

## Chapter 13: Discussion

The purpose of defining vegetation types in Chapters 3 through 12 is to allow an estimate of the number of vegetation types protected and unprotected at parks and refuges in Texas. As stated in the introduction, classifying vegetation is inherently problematic, and estimating the extent of plant communities protected in conservation areas is further limited by deficiencies and inconsistencies in available data. The lists of vegetation types present at specific conservation areas in Tables 3 through 12 are compiled from a variety of sources, including studies with differing criteria and methods as well as anecdotal information that may have been misinterpreted by the author. Despite these caveats, the information gathered is sufficient to support some general conclusions about the status of natural communities in Texas.

As mentioned in the introduction, at least one similar, statewide survey of vegetation types at conservation areas has been conducted in Texas. The Texas Parks and Wildlife Department (1996) classified vegetation at state parks and wildlife management areas using the classification system of Diamond (1993) and estimated the acreage of each vegetation type in each TPWD unit. That study found that 78 of the 90 vegetation types recognized by Diamond, or 86 percent, were protected at one or more TPWD units. However, the study also found that 55 vegetation types (61 percent) were protected at fewer than ten sites, and only 44 vegetation types (48 percent) were represented by examples given an "excellent" condition rating (i.e. substantially "natural" in structure and species composition). "Good" and "excellent" examples of vegetation types totaled only 359,782 acres, or 38 percent, of the 946,304 acres owned by TPWD at that time. (These figures exclude U.S. Forest Service lands designated as wildlife management areas, because these areas are not actually owned by TPWD and are managed primarily for timber or range production).

The TPWD study did not survey areas managed by other entities such as the National Park Service, U. S. Fish and Wildlife Service, U. S. Forest Service,

and the Nature Conservancy. If such areas are taken into account, all vegetation types recognized by Diamond (1993) are protected at one or more sites in Texas. (For example, montane conifer forests in West Texas are not represented at any sites managed by the TPWD but are extensively protected within Guadalupe Mountains National Park, which is managed by the National Park Service.) However, 20 of the 90 types recognized by Diamond (22 percent) are probably represented by fewer than 1,000 acres in public or private conservation.

As this thesis defines 120 types of vegetation rather than 90, it is not surprising that a somewhat larger number of rare and little-protected vegetation types have been identified than in the 1996 study. Based on the information collected for this thesis, 41 of the 120 types described in this thesis (34 percent) are represented by less than 1,000 acres in protection. Only 36 of the vegetation types defined herein (30 percent) are represented by more than 10,000 acres in conservation ownership.

Other findings of this thesis are summarized in Table 13. The first column of Table 13 again lists the 120 vegetation types. The second column gives a status value for each community based on its rarity or potential threats. These status values come from various sources; as explained above, Diamond (1993) assigned status values for only 90 vegetation types. Some additional communities have been assigned global status values by Weakley et al. (2000). Communities for which neither reference provides a status value were given a tentative ranking by the author based on conversations with ecologists or field personnel. Status values given by Diamond (1993) for a few communities have been modified to reflect new information. For example, wetland pine savannas (vegetation type #8) are increasingly rare in Texas and threatened by fire suppression (MacRoberts and MacRoberts 2000), so Diamond's ranking of G3S2 was changed to G3S1. The Little Bluestem-Nuttall's Rayless-Goldenrod and Sweetbay Magnolia Series are rated as G3S3 and G4S4 respectively by Diamond (1993) but as G1G2 and G3 by Weakley et al. (2000), and the more recent value was used.

Table 13. Vegetation types of Texas, with status value, the amount of acreage in conservation areas, and suggested priority ranking for further protection. Status values were assigned by Diamond (1993) unless otherwise indicated.

<i>Community Name</i>	<i>Status</i>	<i>Protected Acreage (approx.)</i>	<i>Suggested Priority for Future Protection</i>
<b>East Texas Pineywoods</b>			
1. Xeric sand woodlands/barrens	G4S2	300	High
2. Longleaf pine open forests	G3S2	5,700	Fairly High
3. Upland hardwood-pine forests	G4S4	8,000	Fairly Low
4. Pine-hardwood dry-mesic forests	G4S4	30,000	Low
5. Sandstone barrens	G1-2 <sup>1,2</sup>	<5	High
6. Glauconitic shale glades	G1 <sup>1</sup>	0	High
7. Herbaceous acid seeps	G4S2	800	High
8. Wetland pine savannas	G3S1? <sup>3</sup>	2,050	High
9. Forested acid seeps/wet creeksides	G3 <sup>1,2</sup>	300	Fairly High
10a. Mesic slope forests	G4S4? <sup>3</sup>	600	Medium
10b. American beech mesic slope forests	G3S2	5,000	Fairly High
11. Herbaceous depressional wetlands (East Texas Pineywoods)	G3 <sup>1</sup>	<500?	Fairly High
12. Forested depressional wetlands (baygalls)	G3S2? <sup>3</sup>	1,900	Fairly High
13. Magnolia-beech mesic forests	G3S2	10,000	Fairly High
14. Swamp chestnut oak-oak floodplain forests	G3S3	16,000	Medium
15a. Floodplain hardwood forests	G4S3	41,000	Fairly Low
15b. Frequently inundated floodplain forests	G4S3	12,000?	Medium
16. Sloughs/seasonally flooded floodplain forests	G4S4	3,500	Fairly Low
17. Baldcypress-tupelo inundated forests	G4S3	13,500	Medium
18. Freshwater shrub swamps	G4S4	4,000	Fairly Low <sup>4</sup>
19. River banks	G5S5? <sup>3</sup>	>1,000	Low
20. Freshwater wetlands (upland Texas)	G4S4? <sup>3</sup>	1,000?	Medium
<b>Post Oak Savanna</b>			
21. Post oak-blackjack oak upland forests/woodlands	G4S4	24,000	Fairly Low <sup>5</sup>
22. Loblolly pine-post oak upland forest	G4S4	4,000	Fairly Low
23. Eastern redcedar chalk glades	G2S2? <sup>3</sup>	<100?	High

24. Herbaceous seeps/bogs (Post Oak Savannas)	G4S2	<500	High
25. Water oak floodplain forest	G4S4? <sup>3</sup>	2,000	Fairly Low
26. Sugarberry-elm floodplain forests	G4S4	>20,000	Low
<b>Blackland Prairies</b>			
27. Upland Vertisol tall grasslands	G2S2	850	High
28. Upland Alfisol tall grasslands	G2S2	500?	High
29. Switchgrass-gammagrass mesic tall grasslands	G2S1	650?	High
30. Silveanus dropseed Alfisol tall grasslands	G2S2	200	High
31. Deciduous dry-mesic slope forests	G3S3? <sup>3</sup>	2,000	Medium
32. Bur oak-Shumard oak floodplain forest	G4S3? <sup>3</sup>	>1,000	Medium
<b>Gulf Coastal Prairies and Marshes</b>			
33. Upland tall grasslands (Coastal Prairies)	G2S2	27,000	Medium
34. Upland live oak woodlands (upper Gulf Coast)	G3S3 <sup>6</sup>	180	Fairly High
35. Upland live oak savannas (Ingleside Barrier)	G3S3	>20,000	Fairly Low
36. Coastal xeric brush	G2 <sup>1</sup>	1,000?	Fairly High
37. Live oak-water oak floodplain woodlands	G3S3	4,200	Medium
38. Ephemeral freshwater wetlands (Coastal Prairies)	G2 <sup>1</sup>	>1,000	Fairly High
39. Semipermanent freshwater wetlands (Coastal Prairies)	G4S3? <sup>3</sup>	18,000?	Medium
40. Coastal dune grasslands	G4S3	23,000	Fairly Low
41. Gulf cordgrass saline grasslands	G4S4	48,000	Low
42a. Intermediate marshes	G4S4	115,000	Low
42b. Brackish marshes	G4S4	>20,000	Low
43. Sea ox-eye saline flats	G4 <sup>1</sup>	10,000?	Low
44. Glasswort-saltwort hypersaline estuarine flats	G4S4	8,000	Fairly Low
45. Tidal salt marshes	G4S3? <sup>3</sup>	30,000	Low
46. Black mangrove tidal shrub marsh	G5S2 <sup>7</sup>	<500	Fairly High
47. Beaches/active coastal dunes	G4S3	10,000	Medium
48. Wind-tidal algal flats	G4S3? <sup>3</sup>	>30,000	Fairly Low
49. Estuarine seagrass beds	G4S3? <sup>3</sup>	>30,000	Fairly Low <sup>8</sup>
<b>South Texas Plains</b>			
50. Upland post oak-live oak woodlands	G4S4	<1,000	Medium
51a. Upland mixed grasslands (South Texas Sand Sheet)	G4S3	0	Fairly High

51b. Live oak savannas (South Texas Sand Sheet)	G4S4? <sup>3</sup>	0	Medium
52. Upland mixed grasslands (South Texas Plains)	G2S2? <sup>1,2</sup>	<20	High
53a. Upland mesquite savannas	G5S5	12,500	Low
53b. Mesquite-mixed shrub savanna (Lower Rio Grande Valley)	G3S3? <sup>3</sup>	3,800	Medium
54. Upland Texas paloverde-mesquite brush	G4 <sup>1</sup>	4,400	Fairly Low
55. Blackbrush xeric brush	G5S5	8,000	Fairly Low <sup>5</sup>
56. Cenizo-blackbrush xeric brush	G4S4	4,000	Fairly Low
57. Guajillo xeric brush	G5S5	5,500	Low
58. Saline/gypsum brush	G1? <sup>1</sup>	<300	High
59. Short brush on clay ridges (lomas)	G2S2	10,000	Fairly High
60. Saline grasslands	S2-3? <sup>3</sup>	700	Fairly High
61a. Wetland brush	G5S5	1,000	Fairly Low
61b. Depressional wetlands (potholes)	G3S3? <sup>3</sup>	>1,000	Medium
62. Coastal saline grasslands	G4S4	>20,000	Low
63a. Texas ebony floodplain forests	G2S1	310	High
63b. Texas palmetto floodplain forest	G2S1	<150	High
64. Sugarberry-elm floodplain forests (South Texas Plains)	G4S4	<500	Medium
65. Sugarberry-elm floodplain forests (Lower Rio Grande Valley)	G1-2 <sup>1</sup>	1,200	Fairly High
<b>Edwards Plateau</b>			
66. Ashe juniper low forests	G4S4	46,000	Low
67. Upland plateau live oak savannas	G3S3	22,000	Fairly Low
68a. Upland post oak-blackjack oak woodlands (Llano Uplift)	G4S4	>5,000	Fairly Low
69. Upland mixed grasslands (western Edwards Plateau)	G3S3	5,000	Medium
70. Upland savannas (western Edwards Plateau)	G4S4	5,800	Fairly Low
71a. Oak-juniper dry-mesic forests (Edwards Plateau)	G3S3	9,000	Medium
72. Deciduous mesic canyon forests	G4S2	200?	High
73. Limestone bluffs and seeps	G2? <sup>1</sup>	<500?	High
74. Exposed granite outcrops	G2 <sup>1</sup>	800	High
75. Spring-fed streams (Edwards Plateau)	G2-3 <sup>1</sup>	<500	Fairly High
76a. Pecan-elm floodplain woodlands (Edwards Plateau)	G4S4	1,200	Fairly Low
77. Streambeds	G3S3	500?	Fairly High
78. Baldcypress riparian woodlands	G3S3	300	Fairly High

79. Nettleleaf hackberry-plateau live oak floodplain woodlands	G4S4	500	Medium
<b>Prairies and Cross Timbers</b>			
68b. Upland post oak-blackjack oak woodlands (Cross Timbers)	G4S4	8,000	Fairly Low
71b. Oak-juniper dry-mesic forests (Cross Timbers)	G3S3	>1,000	Medium
76b. Pecan-elm floodplain woodlands (Cross Timbers)	G4S4	1,200?	Fairly Low
80. Upland Mollisol tall grasslands	G2S2	500?	High
<b>Rolling Plains</b>			
81. Upland mesquite-midgrass savannas	G5S5? <sup>3</sup>	3,000	Low
82a. Upland mixed grasslands	G3S3	3,000	Medium
82b. Deep sand grasslands	G3S3	1,000?	Medium
83. Switchgrass-gammagrass mesic tall grasslands	G2S1	2,300?	Fairly High
84. Sand sage shrub grassland	G4S4	10,800	Fairly Low
85. Havard shin oak brush	G3S3	3,500	Medium
86a. Upland juniper-mesquite savannas	G4S4	33,000	Low
86b. Rocky Mountain juniper woodlands	G4S2	320	High
87. Mesquite floodplain brush	G5S5? <sup>3</sup>	>2,000	Low
88. Cottonwood-willow riparian woodlands	G3S3	3,000	Medium
<b>High Plains</b>			
89. Blue grama-buffalograss short grasslands	G4S3	>15,000	Medium
90. Intermittent wetlands (playa lakes)	G2-3 <sup>1</sup>	600	Fairly High
<b>West Texas</b>			
91. Saline or gypsic hardlands	G2-3 <sup>1</sup>	>1,000	Fairly Low
92. Mesquite-saltbush saline brush	G4S4	1,900	Fairly Low
93. Hypersaline flats	G4S4	5	Medium
94. Sacaton saline grasslands	G4S3	2,300	Medium
95. Saline or alkaline wetlands	G3S2	200	High
96. Gypsum scrub/grasslands	G4S4	1,000	Medium
97. Quartz sand dunes	G4S4	1,380	Fairly Low
98. Havard shin oak low shrublands	G3S3	2,800	Medium
99. Viscid acacia thickets	G4S4	>10,000	Low <sup>4</sup>
100. Creosotebush open shrub deserts	G5S5	425,000	Low
101. Mesquite thickets	G4S4? <sup>3</sup>	10,000	Fairly Low <sup>4</sup>
102. Cottonwood-willow riparian woodlands	G2S2	2,000?	Fairly High
103. Arroyo scrub	G4S4	14,000	Fairly Low
104. Chihuahuan Desert scrub	G4S4	420,000	Fairly Low <sup>5</sup>
105. Alluvial short grasslands (tobosa flats)	G4S4	500	Medium

106. Lower-elevation desert grasslands	G4S3	15,000	Medium
107. Yucca shrub savannas	G4S3	40,000	Fairly Low
108. Riparian shrub woodlands	G4S4	3,500	Fairly Low
109. Lower-elevation juniper woodlands	G4S4	>5,000	Fairly Low
110. Spring-fed streams/cienegas	G2S2? <sup>3</sup>	<500?	High
111. Limestone cliffs and seeps	G4S4? <sup>3</sup>	>1,000	Medium
112. Igneous outcrops	G4S4? <sup>1</sup>	<500?	Medium
113. Mid-elevation mixed grasslands	G4S3	6,500?	Fairly High
114. Canyon riparian woodlands	G3S2	500?	High
115. Montane shrub thickets	G4S4	20,100	Low
116. Juniper-pinyon-oak savannas	G4S4	14,000?	Fairly Low
117. Deciduous canyon forests	G4S2	330	High
118. Montane pinyon-juniper-oak woodlands	G4S4	1,100	Medium
119. Montane grass openings	G4 <sup>1</sup>	>1,000	Medium <sup>10</sup>
120. Montane conifer forests	G4S3, G4S1 <sup>9</sup>	15,000	Fairly High <sup>10</sup>

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1 Status value assigned to equivalent plant association or alliance by Weakley et al. (2000).

2 Status value of Weakley et al. (2000) differed from that of Diamond (1993), so the more recent reference was used.

3 Status value assigned by the author based on information from experts. This vegetation type was not given a status ranking by Diamond (1993) or Weakley et al. (2000).

4 This vegetation type occurs widely as a disturbance type.

5 Some forms of this variable vegetation type are rarer than the overall status ranking indicates; thus, the recommended priority value has been increased by one grade.

6 The extent of this vegetation type prior to Anglo-European settlement is uncertain.

7 The abundance of black mangrove in Texas is dictated by natural fluctuation (winter freezes).

8 All occurrences are submerged lands owned by the state of Texas.

9 Corresponds to two types described by Diamond (1993) with differing status values

10 Most examples of this community in Texas are protected in conservation areas.

Rough estimates of the total acreage of each community protected in conservation areas are given in the third column of Table 13; these are derived from the percentages of vegetation types in conservation areas in the second columns of Tables 3 through 12. These are obviously approximate, as data were not available for some conservation areas and others were roughly estimated.

The fourth column of Table 13 gives recommended priority values for future preservation of each vegetation type. As explained in the Introduction, these values are based in part on the rare and threatened status values; however, some values have been adjusted one grade based on the amount of acreage in conservation areas. If more than 20,000 acres of a community is in protection, the recommended priority value was downgraded one rank (e.g. from Fairly Low to Low); if 1,000 acres or less was found to be in protection the priority value was upgraded one rank (e.g. Fairly High to High). In a few cases, other subjective factors were incorporated into the values, which are explained in the footnotes to Table 13. For example, some very broadly defined communities --- including blackbrush-dominated xeric shrublands (#55) and Chihuahuan Desert scrub (#104) --- encompass plant associations or subtypes that are more restricted in extent than the matrix vegetation or contain rare species. The priority ranking for these communities was increased one grade to reflect the importance of these subtypes.

Based on status values, the amount of acreage in protection and other available information, 46 of the 120 vegetation types in Texas have been assigned priority values of High or Fairly High, meaning that these vegetation types are rare and/or little protected and should perhaps be given priority in future conservation planning. These rare, threatened, or poorly protected vegetation types are distributed statewide, with at least one occurring in every region of the state. These 46 vegetation types are listed in Table 14.

Table 14. Rare, threatened and little protected vegetation types of Texas.

<b><i>Community Name</i></b>	<b><i>Recommended Priority for Protection</i></b>
<b>East Texas Pineywoods</b>	
1. Xeric sand woodlands/barrens	High
2. Longleaf pine open forests	Fairly High
5. Sandstone barrens	High
6. Glauconitic shale glades	High
7. Herbaceous acid seeps	High
8. Wetland pine savannas	High
9. Forested acid seeps/wet creeksides	Fairly High
10b. American beech mesic slope forests	Fairly High
11. Herbaceous depressional wetlands (East Texas Pineywoods)	Fairly High
12. Forested depressional wetlands (baygalls)	Fairly High
13. Magnolia-beech mesic forests	Fairly High
<b>Post Oak Savanna</b>	
23. Eastern redcedar chalk glades	High
24. Herbaceous seeps (Post Oak Savannas)	High
<b>Blackland Prairies</b>	
27. Upland Vertisol tall grasslands	High
28. Upland Alfisol tall grasslands	High
29. Switchgrass-gammagrass mesic tall grasslands	High
30. Silveanus dropseed Alfisol tall grasslands	High
<b>Gulf Coastal Prairies and Marshes</b>	
34. Upland live oak woodlands (upper Gulf Coast)	Fairly High
36. Coastal xeric brush	Fairly High
38. Ephemeral freshwater wetlands (Coastal Prairies)	Fairly High
46. Black mangrove tidal shrub marsh	Fairly High
<b>South Texas Plains</b>	
51a. Upland mixed grasslands (South Texas Sand Sheet)	Fairly High
52. Upland mixed grasslands (South Texas Plains)	High
58. Saline/gypsum brush	High
59. Short brush on clay ridges (lomas)	Fairly High
60. Saline grasslands	Fairly High
63a. Texas ebony floodplain forests	High
63b. Texas palmetto floodplain forest	High
65. Sugarberry-elm floodplain forests (Lower Rio Grande Valley)	Fairly High

Table 14 (cont.)

**Edwards Plateau**

72. Deciduous mesic canyon forests	High
73. Limestone bluffs and seeps	High
74. Exposed granite outcrops	High
75. Spring-fed streams (Edwards Plateau)	Fairly High
77. Streambeds	Fairly High
78. Baldcypress riparian woodlands	Fairly High

**Prairies and Cross Timbers**

80. Upland Mollisol tall grasslands	High
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**Rolling Plains**

83. Switchgrass-gammagrass mesic tall grasslands	Fairly High
86b. Rocky Mountain juniper woodlands	High

**High Plains**

90. Intermittent wetlands (playa lakes)	Fairly High
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**West Texas**

95. Saline or alkaline wetlands	High
102. Cottonwood-willow riparian woodlands	Fairly High
110. Spring-fed streams/cienegas	High
113. Mid-elevation mixed grasslands	Fairly High
114. Canyon riparian woodlands	High
117. Deciduous canyon forests	High
120. Montane conifer forests	Fairly High

It should be reiterated that many of the community types defined in this report encompass a number of associations that some authors have distinguished further into separate types. Several extensively protected vegetation types --- including post oak-blackjack oak woodlands (#21), mesquite-mixed brush woodlands (#53), and Chihuahuan Desert scrub (#104) are sufficiently diverse to possibly justify identification and prioritization of subtypes to be added to the total of communities that are not extensively protected by public entities.

As mentioned above, much of the vegetation at sites in conservation ownership throughout Texas is significantly altered in species composition and structure. Many types are not protected at sites of relatively high quality, and existing "old growth" sites are almost absent in Texas. Even types of vegetation that are widespread and well represented in protected areas, such as East Texas pine-hardwood forests (vegetation types #3 and #4), are not represented by many relatively undisturbed sites.

### **Summary of Findings by Region**

*East Texas Pineywoods.* Despite the large number of parks and wildlife management areas in East Texas, most types of plant community native to East Texas are poorly protected. More than 40,000 acres of upland forest (vegetation types #3 and #4) are protected in parks and wildlife areas in East Texas, but most sites have been modified by logging in the last four decades. Timber harvesting is ongoing at some state parks as well as most national forest lands and private lands. Consequently, the species richness of native mixed forests is often not evident, even at "protected" sites. A number of species-rich communities, including xeric sandhills (#1), longleaf pine woodlands (#2), barrens (#5), glades (#6), wet pine savannas (#8), seeps and seep forests (#9), flatwoods ponds (#11), and baygalls (#12) occur only as small, isolated sites that are vulnerable to logging or hydrologic alteration on adjacent lands (Bridges and Orzell 1989b). Preserved examples of these communities are, in every case, possibly inadequate to ensure

their viability in Texas. Several of these community types are still extensive on U.S. Forest Service public lands but are not protected by the Service from logging or other potentially harmful activities (Orzell 1990). Despite being relatively well represented in wildlife areas and preserves, bottomland forest (vegetation types #14 through #17) have decreased in area by an estimated 63 percent in eastern Texas since 1950, and commercial clear-cutting of bottomlands has increased dramatically in the last two decades (Frye 1987). Mature examples of bottomland forest still exist in most of the river basins of East Texas, especially the Neches River, but the majority of examples are threatened by water development projects proposed by regional water plans (Buescher, Willis and Ratliff 2000; Schaumburg and Polk Inc. 2000).

*Post Oak Savannas.* The upland vegetation of the Post Oak Savannas is protected at a number of wildlife management areas and other sites; however, sites that support rare or endemic plants are not well represented (e.g. Eocene sandhill sites occurring in upland forests of type #21). Unusual habitats such as bogs (#24) and pine forest (#22) are protected at multiple sites, but some protected areas fail to protect the viability of unusual habitats (e.g. the Palmetto State Park, which ostensibly preserves the Ottine Swamp of Gonzales County but contains little bog habitat).

*Blackland Prairies.* As mentioned above, the natural vegetation of the Blackland Prairies is almost extirpated. The largest protected area of contiguous natural grassland in the region, the Clymer Meadow Preserve, is only 800 acres in size. Regrettably, restoration of large areas of grassland may be impractical, but unprotected remnants of significant size exist in private ownership, as well as small tracts. Assisting landowners in managing and protecting these beautiful and underappreciated relicts should be a high priority.

*Gulf Coastal Prairies and Marshes.* The Gulf coast is a part of the state where conservation of nature has been given deserved attention. Most ecological communities are well represented in conservation areas, with the arguable exception of upland grasslands and swales (vegetation types #33 and

38). However, there are still specific locales important to wildlife that are not fully protected. Examples include the relatively undisturbed freshwater marshes and bottomland forest of the Trinity River delta and the wind-tidal flats and seagrass beds in the Laguna Madre.

*South Texas Plains.* The vegetation of South Texas is perhaps most complex and diverse around the Lower Rio Grande Valley, where conservation efforts have been focused for two decades. The acquisition of habitat in the Valley for wildlife by the TPWD and USFWS has provided opportunities to preserve and study the vegetation of that nationally unique area. However, more than 90 percent of the lower Valley has been converted to agricultural use, and the success of revegetation efforts conducted by the U.S. Fish and Wildlife Service has been mixed (USFWS 1979; Best pers. comm.). Efforts should continue to acquire and preserve the last remnant tracts of habitat in the Valley (e.g. vegetation types 53b, 55, 58, 59, 63a, 63b and 64b).

*Edwards Plateau.* Though significant park and wildlife management areas have been purchased in recent decades in the Edwards Plateau, much of that acreage is not in natural condition (TPWD 1996). Much protected acreage is in Travis County, which lacks a number of rare plants and communities found further west. Extensive undeveloped areas of native vegetation remain in the Edwards Plateau, but rural residential development and ever-increasing land prices threaten the character of much of the region. Canyons, where much of the region's floral diversity occurs, are limited in extent and vulnerable to increased fragmentation. Protection of the maple-oak canyon forest type (#72) seems particularly urgent.

*Prairies and Cross Timbers.* Woodland vegetation types in this region are similar to those occurring in the Edwards Plateau and Post Oak Savannas, so the representation of the region in parks and preserves is perhaps not as poor as Table 9 suggests. But like all regions of Texas where grasslands once occurred, there are few remnants of natural ecosystems left, and urbanization is changing landscapes here as elsewhere.

*Rolling Plains.* The Rolling Plains region contains relatively low diversity both of species and communities (Carr 1999c). However, most communities recognized in the region, including grasslands (vegetation type #82) and riparian woodlands (#88), have been overutilized and, though not rare, are little protected. As in other parts of western Texas, overutilization of groundwater has starved springs and streams.

*High Plains.* The High Plains contains the smallest amount of park and preserve acreage of any region of Texas (about 15,000 acres, less than .1 percent of the region), though sizeable acreage is enrolled in range conservation programs and game hunting is an important component of the region's economic base. Areas of native rangeland remain, sustaining wildlife. However, playas and other wetlands are little protected and are rapidly being modified.

*West Texas.* There are more conservation areas in West Texas than elsewhere in Texas. Several parks and wildlife areas in West Texas encompass complete mountain ranges and thus contain a cross-section of vegetation types. Plant diversity is highest in the Guadalupe, Davis and Chisos ranges, and all or part of the three ranges is in conservation management. However, the status of some endemic and rare plants is of concern. Rangelands were overgrazed throughout the Trans-Pecos with dramatic degradation of grasslands resulting. Relatively undisturbed examples of most grassland types (e.g. vegetation types #105, #109, and #113) are few in number and should take precedence in conservation efforts. Vegetation associated with natural water sources has been overgrazed, cleared, and otherwise modified. Riparian woodlands (vegetation types #102, #108, and #114) and cienegas (#110) should be high priorities for preservation by private owners and the public.