BOSWELL CREEK SPECIALIST REPORT
Dave Peterson – Aquatics
July 8, 2003

1. Background

A. A working copy map of the proposed project area (with documentation) and a complete Species List are in the project.

B. Below are applicable 1996 Land and Resource Management Plan *(Plan*) Standards and Guidelines (S&Gs), as well as Forest Service Manual (FSM) Regulations:

***Plan* S&Gs**

MA-4-01 Construct physical structures or initiate mitigation where USFS or USFS related management activities are causing or may cause deterioration of the streamside environment, or water quality impairment as determined by site-specific environmental analysis.

a. Implement action to protect or improve the aquatic and streamside environment including the hydrologic function of the riparian area.
b. Actions include, but are not limited to, construction of sediment traps, stream stabilization structures, or vegetative planting or manipulation.

MA-4-02 Investigate and document fish kills.

MA-4-13 Prohibit non-aquatic herbicide uses except hand applications for noxious weed control following restrictions on the herbicide label.

MA-4-23 Bridges are constructed so as to not constrict clearly defined stream channels.

b. Bridge approaches should be constructed to prevent erosion; use of culverts or box culverts that adversely restrict flow and native fisheries should be avoided.

MA-4-24 Require appropriate structures at all designated trails, permanent and temporary road system stream crossings.

c. Use culverts, anchored corduroy, bridges, gravel and/or concrete fords at intermittent and certain ephemeral streams that are determined during site specific analysis to require protective measures.

MA-4-102 Designate all perennial and intermittent stream courses as protected stream courses in timber sale contract and protected as described in standard contract provisions.

MA-4-106 Stream channels shall not be used at any time as skid trails.

MA-4-134 Habitat management activities essential for population enhancement of federally listed threatened or endangered species may be conducted.

FW-014 Natural lakes, perennial and intermittent streams will be managed for native species and communities.

FW-015 Where beneficial uses of the aquatic resource are being impaired, investigate the cause and determine measures and/or methods needed to improve the aquatic ecological condition.

FSM Regulations

2670.12 - Secretary of Agriculture's Policy on Fish and Wildlife. Departmental Regulation 9500-4 directs the Forest Service to:

1. Manage "habitats for all existing native and desired nonnative plants, fish, and wildlife species in order to maintain at least viable populations of such species."

2. Conduct activities and programs "to assist in the identification and recovery of threatened and endangered plant and animal species."

3. Avoid actions "which may cause a species to become threatened or endangered."

2670.22 - Sensitive Species.

1. Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions.

2. Maintain viable populations of all native and desired nonnative wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.

3. Develop and implement management objectives for populations and/or habitat of sensitive species.

2670.32 - Sensitive Species.

1. Assist States in achieving their goals for conservation of endemic species.

2. As part of the National Environmental Policy Act process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species.

3. Avoid or minimize impacts to species whose viability has been identified as a concern.

4. If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole. (The line officer, with project approval authority, makes the decision to allow or disallow impact, but the decision must not result in loss of species viability or create significant trends toward Federal listing.)

5. Establish management objectives in cooperation with the States when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions. Establish objectives for Federal candidate species, in cooperation with the FWS or NMFS and the States.

2670.45 - Forest Supervisors. The Forest Supervisors:

1. Ensure that legal and biological requirements for the conservation of endangered, threatened, and proposed plants and animals are met in Forest land and resource management planning; ensure compliance with procedural and biological requirements for sensitive species.

2. Develop quantifiable recovery objectives and develop strategies to effect recovery of threatened and endangered species. Develop quantifiable objectives for managing populations and/or habitat for sensitive species.

3. Make recommendations to the Regional Forester for critical or essential habitat designation on National Forest System lands.

4. Determine distribution, status, and trend of threatened, endangered, proposed, and sensitive species and their habitats on Forest lands.

5. Coordinate Forest programs with other Federal agencies, States, and other groups and individuals concerned with the conservation of threatened, endangered, proposed, and sensitive species.

6. Ensure that consultation and conferencing requirements pursuant to Section 7 of the Endangered Species Act are met in all Forest programs and activities.

2670.46 - District Rangers. The District Rangers:

1. Ensure compliance with legal and biological requirements for the conservation of threatened, endangered, and proposed species in District land management and project planning; ensure compliance with procedural and biological requirements for sensitive species.

2. Identify, manage, and protect essential and critical habitats to meet legal requirements and recovery objectives for Federally listed species; identify, protect, and manage habitat necessary to meet sensitive species objectives.

3. Coordinate District activities with interested State and Federal agencies, groups, and individuals concerned with the conservation of threatened, endangered, proposed, and sensitive species.

4. Conduct necessary biological evaluations and notify the Forest Supervisor of those projects requiring formal or early consultation or conference with the Fish and Wildlife Service (FWS) or the National Marine Fisheries Service (NMFS).

5. Prohibit the taking of threatened and endangered species of plants and animals except under FWS or NMFS permits. Prohibit the collection or taking of sensitive plants except as authorized by Regional policy.

19. Sensitive Species. Those plant and animal species identified by a Regional Forester for which population viability is a concern, as evidenced by:

a. Significant current or predicted downward trends in population numbers or density.

b. Significant current or predicted downward trends in habitat capability that would reduce a species' existing distribution.

C. References

Healy, B.D. 2000. Assemblages of Native Mussels in the Sam Houston National Forest, East Texas, draft publication submitted to unknown journal, Texas A&M, College Station, Texas.

Healy, B.D. 2002. Relationships of drought and biotic interactions to crayfish assemblage structure in gulf coastal headwater streams. MS thesis, Texas A&M University, College Station, 66 pp.

Herbert, M.E. 1999. Fish assemblage structure along environmental gradients in a coastal plain drainage: influences from a reservoir. MS thesis, Texas A&M University, College Station, Texas.

Howells, R.G. 1994. Info-mussel newsletter, Vol 2. Number 3, TPWD- Heart of the Hills Research Station, Ingram, Texas.

McLean, S.C. 1992. Effects of timber harvesting activities on stream fish assemblages in Kisatachie National Forest, Louisiana. MS thesis, LSU, Baton Rouge, LA.

Provine, W.C. 1972. A preliminary study of the proposed Lake Conroe and a survey of the San Jacinto River. Federal Aid Project No. F-12-R-17, TPWD.

Stoffels, C.D. 2000. The effects of timber harvesting on stream water quality in the Sam Houston National Forest: A physicochemical, benthic macroinvertebrate, and fish analysis. MS thesis, SFA, Nacogdoches, Texas.

D. Presence/absence analysis of protected species and their habitat requirements. Cumulative effects analysis for water quality: sediment thresholds (Clingenpeel).

E. Indicators are primarily viewed as structures or individual road-stream intersects. Key species, such as R8 Sensitives, State Threatened, *Plan* Management Indicator Species (MIS) and spring indicators are noted.

2. Direct and Indirect Effects

The no action alternative still leaves the direct effects of actively eroding roads and stream channels, unnatural sediment movement into streams and impassable fish structures. Robert Howells (1994) noted that although the San Jacinto River area on or near the Forest once "contained an abundant and diverse mussel population as recently as 1972 or later, no living unionids were found" in 1994. "The river bottom was filled with deep-shifting sand which had covered mussels and their habitat." This is indicative of sediment producing land practices in the area, including U.S. Forest Service roads and trails.

The proposed alternative for burning and thinning could result in more sediment production with many unused roads being put back into use for vehicular traffic and heavy equipment. Particularly hot fires could result in phosphate impacts on streams (see reference in Bill Floyd's Soils and Hydrology write up). Conversely, reactivating roads could result in proper upgrades and repairs to failing crossing structures and drainage regimes. Knutsen-Vendenberg (KV) collections could activate CWKV 6823 stream restoration and enhancement targets to specifically address fish passage and habitat issues.

3. Cumulative Effects

Cumulative effects of continued active erosion would involve channel downcutting throughout entire reaches of watersheds. These are basically non-repairable permanent habitat and soil losses. Eroded sediments would continue to make aquatic habitats unsuitable for silt-intolerant organisms, as already evident in the loss of many mussel species and the Sabine shiner from much of the San Jacinto drainage. In sandy areas, soil water retention may decrease due to cut bank flows of subsurface water tables.

4. Conclusion or Summary

-The state Threatened creek chubsucker (E oblongus- yellow) turned up in five of 10 samples in project watersheds.

-The dusky darter (P sciera- green), a *Plan* MIS for lowland streams, was evident in two out of 10 samples.

-The spring-dependent, Forest sensitive goldstripe darter (E parvipinne- pink) occurred in five out of 10 streams. This is a very important indicator for spring presence and fish passage because these darters need to be able to migrate to spring heads in very small feeder streams.

-Only five of 16 mussel species, historically present on the Sam Houston National Forest, were found in a 199-2000 study of 17 streams (Healy, 2000).

-Region 8 Sensitive crayfish, Procambarus kensleyi, inhabits three of the nine sample sites in or fed by project area watersheds. According to Healy (2002), this species appears to be more resistant to “faunal turnovers” during droughts. It is also more incompatible with predatory fish. Increased runoff from timber harvest and/or burning could impact this species in either scenario.

-Timber harvest can also result in short-term species changes that favor wood and bark detritus-favoring species, such as madtoms (McLean, 1992).

-Tradeoffs can include greater impacts to aquatic fauna under the proposed alternative if timber harvest and burning are not conducted in a sensitive manner and according to *Plan* precepts.

-Not all fish passage and channel erosion problems will be solved or improved with the proposed project due to the magnitude of the damage and the lack of a coordinated system for rectifying culvert problems with replacement.

--See Attachment 1 - Boswell Creek Watershed Fish Survey Points as of 7/9/03.

-See Attachment 2 - Listing of impacts of sediment on aquatic organisms.

-See Attachment 3 - Chart detailing individual culvert problems.

ATTACHMENT 1 - Boswell Creek Watershed Fish Survey Points as of 7/9/03.

(Hard copy available upon request.)

Attachment 2 - Listing of impacts of sediment on aquatic organisms.

The following is text from an e-mail dated 3/13/2003 at 2:33 p.m. to Don Benner and Larry Felts.

Here's some more on the biological impacts:

-Construction activities are responsible for 99.5% of the sediment eroded from highways and bridges (Little and Mayer 1993).
-Increased suspended sediments lower permeability of gravel beds, degrading habitat for spawning fish (Binkley and Brown 1993). Gravel beds are at a premium in our area of the state and their loss is attributed the near total decline of the paddlefish and curtailment of restoration efforts.
-Increases in stream silt loads reduced percolation and aeration in stream substrates, smothering fish eggs and fry and restricting fish emergence from nests (Cordone and Kelly 1961, Sheldon and Pollock 1966, Hassler 1970).
-Sedimentation decreased the number and depth of pools, creating reaches with uniform bottom contour. Such changes alter flow patterns and pool:riffle ratios to the detriment of a diverse fish community (Filipek 1986)
-Reductions in benthic macroinvertebrate density (Tebo 1955: Cordone and Kelly 1961; Leudtke et al. 1976) and shifts in species composition (White and Brynildson 1967 and Chutter 1969) were observed in situations where harvesting had increased silt deposition. Many of our fish are totally dependent on these invertebrates for food.
-Erosion silt alters aquatic environments, chiefly by screening out light, by changing heat radiation, by blanketing the stream bottom, and by retaining organic material and other substances which create unfavorable conditions at the bottom. Silt acts as an opaque screen to all wavelengths of visible light. Silt alters the rate of temperature change in rivers (Ellis 1936).
-Layers of fine silt from .25-1.00 inch thick, produced a very high mortality among freshwater mussels living in gravel and sand beds in which water was otherwise favorable (Ellis 1936).
-EPA noted that 20 mg/m3 suspended solids caused behavioral anomalies and 200 mg/m3 caused death in fish (Little and Mayer 1993).
-Suspended solids (silt) can cause clogging and abrasion of respiratory surfaces, hinder foraging and spawning, induce hypoxia, smother benthic organisms, interfere with feeding and growth of filter feeders, and reduce resistance to disease (McDaniel 1993).

Dave Peterson
Forest Fisheries/Aquatics Biologist
701 N. First
Lufkin, TX 75901
936-639-8541, 639-8588 FAX

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Attachment 3 - Chart detailing individual culvert problems.

Road	Creek	Mile	GPS	Photo	Description	Needs/Problems	Target
206A	Briar	end		1	Briar	decommission & waterbar	1 x 6823
207		0.5			dry IM, 36"	culvert rotted, 1 bad rd ditch	
207		next	33		dry IM, 36"	same, more channel erosion	
207	Hodgekins		34	2	IM, 36"	culv too level for grade; larger	
207		2.2	36	3,4	dry IM, 36"	bad wing & road ditch gullies	
207A		1.3		5,6		large gullies; 500' with 1 wing	
		2.9	39	7	pooled IM, 36"	rd ditch gullies; causing turbidity	
Rd off 207A	Pea			8,9	P 5'	gullies; larger culvert, patch, control H2O	1 x 6823
		1.6	40	10	IM, 24" CCC	clogged, gullies back in woods	
		2.5	41		dry IM, 18" CCC	some ditch cutting- needs repair	
			42,43		IM, 24"	grade too steep for culvert-fish concern	1x 6823
			44	11,12	P 4-5' w apron	blowout pool with fish drop	
		0.7			dry IM, 48"	4-6" drop, ditch erosion, no fish concern	
223		0.9		13	P, 48"	1' drop, dumping, gullies, silt input	2 x 6823
		1.13?			dry IM, 24"	6-8" drop, no fish passage concern	
223			47,48		dry IM, 18"	crushed & misalign- causing channel cut	
223			49		IM, 36"	clogged, large wing gully, active erosion	
223			50		dry IM, 36"	gullied wings to creek, active erosion	