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Environmental Assessment

Boswell Creek Watershed Healthy Forest Initiative Project

Sam Houston Ranger District, Sam Houston National Forest
Walker and San Jacinto Counties, Texas



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INTRODUCTION

The Forest Service has prepared this Environmental Assessment (EA) to determine whether or not to prepare an Environmental Impact Statement (a proposed Finding of No Significant Impact is attached). The reports cited in this EA and additional project documentation can be obtained from the National Forests and Grasslands in Texas website (http://www.southernregion.fs.fed.us/texas/healthy_for_ini/hfi_page.html) or from the project planning record located at the Sam Houston Ranger District Office in New Waverly, Texas. This EA tiers off the Final Environmental Impact Statement for the Revised Land and Revised Resource Management Plan for the National Forests and Grasslands in Texas and implements the management direction in the Plan.

The Boswell Creek Watershed Healthy Forest Initiative Project (BCWP) includes about 8,650 acres of the Sam Houston National Forest about 10 miles northeast of New Waverly, Texas (see map at http://www.southernregion.fs.fed.us/texas/healthy_for_ini/maps/bcw_vicin.htm). The Revised Land and Resource Management Plan (The Plan) designates the upland forestlands in BCWP as Management Area 2 (MA-2). The Plan directs forest management activities within MA-2, which contains important recovery habitat for the red-cockaded woodpecker (RCW), to provide the best opportunity for protection and enhancement of the federally endangered RCW population in East Texas. Of the approximately 8,360 acres in this project within MA-2, about 7,420 acres are upland pine and pine-hardwood habitat designated as part of a 111,000 acre Habitat Management Area for the Red-cockaded Woodpecker on the Sam Houston National Forest¹. The desired future condition of this habitat is open pine forests with some hardwood species maintained by frequent fires to maintain the open pine character. Hardwood and mixed hardwood-pine forests occupy about 940 acres of MA-2, primarily on the moister areas of lower slopes near streams.

The remainder of the BCWP, about 290 acres, lies within Management Area 4 (MA-4), Streamside Management Zones. This management area, embedded within the larger MA-2 much like the veins in a maple leaf, lies adjacent to intermittent and perennial streams that dissect the BCWP. MA-4 is managed to maintain the role and function of aquatic, riparian, and wetland ecosystems while providing opportunities for compatible multiple uses (The Plan, p. 151). The Plan provides for increased dominance of hardwoods on the generally moister, lower-lying land formations. A mixture of hardwoods and pines dominates these areas.

NEED FOR THE PROPOSAL

On August 22, 2002, President Bush announced the Healthy Forest Initiative (HFI) for Wildfire Prevention and Stronger Communities. The Healthy Forests Initiative implements core components of the consensus 10-year Implementation Plan agreed to by states, tribes, and Stakeholders. The proposed treatments in the BCWP further the goals of the President's initiative. They will reduce the threat of catastrophic wildfires to protect communities, firefighters, wildlife and forest health. In addition, the actions will reduce the potential for accelerated losses from southern pine beetle infestations to protect habitat for the endangered red-cockaded woodpecker.

Need for Action _____

The existing conditions present two primary concerns within the Boswell Creek area:

- The potential for increasing understory loads that can fuel catastrophic wildland fire and create unacceptable risks to the public, firefighter safety, and RCW habitat; and
- The high southern pine beetle (SPB) hazard in the pine-dominated forests and the risk of SPB infestation to cause unacceptable loss of future RCW habitat and further increase hazardous fuel buildup.

This project's purposes are to reduce hazardous fuels and to reduce the southern pine beetle hazard. Fuel treatments are needed to change fire behavior by reducing flame lengths, fire intensity, and rates of spread. These reductions provide greater effectiveness in fire management, greater safety for firefighters and the public, and protection and improvement of habitat for the endangered RCW. Reduced understory vegetation, surface fuels and fuel ladders; increased spacing between individual trees and shrubs; and increased grass and herbaceous vegetation reduce the potential for fires to move into or through the wildland urban interface or to adversely affect RCW habitat.

Thinning reduces stand density and increases the distance between individual trees, which increases the host resistance of the residual pines and decreases the SPB hazard. Reduced SPB hazard on the pine-dominated uplands lessens the likelihood of accelerated losses when infestations do occur. Increasing the distance between trees decreases the probability of spread of SPB to neighboring trees. Thinning to reduce hazard to SPB is recommended when basal area² approaches 120 ft²/ac, and reducing basal area to 70-100 ft²/ac decreases risk of SPB attack and spread. Infestations initiated in stands with a basal area of 70 ft²/ac or less rarely expand beyond 5 trees.³

Existing and Desired Conditions _____

Fuels and fire behavior – Existing Condition

The upland pine forests in the Boswell Creek project can be divided into two fuel models based on past management. Areas that have been prescribe burned in the past three years approach fuel model 2, Timber with a Grass Understory⁴, and areas where prescribed burning has not been done recently, or at all, are classed as fuel model 7, Southern Rough⁵. Table 1 compares the fire behavior of the two models and estimates the area of upland pine in each.

Table 1. Fuel models, key wildfire behavior outputs, and area of upland pine forests in the BCWP

Fuel Model	Fire Behavior Parameter						Acres
	Rate of spread (feet/hour)		Fireline Intensity ⁶ (BTU/ft./sec.)		Flame Length (feet)		
	Moderate conditions ⁷	High fire danger conditions	Moderate conditions	High fire danger conditions	Moderate conditions	High fire danger conditions	
2	73	693	2	79	0.6	3.4	150
7⁸	515-997	1240-3015	146-192	515-549	4.5-5.1	8.0-8.2	7,270

Figure 1 on page 3 provides an example of typical Fuel Model 7 conditions in the upland pine plantations and mature stands.



Figure 1. Typical fuel model 7 conditions in upland mature (left) and young (right) pine forest in Boswell Creek Watershed (March 2003).

Fuels and fire behavior – Desired Condition

The Plan describes the desired condition on pine-dominated uplands in the Boswell Creek project as *“open pine forest mixed with some hardwood species...Frequent fires to maintain an open, mature pine character will be evident. This fire regime will create a more open, grasslike understory characteristic of longleaf or shortleaf (pine) communities. Interspersed within this ecosystem are stream courses that have a greater species composition of oak and hickory”* (The Plan, p. 98). From a fuels standpoint, these desired upland conditions can be characterized as Fuel Model 2, where grasses and small shrubs are the primary fuels that carry low intensity surface fires (see figure 2).



Figure 2. Example of upland pine-dominated forest exhibiting fuel conditions approaching fuel model 2. This area is in Compartment 72 in the Boswell Creek Watershed (photo taken March 2003).

Southern Pine Beetle Hazard – Existing Condition

About 7,420 acres of pine-dominated forest exist in the BCWP. Pine forests are susceptible to attack by the southern pine beetle. The Texas Forest Service estimated the 2003 SPB population to be low in Texas⁹, but based on past history the SPB population will increase some time in the future. SPB hazard depends primarily on the age of the pines and how dense they are. Pine species also vary in their susceptibility to SPB. Loblolly pine, the most common pine in the BCWP, is the pine species in the South most susceptible to SPB attack. SPB hazard can be assessed at the landscape scale and at the stand level. The Texas Forest Service assessed the landscape scale SPB hazard in BCWP as similar to or slightly higher than the hazard that existed in the area in 1983, when the major SPB epidemic devastated the area¹⁰. At the stand scale, about 2,400 acres are classed as high hazard and about 2,400 acres as moderate hazard. Low SPB hazard exists on about 2,620 acres, primarily due to past

thinning. In addition to being susceptible to SPB attack, stands with moderate to high SPB hazard in BCWP do not meet the Plan's desired conditions for red-cockaded woodpecker habitat, open forests with lower density of pines and a few hardwoods.



Figure 3. Examples of mature (left) and young (right) pine stands in the Boswell Creek Watershed with high SPB hazard due to the high density of trees (total basal areas exceed 120 square feet per acre).

Southern Pine Beetle Hazard – Desired Condition

The Plan provides direction to minimize losses from insects and diseases through an integrated pest management program (The Plan, p. 48) and management will be directed to provide the best opportunity for protection and enhancement of the RCW population in east Texas (The Plan, p. 99). The desired condition on upland pine forests in Boswell Creek is reduced susceptibility to the SPB. Mature stands with basal areas below 80 square feet per acre can be rated as low to moderate SPB hazard and young pine stands with basal areas less than 80 are rated low. Figure 4 provides examples of stands with basal areas approximately 70 to 80.



Figure 4. Mature pine (left) and young pine (right) in BCWP demonstrating the appearance of pine forest with low SPB hazard due to low tree density (basal areas are from 70 to 80 square feet per acre). Although the trees appear the same size, the trees in the left photo are about 1.5 times larger than those on the right.

ALTERNATIVES, INCLUDING THE PROPOSED ACTION

No Action

The continued development of the existing fuel condition and southern pine beetle hazard is the No Action Alternative. The treatment areas would remain as described in the Existing Condition section and current trends would continue. The pine-dominated forests would continue to grow and the amount of fuel on the forest floor and in the understories would increase. Continued growth of the pine overstory would also increase the density of the forest. If no action is taken, potential fire behavior would continue to be at an elevated risk and fire suppression would grow increasingly difficult. As a result, the adjacent private structures and potential habitat for the endangered RCW would continue to be threatened. The upland pine forests would continue to grow, increasing stand basal areas, which increases the southern pine beetle hazard. The increase in stand density would increase competition between trees, which decreases their resistance to SPB attack.

Proposed Action

The Proposed Action consists of prescribed burning on a 2 to 5-year cycle on about 7,420 acres of pine-dominated stands and thinning on about 4,800 acres of upland pine in Management Area 2 (see the treatment summary table in Appendix 1 and project maps in Appendix 2 or at http://www.southernregion.fs.fed.us/texas/healthy_for_ini/hfi_page.html). The prescribed burning would begin in the winter of 2003. All acres are expected to have initial prescribed burning completed by the spring of 2006. Thinning would likely begin in the summer of 2004 and would be expected to continue through 2008. Road restoration and minor temporary road construction would be required to remove the thinned trees (see Design Criterion #3 on page 7).

Additional prescribed fire would be conducted in the areas after thinning to reduce the activity-created fuels, to reduce the amount of resprouting shrubs, and to promote the development of grassy, open understories. Although thinning would increase fuel loads, post-thinning prescribed burning can be conducted safely; this type of prescribed burning has been conducted on thousands of acres of RCW habitat across the Sam Houston NF. The thinning and prescribed fire would be instrumental in fuel reduction and the progression of the upland pine-dominated forests toward Condition Class 1 (low risk of losing key ecosystem characteristics due to wildland fire). Currently, because prescribed fire has not been implemented frequently enough, none of the upland pine-dominated forests are in Condition Class 1. About 1,865 acres, mostly in Compartments 70 and 72, are in Condition Class 2 (moderate risk of losing key ecosystem components), where fire frequencies have departed from historical frequency by one or more return intervals. The remainder of the upland pine forests are in Condition Class 3 (high risk of losing key ecosystem components) where fire frequencies have departed from historical frequency by multiple return intervals.¹¹

Thinning dense stands now should cause significant reductions of the impacts of SPB within the BCWP. Research has found that SPB-caused tree mortality over a 10-year period in non-thinned stands of loblolly pine was twice as great as in thinned stands. Thinning stands with basal areas greater than 100 ft²/ac should reduce acreage losses to SPB by 50%, with thinning in less dense stands reducing losses by 33%. Thinning increases tree vigor which would prevent initiation of about 10% of infestations, further reducing potential losses to SPB. Thinning also would reduce SPB population increase in the area, resulting in reductions in impacts on a landscape level.¹²

This Proposed Action is consistent with the National Forest Management Act, 16 U.S.C. 1604(g) (1) and with the management direction described in the National Forests and Grasslands in Texas Land and Resource Management Plan¹³.

1.) Prescribed Burning

Dormant season and growing season burning would be used to reduce fuels on about 7,420 acres of upland pine forest in Compartments 69, 70, 72, 73, 74, 75, 76, 77, and 83. Prescribed fire would be allowed to back into the approximately 940 acres of moister, hardwood-dominated areas in MA-2 and burn to the extent that the fuels allow. Fire would also not be excluded from the approximately 290 acres of streamside management zones (MA-4) that are embedded within the larger matrix of MA-2. While these hardwood-dominated areas are within the project boundary, their fuel type does not present the wildfire threat that exists on the upland pine forests. It is logical to allow prescribed fire to enter these areas where the fuels allow, however, reducing fuel loads rather than excluding them entirely from fire. Excluding fire from these areas would require the construction of many miles of additional fireline; such fireline would be unnecessary because these areas would burn at low intensity, if at all.

- a. In areas where thinning is also proposed, an initial prescribed burn would be conducted prior to thinning operations.
- b. The scheduling priority for prescribed burning would be for areas adjacent to private lands first.
- c. Existing firelines would be used to the extent practicable. Where feasible, roads and streams would be used as control lines. New fireline construction would be the minimum needed to protect adjacent unburned areas and private land. An estimated 9.9 miles of new fireline would be needed.

The prescribed burning cycle would require additional entries in the next ten years to maintain fuel loads at the desired levels and create the desired forest structure. The Plan provides for burning at 2 to 5 year intervals (The Plan, p. 110). Future conditions and/or information will determine new analysis needs at the time of the follow-up prescribed burns. The effects described on pages 10-16 of this document consider this maintenance treatment.

2.) Thinning

Thinning would be conducted on about 3,360 acres of young pine stands and on about 1,440 acres of older, mature pine stands in Compartments 69, 70, 72, 73, 74, 75, 76, 77, and 83. Thinning would be accomplished using timber sale contracting procedures where practical.

- a. Young pine stands would be thinned to leave a residual pine basal area of 60 square feet per acre (about 135 to 195 trees per acre; the number of trees per acre depends on the average diameter of the leave trees).
- b. Thinning in young pine stands would be prioritized based on the existing basal area. Where practical, stands with the highest basal area would be given highest priority for initial treatments.
- c. Mature pine stands would be thinned to a residual pine basal area of about 70 square feet per acre. The desired spacing between the residual pine trees would be 20 to 25 feet. Marking would follow the Plan's guidelines for thinning in red-cockaded woodpecker habitat, leaving the largest, oldest trees available while still meeting the average spacing guidelines. These marking guidelines are also

responsive to public comments about maintaining large size trees. Shortleaf pine would be favored as a residual tree over loblolly pine where possible.

Design Criteria

1. To limit the potential for damage to residual trees, a seasonal restriction on thinning in the young pine plantations will be established. Operations will be restricted during spring sap flow when trees are especially susceptible to bark damage if scraped by equipment or other trees. Sale contracts will include a provision to delay the beginning of thinning operations until July 1 unless approved by the Forest Service.
2. To protect water quality, ephemeral streams in MA-2 requiring protection according to Plan standard FW-218¹⁴ have been identified in the Hydrology and Soils Specialist Report¹⁵. These streams will have a minimum 33-foot equipment exclusion zone delineated on the ground. No equipment will be allowed in the zone unless approved by the Forest Service. If other ephemeral streams that require protection are discovered during on-the-ground implementation of project activities, they will be protected according to FW-218.
3. To reduce sediment production from the transportation system and protect water quality, the following road management actions will be implemented:
 - a. Road reshaping, placing additional surfacing material, reconstructing wing ditches, constructing additional wing ditches, and replacing culverts on main Forest Service system roads 200, 206, 206A, 207, 207A, 213, 223, and 246 will be done.
 - b. About 6.4 miles of unclassified roads in the watershed will be decommissioned by waterbarring, seeding, and fertilizing to establish ground cover and blocked to prevent unauthorized use.
 - c. Temporary roads established to access thinning areas will be waterbarred, seeded with native plant species, and fertilized to establish ground cover and blocked to prevent unauthorized use.
4. To protect water quality and maintain the function of MA-4 no thinning or mechanical fireline construction will occur in the primary zone¹⁶ of perennial or intermittent streams.
5. Monitoring of fish populations in Boswell and Briar Creeks will be conducted prior to and during project implementation.



6. The following action will mitigate existing visual effects along Four Notch Road identified by the Forest Landscape Architect: tree marking along the straight utility corridor adjacent to the Four Notch Road will be coordinated with the Forest Landscape Architect
7. The following actions will mitigate public concerns for visual effects along the Lone Star Hiking Trail (LSHT) raised by the public during scoping:
 - a. Within 50 feet of the LSHT, slash will be removed. Slash within 50 to 100 feet of the LSHT will be lopped to lie within 2 feet of the ground;
 - b. Where thinning will be done within 50 feet of the LSHT, designate oaks, hickory, magnolias and other flowering trees 5 inches and greater in diameter as reserve trees.

8. To protect public safety during project activities, the Lone Star Hiking Trail will be closed to hikers when thinning operations are active or during prescribed burning.

Other Alternatives

Public involvement in the project included sending a letter to the SHNF scoping list soliciting comment on the Proposed Action and holding an open house at the District Office. Forty-four responses were received as the result of the public involvement efforts during the thirty-day scoping period. The Interdisciplinary (ID) Team identified a number of issues related to project effects during scoping, which are discussed in the environmental impact section of this EA (see Scoping Response Analysis, project file). Public comments associated with protecting the Lone Star Hiking Trail and ensuring that thinning in mature pine stands maintained large diameter trees were incorporated into either the Proposed Action or the Design Criteria¹⁷. The Forest Service has found no significant issues or unresolved conflicts that warrant consideration of additional alternatives.

Two responses proposed several alternative actions to the Proposed Actions that they believed should be considered in the EA. The ID Team discussed these proposals and determined that these actions did not warrant development of additional alternatives with detailed discussion in the EA. These alternative actions and the rationale for their elimination are discussed below:

1. Provide educational, technical, and grant assistance to adjacent private property owners and in-holders in the BCW to treat their property and structures so that they are fire-proofed.

Response – Educational and technical assistance is already available to adjacent property owners through the Firewise program (<http://www.firewise.org/>) implemented in The National Fire Plan as well as through programs coordinated by the Texas Forest Service (<http://www.tamu.edu/ticc/firedepartment.htm>). This Proposed Action focuses on national forest lands adjacent to private property, which furthers the identified need to protect adjacent private ownership in addition to protecting national forest resources.

2. Manage for a denser forest canopy to increase fuel moisture and reduce wind movement, resulting in fire hazard reduction, and

3. Do not thin stands because it will increase fire hazard due to increased temperatures, lower humidity, and more wind movement in the thinned areas.

4. Increase the percentages of hardwoods in both the young and mature pine stands to provide more shading and cooling, increase the amount of fire-resistant fuel, and reduce SPB hazard.

Response (2, 3, and 4) – An alternative that includes these actions would not address the immediate needs for action, to reduce fuels and resulting fire behavior and to reduce SPB hazard. The hypothesis that denser forest canopies would reduce fire hazard is not supported by current research on the effects of fuels treatment on fire behavior. Omi and Martinson¹⁸ investigated the severity of four recent wildfires that burned into existing fuel treatment areas. They included one example from the Southern U.S., a slash pine forest in Mississippi. Their results support thinning as a tool to reduce fire hazard (Analysis of Other Alternatives, project file). Denser forest canopies created by increasing the hardwood percentages and not thinning would result in SPB mortality, creating an open dead canopy with extremely high dead fuel load, increasing fuel hazards. Total basal area is a factor often used in SPB hazard-rating systems developed for loblolly or shortleaf pine types, and high stand density is directly related to increased incidence of new infestations.¹⁹ In addition, once infestations are initiated, total basal area is positively correlated with spot expansion and trees killed per day. Increasing

hardwood composition without a concurrent reduction in pine basal area reduction would increase SPB hazard. Increasing the number of hardwoods in pine-dominated stands would not decrease the amount of hazardous fuel that exists and that would continue to accumulate nor would it change the fuel model from what currently exists.

Actions 2, 3 and 4 also would affect the structure and composition of MA-2 in ways inconsistent with the Plan's desired conditions. The actions would not meet the desired pine-dominated open forest conditions and Forest Plan MA-2 goals for RCW habitat (The Plan, pages 96-102). They appear to be similar to MA-4 goals applied to the entire Boswell Creek watershed area, consideration of which is beyond the scope of this proposal.

Actions 2, 3, and 4 are consistent with MA-4 direction (The Plan, pages 145-151). The Proposed Action is also consistent with actions 2, 3, and 4. While the project vicinity includes MA-4, the Proposed Actions do not include thinning in this MA and only minimal fire incursions from adjacent upland MA-2 areas. The Proposed Actions, therefore, are consistent with both the actions 2, 3, and 4 and with the Plan's direction.

5. Protect older and larger trees. Large trees are more fire resistant and provide more shade and thus reduce fire risk.

Response – The scoping letter for the proposal did not include specific marking guidelines for the areas to be thinned. Generally, older and larger trees would be low priority for removal because they are more resistant to fire and usually provide habitat components desirable for the endangered red-cockaded woodpecker. Some larger trees may need to be removed to provide for spacing requirements to reduce SPB hazard. Incorporating measures to protect older and larger trees does not, however, require the preparation of additional alternatives. Marking guidelines have been incorporated in the Proposed Action to provide for protection of older and larger trees in thinning areas (see page 5, item 2c).

6. An alternative that addresses restoration of the original Loblolly Pine, Shortleaf Pine, and Mixed Hardwood Ecosystems using the Houston Sierra Club principles for restoration of SHNF. The principles could be developed into an alternative to help restore the BCW to its former biological diversity and health.

Response – The Houston Sierra Club lists thirteen principles for their view of restoring the SHNF (Project file, scoping responses), but did not include an alternative that incorporates these principles. The principles appear to provide primarily for natural events to shape the composition and structure of the forest. Their principles describe fires and insect attack as natural disturbance processes that should be allowed to determine the management and ultimate composition of the forest. Therefore, the no action alternative is consistent with the HSC principles.

The only action that could be undertaken under the HSC principles would be prescribed fire, but only if it is implemented after "*conducting research on the natural fire regime, frequency, seasonality, rate, evenness, start locations, duration, and intensity so that you can create the vegetation mosaic or patchiness on the landscape that used to exist before Anglo-Saxon settlers.*"²⁰ Research on historical fire occurrence and characteristics is hampered by the lack of suitable sites from which to gather data. Unlike western forests that, in many places, contain evidence of centuries of fire occurrence, the forests in the South have changed considerably due to past land uses and other human influences. In his research, Cecil Frost²¹ postulates that fire was once widespread and frequent across most of the southern United States, including east Texas. Fire occurred at the landscape scale, often covering many thousands of acres due to the lack of barriers to its spread. Frost estimated fire frequency in the area that

includes the Sam Houston National Forest at 1-3 years. Even if we could, with certainty, fully describe the “natural” fire regimes in east Texas, it is very unlikely that prescribed fire could be implemented completely consistently with all the factors that the Sierra Club proposes. The primary consideration is the development of the forest’s desired conditions as described in the Plan. The Plan’s direction for the application of prescribed fire was designed to move the structure and composition of the forest nearer these desired conditions. It should be noted that the 2- to 5-year fire cycle for MA-2 in the Plan (The Plan, page 119) as proposed in this project is consistent with Frost’s approximation of fire frequency in east Texas.

7. Use group selection (uneven-age management) in loblolly pine plantations to reduce pine basal area and promote the development of mast-producing hardwoods.

Response – Group selection is an uneven-age management method of regeneration. The Proposed Action addresses hazardous fuels reduction, not regeneration. Extensive regeneration was done in the late 1980s as the result of large southern pine beetle infestations. Regeneration is outside the scope of the proposal.

The proponent of this alternative action also promotes group selection to shift the vegetation in the young loblolly pine stands toward a more mixed pine-hardwood composition. The use of group selection as proposed would result in vegetation inconsistent with the Plan’s desired future conditions for these upland pine forests.

ENVIRONMENTAL IMPACTS OF THE PROPOSED ACTION

This section provides a summary of the key environmental impacts of the Proposed Action as described in the specialist reports prepared for this project. It provides the necessary information to determine whether or not to prepare an Environmental Impact Statement. Based on our analysis, a proposed Finding of No Significant Impact has been prepared²². The analysis and conclusions about the potential effects are synopsisized and cited below. The reports, which disclose the full analysis of the direct, indirect, and cumulative effects, are available online at http://www.southernregion.fs.fed.us/texas/healthy_for_ini/hfi_page.html or in the Project File, located at the Sam Houston Ranger District Office in New Waverly, Texas.

Water Resources, Wetlands/Floodplains – Direct and indirect effects from the proposed thinning, burning, and associated road use on water would be minimal with the implementation of the Plan’s S&Gs and Design Criteria 2, 3, and 4, which limit the potential for sediment to enter streams. Based on the results from research and monitoring efforts, adverse direct or indirect effects resulting from these proposed management actions is unlikely.²³ All of the project activities adjacent to intermittent and perennial streams would follow Design Criterion #4, which has been found to be effective in preventing sedimentation.²⁴ In addition, ephemeral streams would be protected as specified in Design Criterion #3, which would minimize the potential for sediment to be introduced to the intermittent and perennial streams into which they eventually flow. These Design Criteria, as well as the Plan’s Standards and Guides, have been developed to meet or exceed the state’s Best Management Practices (BMPs). The recently completed Southern Forest Resource Assessment included key findings about BMPs, their implementation, and effectiveness, stating “*BMPs are critical in mitigating water-quality degradation from silviculture. When appropriately implemented and maintained, BMPs are very effective in controlling nonpoint sources of pollution.*”²⁵ The Texas Forest Service conducted the most recent forestry BMP monitoring between August 16, 2000 and

April 23, 2002 and found that the National Forest sites use of the Plan S&Gs effectively prevented significant risks to water quality.²⁶

The cumulative effects area (CEA) evaluated by the Interdisciplinary Team for water resources includes the Boswell Creek watershed, which totals about 15,150 acres. Implementing the Proposed Action in conjunction with the other land uses in the BCWP would result in an increase above the natural/undisturbed condition representing a low risk for adverse cumulative impacts on water quality or beneficial uses. The project would not occur in one entry and there would be significant improvements in the road system. Additional monitoring (Design Criteria 5) of the aquatic biota will occur to determine the actual condition of the aquatic ecosystem. Based on the findings, the project will proceed as planned or additional mitigation will be developed. Any short-term increased levels of sedimentation would decline in subsequent years (2-3 years). Sediment levels, therefore, would be within acceptable levels and not have any long-term detrimental effects on water quality and aquatic resources.²⁷

There are base floodplains within the Boswell Creek watershed. There are no other land-forms and/or landscape positions within the Boswell Creek watershed that contain the criteria needed for Jurisdictional Wetlands. The base floodplains are located in Management Area 4 (MA-4), Streamside Management Zones. The S&G's for MA-4 and Design Criteria 4 will mitigate adverse direct and indirect effects to these floodplains. This project is consistent with the wetlands and floodplain direction in the NFGT Plan²⁸.

Soil – Road maintenance, fire line construction and reconstruction, fuel reduction burns, and timber management activities, such as construction of skid trails, temporary roads and log landings can affect soil erosion, compaction, and productivity. The Proposed Actions would displace or remove some trees, soils, shrubs, forbs and grasses. Removal of trees by logging exposes bare soil and creates a potential for soil compaction/erosion, which would result in an indirect effect of increased runoff that may increase sediment delivery to streams. Fuel reduction burns may also affect soil properties and have a direct effect on soil biota, physics, organic matter, nitrogen, and erosion/sedimentation and water chemistry.

All soils on the NFGT are relatively low in available nutrients, especially phosphorus and potassium; therefore, soil moisture, texture, and structure play a major role in site productivity. The *Plan's* Appendix F establishes limits for allowable soil loss based on the coefficients developed by using the Modified Universal Soil Loss Equation and estimates the potential soil loss for the Proposed Actions (The Plan, App. F, page 2). According to Appendix F, the proposed commercial thinning and fuel reduction burns do not exceed the soil loss tolerance values. The proposed roads and skid trails have the potential to exceed the soil loss tolerance values; however, the implementation of appropriate Plan Standards and Guidelines (S&Gs) will minimize the potential soil loss and keep this loss below the tolerance value. Through implementation of the S&Gs, direct and indirect effects from the Proposed Action activities will be minimal because they are effective at reducing soil loss²⁹ and have been implemented effectively on the NFGT³⁰.

The main concern on impacts to the soil is the potential for damage from moderate or high intensity fires³¹ in Fuel Model 7, which could provide the heat needed to remove the duff layer and consume soil organic matter in the surface layer. The fire behavior model indicates that prescribed fireline intensity would range from 40 to 97 btu/ft/sec while a wildfire would produce fireline intensity from 146 to 515 btu/ft/sec³². Actions to move the upland pine forests from Fuel

Model 7 to Fuel Model 2 would reduce the fireline intensity, even under wildfire conditions, below the level that would threaten soil productivity³³.

The cumulative effects analysis for soils considered activities on national forest land in BCWP and indicated that implementation of the Proposed Actions may have minor negative short-term cumulative effects to soil properties (i.e. productivity, compaction and biota) when considered with other past, present, and reasonable foreseeable actions. Application of the S&Gs and Design Criteria would minimize the long-term negative cumulative effects.³⁴

Public Health & Safety – The safety of surrounding private residences, other structures, and forest land would be improved. Reducing fuels changes fire behavior enough to allow direct suppression tactics by local firefighting resources. This increases the chance of suppressing the fire before it reaches the adjacent privately-owned structures.³⁵ Smoke management actions would limit exposure of workers and local residents during prescribed burning activities, mitigating the human health concerns from smoke.³⁶ In addition, measures to limit the use of the Lone Star Hiking Trail during prescribed burning and thinning would ensure safety of the public.³⁷

Vegetation – The thinning and burning would result in the development of open forest conditions in the pine-dominated uplands, as overstory density and the woody understory vegetation are reduced. Thinning and burning would encourage herbaceous groundcover to develop. No fragmentation or change in the distribution of acres in various age classes would occur since none of the forested area would be regenerated. The actions proposed in this project are similar to those that have taken place in the last several years in and around the watershed. The end result is an open forest that improves habitat for the red-cockaded woodpecker and moves the Sam Houston NF towards the desired future condition for MA-2. No thinning would take place within hardwood-dominated areas, including those in MA-4, but prescribed fire would be allowed to enter from adjacent pine forests, extinguishing naturally as conditions become moister. Fire intensity would be low in these hardwood-dominated areas because they are more similar to fuel model 9, a type which typically burns with lower flame heights and less heat output than fuel model 7. Some hardwoods in these areas, such as magnolia, elm, sweetgum, holly, yaupon, cherry, and eastern hophornbeam are susceptible to fire and can be top-killed. All possess the ability to sprout ensuring their presence over time. Hardwood composition would change very little, if at all, in these hardwood-dominated areas.³⁸

The effect of the Proposed Actions on old-growth forests was raised as an issue by the public during scoping. Old-growth forests do not exist in the BCWP. The actions would not prevent old growth from developing in MA-4, where the Plan allows for old-growth allocations.³⁹

Fuels and Fire Behavior – In the short term, prescribed burning would reduce fuel loads, fireline intensities, flame lengths, and rates of spread on the 7,420 acres of upland pine forest. Thinning would increase small diameter fuels and fine fuels and encourage herbaceous groundcover to develop on approximately 4,800 acres. These fuels can be safely reduced through continued prescribed burning during appropriate weather and fuel moisture conditions. As a consistent and repeated prescribed fire program is applied to the pine-dominated uplands, Fuel Model 7 would be replaced by Fuel Model 2 and grass/forb type understories will become more common.⁴⁰

The Proposed Action insures that all acres in need of fuels treatment would be prescribed burned on a consistent basis in order to develop a Fuel Model 2 in the pine and pine/hardwood forest types and move the areas closer to Condition Class 1.

Southern Pine Beetle Hazard – The Proposed Actions would reduce SPB hazard from moderate or high to low or moderate on about 4,800 acres of upland pine forests. When considered with the past thinning in Compartments 70, 72, 75, 76, 77, and 83 and thinning that is yet to be done under already approved decisions in Compartments 75 and 76, about 6,500 acres, or 88% of the upland pine forest in the BCWP would have reduced SPB hazard.

Heritage Resources – There are no historic properties listed on, or eligible for listing on, the National Register of Historic Places within the areas where activities are proposed. One archeological site was recorded during the field inventory; however, it is not located within the boundaries of the project areas and will not be affected by the Proposed Actions. Comments from the SHPO and THPOs/Tribes were sought pursuant to 36CFR800.3(c) (4). The State Historic Preservation Officer has concurred with this determination.⁴¹ The THPOs/Tribes have not responded within the 30-day time frame and the Forest Service assumes reasonable presumptions of concurrence as provided for in 36CFR800.

Air Quality Considerations – The air quality within Walker and San Jacinto Counties, where the project is located, is generally good, but regional haze affects visibility in the area year-round, but especially during the summer months. Forest Service prescribed fire managers are primarily concerned with two air pollutants: (1) ozone and (2) fine particulate matter. Montgomery County, approximately 10 miles from the project, is within the Houston-Galveston one-hour ozone non-attainment area. Monitoring data indicate current conditions of ozone pollution within Walker and San Jacinto Counties are acceptable in terms of the National Ambient Air Quality Standards. Additionally, prescribed burning is a minor contributor to ozone air pollution problems, both in terms of ozone precursor pollution (nitrogen oxides and volatile organic compounds) and minor amounts of direct ozone generation.⁴² State air quality monitoring data indicates that counties in the SHNF are in attainment for fine particulate matter at this time. If counties near the SHNF eventually fall into non-attainment for fine particulate matter, prescribed fire would most likely be considered as a small source of emissions on an annual basis.⁴³ The Forest Service mitigates prescribed burning air quality effects by conducting burning during appropriate weather conditions and using proper ignition and smoke management tools. Because of this, it is expected there would be no effect regarding attainment of State Air Quality Standards.

Threatened and Endangered Species – The BCWP contains habitat potentially suitable for several federally threatened or endangered species that were considered in the analysis.

Red-Cockaded Woodpecker (RCW) – The endangered red-cockaded woodpecker does not presently inhabit the project area and therefore would not be directly affected by thinning and prescribed fire. Several active RCW sites existed in the area prior to the mid-1980s SPB epidemic; many cavity trees used by the birds in the past still exist in the watershed. The Proposed Action would improve existing and potential nesting and foraging habitat for this species. Thinning of the proposed pine stands would reduce basal areas and open the forest floor to sunlight, facilitating the establishment or improvement of favorable habitat conditions. Prescribed fire would improve habitat for this species by impeding the development of a woody understory and midstory, while promoting the establishment or expansion of herbaceous vegetation in the understory.

Thinning and prescribed fire would reduce basal areas and fuel loads, lessening the susceptibility of pine stands to potentially catastrophic wildfire and SPB infestation. The loss of cavity trees is possible from prescribed fire. However, the threat of cavity trees being harmed is minimized by preventative measures employed during prescribed burning operations.⁴⁴ The Proposed Action would move pine stands toward meeting the desired future condition of Management Area 2 (MA2) and developing the structural elements of good quality foraging habitat. Improved habitat conditions within the project area would likely aid the future expansion of the central RCW sub-population.⁴⁵

Other Threatened or Endangered Species – Thinning and prescribed fire would have no direct, indirect, or cumulative effects to the endangered Houston Toad, American Burying Beetle, and American Chaffseed, and the threatened Bald Eagle, Piping Plover, Louisiana Black Bear, and American Alligator because they are not present or the BCWP does not provide suitable habitat.⁴⁶

Sensitive Species – Several species on the Regional Forester’s Sensitive Species List are either present or have suitable habitat in the BCWP and are considered potentially affected by the Proposed Action. They include Rafinesque's big-eared bat, southeastern myotis, Texas emerald dragonfly, Bachman’s sparrow, and aquatic species. These are discussed below.

Rafinesque's Big-eared Bat and Southeastern Myotis : Thinning and prescribed burning may displace or harm individual Rafinesque's big-eared bat and southeastern myotis. However, due to the high mobility of these species, possible impacts are likely to be negligible⁴⁷. Potential roosting habitat may be lost and/or created as a result of timber harvest or prescribed burning. However, these species prefer bottomland habitats, in which thinning would not occur and which tend not to carry fire well.

The Proposed Action would decrease the susceptibility of pine stands to catastrophic events and promote the growth of pine. This would benefit these species by increasing the probability that pine stands reach an old age class that provides long-term roosting habitat.⁴⁸

Texas Emerald Dragonfly: Thinning and prescribed burning would have no negative effects on the adult Texas emerald dragonfly. The Proposed Action would not result in large clearings of mature pine, and therefore would not negatively affect habitat suitability. The larvae of this species are susceptible to siltation of aquatic habitats caused by ground disturbing activities. However, streamside protection measures (Design Criteria 2, 4) would considerably impede sedimentation, and therefore protect larval habitat.

The Proposed Action would increase available foraging habitat for this species. Thinning overcrowded pine stands will promote accelerated growth, reducing the time it takes for these stands to reach suitable size for foraging adults. Increased road use would contribute to the short-term sedimentation of aquatic habitats, but would be minor with the implementation of Design Criteria 3, which would minimize sediment production from roads. Road repair will reduce sediment delivery to streams and would result in a long-term improvement in larval habitat.⁴⁹

Bachman’s Sparrow: The Bachman’s sparrow is unlikely to occur within the project area and therefore would not be directly affected by thinning and prescribed burning. However, this species would benefit from the improved habitat conditions that are likely to develop from thinning and prescribed fire. Thinning would reduce overstory density and open the understory

to sunlight, subsequently promoting the establishment of herbaceous vegetation that would be maintained by prescribed fire.

Adjacent private lands primarily lack suitable habitat conditions necessary for this species. The Proposed Action would likely lead to the production of habitat that may sustain this species in the future.⁵⁰

Other Sensitive Vertebrate Species

Thinning and prescribed fire would have no direct, indirect, or cumulative effects to the sensitive Louisiana Pine Snake and Migrant Loggerhead Shrike because the BCWP does not possess suitable habitat and the actions would not create suitable habitat that could be occupied by these species.⁵¹

Sensitive Aquatic Species

The Sabine shiner and western sand darter (fish); Texas pigtoe, triangle pigtoe, sandbank pocketbook, Louisiana pigtoe, Texas heelsplitter (freshwater bivalves); and Neches crayfish, *Procambarus nigrocinctus* and *Procambarus kensleyi* (crayfish) were considered in the analysis.⁵²

Thinning would not negatively affect aquatic species due to Forest Plan S&Gs and Design Criteria 4 that exclude timber harvest within streamside management zones (SMZ's). Prescribed fire would occur within SMZ's, but would consist of generally low intensity backing fires that would not likely alter soil stabilizing riparian vegetation.⁵³

Increased road use, or improving existing roads or stream channels will likely cause increased sedimentation that may negatively affect aquatic species in the short-term. However, adherence to Forest Plan S&Gs and Design Criteria 2, 3, and 4 would impede sediment delivery to SMZ's. Aquatic species would likely benefit in the long-term from the reduced sedimentation and improved water quality that would result from improved road and stream channel drainage.⁵⁴

Since only small portions of streams occurring within the project area begin outside federal property boundaries, private land use is likely to have minimal impacts on aquatic habitats. In addition, the Proposed Action is unlikely to alter water quality downstream of the project area because management practices on national forest lands require measures that protect aquatic habitats from sedimentation.⁵⁵

Sensitive Plants

Thinning and prescribed fire would have no direct, indirect, or cumulative effects to the sensitive Texas bartonia, Warner's hawthorn, branched gayfeather, and Texas sunnybell because suitable habitat does not exist in the BCWP and would not become available as the result of the Proposed Actions.⁵⁶

Management Indicator Species (MIS) – **White-tailed deer, eastern wild turkey, yellow-breasted chat, pileated woodpecker, and stonefly guild** are the management indicators selected for the project based on their association with habitat present in the BCWP and would be indicators of the project's effects on habitat.⁵⁷ Although thinning and prescribed

fire would temporarily displace and possibly harm individual management indicator species, impacts are expected to be negligible.

White-tailed deer would benefit from stimulated woody growth and improved quality of forage in the short term as the result of thinning and prescribed fire. The Proposed Action would not reduce suitable habitat for this species.

The Eastern wild turkey would benefit from improvements in brood habitat because thinning and burning facilitate herbaceous vegetation and insect production, important food for young turkeys.⁵⁸ Future sustainability or growth of eastern wild turkey populations depend on habitat developed or maintained on national forest lands since management practices of adjacent private lands do little to enhance habitat for this species.

The yellow-breasted chat would temporarily benefit from the growth of dense understory shrubs that would develop after thinning⁵⁹, but prescribed burning would reduce habitat for this species. Early succession habitat for this species would continue to exist on surrounding private land as a result of reasonably foreseeable intensive timber management.

Snags utilized by pileated woodpeckers would be reduced in upland sites due to losses from prescribed burning, but habitat would continue to exist in bottomlands where snags would be maintained. Adjacent private lands will likely continue management practices that do not favor the creation of snags required by the pileated woodpecker.

Thinning would not negatively affect the stonefly guild because the Proposed Actions exclude timber harvest within streamside management zones and mechanical disturbance is limited in these areas (Design Criteria 2 and 4). Prescribed fire would occur within SMZ's, but would consist of generally low intensity backing fires that are unlikely to alter soil stabilizing riparian vegetation. In addition, the effects of past management actions on water quality demonstrate that the Proposed Action would not have negative long-term effects on the stonefly guild.⁶⁰

AGENCIES AND PERSONS CONSULTED

The Forest Service consulted the following individuals, Federal, State, and local agencies, Tribes and non-Forest Service persons during the development of this environmental assessment:

FEDERAL, STATE, AND LOCAL AGENCIES:

United States Fish and Wildlife Service
Texas State Historic Preservation Officer
(SHPO)
Texas Historical Commission
Texas Department of Agriculture
Texas Parks and Wildlife Department
Walker County Judge
City of Huntsville

Texas Forest Service
Office of the Governor, State of Texas

Texas Commission on Environmental Quality
Houston-Galveston Area Council
San Jacinto County Judge
CEA County Extension Agent

TRIBES, ORGANIZATIONS, AND INDIVIDUALS^a

Alabama-Coushatta Tribe	Coushatta Tribe
Caddo Tribe	Cherokee United Keeowah Band
Cherokee Nation of Oklahoma	Tunica-Biloxi Indians of Louisiana
Texas Forestry Association	Sierra Club
Texas Committee on Natural Resources	National Wild Turkey Federation
Gulf Coast Trades Center	Choctaw Nation of Oklahoma

ENDNOTES

¹ W.Bartush, Biological Assessment for the Plan, p.14 (In Appendix I, Final Environmental Impact Statement for the Revised Land and Resource Management Plan, NFGT)

² Basal area is the cross section area of the stem or stems of a plant or of all plants in a stand, generally expressed as square units per unit area. Tree basal is used to determine relative stocking of an area.

³ Project file, Projected Reductions in SPB Activity from Thinning in the Boswell Creek Watershed Project

⁴ J.Flue, Fuels Specialist Report, pages 5 and 9.

⁵ J.Flue, Fuels Specialist Report, pages 5, 7, and 8.

⁶ A measure of the amount of heat produced, which affects the difficulty to control the fire. Intensity less than 100 can be controlled by firefighters with handtools, from 100-500 requires equipment such as dozers, and greater than 500 indicate serious control difficulties, tree torching, and spotting.

⁷ Moderate and high fire danger conditions depend on weather conditions and fuel moisture. (See Fuels Specialist Report, project file).

⁸ Includes estimates for pine plantation and mature pine, which differ slightly (see Fuels Specialist Report, project file).

⁹ R.Billings, Texas Forest Service 7/24/03, from TFS website at

<http://texasforests.tamu.edu/shared/article.asp?DocumentID=854&mc=forest>

¹⁰ Four Notch Aerial SPB Hazard Rating

¹¹ J.Flue, Fuels Specialist Report, page 6.

¹² S.Clarke, Projected Reductions in SPB Activity from Thinning in the Boswell Creek Watershed Project,

¹³ Revised Land and Resource Management Plan for the National Forests and Grasslands in Texas (The Plan) dated 1996. See specifically Management Areas 2 and 4.

¹⁴ National Forests and Grasslands in Texas Revised Plan (The Plan), page 83.

¹⁵ B. Floyd, Hydrology and Soils Specialist Report, map 2.

¹⁶ The primary zone is the area within 50 feet of the stream channel (The Plan, p. 152)

¹⁷ Project File, Summary of Public Scoping Comments

¹⁸ Omi, PN and EJ Martinson. 2002. Effect of fuels treatment on wildfire severity. Final Report. Submitted to the Joint Fire Science Program Governing Board. (see report conclusions at <http://www.cnr.colostate.edu/frws/research/westfire/FinalReport.pdf>)

¹⁹ Lorio, P. L. Jr. 1968. Soil, site and stand conditions related to southern pine beetle activity in Hardin County, Texas. J. Econ. Entomol., 61:565-566 and Coulson, R. N., F. P. Hain, and T. L. Payne. 1974. Radial growth characteristics and stand density of loblolly pine in relation to the occurrence of the southern pine beetle. Environ. Entomol. 3: 425-428.

²⁰ Sierra Club Restoration Principles for Sam Houston National Forest, project file.

²¹ Frost, Cecil C. 1998. Presettlement fire frequency regimes of the United States: a first approximation. Pages 70-81 in Teresa L Pruden and Leonard A Brennan (eds.). Fire in ecosystem management: shifting the paradigm from suppression to prescription. Tall Timbers Fire Ecology Conference Proceedings, No. 20. Tall Timbers research Station, Tallahassee, FL.

²² See 40 CFR 1508.27

^a See the Project File for a list of those who were sent the scoping notice or who responded during the scoping period

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- ²³ B. Floyd, Hydrology and Soils Report, p. 18.
- ²⁴ B. Floyd, Hydrology and Soils Report, p. 11-12 and The Plan pages 151-152.
- ²⁵ Southern Forest Resource Assessment, Chapter 21:Forestry Impacts on Water Quality, p.501 (<http://www.srs.fs.usda.gov/sustain/report/aqua3/aqua3.htm>).
- ²⁶ B. Floyd, Hydrology and Soils Report, p. 11-12 The Texas Forest Service monitors BMP compliance on forestry operations in the state, including National Forest lands. The TFS conducted the most recent forestry BMP monitoring between August 16, 2000 and April 23, 2002. This monitoring found that the National Forest sites had an overall implementation of 98.4% with no significant risks to water quality identified. (The TFS report is online at <http://texasforestservice.tamu.edu/pdf/forest/water/round5.pdf>)
- ²⁷ B. Floyd, Hydrology and Soils Report, pages 17.
- ²⁸ National Forests and Grasslands in Texas Revised Plan (The Plan), pgs. 151, 153-161.
- ²⁹ B. Floyd, Hydrology and Soils Report, p. 5-6 and Southern Forest Resource Assessment Technical Report, Chapter 22 (available online at <http://www.srs.fs.usda.gov/sustain/report/aqua4/aqua4.htm>).
- ³⁰ B. Floyd, Hydrology and Soils Report, p. 11-12 and Texas Forest Service, Voluntary Implementation of Forestry Best Management Practices in East Texas, Results from Round 5 of BMP Implementation Monitoring 2000-2002.
- ³¹ Heat output of 116-520 btu/ ft /sec.
- ³² B. Floyd, Hydrology and Soils Report, p. 10.
- ³³ Fuel model 2 fireline intensity would range from 2 to 79 btu/ft/sec, J.Flue, Fuels Specialist Report, p. 14.
- ³⁴ B. Floyd, Hydrology and Soils Report, p. 18.
- ³⁵ J.Flue, Fuels Specialist Report, page 16-17.
- ³⁶ B.Baile, Air Quality Considerations for Prescribed Burning Options (modified), p. 5.
- ³⁷ Design Criterion #7.
- ³⁸ C.Prewitt, Vegetation Report, page 8.
- ³⁹ C.Prewitt, Vegetation Report, pages 3-4 and 8.
- ⁴⁰ J.Flue, Fuels Specialist Report, pages 20-21.
- ⁴¹ W.Martin, Texas Historical Commission correspondence dated July 23, 2003.
- ⁴² Air Quality Considerations for Prescribed Burning Options, p. 4.
- ⁴³ Air Quality Considerations for Prescribed Burning Options, p. 5.
- ⁴⁴ The Plan, page 115.
- ⁴⁵ F.Quesada, Wildlife Report, pages 3-4.
- ⁴⁶ F.Quesada, Wildlife Report, pages 4-6.
- ⁴⁷ F.Quesada, Wildlife Report, page 7.
- ⁴⁸ F.Quesada, Wildlife Report, page 8.
- ⁴⁹ F.Quesada, Wildlife Report, page 9.
- ⁵⁰ F.Quesada, Wildlife Report, page 11.
- ⁵¹ F.Quesada, Wildlife Report, pages 8-10.
- ⁵² F.Quesada, Wildlife Report, pages 11-13.
- ⁵³ F.Quesada, Wildlife Report, pages 13-14.
- ⁵⁴ F.Quesada, Wildlife Report, page 14.
- ⁵⁵ F.Quesada, Wildlife Report, pages 14.
- ⁵⁶ C.Griffith, Botanical Survey of the Four Notch Area page 2 and F.Quesada, Wildlife Report, page 11.
- ⁵⁷ F.Quesada, Wildlife Report, page 15.
- ⁵⁸ F.Quesada, Wildlife Report, page 19.
- ⁵⁹ F.Quesada, Wildlife Report, page 21.
- ⁶⁰ F.Quesada, Wildlife Report, pages 23-24.