14740

Gulf and Atlantic Coastal Plain Small Stream Riparian Systems

BpS Model/Description Version: Aug. 2020

|  |  |  |  |
| --- | --- | --- | --- |
| **Modelers** |  | **Reviewers** |  |
| Elizabeth Smith | elizabeth.smith@tamucc.edu | Doug Zollner | dzollner@tnc.org |
| Lauren Young | lauren.young@tamucc.edu |  |  |
|  |  |  |  |

Vegetation Type

Woody Wetland

Map Zones

36

Geographic Range

The geographic distribution of this BpS includes second and third order wooded streams from the Guadalupe River south to and including the Nueces River. Species composition and arrangement will likely vary from north to south. Small stream riparian systems are defined as those that drain areas within MZ36.

Biophysical Site Description

The West Gulf Coastal Plain Small Stream Riparian Systems includes mesic stream bottoms, wet-mesic stream bottoms, and ephemeral stream drainages (<150m wide). Characteristically they form deep, well-developed stream channels and narrow flood plains in the upper reaches. In the lower areas they form broader flood plains along the southeastern coast. In the Texas Coastal Bend area, floodplains grade into tidally influenced wetlands. Tidal floods irregularly inundate the lower reaches.

Riparian corridors are generally characterized by mesic tree and shrub species that increase in productivity as a result of higher water availability. During low flow conditions, instream flow is maintained in some streams by artesian springs associated with the karst formation on the Edwards Plateau.

Vegetation Description

Predominant species adjacent to the river include cedar elm (*Ulmus crassifolia*), hackberry (*Celtis* spp.), black willow (*Salix nigra*), pecan (*Carya illinoinensis*) and green ash (*Fraxinus pennsylvanica*), with occasional black walnut (*Juglans nigra*) and cottonwood (*Populus deltoides*). Tree species grade into live oaks (*Quercus virginiana*) (sandy soils) and mesquite (*Prosopis glandulosa*) (loamy soils) at higher elevations. In early succession stages in the mid and lower areas of MZ36, Tamaulipan shrub/scrub species including brasil (*Condalia hookeri*), lime pricklyash (*Zanthoxylum fagara*) and gum bumelia (*Sideroxylon lanuginosum*) may increase in relative importance. In the upper northeastern portions of MZ36, shrub species include American hornbeam (*Carpinus caroliniana*) and holly (*Ilex* spp.). In later successional stages, vines and understory grasses replace the shrubs. Vine species include grape (*Vitis* spp.), trumpet creeper (*Campsis radicans*), pepper vine (*Ampelopsis arborea*), poison ivy (*Toxicodendron radicans*) and virginia creeper (*Parthenocissus quinquefolia*) within the tree canopy and dewberry (*Rubus riograndis*) as a component of the ground cover. Inland seaoats (*Chasmanthium latifolium*), Virginia wild rye (*Elymus virginiana*) and longtom paspalum (*Paspalum livida*) are common grass species within the riparian zone. Sedges and rushes were present in the herbaceous layer. Common reed (*Phragmites australis*), presumably the native strain, was also present. Giant ragweed (*Ambrosia trifida*) colonizes after disturbance events. Species composition and dominance shifts north to south.

BpS Dominant and Indicator Species

|  |  |  |
| --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** |
| ULCR | *Ulmus crassifolia* | Cedar elm |
| CELTI | *Celtis* | Hackberry |
| SANI | *Salix nigra* | Black willow |
| CAIL2 | *Carya illinoinensis* | Pecan |
| PODE3 | *Populus deltoides* | Eastern cottonwood |
| VIMU2 | *Vitis mustangensis* | Mustang grape |
| CHLA5 | *Chasmanthium latifolium* | Indian woodoats |

Species names are from the NRCS PLANTS database. Check species codes at http://plants.usda.gov.

Disturbance Description

Flooding and tidal storm surge play a major role in the structural composition of this system. Flood volume and salinity are more important factors in these events than velocity due to the low topographic relief of these small coastal river systems. The mesic shrub zone may reduce intensity of fires advancing from the prairie before it reaches the riparian zone. However, even low intensity fire in riparian areas could have a replacement effect due to the presence of fire sensitive tree species. It probably occurred with slightly less frequency than in adjacent uplands. Most tree species in riparian areas are shallow rooted and windfall events are frequent, creating gaps in the canopy. Regeneration of hackberry and cedar elm typically occurs within a growing season. Drought/wet cycles influence surface and subsurface water levels and impact vegetation productivity. In the lower reaches of these streams, the lower limits of the riparian zone may be defined by storm surge events during hurricanes when high salinity causes the death of freshwater tree species.

Fire Frequency

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Severity** | **Avg FI** | **Percent of All Fires** | **Min FI** | **Max FI** |
| Replacement | 186 | 5 |  |  |
| Moderate (Mixed) | 172 | 5 |  |  |
| Low (Surface) | 10 | 90 |  |  |
| All Fires | 9 | 100 |  |  |

Fire interval is expressed in years for each fire severity class and for all types of fire combined (All Fires). Average FI is the central tendency modeled. Percent of all fires is the percent of all fires modeled in that severity class. Minimum and Maximum FIs show the relative range of fire intervals as estimated by model contributors, if known.

Scale Description

The scale of disturbance is primarily small and gap-phase disturbance occurring from natural tree death, occasional wind events and fire encroachment from uplands. Widespread events including floods, high winds and tidal storm surges occur. Although rare, wildfires can occur in this BpS.

Adjacency or Identification Concerns

Exotic tree species that have invaded small river riparian systems include Chinese tallow (*Triadica sebifera*) in eastern portions of the zone and to a lesser extent chinaberry (*Melia azedarach*). Exotic grasses such as guineagrass (*Urochloa maxima*), buffelgrass (*Pennisetum ciliare*), cultivated bluestems (*Bothriochloa* spp.) and giant reed (*Arundo donax*) are an increasing problem along the riparian upland interface.

Issues or Problems

Native Uncharacteristic Conditions

Comments

In MZ36, this BpS model was developed from the same BpS in MZ37 by Philip Hyatt, Jared Laing and Roger Mangham and reviewed by Douglas Zollner. Significant changes were made to the description for MZ36 due to geographic differences resulting in a change in modelership. Douglas Zollner reviewed the model again for MZ36. Potential reviewers of thie type: Dr. Janis Bush and O.W. "Bill" Van Auken (UTSA).

Succession Classes

**Mapping Rules**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Upper Layer Lifeform** | **Height (m)** | **Canopy Cover (%)** | | | | | | | | | |
| **0-10** | **11-20** | **21-30** | **31-40** | **41 - 50** | **51-60** | **61-70** | **71-80** | **81-90** | **91-100** |
| Herb | 0-0.5 | A | A | A | A | A | A | A | A | A | A |
| Herb | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Herb | >1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 0-0.5 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 0.5-1.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | 1.0-3.0 | A | A | A | A | A | A | A | A | A | A |
| Shrub | >3.0 | A | A | A | A | A | A | A | A | A | A |
| Tree | 0-5 | A | A | A | A | A | A | A | A | A | A |
| Tree | 5-10 | A | A | A | A | A | A | A | A | A | A |
| Tree | 10-25 | B | B | B | B | B | B | B | B | B | B |
| Tree | 25-50 | B | B | B | B | B | B | B | B | B | B |
| Tree | >50 | B | B | B | B | B | B | B | B | B | B |

Succession class letters A-E are described in the Succession Class Description section. Some classes use a leafform distinction where a qualifier is added to the class letter: Brdl (broadleaf), Con (conifer), or Mix (mixed conifer and broadleaf). UN refers to uncharacteristic native or a combination of height and cover that would not be expected under the reference condition. NP refers to not possible or a combination of height and cover which is not physiologically possible for the species in the BpS.

**Description**

Class A 40 Early Development 1 - All Structures

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| CELTI | Celtis | Hackberry | Upper |
| ULCR | Ulmus crassifolia | Cedar elm | Mid-Upper |

Description

The dominant tree species is hackberry, in both canopy cover and stem density. Shrub species vary along the moisture gradient. Surface fires occur as a result of frequent fires in adjacent prairie communities. Mixed fires are more common than replacement fire events due to the shrub/scrub species. Windfall from tropical storms are an important disturbance type, however, they do not replace this class and are not included in the model. Species dominance could vary from shrub/scrub to small trees, depending on frequency of windfall and flooding.

*Maximum Tree Size Class*  
Pole 5-9" DBH

Class B 60 Mid Development 1 - Closed

Indicator Species

|  |  |  |  |
| --- | --- | --- | --- |
| **Symbol** | **Scientific Name** | **Common Name** | **Canopy Position** |
| ULCR | Ulmus crassifolia | Cedar elm | Upper |
| CELTI | Celtis | Hackberry | Mid-Upper |
| FRPE | Fraxinus pennsylvanica | Green ash | Upper |
| CAIL2 | Carya illinoinensis | Pecan | Upper |

Description

The diversity of dominant tree species increases to include species such as cedar elm, ash and pecan. Shrub cover declines with increased tree canopy cover and frequency of replacement fire increases. Surface fire is relatively frequent. The frequency of mixed fire is reduced since the shrubs no longer act as a fire break. Flooding and/or tidal storm surge sets succession back. The class is best defined by tree height and diameter. Hydrology varies widely, with increasing aridity from north to south in MZ36. Windfall from tropical storms is a more important disturbance type in this class due to tree height.

*Maximum Tree Size Class*  
Medium 9-21"DBH

Model Parameters

Deterministic Transitions

|  |  |  |  |
| --- | --- | --- | --- |
| **From Class** | **Begins at (yr)** | **Succeeds to** | **After (years)** |
| Early1:ALL | 0 | Mid1:CLS | 15 |
| Mid1:CLS | 16 | Mid1:CLS | 999 |

Probabilistic Transitions

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Disturbance Type** | **Disturbance occurs In** | **Moves vegetation to** | **Disturbance Probability** | **Return Interval (yrs)** | **Reset Age to New Class Start Age After Disturbance?** | **Years Since Last Disturbance** |
| Replacement Fire | Early1:ALL | Early1:ALL | 0.003 | 333 | Yes | 0 |
| Mixed Fire | Early1:ALL | Early1:ALL | 0.01 | 100 | No | 0 |
| Optional 1 | Early1:ALL | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Surface Fire | Early1:ALL | Early1:ALL | 0.1 | 10 | No | 0 |
| Mixed Fire | Mid1:CLS | Mid1:CLS | 0.003 | 333 | No | 0 |
| Replacement Fire | Mid1:CLS | Early1:ALL | 0.007 | 143 | Yes | 0 |
| Wind or Weather or Stress | Mid1:CLS | Early1:ALL | 0.01 | 100 | Yes | 0 |
| Optional 1 | Mid1:CLS | Early1:ALL | 0.02 | 50 | Yes | 0 |
| Surface Fire | Mid1:CLS | Mid1:CLS | 0.1 | 10 | No | 0 |

Optional Disturbances

Optional 1: Flooding and storm surge

References

Glasscock, Selma N. 2001. Analysis of vegetation dynamics, wildlife interactions, and management strategies in a semi-arid rangeland systems: the Welder Wildlife Refuge model. Ph.D. Dissertation, Texas A&M University-Kingsville, TX. 201 pp.

Longfield, A.J. 2001. Spatial and temporal evaluation of riparian habitat dynamics along a coastal river in Texas. Master’s Thesis, Texas A&M University-Corpus Christi, Texas. 77 pp.

NatureServe. 2007. International Ecological Classification Standard: Terrestrial Ecological Classifications. NatureServe Central Databases. Arlington, VA. Data current as of 10 February 2007.

Pulich, W., Jr. and J. Hinson. 1996. Development of geographic information system data sets on coastal wetlands and land cover. Coastal Studies Technical Report No. 1, Texas Parks and Wildlife Department, Resource Protection Division, Austin, TX.

Smith, E.H., S.J. Dilworth, A. Koltermann, J. Wood, R. Hays, D. Moulton and W.J. Pulich, Jr. 2002. Riparian habitat corridor characterization in the Coastal Bend bays and estuaries program area. CBBEP-36, Coastal Bend Bays and Estuaries Program, Corpus Christi, TX.

White, W.A., T.R. Calnan, R.A. Morton, R.S. Kimble, T.G. Littleton, J.H. McGowen, H.S. Nance, K.E. Schmedes and others. 1985. Submerged Lands of Texas, Galveston-Houston Area: Sediments, Geochemistry, Benthic Macroinvertebrates, and Associated Wetlands, 145 pp.