



United States Department of the Interior

FISH AND WILDLIFE SERVICE

Ecological Services
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Memorandum

To: Billy Colbert, Environmental Planner, U.S. Army Corps of Engineers, Fort Worth District

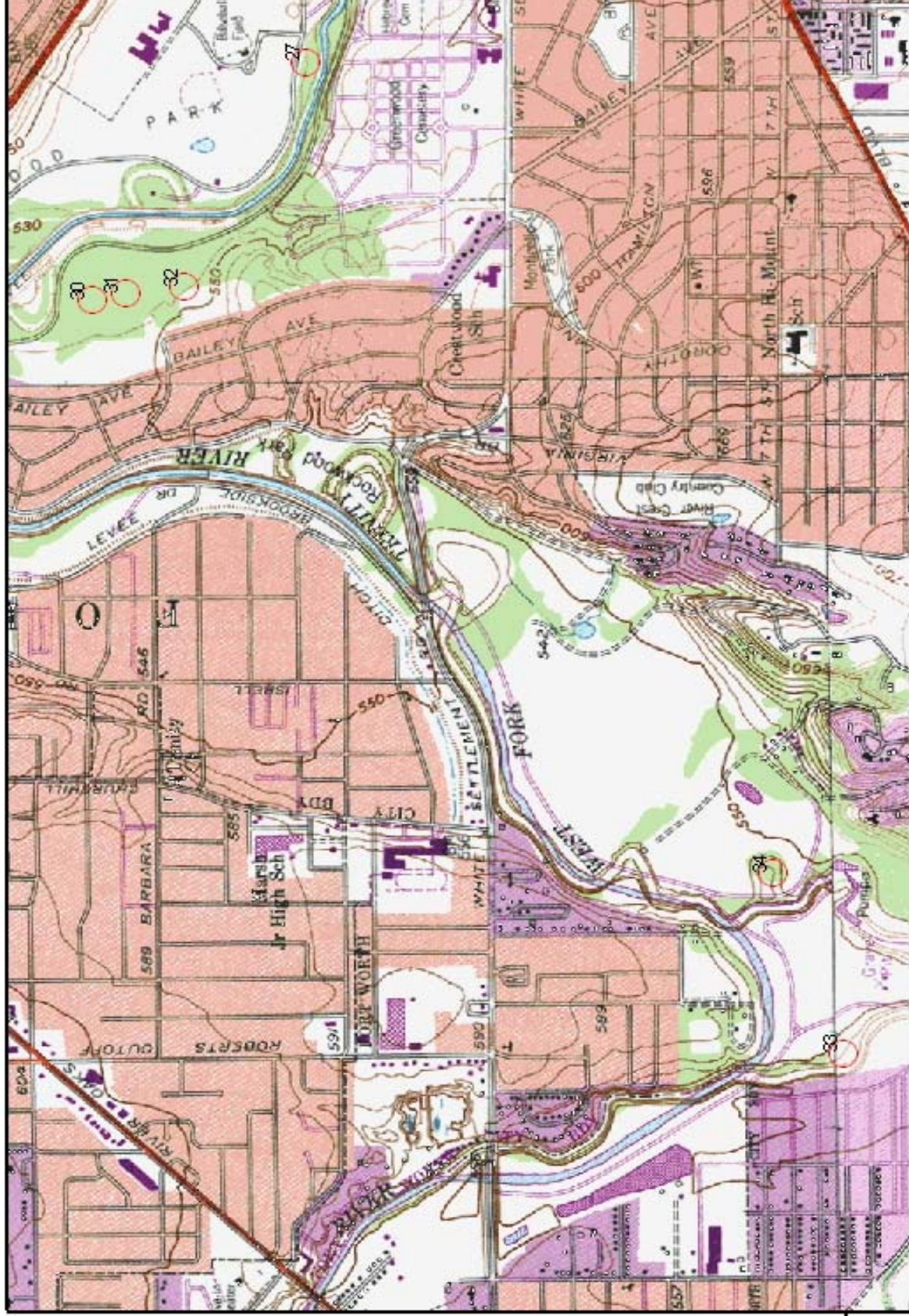
From: Carol S. Hale, Fish and Wildlife Biologist

Subject: HSIs and Analysis for the Central City Project Extended Area Upstream

This memo contains the results of the *Habitat Evaluation Procedure* (HEP) (U.S. Fish and Wildlife Service, 1980) analysis for the Central City Project extended area between Rockwood Park and U.S. Highway 183 along the West Fork of the Trinity River. During the planning of the locally preferred plan, the sponsor began looking west of the project boundary for additional flood storage. The Corps determined that project modifications required moving the project boundary to include this area. The Corps found that these modifications could impact bottomland riparian woodlands and upland deciduous forest habitats within this area and additional field data was required to assess these impacts. The information contained in this memorandum is intended to supplement our June 18, 2004 planning aid report for the Central City project.

This extended area contains the HEP sites for the habitat analysis conducted for the Upper Trinity River Basin Interim Feasibility Study for the Clear and West Forks of the Trinity River and Tributaries (Feasibility Study) contained in the Service's November 3, 2001 planning aid for that study. Sites 163, 164, and 165 are riparian sites close to Sumps 7 & 8 within the Riverbend Nature Area. Sites 224, 227, and 230 are riparian sites in the Rockwood Park area. Site 166 is an ephemeral wetland within the Riverbend Nature area and Site 169 is a wetland in the southeast corner of Sump 9. Site 167 is grassland at Sumps 7 & 8. Site 168 is grassland at Sump 9. Sites 228, 229, 231, and 232 are grasslands and Sites 225 and 226 are shrublands, all located within Rockwood Park. The analysis for these sites in the Service's report can be used in assessing existing conditions for the Central City project. No upland forest data was collected in the extended area during the Feasibility Study. Site 230 in the Feasibility Study will be included in this analysis since it is a riparian site located within the Central City Extended area.

Figure 1: HEP Sites in Extended Central City Project Area



U.S. Fish & Wildlife Service

Arlington, Texas, Ecological Services Field Office

Projector: UTM Zone 14N, NAD 1983, GRS 1980
 Product: Date: 07/26/2004

An interagency team collected field data at five randomly selected survey sites in upland deciduous forest and riparian forest habitats within the extended area on September 8 and 9, 2004. The locations of the survey sites are depicted by red circles on Figure 1. Site 27 on the map is part of the analysis contained within the June 18, 2003 planning aid report. Table 1 lists the geographical locations of these sites.

Table 1. Geographical Positions of the HEP Sites in the Central City Extended Area.

Site #	Latitude	Longitude
30	32° 46' 17.11" N	97° 22' 19.65" W
31	32° 46' 14.09" N	97° 22' 19.11" W
32	32° 46' 07.56" N	97° 22' 18.24" W
33	32° 44' 59.98" N	97° 24' 00.18" W
34	32° 45' 07.21" N	97° 23' 47.30" W
230	32° 46' 4.74" N	97° 22' 4.31" W

The same indicator species were used for these habitats and the same structural habitat composition variables were measured or estimated as in the June 18 planning aid report. Habitat measurements were collected at 3 sites in the bottomland riparian woodlands (Sites #30, 31, and 32) (Table 2), and 2 sites in upland deciduous forest (Sites #33 and 34) (Table 3). These data were analyzed using the HEP to describe the habitats and calculate the Habitat Suitability Indices (HSI) for each species (Table 4). A plant list of all the plants found in the data plots can be found in Appendix A. Appendix B contains the observation sheets and Appendix C contains photos of each HEP site.

Riparian Woodland

According to the information obtained from the Corps via email on November 17, 2004, there are 118.07 acres of riparian woodland in the extended area. These acres are broken up into small scattered bottomland hardwood stands on public and private lands. HEP Sites #30, 31, and 32 are located in this habitat. These woodlands where the HEP sites are located are predominately composed of cedar elm, American elm, green ash, pecan, bur oak, and Texas red oak. Site 31 also had a tree-sized privet (*Ligustrum sp.*). Six indicator species represent the guild that uses riparian woodlands: barred owl, raccoon, Carolina chickadee, fox squirrel, wood duck, and red-tailed hawk. The HSI values for the species for each HEP site, range from good to poor. The overall HSI values for the HEP sites range from average to below average.

Site 30: Site 30 is located in the Greenwood Memorial Park Bird Sanctuary in the Rockwood Park area. It is an oak dominated woodland on flat ground heavily littered

Table 2. Structural habitat composition parameters estimated at each Riparian/Bottomland Hardwood survey site in the Central City Extended Area.
Survey sites

Parameter	30	31	32	230
1. Percent tree canopy closure (%)	70	50	80	50
2. Percent tree canopy closure of mast producers \geq 6 in. dbh (%)	35	0	10	10
3. Percent canopy closure deciduous trees in stand (%)	70	50	80	50
4. Ave. dbh of overstory trees (in.)	15.4	7.2	8	36
5. Ave. height of overstory trees (ft.)	55	50	40	60
6. Overstory forest size class: (A =<6"dbh, B =6-10"dbh, C =10-20"dbh, D =>20"dbh)	C	B	B	D
7. # of snags <10 in. dbh per acre (#)	60	70	60	16
8. Percent shrub crown cover (%)	85	95	60	75
9. Number refuge sites per acre (#)	30	20	20	30
10. Distance to water (ft.)	782	840	764	440
11. Water regime: (A=Permanent, B=Semi-Permanent (3-5 mo.s April-Sept.), C=Semi-Perm. (<3 mo.s April-Sept.), D=None/Ephemeral)	A	A	A	A
12. # potential nest cavities per acre	0	0	10	10*
13. % herb. canopy cover in littoral zone	0	0	0	0*
14. % water surface covered by logs, trees, or woody veg. within 1m	0	0	0	0*
15. % water area <6 ft. deep	50	50	50	50*
16. Water current: A)Still to slow (6 in/sec B)Mod. Slow (6 to 24 in/sec) C) Mod. fast (24 to 40 in/sec) D) Fast (40 in/sec)	A	A	A	A*
17. # of woody stems (\geq 1m tall)/ac	2600	4600	3000	2000*
18. # of trees \geq 20 in. dbh/ac	20	0	0	20*

* Data estimated (not collected in field)

Fox Squirrel – 1, 2, 4, 8
 Carolina Chickadee – 1, 3, 5, 7
 Raccoon – 6, 9, 10, 11

Barred Owl – 1, 4, 18
 Red-tailed Hawk – 1, 17, 18
 Wood Duck – 12, 13, 14

Table 3. Structural habitat composition parameters estimated at each Upland Forest survey site in the Central City Extended Area.

Parameter	Survey sites	
	33	34
1. % tree canopy closure	60	70
2. % tree canopy closure of mast producers ≥ 10 " dbh	25	65
3. % canopy closure deciduous trees in stand	60	70
4. % canopy closure of overstory trees	50	60
5. Ave. dbh of overstory trees	26	14.4
6. Ave. height of overstory trees	50	52
7. # snags <10" dbh/ ac.	90	30
8. # snags > 6" dbh/ ac.	10	0
9. % shrub crown cover	45	10
10. # refuge sites per ac.	20	60
11. Distance to water (feet)	670	375
12. Water regime: A -Perm. B -Semi-perm.(3 mos. April-Sept.) C -Semi-perm.(3-5mos.April-Sept.) D -None/ephemeral	A	A
13. % canopy cover of persistent herb vegetation	10	30
14. # of woody stems (≥ 1 m tall)/ac.	1800	90
15. # of trees ≥ 20 in. dbh/ ac	40	10
16. Overstory forest size class: A -Saplings (<6 in dbh) B - Pole timber (≥ 6 in to 10in dbh) C - Sawtimber (≥ 10 in to 20 in dbh) D - Mature tress (≥ 20 in dbh)	D	C
17. Distance to grain	> 1 mile	> 1 mile
18. Ave. dbh of all stems	.55	13.5

Fox Squirrel – 1, 2, 5, 9, 17
 Carolina Chickadee – 1, 3, 6, 7
 Raccoon – 10, 11, 12, 16

Downy Woodpecker – 8, 18
 Red-tailed Hawk – 4, 14, 15
 Eastern Cottontail – 1, 9, 13

Table 4. Habitat suitability index values for the Extended Area for the Central City Project on the West Fork Trinity River.

Habitat/Species	Riparian					Upland Forest		
	30	31	32	230	Ave.	33	34	Ave.
Barred Owl	0.83	0.09	0.14	0.75	0.45			
Raccoon	0.80	0.60	0.60	0.97	0.74	0.97	0.80	0.97
Carolina Chickadee	0.97	0.93	0.95	0.93	0.95	0.93	0.97	0.95
Fox Squirrel	0.47	0.00	0.28	0.28	0.26	0.66	0.93	0.98
Wood Duck*	0.00	0.00	0.00	0.00	0.00			
Red-tailed Hawk*	0.31	0.30	0.27	0.57	0.40*	0.59	0.53	0.40*
Eastern Cottontail						1.00	0.85	1.00
Downy Woodpecker						0.50	0.00	0.50
HSI	0.56	0.32	0.37	0.58	0.46	0.77	0.68	0.80

* Adjusted HSI for multi-habitat species

with leaves and woody debris. The understory is dense with privet. This site is considered average habitat for riparian woodland wildlife species with an overall HSI value of 0.56. The HSI for each species ranges from excellent for the Carolina chickadee to poor for the wood duck. Although most of the fox squirrel parameters are valued as optimum to average, the percent shrub crown cover is too thick, making this site only average fox squirrel habitat. The limiting factor for this site is the fact that the closest water is the river itself, which doesn't contain any brood or winter cover for the wood duck.

Site 31: This site is also located in the Greenwood Memorial Park Bird Sanctuary. It shows signs of being periodically flooded, such as the buttressing on the dominating cedar elm. The understory is dominated (95%) by invasive privet. There were no forbs present, but there was large wood debris scattered about. Overall, this site is considered poor habitat for riparian wildlife species with an average HSI value of 0.32. It is very good Carolina chickadee habitat, but contains very little life requisites for the wood duck, barred owl, or the fox squirrel. The site did not contain any large mast producing trees species required for fox squirrel food. The lack of large trees greatly lowered the HSI value for barred owl cover and reproduction. The closest water is the river itself which does not contain any brood or winter cover for the wood duck.

Site 32: This site is also located in the Greenwood Memorial Park Bird Sanctuary and close to the new proposed levee area. It was very wet during the field visit. This site also

shows signs of being periodically flooded with dominating buttressed green ash. It has a large amount of woody debris present. Although there were no large trees with a 20 inch dbh or larger within the plot, there were several present just outside. Overall, this site is considered poor habitat for riparian wildlife species with an average HSI value of 0.37. It is very good Carolina chickadee habitat, but contains very little life requisites for the wood duck and barred owl. The lack of large trees greatly lowered the HSI value for barred owl cover and reproduction. However, considering large trees are located just outside the plot, the HSI for the barred owl could be raised. The average barred owl HSI value for the extended area HEP sites (0.45) could reflect the value of this site. The closest water is the river itself which does not contain any brood or winter cover for the wood duck. The site contained very little mast producing trees species required for fox squirrel food.

Site 230: The data for this site was collected on September 18, 2001 as part of the Clear and West Forks of the Trinity River Feasibility Study. This site is located in a small woodland stand at the north end of Crestwood Park, south of the playground, and northeast of the Greenwood Memorial Park Bird Sanctuary. The overall HSI value for the site is 0.58, which is considered average habitat for riparian woodland wildlife species. The understory vegetation was very thick and Japanese honey-suckle dominated the ground cover. The low percentage of mast producing trees and the high percentage of shrub cover made this site poor fox squirrel habitat. The closest water is the river itself which does not contain any brood or winter cover for the wood duck.

Upland Deciduous Forest

There are 48.03 acres of upland forest habitat within the extended area. HEP sites 33 and 34 are located in this habitat. The tree species found in the HEP sites include American elm, pecan, sycamore, hackberry, bur oak, and cedar elm. Six species represent the upland forest guild: raccoon, Carolina chickadee, fox squirrel, downy woodpecker, red-tailed hawk, and eastern cottontail. The HSI values for the indicator species range from optimum for cottontail habitat in Site 33 to very poor for downy woodpecker habitat in Site 34. The HSI values for the HEP sites were average and good.

Site 33: This site has a motte-like character due to the mowing around tree stands with a dense small diameter shrub layer and large woody debris present. There is a mixture of pecan, American elm, sycamore and hackberry trees. The habitat values for this site range from average to optimum. The overall HSI value for this site is good (0.77).

Site 34: Large bur oak and pecan trees dominate this stand. The understory has been heavily disturbed as a result of clearing and dumping from the Rivercrest Golf Course. The HSI value for the downy woodpecker is low, because there is a lack of large snags for nest cavities, although there is one just outside the data plot. There is not enough persistent herbaceous cover for the cottontail due to the mowing, but the habitat value for the cottontail is good. The overall HSI for this site is average (0.68).

Recommendations

Our habitat analysis indicates the following specific measures could restore natural habitats impacted by urban development within the project area.

1. Widen the riparian woodland corridors along the river as much as possible (up to 150 feet on each side) where needed by planting native mast producing trees and shrubs. Native mast producing trees and shrubs, such as pecan, bur oak, red oak, black walnut (*Juglans nigra*), wild plum (*Prunus mexicana*), sumac (*Rhus sp.*), hawthorne (*Crataegus sp.*), and coral-berry (*Symphoricarpos orbiculatus*) should be planted in the expanded portion of the riparian woodland to improve canopy cover and food base. Plant 70 percent woody stems, with no more than 25 percent soft mast producers. Shrubs should be planted at no more than 30 percent stems. Maintain some scattered open spaces for fox squirrel movement.
2. Maintain existing mast producing trees allowing them to mature.
3. Clear portions, not all, of the existing riparian habitat where the shrub cover is too dense for fox squirrels and red-tailed hawks.
4. Provide brush and log piles in the existing riparian habitat where ground cover is lacking to provide cover for small mammals.
5. Create wetlands that have readily available water close to the riparian woodlands where the river is the only available waters.
6. Plant locally available native aquatic plants, shrubs, and trees in and around wetland edges for wood duck cover. We recommend the use of locally available sedges, water willow, softstem bulrush, water pennywort (*Hydrocotyle umbellata*), switchgrass, smartweeds, and buttonbush (*Cephalanthus occidentalis*). The wetland should not be mowed unless it is to manage non-desirable species, i.e, invasives, exotics.
7. Planting mast producing trees and shrubs in the existing woodlands, to improve the canopy cover and food base. The thick overstory and/or understory may need to be thinned and cleared around the young trees to provide space and sunlight.
8. Eradicate exotic plants within the project area. Use only native plants during the restoration project.

We recommend that a biological analysis be conducted every few years using the same habitat evaluation technique to monitor and quantify habitat impacts of the restoration sites. Such an analysis would provide good information for adaptive management and for future habitat restoration planning projects.

Appendix A.
Central City Project (Extended Area)

Plants by Common Name in Alphabetical Order

<u>Common Name</u>	<u>Scientific Name</u>
American elm	<i>Ulmus americana</i>
Bermudagrass	<i>Cynodon dactylon</i>
Bur oak	<i>Quercus macrocarpa</i>
Canada wildrye	<i>Elymus canadensis</i>
Cedar elm	<i>Ulmus crassifolia</i>
Chinaberry	<i>Melia azedarach</i>
Common balloonvine	<i>Cardiospermum halicacabum</i>
Cottonwood	<i>Populus deltoides</i>
Curly dock	<i>Rumex crispus</i>
Dallis grass	<i>Paspalum dilatatum</i>
Dewberry	<i>Rubus trivialis</i>
Frogfruit	<i>Lippia sp.</i>
Giant ragweed	<i>Ambrosia trifida</i>
Green ash	<i>Fraxinus pennsylvanica</i>
Japanese honey-suckle	<i>Lonicera japonica</i>
Japanese privet	<i>Ligustrum japonicum</i>
Johnsongrass	<i>Sorghum halepense</i>
Live oak	<i>Quercus fusiformis</i>
Mesquite	<i>Prosopis grandulosa</i>
Mustang grape	<i>Vitis mustangensis</i>
Pecan	<i>Carya illinoensis</i>
Pepperweed	<i>Lepidium sp.</i>
Pigeon-berry	<i>Rivina humilis</i>
Poison ivy	<i>Toxicodendron radicans</i>
Privet	<i>Ligustrum sp.</i>
Red oak	<i>Quercus shumardii</i>
Red cedar	<i>Juniperus virginiana</i>
Rough-leaf dogwood	<i>Cornus drummondii</i>
Rye grass	<i>Lolium perenne</i>
Sacred-bamboo	<i>Nandina domestica</i>
Saw greenbrier	<i>Smilax bona-nox</i>
Sedge sp.	<i>Cyperaceae Family</i>
Spurge sp.	<i>Euphorbia sp.</i>
Stork's-bill	<i>Erodium cicutarium</i>
Swamp Privet	<i>Forestiera acuminata</i>
Sugar hackberry	<i>Celtis laevigata</i>
Threeawn	<i>Aristida sp.</i>
Toothed spurge	<i>Euphorbia dentata</i>
Virginia wildrye	<i>Elymus virginicus</i>
Western ragweed	<i>Ambrosia psilostachya</i>
Wild morning glory	<i>Ipomoea sp.</i>
Woodbine (Virginia creeper)	<i>Parthenocissus quinquefolia</i>
Woodsorrel	<i>Oxalis sp</i>
Yellow nut-grass	<i>Cyperus esculentus</i>

Appendix B
HEP Sites Observation Sheets
for the Central City Extended Area

HEP Site Observations for the Central City Project

Site: Greenwood Memorial Park Bird Sanctuary

Date: 09/08/2004

GPS/ HEP sites #: 30

GPS/ Photo Sites #: Disk #1: 1, 2, 3, 4

General Description and Observations: Oak dominated riparian woodland. Flat topography. Understory is dense with ligustrum/invasive species dominate. Heavily littered floor with leaves and woody debris. 8" dbh red oak in vicinity.

Plant Species:

Tree:	Shrub:	Grass:	Vine or Forb:
bur oak	Ligustrum sp.		green brier
red oak	swamp privet		honeysuckle
cedar elm	spade shaped leaf shrub		poison ivy

Wildlife Species Observed

Flicker
White-eyed Vireo
Woodpecker sp.
Northern Cardinal

HEP Site Observations for the Central City Project

Site: Greenwood Memorial Park Bird Sanctuary

Date: 09/08/2004

GPS/ HEP sites #: 31

GPS/ Photo Sites #: Disk #1; 5, 6, 7, 8

General Description and Observations: Riparian woodland with buttressing on cedar elms. The understory is completely dominated by invasive Ligustrum privet. No forbs present. Large downed woody debris. 95% shrub cover.

Plant Species:

Tree:	Shrub:	Grass:	Vine or Forb:
cedar elm	swamp privet		Green brier
Ligustrum	Nandina (Sacred-bamboo)		poison ivy

Wildlife Species/Sign Observed:

White-eyed vireo
Wren
Armadillo digging
Carolina Chiskadee
Raccoon tracks

HEP Site Observations for the Central City Project

Site: Greenwood Memorial Park Bird Sanctuary

Date: 09/08/2004

GPS/ HEP sites #: 32

GPS/ Photo Sites #: Disk #1: 15, 16, 17, 18

General Description and Observations: Very wet riparian woodland. Ash dominated. Lots of woody debris, buttressed trees. 20 in. dbh tree in vicinity, but outside plot. Plot is close to the proposed new levee area.

Plant Species:

Tree:	Shrub:	Grass:	Vine or Forb:
green ash	swamp privet	monkey grass	honey suckle
pecan	another Ligustrum sp.		poison ivy
bur oak	dogwood		
red oak			
cedar elm			
American elm			

Wildlife Species Observed:

Bluejay
Northern cardinal
White-eyed vireo
Box turtle
Woodhouse toad

HEP Site Observations for the Central City Project

Site: Riverbend Nature Area

Date: 09/08/2004

GPS/ HEP sites #: 33

GPS/ Photo Sites #: Disk #1: 19, 20, 21, 22

General Description and Observations: Upland deciduous forest. Mowed underneath to form motte-like stands. Rolling topography. Large woody debris on ground in nearby understory.

Plant Species:

Tree:	Shrub:	Grass:	Vine or Forb:
pecan	swamp privet	Bermudagrass	mustang grape
American elm	Ligustrum sp.	Dallis grass	poison ivy
sycamore	Unknown ornamental	Johnson grass	greenbrier
hackberry	Unknown ornamental		dewberry
	red cedar		sorrel
			honey suckle
			two species of spruce

Wildlife Species Observed:

Bluejay
Turkey vulture
Northern cardinal
vireo

HEP Site Observations for the Central City Project

Site: Rivercrest Golf Course (East of the Riverbend Nature Area)

Date: 09/09/2004

GPS/ HEP sites #: 34

GPS/ Photo Sites #: Disk #2: 1, 2, 3, 4

General Description and Observations: Upland site with large mast producing trees. Understory highly disturbed as a result of clearing and dumping from the Rivercrest Golf Course nearby. Snag just outside plot. Other trees in vicinity are Chinaberry and mesquite.

Plant Species:

Tree:	Shrub:	Grass:	Vine or Forb:
Bur oak	Hackberry	Canada wildrye	spurge
pecan			poke
cedar elm			pigeonberry
			greenbrier
			morning glory
			Virginia creeper
			poison ivy
			giant ragweed

Wildlife Species Observed:

Northern cardinal
wren

Appendix C
Photos of HEP Sites in the Central City Extended Area



Site 30 East view



Site 30 North view



Site 30 West view



Site 30 South view

C-3



Site 31 East view



Site 31 North view

C-4



Site 31 West view



Site 31 South view

C-5



Site 32 East view



Site 32 North view



Site 32 West view



Site 32 South view

C-7



Site 33 East view



Site 33 North view

C-8



Site 33 West view



Site 33 South view



Site 34 East view



Site 34 North view

C10



Site 34 West view



Site 34 South view

C41