USDA Natural Resources Conservation Service

Ecological site R150BY652TX
Southern Salt Marsh

Last updated: 9/22/2023
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General information

Provisional. A provisional ecological site description has undergone quality control and quality assurance review. It contains a working state and transition model and enough information to identify the ecological site.

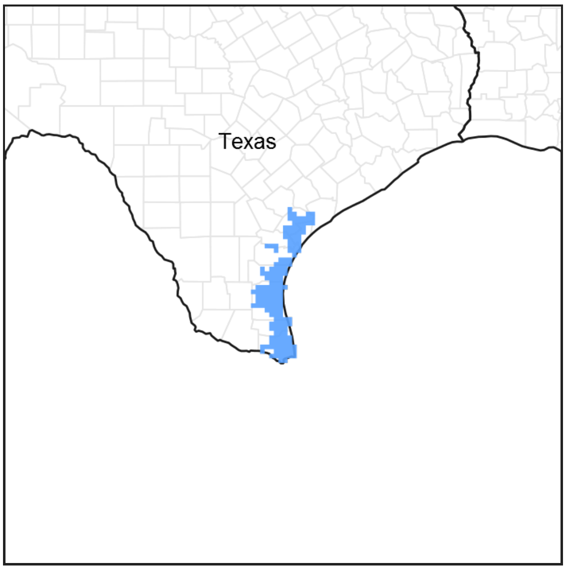


Figure 1. Mapped extent

Areas shown in blue indicate the maximum mapped extent of this ecological site. Other ecological sites likely occur within the highlighted areas. It is also possible for this ecological site to occur outside of highlighted areas if detailed soil survey has not been completed or recently updated.

MLRA notes

Major Land Resource Area (MLRA): 150B–Gulf Coast Saline Prairies

MLRA 150B is in the West Gulf Coastal Plain Section of the Coastal Plain Province of the Atlantic Plain and entirely in Texas. It makes up about 3,420 square miles. It is characterized by nearly level to gently sloping coastal lowland plains dissected by rivers and streams that flow toward the Gulf of Mexico. Barrier islands and coastal beaches are included. The lowest parts of the area are covered by high tides, and the rest are periodically covered by storm tides. Parts of the area have been worked by wind, and the sandy areas have gently undulating to irregular topography because of low mounds or dunes. Broad, shallow flood plains are along streams flowing into the bays. Elevation generally ranges from sea level to about 10 feet, but it is as much as 25 feet on some of the dunes. Local relief is mainly less than 3 feet. The towns of Groves, Texas City, Galveston, Lake Jackson, and Freeport are in the northern half of this area. The towns of South Padre Island, Loyola Beach, Corpus Christi, and Port Lavaca are in the southern half. Interstate 37 terminates in Corpus Christi, and Interstate 45 terminates in Galveston.

Classification relationships

USDA-Natural Resources Conservation Service, 2006.
-Major Land Resource Area (MLRA) 150B

Ecological site concept

Salt Marshes occur in areas less than 41 inches of mean annual precipitation and are closed depressions of the inland Coastal Plains exhibiting salt-tolerant vegetation.

Associated sites

R150BY551TX	**Salty Prairie** This site is on a higher landform and is drier.
R150BY716TX	**Wind Tidal Flat** This site are in a similar position but are bare of vegetation or just have an algal mat.
R150BY651TX	**Salt Flat** This site is on a slightly higher landform and is drier.

Similar sites

R150BY550TX	**Northern Salt Marsh** This site is located in a higher precipitation regime.

Table 1. Dominant plant species

Tree	Not specified
Shrub	Not specified
Herbaceous	(1) *Spartina spartinae*

Physiographic features

The Salt Marsh occurs inland from the immediate ocean shoreline (strand) and often lies landward behind an additional zone of vegetated sand dunes. The landscape is typically very flat and interspersed with small drainages, small depressional areas, and variable sized open water bays. They may be crossed by streams or rivers that flow to the ocean. Sometimes high, linear ridges (cheniers) occur within the flat surface. The marshlands may extend a few hundred yards or up to several miles from the coast depending on the slope gradient.

Due to their location between the ocean and inland, the marshes are variously influenced by tides, saline substrates, and freshwater inflows. Generally, there is a gradient from saline to brackish to intermediate to freshwater marsh from the near ocean and bay influence to the inland uplands. This site was formed in deltaic, eolian or alluvium sediments. These soils are on nearly level coastal plains and depressional semi-marshy areas adjacent to the Gulf of Mexico. The slope is less than 1 percent. Elevation ranges from 1 to 15 feet.

Table 2. Representative physiographic features

Landforms	(1) Coastal plain > Flood plain (2) Coastal plain > Depression (3) Coastal plain > Swale
Runoff class	Negligible to medium
Flooding duration	Long (7 to 30 days)
Flooding frequency	None to frequent
Ponding duration	Long (7 to 30 days)
Ponding frequency	None to frequent
Elevation	1–45 ft
Slope	0–1%
Ponding depth	0–12 in
Water table depth	0–40 in

Aspect	Aspect is not a significant factor

Climatic features

The climate is predominately maritime, controlled by the warm and very moist air masses from the Gulf of Mexico. The climate along the upper coast of the barrier islands is subtropical subhumid and the climate on the lower coast of Padre Island is subtropical semiarid (due to high evaporation rates that exceed precipitation). Almost constant sea breezes moderate the summer heat along the coast. Winters are generally warm and are occasionally interrupted by incursions of cool air from the north. Spring is mild and damaging wind and rain may occur during spring and summer months. Tropical cyclones or hurricanes can occur with wind speeds of greater than 74 mph and have the potential to cause flooding from torrential rainstorms. Despite the threat of tropical storms, the storms are rare. Throughout the year, the prevailing winds are from the southeast to south-southeast.

The average annual precipitation is 45 to 57 inches in the northeastern half of this area, 26 inches at the extreme southern tip of the area, and 30 to 45 inches in the rest of the area. Precipitation is abundant in spring and fall in the southwestern part of the area and is evenly distributed throughout the year in the northeastern part. Rainfall typically occurs as moderate-intensity, tropical storms that produce large amounts of rain during the winter. The average annual temperature is 68 to 74 degrees F. The freeze-free period averages 340 days and ranges from 315 to 365 days.

Table 3. Representative climatic features

Frost-free period (characteristic range)	365 days
Freeze-free period (characteristic range)	365 days
Precipitation total (characteristic range)	26-32 in
Frost-free period (actual range)	365 days
Freeze-free period (actual range)	365 days
Precipitation total (actual range)	26-34 in
Frost-free period (average)	365 days
Freeze-free period (average)	365 days
Precipitation total (average)	29 in

Climate stations used

- (1) CORPUS CHRISTI NAS [USW00012926], Corpus Christi, TX
- (2) PADRE IS NS [USC00416739], Padre Island Ntl Seashor, TX
- (3) PORT MANSFIELD [USC00417184], Port Mansfield, TX
- (4) PORT ISABEL CAMERON AP [USW00012957], Los Fresnos, TX
- (5) PORT ISABEL [USC00417179], Port Isabel, TX

Influencing water features

Flooding will occur by overbank flow. Salt water will flood this site occasionally from tidal surges during tropical events.

Wetland description

These areas have hydric soils. Onsite investigation needed to determine local conditions.

Soil features

These are very deep mineral soils that vary in texture from sandy to loamy to clayey. Tidal influence and salty substrates produce saline to brackish conditions. However, at any given location, degree of salinity is a result of the local interaction of tidal influence, freshwater inflows, and substrate salt content. Soils are very poorly or poorly drained. Permeability varies with texture and depth of the water table but will generally be very slow or slow. Other features include neutral to strongly alkaline pH, krotovina (redistribution of horizons caused by animals), and redoximorphic accumulations and depletions. Soils correlated to this site include: Aransas, Lomalta, and Noria.

Table 4. Representative soil features

Parent material	(1) Alluvium–igneous, metamorphic and sedimentary rock (2) Eolian deposits–igneous, metamorphic and sedimentary rock
Surface texture	(1) Clay (2) Fine sand
Family particle size	(1) Fine (2) Sandy
Drainage class	Poorly drained to very poorly drained
Permeability class	Very slow to rapid
Soil depth	80 in
Surface fragment cover <=3"	0%
Surface fragment cover >3"	0%
Available water capacity (0-60in)	2–3 in
Calcium carbonate equivalent (0-60in)	0–10%
Electrical conductivity (0-60in)	8–20 mmhos/cm
Sodium adsorption ratio (0-60in)	15–60
Soil reaction (1:1 water) (0-60in)	6.6–9
Subsurface fragment volume <=3" (56-60in)	0–2%

Ecological dynamics

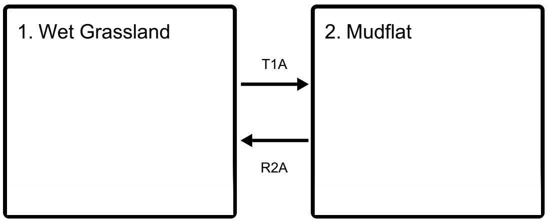
The environment is largely controlled by the Salt Marshes position between the ocean and inland upland sites. The generally flat, featureless plain is influenced by flooding of ocean tides, which vary seasonally and from year-to-year in their extent, duration, depth, and degree of salinity. In opposition to these ocean influences are freshwater inflows which move into the marsh as sheet flow from adjacent areas following precipitation events or result from flood overflow of streams that cross through the marsh from inland areas. Throughout the marsh, slight variations of a few inches in relief can produce noticeable changes in the plant community since minor variations in elevation can locally alter the salinity and water regime.

Within the marsh, many features add heterogeneity to the landscape and increase vegetation variability. Included are many small streams to large rivers that cross the marsh with their associated levees, oxbows, tidal guts, or drains that carry tidal waters inland. Depressional wetlands and small-to-large ridges that resulted from historic differential deposition and erosion within the this geomorphologically recent and active surface are present. Interspersed within the vegetated marsh may be open water bays and mudflats that vary in size, depth, and duration of standing water. The interaction of the tidal influence and the freshwater inflows are temporally and spatially variable which contribute to vegetative variation. This results from the local internal variation in elevation, as well as the rise in elevation from the coast inland, which may be subtle and gradual over long distances or can be abrupt and rapid over short distances.

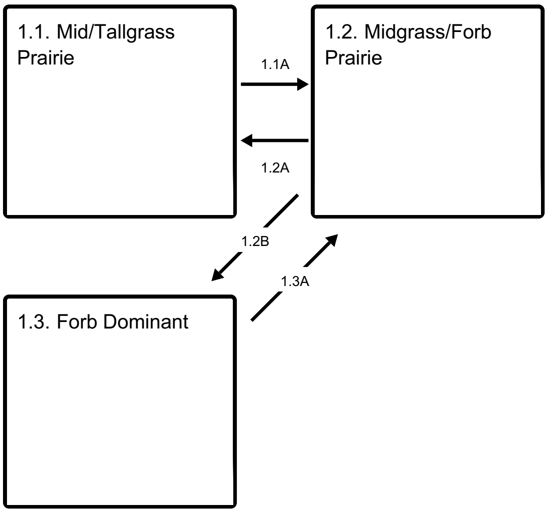
All the variables contribute influences on the degree and rate of change of water and salinity regime moving inland. This correspondingly controls change in plant composition, which may be gradual and continuous when there is a minor elevation gradient or more zonal where it is more abrupt. The variation in salinity fluctuates as the site is further away from the ocean. Typically, saline water (greater than 10 parts per thousand of salt) is found closest to the ocean. Located further inland, they become brackish (3.5 to 10 parts per thousand), then intermediate (0.5 to 3.5 parts per thousand). Eventually, they arrive on the inland border as fresh marsh with less than 0.5 parts per thousand of salt.

State and transition model

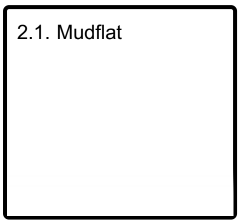
Ecosystem states



State 1 submodel, plant communities



State 2 submodel, plant communities



State 1
Wet Grassland

Community 1.1
Mid/Tallgrass Prairie

The reference community is a mixture of mid and tallgrasses making up greater than 80 percent of the biomass. Dominant grasses would include marshhay cordgrass (*Spartina patens*), smooth cordgrass (*Spartina alterniflora*), seashore saltgrass (*Distichlis spicata*), and gulf cordgrass (*Spartina spartinae*). Interstitial graminoids include shoregrass (*Monanthochloe littoralis*), seashore paspalum, seashore dropseed (Sporobulus virginiucs), common reed (*Phragmites australis*), and bulrushes (Scirpus spp.). Forbs include dwarf glasswort (Salicornia virginica), sea lavender (*Limonium carolinianum*), and seacoast sumpweed (*Iva annua*). Woody plants are generally sparse in this community but may include sea oxeye (*Borrichia frutescens*) and wolfberry (*Lycium carolinianum*). Shifts in composition may occur due to changes in the water, salinity regimes, or in response to grazing impacts. Any of the factors may produce similar vegetation responses and thus careful assessment must be made to determine the cause of observed changes. Many of the graminoids become coarse and unpalatable at maturity and fire can be used to stimulate new, more palatable growth often increasing production. Heavy continuous grazing generally results in a decrease in marshhay cordgrass and smooth cordgrass while increasing the remaining species. Although season of grazing, as well as frequency and intensity, may shift the composition in several directions and interact in various ways with changes in the water and salinity regime to influence compositional changes.

Table 5. Annual production by plant type

Plant Type	Low (Lb/Acre)	Representative Value (Lb/Acre)	High (Lb/Acre)
Grass/Grasslike	3600	7400	11000
Shrub/Vine	200	300	450
Forb	200	300	450
Tree	0	0	0
Total	**4000**	**8000**	**11900**

Table 6. Ground cover

Tree foliar cover	0-1%
Shrub/vine/liana foliar cover	0-1%
Grass/grasslike foliar cover	80-90%
Forb foliar cover	5-10%
Non-vascular plants	0%
Biological crusts	0%
Litter	50%
Surface fragments >0.25" and <=3"	0%
Surface fragments >3"	0%
Bedrock	0%
Water	0%
Bare ground	50%

Figure 9. Plant community growth curve (percent production by month). TX7751, Midgrass Prairie Community. Open grassland plain composed of mid-grasses with seacoast bluestem and gulfdune paspalum dominate the site..

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0	0	5	15	20	15	10	10	15	6	4	0

Community 1.2
Midgrass/Forb Prairie

This community is similar to the Mid/Tallgrass Prairie Community (1.1) but has a shift in dominance to a mixture of marshhay cordgrass, smooth cordgrass, gulf cordgrass, and seashore saltgrass. In addition, common reed, seashore dropseed, and seashore paspalum decrease in abundance. Shoregrass, sea ox-eye, devil-weed/spiny Chlorancantha (*Chloracantha spinosa*), and coffeebean increase in abundance. This shift in composition can be driven by heavy grazing but may occur during extended periods of high salinity. Improved salinity conditions and proper grazing management will help restore reference conditions.

Community 1.3
Forb Dominant

With continued heavy grazing and/or severe persistent high salinities the grass cover of this community begins to open and the amount of bare ground increases along with an increase of forbs. Spiny chloracantha, sea ox-eye, ragged marsh-elder sumpweed (*Hedosyne ambrosiifolia*), seacoast sumpweed, bulrushes, eastern baccharis, and assorted sedges and rushes become dominant. When the site is dominated by these species it becomes more difficult to return it to the Midgrass/Tallgrass Prairie Community (1.1) or the Midgrass/Forb Community (1.2) by grazing management. Pest management, brush management, and prescribed grazing in combination may be necessary to improve the condition.

Pathway 1.1A
Community 1.1 to 1.2

Heavy grazing will impact the site negatively and cause a transition to Community 1.2.

Pathway 1.2A
Community 1.2 to 1.1

Grazing management or reduction of salinity transition the site back to reference conditions.

Pathway 1.2B
Community 1.2 to 1.3

Continued overgrazing and/or prolonged high salinity exposure transition the site to Community 1.3.

Pathway 1.3A
Community 1.3 to 1.2

Prescribed grazing, pest management, and/or lowered salinity conditions transition the site back to 1.2.

State 2
Mudflat

Community 2.1
Mudflat

In the extreme, the site would be denude of vegetation. But in most cases, gulf cordgrass, saltwort, glasswort, seashore saltgrass, and sea-oxeye will be present. Grazing is the main driver of this condition, but other factors like effects from hurricanes with flooding or tidal inundation also have influence. Most of the reference species still found tend to reproduce by vegetative means. The rate of recovery to a vegetated state will be controlled by the density and vigor of these remnant plants, as well as the size of the mudflat. Recovery may be very slow as reseeding is generally not feasible due to lack of a seed source and difficulty of establishment. Some acquisition of plants may be done naturally by wildlife transfer. Planting of vegetative materials can assist in accelerating the recovery process but may not be feasible over large areas. Generally, rest from further disturbance may be the only reasonable approach to recovery but may require several years.

Transition T1A
State 1 to 2

Heavy overgrazing or a hurricane can cause the transition to State 2. The Forb Dominant Community (1.3) is at risk to transition if the site is not allowed to revegetate.

Restoration pathway R2A
State 2 to 1

Revegetation of the natural plant system is necessary to restore the Wet Grassland State (1). Revegetating can be difficult because it requires sprigging as seed sources are usually not viable. Time and restriction from further disturbance is generally the most feasible option.

Additional community tables

Table 7. Community 1.1 plant community composition

Group	Common Name	Symbol	Scientific Name	Annual Production (Lb/Acre)	Foliar Cover (%)

Grass/Grasslike					
1	**Midgrasses**			2000–5500	
	saltmeadow cordgrass	SPPA	*Spartina patens*	1000–3500	–
	smooth cordgrass	SPAL	*Spartina alterniflora*	1000–3500	–
2	**Mid/Tallgrasses**			2000–5000	
	saltgrass	DISP	*Distichlis spicata*	1000–2500	–
	gulf cordgrass	SPSP	*Spartina spartinae*	1000–2500	–
	seashore dropseed	SPVI3	*Sporobolus virginicus*	500–1500	–
	shoregrass	MOLI	*Monanthochloe littoralis*	500–1500	–
	seashore paspalum	PAVA	*Paspalum vaginatum*	500–1500	–
	switchgrass	PAVI2	*Panicum virgatum*	0–1500	–
	common reed	PHAU7	*Phragmites australis*	500–1500	–
	chairmaker's bulrush	SCAM6	*Schoenoplectus americanus*	500–1500	–
	sedge	CAREX	*Carex*	500–1000	–
	flatsedge	CYPER	*Cyperus*	500–1000	–
	southern cattail	TYDO	*Typha domingensis*	500–1000	–
	marsh bristlegrass	SEPA10	*Setaria parviflora*	250–750	–
	Indiangrass	SONU2	*Sorghastrum nutans*	0–500	–
	longtom	PADE24	*Paspalum denticulatum*	0–500	–
	eastern gamagrass	TRDA3	*Tripsacum dactyloides*	0–500	–
Forb					
3	**Forbs**			200–450	
	alligatorweed	ALPH	*Alternanthera philoxeroides*	50–100	–
	Cuman ragweed	AMPS	*Ambrosia psilostachya*	50–100	–
	turtleweed	BAMA5	*Batis maritima*	50–100	–
	herb of grace	BAMO	*Bacopa monnieri*	50–100	–
	bushy seaside tansy	BOFR	*Borrichia frutescens*	50–100	–
	spiny chloracantha	CHSP11	*Chloracantha spinosa*	50–100	–
	seaside heliotrope	HECUO2	*Heliotropium curassavicum var. obovatum*	50–100	–
	narrowleaf marsh elder	IVAN	*Iva angustifolia*	50–100	–
	Jesuit's bark	IVFR	*Iva frutescens*	50–100	–
	Virginia saltmarsh mallow	KOVI	*Kosteletzkya virginica*	50–100	–
	sea lavender	LIMON	*Limonium*	50–100	–
	dwarf saltwort	SABI	*Salicornia bigelovii*	50–100	–
	slender seapurslane	SEMA3	*Sesuvium maritimum*	50–100	–
	annual seepweed	SULI	*Suaeda linearis*	50–100	–
	southwestern annual saltmarsh aster	SYEX	*Symphyotrichum expansum*	50–100	–
	perennial saltmarsh aster	SYTE6	*Symphyotrichum tenuifolium*	50–100	–
Shrub/Vine					
4	**Shrubs/Vines**			200–450	
	eastern baccharis	BAHA	*Baccharis halimifolia*	50–300	–
	Carolina desert-thorn	LYCA2	*Lycium carolinianum*	50–300	–
	bigpod sesbania	SEHE8	*Sesbania herbacea*	50–300	

	bigpod sesbania	SEHE8	*Sesbania herbacea*	50–300	–

Animal community

The animal communities of the Coastal Prairie communities are influenced by fresh and salt water inundations. Cattle and many species of wildlife make extensive use of the site. White-tailed deer may be found scattered across the prairie and are found in heavier concentrations where woody cover exists. Feral hogs are present and at times become abundant. Coyotes are abundant and fill the mammalian predator niche. Rodent populations rise during drier periods and fall during periods of inundation. Alligators are locally abundant and make frequent use of the marshes depending on salt concentrations in the marshes.

The region is a major flyway for waterfowl and migrating birds. Hundreds of thousands of ducks, geese, and sandhill cranes abound during winter. Whooping cranes are an important endangered species that occur in the area, especially near Aransas National Wildlife Refuge. Northern harriers are common predatory birds seen patrolling marshes. Curlews, plovers, sandpipers, and willets are shorebirds that make use of the tidal areas. Seagulls and terns are plentiful throughout the year trolling the shores as well. Further inland, rails, gallinules, and moorhens make use of the brackish marshes.

Hydrological functions

Infiltration into the soils of this site is variable corresponding to the texture. However, because of the level terrain and proximity to the Gulf of Mexico, this site may be inundated periodically.

Inventory data references

Information presented was derived from the Range Site Description, NRCS clipping data, literature, field observations, and personal contacts with range-trained personnel.

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Site Development and Testing Plan:

Future work, as described in a Project Plan, to validate the information in this Provisional Ecological Site Description is needed. This will include field activities to collect low, medium and high-intensity sampling, soil correlations, and analysis of that data. Annual field reviews should be done by soil scientists and vegetation specialists. A final field review, peer review, quality control, and quality assurance reviews of the ESD will be needed to produce the final document. Annual reviews of the Project Plan are to be conducted by the Ecological Site Technical Team.

Rangeland health reference sheet

Interpreting Indicators of Rangeland Health is a qualitative assessment protocol used to determine ecosystem condition based on benchmark characteristics described in the Reference Sheet. A suite of 17 (or more) indicators are typically considered in an assessment. The ecological site(s) representative of an assessment location must be known prior to applying the protocol and must be verified based on soils and climate. Current plant community cannot be used to identify the ecological site.

Author(s)/participant(s)	
Contact for lead author	
Date	04/23/2025
Approved by	Bryan Christensen
Approval date	
Composition (Indicators 10 and 12) based on	Annual Production

Indicators

1. **Number and extent of rills:**

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2. **Presence of water flow patterns:**

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3. **Number and height of erosional pedestals or terracettes:**

---

4. **Bare ground from Ecological Site Description or other studies (rock, litter, lichen, moss, plant canopy are not bare ground):**

---

5. **Number of gullies and erosion associated with gullies:**

---

6. **Extent of wind scoured, blowouts and/or depositional areas:**

---

7. **Amount of litter movement (describe size and distance expected to travel):**

---

8. **Soil surface (top few mm) resistance to erosion (stability values are averages - most sites will show a range of values):**

---

9. **Soil surface structure and SOM content (include type of structure and A-horizon color and thickness):**

---

10. **Effect of community phase composition (relative proportion of different functional groups) and spatial distribution on infiltration and runoff:**

---

11. **Presence and thickness of compaction layer (usually none; describe soil profile features which may be**

mistaken for compaction on this site):

---

12. **Functional/Structural Groups (list in order of descending dominance by above-ground annual-production or live foliar cover using symbols: >>, >, = to indicate much greater than, greater than, and equal to):**

    Dominant:

    Sub-dominant:

    Other:

    Additional:

---

13. **Amount of plant mortality and decadence (include which functional groups are expected to show mortality or decadence):**

---

14. **Average percent litter cover (%) and depth (in):**

---

15. **Expected annual annual-production (this is TOTAL above-ground annual-production, not just forage annual-production):**

---

16. **Potential invasive (including noxious) species (native and non-native). List species which BOTH characterize degraded states and have the potential to become a dominant or co-dominant species on the ecological site if their future establishment and growth is not actively controlled by management interventions. Species that become dominant for only one to several years (e.g., short-term response to drought or wildfire) are not invasive plants. Note that unlike other indicators, we are describing what is NOT expected in the reference state for the ecological site:**

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17. **Perennial plant reproductive capability:**
