

Tutorial Set 3: Spatial data analysis

Exercise Site20_3-1 Developing a P fertilizer prescription map

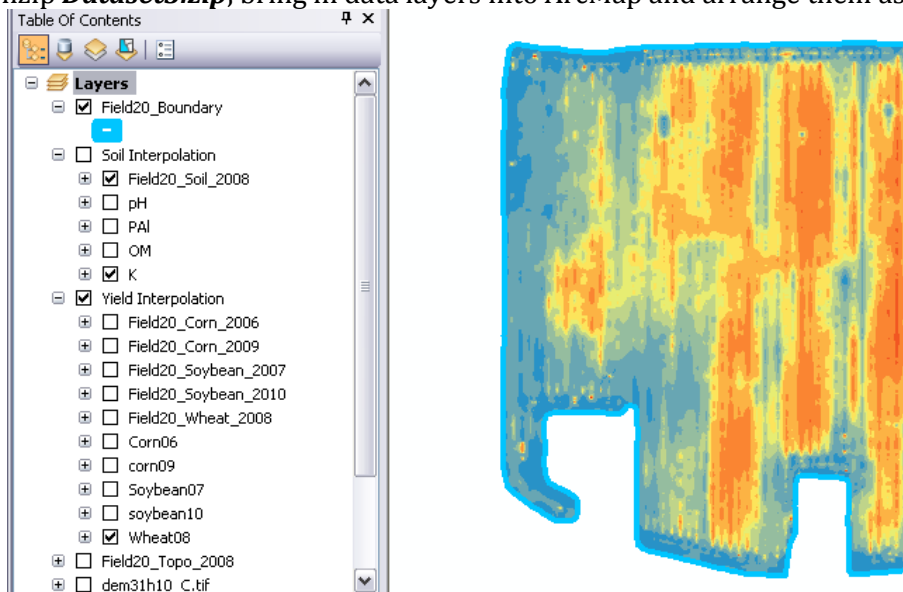
Learning objective: Generating a phosphorus (P_2O_5) prescription variability map (raster) and converting it to a classified polygon layer

Techniques: ArcToolbox – Spatial Analyst – Map Algebra – Raster Calculator
ArcToolbox – Spatial Analyst – Reclass – Reclassify
ArcToolbox – Conversion Tools – From Raster – Raster to Polygon

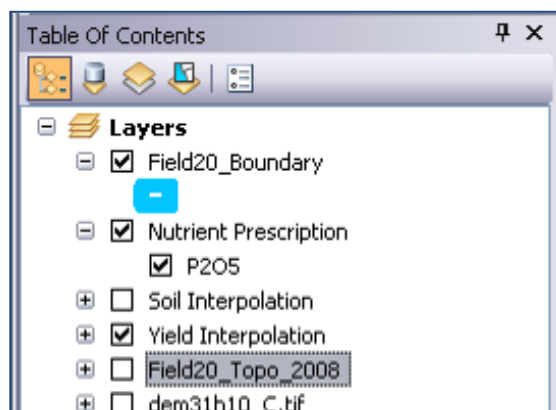
Data Source: Dataset3 (or your previously saved project)

Part 1: Layer management

1. Unzip **Dataset3.zip**, bring in data layers into ArcMap and arrange them as shown below:

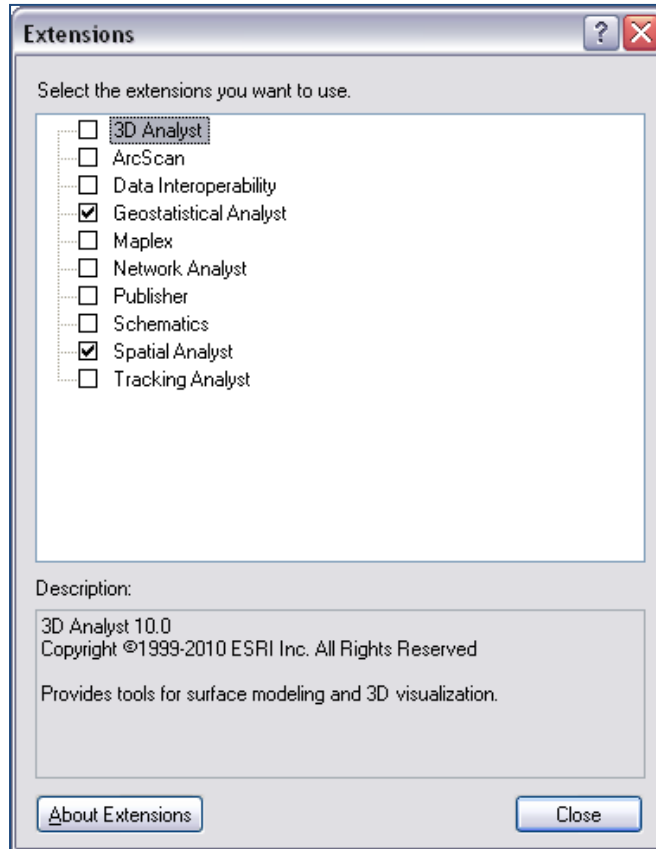


2. Right click on **Layer** in **Table of Contents** to add the **New Group Layer**, name it "**Nutrient Prescription**". Then add a subgroup named "**P2O5**" under the group "Nutrient Prescription".



Part 2: Activating Spatial Analyst

1. Go to **Customize > Extensions** to launch **Extension** dialog window and the select **Spatial Analyst** and **Close**. (By default, the Spatial Analyst is not activated in ArcGIS. You need to activate only once.)

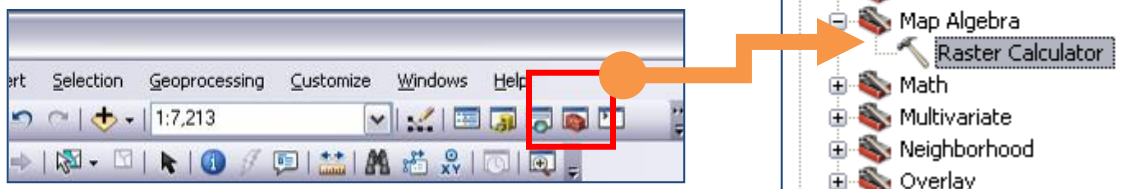


Part 3: Creating a P₂O₅ prescription map using the ArcToolbox -> Raster Calculator

1. Understand the formula used to estimate the P₂O₅ prescription

$$\begin{cases} \text{if } \frac{P}{Al} > 20 \rightarrow P_2O_5 \text{ rate} = 0 \text{ kg/ha} \\ \text{if } \frac{P}{Al} \leq 20 \rightarrow P_2O_5 \text{ rate} = (20 - P/Al) \times 4 \text{ kg/ha} \end{cases}$$

2. Launch the **ArcToolbox** by clicking on the **ArcToolbox** button. Go to **ArcToolbox > Spatial Analyst Tools > Map Algebra > Raster Calculator**.

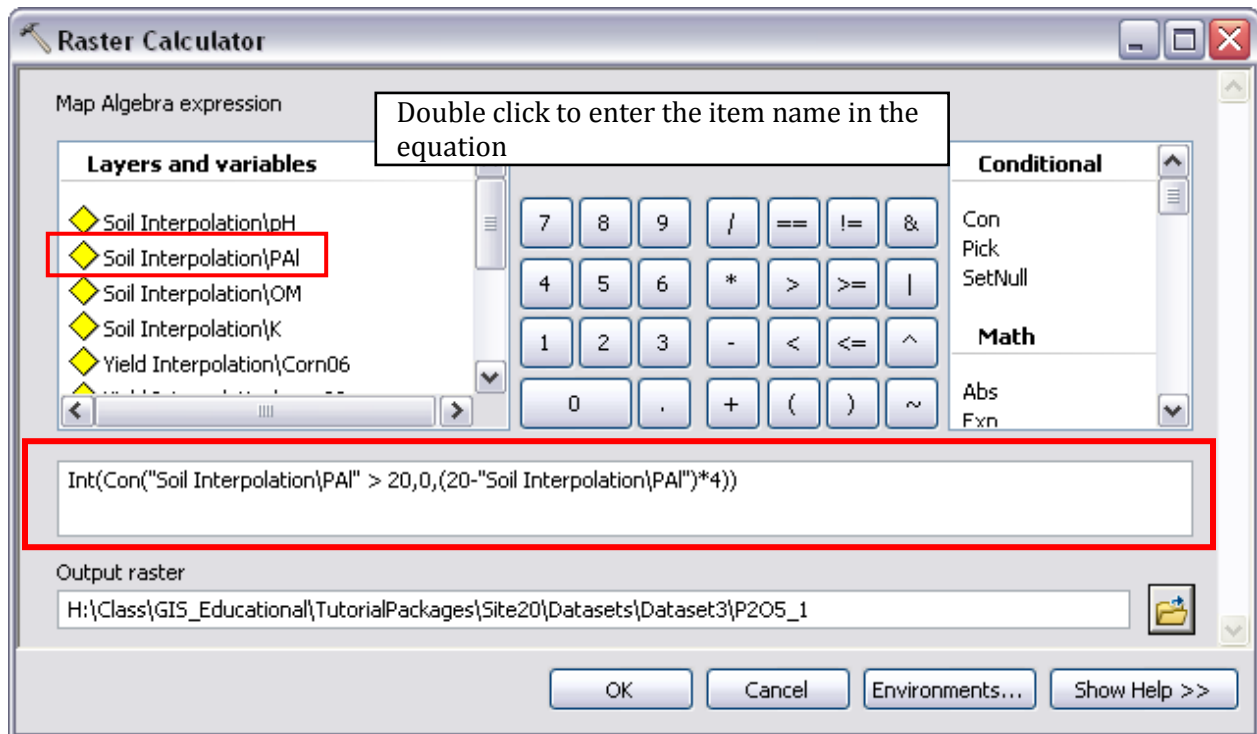


3. Generate a P_2O_5 prescription map by entering the following map algebra expression in the **Raster Calculator** dialog window. A new raster **P205_1** is added to **Table of Contents**.

Meaning of the operators:

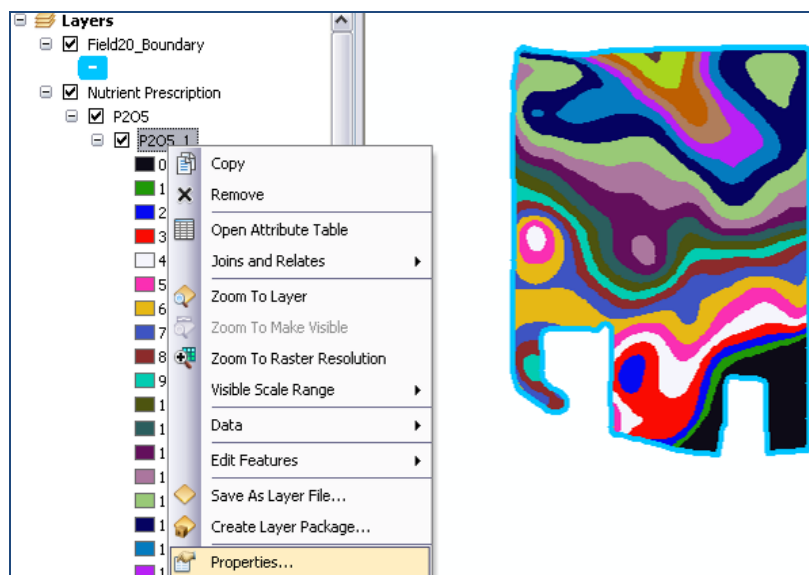
Con: an operator for IF statement

Int: an operator to convert value to integer

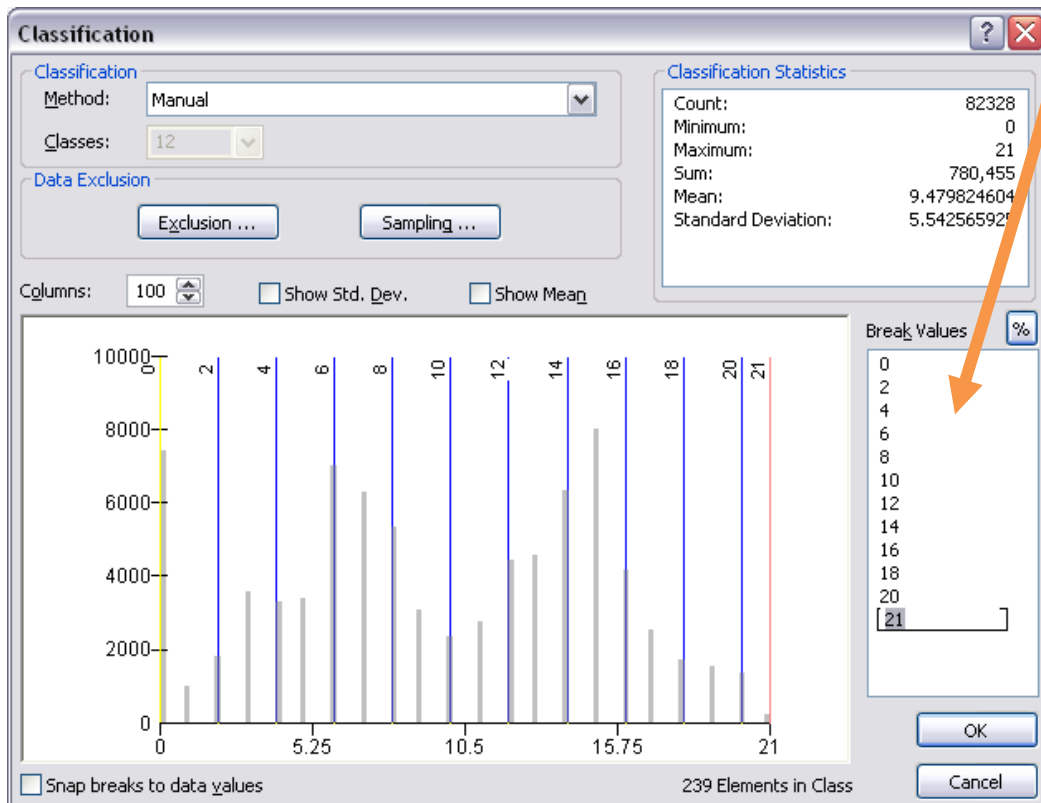
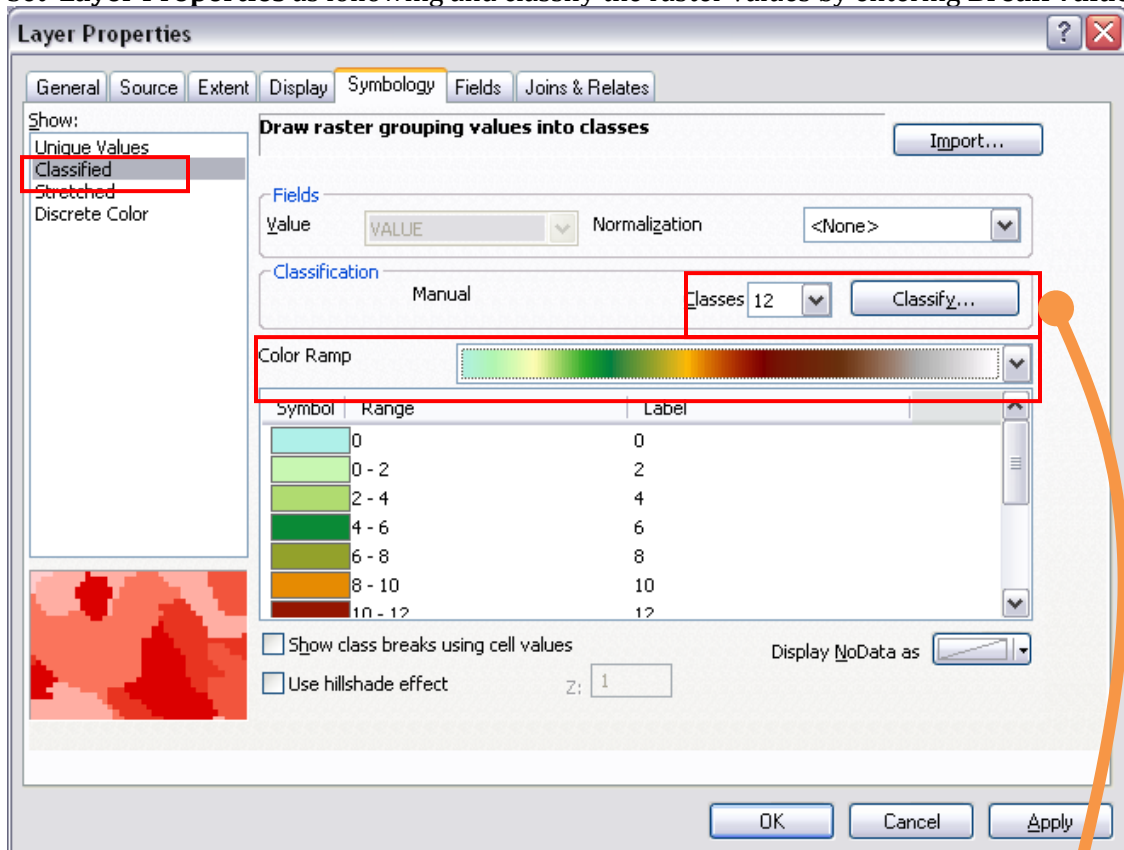


Part 3: Converting P_2O_5 prescription map (raster) into a classified polygon layer

1. In **Table of Contents**, right click on **P205_1** layer and then click **Properties**. Change **Symbology** to show the values as **Classified**.

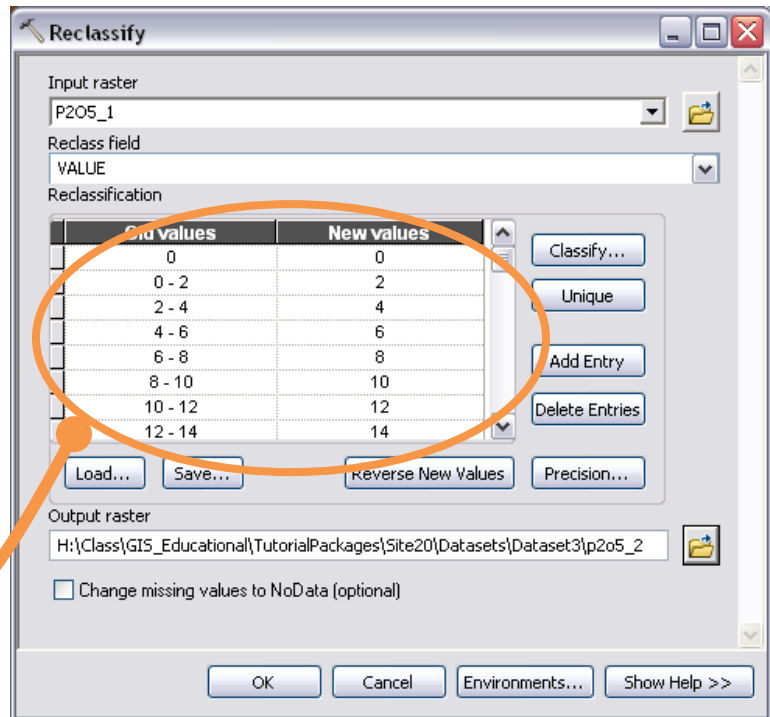


- Set **Layer Properties** as following and classify the raster values by entering **Break Values**.

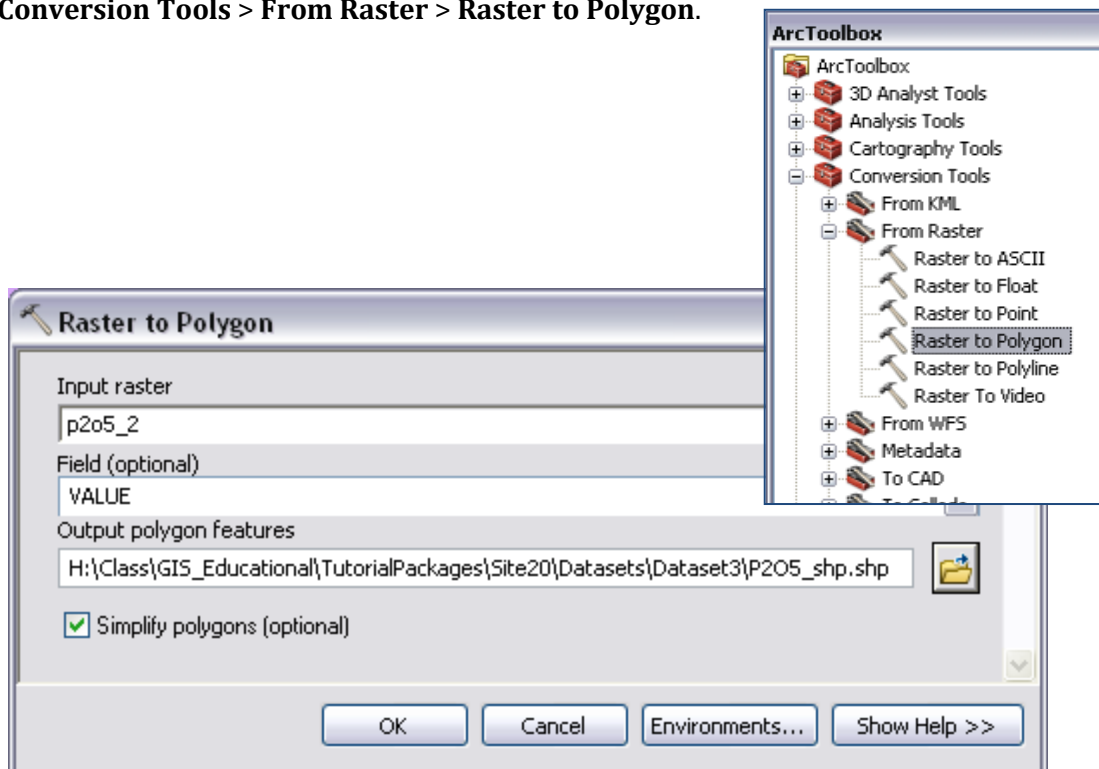


- Reclassify the raster layer **P205_1** to a new raster containing pixels with integer values. Go to **ArcToolbox > Spatial Analyst Tools > Reclass > Reclassify**. Assign new values to reclassify **P205_1** and save it as **P205_2**.

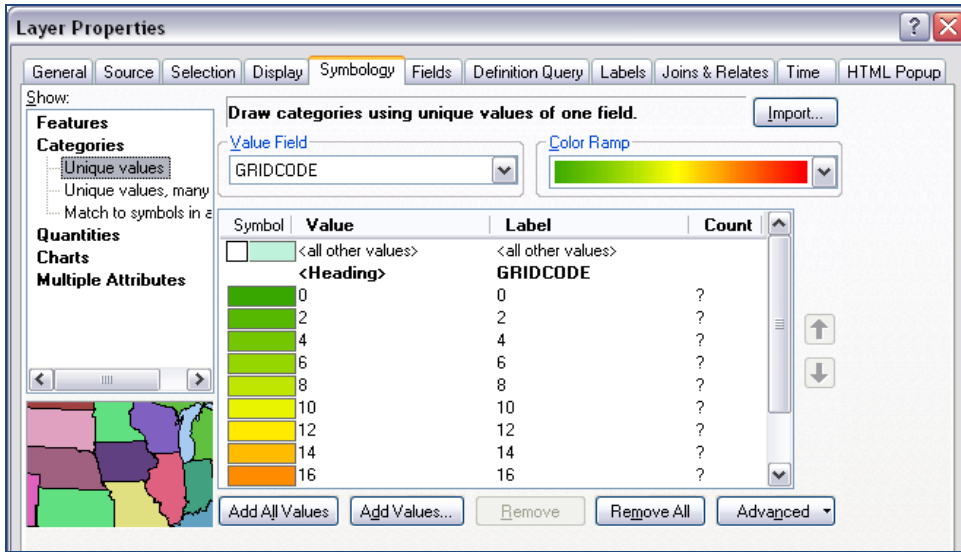
Old values	New values
0	0
0-2	2
2-4	4
4-6	6
6-8	8
8-10	10
10-12	12
12-14	14
14-16	16
16-18	18
18-20	20
20-21	21



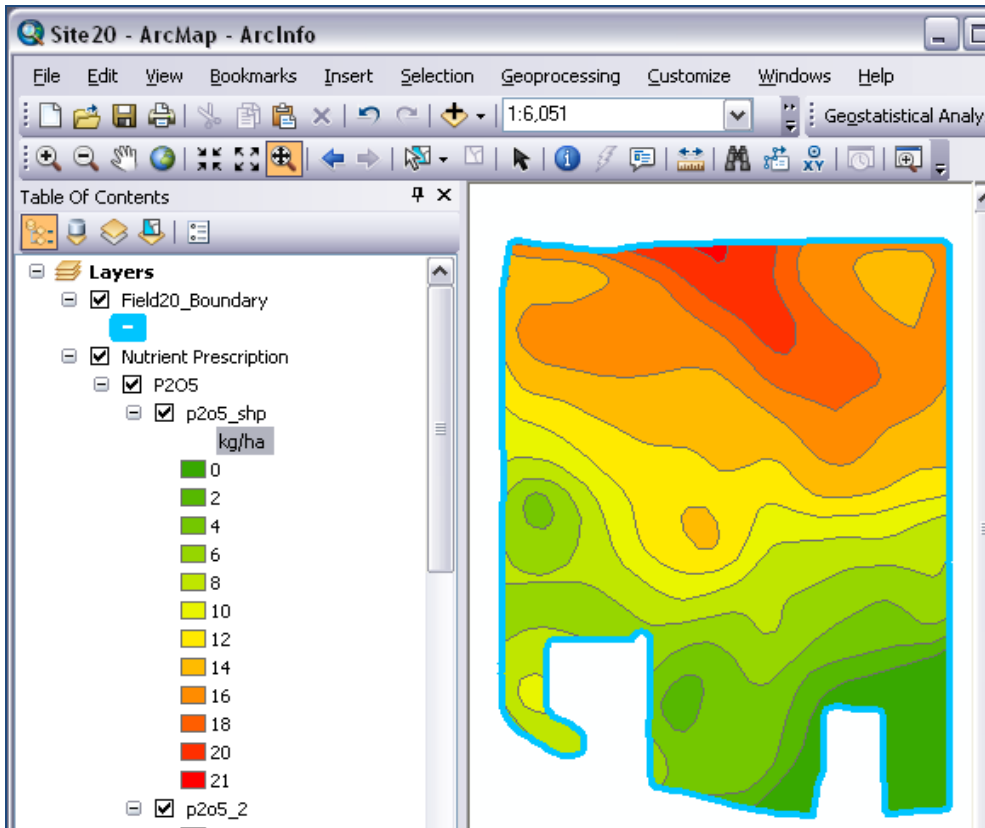
- Convert the raster layer **P205_2** to a shapefile using the **ArcToolbox**. Go to **ArcToolbox > Conversion Tools > From Raster > Raster to Polygon**.



- Now, modify the **Symbology** of *P205_shp* as follows.



- The map showing different zones of P_2O_5 prescription is shown as follows.



- Save the project.