat functionality must be taken into account; habitat utility by the species should be a factor in determining credit values.

Once the credits had been calculated, the landowner worked with program operators to prepare a bid. Several steps were taken to ensure that the process was competitive. First, landowners were provided information about the last bid round: high, low, and accepted. By extending contract years, landowners could increase their recovery credit years and be more competitive. Upon the request of Fort Hood, program operators began to encourage 25-year bids. Program operators report, however, that "many of them were actually willing to go further, but we made an agreement with Fort Hood because of our State Farm and Ranchlands Conservation Program which allowed for 30-year term easements. We made an agreement with Fort Hood to keep from competing with that. We would not include anything longer than a 25-year term agreement." In addition to their bid, cost share was the item where landowners could be more competitive. Bids were ranked on recovery credit years (determined by the assessment and contract length), cost per recovery credit year, and cost share. The program operators purposefully did not accept every bid in a round to create competition: "You want to have that competition, that market force. You've always got to have winners and losers. You can let the losers go back and bid again." Therefore, bid rounds were conducted every three to four months so that unsuccessful landowners could then rebid; there were a total of eight bid rounds conducted.

Figure 8 provides an example of a bid. As noted, the first step is for recovery credits to be assigned (2.52 credits in this example). Given a contract length of twenty years, the recovery credit years equal 50.4 years. In this example, the landowner bid \$700 per recovery credit year for a total sponsor cost of \$35,280. This is the amount provided to the landowner for the lease of the credited habitat through a combination of completed management practices and annual payment. In addition to the total sponsor cost, the landowner also bids on their cost share. In this example, the landowner bid 33.3 percent of the \$35,280, so the landowner must put \$11,748.24 in cash into their account which will also be distributed through completed management practices or annual payments. The total value is then the sponsor portion plus the landowner portion (\$35,280.00 + 11,748.24), or \$47,028.24. Among the enrolled properties, 64 percent of the total account value was used for management practices and 36 percent for annual payments; the total account value includes landowner contributions.

Figure 8: Bidding example.

Line Item	Calculation
Recovery credits assigned to the property based on size, location, and other weighting factors	2.52
Length of contract	20
Recovery credit years (credits X length of contract)	50.4
Bid per recovery credit year	\$700.00
Total sponsor (program) cost put into account for annual payments and management practices (RCY times amount per)	\$35,280.00
Landowner cost share (33.3%) put into their own account for annual payments and management practices	\$11,748.24
Total in account for management practices and annual payments	\$47,028.24

Bids were ranked based on number of credits, contract length, recovery credit years, recovery credit year cost, and percent of landowner cost share. Finally, bid packages and a ranking sheet were taken to Fort Hood for review and approval. During interviews, two issues were mentioned. First, although the ranking system was designed to identify the properties with both the best habitat value (through the credit valuation) and the best fiduciary value, Fort Hood staff occasionally chose properties based on proximity to the base and not on the ranking system developed by the science and economic committees during the

planning process. This may be due, in part, to the second issue. Although the credit criteria was approved by the U.S. Fish and Wildlife Service, Fort Hood staff expressed a desire to know more details about the habitat in order to increase their comfort level that credit would be acceptable to the U.S. Fish and Wildlife Service. Interviewees mentioned that, in hindsight, additional information would have been desirable: whether birds were on-site and functioning as a productive unit and how the site functioned for the metapopulation.

### **Management practices**

Although the contract with the landowner is a lease of their land, the value is conveyed in two ways. The first is an annual payment for the life of the contract. The second is through property improvements where landowners use the money in their account to implement management practices. Practices are prioritized first by what is required in the plan to support the warbler, then by what is recommended or suggested. For example, twenty percent of a contract may be used for habitat work required by the Environmental Defense Fund. Typically, most of the money spent on management is spent at the beginning of the contract, with funds held back for reseeding or ongoing prescribed burns. On-site observations also inform the work. For example, if the graduate students who are participating in monitoring find black-capped vireo, then that information is communicated to the contractors so that work is not done in those areas.

Contractors were certified through the Texas Department of Agriculture in order to implement the prescribed practices. To date, program operators report that 450 contractors have been certified and that staff and contractors also have attended Texas Certified Prescribed Burn Manager training; program operators report keeping rates consistent with the published Environmental Quality Incentives Program rates.

In regard to credited habitat, the peer-review team saw no evidence that designated warbler habitat was itself ever affected by deleterious management that would impact the species – i.e., the program is providing excellent protection to the species' habitat in designated areas of high quality habitat. Peer reviewers found that the following items appear to be affecting or potentially weakening protection of this habitat. It is important to note, however, that these items are not unique to the Recovery Credit System but would possibly be true of all conservation efforts.

- Recruitment of deciduous species (especially oaks) appeared to be low or nonexistent on every property visited – there were almost no seedlings, saplings, or young trees suggestive that any recruitment has been occurring for 10 or more years. This contrasts with the statement that there was no evidence of excessive browsing parroted in every site management plan. There is evidence that livestock management and/or deer management practices to exclude these animals from some habitats may be needed to prevent the slow but steady decline in habitat. Additionally, the presence of cattle fosters the presence of the brown-headed cowbird (*Molothrus ater*), a serious brood parasite that reduces the fecundity of the golden-cheeked warbler (Gass 1976, Ortega et al. 2005, Rothstein and Peer 2005).
- The management of adjacent areas – especially of supporting habitat – is critical because these areas provide buffers and foraging areas for warblers resident in credited habitat. Management in these areas may be reducing their quality and quantity and thus affecting the value of credited habitat. Juniper thinning may reduce habitat quality in the immediate future but will produce a long-term gain in habitat by allowing higher deciduous recruitment and remaining junipers to grow larger more quickly. If there is no exclusion of cattle from these areas, however, it is difficult to see how any recruitment of deciduous species will occur.
- There was little evidence that the hand-clearing or low-impact juniper management suggested in a number of management plans was happening as suggested. It may be important to protect the value of credited habitat, and program directors should consider ways to change the incentives built into the program to undertake such management (i.e., more compensation, and required management activity). In contrast, mechanical clearing had occurred in a number of areas, including some where such a recommendation did not appear in the plan and no presence/absence survey was performed.

Finally, peer reviewers found that management plans improved over time, but that they could be further refined; several landowners also mentioned that the management plans seemed boilerplate. As one peer reviewer noted, “I believe this site would be better managed if it had been a later bid and provided with the more precise and extensive management plans that cover more recent property enrollments in the program.”

## DEBITING

The Recovery Crediting Guidance (USFWS 31 July 2008) outlines the general steps while the biological opinion for debiting (USFWS 3 March 2009) clearly describes the process for the proof of concept. As of 21 January 2010, the debiting action had been reviewed, approved, and assigned debits, but the action had not yet been implemented.

As described in the Recovery Crediting Guidance, the recovery debiting process includes the debit development phase and programmatic debiting consultation phase. The debit development phase establishes the standards according to which credits will be used. This phase may be conducted separately or concurrently with the credit accrual planning and development. The debiting process as part of a Recovery Credit System is subject to consultation under section 7(a)(2) of the Endangered Species Act (programmatic debiting consultation). The project-specific application includes project-specific consultation under programmatic consultation and actual debits of the credits. As individual projects are proposed, the Federal Action Agency provides project-specific information as described in the programmatic biological opinion.

The biological opinion for debiting applied these steps to the Recovery Credit System at Fort Hood; the crediting and debiting aspect were noted by interviewees as being a particularly good innovation. As described in the biological opinion for debiting (USFWS 3 March 2009), a tiered decision approach for site selection will be used in order to prioritize training areas based on minimizing impacts on GCWA [golden-cheeked warbler] habitat. Tiers were defined by the size of gaps in habitat and relation to habitat edge as follows:

- Tier 1. Non-endangered species habitat
- Tier 2. Isolated < 101-hectare marginal habitat
- Tier 3. > 101-hectare marginal habitat
- Tier 4. Isolated < 101-hectare moderate to high quality habitat
- Tier 5. > 101-hectare moderate to high quality habitat

A sub-committee of species and habitat experts developed treatment standards for modifying golden-cheeked warbler habitat on Fort Hood and estimated appropriate habitat recovery periods. The sub-committee specified standard one as light thinning and standard two as moderate thinning.

Recovery periods, and therefore debits, will then be assigned based on the tier and the standard. As described in the biological opinion, "Debit values will be traded for credits based on the duration of use plus the habitat recovery period. Habitat recovery period is the time necessary for the affected habitat within the training area to return to acceptable predisturbance condition as a result of the treatment standard, scheduled maintenance, and training disturbance. Habitat recovery period begins when scheduled training area maintenance and training use have ceased" (USFWS 3 March 2009 p. 10). The actual habitat recovery period is unknown at this time; however, the subcommittee developed standards to estimate the habitat recovery period that will be added to the training duration. The document notes the estimates are based on professional judgment as there are no data that support these estimates.

For the proof of concept, Fort Hood Military Reservation will debit their account 755 recovery credit years to thin small juniper trees using treatment standard two on 237 acres in Land Group Two in order to allow dismounted squads, platoons, and companies to conduct force on force maneuver training. Of the 237 acres, 35.14 are designated as tier 3, 5.05 acres as tier 4, and 196.98 acres as tier 5. Fort Hood plans to implement minimization periods so that the recovery period for Tier 5 habitat will be five years, allowing for a five-year training period. As of 21 January 2010, the U.S. Fish and Wildlife Service approved the proposed action, finding it consistent with the terms and conditions of the Recovery Credit System opinion, although actual thinning has not yet occurred. As this single action will utilize the accumulated credits, the Recovery Credit System opinion is therefore terminated from further actions.

## MONITORING

Although the Recovery Crediting Guidance describes monitoring the credits, there are actually four types of monitoring occurring: monitoring of management practices, species monitoring, fund accounting, and credit accounting.

### **Management practices**

While work is occurring, Texas Watershed Management Foundation (TWMF) personnel make weekly visits to the enrolled properties. After work is completed, then both TWMF personnel and representatives from Environmental Defense Fund visit the property to ensure compliance with the management plan. TWMF personnel also make an annual visit to verify that the habitat is still intact and then complete a written annual inspection report; this is typically completed after the species has left central Texas for its winter range and the graduate students have completed their summer work. In addition to the annual

visit, both TWMF and Texas A&M University extension personnel review aerial photos to assess compliance.

### **Species monitoring**

It is difficult to separate the habitat monitoring from the species research as they are occurring in an integrated fashion. The research program being completed by Texas A&M University IRNR, however, includes both Recovery Credit System and non-Recovery Credit System properties. The field technicians and the graduate students are paid a stipend for the contractual work done on the Recovery Credit System properties, which is to visit each site to review habitat and determine if the golden-cheeked warbler is present. Prior to arriving onsite, Texas A&M University extension personnel send property information, including the report from the Environmental Defense Fund that documents prime and supporting habitat, to the technicians and students. Steps are taken to ensure the quality of the monitoring through selection and training of the graduate students and data protocols. Once on-site, the students document presence or absence on the enrolled patches. Then, on a subset of all properties, the students also determine the abundance of the birds through point counts and also productivity (nesting status and fledgling success). The final result is a data set that includes presence/absence, abundance, and productivity on both the Recovery Credit System and 25 non-Recovery Credit System properties. Reporting requirements for monitoring will begin once the debiting process has begun. Therefore, although site-specific species data have been collected, they have not been provided at this time. While the peer-review panel found that the monitoring was consistent with current scientific thinking, they found that the monitoring information provided was not sufficient to assess fully the quality of the sites with respect to habitat or species management. The panel noted that presence/absence is the least relevant of the relevant issues and recommends additional time to document other issues. What issues should be addressed, however, varied among reviewers. In addition, they suggested that collecting baseline data on the species would strengthen the monitoring.

The graduate students also conduct research projects, which are not a monitoring requirement. Those projects contribute to the general knowledge of the species and are the source of the scientific information (see pages 55 through 57 for more details). Because the students conduct research on the sites, they have a vested interest in ensuring the quality of the habitat remains high.

### **Fund and credit accounting**

In addition to site and species monitoring, there is also fund accounting and credit accounting that takes place. The accounting firm used by the Texas Watershed Management Foundation accounts for both the money and the credits. Recently, the foundation commissioned an audit of both the funds and the credits separately. The management letter states that financial statements “present fairly, in all material respects, the financial position of the foundation as of August 31, 2009, 2008 and 2007 and the changes in its net assets and its cash flows for the years then ended in conformity with accounting principles generally accepted” and that the supplemental recovery credit suppliers’ schedule and values are also fairly stated.

In terms of monitoring and accounting, some interviewees suggested that not enough information was provided to them, while another thought that too much monitoring and research occurred. One interviewee thought that the biological recovery measures should have been documented at the project’s beginning, although recognizing that three years may not be a sufficient amount of time to determine whether the program was effective on those measures.

As the debiting action has not yet occurred, the monitoring requirement has not yet been activated. The biological opinion (USFWS 3 March 2009 p.16), however, clearly describes the expectations: “On an annual basis, Fort Hood will evaluate and report on Management Plan compliance for each property. The report will include, but not be limited to: property bid contract number system used by the Cooperator..., county location of property, contract length (10-year, 20-year, etc.), credit vintage, results of bird monitoring surveys, results of vegetation monitoring surveys, results of scientific studies other than bird and vegetation monitoring, any change in status of the credit property (e.g., habitat damage from fire or land management), any change in status of credit property owner, any change in status of the surrounding properties, and copy of aerial imagery and any other imagery/maps used to determine credit land status.” Fort Hood is required to monitor the account balance and the habitat developed on Fort Hood (i.e., debit projects) and to report the results of monitoring to the Service on an annual basis.

### ***3. Proof of concept process efficiency***

Evaluation question two was designed to identify whether participants perceived the implementation as efficient. Areas of efficiency explored included whether proof of concept activities occurred in a timely manner, the nature and

extent of perceived problems that occurred, and the nature and extent of perceived successes. As most interviewees and landowners described the process as efficient, this section highlights both notable successes and challenges with the pilot process. Interviewees noted success such as the committee structure, the publication of the guidance, and the ongoing work to develop a model addressing permanent credits. In addition, landowners had positive impressions of the program, comparing the program process favorably with other government programs in which they had participated in the past. Challenges included the pace of the project. Finally, the engagement of private landowners through a reverse auction was seen as both a valuable model element and a success in terms of process.

### PROCESS SUCCESSES AND CHALLENGES

Interviewees noted successes such as the committee structure, the publication of the guidance, and continued work on developing the Recovery Credit System. The committee structure allowed for clear charges as well as a method to work through changes. The resulting guidance was seen as a significant indicator of success as was completing the pilot, with interviewees noting, "I feel like it was a success because we tested something, we did what we were asked to do, we worked together, and we offered up an alternative for consideration for those that care about these things." Finally, interviewees were pleased that the committees were now tackling the permanent crediting and debiting issue.

Landowners reported positive impressions of the program and mentioned that everything went "smoothly" and "as explained." In particular, the landowners had high praise for the program staff, noting that they were "very helpful, very open." The only item mentioned frequently as a concern was the planned controlled burns. There has been a burn ban in the area due to drought conditions, and several landowners are unsure of how it will work and what they need to do to prepare. Landowners rated the communication with the program staff high with most noting that they were contacted every week while work was being done and three to four times per year otherwise to share information about monitoring, the warbler, or management practices.

Challenges included the pace of the project, which meant that crediting and debiting criteria and processes were not developed at the same time. Although several interviewees noted the "lightening fast" pace, some felt that it was a positive while others found it a challenge. One stated, "Those ambitious deadlines probably kept everybody on task because otherwise people let things slide." However, another interviewee noted that the pace meant that the

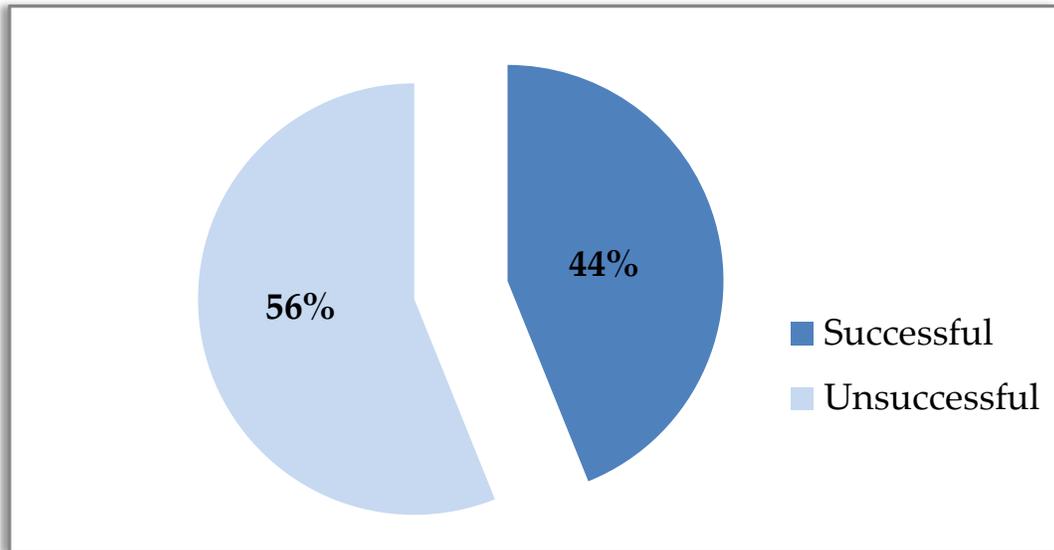
crediting and debiting were not completed at the same time, which could have been a problem, noting, “You set yourself up for a potential major disappointment or major failure to achieve what you expected to achieve if the debiting process turns out differently than you might have implicitly anticipated.”

MARKET EFFICIENCY

The Recovery Credit System was designed to engage private landowners; one measure of success was the number of bids received compared to the resources available. The reverse auction was designed to encourage competition of selected variables. Competitive variables included cost per recovery credit year, cost share, and contract length, although contract length was capped at 25 years. Measures of success would, therefore, include cost per recovery year trend, cost share trend, and contract year movement. Figures 10 – 12 present data on these three variables.

Figure 9 presents the percentage of successful versus unsuccessful bids. Of the 41 total bids (excluding bid round one but including property A8 and three total unsuccessful bids in round six), 44 percent were successful and 56 percent were unsuccessful.

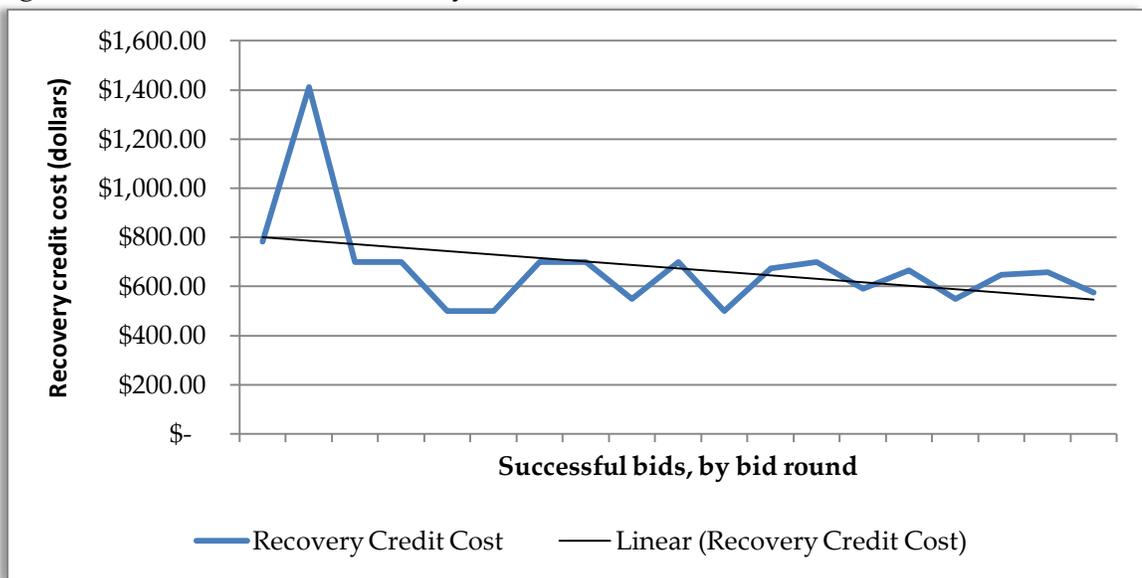
Figure 9: Percentage of successful vs. unsuccessful bids.



As noted under evaluation question 1, the credit unit was 20 acres within a contiguous block of 250 acres; partial credit was not allowed, meaning that 39 acres was still just one credit. Weights were then applied to that basic credit unit to determine total credit value. As part of the habitat assessment, habitat that met the Texas Parks and Wildlife Department guidelines was identified (and later included supporting habitat) and credits were assigned based on all habitat that met the criteria. Therefore, landowners would not have been able to enroll only increments of 20 acres or partial patches. A review of all bids (successful and unsuccessful) determined that 15 percent of all bids were exact multiples of 20 (this could include multiple patches, however). An additional 44 percent of all successful and unsuccessful bids were between 10 and 19 acres over the minimum but not yet to the next 20 acre increment (meaning they were 30 to 39 acres). The remaining 41 percent of bids were between 1 and 9 acres over the minimum.

Figure 10 presents the successful bid recovery credit cost over time with the straight line representing the trend line. (The trend line is a best-fit straight line using  $y=mx+b$  to calculate the least squares fit for a line.) The amount bid per recovery credit year trended from a high of \$800 to just under \$600 over time. Bid round one was not competitively bid; therefore, there was greater fluctuation. When all bids (unsuccessful and successful) were included, the trend line began at \$800 and dropped to just over \$600. This analysis did not include an allocation for noncontract costs.

Figure 10: Successful bid recovery credit cost, over time.



During the interviews, landowners noted the impact of the reverse auction process:

- “Putting money into it up front was kind of hard for us to understand, but I think a real positive on this was getting the conservation practices done up front, and there’s no way that you can figure out a bid and all of that to make it work so that everything is paid for that you need to be done. You know, you’d best put in more money.”
- “I submitted a bid and it came back there isn’t enough money so you need to pull it back and so I pulled back. It ended up being what it ended up being and it was fair, but it wasn’t what my bid was.”
- “There’s a limited amount of funds, and you might not make it. We didn’t get in the first time we bid. The second time we did.”
- “I think our first bid was slightly too high. I think it’s an equitable way of doing it. It’s kind of interesting. It’s definitely different to anything else that we had been in, because you have to decide what you can do on it, and you can say, ‘Well hey, I’d like a lot more,’ and then you don’t get it.”

In addition to the reverse auction process, landowners identified the term as being a competitive driver:

- “They didn’t want to go any less; I’ll put it that way. But I can see their value. They’ve got to know longer – it’d been okay with me if it was a shorter time period.”
- “I think one of the things that we did do on the first bid was we bid at 20-year rather than 25, and I think that’s one of the reasons we lost the bid is because there’s more weighting to longer periods, and that makes sense.”

Figure 11 presents the landowner cost share percentage over time. The line is the trend line: the landowner cost share percentage of bids rose from 15 percent to almost 30 percent over time. For successful bids only, this represents \$451,295.37 in landowner contributions to their accounts.

Figure 11: Landowner cost share percentage for all submitted bids, over time.

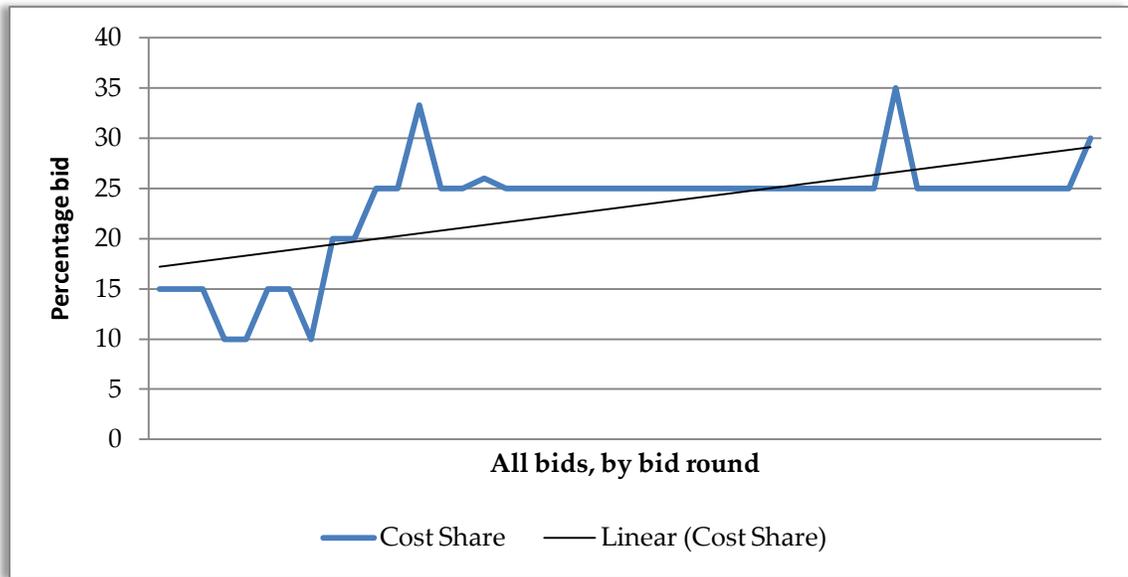
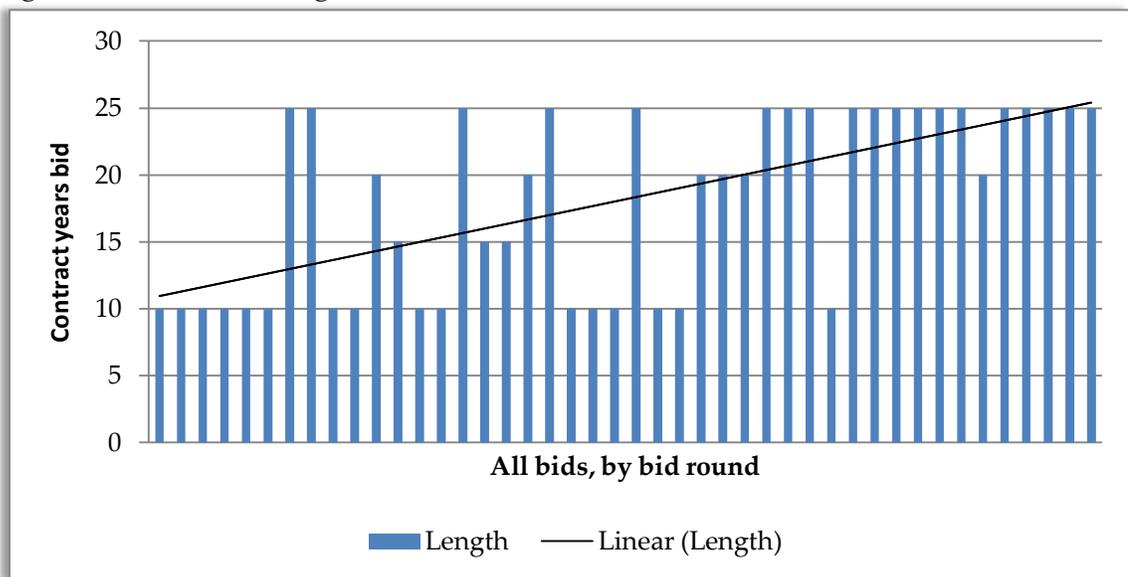


Figure 12 presents the same type of analysis for contract length for all submitted bids. Please note, however, that in bid round 4 landowners were informed that Fort Hood preferred longer-term contracts but that 25 years was the maximum, which effectively created both a floor and a ceiling for term.

Figure 12: Contract length for all submitted bids, over time.



Landowners and nonlandowners reported that the incentive program meant that individual private landowners began to view the habitat as an asset and not as a liability. This change was often due to their peers. One interviewee described the

situation as, “The last thing they [private landowners in the area] ever really heard about this bird was that it was a bad deal. [Now] they know their neighbors are happy. That bird is a valuable asset, and they may not have thought of that going in.” Another noted, “One thing that I didn’t expect was to have one landowner -- while you’re talking to him about a project -- call his neighbor, encourage his neighbor to sign up because he’s got this great deal. That was kind of refreshing.” Finally, an interviewee noted “the positive incentives that it creates for landowners that aren’t even in the program [in] retaining suitable habitat.”

#### ***4. Model effectiveness in promoting federal/nonfederal partnerships***

This question begins the assessment of impacts of the model as tested in the proof of concept. The Recovery Crediting Guidance (USFWS 31 July 2008) does not specifically define partners, but does identify state and local agencies, tribal governments, conservation organizations, the business community, and private landowners as possible collaborators in recovery efforts. This section predominantly focuses on partnerships developed with private landowners, but also includes data on the collaboration and communication among the participants.

The proof of concept did engage private landowners, who are considered critical for making progress in recovery (Bean 2000; GAO November 2006; USFWS 3 March 2009), and – whether due to establishing trust, raising awareness, or incentives – engaged those who were not engaged in species conservation before. The program was able to build relationships with landowners through building trust and providing technical assistance and education.

Interviewees reported both successes and challenges relating to collaboration and communication. Nonlandowner interviewees reported (1) increased collaboration among state stakeholders, (2) increased collaboration among working group members, and (3) delayed involvement of Fort Hood Natural Resources staff. Interviewees reported that communication was very good among those most involved with the project but that satisfaction with communication decreased as distance from day-to-day involvement increased. There was a perceived lack of communication between Fort Hood natural resources and training branches.

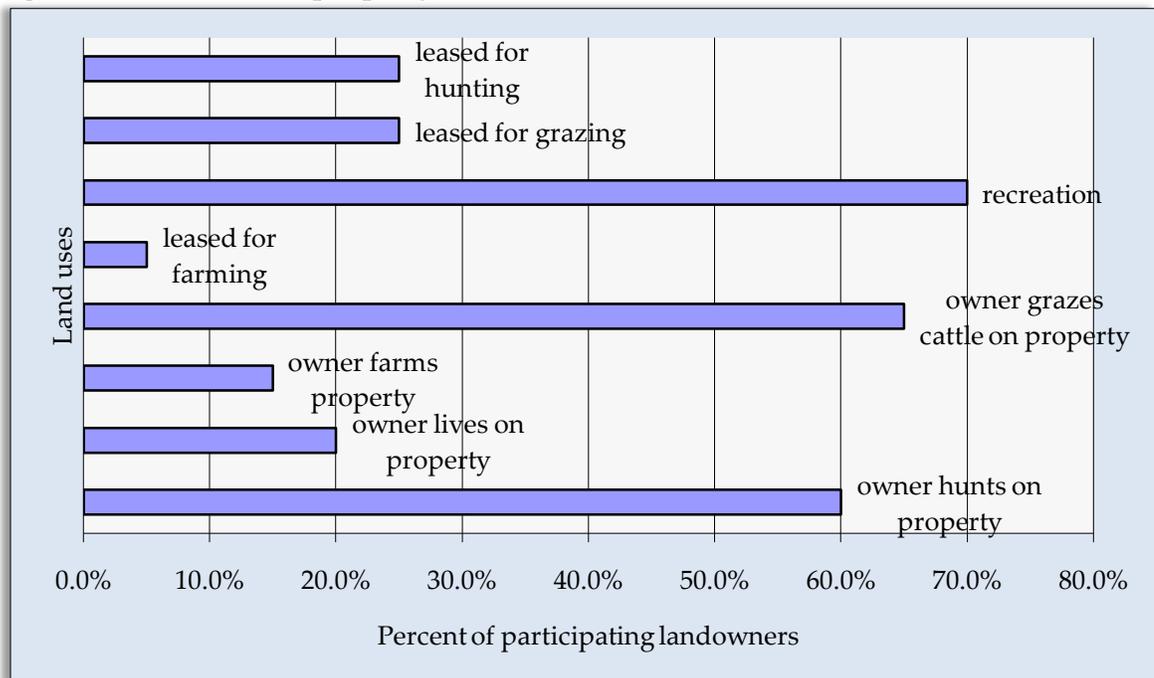
## PRIVATE LANDOWNER PARTNERSHIPS

The proof of concept engaged those who were not engaged previously in species conservation. As one interviewee noted, “It engaged participation of a set of landowners who, in my experience, would otherwise not participate in conservation for endangered species...finding the right tool to just get the door open is extremely important,” adding that “for some landowners, it’s a stepping stone toward a more permanent type of conservation activity, which you never would have gotten that far if you came to the door with that as your first option.” Program operators noted that “at first, they’re just real curious about it, and then we get our foot in the door.”

### **Ownership and use**

Ten of the 17 landowners interviewed reported long-term family ownership with comments such as, “It’s been in the family since 1860,” and “I inherited it from my grandmother in 1992.” Figure 13 presents how landowners use the property. Please note that landowners often had multiple uses for the property. The most common responses were recreation, grazing cattle, or hunting.

Figure 13: Landowner property use.



Source: Habitat Assessments completed by the Environmental Defense Fund.

The landowners plan to continue using the land the way they are; and, given their family history with the properties, it is not surprising that 10 of the 17

landowners specifically mentioned they were planning for their heirs to inherit. As one noted, "In 15 years, I will be 65 and my children can decide what to do with it." Landowners noted the impact on their heirs as a reason for preferring term contracts. One landowner noted, "I'm not going to live forever – the kids can do what they want," while another said, "Even the 25-year becomes important as far as 25 years from now I'll probably not be still here. So, I talked to my children and said, 'This is what we'll be doing,' and if they had said, 'Oh, no. Don't ever do that,' kind of thing, I might have taken a different track." Of the two landowners who would consider a permanent easement, one "would do permanent if there was a better tax break, so the temporary was appealing."

### **Prior experiences**

Only one landowner had not implemented prior land management practices; some had participated in U.S. Department of Agriculture or other programs. Of the 17 respondents, 13 had been involved with some type of land management program before, ranging from the Environmental Quality Incentives Program to Great Plains, but only one had been involved in any type of species or habitat conservation program in the past. As one landowner noted, "We didn't know we had anything to be protected."

Notable elements of the partnership included changing landowner perceptions of the military around Fort Hood Military Reservation and sharing technical assistance and education. While the first dimension may only be pertinent to Fort Hood, the second element is transferable.

### **Building trust**

Interviewees report that the Recovery Credit System allowed the military to change perceptions. Comments included, "There's been a lot of controversy between landowners who had property taken by the federal government in order to build Fort Hood back in the '40s," and "The private landowners in that area were not very receptive to the military kind of taking more chunks of land. That was their perception." Interviewees reported that this effort was "a good faith way of the government reaching out and willing to work with private landowners with this project that would be a win/win situation both for them and for the endangered species that we're trying to protect." Finally, one interviewee stated that, "Our 2005 biological opinion, if not required us, certainly encouraged Fort Hood strongly to seek – to work with outside agencies and private landowners to find habitat off-post. We didn't know how to do that at the time but the RCS [Recovery Credit System] did that."

### **Technical assistance and education**

Interviewees also noted that landowners received technical assistance and education, stating that “through participating in this program, they’re receiving this technical assistance, and they are learning and they are being taught to be better managers. In the end, when it’s all said and done, they are managing the land in ways that perhaps they were not before, just because they now understand what’s happened and they’ve seen the results. So, that educational component of these landowners that have participated can’t be understated, I think.” Landowners also noted learning new techniques, with one noting, “I think, you know, you learn something by seeing them do it, and I probably even would have said don’t use a hand cutter or loppers under some of the trees,” and “Fifteen years ago we bought dozers and chains. It made a terrible mess. What we did was terribly wrong.”

Another interviewee noted, “As part of that building the relationships with the landowners, establishing trust and being able to identify management opportunities that were compatible with the landowner’s needs and objectives, and also compatible with conservation objectives, those were all useful things, even though they may not have produced credits per say.” Landowners concurred: “The fact that we were given the opportunity to determine, I guess, different practices that we wanted implemented, I really appreciate that. So we got into the project for X amount of money and then it indicated what practices we wanted to follow. I thought that was really great that they allowed the land owners to as opposed to being told what you have to do.”

Program operators also reported that the landowners “get to know me... and then by the time that we’re through, after two or three years in, they’re looking to me for technical advice.” In terms of partnership, one landowner mentioned that he and the program operators had become “friends over time” while others mentioned that the program operators had become a resource, noting, “The program is as good as the people. They are very prompt, remind you when it is time to do management. I was looking for native trees to plant and they helped me find some.” Another said, “In that one area close to where the habitat is, the only water was from a natural creek, and that creek didn’t have water in it year-round. So, in their program they suggested – and I liked the idea – and we built a pond for the wildlife.”

One issue raised crosses both the partnership and the market aspect. When a transmission line was proposed for the area, landowners realized it would negatively impact their contract, so they asked the program operators to help:

- “We had this potential for a transmission line coming through the county. It will happen. It’s to carry wind energy from west Texas to the populated area in east Texas, and the route is gonna go through our county, and the question is where. We’re on one of the two routes, and of course this could very definitely affect the deal here on the warbler, so we’ve talked to him about that.”
- “And we recently – this is just extra information, but there’s a proposal, and you may be aware and may not, they have the wind generator generating electricity out in west Texas, and they’re building transmission lines to bring the electricity to where the people live, you know, the metroplex and Austin/San Antonio, and we looked, and we got information that they might be looking at our place, and we called Justin and told him. I mean, he’s right on top of it, and he got there and went to the presentation they had on where you could check it out and see. ”

#### NONLANDOWNER PARTNERSHIPS

General Thomas Metz [CO at the time] convened an environmental summit at Fort Hood in October 2003 to, as one interviewee stated, “get all of the stakeholders involved and he brought in nongovernmental organizations, invited state people, invited federal people, invited Fish and Wildlife. There was probably over 150 people in the room.” Another interviewee concurred: “So, it was the state agencies, federal agencies, military, all the commodity groups, agricultural groups, so there was a wide diversity of people that attended that first meeting.” Interviewees reported that the Recovery Credit System unfolded primarily from that meeting (although there were other drivers as well, including an existing project at Leon River and the 2005 biological opinion that suggested implementing off-site conservation).

Interviewees noted that “partnerships have been established between state government and nongovernmental organizations at Fort Hood that did not exist prior” and that those partnerships led to [some work]: “It would have been fully funded by the state to give us permanent credits on state properties and we blew it.” This was seen as important because, “none of that really honestly would have happened – there was an acrimonious relationship between the state government and Fort Hood on issues like cattle grazing that this Recovery Credit System really led to some positive things to be honest with you.” Others reported forming new relationships with “the training folks and the leadership at Fort

Hood” adding that, “it did bring people into meetings with other people that probably don’t see each other very often.”

Interviewees report a wide range of participants in the working groups. One noted that “the military was involved, NGOs, Texas state agencies, Texas A&M was a member. I believe every entity that was involved over the entire project had members sitting on each of the committees.” Another said, “I sat on the policy committee. So we developed this program with a whole bunch of stakeholders including TNC [The Nature Conservancy], Environmental Defense, Department of the Army and the Department of Defense has a representative – and AEC [Army Environmental Command] - had representatives sitting in these meetings down in Austin. So the Army – OSD [Office of the Secretary of Defense] did as well.” This collaboration was maintained through the debiting process with the U.S. Fish and Wildlife Service, Fort Hood Natural Resources, Fort Hood Training, Texas A&M University, and the Environmental Defense Fund involved. Others noted that “we had very, very capable people in all aspects involved.”

Among committee members, there were benefits from the increased collaboration. For example, on the science committee, it “forced us to think very critically about what we do know and what we don’t know. Not only that, but what we felt is a workable model, and so it forced everybody to talk about it and think about it, and get together about the things that – the gaps, the issues that Fort Hood has brought up. I mean, in other words, we understand there are certain issues that the military has, and I think this whole process certainly helped to clarify their perspective on it. It forced all of those who are involved and care about these issues to get together.” Others reported that in the process, “everybody participated and everybody had their thoughts aired.”

Fort Hood personnel were involved in the initial summit and the subsequent working groups but interviewees report that the Fort Hood Natural Resources Branch was not initially involved. Although this changed within a few meetings, it was their observation that this limited Natural Resources’ support of the pilot. In addition, Natural Resources personnel changed, causing a lack of continuity.

### **Communication**

If involved day-to-day, interviewees reported frequent communication: “I was in frequent contact with all of those groups. Not to say that we all necessarily agree on everything...and there was never a time when we needed to talk when we wouldn’t talk.” Another interviewee concurred, “I’m sure I heard about it 20 or

30 times over the last three or four years. I had good communication with the people I felt I needed to.” Others did not report frequent communication, but noted, “I’m confident it’s available if I were to inquire about it but my role, again, was part of the planning.”

As distance from the project increased, however, when asked, interviewees reported less knowledge of the project: “I know that there’s credit properties out there and I understand that there’s birds on them. I can’t tell you how many birds are on there and I can’t tell you how good a quality habitat it is because I don’t know any of those things.” Several interviewees noted the success of tours and outreach conducted, adding, “It would’ve been nice if we’d had those kinds of days throughout the process, a science day or a reporting day, an outreach day.”

Finally, several interviewees noted disjointed communication between Fort Hood Natural Resources and Fort Hood Training so that if program staff or stakeholders spoke to one branch, the other could be unaware.

## ***5. Model goals for endangered species conservation***

The net benefit to recovery is defined as enhancement of a species’ current status by addressing the threats identified at the time of listing or in a current status review (USFWS 31 July 2008). The standard for the proof of concept was defined as follows: a) Maintain an annual 10% reserve of credits; b) Overestimate debits and underestimate credits; c) Report annually on status of credit properties; d) Continue maintenance of a self-sustaining viable population and habitat protection; and e) Use a site selection criteria that targets high quality habitats for credits and low quality habitats for debits. Data suggests that those items that can be assessed at this time were met. Data suggests, however, that enhancements to the model would improve endangered species conservation. Following a brief summary of the species provided for context, this section first addresses the defined net benefit to recovery standard and then actions identified in the recovery plan (USFWS 1992). Finally, the status of the species on enrolled properties is addressed; there are no longitudinal data available.

### *Species Summary*

The following is a summary of the status of the species per the biological opinion for debiting (USFWS 3 March 2009): golden-cheeked warblers are confirmed in 27 counties and may occur in another 11 counties; however, the latter counties may have only small amounts of suitable habitat. The majority of the breeding

range occurs on private lands that have been either occasionally or never surveyed. Currently, there are only four large golden-cheeked warbler populations known that receive some degree of protection: Balcones Canyonlands Preserve in Travis County; the nearby Balcones Canyonlands National Wildlife Refuge in Travis, Burnet, and Williamson Counties; Fort Hood Military Reservation in Coryell and Bell Counties; and Camp Bullis in Bexar County.

Habitat loss has occurred due to suburban developments. Additional activities that threaten golden-cheeked warblers include the clearing of deciduous oaks, oak wilt, nest parasitism by brown-headed cowbirds, drought, fire, stress associated with migration, and competition with other avian species. The recovery strategy outlined in the golden-cheeked warbler recovery plan divides its breeding range into eight regions and calls for the protection of sufficient habitat to support at least one self-sustaining population in each region. Fort Hood occurs in Recovery Region 3; with approximately 24,267 hectares of suitable golden-cheeked warbler habitat. Population viability assessments on golden-cheeked warblers have indicated the most sensitive factors affecting their continued existence are population size per patch, fecundity, and fledging survival.

#### MEETING THE NET BENEFIT CRITERIA

The criteria for meeting the net benefit to recovery standard in the proof of concept as identified in the biological opinion for debiting (USFWS 3 March 2009) are as follows:

- a) Maintain an annual 10% reserve of credits.
- b) Overestimate debits and underestimate credits.
- c) Report annually on status of credit properties.
- d) Continue maintenance of a self-sustaining viable population and habitat protection.
- e) Use a site selection criteria that targets high quality habitats for credits and low quality habitats for debits.

At this time, three of the five can be assessed: overestimating debits and underestimating credits, reporting annually, and using a site selection criteria that targets high quality habitat for credits and low quality habitats for debits. Although planned, continued maintenance has not yet occurred and, until the debiting occurs and landowner contracts end, the reserve cannot be confirmed.

The science committee included recommendations to ensure that credits were underestimated. A review of the habitat assessments and bid sheets confirms that the system was followed. The biological opinion for debiting notes that “the debit value of a proposed action is calculated based on the 20-acre conservation unit and ranked based on the value to the GWCA [golden-cheeked warbler]” (USFWS 3 March 2009 p. 10). In practice, this means that, although the weighting criteria will be applied to determine debits, size will be the most important factor as all sites on Fort Hood are in region three and have the same proximity to existing populations. The tier system described is used to encourage use of lowest quality sites and directs use toward the edges and isolated fragments.

Program staff, military personnel, and other stakeholders advise that annual reports were created and provided. The reporting requirement described in the biological opinion for debiting, however, will require more detailed reporting than has previously occurred.

The science committee specified that the Texas Parks and Wildlife Department guidelines be used for assessing golden-cheeked warbler habitat. Credits were limited to sites highly likely to be used by golden-cheeked warblers although landowners had restrictions on supporting habitat that may be used as well; habitat assessments referenced these guidelines. The weighting criteria also ensured that sites with the highest ecological value were selected, although one peer reviewer felt that different weighting criteria for the proximity of pairs would be helpful. All three of the peer reviewers confirmed that the program enrolled properties containing high quality habitat and, that on those properties, the highest quality habitat is what is being counted and tracked for credits in the system. As one noted, “I observed no major inconsistencies in the habitat evaluations with respect to the Texas Parks and Wildlife Department descriptions. It appears that the Texas Parks and Wildlife Department guidelines for identification of habitat were carefully followed.” The reviewers further found that the criteria should be revised to reflect more closely habitat use and that the move to identify and protect supporting areas should be continued. Please see more regarding supporting habitat below.

Although it is in process, the following procedures were put in place to ensure that low-quality sites were targeted. As described in the biological opinion for debiting (USFWS 3 March 2009 p. 9), “A tiered decision approach for site selection will be used in order to prioritize training areas based on minimizing impacts on golden-cheeked warbler habitat. A sub-committee consisting of species and habitat experts was assembled to develop ‘standards’ that will be

used to modify golden-cheeked warbler habitat on Fort Hood and estimate appropriate habitat recovery periods for use in the Recovery Credit System. Recovery periods, and therefore debits, will then be assigned based on the tier and the standard.”

### OTHER RECOVERY STRATEGIES

In addition to meeting the required net benefit to recovery, the model was designed to address recovery strategies. This section describes what effort was made to address recovery strategies beyond producing a net habitat benefit. The 1992 recovery plan (USFWS 1992) identified six needed actions for recovery:

- Studies of golden-cheeked warbler population status, biology, ecology, habitat requirement, and threats on the breeding ground, in the winter range, and along their migration corridor.
- Protection of existing populations and habitat in the breeding range, wintering range, and along the migration corridor.
- Increased voluntary protection of warbler habitat.
- Enhancement and maintenance of the quality of warbler habitat on public and private lands.
- Increased public awareness of the importance of the species and other endangered species.
- Regulatory protection. (Action achieved with listing of the species.)

While not an evaluation question, data on the above strategies were generated during data collection. This section presents those data.

#### **Studies**

As noted in question 7, a research agenda has been implemented that includes population studies in the area around Fort Hood, habitat requirements, and threat on the breeding ground. For several interviewees, the research generated was a positive outcome of the Recovery Credit System pilot project. Those with frequent contact with the program were highly satisfied with the scientific information generated, feeling that the information generated was a significant contribution to the recovery effort for the species.

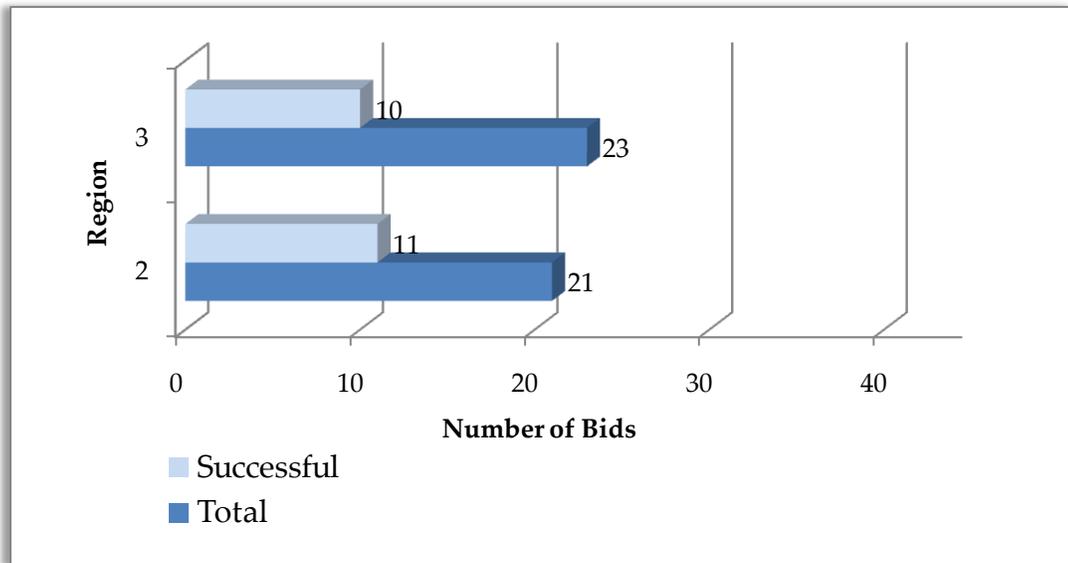
#### **Protection**

As noted elsewhere in this report, habitat was protected under the Recovery Credit System proof of concept. In regard to credited habitat, the peer review team saw no evidence that designated warbler habitat was itself ever affected by

deleterious management but identified items that appear to be affecting or potentially weakening protection of the supporting habitat, which could be deleterious ultimately. The panel identified the following items that appear to affect or potentially weaken protection of this habitat: recruitment of deciduous species, management of areas adjacent to credited parcels, and clearing either not occurring or occurring where not planned.

Figure 14 presents the total bids submitted by recovery region. Of all 44 bids submitted (including round one), 23 or 52 percent were from region three. As the project progressed, more properties from region two were enrolled.

Figure 14: Total bids submitted by region.



### Voluntary protection

As noted elsewhere in this report, the project increased voluntary protection by executing 20 contracts with local landowners. Interviewees noted that when the species is on private land, recovery credit is a good fit. For example, one interviewee noted, “A lot of lands, privately owned lands, that had significant environmental resources on them were made accessible to conservation efforts to people in institutions involving conservation work, and those were lands that had not previously been as accessible.” Finally, one interviewee noted, “I think that that’s the largest value in the whole effort is that, in Texas at least, almost all of our habitat is on private land, and our rare species habitat and habitat of listed species is on private land. And so it behooves us to figure out ways that we can move recovery forward in working on private land with the private landowners, and we’re not the only state like that. It’s private land, and we don’t get

anywhere unless we can figure out how to make it work for people and incentivize them to do what's right for the habitat and for the species. So, to me, that's huge. I think that if we don't do that, the regulatory arm is not going to get it done. You have to work with people."

### **Enhancement and maintenance**

The net benefit definition, enrollment criteria, and management practices were not designed for restoration. Nevertheless, the program and site plans dedicate significant attention to juniper thinning practices and also discuss fencing and out-planting as options to improve habitat. The program has made limited efforts to enhance habitat, primarily through juniper thinning in selected areas. Thinning in such a manner promotes the growth of the remaining junipers and possibly encourages the growth of broadleaf trees. This would probably result in an enhancement of golden-cheeked warbler habitat, though not within the short amount of time since the management action was undertaken. There was no evidence, however, that fencing or any change in grazing management was planned for any property. In several cases, very recent evidence of cedar removal was observed in areas that appeared to have been potential golden-cheeked warbler habitat. In other areas, juniper management pushed into golden-cheeked warbler habitat both below a hillside band of habitat and on the plateau above it. Program staff report that there are 938 golden-cheeked warbler supporting acres enrolled, and that, to date, work has been completed on 55 of those acres; work will be done on another 200 acres of supporting habitat in the future. Funds for future management practices are held in the landowner account.

### **Increased public awareness**

Many of the landowners noted that they had learned more about the warbler through the project, with one setting aside plans to do work so that the students could do an in-depth study on bird nesting habitats. (This landowner had stated conservation was not important to him when he enrolled.) One landowner noted, "I think we get a report, and it seems like, you know, that it is indeed working for the wildlife and for the warbler population. So, I guess we're achieving something there with the birds." (This landowner also stated conservation was not initially important to him). Another said, "I had never heard of the golden-cheeked warbler or black-capped vireo. Still haven't seen one but they said they had heard or seen them on the property. It's interesting to learn about them. That's my favorite bird now."

Interviewees also remarked on the importance of the awareness, given the past perception of the military: "To have folks actually competing to participate in a

program that has federal dollars and involves federal entities... we couldn't plan an outreach program or an education program to achieve those results." Another stated, "There's a little bit more awareness of the endangered species is out there on a larger scale." Finally, one interviewee noted (although he did not see this as a positive), "Landowner expectations in the vicinity of some of our major training areas are changing to think that the Army is going to be willing to purchase these temporary requirements."

**Presence of the golden-cheeked warbler**

As noted, the monitoring of Recovery Credit System properties included annual site visits by program staff, annual visits by graduate students through Texas A&M University, and presence/absence, abundance, and productivity assessments completed through a contract with Texas A&M University. As of July 2009, 19 of the 20 enrolled properties had been surveyed using point count methodology for golden-cheeked warblers during at least one breeding season; occupancy and abundance point count surveys indicated golden-cheeked warblers were present during at least one breeding season on 18 of the 19 properties from 2007 to 2009. In addition, Figure 15 provides an excerpt from the research and monitoring database provided by Texas A&M University that displays additional information on territory and fledgling status on six Recovery Credit System sites.

Figure 15: RCS properties monitored for territories and fledglings, 2007-2009.

Site Monitored	Year	Territories with paired males	Territories with fledglings observed
A	2007	Unknown	Unknown
A	2008	0	0
B	2009	3	0
C	2009	1	1
D	2009	4	2
E	2009	3	3
F	2009	5	5

Source: Texas A&M University

Although the original evaluation design specified a time series analysis of population trends, these data were not available as no large-scale surveys in the area had been completed prior to the implementation of the Recovery Credit System. In addition, the peer review panel noted that baseline surveys had not been completed on all properties at enrollment due to the limited breeding

season, further limiting assessment of the species status on each site. Finally, the monitoring data to date provides limited information on habitat utility, although the reporting requirement described in the biological opinion (USFWS 3 March 2009) will generate more information on species impact.

## ***6. Model impact on Endangered Species Act/mission flexibility***

While this evaluation did not assess the full complexity of issues surrounding mission flexibility, several items relevant to the proof of concept are noted here. First, the 2005 biological opinion (USFWS 16 March 2005) noted that off site conservation provides an opportunity to offset potential effects of mission activities at Fort Hood. The biological opinion further noted that Fort Hood had participated in off site activities in 2004 and encouraged Fort Hood to continue work on off site plans. Second, nonlandowner interviewees noted the changes to the mission at Fort Hood since 2005 and the resulting changes to training needs; the 2005 biological opinion also noted the potential for changes to mission due to reviews of force structure and deployment and the Base Realignment and Closure effort underway at the time of the opinion. Finally, as described in more detail below, there are training restrictions placed upon Fort Hood through the biological opinions. These issues are not unique to Fort Hood, of course, and the army has several tools to address them, most commonly a Section 7 consultation with US Fish and Wildlife. The broad umbrella of Section 7 allows for offsite activities, including conservation banking. Three elements of the Recovery Credit System, however, can increase the flexibility of federal agencies to accomplish their mission while meeting their requirement under the Endangered Species Act: a focus on recovery, extending conservation beyond the boundaries of the installation through engaging private landowners, and providing an additional method for removing restrictions. This section discusses removing restrictions; a focus on recovery and extending conservation beyond installation boundaries were discussed under evaluation question 1.

The following summary describes the context in which Fort Hood was operating at the time the proof of concept began and the restrictions placed upon training by the 1993, 2000, and 2005 biological opinions. As noted, although there was a general trend in the biological opinions to reduce restrictions, events such as fires (not uncommon) can generate additional restrictions.

### History

1992 Warbler Recovery Plan completed.

The 1993 Biological Opinion at Fort Hood restricted training activities in 35,734 acres of known endangered species habitat. Guidelines restricted the use of fires, digging, brush or tree cutting, and the length of time personnel could spend in habitat during breeding season. These restrictions were applied to all endangered species habitat across Fort Hood.

Due to a 1996 fire that destroyed 5,715 acres of golden-cheeked warbler habitat, there was a second Biological Opinion in 2000. The 2000 Biological Opinion incorporated a fire danger rating system for the live fire area and established a core habitat for the golden-cheeked warbler and the black-capped vireo (47,106 acres); endangered species training guidelines applied only to the core habitat.

The 2005 biological opinion estimated Fort Hood golden-cheeked warbler habitat of 52,000 acres. The U.S. Fish and Wildlife Service removed restrictions as follows: reduction of golden-cheeked warbler core habitat, establishment of a “let burn” policy in the live fire area, reduction of the period for use of the training guidelines, and creation of incidental take allowances.

Although there was widespread recognition of Fort Hood’s success in managing the warbler to minimize impact on training, interviewees felt that the Recovery Credit System could contribute to flexibility in meeting their mission and requirements for the Endangered Species Act either at Fort Hood or for other federal agencies. The first was that the Recovery Credit System provided an additional method to remove some, any, or all restrictions; the second was that it provided an additional tool in a rapidly changing training environment.

### REMOVING RESTRICTIONS

As noted, due to onsite habitat destruction, severe training restrictions have been imposed in the past; the 1993 and 2000 biological opinions restricted training on more than 66,000 acres of Fort Hood’s training land. The potential for golden-cheeked warbler habitat destruction onsite, therefore, creates uncertainty regarding restricting future training. The Recovery Credit System provides a way to offset take not covered under the biological opinion offsite so that training restrictions are not imposed. The Recovery Credit System could also increase the species baseline.

Interviewees noted that removing any constraint was beneficial. One interviewee noted, “We lose thirty 24-hr calendar days to fire each year and 99 percent is related to habitat.” (Not all fire delays occur on golden-cheeked warbler habitat.) Another noted that before the proof of concept, “you were somewhat limited in

terms if you had a fire, if you had to do a construction project on the range or something else like that and you were working in habitat.” Interviewees reported that the Army personnel would hope that in “future biological opinions [we’ll] get more take...or [we’ll] get less restrictions.” In addition, one interviewee noted, “The Biological Opinion said if you enter into or find partnerships with nongovernmental organizations that preserve habitat and recover the species off-site then we’ll lift the training restrictions on them.” So, the increased ability to remove any training restrictions beyond what is allowed under a biological opinion is seen as beneficial. Other interviewees noted that “if we can pile up enough credits, temporary or permanent, the next time we have a 1996 fire, it’s an insurance policy for us.”

Interviewees noted that the Recovery Credit System as implemented – with 10- to 25-year contracts – did not allow enough training flexibility for training in warbler habitat due to the time required for recovery. Those interviewees noted, however, that longer-term contracts would allow time to train and recover the habitat and that “longer term is definitely much better as it gives us flexibility within that longer term.” For other purposes, such as construction, permanent take would still be required and permanent credits could address that need.

#### RAPIDLY CHANGING TRAINING NEEDS

Interviewees report that training needs at Fort Hood have changed and are likely to continue to change rapidly. As one interviewee noted, “The training tempo at Fort Hood was going to increase, and the commanding general convenes this environmental summit” in order to address restrictions while another noted, “As things evolved, Fort Hood gained the need to develop training areas for infantry soldiers. Well, Fort Hood has always been a mechanized training facility, and so they didn’t have the facilities for infantry, which takes a different kind of terrain. So once the evolution toward this view of the future of Fort Hood being more of an infantry training, which only happened recently.”

As one interviewee said, “We really never had light infantry stationed at Fort Hood before....Recently we got a light infantry brigade and we had to go out and kind of restructure the way we conducted training down range.” Another noted, “We want to and do more infantry training, foot soldier training which is what we’re doing right now in both theaters. Everything’s on foot mostly other than mobile patrols. So it’s going to greatly enhance our ability to train infantry soldiers here because the infantry terrain that we need is not in the western side. But on the east side you can see the green on the map [area of warbler habitat]. That’s good infantry terrain.” Although the 2005 biological opinion removed

restrictions, there remained core habitat. At the time, it was only on a small portion of the eastern training land and well outside established maneuver areas; because training needs have changed, however, so have the utilized habitats. As one interviewee noted, "We were not operating in the realistic environment we were seeking. We talked to the commander and started doing 'what if?' and ran into the ESA[Endangered Species Act] hurdle. Our old range was good for our old needs." By now operating in the habitat with an expanded range, interviewees noted that "three elements can work together - we couldn't do that before. We leveraged the range by adding habitat to expand the training exercise. It added flexibility. All the infrastructure that was spent on the range we can now be supported with habitat. It enhanced capabilities from a very small window and increased our training capacity - number of tasks, type of tasks. The Dutch chose Fort Hood over other bases because of what we can do. The commander now has a lot of options."

The Recovery Credit System was seen as another option both to allow take and to provide flexibility in a rapidly changing military environment. One interviewee noted, "It wasn't an option before. Temporary is appealing as doctrine changes are now the norm and things change so quickly. We can use permanent take for permanent construction but things will change again. We did what we could [with range changes], now we're stopped until the Recovery Credit System or a new biological opinion comes out with more take." The potential impact on training has not yet been fully realized. As one interviewee noted, "Some of the early contracts we have with landowners were five years which really didn't do a lot for us but we're moving on and we could move on to 30-, 40-, 50-year contracts." Another noted, "For the current project, we used take we could have used for other projects. It boils down to can or can't do." In contrast, one interviewee noted that although training needs change quickly, that very pace means it is hard to predict what training needs might be and that permanent credits would be preferred.

Finally, the Recovery Credit System is flexible. As program operators noted, "We actually modified our screening criteria based off the mission change at Fort Hood. And we got away from fire and we needed something else entirely, then we kind of change what we are looking for. So it evolved over time; you know, we started off thinking we were going to do A. Well, it's a flexible military. They're in a war; they had to be flexible. Now we ended up we were using those credits for B."

## OTHER BENEFITS

In adding to the flexibility of federal agencies, other benefits to the Recovery Credit System were providing a framework to customize a system, moving conservation off-site, and a focus on recovery. Several interviewees mentioned that conserving habitat off-post was already allowed, noting, "We were already able to participate in this kind of thing under Section 7 with the Federal Action Agency before, but it was on a case-by-case basis." The Recovery Crediting Guidance notes, "Although Federal agencies with appropriate authorities may also purchase credits in a conservation bank or employ other mitigation or recovery measures, a Federal agency may want to establish a system specific to its needs" (USFWS 31 July 2008 p.44769). An interviewee noted that the Recovery Credit System was particularly helpful when agencies "really can't do any more within their boundaries but if they could go just a little bit outside of their boundaries and work with adjoining landowners, they could actually achieve meaningful conservation." Finally, as one interviewee said, "Everything we're doing is going to lead to finding more habitat and more birds which is good for Fort Hood." Fort Hood (and other federal agencies) must negotiate for take, which restricts training and does not further the recovery of the species. In contrast, there are 75,934 acres of mature oak-juniper woodland in patches of more than 250 acres within the proof of concept area. The Recovery Credit System, as noted in the first section, allows for a holistic approach to recovery across a geographical area and in partnership with private landowners.

### ***7. Proof of concept scientific information generated***

This question explored whether the scientific information generated by the Recovery Credit System monitoring and research program provided reliable information likely to lead to more effective conservation and recovery strategies for the species in this and other models. The program used three dissemination strategies: an annual local symposium, peer reviewed articles, and presentations at conferences. Those with frequent contact with the program were highly satisfied with the scientific information generated, feeling that it was a significant contribution to the recovery effort for the species; stakeholders with less frequent contact reported less awareness. To date, there have been 14 papers and 20 conference presentations generated. As 11 papers are in press or in preparation, however, it is too early to determine whether the information will lead to more effective conservation and recovery strategies.

## RESEARCH PROGRAM

For several interviewees, the research generated was a positive outcome of the Recovery Credit System pilot project. Those with frequent contact with the program were highly satisfied with the scientific information generated, feeling that it was a significant contribution to the recovery effort for the species. As one interviewee noted, "The biggest advantage for us is that increased knowledge and information about the species, and that was expected, but the level of scientific information, I think, was surprising for us." The ability to research on private lands was the item mentioned most often: "Once a landowner signed a piece of paper saying he wants to enroll, then a small army of graduate students would descend on the site and survey the site for existence of warblers and then do some follow-up monitoring of productivity."

Scientific information generated included adding to the baseline of the population of the warblers, interaction with landowners and landowner attitudes, and being able to see over the landscape of the area around Fort Hood, specifically how numbers of birds are trending. In addition, one stakeholder noted that the information was helpful in "validating and sometimes revising our assessment of what is habitat. In most cases, we were quite correct in the outlining of the occupied habitat areas. What was most interesting was finding birds in areas we hadn't outlined." Another stated, "We've learned an awful lot about the species on private land, and we've learned even more about the species on Fort Hood because of this project. The impacts that some of the military activities are having on the warbler where we learned what the military needed to do in order to fully utilize those lands, to maneuver on those lands. The impacts were much less than we ever realized, and that was primarily through this process."

## DISSEMINATION

Those with frequent contact with the program were highly satisfied with the scientific information generated, feeling that it was a significant contribution to the recovery effort for the species. Information was shared through program tours, face-to-face interaction with the graduate students, and through personal communication. Those with less involvement were not aware, at this time, of the ongoing research although they identified that it would be valuable. This may be due to a timing issue as the second symposium occurred in January 2010; there are currently 11 articles in press. At this time, dissemination has not targeted managers and practitioners.

The 2010 golden-cheeked warbler symposium hosted by the Environmental Defense Fund, Texas A&M University, and the U.S. Fish and Wildlife Service will include several presentations that are a direct result of the Recovery Credit System research program: estimating golden-cheeked warbler occupancy in Texas, post-breeding habitat use of golden-cheeked warblers, effects of tree species composition and foraging effort on the productivity of golden-cheeked warblers, and the impact of oak wilt on avian communities in central Texas.

There have also been several publications in peer-reviewed journals, and more in press, as follows:

### **Published**

Campomizzi, A.J., J.A. Butcher, S.L. Farrell, A. Snelgrove, B.A. Collier, K. Gutzweiller, M.L. Morrison, and R. N. Wilkins. 2008. Conspecific attraction: a missing ingredient in habitat modeling. Journal of Wildlife Management 72: 331-336.

Campomizzi, A.J., S.L. Farrell, and J.A. Butcher. 2008. Nest site selection by a male black-capped vireo. Wilson Journal of Ornithology 120:407-409.

Wilkins, R.N., D. Wolfe, L.S. Campbell, and S. Baggett. 2008. Development of recovery credit systems as a new policy innovation for threatened and endangered species. Transactions of the 73<sup>rd</sup> North American Wildlife and Natural Resources Conference 73:1-12.

### **In Press**

Collier, B.A., M.L. Morrison, S.L. Farrell, A.J. Campomizzi, J.A. Butcher, K. Brian Hays, D.I. Mackenzie, and R.N. Wilkins. 2009. Monitoring endangered species occupying private lands: case study using the golden-cheeked warbler. Journal of Wildlife Management, In Press.

Butcher, J.A., M.L. Morrison, R.D. Ransom, Jr., R.D. Slack, and R.N. Wilkins. 2009. Evidence of a minimum patch size threshold of reproductive success in an endangered songbird. Journal of Wildlife Management, In Press.

Campomizzi, A.J., M.L. Morrison, S.L. Farrell, R.N. Wilkins, B.M. Drees, and J.M. Packard. 2009. Red imported fire ants can decrease songbird nest survival. Condor, In Press.

Farrell, S.L., M.L. Morrison, R.N. Wilkins, R.D. Slack, and A.J. Campomizzi. 2009. Brown-headed cowbird parasitism on endangered species: relationships with neighboring avian species. Western North American Naturalist, In Press.

Sorice, M.G., J.R. Connor, and R.N. Wilkins. Recovery of endangered species on private lands: Prospects for incentive programs. Journal of Wildlife Management, In Press.

Topics of articles in preparation include landowner intentions, assessing the detectability of songbird fledglings, evaluating reproductive success, occupancy modeling study design, and range expansion.

## Conclusions, Lessons Learned, and Recommendations

A proof of concept demonstrates in a real-world environment that a model or innovative approach is viable, feasible, and capable of solving or diminishing a particular problem. The Recovery Credit System demonstrated its viability to create a market mechanism for trading credits, engage landowners, and increase competitiveness. Its performance on solving or diminishing two related problems – endangered species habitat protection and federal agency flexibility – was positive, but could be enhanced. Species recovery could be enhanced through refining habitat criteria to reflect actual species use, incentivizing supporting and restorable habitat to enhance habitat, and establishing species metrics. Federal agency flexibility could be enhanced through matching contract enrollments to length of impacts and recovery of habitat.

This section restates conclusions for the first seven evaluation questions and then lists lessons learned (question eight) within each question discussion rather than separately. Lessons learned include both those elements that worked well and those elements that need modification.

### *Conclusions and lessons learned*

#### **Question 1: What is the Recovery Credit System and how does it differ from other models?**

Interviewees and the peer-review panelists agreed that the model provided important contributions to both conservation and to the military: working toward species recovery, extending conservation beyond the boundaries of the installation by engaging private landowners, formalizing a market-based tool for

trading credits, and providing an additional method for removing restrictions on trading. With enrolling distributed private lands, the model also allows addressing recovery holistically. Finally, although the Recovery Crediting Guidance (USFWS 31 July 2008) allows for permanent credits, the proof of concept used term credits. There were two perceived advantages of term credits in this context: engaging landowners and matching military needs.

**Question 2: Was the Recovery Credit System implemented as planned?**

Yes, the system was implemented as planned and demonstrated in a real-world environment that the model was viable and feasible. Lessons learned included credit and debit determination, identifying and protecting contiguous and supporting habitat, and reporting.

As noted in this report, the mechanism developed for credit and debit determination was perceived positively by interviewees. The science committee first determined a biologically-based unit and then assigned credit values to that unit on variables derived from available science and recovery goals. For example, the criteria provide greater weight for certain recovery regions. The end result was a quantifiable and consistent credit and debit determination method.

The identification of contiguous habitat was a lesson learned; the identification of supporting habitat was adapted during the proof of concept. Interviewees noted the need for a better definition of an intact 250-acre patch of habitat; i.e., how much of a break in the canopy is allowable? For supporting (noncredited) habitat, while the peer review panel noted that the designation of supporting habitat was essential and laudable, they also recommended that greater care be taken in prescribing and prohibiting management practices in those areas to maximize the likelihood that supporting habitat will continue to support credited habitat in the future. In particular, recruitment of deciduous species (especially oaks) appeared to be low or nonexistent on properties visited. In addition, peer reviewers found that the definition of habitat used by the system should be refined to reflect actual use by the species. Peer reviewers found that management plans improved over time, but that they could be further refined; several landowners mentioned that the management plans seemed boilerplate.

A final lesson learned during the proof of concept related to reporting. Interviewees desired additional site information, such as whether birds were on-site and functioning as a productive unit and how the site functioned for the metapopulation. The reporting requirements for monitoring specified in the debiting opinion will include this information but were not required until

debiting occurred (in process as of January 2010). Therefore, although site-specific species data have been collected, they have not been reported at this time. While the peer review panel found that the monitoring was consistent with current scientific thinking, the team found that the monitoring information provided was not sufficient to assess fully the quality of the sites with respect to habitat or species management. The panel found that collecting baseline data on the species in addition to the habitat would strengthen monitoring.

**Question 3: Did the participants perceive that the process was efficient?**

Yes, landowners and other interviewees described the process as efficient (defined as whether the proof of concept activities occurred in a timely manner, the nature and extent of perceived problems that occurred, and the nature and extent of perceived successes). Landowners expressed positive impressions of the program, comparing the program favorably against prior experiences with similar government programs. Process lessons learned included the committee structure, the pace, and the reverse auction.

During the planning process, the working group developed three committees: science, economic, and policy. Committee members were recruited from a variety of organizations (e.g., government and NGO) based on relevant expertise and worked collaboratively to develop recommendations.

The second process lesson learned was the pace of the project. Although some interviewees reported that the pace kept participants on track, others reported feeling rushed. The pace meant that the crediting and debiting process did not occur concurrently, which could have led to missed expectations.

Finally, the engagement of private landowners through a reverse auction was seen as both a valuable model element and a success in terms of process as the model increased competitiveness among landowners. The proof of concept incorporated several steps to do this. First, landowners were provided information about the last bid round: the high bid, the low bid, and accepted bids. Second, not every bid was accepted in any bid round. Third, bid rounds were conducted approximately every quarter so that losing bidders could reapply with lower bids. Competitive variables included cost per recovery credit year, cost share, and contract length, although contract length was capped at 25 years.

**Question 4: Did the Recovery Credit System promote effective federal/nonfederal partnerships for species recovery?**

Yes, the program promoted landowner partnerships; other federal/nonfederal partnerships had both successes and challenges. Lessons learned included establishing trust with landowners, raising awareness among landowners, collaboration among all stakeholders, and ensuring communication among all stakeholders.

The proof of concept engaged private landowners, who are considered critical for making progress in recovery (Bean 2000; GAO November 2006; USFWS 3 March 2009), and – whether due to establishing trust, raising awareness, or incentives – engaged those who were not engaged in species conservation before. Private landowners in the area, due to the prior history of the base, were perceived as not being receptive to the military in terms of land use. Through using a third party and offering term contracts, the program was able to establish initial trust with landowners. Through providing technical assistance and education, the program was also able to build relationships with landowners. Finally, as evidenced by the number of bids received and the word of mouth generated, the program was able to raise awareness among private landowners.

Interviewees reported both successes and challenges relating to collaboration and communication. Nonlandowner interviewees reported (1) increased collaboration among state stakeholders, (2) increased collaboration among working group members, and (3) delayed involvement of Fort Hood Natural Resources staff. Interviewees reported that communication was very good among those most involved with the project but that satisfaction with communication decreased as distance from day-to-day involvement increased. There was a perceived lack of communication between Fort Hood natural resource and training branches.

**Question 5: Did the operation of the Recovery Credit System meet its goals for endangered species conservation?**

Yes, the program met its goals for habitat conservation, but the model could be enhanced to provide a net benefit to recovery for the species. Lessons learned included material enhancement.

To date, the system is meeting the net benefit to recovery criteria as well as addressing recovery actions. The net benefit to recovery is defined as enhancement of a species' current status by addressing the threats identified at the time of listing or in a current status review (USFWS 31 July 2008). The standard for the proof of concept was defined as follows: a) Maintain an annual 10% reserve of credits; b) Overestimate debits and underestimate credits; c)

Report annually on status of credit properties; d) Continue maintenance of a self-sustaining viable population and habitat protection; and e) Use a site selection criteria that targets high quality habitats for credits and low quality habitats for debits. Those items that can be assessed at this time were met.

The model also addressed items identified in the recovery plan, but could do more to materially enhance habitat. The management of areas adjacent to credited habitat— especially of supporting habitat – is critical because these areas provide buffers and foraging areas for warblers resident in credited habitat. Management in these areas may be reducing their quality and quantity and thus potentially affecting the value of credited habitat. The peer-review panel recommended expanding protected habitat to include a buffer between all golden-cheeked warbler habitat and possible harmful land management. The model should include incentives for developing habitat and to undertake such management (i.e. more compensation or required management activity).

**Question 6: Did the Recovery Credit System increase the flexibility of federal agencies to accomplish their mission while meeting their requirement under the Endangered Species Act?**

Yes, the model provided additional flexibility, but there is even greater potential. One lesson learned was matching contract lengths to impacts length and recovery periods.

Although there was widespread recognition of Fort Hood’s success in managing its endangered species, additional flexibility is provided through removing some, any, or all restrictions and providing a flexible tool in a rapidly changing environment. The Recovery Credit System provides a method to offset take not covered in the biological opinions and has the potential to increase the species’ baseline. The tool provides flexibility in a rapidly changing training environment by matching contract lengths to the impact needed.

The potential impact of the proof of concept has not yet been realized, however, as the contract lengths initially included shorter-term contracts and were later capped at 25 years.

**Question 7: To what degree does the scientific information generated by the Recovery Credit System monitoring and research program provide reliable information likely to lead to more effective conservation and recovery strategies for the species in this and other models?**

To date, 14 papers and 20 conference presentations have been generated. As 11 papers are in press or in preparation, however, it is too early to determine whether the information will lead to more effective conservation and recovery strategies. The lesson learned to-date relates to dissemination and not the quality of the information.

The program used three dissemination strategies: an annual local symposium, peer-reviewed articles, and presentations at conferences. No specific outreach plan targeted managers or practitioners. Those with frequent contact with the program were highly satisfied with the scientific information generated, feeling that the information generated was a significant contribution to the recovery effort for the species; stakeholders with less frequent contact reported less awareness.

### *Recommendations to consider*

This section presents recommendations to consider at three levels: the Recovery Credit System model, the Recovery Credit System as applied to the golden-cheeked warbler, and for the proof of concept applied at Fort Hood Military Reservation. While the recommendations were generated based on the data collected, program sponsors and operators will determine their feasibility.

#### RECOVERY CREDIT SYSTEM MODEL

- Establish metrics for recovery and Federal Action Agency results at the onset and then establish baselines (if possible) so that net benefit can be assessed; this would include completing guidelines for crediting and debiting at the same time. Recovery measures may be habitat or species related, depending on the species and the recovery plan. For federal agencies, for example, metrics could include training delays, number of tasks, or task combinations. Report on process and metrics throughout the project.
- Protection is important, but by itself is not adequate to meet the net benefit standard; greater emphasis could be put on other activities that materially enhance habitat or address additional recovery measures.
- Include both permanent and term contract options as there are many activities short of permanent loss. Think actively about the length of impacts and recovery of habitat and match contract enrollments accordingly.

### RECOVERY CREDIT SYSTEM FOR THE GOLDEN-CHEEKED WARBLER

- Allow landowners to receive credit for supporting habitat that will be managed to produce higher quality habitat in 20 years – and require investments in the recommended management practices to produce those gains – to create material enhancement to warblers that would leave them with more habitat and healthier populations at the end of 25 years, as opposed to less total habitat that is better protected.
- Allow for term contracts beyond 25 years for the golden-cheeked warbler; this will add to the flexibility of federal agencies.
- Ensure that ranking is followed; consider revising the weighting criteria to give proximity to populations more weight by creating gradations of value.
- Establish metrics for conservation and for the Federal Action Agency activities during the planning process, and develop a clearer link between the wildlife management plan and conservation metrics. Report throughout the project on both process measures and these metrics.
- Develop more refined criteria in the future, particularly with regard to supporting and restorable habitats.
- The program currently supports management practices that are intended to benefit warblers *and* separate practices that are implemented exclusively to benefit ranching operations. Incentivize warbler-benefitting practices through scoring during the enrollment competition.

### RECOVERY CREDIT SYSTEM AT FORT HOOD MILITARY RESERVATION

- Refine management actions to enhance deciduous recruitment and manage supporting habitat in ways that improve or maintain its suitability to support breeding, feeding, and other activities of the golden-cheeked warbler.
- With a group of stakeholders, implement a formal communication plan to share successes and challenges. The plan should identify stakeholders and their information needs.
- If the pilot is expanded at Fort Hood Military Reservation, then consider the recommendations under the Recovery Credit System, as described above.

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## Appendices

### Appendix A: Methodology

As noted, multiple sources of data were collected during this evaluation. This appendix describes each source in more detail. Figure 16 provides an overview of the sources of data relevant to each of the evaluation questions; more detailed descriptions of each source follow the table.

Figure 16: Sources of data for evaluation questions.

	Model features	Implemented as planned	Efficient process	Partnership	Increased flexibility	Met conservation goals	Generated scientific information
Interviews with operators, military personnel, and other stakeholders*	X	X	X	X	X	X	X
Landowner interviews	X	X	X	X			X
Site visits		X				X	
Successful and unsuccessful bids	X	X		X			
Peer-review panel	X				X	X	
Program documents	X	X	X	X	X	X	X

\*See Figure 17 for a breakdown by interview respondent.

#### PEER-REVIEW PROCESS

The peer review process was designed to follow the guidelines in the *Peer Review Handbook* (USEPA 8 May 2006) and consisted of preparing the charge, vetting the peer reviewers, providing materials to the peer reviewers, conducting site visits, and preparing the report. As the peer-review panel report (attached as Appendix D) contains additional details, this section highlights only a few items relating to the methodology.

#### **Preparing the charge**

Per the guidelines (USEPA 8 May 2006), the charge was focused on specific questions and included an overview of the project, background materials, due date, and format for the review. The charge was prepared by the evaluation team after the evaluation questions were revised by relevant stakeholders.

### **Vetting the peer reviewers**

Peer reviewers were solicited and chosen to bring expertise on three important aspects of the project (species and habitat, military conservation, and private landowner engagement) and from a variety of perspectives (nongovernmental, academia, and private practice). In order to generate names of potential peer reviewers, the evaluation firm asked for referrals from colleagues and reviewed the literature to identify those with expertise in areas relevant to the charge (USEPA 8 May 2006). Dr. Jerome Jackson is an ornithologist with expertise in a species of a similar habitat, has experience in endangered species law and conservation, and has experience working with the military balancing conservation with mission requirements. Clifton Ladd is based in central Texas and has extensive experience in the golden-cheeked warbler, as well as its habitat, and provides an understanding of the particular context in which this concept was tested. Dr. Timothy Male has extensive experience with engaging landowners and with endangered species law. Peer reviewers were sent an overview of the project and participated in a screening interview using questions from the Environmental Protection Agency guidelines. All peer reviewers submitted written conflict of interest and confidentiality statements. The only identified conflict was that Dr. Male is an employee of the National Fish and Wildlife Foundation; however, this program was not part of his portfolio and the National Fish and Wildlife Foundation funding was only 6.5 percent of the total program funding. Dr. H. Bruce Rinker, a member of the evaluation team, brings expertise in forest ecology and working with multiple stakeholders for conservation, including government and private landowners. Biographies are in Appendix B.

### **Preparing the final report**

Peer reviewers submitted written reports responding to each item in the charge. Dr. Rinker and Dr. Robertson synthesized the individual reports into one peer-review panel report. After submitting their individual reports, peer reviewers were provided each others' reports and conducted a phone conference. The team also signed off on the final, synthesized report. That report – like other compilations – was synthesized with the data from the other data sources for this report. The complete peer-review panel report is included as Appendix D.

### INTERVIEWS

The list of interviewees was developed in conjunction with relevant stakeholders and designed to provide multiple perspectives on the evaluation questions; interviewees with firsthand knowledge of the pilot were preferred. A complete list of interviewees is included in Appendix C. Figure 17 presents the perspective

and organization represented and the information generated for input to each evaluation question.

Figure 17: Organization and input to evaluation question.

Type and number	Organization	Questions					
		Implemented	Efficient process	Partnerships	Flexibility	Scientific information	Lessons learned
Landowners (17)	N/A	X	X	X			X
Military – HQ (2)	Department of the Army				X	X	X
Military – local (9)	Fort Hood Military Reservation	X	X		X	X	X
Operator (5)	Texas A&M University, Texas Watershed Management Foundation	X		X		X	X
Stakeholder – HQ (2)	Environmental Defense Fund, U.S. Fish and Wildlife Service					X	X
Stakeholder – local (5)	Environmental Defense Fund, Texas Parks & Wildlife Department, U.S. Department of Agriculture, U.S. Fish and Wildlife Service	X	X	X		X	X

Interviews were conducted in person and via phone. The Project Director provided a list of landowners with their property code, name, address, and phone number. Dr. Robertson contacted the landowners directly; the list was locked in the office safe when not actively being used. Of the 20 participating landowners, 17 interviews were conducted via phone and one by survey. The remaining three landowners did not respond to requests for interviews prior to the deadline; four attempted contacts were made for each of them. There were 24 additional interviews conducted with operators, military at headquarters, local military, stakeholders at headquarters, and local stakeholders. Interviewees were defined as follows to ensure a variety of perspectives:

- Military – HQ: non-Fort Hood personnel.
- Military – local: Fort Hood personnel. (This included both training and natural resources positions.)
- Operators: Texas A&M University and Texas Watershed Management Foundation (These were the day-to-day operators of the project.).

- Stakeholders – HQ: representatives from the headquarters of entities engaged in the project
- Stakeholders – local: people and entities engaged in the project at the local level

Interview protocols were sent to the participating interviewees in advance with the meeting confirmation. Interviewees were asked about their level of involvement and only asked questions relevant to their firsthand experience.

Analysis techniques varied between the landowners and the stakeholders. All landowners answered the same set of questions in a semi-structured interview. Responses from the interviews were placed in an Excel spreadsheet so that responses by question and by landowner were easily processed; responses were coded and reported by prevalence. Stakeholders, however, often had experience with only one aspect of the process (for example, planning) but also had more diverse input. Responses were coded and reported although not limited by prevalence; open coding was used to capture both prevalence and nuance. Each data item was assigned a code and an interview source code in an Excel spreadsheet. Data were then sorted by content code while keeping the source code designator. This allowed for an assessment of stakeholder perspectives.

Figure 18: Coding scheme

Interview Source Codes	Content Code
Operator Military – Fort Hood Military – HQ Stakeholder – Local Stakeholder – HQ	Collaboration Communication Flexibility (federal agencies) Implementation – bid process Implementation – credit process Implementation – process Implementation – management practices Leverage Model – comparisons Model – the Recovery Credit System Model – temporary permanent credits Monitoring Partnership (landowners) Recovery Science

## SITE VISITS

As noted, the peer review team visited eight contracted sites, including one from each bid round. Additional variables driving site selection were recovery region, acreage enrolled, contract years, proximity to known habitat, and adoption of cowbird control measures; sites were chosen for representation of all enrolled properties. Please see the description of the peer-review process for additional details. The peer reviewers submitted their site review sheets which included the following:

- An assessment of the habitat re: warbler use.
- Assessment of wildlife management practices recommended and implemented.
- Assessment of material enhancement.
- Summative evaluation of site.

Analysis techniques were both descriptive and inductive. For items that were rated, descriptive statistics were used to calculate frequency of ratings. For those items that were descriptive, a general inductive approach was used (Thomas 2006).

## DOCUMENT REVIEW

Project documents were the data for several of the evaluation questions. Documents reviewed included the following:

- Contracts, bid forms, habitat assessment, and management plans for successful bids.
- Bid forms and habitat assessments for unsuccessful bids.
- Final monitoring report prepared by the operator.
- Initial planning documents, such as science, economic, and policy committee guidelines.
- Biological opinions and recommendations.
- Recovery Crediting Guidance document.

The evaluation team used an online database to collect and conduct descriptive analysis on the following variables from both the successful and unsuccessful bids.

- Bid round.
- Recovery region.
- Total acres.

- Acres enrolled.
- Land uses.
- Recovery credit years.
- Landowner cost share.
- Length of contract.
- Planned actions.
- Bid successful or unsuccessful.

Finally, monitoring and planning documents were used by the peer-review panel to respond to its charge. Other documents were used to provide context and to check the implementation procedures of the project.

## *Appendix B: Peer-review panel biographies*

### **Dr. H. Bruce Rinker**

As the Environmental Lands Division Director for Pinellas County, Dr. Rinker supervised a staff of 50 personnel and 500 volunteers engaged in long-term management of nearly 16,000 acres of county-owned environmentally sensitive lands and waterways. He received his Doctorate in Environmental Studies from Antioch University Graduate School (Keene, NH). He was elected a National Fellow of the Explorers Club in March 1998, a Switzer Environmental Fellow in May 2000, a Fellow of the New York Academy of Sciences in 2002, and a Full Member of Sigma Xi in 2005. Dr. Rinker has numerous publications to his credit, including *Gaia in Turmoil* (2010, MIT Press). Dr. Rinker has been co- or primary investigator on eight major grants, including an Ecological Circuitry Collaboratory grant from the National Science Foundation. He is a member of the Ecological Society of America, Society for Conservation Biology, and the American Institute of Biological Sciences.

### **Dr. Jerome Jackson**

Dr. Jackson is a professor at Florida Gulf Coast University in Fort Myers, Florida. He holds a Bachelor degree in Zoology from Iowa State University and a Doctorate in Zoology from the University of Kansas. His research interests include avian and reptilian behavioral ecology, biogeography of invasive and endangered species, barrier island ecosystem ecology, forest ecology, conservation biology, and the history of ornithology. He is the author of several publications including *George Miksch Sutton: Ornithologist, Artist, Teacher* and *In Search of the Ivory-billed Woodpecker*. He has had research support from the U.S. Army and has conducted research at Ft. Benning, Georgia, and Ft. Polk, Louisiana. Dr. Jackson has served on three endangered species recovery teams for the U.S. Fish and Wildlife Service (Red-cockaded and Ivory-billed Woodpeckers and the South Florida Ecosystems Recovery Team) and chaired the Red-cockaded Woodpecker Recovery Team for eight years. He has also testified as an expert witness for the Environmental Defense Fund (in the early 1970s relative to construction of the Tennessee-Tombigbee Waterway), and completed a review of a Pileated Woodpecker Habitat Conservation Plan for the Nature Conservancy. Relevant qualifications also include more than 25 years teaching graduate and undergraduate courses in Ornithology and Biogeography as well as having taught graduate seminar courses in Endangered Species Law and Endangered Species Conservation.

**Clifton Ladd**

Co-author of golden-cheeked warbler in *The Birds of North America*, Clif Ladd is the Senior Ecologist and Principal in the environmental, planning, and engineering firm of Loomis Partners in Austin, TX. He is one of the original authors of the Balcones Canyonlands Conservation Plan, a habitat conservation plan for the Golden-cheeked Warbler and other species in Travis County, TX. After the plan was approved, he served for two years as the first administrator of the plan for the Travis County Natural Resources Program. He is active in various conservation efforts in Texas, serving on recovery teams for the Golden-cheeked Warbler, Barton Springs salamander, and the Westcave Preserve Land Conservation Committee. Cliff is also a Certified Wildlife Biologist.

**Dr. Timothy Male**

Dr. Timothy Male has extensive experience with engaging landowners and with endangered species law. An ornithologist, Dr. Male worked at the Environmental Defense Fund prior to working at the National Fish and Wildlife Foundation (NFWF). At NFWF, Dr. Male is the Director of Wildlife and Habitat Conservation that addresses conservation needs for mammals, reptiles, amphibians, invertebrates, and plants, as well as landscape-level and issue-based conservation. Dr. Male has published articles in peer-reviewed journals, including *Measuring Progress in US Endangered Species Conservation*, and *Recovery of Imperiled Species Under the Endangered Species Act: The Need for a New Approach*, and authored publications for The Center for Conservation Initiatives, including a paper on landowner incentives.

### *Appendix C: List of interviewees*

The following military personnel, operators, and stakeholders were interviewed as part of the overall study. Please note that several interviewees have changed positions. For example, Michael Bean worked for the Environmental Defense Fund during the project and John Cornelius has since retired. Interviewees who changed positions are noted with an asterisk and their positions at the time of the proof of concept are noted.

- \*Michael Bean (position during proof of concept): Chair, Wildlife Program, Environmental Defense Fund.
- Scott Belfit, Endangered Species Program Manager, US ARMY.
- Omar Bocanegra, Endangered Species Coordinator for the Arlington Field Office, U.S. Fish and Wildlife Service.
- Tim Buchanan, Acting Chief, Natural Resources Management Branch, Fort Hood, US ARMY.
- Steve Burrows, Chief, Environmental Programs, Fort Hood, US ARMY.
- Linda Campbell, Program Director – Private Lands and Public Hunting, Texas Parks and Wildlife Department.
- \*Rod Chisholm, (position during RCS pilot): Directorate of Public Works, Fort Hood, US ARMY.
- \*John Cornelius (position during proof of concept), Chief of Natural Resources at Fort Hood. Retired summer 2009.
- James Featherston, Agricultural Economist, U.S. Department of Agriculture Natural Resources Conservation Service.
- \*Keith Gogas, Chief of Training, DPTMS, Fort Hood, US ARMY (new to position).
- \*David Guldenzopf, Principal Assistant – Sustainability, Deputy Assistant Secretary of the Army (new to position in February 2009).
- Eric Harmon, Range Officer, DPTMS Range Control, Fort Hood, US ARMY.
- K. Brian Hays, Program Specialist, Texas A&M Institute of Renewable Natural Resources.
- Landowners (A1, A2, A4, A5, A7, A9, A10, D1, D2, D3, D4, D5, D7, D8, D9, D10, and F1).
- Steve Manning, Board of Directors, Texas Watershed Management Foundation.
- Michael L. Morrison, Ph.D., Professor and Caesar Kleberg Chair in Wildlife Ecology and Conservation, Department of Wildlife and Fisheries Sciences, Texas A&M University.
- Reynaldo Navarro, Range Planner, DPTMS Range Control, Fort Hood, US ARMY.

- Joy Nicholopoulos, Texas State Administrator, U.S. Fish and Wildlife Service.
- \*Col. (Ret.) William H. Parry, III (position during proof of concept), Garrison Commander at Fort Hood 2001-2004.
- Ron Perry, Director, Mission Support, FORSCOM Mission Support, Element, III Corps.
- Rick Sayers, Ph.D., Branch Chief, U.S. Fish and Wildlife Service, Endangered Species Program, Washington, DC.
- \*Lynn Scarlett, (position during proof of concept): former Deputy Secretary of the U.S. Department of the Interior.
- Justin Tatum, Program Specialist, Texas Watershed Management Foundation.
- Neal Wilkins, Ph.D., Director, Texas A&M Institute of Renewable Natural Resources and Professor of Wildlife & Fisheries Sciences.
- David Wolfe, Director of Conservation Science, Environmental Defense Fund.

*Appendix D: Peer-review panel report*

# Recovery Credit System

## Peer-Review Panel Report

January 2010

Submitted by contractors:

Jerome Jackson, Ph.D.

Clifton Ladd, C.W.B.

Timothy Male, Ph.D.

H. Bruce Rinker, Ph.D.



Robertson Consulting Group, Inc.

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## Introduction

This report documents the peer-review panel process conducted as part of the evaluation.

### *Purpose and methodology*

The peer review process was designed to follow the guidelines in the *Peer Review Handbook* (U.S. Environmental Protection Agency, 2006) and consisted of: preparing the charge, vetting the peer reviewers, providing materials to the peer reviewers, conducting site visits, and preparing the final report.

### PREPARING THE CHARGE

Per the guidelines (USEPA 8 May 2006), the charge was focused on specific questions and included an overview of the project, background materials, due date, and format for the review. The charge was prepared by the evaluation team after the evaluation questions were revised by relevant stakeholders. The specific questions were as follows:

1. Did the site selection criteria enroll high quality habitats for credits?  
During the site visits, consider the Texas Parks and Wildlife Department description of habitat “highly likely to be” warbler habitat and determine if the site meets those criteria. Please also review the committee recommendations to determine if the criteria used were consistent with established scientific guidelines and could be reasonably expected to result in enrolling high quality habitat.
- 2a. To what extent was there a protection of the species’ habitat? 2b. To what extent was there a material increase and/or a material enhancement or restoration of the species’ habitat? Please consider if the system was designed to meet objective 2b, and if so, whether there was available evidence that progress had been made. Please also provide recommendations for how this objective could be enhanced in this and future projects.
3. Were monitoring areas, methods, and results described in Section V of the draft report consistent with current scientific thinking? Please review the Draft Monitoring Report to determine if the monitoring was conducted according to generally accepted methods.

4. What are the principles or elements that make the Recovery Credit System valuable and in what context? Please consider the relative performance of this model as well as (if enhanced, perhaps) whether this model has the potential to contribute to species recovery, particularly in comparison to other models or situations with which you may be familiar. Based on your experience, what elements are valuable and in what context? Elements may include private landowner participation, ability to expand monitoring and research on private lands, likelihood of meeting goals for endangered species conservation, or comparison to other conservation options available to the military (such as permanent easements, etc.).

#### VETTING THE PEER REVIEWERS

Peer reviewers were solicited and chosen to bring expertise on three important aspects of the project (species and habitat, military conservation, and private landowner engagement) from a variety of perspectives (non-governmental organization, academia, and private practice). In order to generate names of potential peer reviewers, the evaluation firm asked for referrals from colleagues and reviewed the literature to identify those with expertise in areas relevant to the charge (USEPA 8 May 2006). Dr. Jerome Jackson is an ornithologist with expertise in a species of a similar habitat, experience in endangered species law and conservation, as well as experience working with the military balancing conservation with mission requirements. Mr. Clifton Ladd is based in central Texas and has extensive experience with the golden-cheeked warbler, as well as its habitat, and provides an understanding of the particular context in which this concept was tested. Dr. Timothy Male has extensive experience with engaging landowners and with endangered species law. Peer reviewers were sent an overview of the project and participated in a screening interview using questions from the Environmental Protection Agency guidelines. All peer reviewers submitted written conflict of interest and confidentiality statements. The only identified conflict was that Dr. Male is an employee of the National Fish and Wildlife Foundation; however, this program was not part of his portfolio and National Fish and Wildlife Foundation funding was only 6.5 percent of the total program funding. Dr. H. Bruce Rinker, a member of the evaluation team, brings expertise in forest ecology and working with multiple stakeholders for conservation, including government and private landowners. Biographies are in Appendix B.

#### PROVIDING MATERIALS

After an orientation conducted via conference call on October 23, 2009, the peer reviewers were sent a package that included the following items:

- Fact sheet prepared by Dr. Robertson and Dr. Rinker that provided a summary of the biological opinions related to the golden-cheeked warbler and Fort Hood
- Golden-cheeked Warbler Management Guidelines from Texas Parks and Wildlife Department
- Species Biology and Habitat Management Committee recommendations from the Recovery Credit System planning process
- Site description prepared by the Environmental Defense Fund as part of the landowner recruitment and bidding process
- Management plan summary prepared by the Environmental Defense Fund as part of the landowner recruitment and bidding process
- Draft of monitoring report prepared by the project operators
- Recovery Crediting Guidance (U.S. Fish and Wildlife Service, 2008)
- Site review checklist prepared by Dr. Robertson and Dr. Rinker that addressed site characteristics and management practices

### CONDUCTING SITE VISITS

As noted, sites were chosen based on the following variables: bid round, size, land use, contract length, and management practices. Site visits were conducted at the following properties in December 2009: A4, A6, A7, A10, D1, D4, D6, and D7.

On the evening prior to beginning the site visits, the peer review team met to discuss the next day's itinerary. We had conducted a phone orientation in late October, and they received site review sheets, habitat summaries for each site, management plan summaries for each site, and other background material prior to arriving in Texas. (During the site visit, additional written and verbal information was provided by the program staff.)

The next day, the team conducted 6 site visits. (Sites were chosen randomly by the evaluator based on bid round and other variables.) At each site, the team conducted a brief site summary then spent at least an hour in the habitat. The peer reviewers took notes and pictures as well as completed a first draft of site peer review sheets. Before beginning, we did an inter-rater review followed by a debrief that evening to ensure quality. Photo monitoring was completed at each site using protocols established by the U.S. Forest Service (Hamilton, n.d.). K. Brian Hays, Project Director, Texas A&M, and Justin Tatum, Program Specialist, Texas Watershed Management Foundation, drove the team to the six site visits

and answered questions during the summaries, but did not accompany the team into the habitat.

On the second day, K. Brian Hays and Justin Tatum provided a presentation and answered questions from the team; this session lasted two and one half hours. The team then visited the final two sites (again, at about an hour each) and also visited a designated warbler habitat site on Fort Hood. This site on Fort Hood is not part of the Recovery Credit System as the debiting process has not yet occurred and is being used (using permanent take) to test the impact on the warbler of thinning and training in warbler habitat. The planned debiting process, however, will involve the same level of thinning as observed on the non-Recovery Credit System site viewed. There was a meeting that evening to review the peer review charge. The peer reviewers submitted both the individual site sheets to document habitat quality ratings as well as a longer report that included questions about habitat quality, net benefit to recovery, monitoring, and model elements.

Post-visit a CD ROM with the site name and photos associated with that site was made available to the team; 222 photos were taken at the eight sites.

### PREPARING THE FINAL REPORT

Peer reviewers submitted written reports responding to each item in the charge. Dr. Rinker and Dr. Robertson synthesized the individual reports into this peer review report. After submitting their individual reports, peer reviewers were provided each others' report and conducted a phone conference. The team also signed off on the final, synthesized report. The purpose of this compilation is to present the peer review panel report.

### *Findings*

Findings listed within this report were determined by peer review reports only; these findings were synthesized with data from other data sources (interviews, file review) for inclusion in the final evaluation report. There are three levels of analysis. The first level is the recovery credit system model, which may be applied to various species in various locations; lessons learned from this application may be relevant to future applications. The second level is the model as applied to the golden-cheeked warbler in order to capture lessons learned pertaining to this species if the model is applied to the warbler beyond the Fort Hood application. The third level is the proof of concept at Fort Hood. The findings are presented followed by recommendations; recommendations may

not have been specifically stated by all three peer reviewers but follow from findings and those recommendations made.

There were several terms used to categorize habitat. While the Texas Parks and Wildlife Department guidelines for the golden-cheeked warbler describe habitat that is “highly likely to be used” and “may be used,” the management plans and program staff adopted “prime,” “credited,” or “high quality” to denote habitat meeting guidelines for highly likely to be used. In addition, “supporting” or “recovering” habitat was adopted to describe habitat that was not credited but was included in the management plan guidelines.

#### RECOVERY CREDIT SYSTEM MODEL

The team concurred that the Recovery Credit System model has value, with one noting that “the Recovery Credit System has considerable merit and might well work for a number of endangered and threatened species” and another noting that “the ‘net benefit’ standard of the recovery credit trading system is a significant policy improvement over the standard practice of federal agency consultation through Section 7.”

A review of the peer team reports suggests the following recommendations related to future applications of the recovery credit system model:

- Protection of habitat is important but by itself is not adequate to meet the net benefit standard; greater emphasis could be put on other activities that materially enhance habitat or contribute to recovery.
- Future applications of the model should collect baseline data on conservation measures so that the net benefit can be assessed. Measures may be habitat or species related, depending on the species and the recovery plan.
- Among the baseline and monitoring data collected should be data specifically related to the population dynamics of the species in the habitat being evaluated. Presence of the species alone cannot attest to the quality of the habitat.

#### RECOVERY CREDIT SYSTEM AS APPLIED TO THE GOLDEN-CHEEKED WARBLER

Identification of credited habitat was limited to habitat meeting Texas Parks and Wildlife Department guidelines for highly likely to be occupied. As long as supporting habitat is not cleared, then this strengthens the crediting aspect of the

program by undercounting. Management practices in supporting habitat and areas around the credited patches, however, can reduce the protection of the credited habitat. For example, thinning, overgrazing, and other activities can diminish the extent of these areas which both may be used by warblers and provide a buffer.

Although not a requirement of the proof of concept, the team found that the model could be improved by enhancing non-credited habitat to expand suitable habitat.

Review of the peer review team reports suggests the following recommendations to the recovery credit model when applied to the golden-cheeked warbler:

- The Recovery Credit System as applied to the golden-cheeked warbler would be better served by developing its own, more refined, criteria in the future, with particular regard to ‘supporting’ and ‘restorable’ habitats.
- By modifying scoring criteria to allow landowners to receive credit for supporting habitat that will be managed to produce high quality habitat—and requiring investments in the recommended management practices to produce those gains—would create material enhancement to warblers that would leave them with more habitat and healthier populations at the end of 25 years.
- Continue to identify and designate supporting habitat in contracts but take greater care in prescribing and prohibiting management practices in those areas to maximize the likelihood that these areas will continue to support warblers in the future or even become better habitat that could be credited in a future enrollment.
- Future applications of the Recovery Credit System model as applied to the golden-cheeked warbler should collect baseline data on conservation measures so that the net benefit can be assessed.
- The program currently supports management practices that are intended to benefit warblers *and* separate practices that are implemented exclusively to benefit ranching operations. If there is a way to require some portion of this funding to go into warbler-benefitting management, or incentivize such practices through scoring during the enrollment competition, or simply by tracking practice expenditures under either of

these categories, then doing so might provide a powerful way to increase habitat and very clearly help the program meet its net benefit standard.

### RECOVERY CREDIT SYSTEM PROOF OF CONCEPT

The peer review team found that the eight sites visited were highly likely to be golden-cheeked warbler habitat as defined by the Texas Parks and Wildlife Department.

In regard to credited habitat, the peer review team saw no evidence that designated warbler habitat was itself ever affected by deleterious management but identified items that appear to be affecting or potentially weakening protection of the supporting habitat, which could be deleterious ultimately.

While the team found that the monitoring was consistent with current scientific thinking, they believe that the monitoring information provided to date was not sufficient to fully assess the quality of the sites with respect to habitat or species management. The team noted that presence/absence is the least relevant of the relevant issues and recommends additional time documenting other issues. Which issues, however, varied among reviewers.

As related to the proof of concept, the peer review team reports suggest two recommendations:

- There were differences between deciduous recruitment on Fort Hood and at the sites visited, although the visits were not designed in any rigorous way to sample such recruitment. Any activities that can be taken to speed such recruitment and increase its frequency would seem to be highly desirable.
- Supporting habitat should be managed in ways that improve or maintain its suitability to support breeding, feeding, and other activities of golden-cheeked warblers. Impacts to such habitat have the potential to negate benefits of protecting adjacent high quality habitat if they reduce the amount of habitat available to those birds and thus make high quality areas less able to support breeding pairs. In addition, management actions in supporting and adjacent habitat need to be evaluated to ensure they do not increase cowbird parasitism or predation by other avian species.

## Presentation of Data

As described above, peer reviewers were asked to respond to four specific questions; descriptive data from the site review sheets are compiled in a separate report. This section provides a summary of the responses, by question.

### *Site selection criteria*

The peer review team found that the eight sites visited were “highly likely to be” golden-cheeked warbler habitat as defined by the Texas Parks and Wildlife Department. The team further found that the criteria should be revised to more closely reflect habitat use and that the move to identifying and protecting supporting areas should be continued.

### ENROLLED PROPERTIES

All three of the peer reviewers concurred that the program is enrolling properties containing high quality habitat as defined by the Texas Parks and Wildlife Department and that on those properties the highest quality habitat is what is being counted and tracked for credits in the system. As one noted, “I observed no major inconsistencies in the habitat evaluations with respect to the Texas Parks and Wildlife Department descriptions. It appears that the Texas Parks and Wildlife Department guidelines for identification of habitat were carefully followed.”

### A MORE INCLUSIVE REVIEW

Peer reviewers noted that the Texas Parks and Wildlife Department guidelines were written to help the average landowner (not biologists) understand what could be habitat and what probably is not habitat. Quality habitat for any species is an “n-dimensional” entity, where “n” includes a vast array of physical, biological, temporal, and other characteristics that may work independently or synergistically to positively or negatively influence the species population dynamics. The peer review team recommended that the Recovery Credit System should take a broader, more inclusive view of what actually *is* habitat and not limit the consideration to areas where the birds are expected to occur or that may be used. The Texas Parks and Wildlife Department label is based on likelihood of occupancy; such habitat could be used by the golden-cheeked warbler beyond what is indicated by the label of supporting habitat. Because so many areas of warbler habitat are highly fragmented and narrow (i.e. on slopes), supporting habitats may play a vital role now in helping support territories and increasing reproductive success and in the future by allowing for the expansion of habitat and thus increasing the viability of habitat. Site visits suggested that not enough

attention was paid to these habitats (both their designation and how they are managed). These areas provide buffers and foraging areas for warblers residing in credited habitat.

### ADAPTIVE MANAGEMENT

The Recovery Credit System proof of concept did enroll high quality habitat. In fact, it appears that in the beginning of the program only the highest quality habitat at each property was enrolled. This was appropriately modified midway through the program to protect supporting habitat; the pilot program and its managers should be credited for their adaptive management to map and designate supporting habitat and requiring its protection. This practice should continue in the future and more attention be paid to the management of these areas. Incentivizing or funding additional management practices in supporting areas to speed the establishment of deciduous trees – an important habitat component that often appeared to be the weakest link in supporting habitat that was otherwise of high quality – would improve the model by creating additional high quality habitat.

### ***Protection and enhancement of the species' habitat***

In regard to credited habitat, the peer review team saw no evidence that credited habitat was itself ever affected by deleterious management but identified items that appear to be affecting or potentially weakening supporting habitat and therefore, long-term protection of this habitat. Although not a requirement of this proof of concept, the team found no evidence that habitat was being enhanced; the model could be improved by doing so. The short length of time since enrollment of these habitats, however, may have precluded anticipated habitat enhancement.

### PROTECTION

The program is providing excellent protection to the species' habitat in credited areas, however, the following items appear to be affecting or potentially weakening protection of supporting habitat, which will impact credited habitat:

- Recruitment of deciduous species (especially oaks) appeared to be low or non-existent on every property visited. There were almost no seedlings, saplings, or young trees suggestive that any recruitment has been occurring for 10 or more years. This contrasts with the statement that there was no evidence of excessive browsing parroted in every site management plan. There is evidence that livestock management and/or deer management

practices to exclude these animals from some habitats may be needed to prevent the slow but steady decline in habitat.

- The management of adjacent areas – especially of supporting habitat – is critical because these areas provide buffers and foraging areas for warblers residing in credited habitat. Management in these areas may be reducing their quality and quantity and thus affecting the value of credited habitat. Juniper thinning may reduce habitat quality in the immediate future but will produce a long-term gain in habitat by allowing higher deciduous recruitment and remaining junipers to grow larger more quickly. If there is no exclusion of cattle from these areas, however, it is difficult to see how any recruitment of deciduous species will occur. The team recommends considering expanding protected habitat to include a buffer between all golden-cheeked warbler habitat and possible harmful land management.
- There was little evidence that the hand-clearing or low impact juniper management suggested in a number of management plans was happening as recommended. Such management may be important to protect the value of credited habitat. Program directors should consider ways to change the incentives built into the program to undertake such management (i.e. more compensation, required management activity, etc.). In contrast, mechanical clearing had occurred in a number of areas, including some at which such a recommendation did not appear in the plan and no presence/absence survey was performed.
- One reviewer noted that although the habitat descriptions provided by the Texas Parks and Wildlife Department include (a) slopes and canyons and (b) flat or rolling uplands, the sites visited were predominately slopes and canyons and, as such, were very linear and often very narrow with narrow finger-like projections of habitat. The result of this configuration is that there is a very high proportion of the habitat that is edge habitat. In addition to the fact that brood parasitism by brown-headed cowbirds and predation on eggs and young occur more frequently in edge habitats, Ladd and Gass (1999) note that golden-cheeked warbler “reproductive success is higher in territories removed from edge.”

### ENHANCEMENT

The program was not particularly designed with a goal of restoration in mind. Nevertheless, the program and site plans dedicate significant attention to juniper thinning practices and also discuss fencing and out-planting as options to

improve habitat. The Recovery Credit System has made limited efforts to enhance habitat, primarily through juniper thinning in selected areas. Thinning in such a manner would promote the growth of the remaining junipers and possibly encourage the growth of broadleaf trees. This would probably result in an enhancement of golden-cheeked warbler habitat, though not within the short amount of time since the management action was undertaken. There was no evidence, however, that fencing or any change in grazing management was planned for any property. In several cases, very recent evidence of cedar removal was observed in areas that appeared to have been potential golden-cheeked warbler habitat. In other areas, juniper management pushed into golden-cheeked warbler habitat both below a hillside band of habitat and on the plateau above it. There has not been a material enhancement or restoration of habitat nor a demonstrated increase in the species population. Demonstrating an increase in the population will be difficult, if not impossible, because no species baseline assessment was provided for any of the sites we visited. Baseline assessments should have been performed on all sites prior to enrolling habitat credits and before conducting any habitat clearing within areas not identified as habitat.

### *Monitoring quality*

While the team found that the monitoring was consistent with current scientific thinking, the team found that the monitoring information provided was not sufficient to fully assess the quality of the sites with respect to habitat or species management. The team noted that presence/absence is the least relevant of the relevant issues and recommends additional time documenting other issues. What issues should be addressed, however, varied among reviewers:

- The presence of a singing bird does not offer proof of successful nesting at a site. It is of paramount importance that nest success or failure and number of young fledged be determined at each site – at least until there are sufficient data to know whether the enrolled sites are ecological sinks or ecological sources.
- Another reviewer was most concerned that management of high quality (credited) and supporting habitat is insufficient to maintain or improve warbler use of that habitat: “If this is the case, I would expect to see territories (boundaries of male singing/defensive behavior) shift away from supporting habitat or high quality habitat that is declining in quality. In contrast, if habitat is improving in quantity, I would expect to see territory boundaries remain or enlarge or for new territories to be

established.” This reviewer urged that more intensive pre-management monitoring of enrolled and supporting territory boundaries occur (after enrollment and before any management activities are implemented or funded for at least one year) and periodic territory mapping occur thereafter, looking for shifts in boundaries away from or toward managed habitat.

- Finally, one reviewer noted that the documents provided did not identify which areas were selected for monitoring or which monitoring methods were used within those areas. The absence of site-specific golden-cheeked warbler data prevented their drawing any conclusions about the accuracy of habitat delineation or effectiveness of habitat or species management.

### *Model elements*

The team responded to a fairly broad question about model elements. The team concurred that the Recovery Credit System model has value, with one noting that “the Recovery Credit System has considerable merit and might well work for a number of endangered and threatened species.” Because the question was open-ended, the remaining comments are listed with the prevalence of comments noted; no attempt was made to synthesize results.

Two members noted that the Recovery Credit System provides the Army increased flexibility in its use of habitats at Fort Hood. At minimum, by offering temporary protection of a greater acreage of high quality habitat in exchange for temporary reductions in quality of impacted high quality habitat on Fort Hood, the program is meeting or exceeding the likely benefits of any alternative biological opinion recommendations the U.S. Fish and Wildlife Service require through consultation without the Recovery Credit Trading System.

One reviewer found that this program provides a significant improvement over the standard process of federal Section 7 consultation and its future use should be encouraged, noting that this program has the potential to increase habitat beyond what is available to warblers today.

One member noted that the program and the landowners participating are producing a high rate of compliance with protection of these areas, adding that “it is difficult to see how a permanent easement or any other system could produce a higher rate of habitat protection at a lower total (or annual) cost.” While this reviewer noted that compared to the counter-factual (partial clearing),

“I would not expect to see very much land clearing of habitat during this program’s short existence”, another noted that the steep slopes of the canyons and other habitats enrolled are of little value for uses other than wildlife habitat.

Finally, two of the reviewers found that lack of site-specific data limited their findings. For example, presence/absence data were not collected prior to enrolling sites, and in some cases, prior to implementing management practices on supporting sites. In addition, data were not available at this time on habitat use by the golden-cheeked warbler, nesting success, etc.

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