

Reference Guide
for

Dwarf Mistletoe Impact Model Keywords:

Program Execution Control:

COMMENT
END
MISTABLE
MISTOE
MISTOFF
MISTPRT

Inventory Data Entry:

MISTPINF

Modification of Model Assumptions:

MISTGMOD
MISTHMOD
MISTMORT
MISTMULT
MISTPREF

The information presented in this keyword reference guide is excerpted from the *Dwarf Mistletoe Impact Modeling System, User Guide and Reference Manual Nonspatial Model, 2005 Update, Revision September 2010*. Detailed information regarding the use of these keywords, complete model description, Forest Vegetation Simulator variants in which the Dwarf Mistletoe Model is available, lists of affected and non-affected tree species by variant can be found in the user guide and reference manual. A list of tree species and their two-character alpha codes for the Western United States FVS variants is in Appendix A at the end of this document.

COMMENT

This keyword is used to enter comments that will be reported in the keyword summary table. This keyword does not have any associated fields, but does require at least one supplemental record. Comments can be entered in columns 1 to 80 on as many supplemental records as desired. The comment is terminated with an END keyword; anything entered between the COMMENT and END keywords will not affect the operation of the model.

DWARF MISTLETOE IMPACT MODEL

END

This keyword is used to signify the end of a keyword set or the end of a COMMENT block within a keyword set as shown in the example below.

Example:

MISTOE

Dwarf Mistletoe Impact Model keywords here.

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.

.

COMMENT

any number of comment lines here

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.

.

END

.

.

.

END

Fields 1-7

Not used.

DWARF MISTLETOE IMPACT MODEL

MISTABLE This keyword is used to produce the detailed species/DBH class statistical output tables. Multiple entries of this keyword may be supplied in a single Dwarf Mistletoe Model keyword set. Detail tables may be requested for any tree species, regardless as to whether it is affected by dwarf mistletoe. There is currently no option to write this output directly to a database.

Field 1 Year or cycle number in which to generate the species/DBH class tables.
[Range: 4-digit calendar year or 0 to 40 for cycle number]

Field 2 Tree species code for which the DBH class detail table is desired. A "0" entry for species will produce tables for all dwarf mistletoe-affected species for the variant, but not those species unaffected by dwarf mistletoe. Tables for unaffected species must be individually requested.
[Range: Number or character code of tree species for the FVS variant in use.]

Fields 3-7 Not used.

Field Default Values

Field	1	2	3	4	5	6	7
All variants	1	0					

MISTGMOD

This keyword provides diameter growth modification values by species and DMR class. Diameter growth modifiers are real number values representing proportions of normal diameter growth due to dwarf mistletoe infection based on the intensity of infection for the tree. This keyword is only valid between a MISTOE and an END keyword. More than one MISTGMOD keyword may be used per sequence. Proportions set at any date remain in effect until replaced by a later scheduled MISTGMOD keyword.

Field 1 Year or cycle number in which diameter growth proportions are applied. [Range: 4-digit calendar year or 1 to 40 for cycle number. A “0” will cause the activity to be performed every cycle which would not be appropriate.]

Field 2 Tree species code to which growth modifiers will be applied or changed. [Range: Number or character code of host tree species.]

Fields 3-7 Not used.

Supplemental Record The supplemental record is used to supply diameter growth modifiers by DMR for the cycle and species listed above. Six fields are required starting in any column and space delimited, the first for DMR = 1, the second for DMR = 2, and so on. In the following example:

1.0 1.0 1.0 0.83 0.65 0.49

Diameter growth proportion of normal for DMR values of 1 through 3 are 1.0 (100%), specifying that these levels of dwarf mistletoe infection do not impact the diameter growth of the tree. The proportion of normal for DMR values 4 through 6 are progressively smaller and specify that a tree with a DMR of 4 will experience diameter growth of 83% of normal (or a 17% growth loss) while a tree with a DMR value of 6 will have a diameter growth of just 49% of normal (or a 51% growth loss). Values must range from 0 to 1.0.

Field Default Values

Field	1	2	3	4	5	6	7
All variants	1	0					

MISTHMOD

This keyword provides height growth modification values by species and DMR class. Height growth modifiers are real number values representing proportions of normal diameter growth due to dwarf mistletoe infection based on the intensity of infection for the tree. This keyword is only valid between a MISTOE and an END keyword. More than one MISTHMOD keyword may be used per sequence. Proportions set at any date remain in effect until replaced by a later scheduled MISTHMOD keyword.

Field 1 Year or cycle number in which height growth proportions are applied.
 [Range: 4-digit calendar year or 1 to 40 for cycle number. A “0” will cause the activity to be performed every cycle which would not be appropriate.]

Field 2 Tree species code to which growth modifiers will be applied or changed.
 [Range: Number or character code of host tree species.]

Fields 3-7 Not used.

Supplemental Record The supplemental record is used to supply height growth modifiers by DMR for the cycle and species listed above. Six fields are required starting in any column and space delimited, the first for DMR = 1, the second for DMR = 2, and so on. In the following example:

1.0 1.0 0.95 0.65 0.50 0.10

Height growth proportion of normal for DMR values of 1 and 2 are 1.0 (100%), specifying that these levels of dwarf mistletoe infection do not impact the height growth of the tree. The proportion of normal for DMR values 3 through 6 are progressively smaller and specify that a tree with a DMR of 3 will experience height growth of 95% of normal (or a 5% growth loss) while a tree with a DMR value of 6 will have a height growth of just 10% of normal (or a 90% growth loss). Values must range from 0 to 1.0.

Field Default Values

Field	1	2	3	4	5	6	7
All variants	1	0					

DWARF MISTLETOE IMPACT MODEL

MISTMORT

This keyword provides a multiplier to alter dwarf mistletoe's effects on mortality. Multiple MISTMORT keywords may be used in a single keyword set. A multiplier set at any date remains in effect until replaced by a later scheduled MISTMORT keyword.

Field 1 Year or cycle number in which mortality multiplier is applied.
[Range: 4-digit calendar year or 1 to 40 for cycle number]

Field 2 Tree species code to which the mortality multiplier is applied.
[Range: Number or character code of host tree species for the FVS variant in use.]

Field 3 Multiplier for changing dwarf mistletoe effects on mortality; a multiplier greater than 1 will increase mortality rate and a multiplier less than 1 will decrease mortality rate. Entries for this field must be greater than or equal to 0.

Fields 4-7 Not used.

Field Default Values

Field	1	2	3	4	5	6	7
All variants	1	0	1.00				

DWARF MISTLETOE IMPACT MODEL

MISTMULT This keyword provides multipliers used to alter the existing rate of dwarf mistletoe spread and intensification through a stand. Multiple MISTMULT keywords may be used in a single keyword set. Multipliers set at any date remain in effect until replaced by a later scheduled MISTMULT keyword.

Field 1 Year or cycle number in which spread and intensification multipliers are applied. A multiplier remains in effect until replaced by a later scheduled multiplier.
[Range: 4-digit calendar year or 1 to 40 for cycle number]

Field 2 Tree species code to which spread and intensification is modified.
[Range: Number or character code of host tree species.]

Field 3 Multiplier for changing probability of increasing DMR. A multiplier greater than 1 will increase this probability, and a multiplier less than 1 will decrease this probability. Entries for this field must be greater than or equal to 0.

Field 4 Multiplier for changing probability of decreasing DMR. A multiplier greater than 1 will increase this probability, and a multiplier less than 1 will decrease this probability. Entries for this field must be greater than or equal to 0.

Fields 5-7 Not used.

Field Default Values

Field	1	2	3	4	5	6	7
All variants	1	0	1.00	1.00			

DWARF MISTLETOE IMPACT MODEL

MISTOE

The MISTOE keyword is actually an FVS Model keyword signifying that the Dwarf Mistletoe Model is to be called. All following keywords, up to the associated END keyword, must be Dwarf Mistletoe Model keywords.

There are no fields associated with this keyword.

DWARF MISTLETOE IMPACT MODEL

MISTOFF

This keyword is used to instruct FVS and the Dwarf Mistletoe Model to ignore all effects of dwarf mistletoe, whether or not any are present in the stand.

There are no fields associated with this keyword.

DWARF MISTLETOE IMPACT MODEL

MISTPINF This keyword is used to introduce dwarf mistletoe infections to a portion of trees in the stand that were not already infected. Multiple MISTPINF keywords may be used in a single keyword set.

Field 1 Year or cycle number in which dwarf mistletoe infections are added to the trees.
[Range: 4-digit calendar year or 0 to 40 for cycle number]

Field 2 Tree species code to be infected.
[Range: Number or character code of host tree species.]

Field 3 Proportion of the uninfected trees of the species to be infected.
[Range: 0.0 to 1.0]

Field 4 Level of infection for that species:

1 = all trees will start with DMR 1.
2 = all trees will start with DMR 1 or 2.
3 = all trees will start with DMR 1, 2, or 3.
4 = all trees will start with DMR 1, 2, 3, or 4.
5 = all trees will start with DMR 1, 2, 3, 4, 5, or 6.

Field 5 Method of infection for the stand:

0 = random infection throughout the species
1 = infection moves from tallest trees to shortest trees
2 = infection moves from shortest trees to tallest trees

Fields 6-7 Not used.

Field Default Values

Field	1	2	3	4	5	6	7
All variants	1	0	0.00	1	0		

DWARF MISTLETOE IMPACT MODEL

MISTPREF This keyword sets removal preference values based on DMR for dwarf mistletoe-infected trees. These values are used in FVS for computing removal priority of trees. Preference values remain in effect until replaced by subsequent removal preference values. Multiple MISTPREF keywords may be used in a single keyword sequence. (For more information on removal priority and how MISTPREF values are used in the algorithm, see *Essential FVS: A User's Guide to the Forest Vegetation Simulator*.)

Field 1 Year or cycle number in which removal preference values will be applied.
[Range: 4-digit calendar year or 0 to 40 for a cycle number]

Field 2 Tree species code whose removal preference will be changed.
[Range: Number or character code of host tree species.]

Fields 3-7 Not used.

Supplemental Record The supplemental record is used to specify removal preferences of the 6 dwarf mistletoe ratings for the cycle and species listed above. Six fields are required starting in any column and space delimited, the first for DMR = 1, the second for DMR = 2, and so on. In the following example:

0 0 0 4000 5000 6000

trees with DMR = 6 have the highest cutting preference added to their calculated tree removal priority value (also known as cutting preference), trees with DMR = 5 will be cut next, and then trees with DMR = 4 next. Because the first three fields are zeros, trees with DMR's of 1, 2, or 3 are treated the same as uninfected trees.

[Range: none]

Field Default Values

Field	1	2	3	4	5	6	7
All variants	1	0					

DWARF MISTLETOE IMPACT MODEL

MISTPRT

This keyword is used to instruct the Dwarf Mistletoe Model to print the statistical summary tables. If the keyword is present three summary tables (stand totals, species specific, and DBH class) will be printed. If keyword is not present, the tables will not be printed. Additionally, this table can also be written directly to a database with the inclusion of the Database Extension keyword MisRpts. For more information see the *Dwarf Mistletoe Impact Modeling System Users Guide and Reference Manual Nonspatial Model* and *Users Guide to the Database Extension of the Forest Vegetation Simulator*.

Field 1

Lower threshold DBH in inches for trees to be counted in DMI/DMR statistics. Trees with a smaller DBH will be ignored during the calculations. The value in this field must be greater than or equal to 0.

Fields 2-7

Not used.

Field Default Values

Field	1	2	3	4	5	6	7
All variants	1.0						

Appendix A: Species Codes
Species Codes - All Western Variants

AF	Subalpine fir	MH	Mountain hemlock
AS	Quaking aspen	MM	Rocky Mountain maple
BC	Bristlecone pine	MP	Monterey pine
BL	Blue oak	NF	Noble fir
BM	Bigleaf maple	OA	Oak species
BO	California black oak	OH	Other hardwoods
BR	Brewer spruce	OS	Other softwoods
BS	Blue spruce	OT	Other species
BU	California buckeye	PB	Paper birch
CB	Corkbark fir	PC	Port-Orford-cedar
CH	Bitter cherry	PI	Pinyon pine
CL	California-laurel	PP	Ponderosa pine
CN	California nutmeg	PY	Pacific yew
CO	Cottonwood species	RA	Red alder
CP	Coulter pine	RC	Western redcedar
CW	Black cottonwood	RF	California red fir
CY	Canyon live oak	RM	Rocky Mountain juniper
DF	Douglas-fir	RW	Coast redwood
DG	Pacific dogwood	SF	Pacific silver fir
EO	Engelmann oak	SH	Shasta red fir
ES	Engelmann spruce	SP	Sugar pine
FL	Oregon ash	SS	Sitka spruce
GC	Giant chinkapin	SW	Southwestern white pine
GF	Grand fir	SY	California sycamore
GP	Gray pine	TO	Tanoak
GS	Giant sequoia	VO	Valley white oak
HT	Hawthorn species	WA	White alder
IC	Incense-cedar	WB	Whitebark pine
IO	Interior live oak	WF	White fir
JP	Jeffrey pine	WH	Western hemlock
JU	uniper species	WI	Willow species
KP	Knobcone pine	WJ	Western juniper
LL	Subalpine larch	WL	Western larch
LM	Limber pine	WN	Walnut species
LO	Coast live oak	WO	Oregon white oak
LP	Lodgepole pine	WP	Western white pine
MA	Pacific madrone	WS	White spruce
MB	Birchleaf Mountain Mahogany	YC	Alaska-cedar
MC	Curl-leaf Mountain Mahogany		