Appendix C: Hsi.ini Configuration File and Documentation

Hsi.ini Configuration File Documentation

Hsi.ini contains all the values needed to control the functionality of satophsi.py. Application of models, calculation methods, cover type thresholds, static habitat attribute data, and output table type can all be set in the configuration file. Eleven sections are available to be set by the user:

Conifer Species

This section contains a list of species codes for all conifer species for the area. These are dependent on the growth model being used by LMS. Since Satsop Forest resides with in the range of the Pacific Northwest variant of the Forest Vegetation Simulator (FVS reference here) codes are for species found in the Satsop Forest area. Defaults are DF (Douglas-fir), WH (western hemlock), RC (western redcedar), SS (Sitka spruce), WP (western white pine), NF (noble fir), GF (grand fir), and SF (silver fir). Codes for species other than these that occur in other areas can be added so that this HEP can be applied.

Cover Types

This section contains a list of all the cover type codes. These come directly from the original HEP (table XX). These should not be modified. If it is necessary to add other cover types to the analysis it will be necessary to all habitat data in the DATA section of the configuration file.

Timbered Types

This section contains a subset of the Cover Types that contain trees that are modeled with the growth model used in LMS. For the analysis in LMS the cover types are C4, C4T, C3, C3T, C2, C1, M3, M3T, M2, M1, H3, H2, H1. These also should not be modified unless threshold values are added in the DATA section of the configuration file.

Timbered Type Attributes

This section contains a list of cover type threshold variable names. These come directly from the original HEP cover typing rules these are CCVar (percent canopy closure), PCVar (percent conifer), PDVar (percent deciduous), LVar (canopy layers), MinDBHVar (minimum DBH (in inches)), MaxDBHVar (maximum DBH (in inches)), BTVar (minimum number of trees with DBH ≥21"), HTVar (minimum average height (in feet)), TPAVar (minimum trees per acre). These can be modified to fit other areas, if necessary, but other variables cannot be added without modifying the HEPCode function in satsophsi.py.

Percent Method

This defines how the composition of the stand is determined. Calculation can be by trees per acre ("T") or basal area ("B").

Habitat Attributes

This section contains the variable names for all of the habitat attributes used by the HSI models. These come directly from the models in satsophsi.py they should not be modified. Variable names are CC (percent canopy closure), OSDBH (DBH (in inches) of the 40 biggest trees per acre), CCC (percent conifer canopy closure, TGC (percent total

ground cover), GR (percent grass cover), DnF (percent cover of downfall litter), SSI (shrub suitability index), BT (trees per acre ≥ 21 " DBH), Stp (stumps per acre), L7 (logs per greater ≥ 7 " diameter), BSn (snags per acre with DBH ≥ 21 "), and DBHBSn (average DBH of snags ≥ 21 " DBH).

Data Type

This allows the user to use static ("Static") or dynamic ("Dynamic") data for habitat calculations. Static data is entered in the DATA section of the configuration file and assumed to be constant for the specified cover type. Dynamic data is calculated from current and projected inventory with functions in satsophsi.py.

HSI Models

This section contains a list of the HSI models used in the analysis. The current set is limited to Cooper's hawk ("CHawk"), southern red-backed vole ("SRVole"), pileated woodpecker ("PWoodpecker"), and spotted towhee ("STowhee"). The user can select one or several of the species for an analysis. To add additional models it will be necessary to add them to the satsophsi.py code. This is not recommended since it would be a major undertaking.

Application Cover Types

For each HSI model the user can define the cover types that the model is applied to. There are two options: Static and Dynamic. Static applies the model to the cover types used in the original HEP performed on Satsop Forest. Dynamic applies the models to the cover types published in the documentation for each model. Depending on how the user has the Data Type set in the configuration file the analysis can be customized to apply the model only to specific cover types. The only valid values to be used come from the list of cover types in the Cover Types section of the configuration file.

Cover Type Output

Several cover type table formats can be chosen selected as output from satsophsi.py that include those used in the original HEP plus additional table that expand analaysis types that can be performed using the output tables. These formats are:

STD – Columns: Year, Stand, Cover type

SUM - Summary of cover type acreages by year

ALL – Both STD and SUM tables with a separator

AV – Formatted for importing into ESRI ArcView for mapping and spatial analysis

DEBUG – STD output with all variable values appended for each stand for each year

Habitat Output

Several habitat table formats are available that mimic those used in the original HEP with the addition of other formats. These are:

HSI – Columns: Year, Stand, Acres, Species 1 HSI, Species 2 HSI...

HU – Habitat units for each species for each year for the entire landscape

AAHU – Annual average habitat units for each species for the life of the LMS projection

BySpp - Individual tables for each species for each year with acreage and average HSI

for the entire landscape

HSISum – Habitat acreage and HSI for each species for each year

ALL – HSISum, HU, and AAHU tables with separators

AV – Formatted for importing into ESRI ArcView for mapping and spatial analysis DEBUG – HSI table with all variables appended for each species for each stand and year

DATA

Sections are available for entering data and cover typing thresholds for each cover type. For each cover type the first section contains cover typing threshold values with the names being the same as in the Timber Type Attributes section. Not all variables apply to all cover types. For variables that do not apply an entry of 0 or 999 is used. The second section contains static data for each cover type. The static data are understory and standing dead and downed wood that are not modeled within LMS as well as overstory data. Variable names are those from the Habitat Attributes section. All the values come from the data collected and reported in the original HEP documentation as averages for each cover type. Any of these values can be modified based on inventories of other areas for habitat analysis.

Hsi.ini Configuration File

[Conifer Species]

Conifer=DF WH RC SS WP NF GF SF

[Cover Types]

CTypeList=C4 C4T C3 C3T C2 C1 M3 M3T M2 M1 H3 H2 H1 B G PF PE

[Timbered Types]

TTypeList=C4 C4T C3 C3T C2 C1 M3 M3T M2 M1 H3 H2 H1 B

[Timbered Type Attributes]

TTAttList=CCVar PCVar PDVar LVar MinDBHVar MaxDBHVar BTVar HTVar TPAVar

```
[Percent Method]
PM=B
[C4]
PCVar=75
PDVar=0
LVar=3
CCVar=70
MaxDBHVar=999
MinDBHVar=0
BTVar=20
HTVar=40
TPAVar=0
CC=80.6
OSDBH=21.4
CCC=73.7
TGC=31.6
GR=0.0
DnF=18.6
SSI=0.5
BT=54.4
Stp=42.2
L7=71.0
BSn=4.4
DBHBSn=27.8
[C4T]
PCVar=75
PDVar=0
LVar=0
CCVar=70
MaxDBHVar=999
MinDBHVar=21
BTVar=0
HTVar=40
TPAVar=0
CC=55.1
OSDBH=17.6
CCC=48.3
TGC=42.1
GR=0.6
DnF=18.6
SSI=0.5
```

BT=28.6 Stp=97.9 L7=63.3 BSn=1.4 DBHBSn=28.0
[C3] PCVar=75 PDVar=0 LVar=0 CCVar=70 MaxDBHVar=21 MinDBHVar=12 BTVar=0 HTVar=0 TPAVar=0
CC=76.0 OSDBH=17.1 CCC=73.7 TGC=39.7 GR=0.1 DnF=17.5 SSI=0.5 BT=30.0 Stp=45.0 L7=56.2 BSn=2.0 DBHBSn=24.5
[C3T] PCVar=75 PDVar=0 LVar=0 CCVar=70 MaxDBHVar=21 MinDBHVar=12 BTVar=0 HTVar=0 TPAVar=0
CC=70.0 OSDBH=17.1 CCC=58.0 TGC=40.0

GR=0.6 DnF=18.5 SSI=0.5 BT=22.5 Stp=45.0 L7=63.3 BSn=2.0DBHBSn=24.5 [C2] PCVar=75 PDVar=0 LVar=0 CCVar=50 MaxDBHVar=12 MinDBHVar=4 BTVar=0 HTVar=0 TPAVar=0 CC=98.0 OSDBH=5.4 CCC=97.6 TGC=12.8 GR=0.7 DnF=16.3 SSI=0.2 BT=0.0 Stp=90.0 L7=41.4 BSn=0.0 DBHBSn=0.0 [C1] PCVar=75 PDVar=0 LVar=0 CCVar=0 MaxDBHVar=4 MinDBHVar=0 BTVar=0 HTVar=0 TPAVar=150

CC=43.8

OSDBH=2.0 CCC=21.1 TGC=23.8 GR=8.1 DnF=15.2 SSI=0.4 BT=0.0 Stp=209.2 L7=26.7 BSn=0.0 DBHBSn=0.0 [M3] PCVar=75 PDVar=75 LVar=0 CCVar=70 MaxDBHVar=999 MinDBHVar=12 BTVar=0 HTVar=40 TPAVar=0 CC=75.9 OSDBH=15.4 CCC=25.5 TGC=45.3 GR=1.2 DnF=8.9 SSI=0.6 BT=17.5 Stp=56.1 L7=21.0 BSn=0.7 DBHBSn=32.0 [M3T] PCVar=75 PDVar=75 LVar=0 CCVar=70 MaxDBHVar=999

MinDBHVar=12

BTVar=0

HTVar=40 TPAVar=0
CC=50.0 OSDBH=17.1 CCC=25.5 TGC=45.3 GR=2.0 DnF=18.9 SSI=0.6 BT=17.5 Stp=56.1 L7=15.0 BSn=2.0 DBHBSn=32.0
[M2] PCVar=75 PDVar=75 LVar=0 CCVar=50 MaxDBHVar=12 MinDBHVar=4 BTVar=0 HTVar=0 TPAVar=0
CC=74.0 OSDBH=6.1 CCC=17.3 TGC=42.1 GR=2.3 DnF=11.0 SSI=0.4 BT=2.3 Stp=100.0 L7=30.5 BSn=1.5 DBHBSn=28.5
[M1] PCVar=75 PDVar=75

LVar=0

CCVar=0 MaxDBHVar=4 MinDBHVar=1 BTVar=0 HTVar=0 TPAVar=150
CC=19.8 OSDBH=1.7 CCC=6.6 TGC=58.3 GR=6.3 DnF=13.1 SSI=0.5 BT=0.0 Stp=148.8 L7=40.0 BSn=0.0 DBHBSn=0.0
[H3] PCVar=0 PDVar=75 LVar=0 CCVar=50 MaxDBHVar=999 MinDBHVar=12 BTVar=0 HTVar=0 TPAVar=0
CC=85.8 OSDBH=13.1 CCC=18.8 TGC=55.5 GR=0.8 DnF=7.1 SSI=0.4 BT=9.2 Stp=97.7 L7=31.7 BSn=0.0 DBHBSn=0.0

[H2] PCVar=0 PDVar=75 LVar=0 CCVar=50 MaxDBHVar=12 MinDBHVar=4 BTVar=0 HTVar=0 TPAVar=0
CC=70.6 OSDBH=6.4 CCC=2.4 TGC=49.3 GR=11.5 DnF=6.8 SSI=0.4 BT=0.8 Stp=93.3 L7=20.0 BSn=0.0 DBHBSn=0.0
[H1] PCVar=0 PDVar=75 LVar=0 CCVar=50 MaxDBHVar=4 MinDBHVar=1 BTVar=0 HTVar=0 TPAVar=0
CC=47.1 OSDBH=3.7 CCC=1.1 TGC=51.4 GR=33.2 DnF=6.5 SSI=0.3 BT=0.6 Stp=58.8 L7=8.3

BSn=0.0 DBHBSn=0.0
[B] PCVar=0 PDVar=0 LVar=0 CCVar=50 MaxDBHVar=9999 MinDBHVar=0 BTVar=0 HTVar=0 TPAVar=0
CC=11.4 OSDBH=4.5 CCC=4.3 TGC=53.3 GR=32.0 DnF=5.0 SSI=0.3 BT=0.0 Stp=30.0 L7=4.2 BSn=0.0 DBHBSn=0.0
[G] CC=0.5 OSDBH=2.1 CCC=0.1 TGC=71.7 GR=66.9 DnF=1.0 SSI=0.2 BT=0.0 Stp=0.0 L7=0.0 BSn=0.0 DBHBSn=0.0
[PF] CC=63.3 OSDBH=6.9 CCC=0.0 TGC=28.3

GR=10.8 DnF=14.6 SSI=0.7BT=5.6 Stp=3.3 L7=15.8 BSn=1.1DBHBSn=21.0 [PE] CC=0.7 OSDBH=1.0 CCC=0.0TGC=72.2 GR=67.2 DnF=0.3SSI=0.3 BT=0.0 Stp=0.0 L7=0.0 BSn=0.0 DBHBSn=0.0

[Habitat Attributes]

HabAtt=CC OSDBH CCC TGC GR DnF SSI BT Stp L7 BSn DBHBSn

[Run Type]

RunType=ModDoc

[HSI Models]

ModelList=CHawk SRVole STowhee PWoodpecker

[CHawk] HEP=H2 H3 M2 M3 M3T PF DOC=B C1 C2 C3 C3T C4 C4T M1 M2 M3 M3T H1 H2 H3 PF

[SRVole] HEP=C2 C3 C3T C4 C4T H2 H3 M2 M3 M3T DOC=B C1 C2 C3 C3T C4 C4T M1 M2 M3 M3T H1 H2 H3

[PWoodpecker] HEP=C2 C3 C3T C4 C4T M2 M3 M3T PF

DOC=B C1 C2 C3 C3T C4 C4T M1 M2 M3 M3T H1 H2 H3 PF

[STowhee] HEP=B C1 C2 H1 H2 M1 M2 G PE PF DOC=B H1 H2 H3 PE PF M1 M2 M3

[HEP Output]

HEPOut=STD

[HSI Output]

HSIOut=HSI