3.4 Vegetation

The principal issues associated with vegetation resources include: 1) disturbance and removal of native vegetation, particularly with respect to the long-term loss of tree species of the Pineywoods region; 2) loss of wetland/riparian vegetation due to direct disturbance and potential water level changes; and 3) successful reclamation of disturbance areas to achieve post-mining land uses and to inhibit the establishment of invasive plant species.

The study area for direct and indirect impacts to vegetation (including special status plant species) includes the area within the proposed permit boundary and the projected mine-related 5-foot groundwater drawdown area of the Carrizo-Wilcox aquifer system, plus segments of the Sabine River, Cherokee Bayou, Black Slough, and Watt Creek (inclusive of their tributaries), extending downstream approximately 5 miles from the points of proposed mine water discharge. A distance of 5 miles was selected based on the proposed in-channel work for the dragline walkway and main haul road crossings of the Sabine River, and the potential for mine-related effects to riparian species along the waterbodies in the study area. The vegetation (including special status plant species) cumulative effects study area includes the area within the proposed permit boundary and the projected mine-related cumulative 5-foot groundwater drawdown area of the Carrizo-Wilcox aquifer system; areas of surface disturbance associated with past, present, and reasonably foreseeable future actions (see Section 2.7); and segments of the Sabine River, Cherokee Bayou, Black Slough, and Watt Creek (inclusive of their tributaries), extending downstream approximately 5 miles from the points of proposed mine water discharge. A distance of 5 miles was selected based on the proposed in-channel work for the dragline walkway and main haul road crossings of the Sabine River, and the potential for cumulative effects to riparian species along the waterbodies in the study area.

3.4.1 Affected Environment

The Rusk Permit Area is located within the USEPA-designated South Central Plains ecoregion and includes the Tertiary Uplands and the Floodplains and Low Terraces subregions (Griffith et al. 2004). The vegetational area is described as Pineywoods (McMahan et al. 1984) and is characterized by irregular plains that once were covered by pine and hardwood forests. Soils are mostly acidic sands and sandy loams. Topography of the region is characterized as gently rolling to near flat, with elevations ranging from approximately 100 to 1,000 feet amsl (Texas Forest Service 2008). Native vegetation types of this region include willow oak-water oak-blackgum forests, loblolly pine-sweetgum forests, and shortleaf pine-post oak-southern red oak forests (McMahan et al. 1984). The region is now predominantly in loblolly and shortleaf pine managed forests and native or introduced grasslands resulting from the clearing of woody vegetation (Griffith et al. 2004; McMahan et al. 1984). Lumber, pulpwood, oil, and gas production are major economic activities (Griffith et al. 2004).

Vegetation nomenclature presented in this section follows the *Checklist of the Vascular Plants of Texas* (Hatch et al. 1990). The dominant vegetation type is a mixed pine and hardwood forest in upland areas and mixed hardwood forest in lowland areas (Hatch et al. 1990). Common native tree species in upland areas include loblolly pine (*Pinus taeda*), sweetgum (*Liquidambar styraciflua*), shortleaf pine (*Pinus echinata*), post oak (*Quercus stellata*), southern red oak (*Quercus falcata*), water oak (*Quercus nigra*), white oak (*Quercus alba*), and winged elm (*Ulmus alata*). Dominate tree species in floodplain areas include willow oak (*Quercus phellos*), water oak, blackgum (*Nyssa sylvatica*), American elm (*Ulmus americana*), overcup oak (*Quercus lyrata*), American beech (*Fagus grandifolia*), and American sycamore (*Platanus occidentalis*). Common shrub and herbaceous understory species include yaupon (*Ilex vomitoria*), wax myrtle (*Myrica cerifera*), American beautyberry (*Callicarpa americana*), Alabama supplejack (*Berchemia scandens*), trumpet creeper (*Campsis radicans*), greenbriars (*Smilax* spp.), blackberry (*Rubus louisianus*), switchgrass (*Panicum virgatum*), and southern arrowwood (*Viburnum dentatum*) (McMahan et al. 1984).

Vegetation types present within the Rusk Permit Area (see **Figure 3.4-1**), as well as the surrounding study and cumulative effects study areas, can be categorized into distinct vegetation types that include floodplain forest, upland forest, pine plantation, clear cut, improved pasture, pasture, residential, disturbed,

and aquatic (ponds). Vegetation types were identified based on review of aerial photographs and field surveys conducted between June 2007 and October 2008 (Sabine 2009a). The TPWD has identified two reaches of the Sabine River in proximity to the proposed Rusk Permit Area as "ecologically significant stream segments" (also see Section 3.2.4, Surface Water). These reaches include one segment that extends from U.S. Highway 59 westward to the northwest corner of the Harrison/Rusk County line. A second segment is located downstream of the proposed Rusk Permit Area and extends from the headwaters of Toledo Bend Reservoir in Panola County northwesterly to the Panola/Rusk County line (TPWD 2008). These reaches are noted for their "diverse riparian assemblage, hardwood forest and wetlands, significant natural areas; priority bottomland hardwood habitats displaying significant overall habitat value; exceptional aesthetic value; and presence of the state listed threatened Paddlefish (*Polyodon spathula*)" (TPWD 2008).

3.4.1.1 Vegetation Types

Forest habitats in the study area include four vegetation community types: floodplain forest, upland forest, pine plantation, and clearcut. These four communities represent the timber management cycle that is practiced in the study area. While some select cutting may occur occasionally, there was no evidence of old growth trees in the inventoried communities. Grassland habitats include improved pasture and pasture vegetative community types and consist of grazed, ungrazed, and old field pastures. Additionally, aquatic and wetland vegetation types were identified within the study area. Residential developments and other disturbed lands where vegetation has been removed comprise approximately 216 acres (1 percent) of the study area (see **Figure 3.4-1**) (Sabine 2009a).

<u>Floodplain Forest</u>

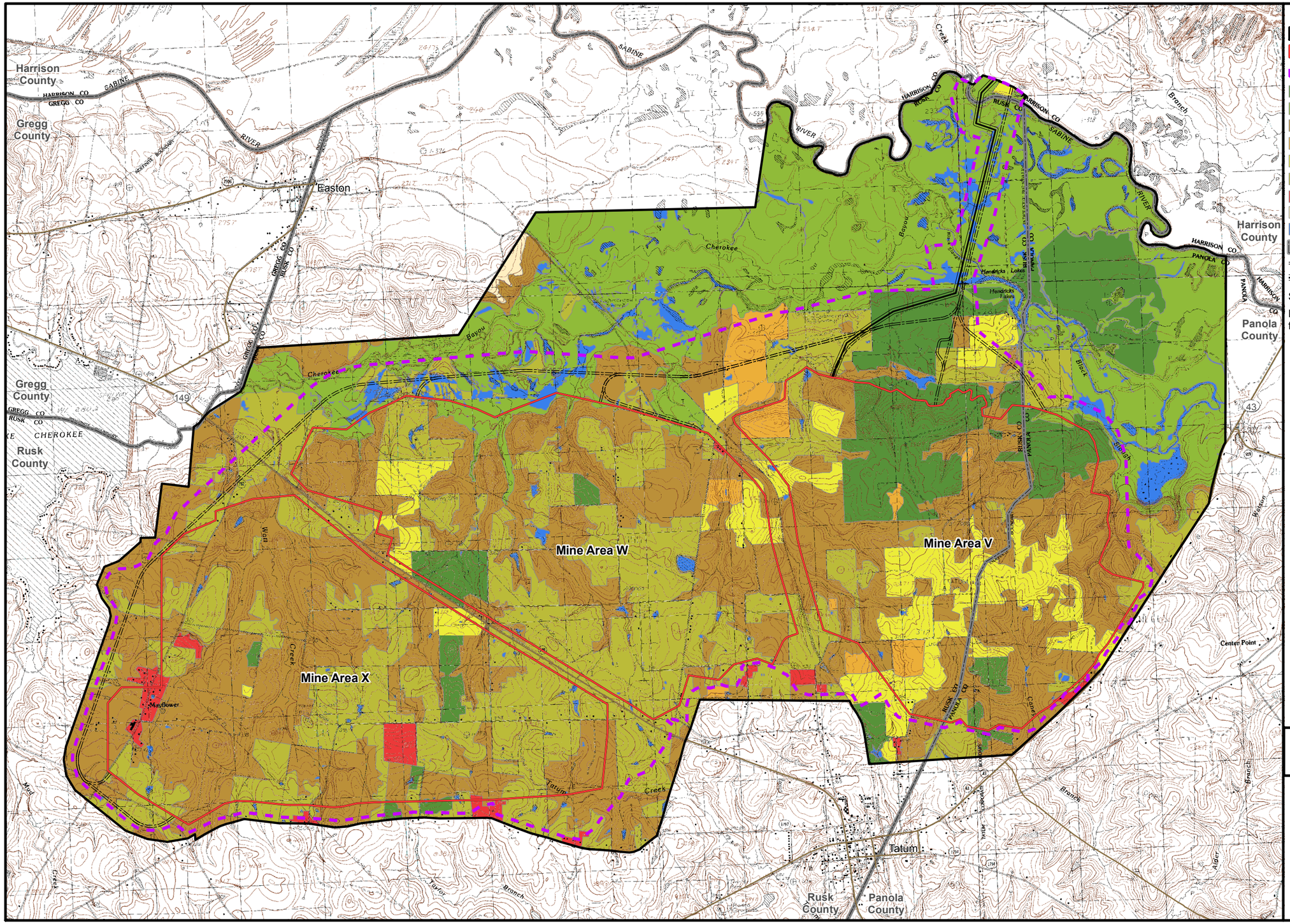
Approximately, 4,505 acres (22 percent) of the Rusk Permit Area are occupied by floodplain forests, which are almost exclusively deciduous woodlands. Floodplain forests were distinguished from upland forests based on topography, with their occurrence designated primarily by topographic position within the floodplains of the Sabine River and Cherokee Bayou. Stands that experience frequent flooding tend to be more open, while other stands contain well developed understories composed of shrub/sapling and herbaceous species.

The dominant tree species include water oak, sweetgum, and willow oak. Other commonly found tree species in the forest overstory include white oak, American elm, and southern red oak. Species such as American hornbeam (*Carpinus caroliniana*), boxelder (*Acer negundo*), red maple (*Acer rubrum*), and common persimmon (*Diospyros virginiana*), which typically occur in the sub-canopy of a mature forest, are found in the overstory within the study area. This suggests that clear cutting of timber occurs at relatively short duration intervals, not allowing forest maturation.

Understory species include sweetgum, winged elm, willow oak, American hornbeam, water oak, farkleberry (*Vaccinium arboreum*), giant cane (*Arundinaria gigantea*), and swamp privet (*Forestiera acuminata*). Vines are an important component of the understory and greenbriars, grapes (*Vitis* spp.), southern dewberry (*Rubus trivialis*), poison ivy (*Toxicodendron radicans*), and Alabama supplejack are the prominent species in the floodplain forests. Most of the understory species in the study area are seedlings of the woody species found in the forest layers above, with a minimal number of grass, sedge, and other forb species (Sabine 2009a).

<u>Upland Forest</u>

Upland forest vegetation comprises approximately 6,880 acres (34 percent) of the Rusk Permit Area, consists of a mixed hardwood/pine community, and occupies the rolling hills above the floodplain forests. This forest type is frequently disrupted by extensions of tributaries that occasionally exhibit small floodplains along their course allowing floodplain forests to invade the upland communities. Similar to the floodplain forests, the upland forests present in the study area are primarily even-aged stands.



Legend

- Proposed Rusk Permit Area Boundary
- Proposed Mine Areas
- Proposed Life-of-mine Disturbance Boundary
- Pine Plantation
- Floodplain Forest
- Upland Forest
- Clearcut
- Pasture - Improved
- Pasture - Mixed
- Residential
- Disturbed Site
- Aquatic
- County Boundary
- Main Haul Roads
- Dragline Walkway

Source: Sabine 2009a,b, 2010c.

Note: See **Figure 3.2-14** for wetland vegetation locations.

N

0 0.5 1 Miles

Rusk Permit Area EIS

Figure 3.4-1

Vegetation Types in Rusk Permit Area

07/22/10

The dominant tree species include sweetgum, southern red oak, post oak, and loblolly pine, while winged elm and red maple also are commonly found. Understory species include devil's walking stick (*Aralia spinosa*), sweetgum, winged elm, wax myrtle, sassafras (*Sassafras albidum*), yaupon, American beautyberry, *Viburnum* spp., and farkleberry. Vines are an important component of the upland forest community with greenbriers, Virginia creeper (P*arthenocissus quinquefolia*), grapes, and southern dewberry being dominant vine species (Sabine 2009a).

Pine Plantation

The pine plantation vegetative type covers approximately 1,776 acres (9 percent) of the Rusk Permit Area and includes both planted plantations and natural re-growth, where densities indicate some management toward pine selection. The majority of pine plantations occur in the eastern half of the study area; however, smaller areas of pine plantations occur throughout. The most common pine species in the study area is loblolly pine; however, shortleaf pine and slash pine (*Pinus elliottii*) also are present (Sabine 2009a).

Clear Cut Areas

Clear cut areas comprise approximately 322 acres (2 percent) of the Rusk Permit Area. Numerous clear cutting operations are evident in the study area and many were observed during field surveys. Clear cut areas are not necessarily associated with pine plantation areas; however, these operations support the field observations of even-aged stands and lack of old growth trees in the study area. Clear cut areas that appeared to be returning to woodlands were considered as wooded. The study area currently is under various types of timber management, varying from natural regeneration after clear cutting to intensive management of pine plantations. More uncommon in the study area are clear cut areas under conversion to pasture (Sabine 2009a).

Improved Pasture

Approximately 1,140 acres (6 percent) in the Rusk Permit Area are classified as improved pasture. During field studies, these improved units generally contained greater than 95 percent bahiagrass (*Paspalum notatum*), while some units contained coastal bermudagrass (*Cynodon dactylon*), and they maintained a high rate of production (Sabine 2009a). Highly managed improved pastures generally occurred with the larger livestock operations, and high forage production was maintained through fertilization and rotational grazing. While some highly managed coastal bermudagrass improved pastures were cut for hay and grazed, most were managed strictly for hay production during the time period of the field studies (Sabine 2009a).

Pasture

The pasture vegetative type covers approximately 4,763 acres (23 percent) of the Rusk Permit Area. Bahiagrass-dominated pastures are the mainstay for livestock production in the study area. Smaller livestock operations, that are not included in the improved pasture category above, tended to over utilize available forage, either through overgrazing or lack of proper fertilization. During field studies, these pastures generally had a slightly higher occurrence of weedy forbs, invasive grasses, and litter, compared to the improved pastures (Sabine 2009a). This category also includes pastures that appear to have been removed from cattle production but are periodically mowed (not hayed), old field pastures (previously grazed and/or hayed pastures that have reverted to a more natural state), and clear cut areas that appear to be under conversion to pasture. Common species found in pastures include bahiagrass, coastal or common bermudagrass, smutgrass (*Sporobolus indicus*), *Panicum* spp., southern dewberry, goldenrod (*Solidago canadensis*), Pennsylvania smartweed (*Polygonum pensylvanicum*), fiddle dock (*Rumex pulcher*), yellow woodsorrel (*Oxalis stricta*), and white clover (*Trifolium repens*) (Sabine 2009a).

Aquatic and Wetland

The aquatic land cover type covers approximately 257 acres (1 percent) of the Rusk Permit Area. Aquatic vegetation within the Rusk Permit Area occurs in association with water-covered lands, such as ponds, open-water areas created by impoundment of streams for livestock and/or recreational use, and natural

features, including oxbow lakes found in the Sabine River floodplain. Common plant species found in aquatic habitats within the Rusk Permit Area include duckweed (*Lemna* sp.), filamentous algae (*Spirogyra* sp.), smartweed (*Polygonum* sp.), bulrush (*Scirpus* sp.), coontail (*Ceratophyllum* sp.), cow lilies (*Nuphar* sp.), and water elm (*Planera* sp.) (Sabine 2009a).

Wetland vegetation in the study area consists of both forested and nonforested wetlands. Disturbance of wetland areas that are waters of the U.S. is regulated under the CWA (see Section 3.2.5, Waters of the U.S. Including Wetlands).

Nonforested wetlands in the Rusk Permit Area cover approximately 128 acres (1 percent) and primarily are located in backswamps, sloughs, and depressions within the floodplains of the Sabine River and Cherokee Bayou and their tributaries, as well as on the lower slopes bordering floodplains within sandy uplands. Nonforested wetlands include wetlands classified as scrub-shrub and emergent. Representative species of nonforested wetlands include red maple, black willow (*Salix nigra*), common hazel (*Alnus serrulata*), *Carex* spp., common rush (*Juncus effuses*), common reed (*Phragmites australis*), woolgrass (*Scirpus cyperinus*), and sugarcane (*Erianthus giganteus*).

Forested wetlands in the Rusk Permit Area cover approximately 390 acres (2 percent) and primarily occur in sloughs and depressions within the floodplains of the Sabine River and Cherokee Bayou and their tributaries. Some forested wetlands occur on the lower slopes bordering floodplains within sandy uplands. Representative species of forested wetlands include baldcypress (*Taxodium distichum*), water hickory (*Carya aquatica*), water oak, willow oak, red maple, overcup oak, sweetgum, red ash (*Fraxinus pennsylvanica*), common hazel, buttonbush (*Cephalanthus occidentalis*), common lizardtail (*Saururus cernuus*), and arrowhead (*Saggittaria latifolia*).

3.4.1.2 Vegetation Attributes

Commercially Important Plant Species

Several commercially important plant species occur within the study area. Pine species, such as loblolly, shortleaf, and slash pine, are managed within pine plantations. These pine species also may be removed from upland forest areas through selective timbering. Bahiagrass and common or coastal bermudagrass are the most important forage species specifically planted in managed grasslands for hay production or cattle grazing (Sabine 2009a).

Important Plant Species for Wildlife

Several plant species that occur in the study area provide valuable cover and forage for wildlife. These species include various oaks, yaupon, water hickory, black willow, winged elm, sweetgum, American elm, American beautyberry, farkleberry, grapes, greenbriars, southern dewberry, common persimmon, trumpet creeper, and several grasses and sedges (Sabine 2009a).

3.4.1.3 Special Status Species and Species of Special Concern

Special status species are those that are listed as federally threatened or endangered, or have been proposed or are considered as candidates for listing by the USFWS, and those species that are state listed as threatened or endangered by the TPWD. Federally listed and proposed species and federally designated areas of critical habitat receive protection under the ESA (Federal Register 1973). State listed plant species are protected under Chapter 88 of the Texas Parks and Wildlife Code and Sections 69.01-69.14 of Title 31 of the TAC.

Under the ESA, the USACE, as lead federal agency for the proposed project, must determine if the proposed activities may affect a federally listed species or species proposed for federal listing. If such a determination is made, the USACE is required under Section 7 of the ESA to consult with the USFWS regarding the scope and magnitude of the effects. A Biological Assessment (BA) is required under 7(c) of the ESA, if a federally listed species or critical habitat may be present in the action area.

Species of special concern collectively refers to non-listed species that the USFWS and/or TPWD consider to be rare or vulnerable. The USFWS' designation for these species is "species of concern," and the TPWD's designation is "rare." Species of concern are defined by the USFWS as species for which there is some information showing evidence of vulnerability but not enough data to support listing at this time. These species are not specifically afforded the same protection under the ESA as threatened or endangered species; however, federal agencies are required to consider them in the agency's planning and decision-making processes. The TPWD "rare" designation is based on a species' global conservation status rank; these species do not have regulatory listing status.

The study and cumulative effects study areas includes portions of Rusk, Panola, and Harrison counties. One federally threatened plant species (*Geocarpon minimum*) has been identified by the USFWS as potentially occurring within Harrison and Panola counties (USFWS 2009a). No state listed threatened or endangered plant species have been identified as potentially occurring within the study or cumulative effects study areas. Two state designated rare species (Neches river rose-mallow and Texas trillium) have been identified by the TPWD as potentially occurring within the study and cumulative effects study areas (TPWD 2009c). Occurrence potential within the study and cumulative effects study areas for each species is presented below.

Earth Fruit (*Geocarpon minimum*)

The earth fruit is federally listed as threatened in Texas and is considered by the USFWS as potentially occurring in Harrison and Panola counties. In Texas, this species is associated with slick spots within saline soil prairies (USFWS 1993). In saline soil prairies, woody vegetation is sparse and limited to low mounds producing a savannah-like community structure. The slick spots form in areas where the natric horizon, which is a soil horizon containing elevated sodium levels, is close to the soil surface. The natric horizon lowers soil water capacity by increasing run-off and lowering permeability to water and gases, which results in poor aeration, little organic matter, and root toxicity. These factors suppress vascular plant growth (USFWS 1993). All of the known populations of this species in Texas occur within the Bonn-Cart complex soil series (Texas Natural Diversity Database [TXNDD] 2009), and the known populations in Arkansas and Louisiana occur within the Carytown, Grubbs, Bonn, Brimstone, Foley, Wing, and Lafe soil series (USFWS 1993). This species was not observed in the study area during general vegetation field surveys conducted between June 2007 and October 2008 (Sabine 2009a). Additionally, none of the soil series associated with known populations in Texas, Louisiana, or Arkansas occur in the Rusk Permit Area. Based on known locations of this species (USFWS 2009c), the nearest known occurrence in Panola County is approximately 10 miles east of the study area, and the nearest known occurrence in Harrison County is approximately 25 miles northeast of the study area. Based on the species' habitat requirements and known distribution, *Geocarpon minimum* has been eliminated from further analysis.

Neches River Rose-mallow (*Hibiscus dasycalyx*)

The Neches River rose-mallow is listed as a rare species by TPWD and is considered by TPWD as potentially occurring in Harrison County. This species also is listed as a federal candidate species by the USFWS; however, the USFWS does not include Harrison County or any other portion of the study area (i.e., portions in Rusk and Panola counties) in the potential distribution for this species. Populations of this species are known to occur in Cherokee, Houston, and Trinity counties (USFWS 2008). The Neches River rose-mallow occurs in marshy areas that are exposed to open sun and generally is found within the immediate floodplain of a permanent stream or river. Areas supporting this species normally hold standing water early in the growing season, and water levels decrease and finally dry out very late in the growing season (USFWS 2008). This species was not observed within the study area during general vegetation field surveys conducted between June 2007 and October 2008 (Sabine 2009a). The TXNDD reports an occurrence of this species, which was last confirmed in 1985, near the northern boundary of the permit area. However, the exact location of this occurrence is unknown; therefore, it is not clear whether or not the occurrence was within the proposed Rusk Permit Area. Based on the known distribution and habitat association of this species, the Neches River rose-mallow potentially could occur in suitable habitat within the study area and in the larger cumulative effects study area.

Texas Trillium (*Trillium texanum*)

The Texas trillium is listed as a rare species by TPWD and is considered by TPWD as potentially occurring in Harrison, Panola, and Rusk counties. This species occurs in low, boggy hardwood bottoms, stream-banks, or sphagnum bogs. Its known distribution is limited to approximately 11 populations in eastern Texas and northwestern Louisiana (NatureServe 2009). This species was not observed within the study area during general vegetation field surveys conducted between June 2007 and October 2008 (Sabine 2009a). The nearest known occurrence in Harrison County is approximately 4 miles north of the Rusk Permit Area, the nearest occurrence in Rusk County is approximately 11 miles southwest of the Rusk Permit Area, and the location of the occurrence in Panola County is unknown as it is based on an old record. Based on the known distribution and habitat association of this species, the Texas trillium potentially could occur in suitable habitat within the study area and in the larger cumulative effects study area.

3.4.1.4 Weeds and Invasive Species

Populations of invasive plant species may occur in the proposed Rusk Permit Area; field surveys have not been conducted to determine the locations and areal extent of any potentially existing populations. The Texas Department of Agriculture has prohibitions and restrictions on the use of noxious weed seeds. Information regarding prohibited (species not allowed in seed mix) and restricted (species inclusion in seed mix is limited) noxious weed seeds is provided in Rule 9.9 (Noxious Weed Seed) of the TAC, Title 4, Part 1, Chapter 9, Subchapter E (TAC 1996). Prohibited and restricted noxious weed seeds are listed in **Table 3.4-1**.

Table 3.4-1 Texas Prohibited and Restricted Noxious Weed Seeds

Common Name	Scientific Name	Prohibited or Restricted	Limitation per Pound
Goatgrass	*Aegilops* spp.	Restricted	20
Corncockle	*Agrostemma githage*	Restricted	300
Wild onion/wild garlic	*Allium* spp.	Restricted	100
Wild oat	*Avena fatua*	Restricted	300
Feral oat	*Avena* spp.	Restricted	300
Wild mustards	*Brassica* spp.	Restricted	300
Chessgrass	*Bromus commutatus*	Restricted	300
Cheatgrass	*Bromus secalinus*	Restricted	300
Hedge bindweed	*Calystegia sepium*	Prohibited	Prohibited
Balloonvine	*Cardiosperma halicacabum*	Prohibited	Prohibited
Russian knapweed	*Centaurea repens*	Restricted	100
Canada thistle	*Cirsium arvense*	Restricted	100
Blessed thistle	*Cnicus benedictus*	Restricted	100
Field bindweed	*Convolvulus arvensis*	Prohibited	Prohibited
Dodder	*Cuscuta* spp.	Restricted	100
Bermudagrass	*Cynodon dactylon*	Restricted	See footnote
Nutsedge	*Cyperus rotundus* and *Cyperus esculentus*	Prohibited	Prohibited

Table 3.4-1 Texas Prohibited and Restricted Noxious Weed Seeds

Common Name	Scientific Name	Prohibited or Restricted	Limitation per Pound
Nutsedge tubers	*Cyperus* spp.	Prohibited	Prohibited
Wild carrot	*Daucus carota*	Restricted	300
Quackgrass	*Elytriga repens*	Restricted	100
Blueweed	*Helianthus ciliaris*	Restricted	100
Morning glory	*Ipomoea* spp.	Restricted	See footnote
Persian ryegrass	*Lolium persicum*	Restricted	300
Darnel ryegrass	*Lolium temuleutum*	Restricted	300
Serrated tussock	*Nassella trichotoma*	Prohibited	Prohibited
Red rice	*Oryza sativa*	Restricted	1
Passion flower	*Passiflora incarnata*	Restricted	See footnote
Bracted plaintain	*Plantago aristata*	Restricted	300
Buckhorn plaintain	*Plantago lanceolata*	Restricted	300
Annual bluegrass	*Poa annua*	Restricted	See footnote
Wild radish	*Raphanus raphanistrum*	Restricted	100
Common giant mustard	*Rapistrum rugosum*	Restricted	300
Castor	*Ricinus communis*	Prohibited	Prohibited
Itchgrass	*Rottboellia cochinchinensis*	Prohibited	Prohibited
Dock and sorrel	*Rumex* spp.	Restricted	300
Giant foxtail	*Setaria faberi*	Restricted	100
Blessed milk thistle	*Silybum marianum*	Restricted	20
Wild turnips	*Sinapis* spp.	Restricted	300
Horsenettle	*Solanum carolinensis*	Restricted	300
Purple nightshade	*Solanum elaeagnifolium*	Restricted	300
Tropical soda apple	*Solanum viarum*	Prohibited	Prohibited
Johnsongrass	*Sorghum halpense*	Restricted	See footnote
Puncturevine	*Tribulus terristris*	Restricted	300
Cocklebur	*Xanthium* spp.	Prohibited	Prohibited

[1] Seeds are considered noxious weed seed only when present in lawn and turf seed such as perennial ryegrass, turf type tall fescue, chewings fescue, rough bluegrass, turf type annual ryegrass, or a mixture containing these grasses.

3.4.2 Environmental Consequences

3.4.2.1 Proposed Action

General Vegetation

Surface Disturbance

Under the Proposed Action, a total of 13,626 acres of vegetation would be directly affected as a result of proposed surface disturbance within the mine areas, transportation and utility corridor, and ancillary support facilities areas. An additional 766 acres may be used during operations for temporary non-coal facilities, such as temporary stockpiles for oxidized overburden, if needed. As discussed in Section 2.5, Proposed Action, vegetation would be removed incrementally in advance of mine development over the 30-year life of the mine. **Table 3.4-2** identifies the acreages of specific vegetation types that would be disturbed or removed as a result of the Proposed Action. As shown, the majority (approximately 73 percent) of the disturbance would occur in upland forest and pasture areas.

Table 3.4-2 Acreages of Affected Vegetation

Vegetation Type[1]	Disturbance Acreage[2]
Floodplain Forest	841
Upland Forest	6,235
Pine Plantation	1,281
Clear Cut Areas	297
Improved Pasture	1,064
Pasture	4,236
Residential/Disturbed	148
Aquatic[3]	76
Forested Wetlands	151
Non-forested Wetlands	63
Total	**14,392**

[1] These categories include acreages for the proposed disturbance footprints associated with the proposed mine areas, ancillary facilities, transportation/utility corridor, plus 766 additional acres that may be used during operations for temporary non-coal facilities, if needed.

[2] Acreages of vegetation types within proposed disturbance area as shown in **Figures 3.4-1** and **3.2-14**.

[3] The aquatic acreage includes ponds, perennial streams, and intermittent streams.

Short-term (limited to the life of the mine and reclamation) and long-term (extending beyond the life of the mine and reclamation) impacts to vegetation would occur as a result of project construction and operation. Short-term impacts would result from the removal of herbaceous species within the mine area, transportation and utility corridor, and ancillary facilities. It is anticipated that herbaceous species would recover to pre-existing conditions within 1 to 5 years after reclamation. Impacts to woody species (i.e., trees and shrubs) primarily would be long term, as it would take approximately 5 to 15 years for shrub species to re-establish to a similar size as those currently present and 20 plus years for tree species to re-establish. These impacts would be minimized to the extent possible through implementation of proposed reclamation, as discussed in Section 2.5.3.5, Revegetation. Impacts to wetland and riparian vegetation would be minimized through implementation of the proposed Conceptual Mitigation Plan for waters of the U.S. (**Appendix C**). In addition, reclamation of the mine areas would proceed concurrently

with mining operations as pits are backfilled, thereby minimizing the extent of surface disturbance at any given point in time. Ancillary facility areas would be reclaimed following the completion of mining, resulting in long-term impacts to both herbaceous and woody species in these areas.

The proposed disturbance areas would be reclaimed to achieve the post-mining land uses as required by RCT and discussed in Section 2.5.3, Closure and Reclamation. The conceptual post-mining land uses are shown in **Figure 2-10**. Although the RCT-designated land use categories would not be directly comparable to the vegetation communities described in Section 3.4.1, the disturbance areas primarily would be reclaimed as forest land and pastureland, which currently are the primary vegetation types in these areas (see **Figure 3.4-1** and **Table 3.4-2**), with reclamation for the other post-mining land uses determined based on landowner agreements. Based on the total mitigation ratios for waters of the U.S., including wetlands, as presented in **Table 2-10**, ponds and streams would be reclaimed at a 1:1 ratio, non-forested wetlands would be reclaimed at a 1.5:1 ratio, and forested wetlands would be reclaimed at a 2:1 ratio. Based on the existing versus conceptual spatial distribution, it is not possible to accurately quantify the resulting conversion of vegetation by vegetation type; however, in general, there would be a conversion of approximately 182.5 acres of upland vegetation to forested and non-forested wetland vegetation following the completion of reclamation.

Potential indirect impacts to vegetation as a result of the Proposed Action likely would include:
1) increased potential for encroachment of noxious weeds and invasive plant species and 2) economic impacts to commercially harvestable vegetation, including trees and herbaceous vegetation, which provide timber, hay production, and forage for livestock grazing. The proposed disturbance areas would be prone to the establishment of noxious weeds or invasive plant species from adjacent areas. Encroachment of noxious weeds or invasive plant species would be minimized to the extent possible through prompt revegetation of disturbance areas and pesticide (inclusive of herbicide) use as outline in the proposed Reclamation Plan.

The loss of commercially harvestable herbaceous vegetation and its associated use would be minimal, since reclaimed areas would provide forage for livestock and wildlife several years after reclamation. The salvage of trees removed during construction may be infeasible due to safety and liability concerns that would outweigh the benefits of utilizing this resource. However, private landowners personally may remove timber for sale prior to the initiation of mining activities on their property. During reclamation, trees would be replanted in the disturbance areas in accordance with the designated post-mining land use and landowner agreements; however, any commercial value would not be realized for a number of years.

Mine Area

Mine development and operation would result in the direct removal of approximately 10,359 acres of vegetation (see **Table 2-4** and **Figure 3.4-1**). The loss of vegetation would occur incrementally over the 30-year life of the mine, with a maximum of 500 acres of mine pit-related disturbance at any given point in time. Concurrent reclamation would occur after each mine pit has been backfilled, thereby minimizing impacts to vegetation.

Ancillary Facilities

Approximately 1,950 acres of vegetation would be disturbed as a result of construction of the ancillary support facilities. Surface disturbance associated with ancillary facilities primarily would occur in mine year 1 and between mine years 11 through 20 (see **Table 2-4** and **Figure 2-2**). These areas would be reclaimed following the completion of mining.

Dragline Walkway, Haul Roads, and Utility Corridor

Construction of the transportation and utility corridor and incremental development of other primary haul roads to facilitate access to Mine Areas W and X (see **Table 2-4** and **Figure 2-2**) would result in the direct disturbance of approximately 930 acres of vegetation and aquatic habitat, which would occur incrementally

over the 30-year life of the mine. After the final dragline is moved from the South Hallsville No. 1 Mine to the Rusk Permit Area in approximately 2027, the dragline walkway would be removed and the disturbance area reclaimed. Following the completion of mining, the main haul road, ramps, and other primary haul roads would be reclaimed (see Section 2.5.3.8, Transportation Utility Corridor Reclamation).

Road and Utility Relocation

Existing roads would be closed prior to mining and utilities would be relocated by the controlling authority. The associated direct impact to approximately 240 acres of vegetation would occur incrementally over the 30-year life of the mine in advance of pit development. Roads would be re-established as the mine pits are reclaimed; therefore, no net loss of vegetation would occur as a result of road construction.

Water Level Change

As discussed in Section 3.2.3, Groundwater, based on groundwater modeling results, mining-related groundwater pumping would result in a 5-foot drawdown area that primarily would be limited to the proposed life-of-mine disturbance boundary plus a small perimeter zone on the west, south, and east sides (see **Figure D-1**). It is anticipated that groundwater withdrawal from the Carrizo-Wilcox aquifer system would not result in direct impacts to upland vegetation within the 5-foot drawdown contour. Oak (willow oak, white oak) and loblolly pine species common in the Rusk Permit Area, as well as other tree species and herbaceous plant species, generally have rooting depths within 5 feet of the surface, although tree taproots may grow to a deeper depth. Taproots provide stability for the trees, while surface roots primarily are responsible for nutrient and moisture uptake, the latter being primarily from precipitation (U.S. Forest Service 1990). Since these species generally are unable to access groundwater at depths greater than 10 feet, it is unlikely that upland vegetation would be affected as a result of mine-related groundwater drawdown.

As discussed in Section 3.2.4, Surface Water, it is anticipated that the projected mining-related groundwater drawdown would have minor impacts to surface water resources. Therefore, it is anticipated that water quantity impacts to aquatic plant species, forested wetland, and non-forested wetland as a result of groundwater pumping also would be minor.

Water Discharge

As discussed in Section 3.2.4, Surface Water, implementation of the proposed program for managing runoff, controlling sediment, and controlling discharges from the proposed disturbance area in accordance with state regulations would reduce the impacts to surface water resources to negligible levels. As a result, no related impacts to forested or non-forested wetland vegetation is anticipated as a result of sedimentation. Although effects to downstream flows as a result of mine-related discharges, there may be a short-term increase in wetland vegetation in the channels below the sediment control ponds' TPDES-outlets (see **Figure 2-5**) during operations, or a long-term increase in wetland vegetation for any sediment control ponds approved for retention in the post-mining landscape.

Special Status Species and Species of Special Concern

As discussed in Section 3.4.1.3, earth fruit was the only special status plant species identified for the project by the USFWS (2009a) and TPWD (2009a). The species has been eliminated from further analysis based on its known distribution and habitat requirements, which would place it outside of the project's area of effect. The two species of special concern identified for the project by the USFWS (2009a) and TPWD (2009a) (Neches River rose-mallow and Texas trillium) are not currently known to occur in the Rusk Permit Area; however, the species' habitat associations may occur in the proposed disturbance areas. Based on the species' known distribution in the region, there is a potential that one or both of these species could occur in suitable habitat within previously unsurveyed portions of the Rusk Permit Area. If present in the proposed disturbance area, project construction and operation could result in direct removal of individual plants. This potential impact could be minimized through implementation of mitigation measure V-1 (see Section 3.4.4, Monitoring and Mitigation Measures).

3.4.2.2 No Action Alternative

Under the No Action Alternative, the proposed Rusk Permit Area would not be developed. As a result, the associated direct disturbance of up to 14,392 acres of vegetation and the potential impacts to vegetation associated with mine-related water level changes and surface water discharge would not occur. Currently authorized operations at the South Hallsville No. 1 Mine (inclusive of the South Marshall Permit Area) and ongoing mine-related effects to approximately 17,600 total acres of vegetation would continue through reclamation in approximately 2035.

3.4.3 Cumulative Impacts

3.4.3.1 General Vegetation

The past and present actions and RFFAs are identified in Section 2.7 and are shown in **Figure 2-12**. The major past and present actions in the vegetation cumulative effects study area include four existing lignite mines (inclusive of the existing South Hallsville No. 1 Mine), two existing power plants and their associated cooling water reservoirs, and other actions for which USACE Section 404 Permits have been issued. Two RFFAs (the proposed Marshall Lignite Mine and a potential conveyor for Rusk Permit Area) also occur in the vegetation cumulative effects study area; however, it is anticipated that the potential conveyor would be constructed within the currently proposed disturbance area for the Rusk Permit Area. These operations have resulted, or would result, in approximately 78,316 total acres of disturbance, inclusive of approximately 1,910.2 acres of disturbance to waters of the U.S., including wetlands. Of this total, the approximately 67,697 acres of lignite mining-related disturbance have been, or would be, incrementally reclaimed over the life of these operations. The remaining 10,619 acres of disturbance represent long-term to permanent disturbance areas. The proposed Rusk Permit Area incrementally would increase the cumulative disturbance by up to an additional 14,392 acres, inclusive of 303.1 acres of disturbance to waters of the U.S., including wetlands, all of which would be incrementally reclaimed over the life of the mine. Based on an estimated waters of the U.S. (including wetlands) total cumulative disturbance of approximately 2,213.3 acres, the known compensatory mitigation for past and present actions, and the proposed compensatory mitigation for the Rusk Permit Area, there would be an estimated net increase of 1,736.5 acres of water of the U.S. (including wetlands) in the cumulative effects study area. This net increase in acreage would represent a conversion of upland vegetation to waters of the U.S., including wetlands.

As cumulative groundwater drawdown impacts are not anticipated, there would be no associated cumulative impacts to vegetation.

3.4.3.2 Special Status Species and Species of Special Concern

The proposed project is not anticipated to impact any special status species or species of special concern (see Special Status Species and Species of Special Concern in Section 3.4.2.1). As a result, the proposed project would not contribute cumulatively to impacts for these species.

3.4.4 Monitoring and Mitigation Measures

Sabine proposes to limit the acreage of disturbance at any given time through prompt revegetation of disturbance areas concurrently as new areas are cleared. Additionally, growth media would be tested for its suitability for revegetation, and amended as necessary. In addition, Sabine would utilize a temporary crop cover for areas of temporary disturbance during periods unfavorable for re-establishment of permanent vegetation, and has committed to designing permanent ponds with graded slopes and shallow shelves to promote propagation of aquatic and wetland vegetation. Based on the EIS analysis, the USACE is considering the following additional mitigation for plant species of special concern.

V-1: Prior to ground-disturbing activities, surveys would be conducted by a qualified botanist for the Neches River rose-mallow and the Texas trillium in areas of potentially suitable habitat within the Rusk Permit Area. If either species is identified during the surveys, Sabine, in coordination with the USFWS and

TPWD, as appropriate, would develop appropriate mitigation to minimize impacts and a management plan for monitoring and reporting.

Effectiveness: This measure would provide for early identification of potential impacts to the Neches River rose-mallow and Texas trillium and facilitate the development of appropriate mitigation, as needed.

3.4.5 Residual Adverse Effects

Residual adverse effects to vegetation would include the long-term impacts to woody species, as it would take up to 15 years for shrub species to fully re-establish (mature) and 20 plus years for tree species to re-establish. Assuming successful reclamation is achieved, these residual adverse effects would cease over time.