Crown Fire – LCD – 10/19/2022

Fire Recurrence

Source data used:

H_FIRE_PLY_polygon.shp (BC_FireHistory) Acquired from BC Data Catalog (https://catalogue.data.gov.bc.ca/dataset/fire-perimeters-historical)
InterAgencyFirePerimeterHistory_All_Years_View.shp (US_Interagency_FireHistory) Acquired from NIFC (AB_FireHistory)

(see: C:\GNLCC_Admin\Landscape_Conservation_Design\CrownofContinent\PHASE_2\Cost_Layers\Fire\CrownLCD_Fire_Sources.xlsx)

Step 1 – Clips:

In ArcMap: Add Data: R:\Base_Data\CROWN_LCD_Phase2\Project_Area\Crown_LCD_PlanningUnit_Mask.shp

1A – Clip H_FIRE_PLY_polygon.shp to Crown_LCD_Planning_Unit_Mask.shp;

Environments/Output Coordinates: Same as Layer "Crown_LCD_Planning_Unit_Mask"

1B – Clip InterAgencyFirePerimeterHistory_All_Years_View.shp to Crown_LCD_Planning_Unit_Mask.shp;

Environments/Output Coordinates: Same as Layer "Crown_LCD_Planning_Unit_Mask"

1C – Clip 9 [Alberta source data] to Crown_LCD_Planning_Unit_Mask.shp;

Environments/Output Coordinates: Same as Layer "Crown_LCD_Planning_Unit_Mask"

Step 2 – Standardize Attributes:

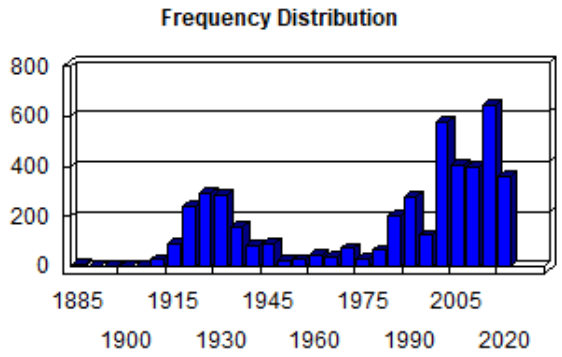
AB_FireHistory: Add Field: Fire_Year (ShortInt); Rt click Fire_Year field/Field Calculator; Fire_Year = Year; Add Field: Size_HA (Double); Rt click Size_HA field/Field Calculator Size_HA = Hectares_U

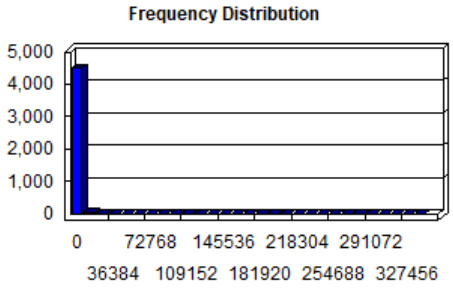
InterAgencyFirePerimeterHistory_All_Years_View.shp Add Field: Size_HA (Double); GIS_Acres Rt click Size_HA field/Field Calculator Size_HA = GIS_Acres * 2.41.

Step 3 – Merge

BC_FireHistory.shp, AB_FireHistory.shp and US_Interagency_FireHistory.shp to create Crown_FireHistory.shp

Resulting in 4,576 distinct polygons dating from 1919 to 2020.



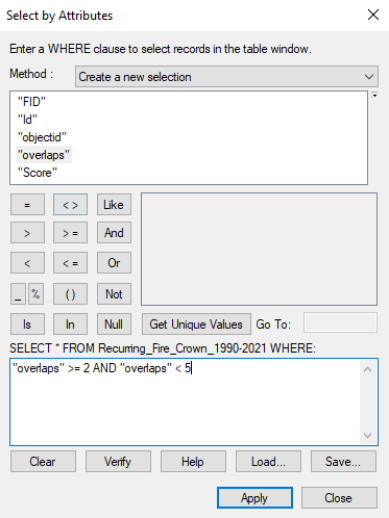


Step 4 – Identify areas with recurring wildfire since 1990

Select from Crown_FireHistory.shp where Fire_Year >= 1990. Use Count Overlapping Features tool to determine the area of multiple polygon overlaps and multiple instances of overlaps. In ArcGIS Pro, on the Analysis tab, click Tools and search for/open the Count Overlapping Features tool. Input Features = Crown_FireHistory.shp; Output Feature Class = Recurring_Fire_Crown_1990-2021.shp. Click Run.

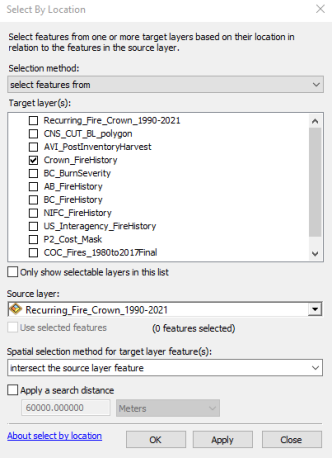
Step 5 – Score recurring fires

In order to score fire history relative to the threat recurring fires, start with Recurring_Fire_Crown_1990-2021.shp. Add Field: Score (ShortInt). Select from overlaps field where value >= 5; use Field calculator to score selected features 7000. Clear selection. Select from overlaps field where value >= 2 AND value < 5. Use Field calculator to score selected features 3000.



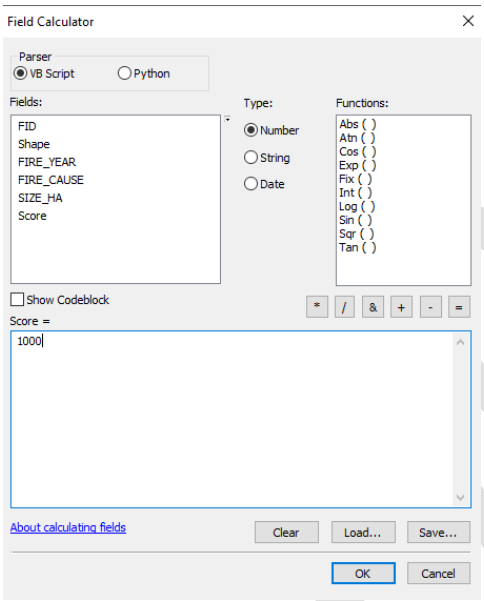
Clear selection.

Use Select by Location to select Crown_FireHistory.shp features that intersect with Recurring_Fire_Crown_1990-2021.shp:



Open Attribute Table for Crown_FireHistory.shp; in Table Options/Switch Selection. Closr Table, rt click Crown_FireHistory.shp/Data/Export and export (selected features) to R:\Base_Data\CROWN_LCD_Phase2\Cost_Layers_P2\Fire\Crown_OneFire_only.shp. Clear selection.

Open attribute table of Crown_OneFire_only.shp. Add Field: Score (ShortInt) and use Field Calculator to make Score = 1000 for all records.

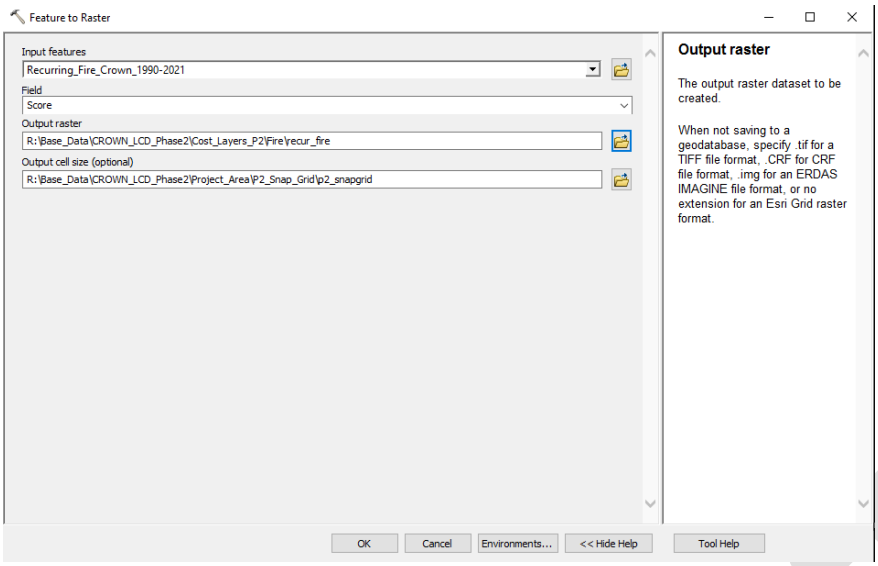


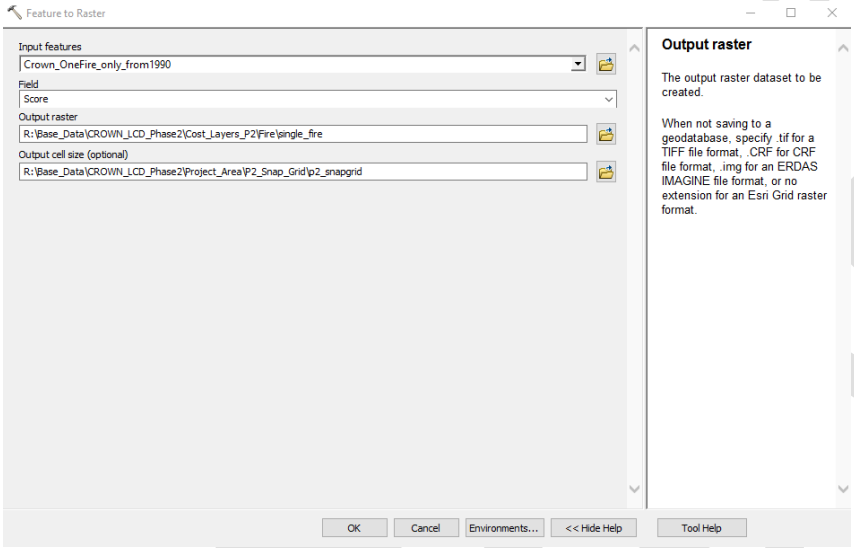
Select from Crown_OneFire_only.shp where Fire_year >= 1990 and create layer from selected feature. Rt click/Data/Export to R:\Base_Data\CROWN_LCD_Phase2\Cost_Layers_P2\Fire\Crown_OneFire_only_from1990.shp. Clear selection.

Step 6 – Feature to Raster

Add R:\Base_Data\CROWN_LCD_Phase2\Project_Area\P2_Snap_Grid\p2_snapgrid to project. GO to Geoprocessing/Environments…/Processing Extent/Snap Raster and select p2_snapgrid.

Feature to Raster (2):

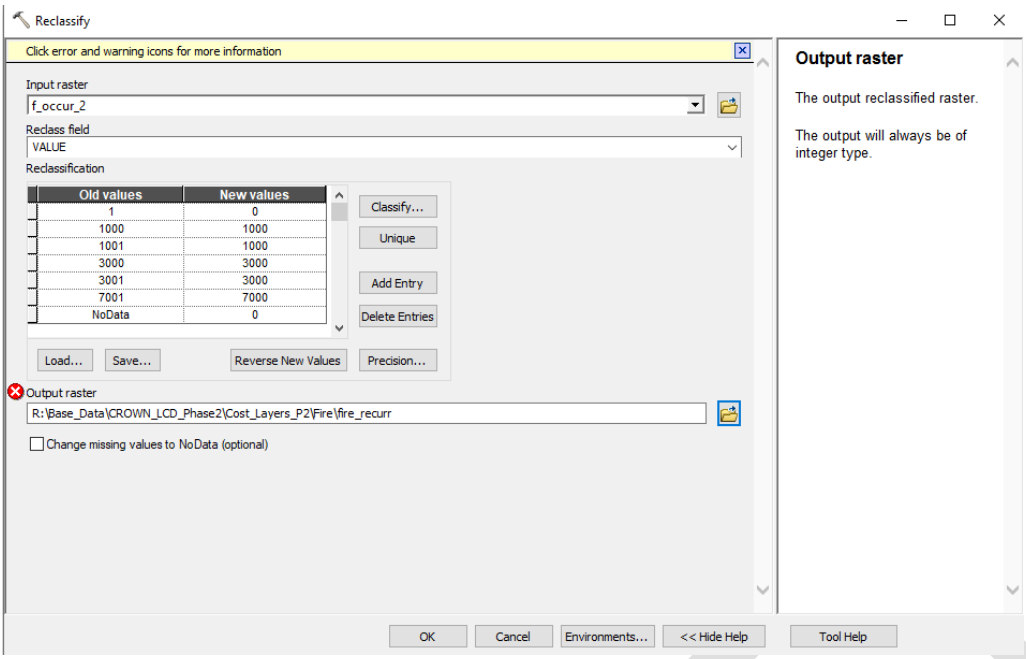




To create 2 new grids: recur_fire and single_fire

Use Mosaic to a New Raster to add recur_fire, single_fire, and p2_snapgrid to create f_occur_2. Set Mosaic Operator to SUM.

Reclassify f_occur_2 to create a Fire Recurrence raster with 4 values: 0, 1,000, 3000, 7,000



Relative Condition	Source cutoffs	Reclass Value/Cost Score
Poor	>= 5 recurring fires since 1990	8000
Fair	2-5 recurring fires since 1990	4000
Good	Zero (0) fires since 1990	1000
Very Good	1 fires since 1990	0

Burn Severity:

Input layers:

BC: BURN_SVRTY_polygon.shp (https://catalogue.data.gov.bc.ca/dataset/fire-burn-severity-historical)
R:\Base_Data\Fire\Burn_Severity\BritishColumbia\BCGW_7113060B_1666211812600_11660\VEG_BURN_SEVERITY_SP\BURN_SVRTY_polygon.shp

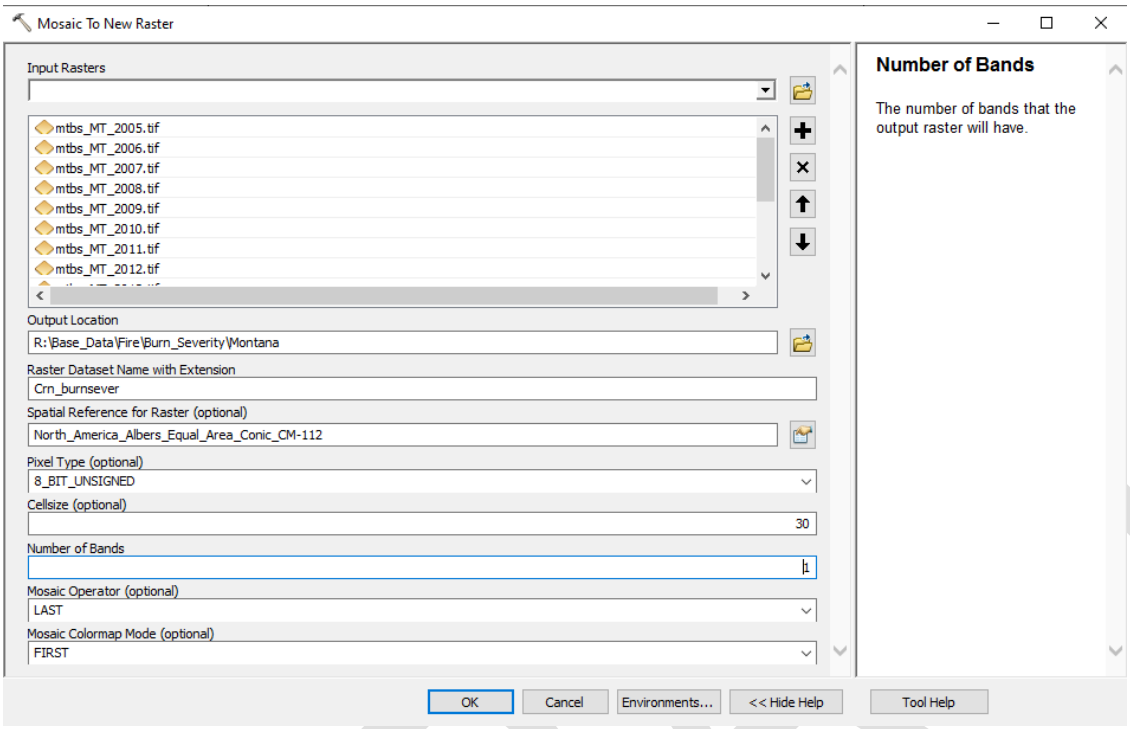
AB: Wildfire Perimeters 1931 – 2021 (https://wildfire.alberta.ca/resources/historical-data/spatial-wildfire-data.aspx);
R:\Base_Data\Fire\historical-wildfire-Alberta\HistoricalWildfirePerimeters\ WildfirePerimeters1931to2021v2.shp

MT: mtbs_MT_YYYY.tif where "YYYY" equals Year between 1990-2020. (https://www.mtbs.gov/direct-download)
(R:\Base_Data\Fire\Burn_Severity\Montana\MTBS_Mosaics_MT_1984-2020\composite_data\MTBS_BSmosaics\YYYY …

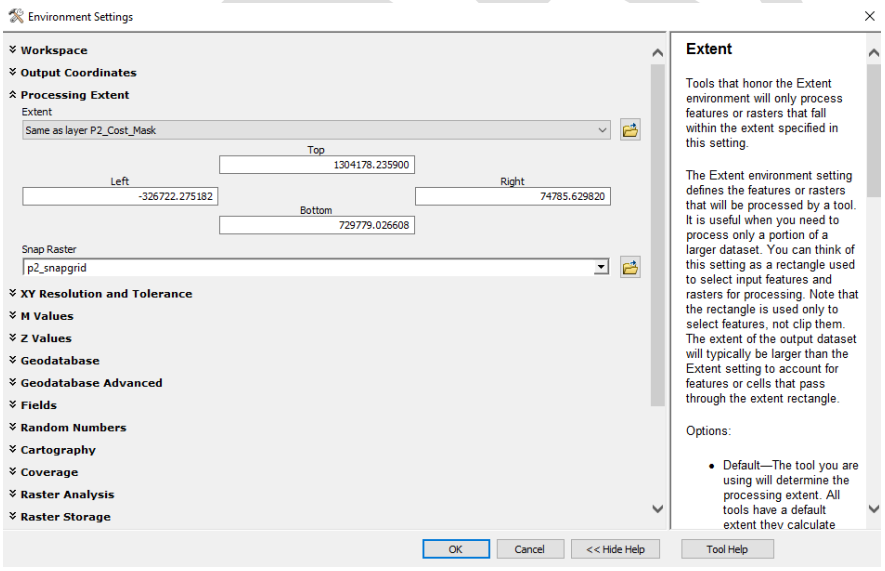
Relative Condition	Burn Severity	MT (Source)	AB	BC (BURN_RATE)	Reclass Value/Cost Score
Poor	High	4		High	6000
Fair	Moderate	3	Burned	Medium	4000
Good	Low	1, 2		Low	2000
Very Good	No measurable severity	0, 5	Unburned	Unburned	0

Montana

Preprocessing: US (MT) burn severity data acquired in annual (1990-2020) tiff files. Step 1 was to Mosaic to a New Raster with all source tiffs to create MT_burnsever. Cellsize was set to 30 (though double check due to snap raster) and Mosaic Operator set to LAST (mtbs_MT_2020.tif).



With Environments/Processing Extent/Extent set to “Same as layer P2_Cost_Mask and Snap Raster at: P2_snapgrid:



Output: R:\Base_Data\Fire\Burn_Severity\mt_burnsever

Attributes:

Unique numeric values contained in each raster cell

0 - Background/No Data
1 - Unburned/Underburned to Low Burn Severity
2 - Low burn severity
3 - Moderate burn severity
4 - High Burn Severity
5 - Increased Greenness/Increased Vegetation Response
6 - Non-Processing Area Mask

Use Reclassify, and the table above to create R:\Base_Data\CROWN_LCD_Phase2\Cost_Layers_P2\Fire\MT_severity (raster) with appropriate Cost Scores – make sure to change 'No Data' to zero (0)

British Columbia:

BC: BURN_SVRTY_polygon.shp

Attributes: (Burn_Rate)

High
Medium
Low
Unburned
Unknown

Starting with BC_BurnSeverity.shp: Add field: Score (ShortInt) and use the BURN_RATE field to calculate scores (see Table above)

Use Feature to Raster to convert shp to a raster (R:\Base_Data\Fire\Burn_Severity\BritishColumbia\bc_burnsever) – cell size 30 m

Use Reclassify to change 'No Data' to zero (0): Output file: R:\Base_Data\CROWN_LCD_Phase2\Cost_Layers_P2\Fire\ bc_severity (raster) with appropriate Cost Scores

Alberta:

AB: Wildfire Perimeters 1931 – 2021 (WildfirePerimeters1931to2021v2.shp)

Field BURNCODE

Attributes:

Burned

Unburned

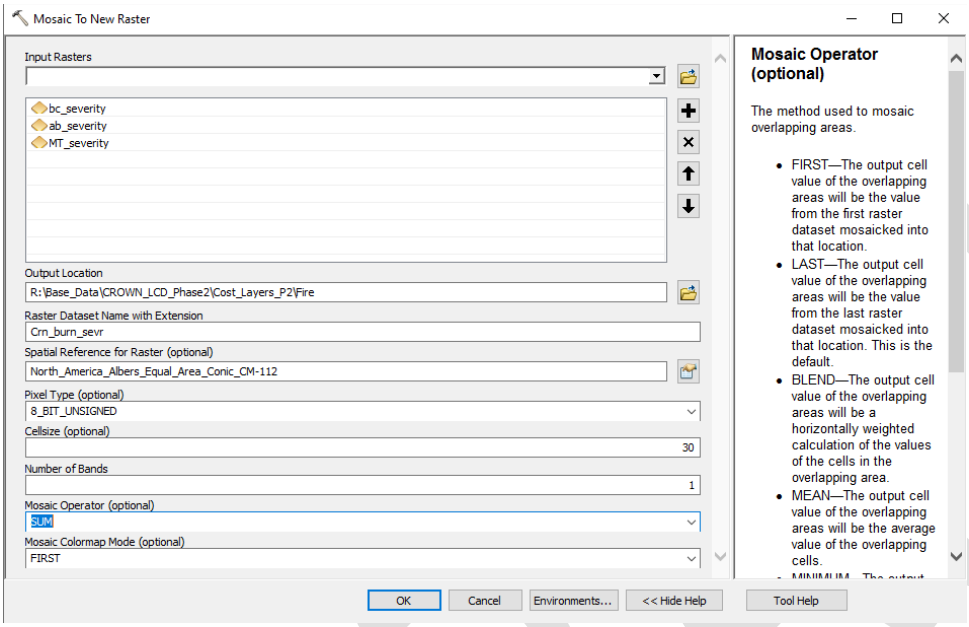
Starting with WildfirePerimeters1931to2021v2.shp, Add field: Score (ShortInt) and use the BURNCODE field to calculate scores (see Table above)

Use Feature to Raster to convert shp to a raster (R:\Base_Data\Fire\Burn_Severity\Alberta\ab_burnsever) – cell size 30 m

Use Reclassify to change ‘No Data’ to zero (0) Output file: R:\Base_Data\CROWN_LCD_Phase2\Cost_Layers_P2\Fire\ab_severity (raster) with appropriate Cost Scores

Step 2: Mosaic to a New Raster

Create crn_burn_sevr (raster) by mosaicking bc_severity, ab_severity and mt_severity; use Mosaic operator ‘SUM”; output : R:\Base_Data\CROWN_LCD_Phase2\Cost_Layers_P2\Fire\crn_burn_sevr



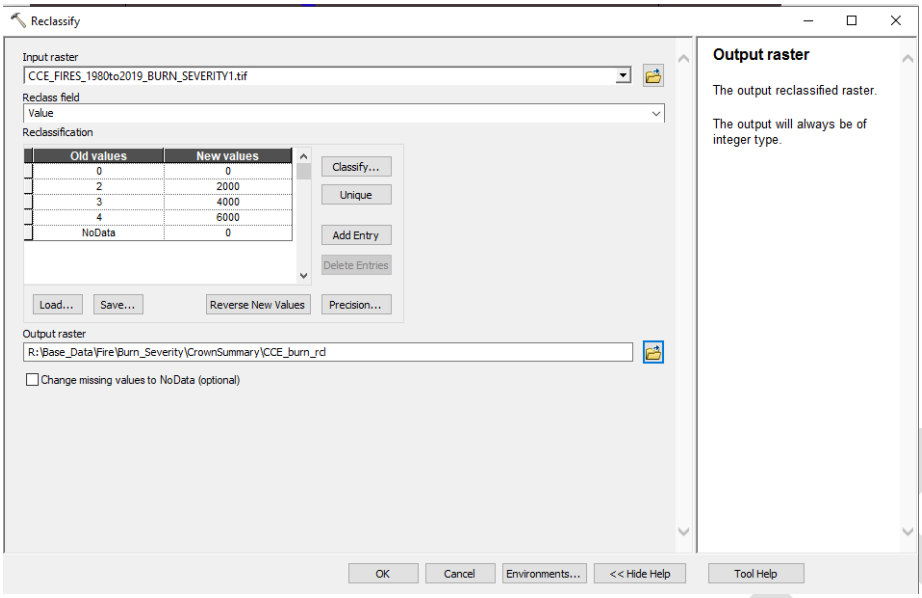
** Late Addition** R:\Base_Data\Fire\Burn_Severity\CrownSummary\CCE_FIRES_1980to2019_BURN_SEVERITY1.tif created by the Hi5 Team and modified by Danie Frevola (located at https://app.box.com/folder/177192968279) has novel information about burn severity. To include that in Forest Cost:

Reclassify:

Table

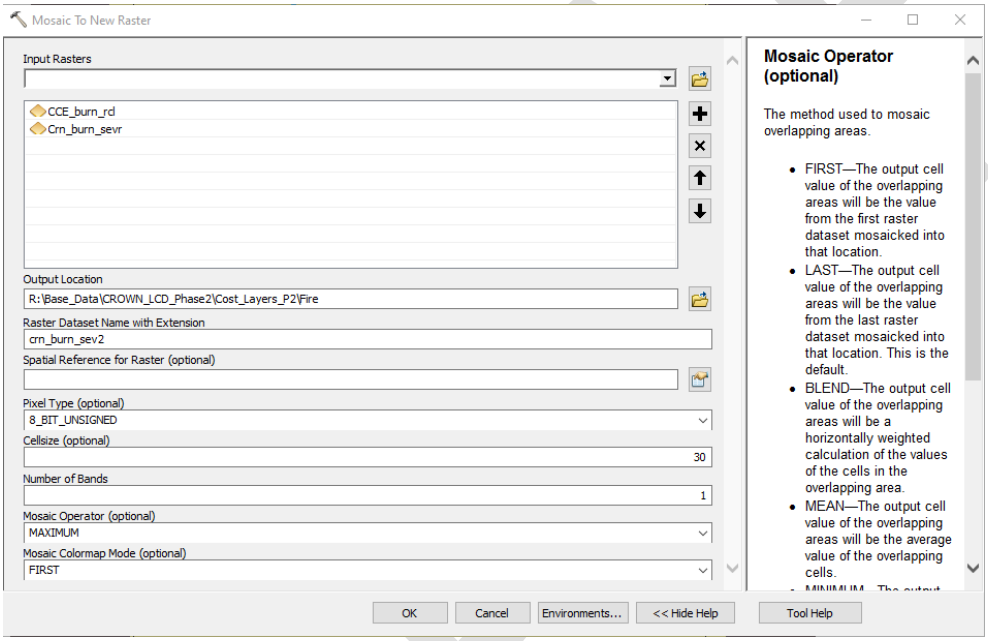
CCE_FIRES_1980to2019_BURN_SEVERITY1.tif

OID	Value	Count	Severity	CBI_Range
0	0	918829	UNBURNED	
1	2	2450631	LOW SEVERITY	0.1 - 1.24
2	3	2861671	MODERATE SEVERITY	1.25 - 2.24
3	4	4209096	HIGH SEVERITY	2.25 - 3



To produce R:\Base_Data\Fire\Burn_Severity\CrownSummary\CCE_burn_rcl

Mosaic to a new Raster (crn_burn_sevr + CCE_burn_rcl) using the MAXIMUM Mosaic Operator to incorporate that new data. Output = crn_burn_sev2.



Public, Private and Tribal Lands

The case here: it's generally less costly to initiate conservation actions on public land than tribal land and private land due to permissions and recognition of forest conservation (as opposed to say extraction priorities) as an important landscape conservation objective.

Relative Condition	Ownership	Reclass Value/Cost Score
Poor	Private	3000
Fair	Tribal	1000
Good	Public	0

Very Good	Public	0

Starting with R:\Base_Data\Ownership\JurisdictionalComplexity_Jurisdictions_c2012\JurisdictionalComplexity\Jurisdictions_c2012.shp, a layer developed by the Crown Managers partnership and stored on ScienceBase (https://www.sciencebase.gov/catalog/item/565f35c1e4b071e7ea54451d), Add Field Pub_Pvt (String, 50) and reclass Jurisdict field as follows:

Public: BLM, Federal Montana FWP, National Park, Provincial/State, Provincially Protected Area, State Trust Land, US Fish and Wildlife, USFS

Private: Local/Municipal Government, Plum Creek, Private, Private Conservation, Uncertain

Tribal: Reservation

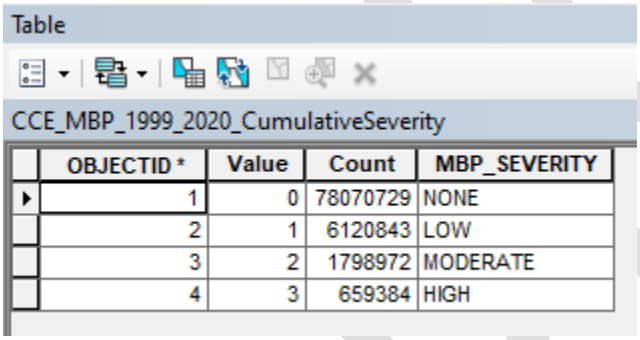
Add Field: Score (ShortInt) and score using the Pub_Pvt field and the table above

Clear Selections!

Merge Jurisdictions_c2012.shp with R:\Base_Data\CROWN_LCD_Phase2\Project_Area\P2_Cost_Mask.shp to account for areas not (yet) classified as Pub_Pvt (those areas will receive a score of 1) to create: R:\Base_Data\CROWN_LCD_Phase2\Cost_Layers_P2\Ownership\Crown_own_part

Insect Impacts

Acquired Mountain Pine Beetle severity index from the Hi5 Working Group and Danie Frivola. It includes 4 levels of pine beetle impact severity (none, low, moderate, and high) with values 0-3:



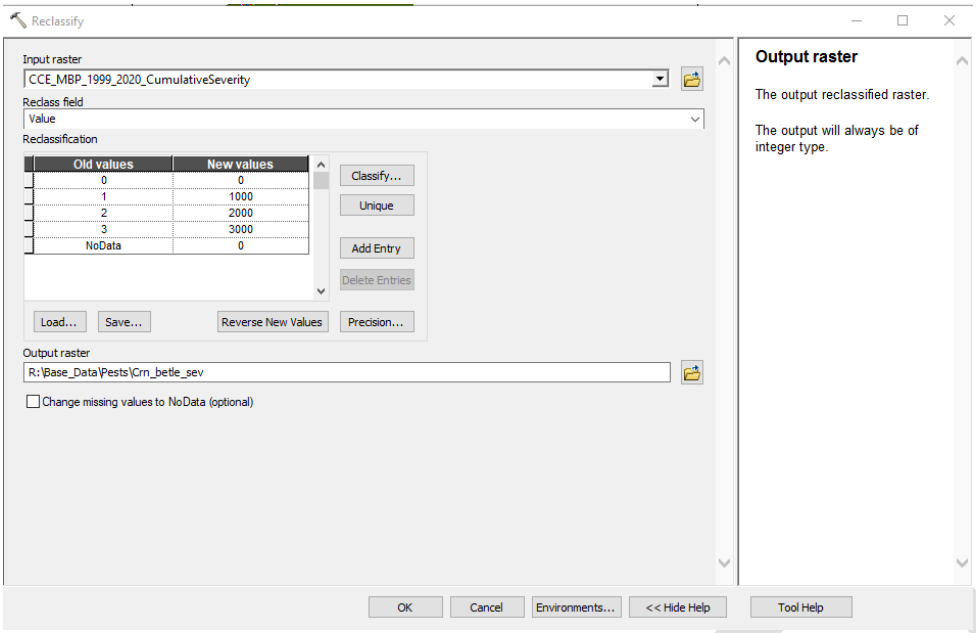
Table

CCE_MBP_1999_2020_CumulativeSeverity

OBJECTID *	Value	Count	MBP_SEVERITY
1	0	78070729	NONE
2	1	6120843	LOW
3	2	1798972	MODERATE
4	3	659384	HIGH

Reclassify:

Relative Condition	Mountain Pine Beetle Severity	Reclass Value/Cost Score
Poor	High	3000
Fair	Moderate	2000
Good	Low	1000
Very Good	None	0

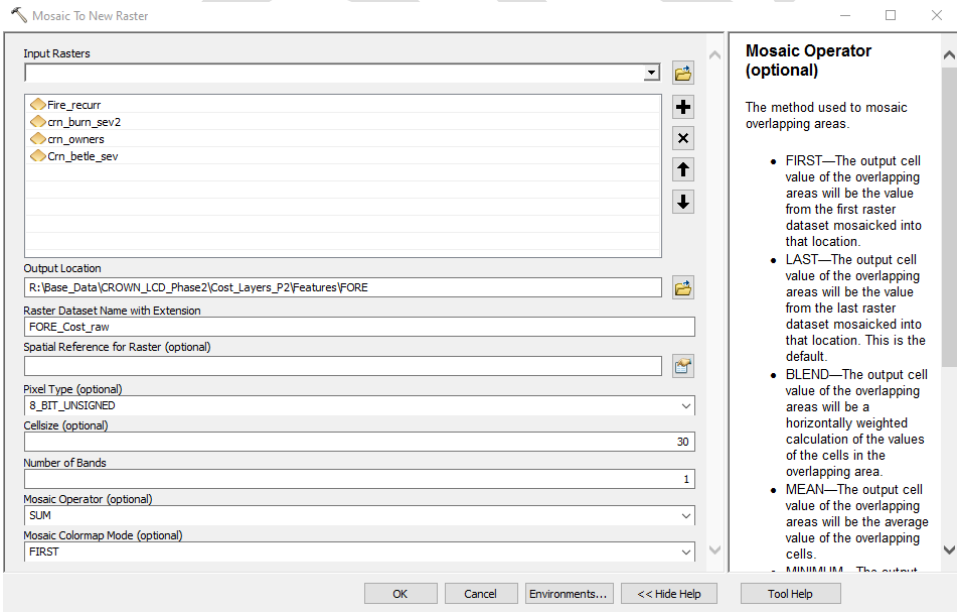


To create: R:\Base_Data\Pests\Crn_betle_sev

Semi-final Rasters for creation of Forest Cost layer:

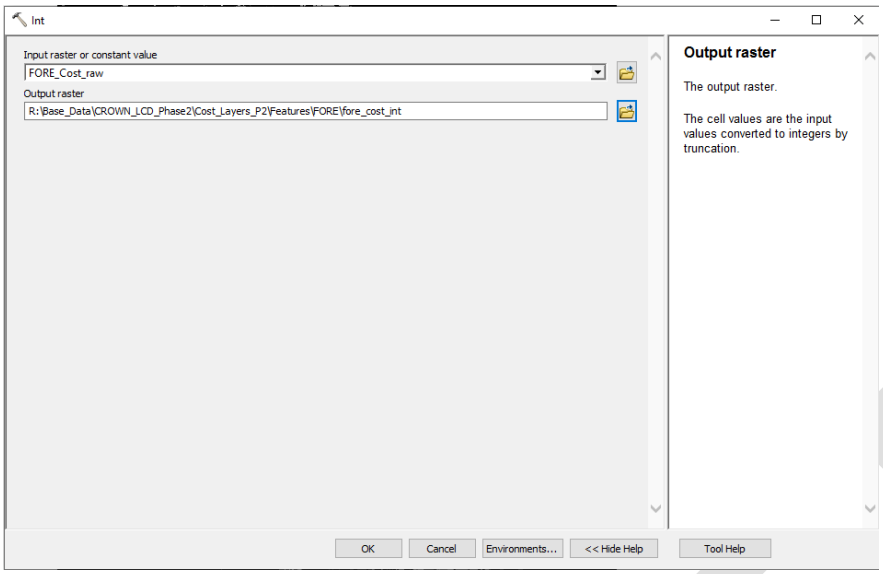
R:\Base_Data\CROWN_LCD_Phase2\Cost_Layers_P2\Fire\fire_recurr
R:\Base_Data\CROWN_LCD_Phase2\Cost_Layers_P2\Fire\crn_burn_sev2
R:\Base_Data\CROWN_LCD_Phase2\Cost_Layers_P2\Ownership\Crown_own_part
R:\Base_Data\Pests\Crn_betle_sev

Mosaic to a New Raster:



To produce output: R:\Base_Data\CROWN_LCD_Phase2\Cost_Layers_P2\Features\FORE\FORE_Cost_raw

Run Int to convert to a signed integer:



Then one final Reclassify to cap Cost at 10,000:

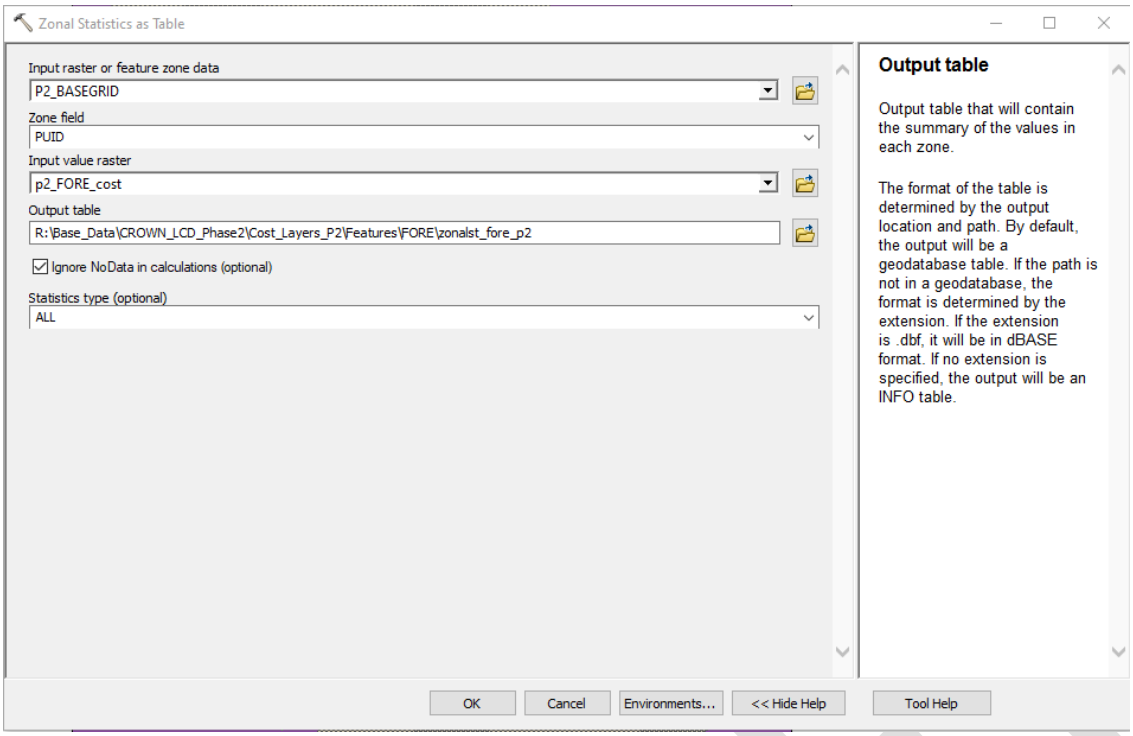
Table

fore_cost_int

Rowid	VALUE	COUNT
0	0	34015282
1	1	166960758
2	1000	10382945
3	1001	3439870
4	2000	2950473
5	2001	1828265
6	3000	22447738
7	3001	1262400
8	4000	3328731
9	4001	1092467
10	5000	1266177
11	5001	610466
12	6000	2730709
13	6001	613563
14	7000	1343424
15	7001	259729
16	8000	380927
17	8001	12218
18	9000	866962
19	9001	116178
20	10000	159221
21	10001	869
22	11000	91769
23	11001	5740
24	12000	14071
25	12001	185
26	13000	75738
27	13001	2064
28	14000	795
29	14001	23
30	15000	28
31	15001	3627
32	16001	36

Resulting in: R:\Base_Data\CROWN_LCD_Phase2\Cost_Layers_P2\Features\FORE\p2_FORE_Cost

Zonal Statistics as a Table:


Zonal Statistics as Table
Input raster or feature zone data
P2_BASEGRID
Zone field
PUID
Input value raster
p2_FORE_cost
Output table
R:\Base_Data\CROWN_LCD_Phase2\Cost_Layers_P2\Features\FORE\zonalst_fore_p2
Ignore NoData in calculations (optional)
Statistics type (optional)
ALL
Output table
Output table that will contain the summary of the values in each zone.
The format of the table is determined by the output location and path. By default, the output will be a geodatabase table. If the path is not in a geodatabase, the format is determined by the extension. If the extension is .dbf, it will be in dBASE format. If no extension is specified, the output will be an INFO table.
OK
Cancel
Environments...
<< Hide Help
Tool Help