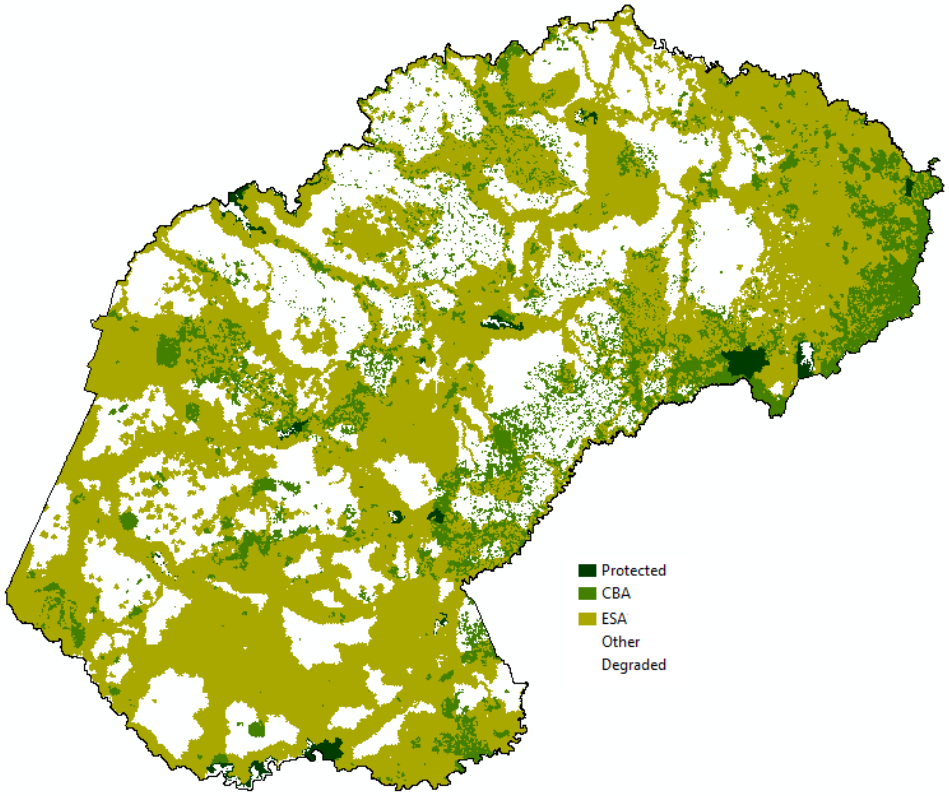
FREE STATE BIODIVERSITY PLAN

Using ArcGIS ModelBuilder for developing the Free State Biodiversity Plan



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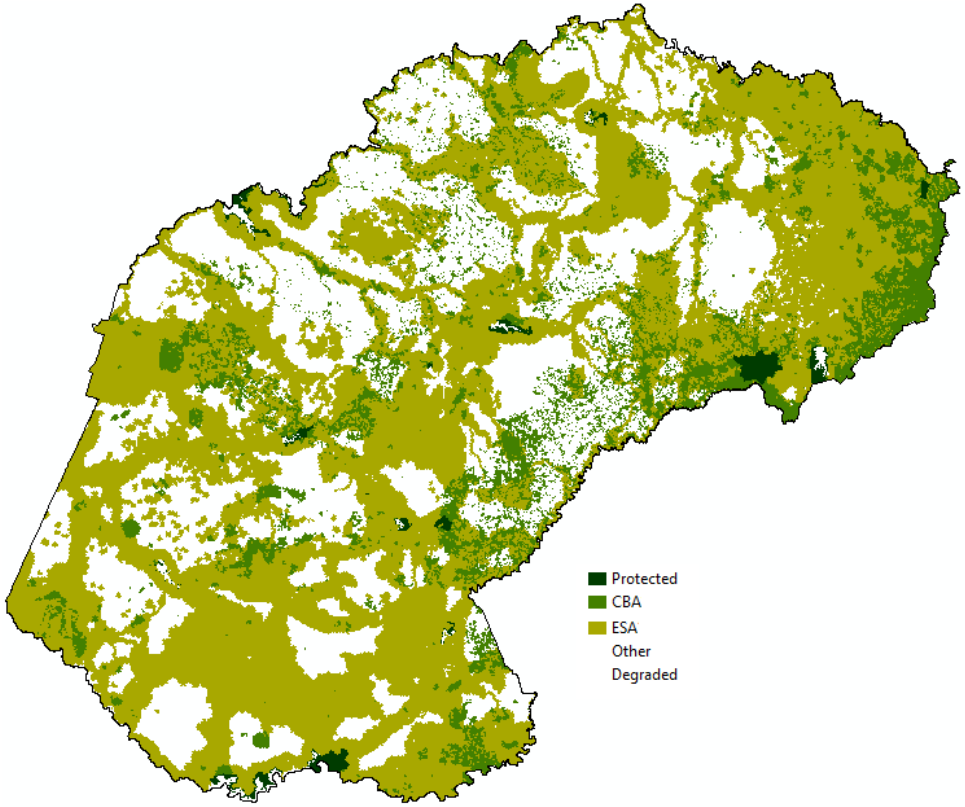
FREE STATE PROVINCE

FREE STATE BIODIVERSITY PLAN

Overview

- What is ModelBuilder?
- Why use ModelBuilder?



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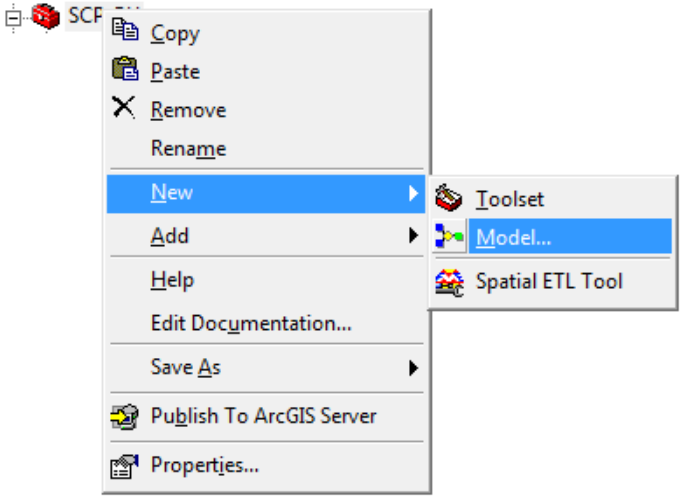
What is ModelBuilder?

- ModelBuilder comes standard with ArcGIS
- It is an application you use to create, edit, and manage models
- Models are workflows that string together sequences of geoprocessing tools, feeding the output of one tool into another tool as input
- ModelBuilder can also be thought of as a visual programming language for building workflows



Drag and drop tools from the toolbox window into the ModelBuilder window to build the model

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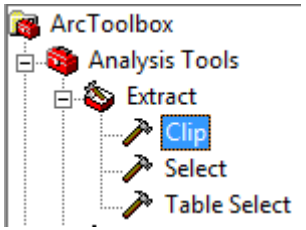
What is ModelBuilder?

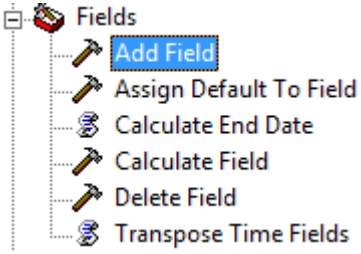
Clip

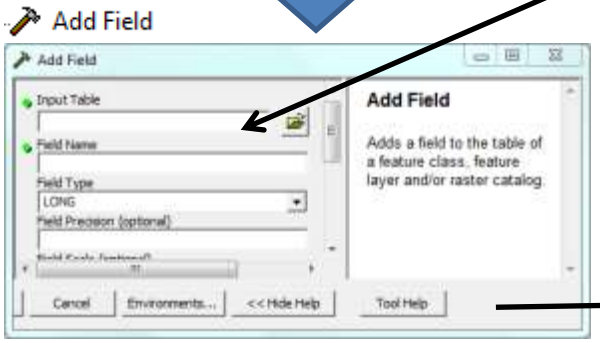


Input file

C:\SCP\clip.shp

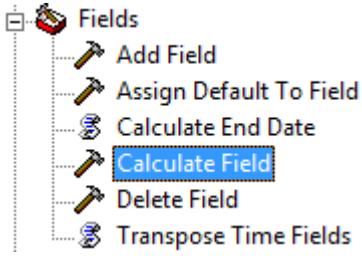
Add Field

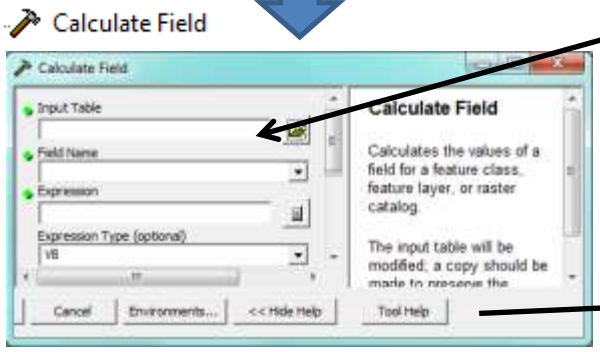




C:\SCP\Clip_AddField.shp

Calculate field

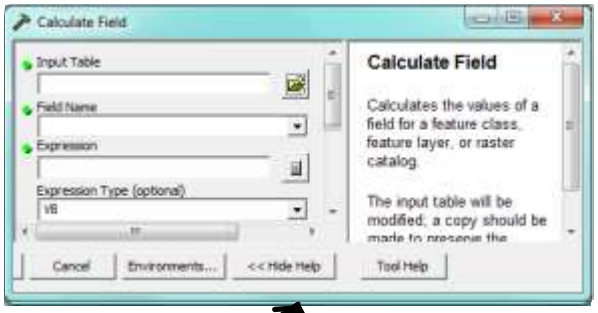




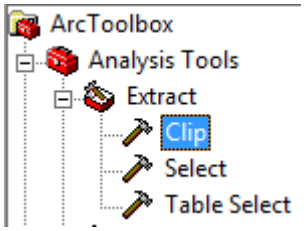
C:\SCP\Clip_AddField_Calculate_field.shp

FREE STATE BIODIVERSITY PLAN

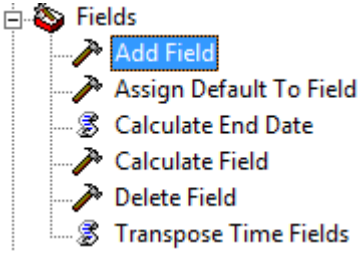
What is ModelBuilder?



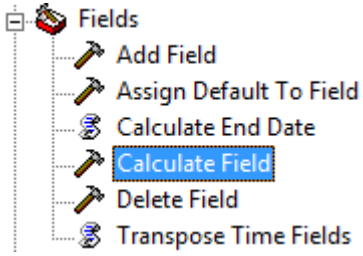
Clip

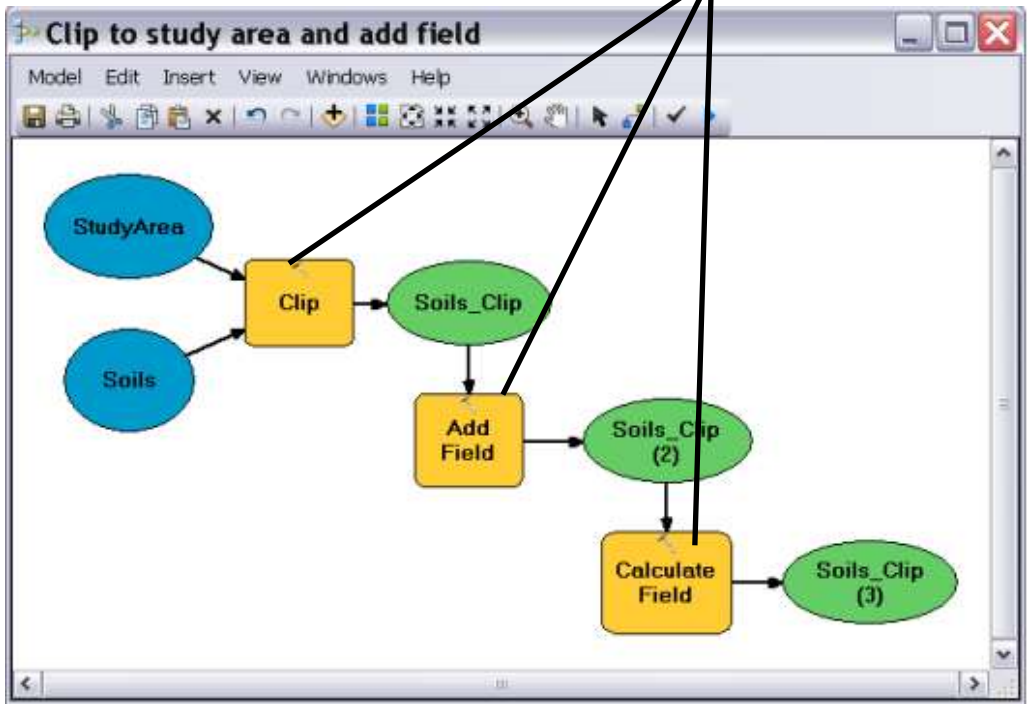


Add Field



Calculate field





FREE STATE BIODIVERSITY PLAN

Why use ModelBuilder?

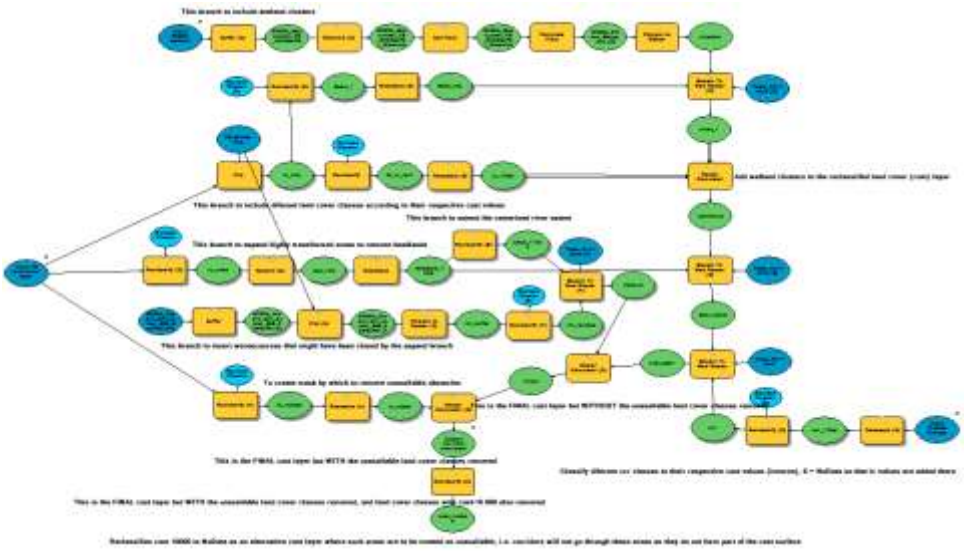
- Good record keeping of the exact GIS operations performed and parameters used
- Easy and ‘quick’ to change a parameter
- Makes ‘trail and error’ development much easier
- Additional functionality
- Easier updating
- Improved consistency from one release to the next
- Easier hand over to next biodiversity planner

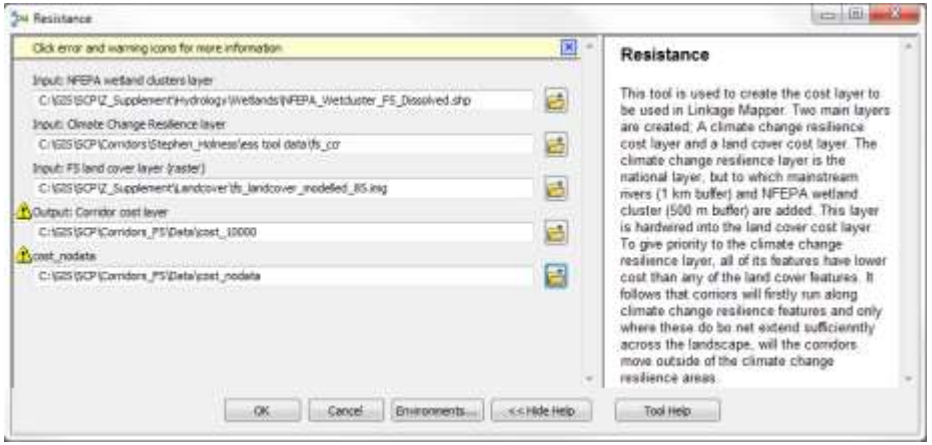
Good record keeping of the exact GIS operations performed and parameters used

Resistance layer for corridor analysis

Run model C:\GIS\SCP\Tools\SCP_Corridors.tbx\Resistance

- To include wetland clusters in the cost layer NFEPA wetland clusters (C:\GIS\SCP\Z_Supplement\Hydrology\Wetlands\NFEPA_Wetcluster_FS_Dissolved.shp) were buffered by 500 m to create C:\GIS\SCP\Temp_Corridors\NFEPA_Wetcluster_FS_500mBuffer.shp and C:\GIS\SCP\Temp_Corridors\NFEPA_Wetcluster_FS_500mBuffer_Dissolved.shp respectively
- Filed 'Id' was created in C:\GIS\SCP\Temp_Corridors\NFEPA_Wetcluster_FS_500mBuffer_Dissolved.shp and all features were populated with value 900 in field "Id" (This so that the wetland cluster have a cost of 900 when the vector is converted to raster; Riverine area were assigned a value of 1 in the climate change resilience layer which when inversed, was assigned a value of 900)
- C:\GIS\SCP\Temp_Corridors\NFEPA_Wetcluster_FS_500mBuffer_Dissolved.shp was converted to a raster layer (cell size = 100) based on field "Id" to create C:\GIS\SCP\Temp_Corridors\clusters
- The FS land cover map (C:\GIS\SCP\Z_Supplement\Landcover\fs_landcover_modelled_85.img) was clipped to the FS border (C:\GIS\SCP\Temp_Corridors\lc_clip)
- C:\GIS\SCP\Temp_Corridors\lc_clip was reclassified to assign a value of 1 to all land cover classes to create C:\GIS\SCP\Temp_Corridors\base_1. The latter was resampled to 100 m cell size to create C:\GIS\SCP\Temp_Corridors\base_res. This was to create a base map with value 1 which is required for the 'Mosaic to new Raster' tools where this base map is the second layer in the 'Mosaic to new Raster' procedure with the values of the first layer being hardwired into those of the base map.
- C:\GIS\SCP\Temp_Corridors\lc_clip was also reclassified according to Field 'Resistance' of Table 5 to create C:\GIS\SCP\Temp_Corridors\fs_lc_recl. The latter was resampled to 100 m cell size to create C:\GIS\SCP\Temp_Corridors\lc_100m. This was to create a raster indicating the cost associated with the different land cover classes.
- C:\GIS\SCP\Temp_Corridors\clusters and C:\GIS\SCP\Temp_Corridors\base_res were mosaiced into a new raster to create C:\GIS\SCP\Temp_Corridors\clust_1. The wetland clusters were herby hardwired into the base map with values 1.
- Using the 'Con" function of the Raster Calculator C:\GIS\SCP\Temp_Corridors\clust_1 and C:\GIS\SCP\Temp_Corridors\lc_100m were combined in a manner so that if the value of a cell in lc_100m <> 2000 and the value of the corresponding cell in clust_1 <> 900, then the value of clust_is assigned, else the value of lc_100m is assigned [Con(("%lc_100m%" == 2000) & ("%clust_1%" == 900),"%clust_1%","%lc_100m%")]. In other words, if a corresponding cells have been assigned a value of 2000 (most suitable land cover classes) AND 900 (wetland clusters), then the value of clust_1 (the wetland cluster) is assigned, else the value of lc_100m) the cost assigned to the land cover class) is assigned. The output was C:\GIS\SCP\Temp_Corridors\resilience





Easy and ‘quick’ to change a parameter

Avifauna

- Pseudo_1(point)
- Pseudo_1 (polygon)
- Pseudo_2 (point)
- Pseudo_2 (polygon)
- Pseudo_3
- Pseudo_4
- Pseudo_5

Feature outputs

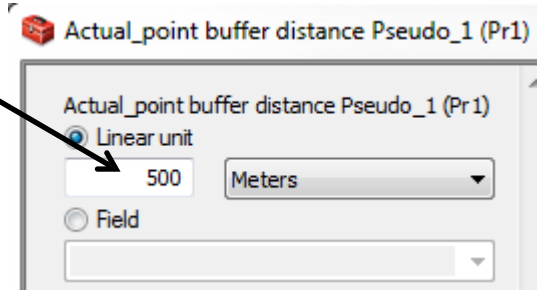
Cost layer outputs

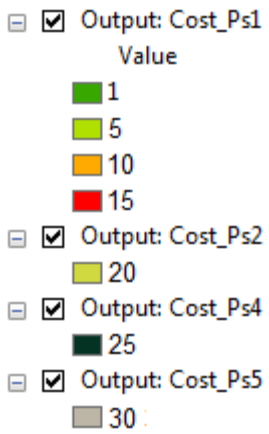
Ps_1

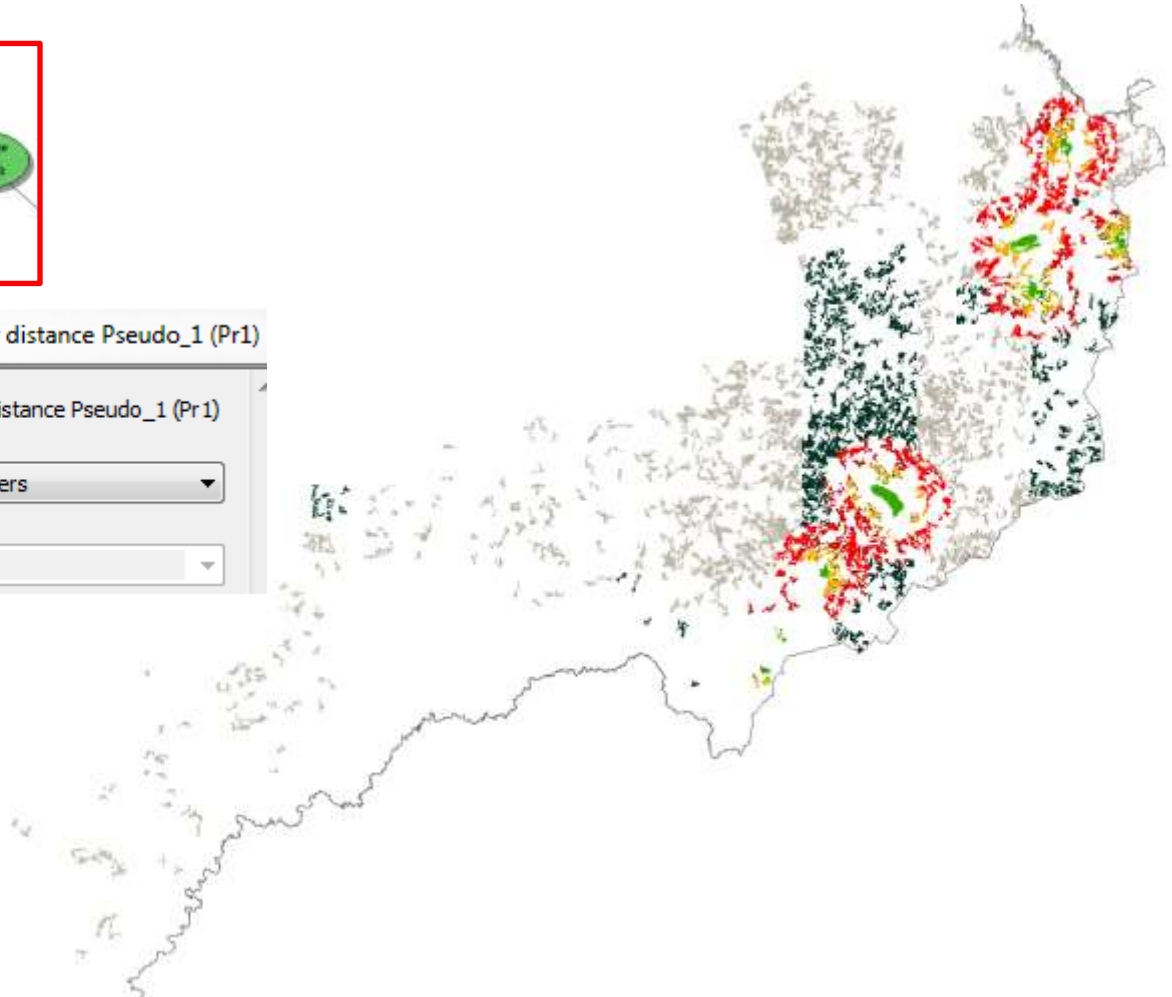
Ps_2

Ps_4

Ps_5

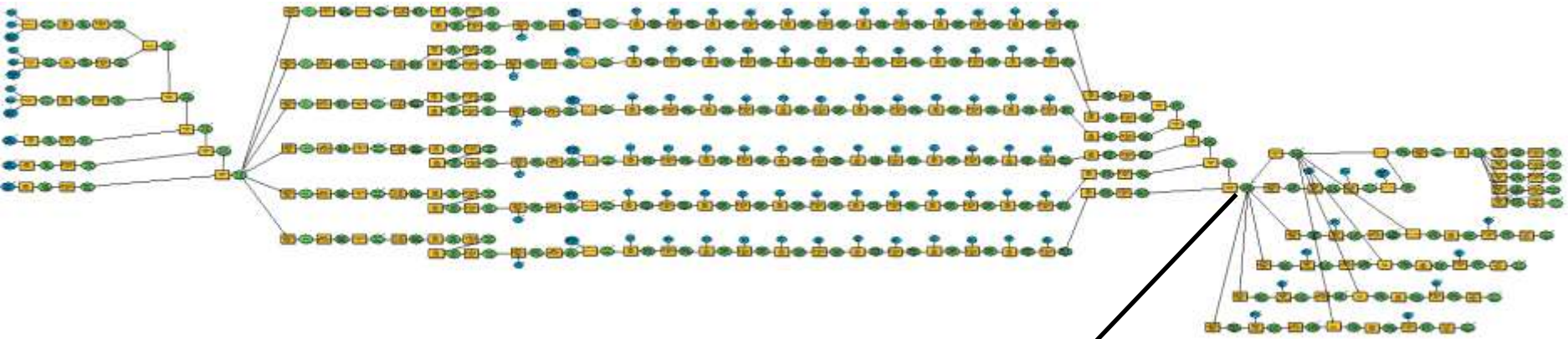


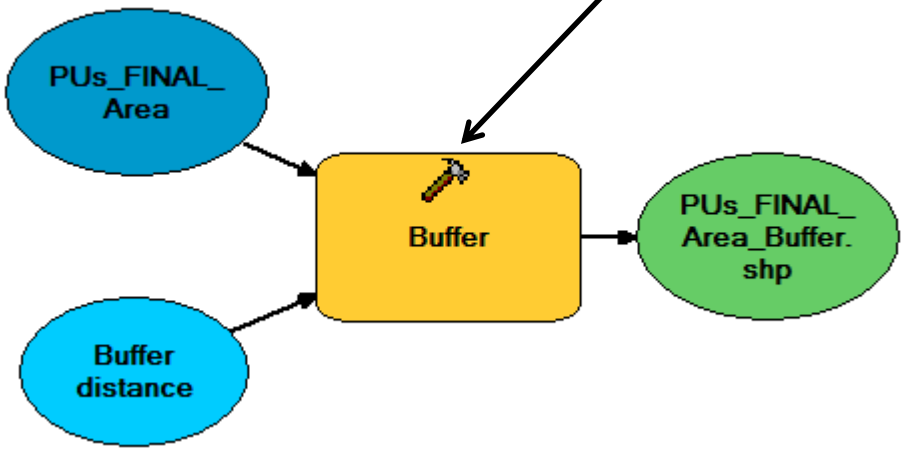




Makes ‘trail and error’ development much easier

E.g. to test different paramours is relatively easy, just change it and re-run the model. No need to manually redo all the GIS procedures





Need to test incidences of:

20 m

50 m

70m

100 m

Additional functionality

For Qmarxan:

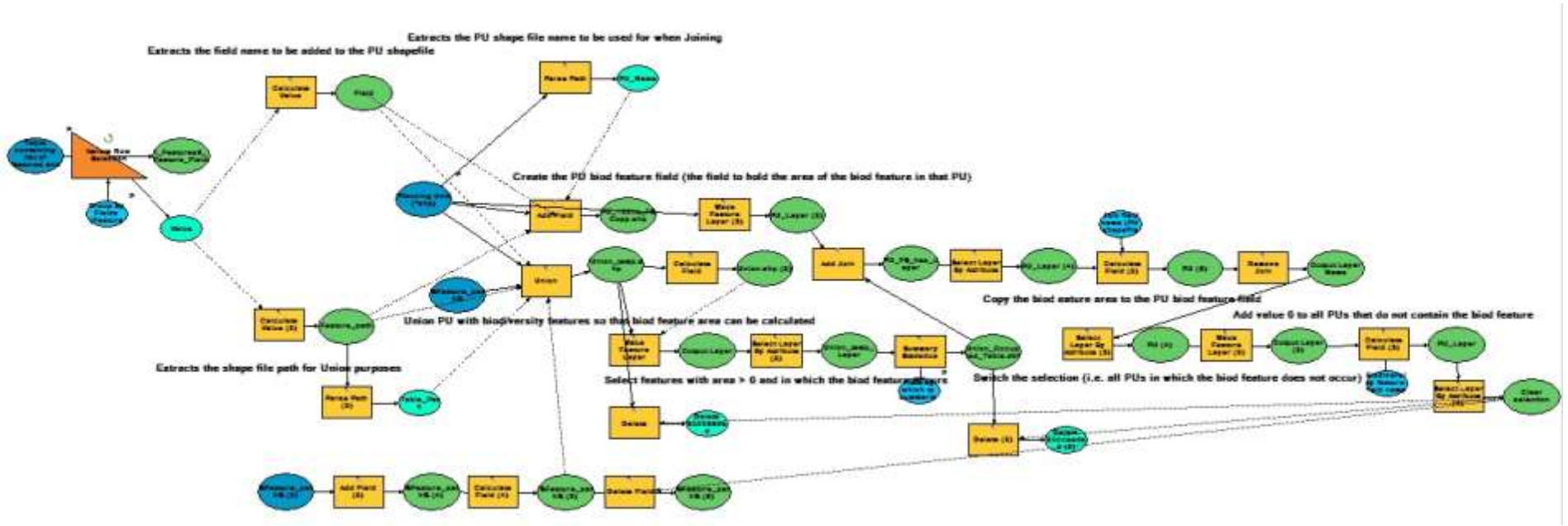
Need to calculate the area of each feature within each Planning Unit (PU) in the PU file

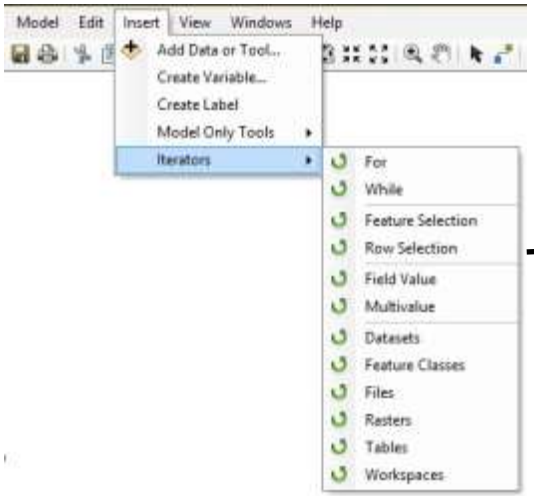
FID	Shape	Area_ha	PU_Cost	PU_Status	ID_PU	Blue_Crane	Yellowbr_1	Yellowbr_2	Crowned_Cr	Wattled_Cr	Lesser_Kes
1061	Polygon ZM	99.999999	99.999999	0	106150	99.999999	0	0	0	0	0
1120	Polygon ZM	100.000001	100.000001	0	112032	99.994744	0	0	0	0	0
1090	Polygon ZM	99.999998	99.999998	0	109029	98.525483	0	0	56.484931	0	0
1025	Polygon ZM	99.999997	99.999997	0	102501	97.092675	0	0	0	0	0
1060	Polygon ZM	94.813404	94.813404	0	106011	94.813403	0	0	0	0	0
9737	Polygon ZM	100.000001	100.000001	0	97377	93.258434	0	0	0	0	0
1021	Polygon ZM	100	100	0	102146	93.073209	0	0	0	0	0
1088	Polygon ZM	100.000003	100.000003	0	108877	89.168275	0	0	100.000003	58.935749	0
1096	Polygon ZM	100.000004	100.000004	0	109677	88.748218	0	0	100.000004	100.000004	0
1023	Polygon ZM	99.999999	99.999999	0	102331	87.984232	0	0	0	0	0
1057	Polygon ZM	86.906568	86.906568	0	105799	86.906568	0	0	0	0	0
8129	Polygon ZM	85.356023	85.356023	0	81295	85.356023	23.457431	61.898592	0	0	85.356023
8107	Polygon ZM	99.999999	99.999999	0	81071	78.078874	39.548155	47.391415	0	0	99.999999

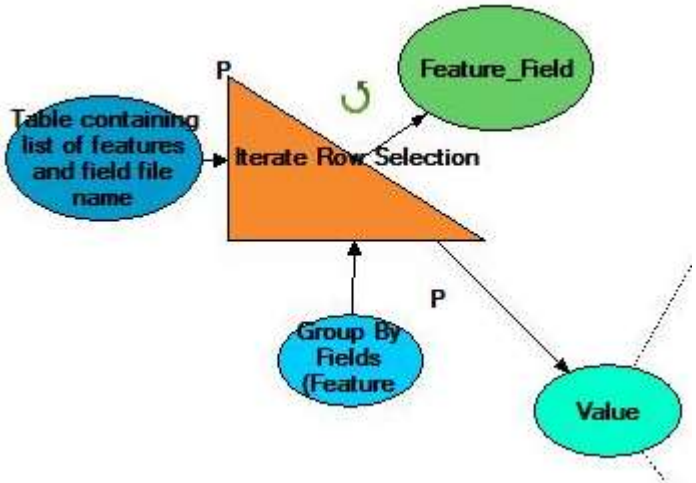
115 Features to include

This Qmarxan tool consistently failed, so it had to be done ‘manually’

Additional functionality



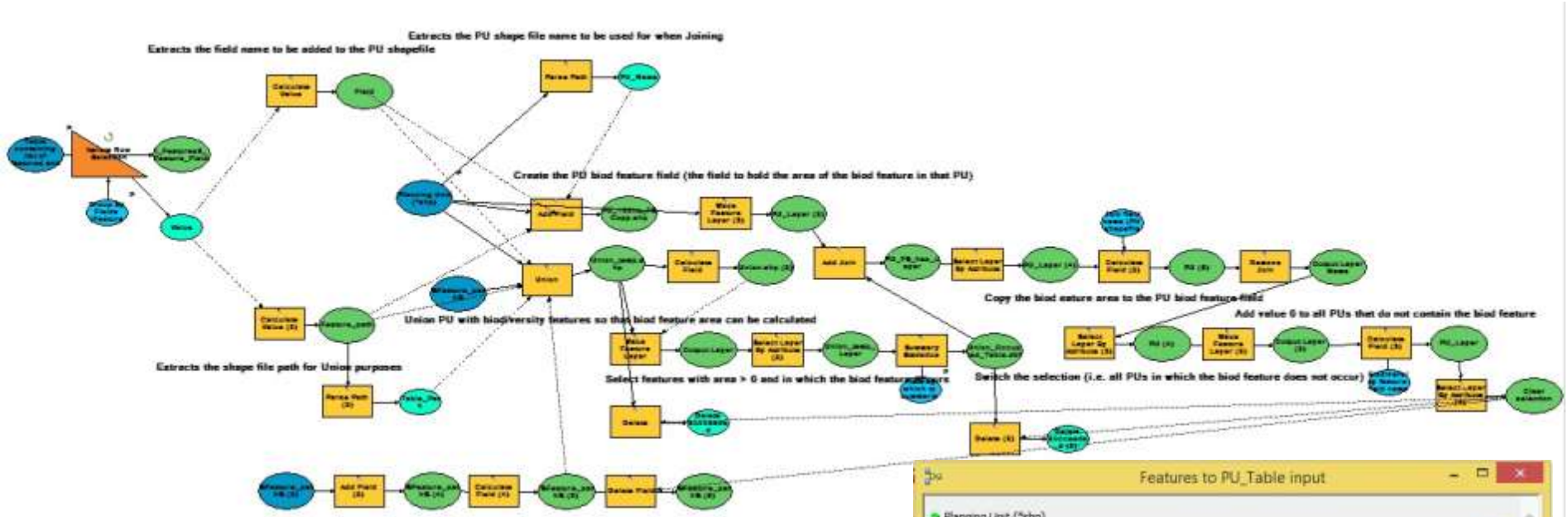


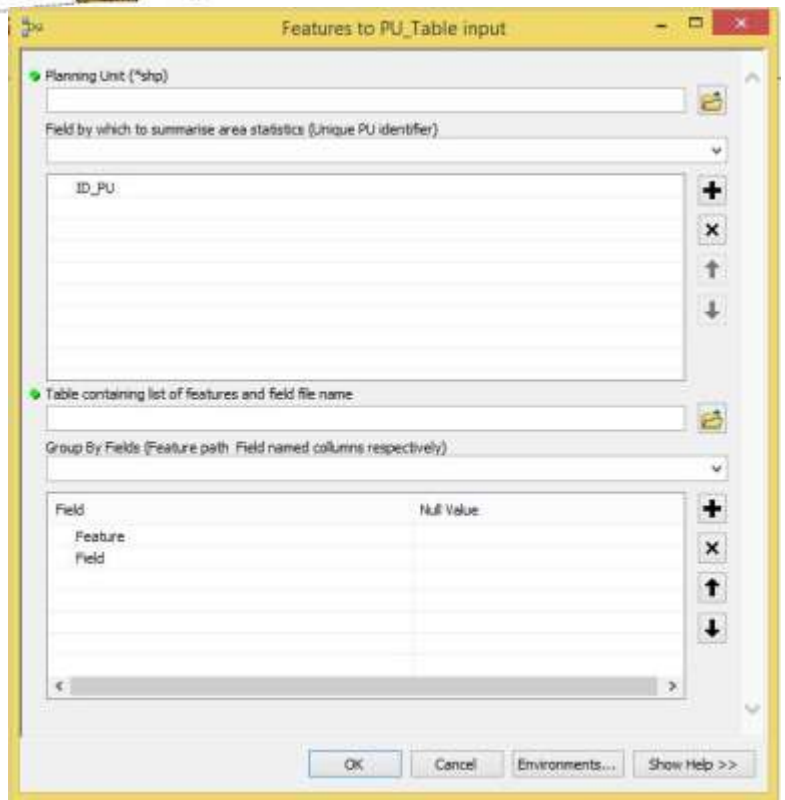


115 Features

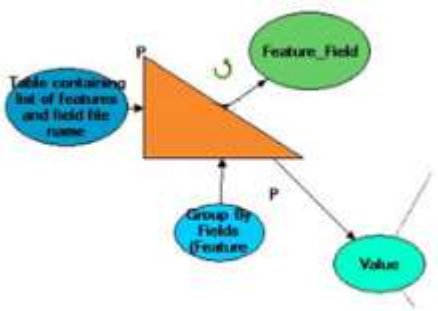
	A	B
1	Feature	Field
2	C:\GIS\SCP\FINAL\EC_Ecological_corridors.shp	Ecol_Corr
3	C:\GIS\SCP\FINAL\SP_Ekangala_CBAs.shp	Ekang_CBAs
4	C:\GIS\SCP\FINAL\VE_Aliwal_North_Dry_Grassland.shp	Aliwal_Nor
5	C:\GIS\SCP\FINAL\VE_Amersfoort_Highveld_Clay_Grassland.shp	Amersfoort
6	C:\GIS\SCP\FINAL\VE_Andesite_Mountain_Bushveld.shp	Andesite_M
7	C:\GIS\SCP\FINAL\VE_Basotho_Montane_Shrubland.shp	Basotho_Mo
8	C:\GIS\SCP\FINAL\VE_Besemkaree_Koppies_Shrubland.shp	Besemkaree
9	C:\GIS\SCP\FINAL\VE_Bloemfontein_Dry_Grassland.shp	Bl_Dry_Gra
10	C:\GIS\SCP\FINAL\VE_Bloemfontein_Karroid_Shrubland.shp	Bl_Kar_Shr
11	C:\GIS\SCP\FINAL\VE_Carletonville_Dolomite_Grassland.shp	Carletonvi
12	C:\GIS\SCP\FINAL\VE_Central_Free_State_Grassland.shp	Central_Fr
13	C:\GIS\SCP\FINAL\VE_Drakensberg_Afroalpine_Heathland.shp	Drak_Afr_H
14	C:\GIS\SCP\FINAL\VE_Eastern_Upper_Karoo.shp	Eastern_Up
15	C:\GIS\SCP\FINAL\VE_Frankfort_Highveld_Grassland.shp	Frank_HGr
16	C:\GIS\SCP\FINAL\VE_Gold_Reef_Mountain_Bushveld.shp	Gold_Reef

Additional functionality





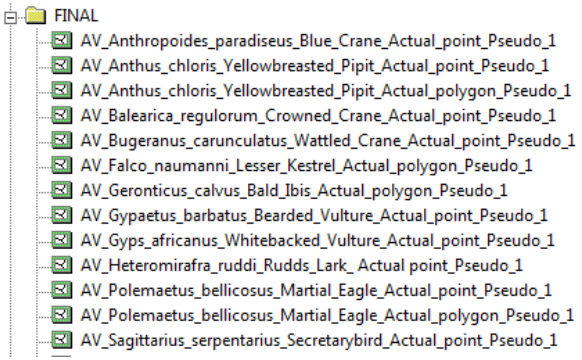
Additional functionality



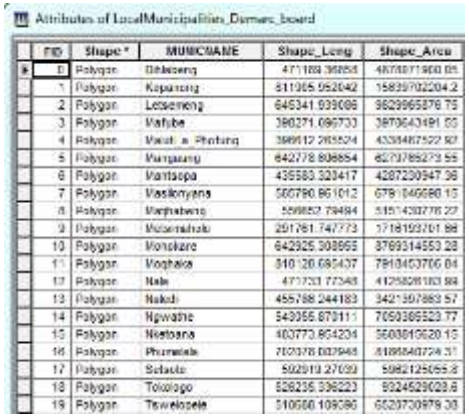
Iterate through a table

	A	B
1	Feature	Field
2	C:\GIS\SCP\FINAL\EC_Ecological_corridors.shp	Ecol_Corr
3	C:\GIS\SCP\FINAL\SP_Ekangala_CBAs.shp	Ekang_CBAs
4	C:\GIS\SCP\FINAL\VE_Aliwal_North_Dry_Grassland.shp	Aliwal_Nor
5	C:\GIS\SCP\FINAL\VE_Amersfoort_Highveld_Clay_Grassland.shp	Amersfoort
6	C:\GIS\SCP\FINAL\VE_Andesite_Mountain_Bushveld.shp	Andesite_M
7	C:\GIS\SCP\FINAL\VE_Basotho_Montane_Shrubland.shp	Basotho_Mo
8	C:\GIS\SCP\FINAL\VE_Besemkaree_Koppies_Shrubland.shp	Besemkaree
9	C:\GIS\SCP\FINAL\VE_Bloemfontein_Dry_Grassland.shp	Bl_Dry_Gra
10	C:\GIS\SCP\FINAL\VE_Bloemfontein_Karroid_Shrubland.shp	Bl_Kar_Shr
11	C:\GIS\SCP\FINAL\VE_Carletonville_Dolomite_Grassland.shp	Carletonvi
12	C:\GIS\SCP\FINAL\VE_Central_Free_State_Grassland.shp	Central_Fr
13	C:\GIS\SCP\FINAL\VE_Drakensberg_Afroalpine_Heathland.shp	Drak_Afr_H
14	C:\GIS\SCP\FINAL\VE_Eastern_Upper_Karoo.shp	Eastern_Up
15	C:\GIS\SCP\FINAL\VE_Frankfort_Highveld_Grassland.shp	Frank_HGr
16	C:\GIS\SCP\FINAL\VE_Gold_Reef_Mountain_Bushveld.shp	Gold_Reef

Iterate through files



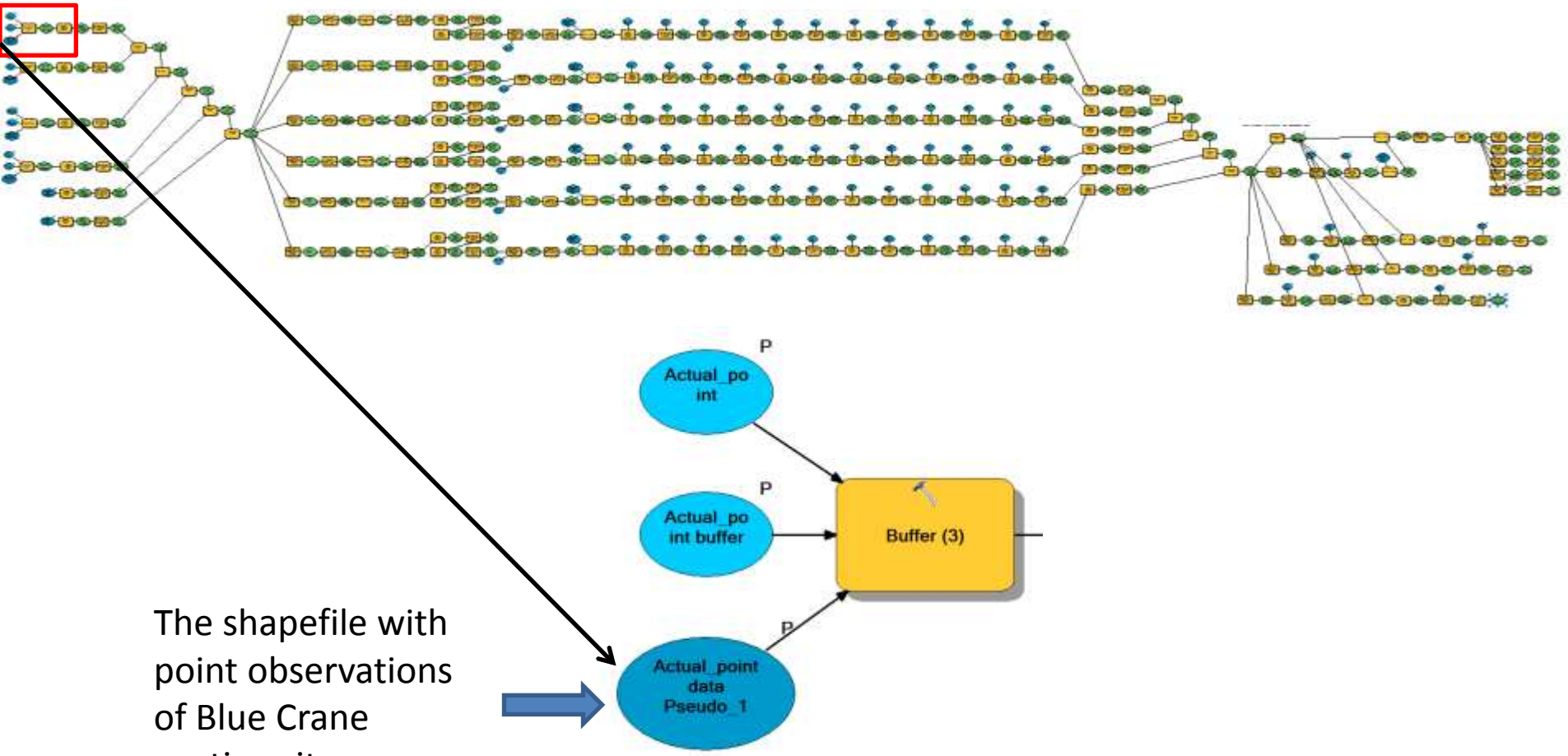
Iterate through records



Easier updating

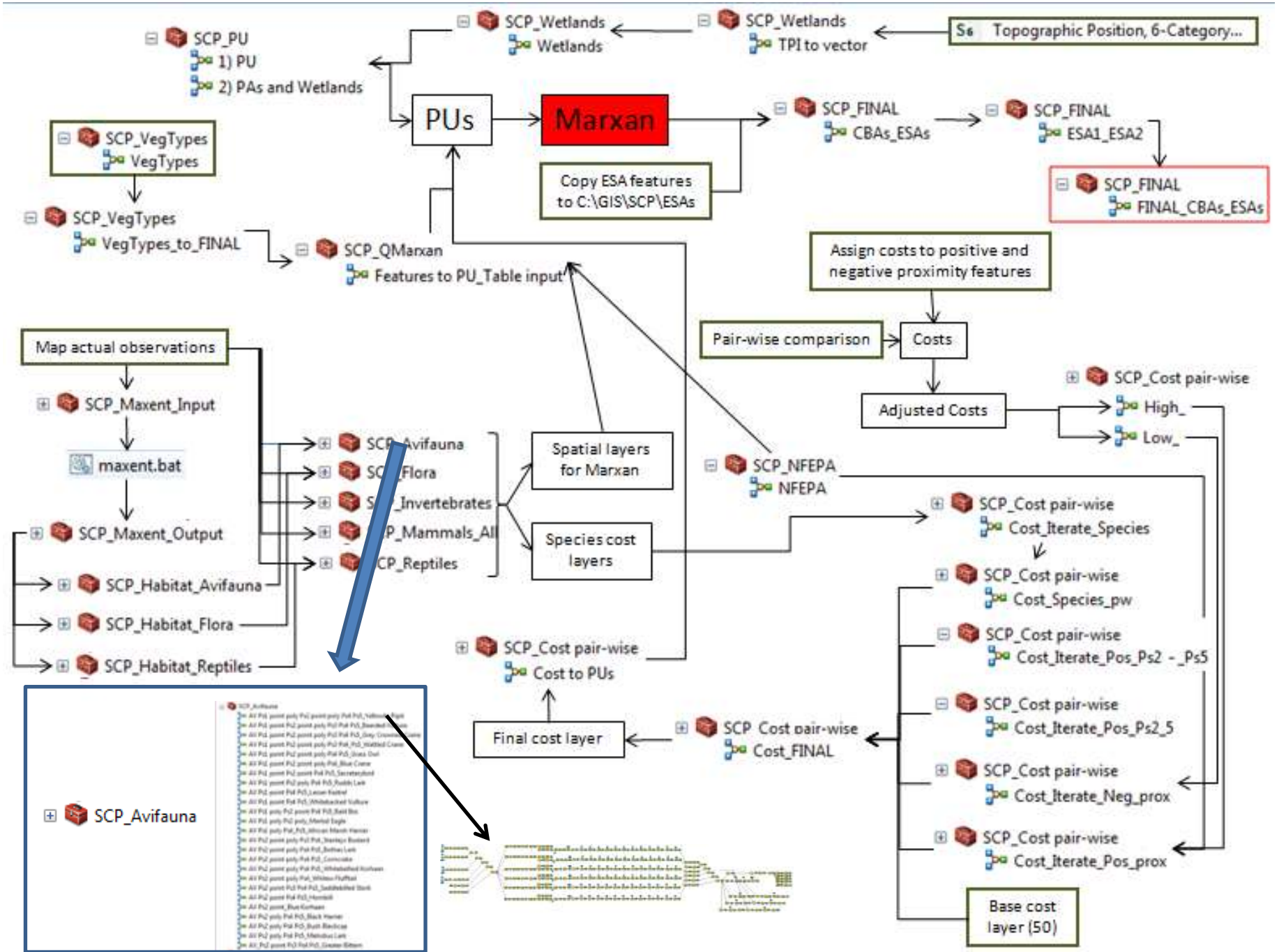
E.g. After having obtained new data on Blue Crane nesting sites:

- Include the data in the Pseudo_1 feature files and re-run the model

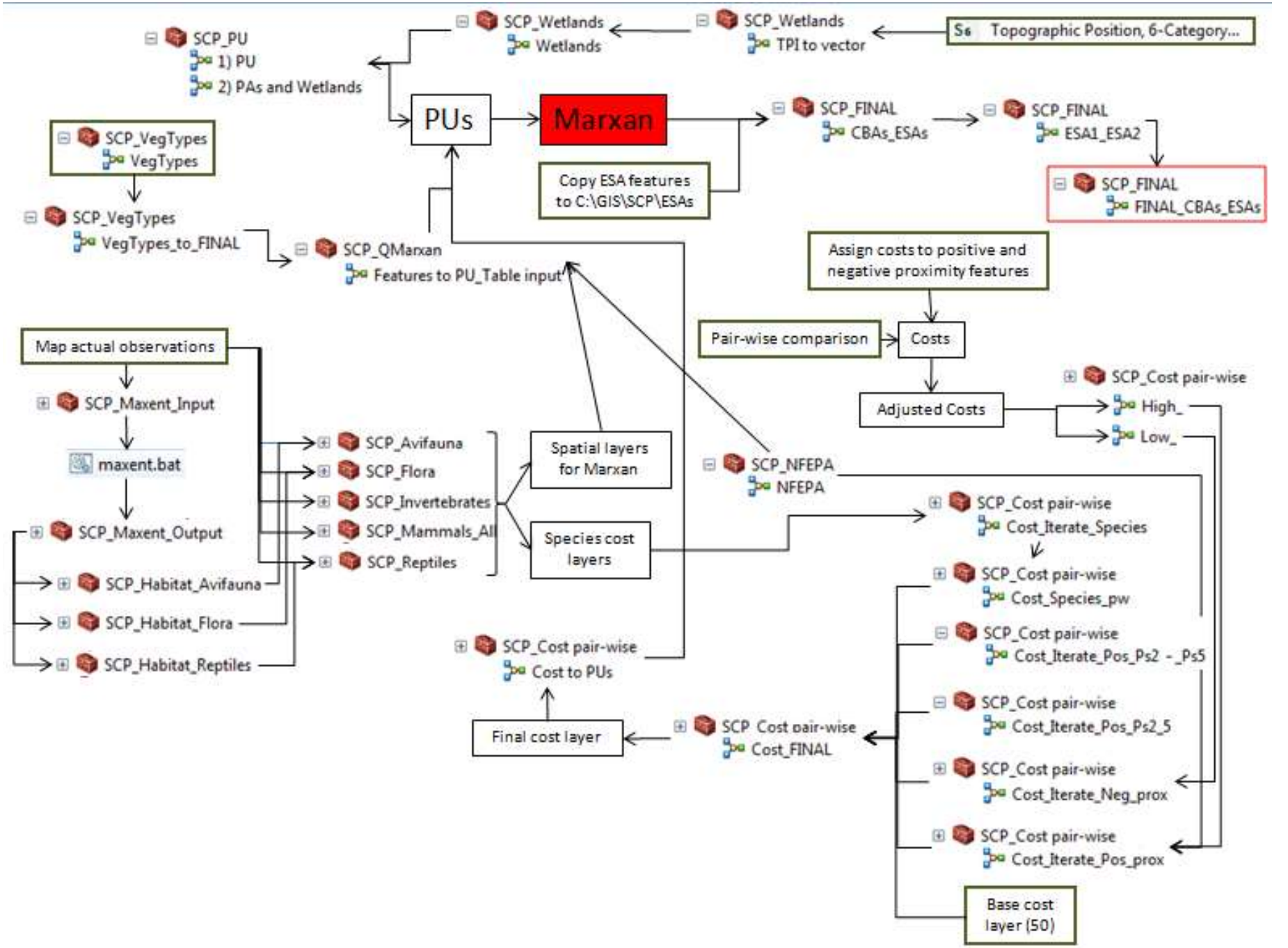


The shapefile with point observations of Blue Crane nesting sites

Improved consistency from one release to the next



Easier handover to next biodiversity planner



THANK YOU!!

destea

department of
economic, small business development,
tourism and environmental affairs
FREE STATE PROVINCE