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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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http://www.southernregion.fs.fed.us/texas/healthy_for_ini/hfi_page.html

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INTRODUCTION

The Forest Service has prepared this Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA) and other relevant federal and State laws and regulations. This EA discloses the project's foreseeable environmental effects for consideration in determining whether or not to prepare an Environmental Impact Statement (see the associated Finding of No Significant Impact document). 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.

The Boswell Creek Watershed Healthy Forest Initiative Project (BCWP) encompasses about 8,650 acres of the Sam Houston National Forest about 10 miles northeast of New Waverly, Texas. The Revised Land and Resource Management Plan (The Plan) designates the upland areas in BWCP as Management Area 2. The Plan directs forest management activities within MA-2 to provide the best opportunity for protection and enhancement of the federally endangered red-cockaded woodpecker (RCW) population in East Texas. The upland forestlands in this area contain important recovery habitat for the RCW. Of the approximately 8,360 acres in this project within MA-2, about 7,420 acres are dominated by pine and pine-hardwood forests. Many of these pine forests were established following a devastating southern pine beetle (SPB) epidemic in the 1980s. This upland pine and pine-hardwood habitat within the BCWP is designated as part of a 108,000 acre Habitat Management Area for the Red-cockaded Woodpecker on the Sam Houston National Forest. 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, Streamside Management Zones. Management Area 4, located adjacent to intermittent and perennial streams, is managed to maintain the role and function of aquatic, riparian, and wetland ecosystems. The Plan provides for increased dominance of hardwoods on the generally moister, lower-lying land formations. A mixture of hardwoods and pines dominates these low-lying 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. These proposed treatments in this project 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 catastrophic wildland fire to create unacceptable risks to public and firefighter safety and habitat for the endangered RCW; and
- The high southern pine beetle hazard in the pine-dominated forests and the risk of SPB infestation to cause unacceptable loss of future RCW habitat.

This project's purposes are to change the potential fire behavior in the national forest and to reduce the southern pine beetle hazard. Reduced flame lengths, fire intensity, and rates of spread 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 encouraging grass and herbaceous vegetation reduces 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 area¹ 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.²

The next section summarizes the existing and desired conditions for fuels and SPB hazard in the BWCP. The comparison of existing and desired conditions provides the basis for the project's need for action.

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 Understory, and areas where prescribed burning has not been done recently, or at all, are classed as fuel model 7, Southern Rough. 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 ³ (BTU/ft./sec.)		Flame Length (feet)		
	Moderate conditions ⁴	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
7⁵	515-997	1240-3015	146-192	515-549	4.5-5.1	8.0-8.2	7,270

Figure 1 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. 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 BWCP as similar to or slightly higher than the hazard that existed in the area in 1983, when the major SPB epidemic devastated the area⁶. 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 activity. 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. Fuel conditions and SPB hazard are dependent on the current condition and development of the vegetation. 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, resulting in increased stand basal areas, which would increase 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 Sam Houston District Ranger proposes prescribed burning on a 2 to 5-year cycle on about 7,420 acres of upland pine and thinning on about 4,800 acres of upland pine. 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.

1.) Prescribed Burning

Dormant season and growing season burning would be used to reduce fuels on about 7,420 acres of upland pine forest.

- a. In areas where thinning is also proposed, an initial prescribed burn would be conducted prior to thinning operations.
- b. Priorities for prescribed burning would be established to complete areas adjacent to existing private improvements 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. New conditions and/or information would determine new analysis needs at the time of the follow-up prescribed burns. The effects described on pages 8-14 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. 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. Shortleaf pine would be favored as a residual tree over loblolly pine where possible.

Design Criteria

1. A seasonal restriction on thinning in the young pine plantations will be established to limit the potential for damage to residual trees. Sale contracts will include a provision to delay the beginning of thinning operations until July 1 unless otherwise agreed by the Forest Service and the contractor.
2. Fire would not be excluded from adjacent streamside management zones or other hardwood-dominated forest areas, but would be allowed to burn to the extent that the existing fuels would allow. About 1,230 acres of hardwood-dominated forests would be included within the burn areas, of which about 290 acres are in streamside management zones (MA-4).
3. Ephemeral streams requiring protection according to Plan standard FW-218⁷ have been identified in the Hydrology and Soils Specialist Report⁸. 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.
4. Road management actions identified in the Roads Analysis Report (see the Project File) will be implemented to limit sediment production from the transportation system:
 - a. Reconstruct existing main Forest Service system roads 200, 206, 206A, 207, 207A, 213, 223, and 246. Reconstruction will consist of reshaping the road, placing additional surfacing material, reconstructing wing ditches, constructing additional wing ditches, and replacing culverts, as described in the Roads Analysis Report.
 - b. About 16.4 miles of unclassified roads exist in the watershed. About 7.9 miles of these roads will be added to the Forest Service system, used for this project's activities, and then closed after use. About 2.1 miles of unclassified roads provide access to private land; these roads will also be added to the Forest Service transportation system. About 6.4 miles will be decommissioned.
5. No thinning or mechanical fireline construction will occur in the primary zone⁹ of perennial or intermittent streams.

6. Monitoring of fish populations in Boswell and Briar Creeks will be conducted prior to project implementation and, if the area thinned in any year exceeds 2,000 acres, it will be done annually until 2 years beyond the completion of thinning.
7. The following actions will mitigate concerns for visual effects along Four Notch Road and the Lone Star Hiking Trail (LSHT):
 - a. Tree marking along the straight utility corridor adjacent to the Four Notch Road will be coordinated with the forest landscape architect;
 - b. 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;
 - c. 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 Team identified a number of relevant issues related to project effects from the scoping responses. The EA includes effects discussion of these relevant issues (see Scoping Response Analysis, project file). Several public comments were incorporated into either the Proposed Action or the design criteria¹⁰. Respondents expressed support and opposition to the project. The Forest Service has found no significant issues or unresolved conflicts concerning alternative uses of available resources 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 – In addition to protecting national forest resources including potential RCW habitat, the protection of adjacent private ownership is one need identified for the proposal. Creating another alternative in this proposal that includes specific actions to achieve protection of private property would duplicate existing programs and, by itself, does little to meet the desired conditions and Forest Plan objectives. Educational and technical assistance is already available to adjacent property owners through the Firewise program implemented in The National Fire Plan as well as through programs coordinated by the Texas Forest Service.

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 – An alternative that includes these actions would not address the immediate needs for action, to reduce fuels and resulting fire behavior and 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 Martinson 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. 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.

Actions 2, 3 and 4 also would affect the structure and composition of the forest in ways inconsistent with the *Plan's* desired conditions. The actions would not meet the desired conditions and Forest Plan MA goals for MA 2. 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. This amounts to an alternative purpose and need, as opposed to an alternative to the proposal.

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. Project design criteria have been incorporated in the EA to provide for protection of older and larger trees in thinning areas.

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 restoring the SHNF (Project file, scoping responses). The principles enumerated by the Sierra Club 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. Based on the past history of the forest, fires and southern pine beetle infestations, given enough time, will occur. Regeneration of the forest was not identified as a need for action, so the principles related to reforestation do not apply to this proposal. 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 conducted in some manner that is “natural”. The determination of what is

“natural” and the mimicking of “natural” fire is problematic in the South. 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. Frost (1998) has postulated 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. 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 those historic regimes. Fuels have changed due to fire suppression and humans are much more prevalent on the landscape. “Natural” fire regimes have little meaning or application to modern landscapes that bear no resemblance to what was “natural” centuries ago. 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.

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. Regeneration was not identified as one of the needs for action in the Boswell Creek watershed. 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 environmental impacts of the Proposed Action. This assessment 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 Plan¹¹. The following analysis was compared against this management direction for consistency purposes.

Effects Summary _____

This section describes the environmental impacts of the proposal. It provides the necessary information to determine whether or not to prepare an Environmental Impact Statement. The associated Finding of No Significant Impact discusses whether this project has significant effects¹². Further analysis and conclusions about the potential effects are available in Resource Specialists Reports and other supporting documentation cited below. As noted in the Introduction, these documents are online at http://www.southernregion.fs.fed.us/texas/healthy_for_ini/hfi_page.html or in the Project File.

Water Resources, Wetlands/Floodplains – All of the project activities adjacent to intermittent and perennial streams would follow Design Criteria #4, which have been found to

be effective in preventing sedimentation.¹³ In addition, ephemeral streams would be protected as specified in design criteria #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.*"¹⁴ The Texas Forest Service monitors BMP compliance on forestry operations in the state, including National Forest lands. The Texas Forest Service 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.¹⁵

The cumulative effects area (CEA) evaluated by the interdisciplinary team for water resources includes the Boswell Creek watershed, which totals about 15,150 acres and three adjacent watersheds. A detailed cumulative effects analysis was only done for the Boswell Creek Watershed. The detailed analysis was not done on the other watersheds because the affected areas represented only 3.26%, 0.76% and 1.08% of the total area of each, respectively. Given these small percentages of the total watershed area, the effects of the activities would be inconsequential.¹⁶

There would be no expected adverse cumulative effects on water quality and the beneficial uses associated with water in the Boswell Creek watershed because the Plan's Standards and Guides and state BMPs would limit the production and movement of sediment into streams. In addition, the project's activities would be spread over several years, which would limit the number of acres disturbed in any year and allow for the rapid recovery of the disturbed sites common in southeast Texas.

Initial cumulative effects modeling indicated that the project had the potential to produce sediment that could affect fish populations. The model, however, cannot account for the reduction in sediment due to standards and guides or BMPs and it calculates sediment production based on all thinning activities occurring in the first year of project implementation. It needs to be noted that this worst-case scenario will not occur as a result of implementing the proposed actions. In reality, the actions will occur over a number of years as opposed to a single year. Thus, the impact in a given year will be much less than the gross amount predicted based on all actions occurring in a single year.

The predictions made by the model for this project can also be put into context by comparing the results to the model's estimates for past activities in the same watershed. In the mid 1980's a Southern Pine Beetle (SPB) epidemic occurred in this same area. The SPB infestations eventually affected roughly half of the watershed. Suppression efforts included chainsaw felling followed by salvage logging. The salvaged stands were mechanically site prepared by combinations of chopping, shear/windrow, and burning then planted with pine from 1986 through 1990. About 3,000 acres of National Forest were treated in this watershed.

The model was used to compare the impacts from the SPB epidemic and recovery to the proposed action. The analysis only included the site preparation and fire line construction activities, which were done from 1985-87. It did not include timber harvesting, road construction/maintenance, and associated activities. The model resulted in estimates of sediment production nearly twice as high as the proposed action. In the mid 1990s Texas A&M conducted sampling on three separate sites in this watershed and the fish populations were evaluated as healthy¹⁷. Therefore, even with this very high level of site disturbance the

streams in this watershed have either recovered, maintained a healthy fish population, or the model drastically overstates sediment production. Design Criteria #5 would be implemented to ensure that project activities do not adversely affect fisheries.

There are base floodplains within the Boswell Creek watershed. However, criteria needed for Jurisdictional Wetlands, as defined in the Corp of Engineers Wetlands Delineation Manual, does not exist within the Boswell Creek Watershed. The base floodplains are located in Management Area 4 (MA-4), Streamside Management Zones. The S&G's for MA-4 will mitigate adverse direct and indirect effects to these floodplains. This project is consistent with the wetlands and floodplain direction in the NFGT Plan¹⁸.

Soil – The Plan's Appendix F sets limits on the amount of soil that can be lost and still maintain productivity. These tolerance limits developed by using a modified version of the Universal Soil Loss Equation. The proposed thinning and prescribed burning does not exceed the soil loss tolerance values. The measures incorporated from the Plan's Standards and Guidelines and Best Management Practices to control soil erosion would ensure that soil losses would be less than the tolerance limits for the types of soil in the BCWP. Research by Texas A&M University on the NFGT and private lands indicate that sediment production from silvicultural activities on these lands produced sediment yields within the range of undisturbed forest¹⁹. The implementation of the S&G's will keep soil loss from proposed roads and skid trails below the tolerance values.²⁰ The main concern on impacts to the soil is the potential for damage from moderate or high intensity fires²¹ 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/sec²². 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 productivity²³.

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.²⁴ Smoke management actions would limit exposure of workers and local residents during prescribed burning activities.²⁵ In addition, measures to limit the use of the Lone Star Hiking Trail during prescribed burning and thinning would ensure safety of the public.²⁶

Vegetation – The proposed actions would result in the development of open forest conditions in the pine-dominated uplands, as overstory density and the woody understory vegetation are reduced. 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. 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.²⁷

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.²⁸

Fuels and Fire Behavior – Prescribed burning would reduce the risk of destructive fires. By conducting a consistent prescribed fire program, the acres of hazardous Fuel Model 7 would be replaced with Fuel Model 2 which has reduced fuel loads and milder fire behavior.²⁹ In the short term, direct effects to the fuels profile would be seen in the reduced fuel loads, fireline intensities, flame lengths, and rates of spread. In the long term, as a consistent prescribed fire program is applied, Fuel Model 7 would be replaced by Fuel Model 2 and grass/forb type understories will become more common. Thinning would also be utilized in much of the project area; thinning would allow sunlight to the forest floor to encourage an herbaceous groundcover to develop and be maintained by prescribed fire.³⁰ As fuel loads decrease, fire behavior would also decrease. Acres of Fuel Model 2, which closely resembles the desired condition for Management Area 2, Red-cockaded Woodpecker Emphasis, would be increased.

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.³¹ 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 to 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.

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.³²

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.³³

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.³⁴ 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.³⁵ 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. Since it is likely the Texas Commission on Environmental Quality will allow the Forest Service to use prescribed fire elsewhere on the district, there is essentially no difference between the existing condition and Proposed Action effects in terms of expected annual emissions.

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 occur within 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. 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.³⁶

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.³⁷

Sensitive Species – Several sensitive species 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 several sensitive plants and aquatic species. These are discussed below.

Rafinesque's Big-eared Bat (*Corynorhinus rafinesquii*) and **Southeastern Myotis** (*Myotis austroriparius*): 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 negligible. 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 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.³⁸

Texas Emerald Dragonfly (*Somatochlora margarita*): 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 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. However, road repair will reduce sediment delivery to streams and would result in a long-term improvement in larval habitat.³⁹

Bachman's Sparrow (*Aimophila aestivalis*): 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.⁴⁰

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.⁴¹

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 sunnyside.⁴²

Sensitive Aquatic Species

The Sabine shiner and western sand darter (fish); Texas pigtoe, triangle pigtoe, sandbank pocketbook, Louisiana pigtoe, Texas heelsplitter (mollusks); and Neches crayfish, *Procambarus nigrocinctus* and *Procambarus kensleyi* (crayfish) were considered in the analysis because they or their habitat exists in the watershed.

Thinning would not negatively affect aquatic species due to Forest Plan measures 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.

Increased use, rebuilding, 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 measures 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.

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.⁴³

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.⁴⁴

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. The proposed action would not reduce suitable habitat for this species.

The Eastern wild turkey would benefit from improvements in nesting and brooding habitat. 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.

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

The yellow-breasted chat would temporarily benefit from the growth of dense understory shrubs that would develop after thinning, 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 intensive timber management.

Thinning would not negatively affect the stonefly guild due to Forest Plan measures 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 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.⁴⁵

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:

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United States Fish and Wildlife Service
Texas Forest Service

ENDNOTES

- ¹ 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.
- ² Project file, Projected Reductions in SPB Activity from Thinning in the Boswell Creek Watershed Project
- ³ 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.
- ⁴ Moderate and high fire danger conditions depend on weather conditions and fuel moisture. (See Fuels Specialist Report, project file).
- ⁵ Includes estimates for pine plantation and mature pine, which differ slightly (see Fuels Specialist Report, project file).
- ⁶ Four Notch Aerial SPB Hazard Rating
- ⁷ National Forests and Grasslands in Texas Revised Plan (The Plan), page 83.
- ⁸ B. Floyd, Hydrology and Soils Specialist Report, map 2.
- ⁹ The primary zone is the area within 50 feet of the stream channel (The Plan, p. 152)
- ¹⁰ Project File, Summary of Public Scoping Comments
- ¹¹ See specifically Management Areas 2 and 4.
- ¹² See 40 CFR 1508.27
- ¹³ B. Floyd, Hydrology and Soils Report, p. 7 and The Plan pages 151-152.
- ¹⁴ Southern Forest Resource Assessment, Chapter 21: Forestry Impacts on Water Quality, p.501 (<http://www.srs.fs.usda.gov/sustain/report/aqua3/aqua3.htm>)
- ¹⁵ B. Floyd, Hydrology and Soils Report, p. 7
- ¹⁶ B. Floyd, Hydrology and Soils Report, p. 1
- ¹⁷ B. Floyd, Hydrology and Soils Report, p. 15.
- ¹⁸ National Forests and Grasslands in Texas Revised Plan (The Plan), pgs. 151, 153-161.
- ¹⁹ B. Floyd, Hydrology and Soils Report, p. 7.
- ²⁰ B. Floyd, Hydrology and Soils Report, pgs. 8-9.
- ²¹ Heat output of 116-520 btu/ ft /sec
- ²² B. Floyd, Hydrology and Soils Report, p. 9.
- ²³ Fuel model 2 fireline intensity would range from 2 to 79 btu/ft/sec, J.Flue, Fuels Specialist Report, p. 13
- ²⁴ J.Flue, Fuels Specialist Report, page 16.
- ²⁵ Air Quality Considerations for Prescribed Burning Options, p. 5.
- ²⁶ Design Criteria #7
- ²⁷ C.Prewitt, Vegetation Report, page 7.
- ²⁸ C.Prewitt, Vegetation Report, pages 3-4 and 8.
- ²⁹ J.Flue, Fuels Specialist Report, pages 13 and 16.
- ³⁰ J.Flue, Fuels Specialist Report, pages 20-21.
- ³¹ J.Flue, Fuels Specialist Report, page 5.
- ³² S.Clarke, Projected Reductions in SPB Activity from Thinning in the Boswell Creek Watershed Project,
- ³³ M. Jacklin, Email Correspondence, March 18, 2003
- ³⁴ Air Quality Considerations for Prescribed Burning Options, p. 3
- ³⁵ Air Quality Considerations for Prescribed Burning Options, p. 3
- ³⁶ F.Quesada, Wildlife Report, pages 1-4.
- ³⁷ F.Quesada, Wildlife Report, pages 4-6.
- ³⁸ F.Quesada, Wildlife Report, pages 6-8.
- ³⁹ F.Quesada, Wildlife Report, pages 8-9.
- ⁴⁰ F.Quesada, Wildlife Report, pages 10-11.
- ⁴¹ F.Quesada, Wildlife Report, pages 8 and 10.
- ⁴² C.Griffith, Botanical Survey of the Four Notch Area page 2 and F.Quesada, Wildlife Report, page 11.
- ⁴³ D.Peterson, Aquatics Report, page ** and F.Quesada, Wildlife Report, pages 12-15.
- ⁴⁴ F.Quesada, Wildlife Report, page **.
- ⁴⁵ F.Quesada, Wildlife Report, pages 14-24.