

Lab #8 – Vegetation Dynamics Development Tool (VDDT)

NR506 – Advanced GIS Applications in Fire Ecology and Management

Objectives

- Learn about vegetation change through modeling
- Understand the terms potential vegetation types, cover types and structure
- Understand VDDT successional block diagrams
- Understand successional pathways and disturbance regimes
- Look at landscape change through time in relation to fire regimes

Find out more about VDDT on the ESSA Technologies web page:

<http://www.essa.com/downloads/vddt/index.htm>

1. Load and interpret the Fescue grassland PVT in VDDT

The following tables explain abbreviations used for pvt, cover, structure and disturbances. All tables are located in c:/VDDT. You can open the tables with Wordpad or in Excel.

table	description
Cover.txt	Description of cover codes (long version)
Coverc.txt	Description of cover codes (short version)
Structure.txt	Description of structural stages used in VDDT
Distcode.txt *	Description of disturbance codes

* more detailed descriptions of the Disturbance codes can be found in the VDDTUserGuide.pdf (in c:/vddt/documents)

The PVT box-models are located in c:/NR506/data/VDDT_craigmtn. In this lab we will explore the following PVT's:

<u>DRDFB</u>	Douglas-fir with Ponderosa Pine
<u>DGFWF</u>	Dry Grand fir
<u>FESC_HI</u>	Fescue grassland (historic)
<u>AGST_HI</u>	Agropyron steppe (historic)

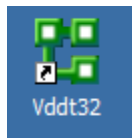
The disturbance categories related to fire in the Fescue PVT are:

WSRF	Wild Stand Replacing Fire
WMSF	Wild Mixed Severity Fire
WnonLethal	Wild Non-Lethal Fire
WUB	Wild Understory Burn

Disturbances related to Wildfire starts with a W

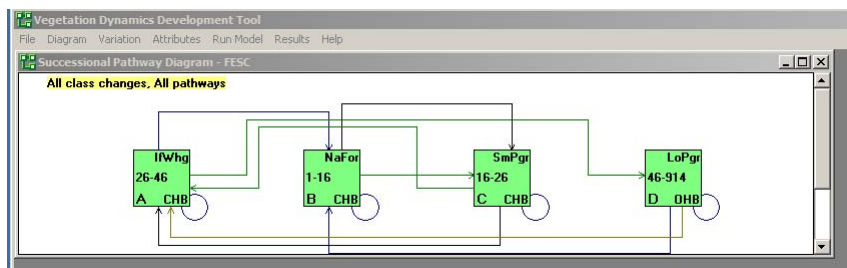
Disturbances related to Prescribed fire starts with a P

Disturbance codes can be found in the VDDTUserGuide.pdf (in c:/vddt/documents)



Start VDDT using the above icon on the desktop or in the Start menu.

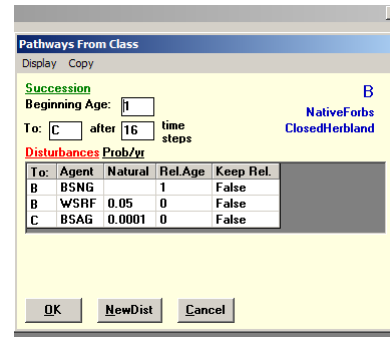
- Select *Open PVT file* in the *File* menu
- Load c:/NR506/data/VDDT_craigmtn/fesc_hi.pvt (pvt-file)
- Load c:/NR506/data/VDDT_craigmtn/fesc_hi.scn (scenario file)
- Load c:/NR506/data/VDDT_craigmtn/fesc_hi.LOC



NOTE: The successional stages (boxes) within a PVT are not always organized in alphabetical order or going from left to right. The years are not always correct on the 'box' label. You should open each box to see for sure how long the pvt stays in this particular cover-structure stage. - Yes this is annoying.

Double-click on each box to find information about time steps, successional pathways, disturbance probabilities etc.

You can only look at one box at a time.



Question #1: List the 'boxes' in **successional order** and enter the information in the table below. The first 'box' is done.

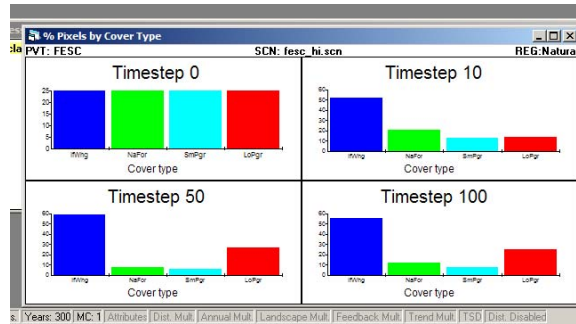
Box	Cover	Structure	Years in stage	Next stage (without disturbance)	Probability of WSRF	Next stage if WSRF
B	NativeForbs	Closed Herbland	16	C	0.05	B

Describe in a few sentences the succession and fire dynamics in this PVT?

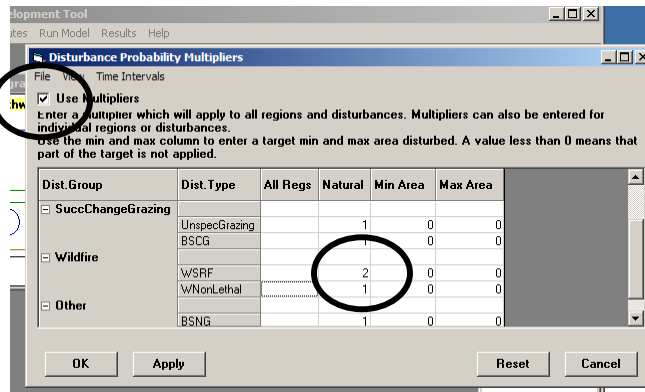
Question #2: Are there any other significant disturbances affecting this PVT? What are they? Describe briefly how they affect the dynamics within the PVT. Use the *VDDTUserGuide.pdf* (in *c:/vddt/documents*) to find disturbance definitions.

2. Run VDDT for the Fescue grassland PVT and interpret the results

- Select *Run Model – Enter Initial Conditions* – click ReCalc (this will evenly distribute the area in each 'box', 25% in each of the four boxes in this case)
- Select *Run Model – Run* to run the model
- View results; select *Results – Bar – Cover Type* (to view the distribution of cover types with time using the above fire probabilities)



- Select *Run Model – Change probs for an agent*
- Check Use multipliers, in crease the Wildfire probability by a factor 2 – OK
- Run the model again



Question #3: Compare the results from the two runs – how is the cover type distribution within the landscape changing when you double the fire probability?

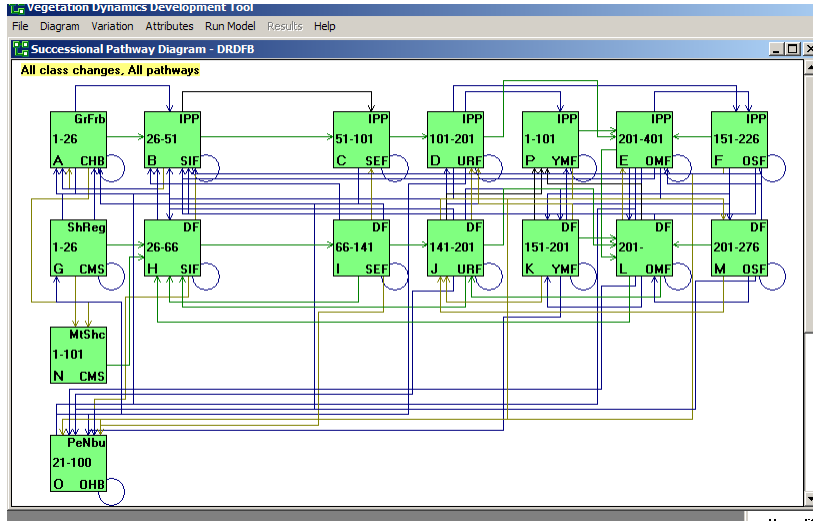
Question #4: Remove fire from the system (multiplier 0); describe and explain the results.

Close the Fescue PVT

3. Load and interpret the Douglas-fir with Ponderosa PVT in VDDT

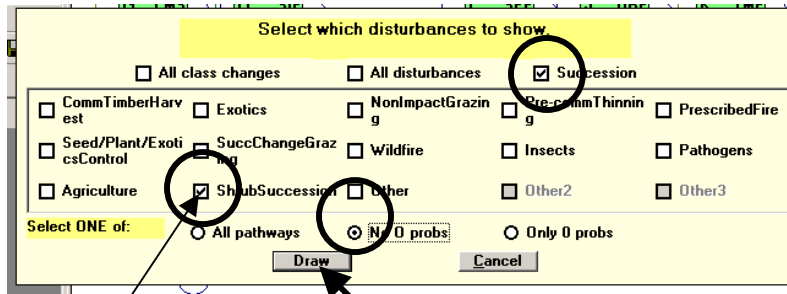
- Select *Open PVT file* in the *File* menu
- Load c:/NR506/data/VDDT_craigmtn/drdfb.pvt (pvt-file)
- Load c:/NR506/data/VDDT_craigmtn/ drdfb.scn (scenario file)
- Load c:/NR506/data/VDDT_craigmtn/ drdfb.LOC

This is really not as bad as it looks!



Question #5: How many 'succession boxes' are in the Douglas-fir/Ponderosa PVT?

- Select *Diagram* then *Simplify pathways* to look at only succession.



Shrub Succession in this case refers to the part of the forest stand succession before trees are established. Shrub succession is NOT a commonly used ecological term - it is simply part of the succession of this PVT.

Question #6: Within the Shrub/Regen stage (box G), the PVT can go into a Douglas-fir cover type or a Ponderosa Pine cover type. Explain what determines the pathways!

Question #7: Explain the events and logic in 'Old Multistory Ponderosa Pine' (box E)!

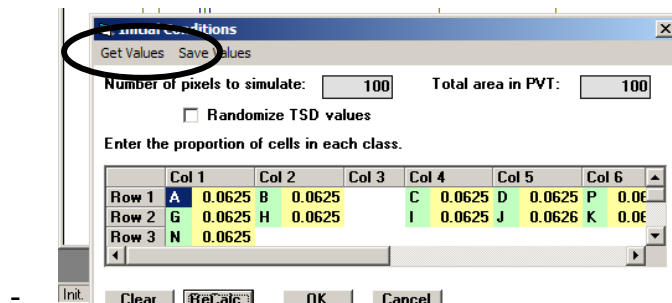
Question #8: In general, what is the probability for stand replacing fire (WSRF) and mixed severity fire (WMRF) set to in the Ponderosa successional boxes?

How is fire introduced in the Douglas-fir boxes?

- Select *Diagram* then *Simplify pathways* and redraw all class changes, do not draw the 0 probability pathways (makes the diagram complex to read).

4. Run VDDT for the Douglas-fir/Ponderosa PVT and interpret the results

- Edit the initial conditions in the *Run Model* menu (click recal to set the distribution of area equal between all stages initially). OK
- Disturbance types can be disabled in the *Run Model* menu or you can use multipliers to change probabilities for agents in the *Run Model* menu (as we did for the Fescue model).
- If you want to run the model more than 100 timesteps you can select *RunModel – Edit initial Conditions – Get Values – Use ending values* and then run the model again for another 100 timesteps



Question #9: Run this Douglas-fir/Ponderosa PVT at different fire levels and explain the fire dynamics in the system.

Question #10: Approximately how many timesteps does it take for the Ponderosa cover type to disappear from the system in the absence of wildfire?

Lab #6 – Vegetation Dynamics Development Tool (VDDT) - Questions

Question #1: List the 'boxes' in successional order and enter the information in the table below. The first 'box' is done.

Box	Cover	Structure	Years in stage	Next stage (without disturbance)	Probability of WSRF	Next stage if WSRF
B	NativeForbs	Closed Herbland	16	C	0.05	B

Describe in a few sentences the succession and fire dynamics in this PVT?

Question #2: Are there any other significant disturbances affecting this PVT? What are they? Describe briefly how they affect the dynamics within the PVT. Use the *VDDTUserGuide.pdf* (in *c:/vddt/documents*) to find disturbance definitions.

Question #3: Compare the results from the two runs – how is the cover type distribution within the landscape changing when you double the fire probability?

Question #4: Remove fire from the system (multiplier 0); describe and explain the results.

Question #5: How many 'succession boxes' are in the Douglas-fir/Ponderosa PVT?

Question #6: Within the Shrub/Regen stage (box G), the PVT can go into a Douglas-fir cover type or a Ponderosa Pine cover type. Explain what determines the pathways!

Question #7: Explain the events and logic in 'Old Multistory Ponderosa Pine' (box E)!

Question #8: In general, what is the probability for stand replacing fire (WSRF) and mixed severity fire (WMRF) set to in the Ponderosa successional boxes?

How is fire introduced in the Douglas-fir boxes?

Question #9: Run this Douglas-fir/Ponderosa PVT at different fire levels and explain the fire dynamics in the system.

Question #10: Approximately how many timesteps does it take for the Ponderosa cover type to disappear from the system in the absence of wildfire?