



Chapter 7: The South Texas Plains and Lower Rio Grande Valley

The South Texas Plains is a 20 million acre region of rangeland and thorn scrub vegetation that represents, ecologically as well as culturally, a transitional zone between Texas and northern Mexico. Annual rainfall decreases rapidly west of the Gulf coast, from approximately 30 inches near Corpus Christi to 20 inches at Laredo. Soils are highly diverse and include fine sands, clays, loams, rocky and gravelly soils and caliche, with areas of saline, alkaline, and gypseous soils. Landscapes of South Texas are correspondingly diverse, ranging from grasslands and oak savannas near San Antonio to xerophytic brush communities that grade into desert scrub at the U.S.-Mexico border (Johnston 1963, McLendon 1991).

By far the most abundant vegetation in South Texas is "brush country": savannas or brushlands dominated by drought-tolerant, mostly small-leaved, and often thorn-laden small trees and shrubs, especially legumes. The most important woody species is mesquite, which may occur in closed stands, as scattered

individuals in grasslands, or as a canopy species overtopping a dense understory ("shrub savannas"). Though mesquite-mixed shrub communities occur naturally, many examples may be former grasslands in which mesquite has increased in density and stature, with savannas possibly representing a transitional state between the two (Bogusch 1928, Malin 1953, Archer et al. 1988). Based on historical accounts, both grasslands and mesquite brushlands were widespread in South Texas prior to 1900 (Inglis 1964, Whittaker et al. 1979). However, overgrazing probably encouraged encroachment of woody species into grasslands; mesquite appears to have increased in abundance since grazing began, despite range reseeding and brush control (Brown and Archer 1987). Xerophytic brush species such as blackbrush, guajillo, and cenizo are native to rocky, gravelly ridges and uplands (Drawe et al. 1978).

Much of the South Texas Plains has been held by private ranching operations since the late nineteenth century. Today deer hunting is as profitable as cattle ranching in many areas, encouraging management for native brush species (Davis and Spicer 1965, Box 1967a).

Despite limited rainfall, the lower floodplain and delta of the Rio Grande, popularly known as the "Lower Rio Grande Valley," support dense, diverse shrub communities and low forests that contain numerous subtropical plants and animals not occurring elsewhere in the United States (Correll and Johnston 1970). However, the fertile floodplain has been largely cultivated and only small patches of natural vegetation remain. The "Valley" is now among the fastest-growing areas in population in the United States (USFWS 1983).

Plant Communities of South Texas

50. Upland post oak-live oak woodlands.

Synonyms: Live oak-post oak woodland (McLendon 1991); Coastal Live Oak-Post Oak Series (Diamond 1993); Live Oak-Post Oak Woodland Alliance (Weakley et al. 2000).

Description: Woodlands of live oak (species uncertain) and post oak grow in sandy soils in the northeastern South Texas Plains (e.g. Atascosa and Wilson counties). Bluestems, threeawns, windmillgrasses, red lovegrass, sand dropseed, and brush species may be common (McBryde 1933, Davis and Spicer 1965, McLendon 1991). Numerous endemic and unusual forbs and grasses occur on Eocene sand formations in south-central Texas (Carr pers. comm.).

Status: These communities are probably not greatly threatened, but undisturbed examples are perhaps uncommon. There are no sizeable conservation areas in the northeastern South Texas Plains, though this vegetation type also occurs on sand ridges in the southwestern Post Oak Belt.

Suggested Priority for Further Protection of Community: Medium

51a. Upland grasslands (South Texas Sand Sheet).

Synonyms: Seacoast bluestem-balsamscale (McLendon 1991); Seacoast Bluestem-Gulfdune Paspalum Series, in part (Diamond 1993); Little Bluestem-Brownseed Paspalum Herbaceous Alliance, in part (Weakley et al. 2000).

Description: Historical accounts suggest that grasslands occurred in large parts of the South Texas Plains (Bartlett 1854, Havard 1885, McClintock 1930). Extensive grasslands persist only on the Coastal Sand Plain or South Texas Sand Sheet, a two million-acre depositional plain of eolian coastal sand mostly located in Brooks, Kenedy, Jim Hogg, Hidalgo, and Willacy counties. Dominant grasses on coastal sand ridges and barrier islands --- such as seacoast bluestem or little bluestem, paspalums, and Pan American balsamscale --- extend westward on grasslands of the Sand Sheet. Other common grasses on the Sand Sheet include common sandbur, sand dropseed, thin paspalum, purple threeawn, hooded windmillgrass, fringed signalgrass, the endemic Texasgrass, knotgrass, and many forbs. Abundant forbs include plains lazy-daisy, woolly croton, Texas croton, partridge-pea, palafoxias, Drummond phlox, American snoutbean on overgrazed sites, and many other species. Deep sands of the central coast and northern South Texas support one of the highest concentrations of endemic plants in

Texas. Large areas have been converted to pastures of hybrid bluestems, buffelgrass, and other non-native range grasses (Tharp 1939, Johnston 1955, Box 1961, Johnston 1963, Chamrad and Box 1965, Whittaker et al. 1979, Drawe and Higginbotham 1980, McMahan et al. 1984, Campbell-Kissock et al. 1985, Everitt et al. 1988, Diamond and Fulbright 1990, Carr 1992, Carr pers. comm.).

Status: What remains of this community occurs on very large private ranch holdings and land use has been relatively stable, but potential development could cause fragmenting of habitat in the future. No examples exist in protected areas.

Suggested Priority for Further Protection of Community: Fairly High

51b. Live oak savannas (South Texas Sand Sheet).

Synonyms: Live Oak Woods/Parks (McMahan et al. 1984).

Description: Mottes and shinnery of live oaks (species uncertain) occur in grasslands and on dunes on the eastern South Texas Sand Sheet, primarily on the King and Kenedy ranches. Other common species include mesquite, shrubs (e.g. Texas persimmon, colima, granjeno), and in lightly grazed areas little bluestem, paspalums, Indiangrass, fringed signalgrass, crotons, bush-sunflower, and many other forbs growing in sands (Johnston 1955, Johnston 1963, Beasom and Haucke 1975). Interdune swales contain graminoids; near the coast, swales may be somewhat brackish due to salt spray and support populations of Gulf cordgrass, saltgrass, sea ox-eye, wolfberries, shoregrass, and seepweeds (Johnston 1955).

Status: This community is located on private land; land use has been stable.

Suggested Priority for Further Protection of Community: Medium

52. Upland mixed grasslands (South Texas Plains).

Synonyms: Cane Bluestem-False Rhodesgrass Series (Diamond 1993), Cane Bluestem Herbaceous Alliance (Weakley et al. 2000).

Description: The extent of grasslands on clay and clay loam soils in South Texas prior to Anglo-American settlement is uncertain. Photographs taken in the early twentieth century depict extensive open pastures of cane bluestem, tanglehead,

and other midgrasses with few shrubs present (Allred and Mitchell 1955, Turner 1982), but examples are rare today except on sandy soils. Openings in brush-dominated communities support trichloris, bristlegrasses, lovegrasses, silver bluestem, lovegrass tridens, and buffalograss, with shortgrasses (red and Texas grama, buffalograss, curlymesquite) dominant on overgrazed native pastures and on drier sites to the west. Little bluestem, Indiangrass and switchgrass are uncommon or absent on clay soils (Johnston 1955; Chamrad and Box 1965; Turner 1982; Lonard 1993; Best, Carr, Lonard, Patterson pers. comm.).

Status: If extensive grasslands were ever present on heavy soils in South Texas, they have been largely plowed and cultivated, replanted in non-native grasses, or replaced by brush vegetation (Carr pers. comm.). Examples are known only from clearings and relict sites which may not be representative of undisturbed stands. Small natural and artificial openings in the Santa Ana and Lower Rio Grande Valley National Wildlife Refuges probably represent natural grasslands (Best pers. comm.).

Suggested Priority for Further Protection of Community: High

53a. Upland mesquite savannas.

Synonyms: Mesquite-granjeno shrubland/dry woodland (McLendon 1991); Mesquite-Granjeno Parks, Mesquite-Granjeno Woods, Mesquite-Live Oak-Bluewood Parks (McMahan et al. 1984); Mesquite-Granjeno Series (Diamond 1993); Honey Mesquite Woodland Alliance, in part (Weakley et al. 2000).

Description: Brush communities with a canopy of mesquite undoubtedly were common on deeper soils and in drainages throughout South Texas prior to Anglo-European settlement (Havard 1885, Inglis 1964). With the beginning of cattle ranching, however, mesquite probably became more dominant and invaded large areas of former grassland. Mesquite were likely spread by cattle; suppression of natural fires may have contributed greatly to the invasion of brush. Mesquite may facilitate the growth of brush species which often fill in a dense understory where not cleared or burned (Davis and Spicer 1965,

Whittaker et al. 1979, Archer et al. 1988). Abundant brush species in mesquite savannas may include granjeno, Texas prickly pear, colima, whitebrush, lotebush, brasil, huisache and other acacias, tasajillo, Texas persimmon, coma, cenizo, coyotillo, Texas colubrina, guayacan, shrubby blue sage, desert-yaupon, agarito, amargosa and Berlandier wolfberry (especially along saline drainages), Texas lantana, chapotillo, orange zexmenia, and other shrubs. As ubiquitous as the brush communities are open stands or savannas of mesquite ("mesquital") with a well-developed herbaceous layer of forbs and native or non-native grasses. Grasslands and shrub savannas may have formed mosaics prior to Anglo-European modification. Texas prickly pear is codominant with mesquite on heavily disturbed sites (e.g. formerly root-plowed pastures); on saline or sodic sites, growth may be stunted (Davis and Spicer 1965, Fanning et al. 1965). Abundant forbs include crotons, low menodora, bush-sunflowers, plains lazy-daisy, Texas virgin's bower, sidas, hoary blackfoot daisy, firewheels, capitana, and many others. Grasses on heavy soils include bristlegrasses, windmillgrasses, silver bluestem, buffalograss, filly panicum, and lovegrass tridens. Mesquite also occurs in sandy prairies on the Sand Sheet, but associated shrubs are typically less dominant or absent (Johnston 1955, Box 1961, Butterwick and Strong 1976b, Drawe et al. 1978, Everitt and Gonzalez 1979, Whittaker et al. 1979, Drawe and Higginbotham 1980, Archer et al. 1988, Everitt et al. 1988, McLendon 1991, Ruthven et. al. 1993, Pollock et al. 1994, Carr pers. comm.).

Status: This is the dominant form of vegetation in South Texas, but much acreage is immature growth that may have supplanted former grasslands. Buffelgrass and other aggressive non-native grasses are ubiquitous; relatively undisturbed examples of mesquite savannas are uncommon. Roughly 12,500 acres are protected in conservation areas, with examples at the Welder Wildlife Refuge, the Nature Conservancy's Mesquite Brushland Preserve, the Lower Rio Grande Valley National Wildlife Refuge (e.g. Garceño Unit) and the Frederick and La Grulla Units of Las Palomas WMA (Box 1961, Vora 1990; Benn, L. Williams pers. comm.).

Suggested Priority for Further Protection of Community: Low

53b. Mesquite-mixed shrub savanna (Lower Rio Grande Valley).

Synonyms: Honey Mesquite/(Granjeno, Snake Eyes, Lotebush) Woodland (Weakley et al. 2000).

Description: Shrub-dominated woodlands or "shrub savannas" in the Lower Rio Grande Valley may contain abundant Texas ebony, snake-eyes, and other species restricted to southernmost Texas, in addition to mesquite, granjeno, coma, brasil, and other brush species found farther north (Havard 1885, Clover 1937, Lonard and Judd 1985, Vora 1990, Weakley et al. 2000). The shrub layer in brush woodlands of the Valley is often diverse and dense and may have no clear dominant species (Lonard pers. comm.). Barbed-wire cactus may be dominant in the ground layer on clay soils of the Beaumont Formation in Cameron and Willacy counties (Clover 1937, Ideker 1991, Johnston 1955). Arroyos and depressions (ramaderos) in the western part of the Valley contain tall brush communities with canopies composed of mesquite, granjeno, coma, Texas ebony, and sugarberry, surrounded by xerophytic brush (USFWS 1983).

Status: Native brushland in the Lower Rio Grande Valley has been reduced to small fragments; parts of the Rio Grande floodplain (e.g. on the Beaumont Formation) have been almost entirely cultivated and the natural vegetation is unknown. Good examples of mesquite-dominated brush communities occur in the Laguna Atascosa and Santa Ana National Wildlife Refuges, the Gabrielson and Thompson Road tracts of the Lower Rio Grande Valley National Wildlife Refuge, and the Longoria, McManus, and Carricitos units of the Las Palomas WMA. The ramadero type is protected in the Alto Bonito and Los Olmos units of the Lower Rio Grande Valley refuge (Best, Benn pers. comm.).

Suggested Priority for Further Protection of Community: Medium

54. Upland Texas paloverde-mesquite brush.

Synonyms: Honey Mesquite Shrubland Alliance, in part (Weakley et al. 2000).

Description: On sandy uplands (McAllen sandy loam soils) on the Goliad Formation in Hidalgo and Starr counties, the dominant vegetation often contains

a canopy of scattered tree-sized mesquite, Texas paloverde, and Texas ebony overtopping a dense understory of brush species such as anacahuita, allthorn, coma, cenizo, blackbrush, granjeno, coyotillo, guayacan, blackbrush, lotebush, and Mission fiddlewood. Scattered openings may include purple threeawn, red grama, lovegrasses, hooded windmillgrass, calderona ratany, rough tiquilia, and abundant forbs. This community is probably more xerophytic than related mesquite and ebony-dominated shrub woodlands in Cameron County (Clover 1937, Lonard and Judd 1985, Heep and Lester 1999, Weakley et al. 2000). Various types of similar brush communities in southernmost Texas and adjacent Mexican states have not been extensively described (Best pers. comm.).

Status: This community has been described based on occurrence in the Lower Rio Grande Valley National Wildlife Refuge, where it is protected in the Havana, La Puerta, Yturria Brush, Sam Fordyce, and other tracts (totaling roughly 4,400 acres) (Best pers. comm.).

Suggested Priority for Further Protection of Community: Fairly Low

55. Blackbrush xeric brush.

Synonyms: Freer Mixed Brush (Davis and Spicer 1965), Barretal (USFWS 1983); Mesquite-Blackbrush Brush (McMahan et al. 1984); Blackbrush-twisted acacia (McLendon 1991); Blackbrush Series (Diamond 1993); Blackbrush-Cenizo-Guajillo Shrubland Alliance, in part (Weakley et al. 2000).

Description: Drier or shallow-soiled sites throughout South Texas are often characterized by xerophytic brush of varying density and species composition, with some grass openings. Blackbrush is the most widely distributed and abundant species on xeric sites, occurring as a dominant species or in mixtures with mesquite, guajillo and other acacias, cenizo, and other low-growing woody species. Associated species may include amargosa, guayacan, lotebush, Texas prickly pear, cacti, granjeno, Texas paloverde, shrubby blue sage, narrowleaf forestiera, and skeletonleaf goldeneye. Scattered grasses may include purple threeawn, red grama, slim tridens, curlymesquite, buffalograss (especially on

deeper soils), and others. Blackbrush-dominated communities may be indistinct from other xerophytic stands of brush dominated by cenizo, guajillo, or other species at adjacent locales and landscape positions (Clover 1937; Butterwick and Strong 1976b; Ideker 1984; Everitt et al. 1988; Carr, L. Williams pers. comm.). Thickets of barreta (or "barretal") occur in a localized area on dry, calcareous, gravelly slopes on the Goliad Formation in Starr and Hidalgo counties, with Texas ebony, blackbrush, cenizo, and other shrubs (Clover 1937, Weakley et al. 2000). Another distinct association on somewhat gypseous clays (e.g. Yegua Formation) contains cenizo, guayacan, amargosa, knifeleaf condalia, calderona ratany, guapilla, spreading tiquilia, and numerous cacti and agaves as codominant species (Carr 1995, Weakley et al. 2000). The dominance of blackbrush extends to sandstone ridges northeast of Corpus Christi, where it grows with some disjunct forbs (Patterson pers. comm.).

Status: Taken as a whole, this type of vegetation is stable, widespread, and presently little threatened, with some 12,500 acres protected in conservation areas. However, certain taxa and plant associations within this variable, broadly defined type, such as the "barretal," are rare and deserve selective protection (USFWS 1983, Weakley et al. 2000). Good examples of blackbrush communities in conservation areas occur in the Amistad National Wildlife Refuge and the Alto Bonito, Yturria Brush, Los Olmos, La Puerta, and Chicharra Banco units of the Lower Rio Grande Valley National Wildlife Refuge (Carr 1995; Best, Carr pers. comm.).

Suggested Priority for Further Protection of Community: Fairly Low

56. Cenizo-blackbrush xeric brush.

Synonyms: Ceniza-Blackbrush-Creosotebush Brush (McMahan et al. 1984); Ceniza Series (Diamond 1993); Blackbrush-Cenizo-Guajillo Shrubland Alliance, in part (Weakley et al. 2000).

Description: Cenizo may be dominant in low-growing brushlands over caliche substrates in the dry, western South Texas Plains, southwestern Edwards

Plateau, and Stockton Plateau. Other abundant species may include blackbrush, guajillo, mesquite, shrubby blue sage, false-mesquite, cacti, Texas paloverde, guayacan, and sparse grasses and forbs including red and sixweeks grama, curlymesquite, purple threeawn, and pink pappusgrass (Bray 1905, Clover 1937, Carr 1995). Arid, gravelly hills near the Rio Grande from Zapata County north and west to the Trans-Pecos may support creosotebush, prickly pears and other cacti, allthorn, and most of the above species. A xerophytic shrub community on shallow, sandy soils over caliche in Hidalgo and Starr counties is dominated by cenizo, shrubby blue sage, blackbrush and redbrush lippia (Butterwick and Strong 1976b, Weakley et al. 2000). Cenizo may colonize openings in blackbrush-dominated brushlands; it is unclear whether there is a successional relationship (Carr pers. comm.).

Status: Cenizo-dominated brush grows on xeric ridges and benches at Amistad National Recreation Area, Seminole Canyon State Park and Devils River State Natural Area (Labus 1989, Larson pers. comm.). This type of vegetation is widespread in southwestern Texas and Mexico and probably is little threatened.

Suggested Priority for Further Protection of Community: Fairly Low

57. Guajillo xeric brush.

Synonyms: Guajillo-cenizo (McLendon 1991); Guajillo Series (Diamond 1993); Blackbrush-Cenizo-Guajillo Shrubland Alliance, in part (Weakley et al. 2000).

Description: Guajillo is often a dominant species on xeric limestone and caliche ridges or mesas along the Bordas Scarp, throughout the northern South Texas Plains, and on the southwestern Edwards and Stockton plateaus (Davis and Spicer 1965). Other associated species may include blackbrush and other acacias, cenizo, Texas prickly pear, guayacan, Texas kidneywood, brasil, Texas persimmon, and false-mesquite. The herb layer is usually sparse and may include curlymesquite, grammas, purple threeawn, lazy-daisies, ruda del monte, lyreleaf parthenium, and other forbs (Drawe and Higginbotham 1980, Everitt et al. 1988, TPWD 1990d). In the southwestern Edwards Plateau and Stockton

Plateau, this community mixes with Chihuahuan Desert vegetation of lechuguilla, sotol, leatherstem, and ocotillo (TPWD 1992).

Status: This vegetation type is widespread and apparently not threatened (Diamond 1993). Examples may be found in several protected areas, including Devils River, Garner and Kickapoo Cavern State Parks and the Nature Conservancy's Dolan Falls Preserve (TPWD 1992, 1996).

Suggested Priority for Further Protection of Community: Low

58. Saline or gypsum brushlands.

Synonyms: Mesquite-pricklypear, in part (McLendon 1991); Saladillo-Amargosa Shrubland Alliance (Weakley et al. 2000).

Description: Saline or gypseous clay soils (e.g. Maverick and Montell clays) in the southwestern part of the Lower Rio Grande Valley and South Texas Plains may be dominated by saladillo, amargosa, guapilla, knifeleaf condalia, lotebush, wolfberries, common goldenweed, various cacti, and grasses such as curlymesquite, pink pappusgrass, buffalograss, and whorled dropseed. The rare, endemic shrub Johnston's frankenia occurs in openings on gypseous soils in Starr and Zapata counties (Weakley et al. 2000, Carr pers. comm.).

Status: The Chapeño and Cuellar tracts of the Lower Rio Grande Valley National Wildlife Refuge contain small but excellent examples of communities on saline and gypseous soils (Carr 1995).

Suggested Priority for Further Protection of Community: High

59. Short brush on clay ridges (lomas).

Synonyms: Clay Loma (USFWS 1983); Texas Ebony-Snake-eyes Series, Big Sacaton Series (Diamond 1993); Texas Ebony-Snake Eyes Shrubland Alliance, Saltmeadow Cordgrass-(Common Threesquare) Herbaceous/Subshrub Alliance, in part (Weakley et al. 2000).

Description: Diverse brush communities occupy better-drained, somewhat saline clay hills composed of sediments transported by winds from coastal bays or

inland salt lakes. The "lomas" of Cameron and Willacy counties are representative of these features and support very variable and unusual vegetation. Lomas may be surrounded by coastal wetland types, grasslands, or periodically inundated wind-tidal flats and dunes. High soil salinity probably accounts for the stunted growth of such species as mesquite and Texas ebony. The often dense, variable midstory usually includes brush species such as Texas prickly pear, running mesquite, lotebush, snake-eyes, granjeno, Trecul yucca, leatherleaf, coma, Berlandier fiddlewood, amargosa, crucillo, Mexican amyris, and Drummond goldenweed. Fairly pure stands of big sacaton are present on some lomas (Johnston 1955). Lomas adjoining wind-tidal flats or salt lakes may be fringed by bands of salt-tolerant grasses (e.g. shoregrass, Gulf cordgrass, buffalograss, plains bristlegrass, whiplash pappusgrass) or halophytic forbs (Johnston 1952, Johnston 1955, Auffenberg and Weaver 1969, Lonard and Judd 1985, Ideker 1992a, Carr 1995, Heep and Lester 1999, Weakley et al. 2000, Carr pers. comm.). Similar low brush communities occur inland on clay soils near resacas (distributaries) in the lower Rio Grande floodplain. These diverse shrublands contain coma, Texas ebony, brasil, snake-eyes, mesquite, lotebush, and many other species (Carr 1995, Best pers. comm.); the same species may also be dominant in taller brush communities with canopies of mesquite, Texas ebony, and other trees (Lonard, L. Williams pers. comm.).

Status: The majority of stands of brush in the Lower Rio Grande Valley have been cleared or altered by grazing. However, some coastal lomas are now protected in the Boca Chica/Loma Preserve, Palmito Hill, Tulosa Ranch, and Vista del Mar tracts of the Lower Rio Grande Valley refuge. Uplands of the Laguna Atascosa National Wildlife Refuge also support vegetation of this type, much of it in good condition. Preserved examples inland occur in the Arroyo Colorado, Resaca de la Palma, and McManus units of the Las Palomas WMA; Chihuahua Woods Preserve; and the Payne, Teniente, and East Lake tracts of the Lower Rio Grande Valley refuge (Carr 1995; Benn, Best and L. Williams pers. comm.).

Suggested Priority for Further Protection of Community: Fairly High

60. Saline grasslands.

Synonyms: None.

Description: A few sites within higher marginal zones around saline playas in Willacy and Hidalgo counties are dominated by native grasses including whorled dropseed, whiplash pappusgrass, curlymesquite, false Rhodesgrass, and alkali sacaton. Shoregrass, glasswort, and saltwort fringe lower margins of these salt lakes (Buckley and Dodd 1969, Poole 1985, Best pers. comm.).

Status: Examples of native pasture around salt lakes are protected in the East Lake and Teniente units of the Lower Rio Grande Valley refuge, totaling some 300 acres (Best pers. comm.). This community may result from prior disturbance, or represent a distinct grassland type or subtype.

Suggested Priority for Further Protection of Community: Fairly High

61a. Wetland brush.

Synonyms: Retamal (Clover 1937); Huisache-pricklypear mesic shrubland (McLendon 1991); Mesquite-Huisache Series (Diamond 1993); Huisache Woodland Alliance (Weakley et al. 2000).

Description: Depressions, streamcourses, resaca banks, and other disturbed wet areas throughout South Texas are characterized by thickets in which huisache, mesquite, and retama are often dominant. Other species may include seep-willow, baccharis, rattlebush, non-native and native grasses (e.g. bermudagrass, Guineagrass, silver bluestem, knotroot bristlegrass, buffalograss), Texas virgin's bower, weedy forbs (e.g. western ragweed, spiny aster, blueweed sunflower) and hydrophytes such as flatsedges, dwarf spikeseed, cattails, and bulrushes (Johnston 1952, Butterwick and Strong 1976b, Farrald and Lonard 1984, Vora 1990, McLendon 1991, Pollock et al. 1994, TPWD 1990h). Black mimosa and amantillo are common in wetlands of the Lower Rio Grande Valley. Banks and levees in the Lower Rio Grande Valley support black willow, hairy panicum, common reed, giant reed, black mimosa, and various forbs and graminoids, as well as brush species of adjacent communities (Davis 1942, Carr 1999a).

Status: Most wetlands are dominated by early-successional species, but Santa Ana and Lower Rio Grande Valley (e.g. La Coma Tract) National Wildlife Refuges contain some less disturbed examples (Carr 1995, Best 2000).

Suggested Priority for Further Protection of Community: Fairly Low

61b. Depressional wetlands (potholes).

Synonyms: Coastal Brushland Potholes (USFWS 1983).

Description: Depressions formed by wind erosion occur in blowouts of the Coastal Sand Sheet and hold fresh water. Vegetation is similar to potholes of the central coast, with giant bulrush, Olney bulrush, spikesedges, flatsedges, white-topped sedge, longtom and other grasses, with arrowheads, burheads, water-lilies, and wigeon-grass in open water (Everitt and Gonzalez 1979, USFWS 1986, Moulton and Jacob 2000). Margins of these potholes may support saltgrass, green sprangletop, spike dropseed, knotroot bristlegrass, Bermudagrass and other native and non-native grasses (Scifres and Mutz 1975). Pothole wetlands also occur in depressions over high water tables on clay soils in the Lower Rio Grande Valley and contain brush vegetation similar to that of ephemeral resacas, with black mimosa, bulrushes, cattails, huisache, and retama (USFWS 1987). Saline soils in depressions in the Lower Rio Grande Valley and near the Gulf coast may support scattered, stunted mesquite, screwbean, and Texas prickly pear (probably on previously disturbed sites) or wetland assemblages of running mesquite, Berlandier wolfberry, Gulf cordgrass, shoregrass, seepweeds, and other halophytes (Best, Patterson, L. Williams pers. comm.).

Status: Pothole wetlands are numerous and widespread, though often somewhat altered in composition as a result of grazing. Many examples occur on large private holdings such as the King and Kenedy ranches. Potholes in the Lower Rio Grande Valley have decreased significantly in extent since 1955 due to drainage and conversion to cropland (USFWS 1986).

Suggested Priority for Further Protection of Community: Medium

62. Coastal saline grasslands.

Synonyms: Sacahuistal (Clover 1937); Big Sacaton Series; Gulf Cordgrass Series, in part (Diamond 1993); Big Alkali Sacaton Semipermanently Flooded Herbaceous Alliance; Gulf Cordgrass Saturated Herbaceous Alliance, in part (Weakley et al. 2000).

Description: Gulf cordgrass dominates large areas of saline prairie along the lower Gulf coast and in the Rio Grande delta, usually intermingled with clay dunes and saline flats. This community is an extension of the Gulf cordgrass prairies found on the upper and central coast. Other common species include saltgrass, Berlandier wolfberry, seashore paspalum, silver bluestem, and brush species (Johnston 1952, USFWS 1987). Gulf cordgrass also grows along river margins and saline washes inland in south Texas (Johnston 1963, Carr 1992).

Status: This vegetation type is represented by 14,000 acres in the Laguna Atascosa National Wildlife Refuge and comparable amounts of acreage in the Boca Chica and Bahia Grande refuge units (Johnston 1952, USFWS 1987).

Suggested Priority for Further Protection of Community: Low

63a. Texas ebony floodplain forests.

Synonyms: Mid-Delta Thorn Forest (USFWS 1983); Texas Ebony-Anacua Series (Diamond 1993); Texas Ebony Forest Alliance (Weakley et al. 2000).

Description: A unique forest type occurs on occasionally flooded, fine-textured soils on natural levees near resacas and river channels in the Lower Rio Grande Valley (Hidalgo and Cameron counties). Taller species may include Texas ebony, anacua, tepeguaje, coma, tenaza, mesquite, and sugarberry, with abundant Spanish mosses. The diverse, often very dense midstory may include snake-eyes, lotebush, brasil, granjeno, colima, Barbados-cherry, chapotillo, crucillo, tropical heartseed, snailseed, pigeonberry, serjania vine, and a sparse ground layer (TPWD 1990h; Ideker 1988a, 1988b, 1988c, and 1992b; Heep and Lester 1999; Weakley et al. 2000).

Status: Most alluvial bottomlands along the lower Rio Grande have been cleared and cultivated. Consequently, this is one of the rarest types of vegetation in Texas. Approximately 300 acres is protected, with the best examples in the Gabrielson, Madero, Ranchito, Resaca de la Palma, and Vela Woods tracts of the Lower Rio Grande Valley National Wildlife Refuge, the Santa Ana National Wildlife Refuge, and the Voshell, Resaca de la Palma, and MacWhorter units of Las Palomas WMA (Vora 1990; Benn, Best pers. comm.).

Suggested Priority for Further Protection of Community: High

63b. Texas palmetto floodplain forests.

Synonyms: Texas Palmetto Series (Diamond 1993); Texas Ebony Forest Alliance, in part (Weakley et al. 2000).

Description: Texas palmetto was once a dominant species on floodplain ridges in the lower delta of the Rio Grande, which was originally named the Rio de las Palmas by Spanish colonists. Other species at the few remaining sites of palmetto forest include sugarberry, tepeguaje (which may be the dominant species in some stands), Texas ebony, anacua, tenaza, colima, snake-eyes, lotebush, mesquite, granjeno, and sugarberry. A number of species are present that do not occur in the United States outside the Lower Rio Grande Valley, such as David's milkberry (Davis 1942, Lonard and Judd 1985, Carr 1999a, Smith pers. comm.).

Status: Virtually all stands of palm forest were cleared for cultivation early in the twentieth century. Remnants are too few to allow confident characterization of this community type. Periodic flooding of the Rio Grande, now largely prevented by upstream channelization and diversion, may have been an important influence on vegetation. The only pure remnants left are protected at the National Audubon Society's Sabal Palm Grove Sanctuary (32 acres) and the Nature Conservancy's Southmost Ranch (about 50-70 acres).

Suggested Priority for Further Protection of Community: High

64. Sugarberry-elm floodplain forests (South Texas Plains).

Synonyms: Pecan-Elm Forest, in part (McMahan et al. 1984); Sugarberry-Elm Series, Pecan-Sugarberry Series (Diamond 1993); Plateau Oak-Sugarberry Woodland Alliance; Sugarberry-Cedar Elm Temporarily Flooded Forest Alliance, in part; Pecan-(Sugarberry) Temporarily Flooded Forest Alliance, in part (Weakley et al. 2000).

Description: Bottomlands in northern South Texas (e.g. the Frio and Nueces rivers) are dominated by hackberries, live oak, cedar elm, huisache, pecan, Mexican ash, boxelder, mesquite, western soapberry and granjeno, with black willow and eastern cottonwood along banks. Peppervine, grapes, creek oats, Virginia wildrye, Texas wintergrass, bristlegasses, and pigeonberry are common (Bush and van Auken 1984, Wood and Wood 1988, Van Auken and Bush 1988).

Status: Though mature examples are not protected in conservation areas in South Texas, these communities are similar to deciduous floodplains in other regions.

Suggested Priority for Further Protection of Community: Medium

65. Sugarberry-elm floodplain forests (Lower Rio Grande Valley).

Synonyms: Mid-valley Riparian Woodland (USFWS 1983); Hackberry-huisache woodland (McLendon 1991); Sugarberry-Elm Series, in part (Diamond 1993); Sugarberry-Cedar Elm Temporarily Flooded Forest Alliance, in part; Black Willow Temporarily Flooded Forest Alliance, in part (Weakley et al. 2000).

Description: Floodplain terraces of the lower Rio Grande support riparian forests in which sugarberry, cedar elm, and Mexican ash are dominant species. The understory contains species that are uncommon or absent north of the Lower Rio Grande Valley, including tepeguaje, anacua, and Barbados-cherry, as well as granjeno, brasil, Texas persimmon, coma, snailseed, serjania vine, pigeonberry, Texas virgin's bower, violet ruellia, and other forbs and vines common in bottomlands to the north (Havard 1885, Butterwick and Strong 1976b, Vora 1990, TPWD 1990h, Ideker 1992a). This vegetation may extend away from the

river along drainages (ramaderos), and grades into woodlands or shrub savannas.

Status: Though dominant, sugarberry and cedar elm may be declining as flood control and diversion have largely eliminated natural floods. Roughly 2,500 acres are protected in the Santa Ana National Wildlife Refuge and the Gabrielson, Madero, Zamora Bend, Havana, La Coma, and other units of the Lower Rio Grande Valley refuge (Carr 1995, Best pers. comm.). The remnant floodplain forest near Salineno below Falcon Dam, in private ownership, is one of the most significant unprotected habitat areas in South Texas (USFWS 1983).

Suggested Priority for Further Protection of Community: Fairly High

Table 7. Conservation areas in the South Texas Plains and Lower Rio Grande Valley, with types of vegetation occurring within each area.

Conservation Area	Vegetation Types Occurring in Area	Acreage of Area	Source
Bentsen Rio Grande Valley State Park (TPWD)	53b,61a,63a,65	588	TPWD 1990h
Boca Chica State WMA (TPWD) and South Bay State Coastal Preserve (GLO/TPWD)	43,44,46 (<1%),47,48,59,62	1,161 (TPWD); 3,430 (GLO)	TPWD 1996
Chaparral State WMA (TPWD)	53a (87%),55 and 57 (11%)	15,200	TPWD 1996
Chihuahua Woods Preserve and Loma Verde tracts (TNC)	53b and 59,55 (<1%), 61b	300	L. Williams, pers. comm.
Choke Canyon State Park and James Daughtrey State WMA (USBR/TPWD)	53a (55%),55 (33%),61a,64	6,190	TPWD 1996
Falcon State Park (TPWD)	53a (30%),55 (45%)	573	TPWD 1996
Laguna Atascosa National Wildlife Refuge (USFWS, 2 tracts)	39,42b,43,44,48,49,53a,59 (18%),61a,61b,62 (30%)	65,137	USFWS 1987
Lake Casa Blanca State Park (TPWD)	53a (20%),55 (30%)	525	TPWD 1996
Lake Corpus Christi State Park (TPWD)	53a (40%),55 (30%)	350	TPWD 1996
Las Palomas State WMA (TPWD, 23 tracts)	53a (7%),53b (7%),59 (14%),61a (3%),61b (<1%),63a (8%),65 (2%)	4,262	TPWD 1996, Benn pers. comm.
Lower Rio Grande Valley National Wildlife Refuge (USFWS, 96 tracts)	43 (5%),44 (<1%),46 (<1%), 47 (<1%),48 (10%),52 (<1%), 53a (4%),53b (3%),54 (5%), 55 (3%),56,58 (<1%),59 (2%),60(1%), 61a (<1%), 61b (2-3%?),62 (7%), 63a (<1%),65 (1%)	76,257	Best pers. comm.
Mesquite Brushland Preserve (TNC)	53a,55	683	L. Williams pers. comm.
Palo Alto Battlefield National Historic Site (NPS)	43,53a,53b,62	456	National Park Service 1997b
Sabal Palm Grove Sanctuary (National Audubon Society)	61a,63b (8%),65	525	Smith pers. comm.
San Antonio Missions National Historical Park (NPS)	64	819	

Santa Ana National Wildlife Refuge (USFWS)	53a,53b (45%),61a (7%),61b (4%),63a (4%),65 (30%)	2,087	Best 2000
Southmost Ranch Preserve (TNC)	61a,63b (9%)	1,370	Smith pers. comm.
Total: 179,913 acres (.91 percent of region)			
Abbreviations of Managing Entities: TPWD=Texas Parks and Wildlife Dept. USFWS=U.S. Fish and Wildlife Service TNC=Nature Conservancy of Texas NPS=National Park Service USBR=U.S. Bureau of Reclamation			