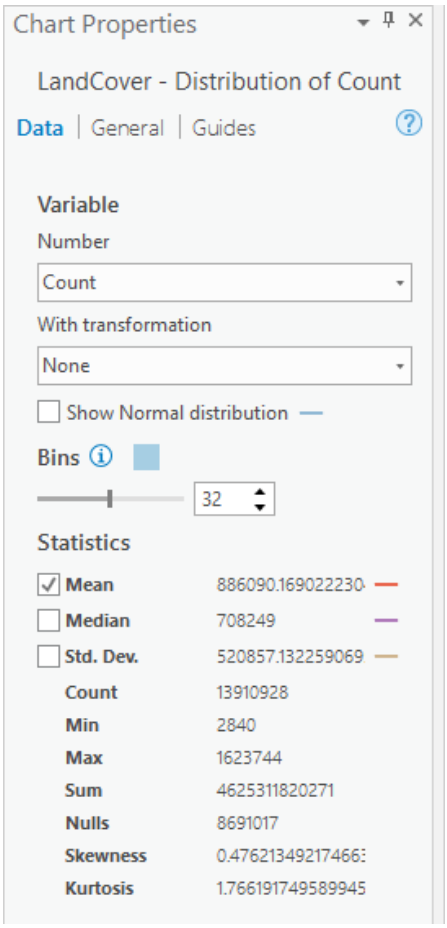
Correcting a problem associated with Landcover in Exercise 2

The area obtained from land cover cell counts in Exercise 2, can be incorrect (off by about 30%) due to the land cover layer obtained using Extract By Mask, being in the Mercator Auxiliary Sphere Projection. This document will explain how to get this into an Albers Equal Area projection to get correct area values. An important lesson learned here is that the Mercator Auxiliary Sphere Projection is very approximate when it comes to quantitative length and area calculations, and really should only be used for web visualization.

The problem.

In following the procedure in Exercise 2, one obtains 5219911 landcover cells with area 30x30m, which adds up to 4697.92 square kilometers.

This can be seen from the following **Statistics** on the **Count** column in the Landcover layer.



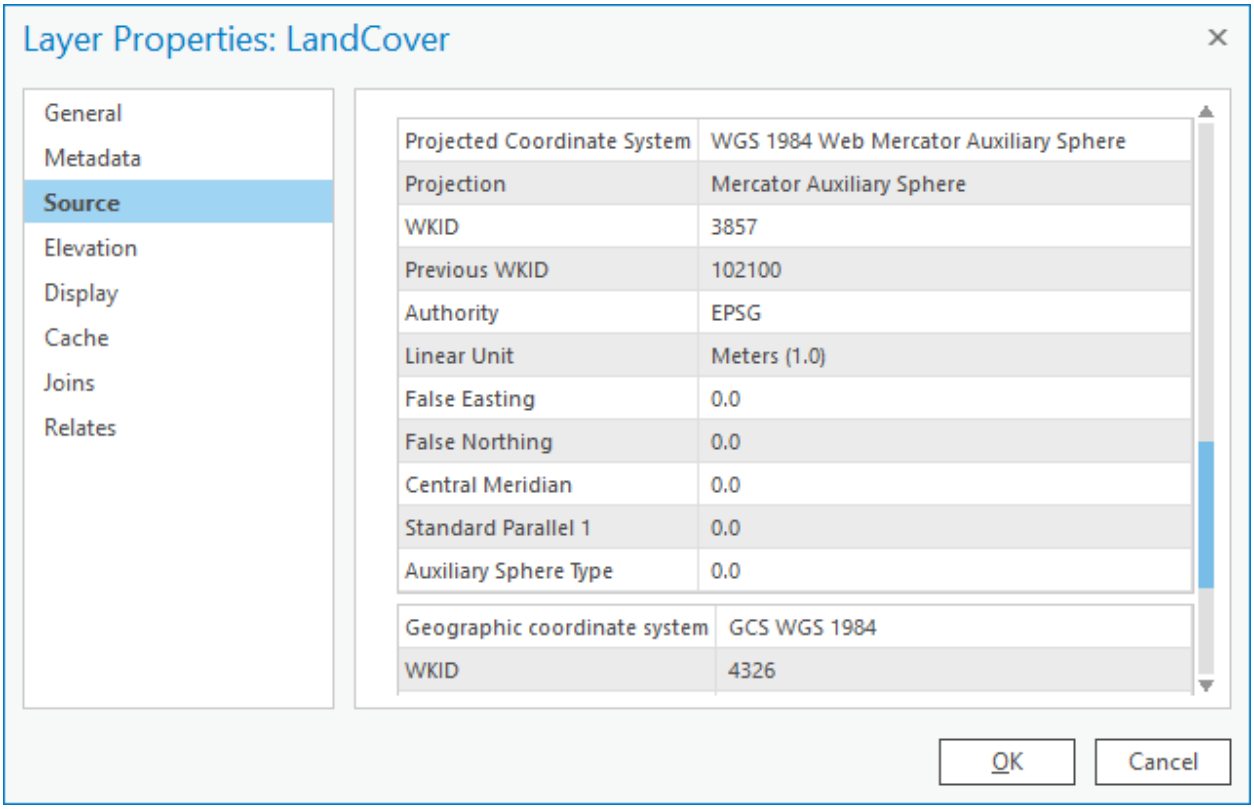
There are n=13910928 cells, of which 8691017 are null. Subtracting and evaluating area I get

n=13910928-8691017=5219911

a=n*30*30/1e6 = 4697.92 km^2

The result should be about 3520 km^2.

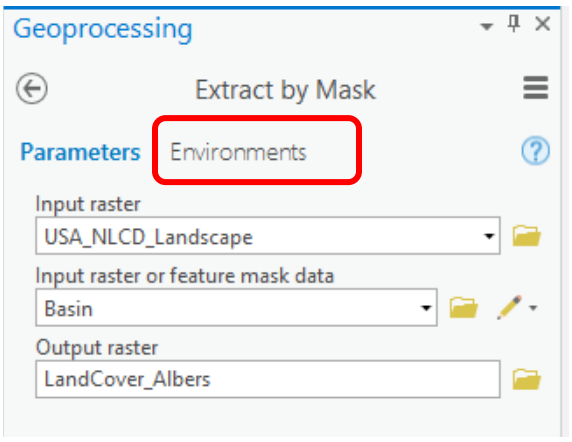
Projection information for this layer shows it is Mercator Auxiliary Sphere



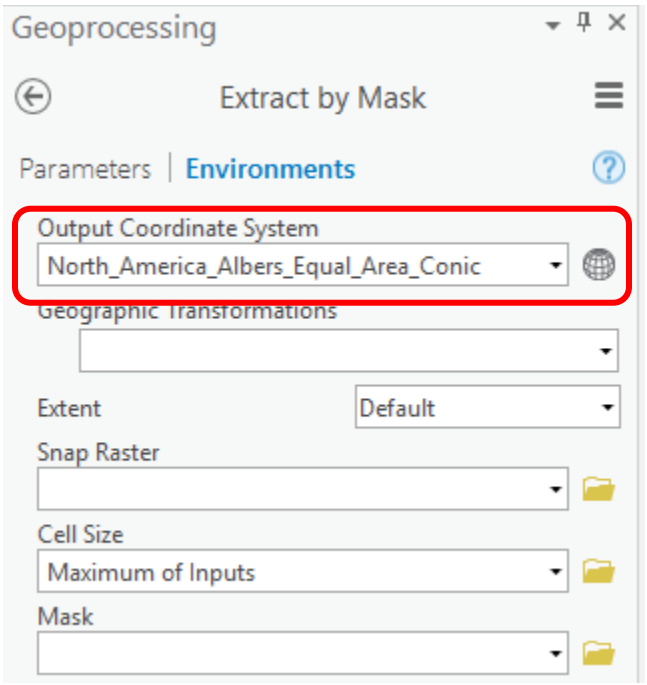
The solution

At the Extract by Mask step specify the output Coordinate System to be North_America_Albers_Equal_Area.

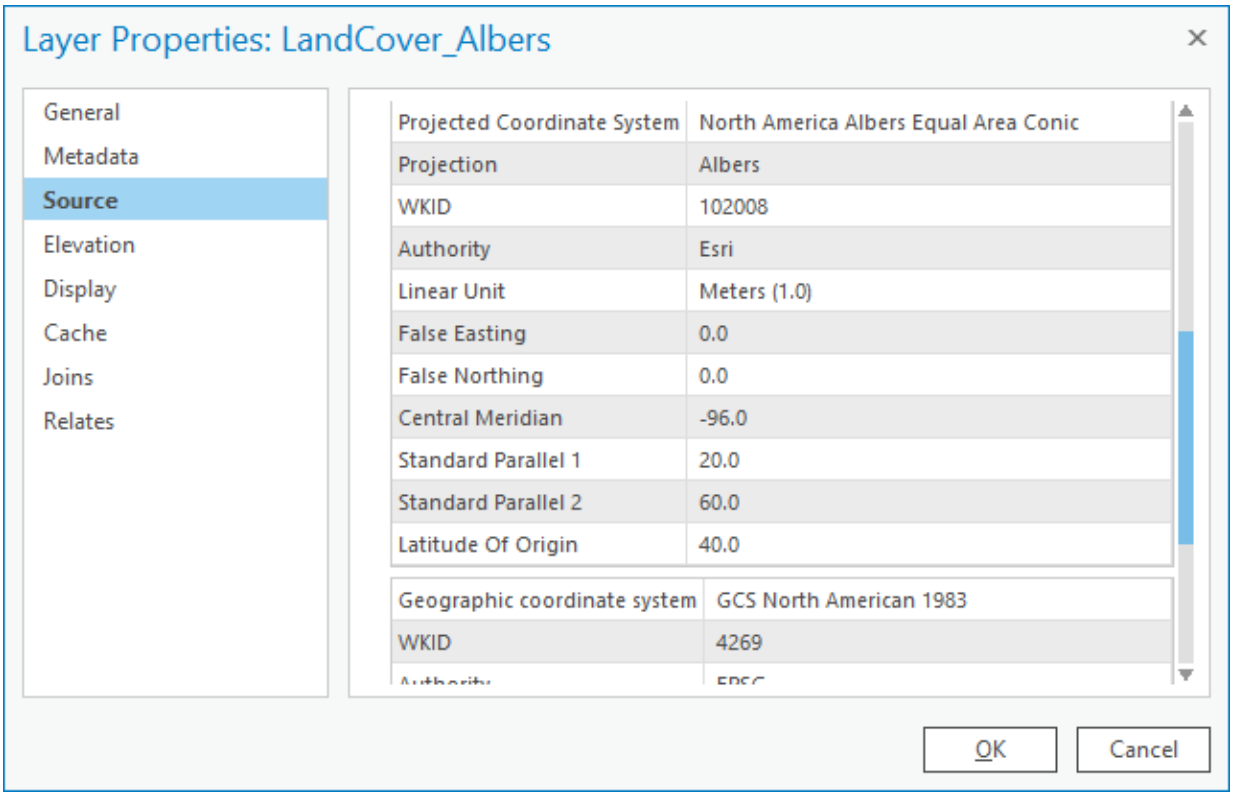
After Setting the inputs and outputs, Click on Environments



Then specify the Output Coordinate System

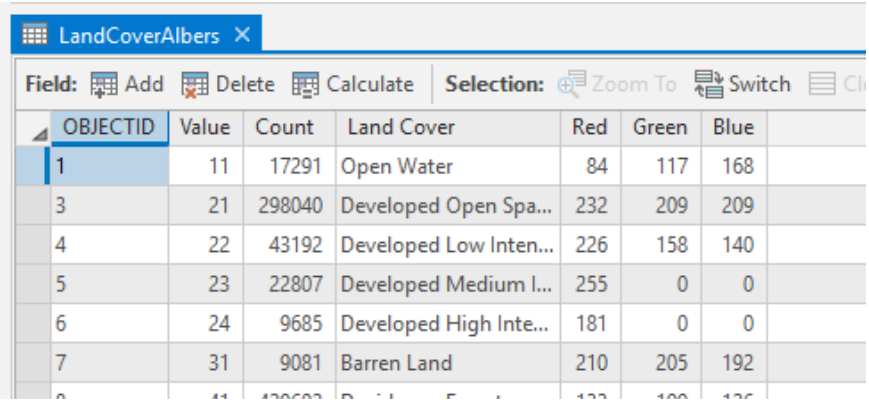


In the layer that results, the coordinate system should be as below



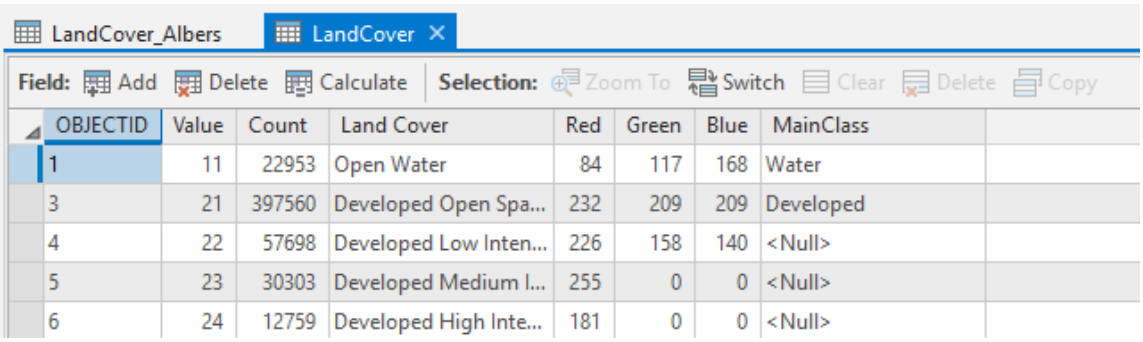
Open the attribute table and you see that the cell counts are different.

New



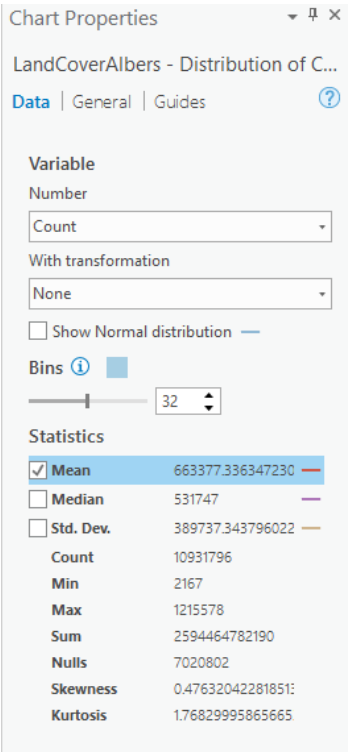
OBJECTID	Value	Count	Land Cover	Red	Green	Blue
1	11	17291	Open Water	84	117	168
3	21	298040	Developed Open Spa...	232	209	209
4	22	43192	Developed Low Inten...	226	158	140
5	23	22807	Developed Medium I...	255	0	0
6	24	9685	Developed High Inte...	181	0	0
7	31	9081	Barren Land	210	205	192

Old



OBJECTID	Value	Count	Land Cover	Red	Green	Blue	MainClass
1	11	22953	Open Water	84	117	168	Water
3	21	397560	Developed Open Spa...	232	209	209	Developed
4	22	57698	Developed Low Inten...	226	158	140	<Null>
5	23	30303	Developed Medium I...	255	0	0	<Null>
6	24	12759	Developed High Inte...	181	0	0	<Null>

Calculating statistics on the Count column results in:



There are n=10931976 cells, of which 7020802 are null. Subtracting and evaluating area I get
n=10931976 -7020802 = 3911174
a= n*30*30/1e6= 3520.057 km^2
This is now a more precise area estimate.

To get more precise area values the projected "LandCoverAlbers" layer and table should be used in the calculations on pages 26-30 of the exercise.