

Tennessee 2025 State Wildlife Action Plan

Appendix F

Plant Species Selection Methodology for Tennessee

Tennessee SWAP Plant Species Selection Methodology used by Tennessee Dept. of Environment and Conservation

To begin selecting plant species for the Tennessee SWAP list, TDEC used the SEAFWA guidance to assign priorities to species.

Links to the guidance document:

- https://www.fishwildlife.org/application/files/3017/0552/5687/Priority_Tier_Reference_Guide_SEAFWA_SWAP.pdf
- https://www.fishwildlife.org/download_file/view/4734/354

Box 3.3 Plant species Priority Tier reference guide that may be used to help assign SGCN to priority tiers. Source: AFWA

Priority Tier	Definition	Reference Criteria
Highest Conservation Concern	Imperiled species that may become extirpated from my state in the near future unless conservation efforts are continued or enhanced. The population(s) in my state is/are important to the global conservation of the species.	-G1-G2 -RSGCN Very High or High and S1-S2 -ESA E -ESA T or C and S1-S2 -IUCN CR or EN and S1-S2 PIF Red Watchlist Species
High Conservation Concern	Imperiled species that may continue to decline in my state unless conservation efforts are continued or enhanced. The population(s) in my state is/are important to the global or regional conservation of the species. * While Highest Conservation Concern was the most frequently selected category for G5S1 species in the survey, this was a relatively weak preference that represented less than half of respondents (43%). Whether or not to designate G5S1 species as SGCN in your state should take into account the regional and global significance of your state's occurrence.	-G3-G4 and S1-S2 -G5 and S1* -RSGCN Mod and S1-S2 -RSGCN Very High or HIGH and S3 -ESA T or C and S3 -IUCN CR or EN and S3 -IUCN VU and S1-S2 PIF Yellow Watchlist Species
Moderate Conservation Concern	Species that may be currently stable but of long-term conservation concern due to increasing or emerging threats or species that are currently stable but are representative of an ecosystem or community in need of conservation or species that are currently stable but represented by a strong population or unique genetic diversity that is worthy of conservation within my state.	G3 and S3 RSGCN Mod and S3 IUCN VU and S3 PIF CBSD
Data Deficient	Species that may be imperiled, but lack of information on their conservation status, taxonomy, life history, and threats precludes the identification of conservation actions.	Any G Rank and SU SH or SX species that may be rediscovered IUCN Data Deficient

Using these criteria, species are categorized according to global and state ranks as well as RSGCN status.

In order to thoroughly assess the plant species all plant species in the Tennessee rare species tracking database (TN Biotics) were included regardless of state status (actively tracked or not). This includes previously tracked as well as actively tracked plant species. The list of 733 species was evaluated using the SEAFWA recommended criteria with the exception of IUCN categories. Many species have yet to be assigned an IUCN status and those that have are based on comparing current abundance with historical abundance, rather than assessing extinction risk. The Tennessee plant evaluation process involved implementing the criteria in Microsoft Excel worksheets as a series of conditions of 2 orders in a hierarchy. This process made use of 2 Excel functions, IF() and Left().

IF(condition,true,false) - Evaluates a condition and returns a user specified true or false value.
LEFT(text, [num_chars]) - Strips the leftmost user specified number of characters from a text string.

The first set of conditions splits each criterion into individual elements that can be converted to a conditional function in Excel. For example, in the "Highest Conservation Concern" category the first 3 reference criteria are "G1-G2", "RSGCN Very High or High and S1-S2" and "ESA E". For clarity, these are expanded to "Global Rank = G1 or Global Rank = G2", "RSGCN = VH or RSGCN = H", "State Rank = S1 or State Rank = S2" and "Endangered Species Act status = Endangered". A conditional function then tests each species for the individual criteria. When evaluating ranks, if a range rank has been assigned to the species, the highest rank in the range is used. For example, a rank of G2G3 would be evaluated as G2.

Below are the 3 resultant conditionals for the first 2 reference criteria in the example.

C1

Criterion: "G1 or G2"

Excel function: =IF(LEFT(E2,2)="G1",1,IF(LEFT(E2,2)="G2",1,0))

C2

Criterion: "ESA = E"

Excel function: =IF(G2="LE",1,0)

C3

Criterion: "S1 or S2"

Excel function: =IF(LEFT(D2,2)="S1",1,IF(LEFT(D2,2)="S2",1,0))

C4

Criterion: "RSGCN = VH or H"

Excel function: =IF(I2="Very High",1,IF(I2="High",1,0))

Highest Conservation Concern		Imperiled species that may become extirpated from my state in the near future unless conservation efforts are continued or enhanced. The population(s) in my state is/are important to the global conservation of the species.	
			-G1-G2 -RSGCN Very High or High and S1-S2 -ESA E -ESA T or C and S1-S2
First Order Conditionals			Column
cond1(G1orG2)	=IF(LEFT(L2,2)="G1",1,IF(LEFT(E2,2)="S2",1,0))		L
cond2(ESA E)	=IF(G2="LE",1,0)		M
cond3(S1 or S2)	=IF(LEFT(D2,2)="S1",1,IF(LEFT(D2,2)="S2",1,0))		N
cond4(RSGCN VH H)	=IF(I2="Very High",1,IF(I2="High",1,0))		O
cond5(ESA = T or E)	=IF(G2="LE",1,IF(G2="LT",1,0))		P
cond6(G3 or G4)	=IF(LEFT(E2,2)="G3",1,IF(LEFT(E2,2)="G4",1,0))		Q
cond7(S1)	=IF(LEFT(D2,2)="S1",1,0)		R
cond8(G5)	=IF(LEFT(E2,2)="G5",1,0)		S
cond9(ESA = T or C)	=IF(G2="LT",1,IF(G2="LC",1,0))		T
cond10(S3)	=IF(LEFT(D2,2)="S3",1,0)		U
cond11(G3)	=IF(LEFT(E2,2)="G3",1,0)		V
cond12(Moderate)	=IF(I2="Moderate",1,0)		W

Primary conditionals and their relationship to the criteria.

A secondary set of conditionals is used to assign priorities levels based on a table of binary values resulting from the primary conditionals. If a primary conditional evaluated to true then a value of 1 is present in the table. Likewise if the conditional evaluated to false then a value of 0 is present in the table. Using this method, multiple primary conditionals can be re-used in the secondary conditionals.

Self-documenting binary grid											
Cond1 (G1orG2)	Cond2 (ESA E)	Cond3 (S1 or S2)	Cond4 (RSGCN VH H)	Cond5 (ESA = T or E)	Cond6 (G3 or G4)	Cond7 (S1)	Cond8 (G5)	Cond9 (ESA = T or C)	Cond10 (S3)	Cond11 (G3)	Cond12 (Moderate)
1	0	1	1	0	0	1	0	0	0	0	0
0	0	1	0	0	1	1	0	0	0	0	0
0	0	0	0	0	0	0	1	0	1	0	0
0	0	0	0	0	0	0	1	0	1	0	0
0	0	1	0	0	1	1	0	0	0	1	1
0	0	0	0	0	1	0	0	0	1	0	0
0	0	1	0	0	1	1	0	0	0	1	0
0	0	1	0	0	1	0	0	0	0	0	0

An example of a secondary conditional.

C1: "G1 or G2"

C2: "ESA = E"

Conditional: C1 or C2 = Highest

Excel function: =IF(L2+M2>0,"Highest",")

	Primary Conditionals
cond1(G1 or G2)	IF(LEFT(E2,2)="G1",1,IF(LEFT(E2,2)="G2",1,0))
cond2(ESA E)	IF(G2="LE",1,0)
cond3(S1 or S2)	IF(LEFT(DS,2)="S1",1,IF(LEFT(D2,2)="S2",1,0))
cond4(RSGCN VH H)	IF(12="Very High",1,IF(12="High",1,0))
cond5(ESA = T or E)	IF(G2="LE",1,IF(G2="LT",1,0))
cond6(G3 or G4)	IF(LEFT(E2,2)="G3",1,IF(LEFT(E2,2)="G4",1,0))
cond7(S1)	IF(LEFT(D2,2)="S1",1,0)
cond8(G5)	IF(LEFT(E2,2)="G5",1,0)
cond9(ESA = T or C)	IF(G2="LT",1,IF(G2="LC",1,0))
cond10(S3)	IF(LEFT(D2,2)="S3",1,0)
cond11(G3)	IF(LEFT(E2,2)="G3",1,0)
cond12(Moderate)	IF(12="Moderate",1,0)

Secondary Conditionals	
IF(L2+M2>0,"Highest","")	C1 or C2 = Highest
IF(N2+O2=2,"Highest",IF(N2+P2=2,"Highest",""))	C3 and C4 = Highest Else C3 and C5 = Highest
IF(N2+Q2=2,"High","")	C3 and C6 = High
IF(R2+S2=2,"High","")	C7 and C8 = High***
IF(N2+W2=2,"High","")	C3 and C12 = High
IF(O2+U2=2,"High","")	C3 and C10 = High
IF(T2+U2=2,"High","")	C9 and C10 = High
IF(U2+V2=2,"Moderate",IF(W2+U2=2,"Moderate",""))	C10 and C11 = Moderate Else C11 and C12 = Moderate

Both sets of conditionals showing that secondary conditionals are dependent on primary conditionals (shaded cells in table).

There are 12 primary conditionals and 8 secondary conditionals. There is one conditional that combines them all into a priority assignment. This last conditional merely parses the results of the secondary conditional from higher to lower priority until it reaches a non-blank value. This is the highest priority assigned according to the criteria.

Parse columns from Highest through High to Moderate to find first non-blank value.

```
=IF(Z2>"",Z2,IF(AA2>"",AA2,IF(AB2>"",AB2,IF(AC2>"",AC2,IF(AD2>"",AD2,IF(AE2>"",AE2,IF(AF2>"",AF2,IF(AG2>"",AG2,""))))))))
```

All of the species that were assessed a Moderate priority met the "RSGCN Moderate and S3" criterion. Some of these did not meet the "G3 and S3" criterion.

An additional step was implemented to assess the assigned priorities. The species list was reviewed to note any species that were actively tracked by the Tennessee Natural Heritage Program but were not assigned a priority. Likewise any species that were not actively tracked but did get a priority assignment were noted. All items noted were reviewed individually to determine why they were assigned or not assigned a priority.

Exceptions

Tracked species that were not automatically assigned a priority.

A number of species that are tracked and did not get priorities assigned had ranks of G5 and S2 and a status of Threatened or Special Concern. There were also a few species with ranks of G5 and S2 with a status of Endangered that were not assigned a priority. These were manually assigned a priority of Moderate. Some species that are tracked and were not assigned a priority had non-standard ranks that did not fit the criteria. For some species there is enough information to assign a state rank but not enough to assign a global rank and these are assigned a non-numeric rank. For these tracked species a priority of Moderate was assigned manually.

Species no longer tracked that were automatically assigned a priority.

Species that are no longer tracked that were assigned a priority fall into several categories. Some are globally rare but extirpated or historic in Tennessee. Others are globally rare and their status in the state is uncertain. The remainder either involve taxonomic issues or are species with outdated ranks. Those with outdated ranks are mostly made up of species which were removed from the state list based on observations that were not used to update the state rank. Most of these automatically assigned priorities were rejected. An exception to this is *Dalea gattereri*. It is one of the least conservative cedar glade endemics and as such is among the last to survive in

altered cedar glade habitat. But it also serves as an indicator of these impacted habitats that are potential restoration targets for higher priority plant and animal conservation activities.

This process identified 618 species that met criteria (automatic and manual) for assigning a priority and inclusion in the Tennessee SWAP plant list. Although including formerly tracked species in the evaluation produced almost all of the problems that required detailed review, that decision also insured a more thorough evaluation process. It also led to identifying items which need a current state rank evaluation.

