

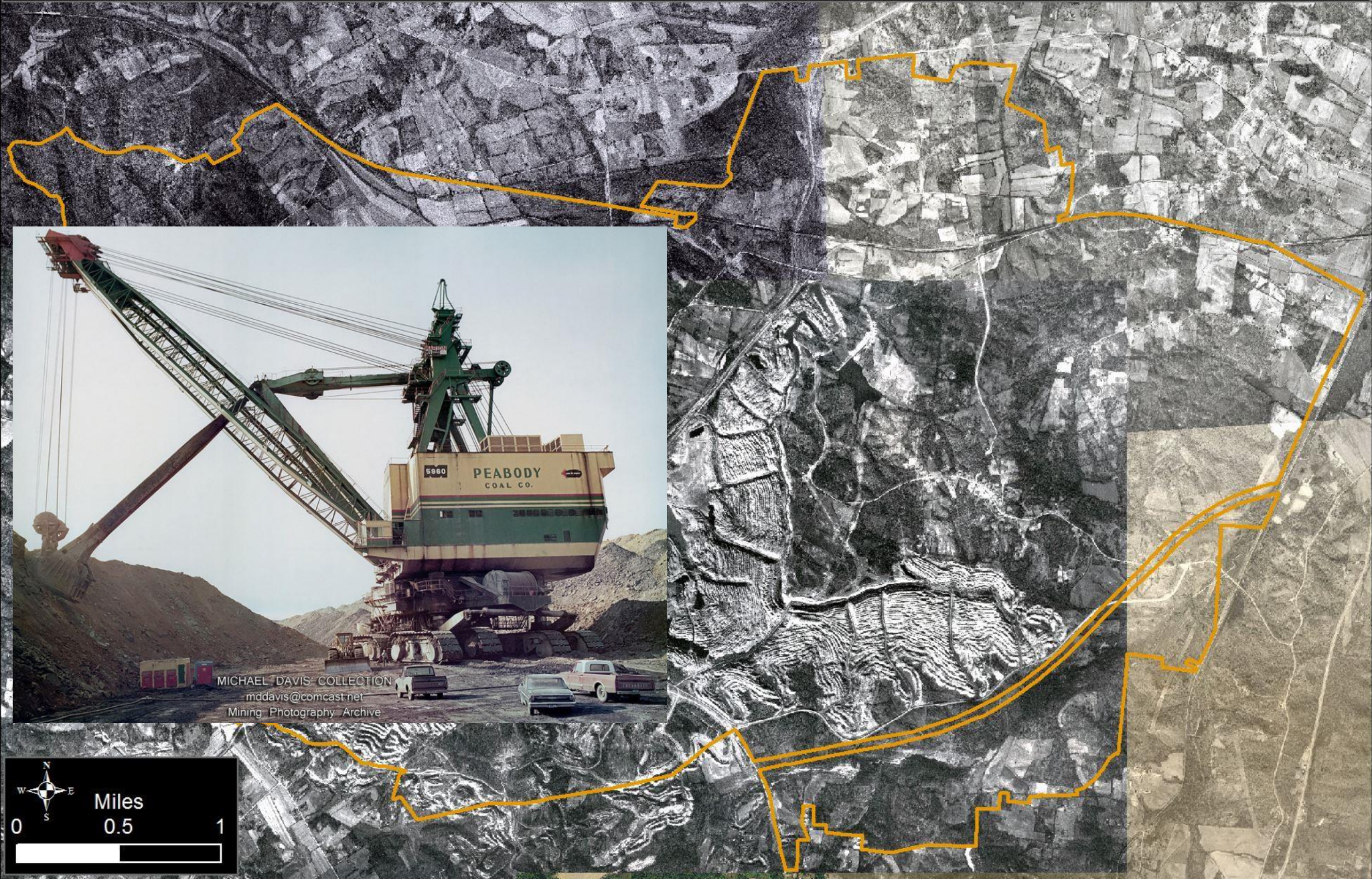
Fishy Problem?

GIS to the rescue



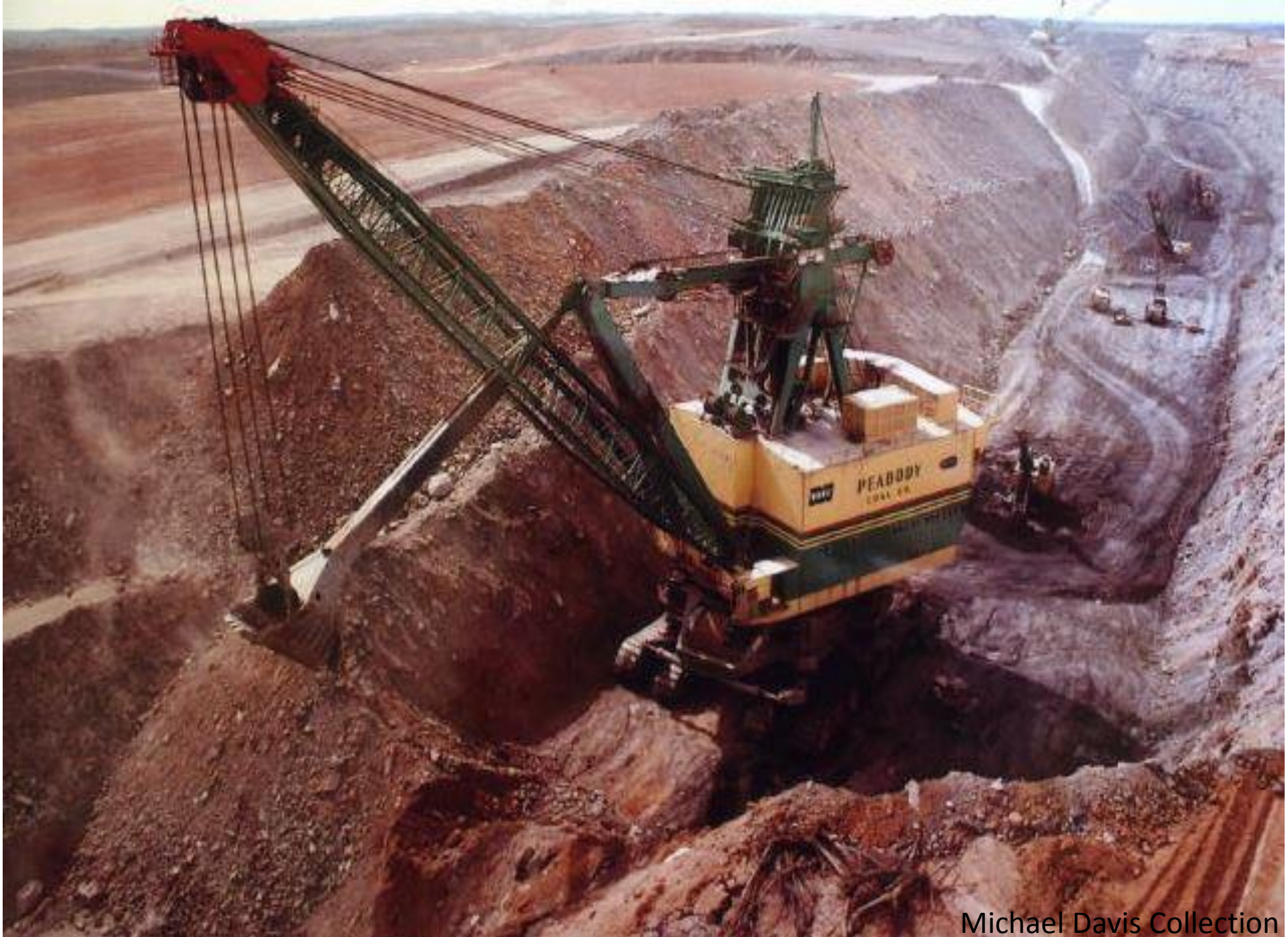


Peabody Mineland, Greenville, Kentucky (circa 1962) Future Wendell H Ford Training Center



MICHAEL DAVIS COLLECTION
mddavis@comcast.net
Mining Photography Archive





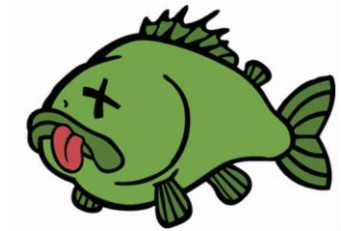
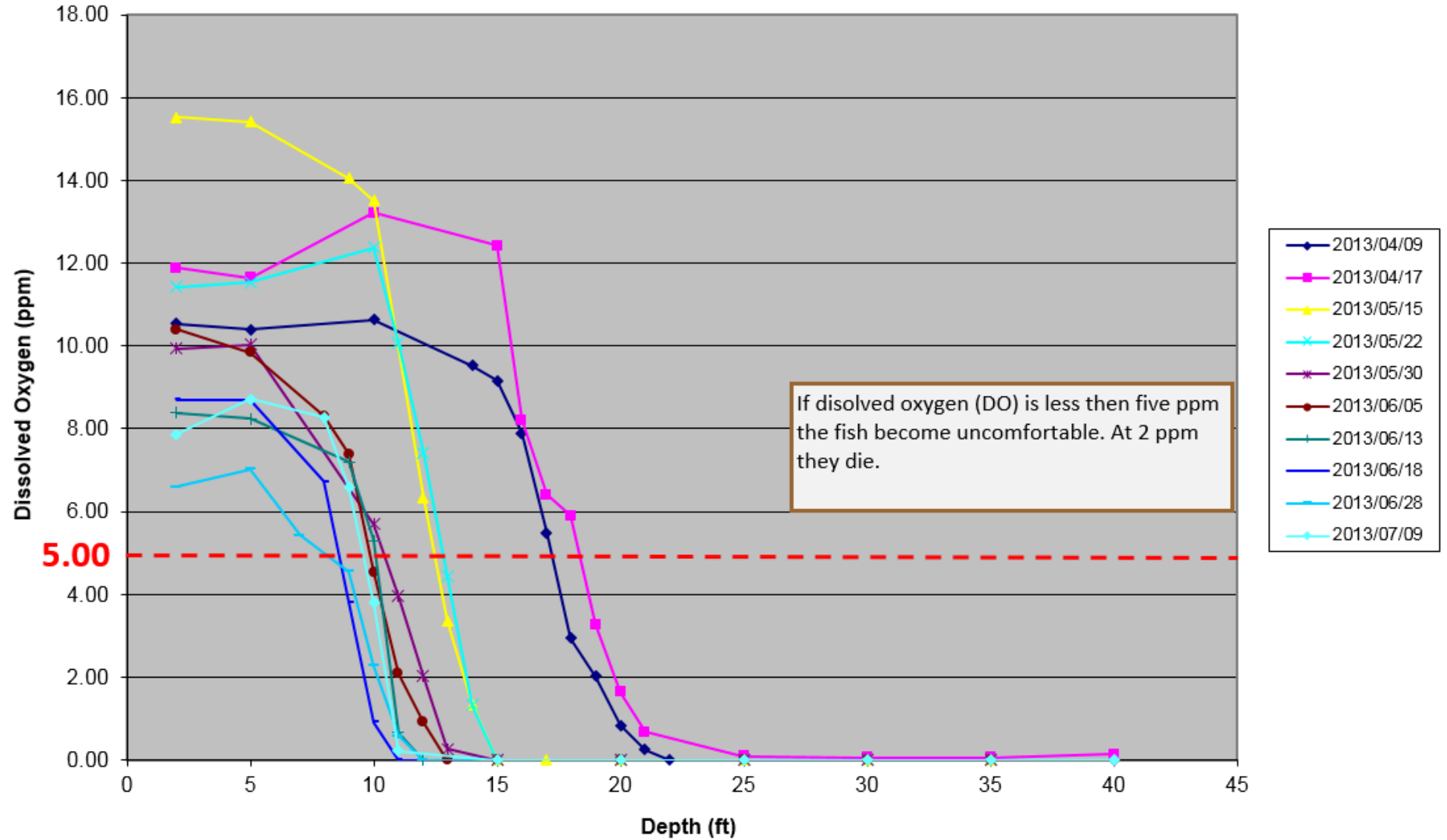
Michael Davis Collection



- HI Multimeter 9142
- Dissolved Oxygen
 - pH
 - Temperature
 - Turbidity

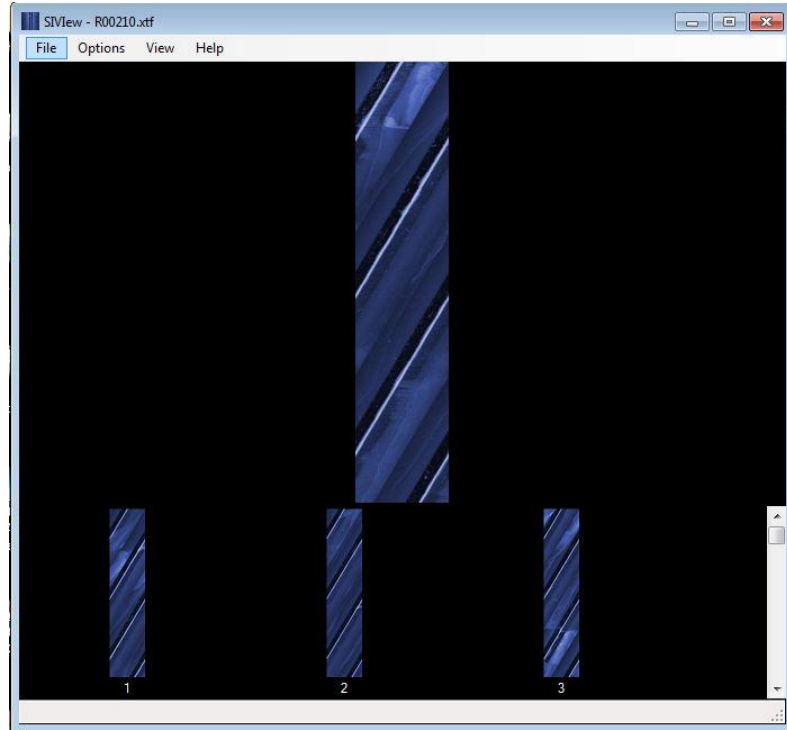
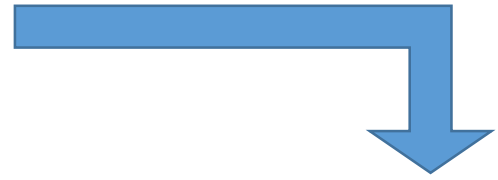
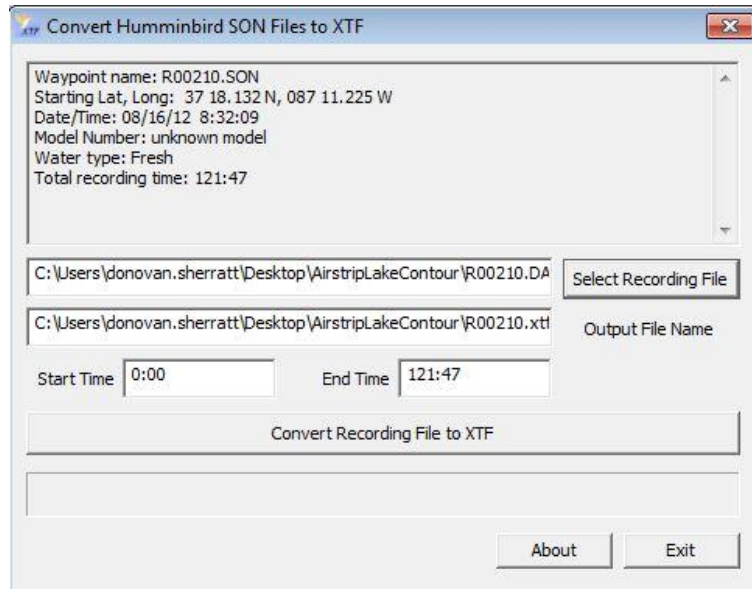


Big Reno DO #3





Humminbird 798ci HD
with transducer (fish finder)





```
# Import arcpy module
import arcpy

# Local variables:
v210_txt = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour\\210.txt"
v210_Layer = "210_Layer"
AirstripnonCon1 = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour.gdb\\AirstripnonCon1"
A1 = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour.gdb\\A1"
AirstripnonCon1_Merge = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour.gdb\\AirstripnonCon1_Merge"
Delete_succeeded = "true"
A2 = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour.gdb\\A2"
Delete_succeeded_2_ = "true"
A1__2_ = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour.gdb\\A1"
Delete_succeeded_3_ = "true"
v211_txt = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour\\211.txt"

# Process: Make XY Event Layer
arcpy.MakeXYEventLayer_management(v210_txt, "longitude", "latitude", v210_Layer, "GEOGCS['GCS_WGS_1984',DATUM['D_WGS_1984'],SPHEROID['WGS_1984',6378137.0,298.257.

# Process: Feature To Point
arcpy.FeatureToPoint_management(v210_Layer, AirstripnonCon1, "CENTROID")

# Process: Merge
arcpy.Merge_management("'F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour.gdb\\AirstripnonCon1';'F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour.gdb\\

# Process: Delete
arcpy.Delete_management(AirstripnonCon1, "")

# Process: Rename
arcpy.Rename_management(AirstripnonCon1_Merge, A2, "")

# Process: Delete (2)
arcpy.Delete_management(A1, "FeatureClass")

# Process: Rename (2)
arcpy.Rename_management(A2, A1__2_, "")

# Process: Delete (3)
arcpy.Delete_management(v210_Layer, "")
```

Insert path
to data

```
# Import arcpy module
import arcpy, os, sys

#path = os.path.dirname(sys.argv[0])
path="F:/LakeContour/Airstrip Lake 1/AirstripLakeContour/"
dirs = os.listdir(path)

# Local variables:
v211_txt = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour\\211.txt"
v211_Layer = "211_Layer"
AirstripnonCon1 = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour.gdb\\AirstripnonCon1"
A1 = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour.gdb\\A1"
AirstripnonCon1_Merge = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour.gdb\\AirstripnonCon1_Merge"
Delete_succeeded = "true"
A2 = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour.gdb\\A2"
Delete_succeeded_2_ = "true"
A1_2_ = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour.gdb\\A1_2_"
Delete_succeeded_3_ = "true"
tr = 1
```

Insert Loop
through
data

```
# Loop through txt files and create point features and merge them
for file in dirs:
    t = file
    v211_txt = "F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour\\" + t
    q = t[:3]
    v211_Layer = q + "_Layer"

# Process: Make XY Event Layer
arcpy.MakeXYEventLayer_management(v211_txt, "longitude", "latitude", v211_Layer, "GEOGCS['GCS_V

# Process: Feature To Point
arcpy.FeatureToPoint_management(v211_Layer, AirstripnonCon1, "CENTROID")

# Process: Merge
arcpy.Merge_management("F:\\LakeContour\\Airstrip Lake 1\\AirstripLakeContour.gdb\\Airstripnon

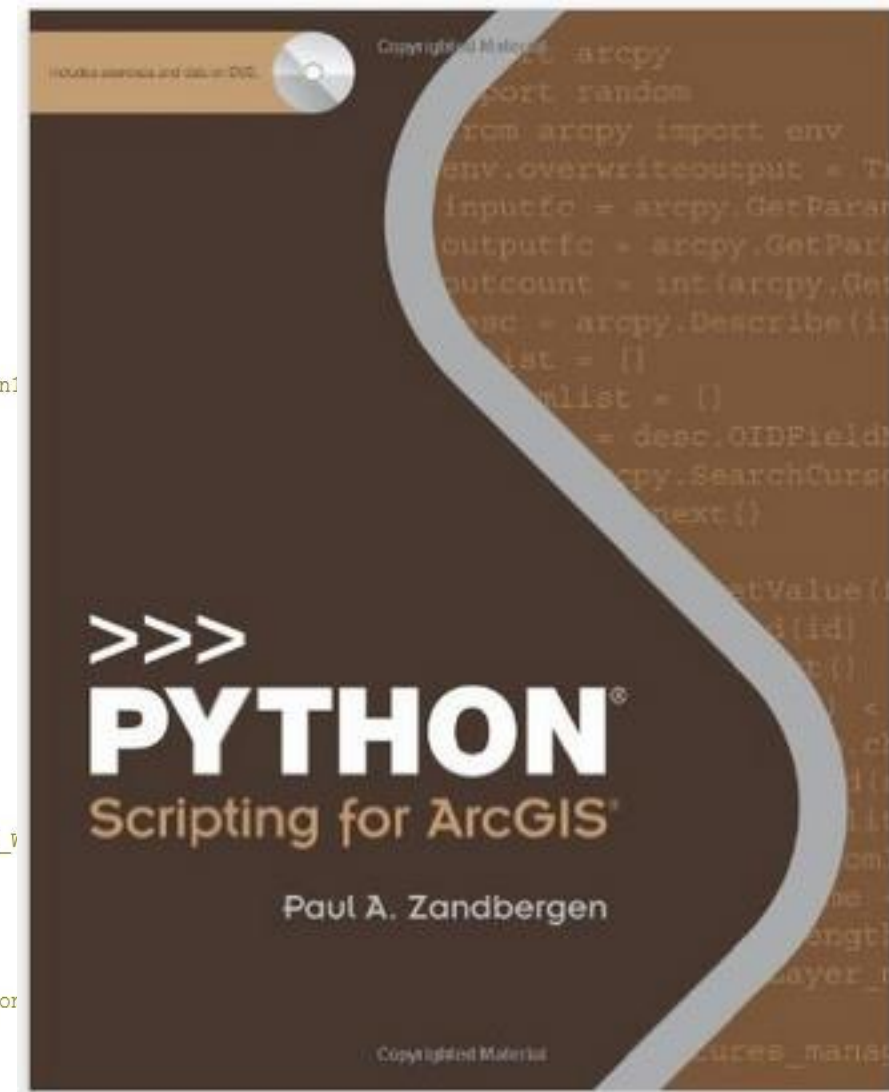
# Process: Delete
arcpy.Delete_management(AirstripnonCon1, "")

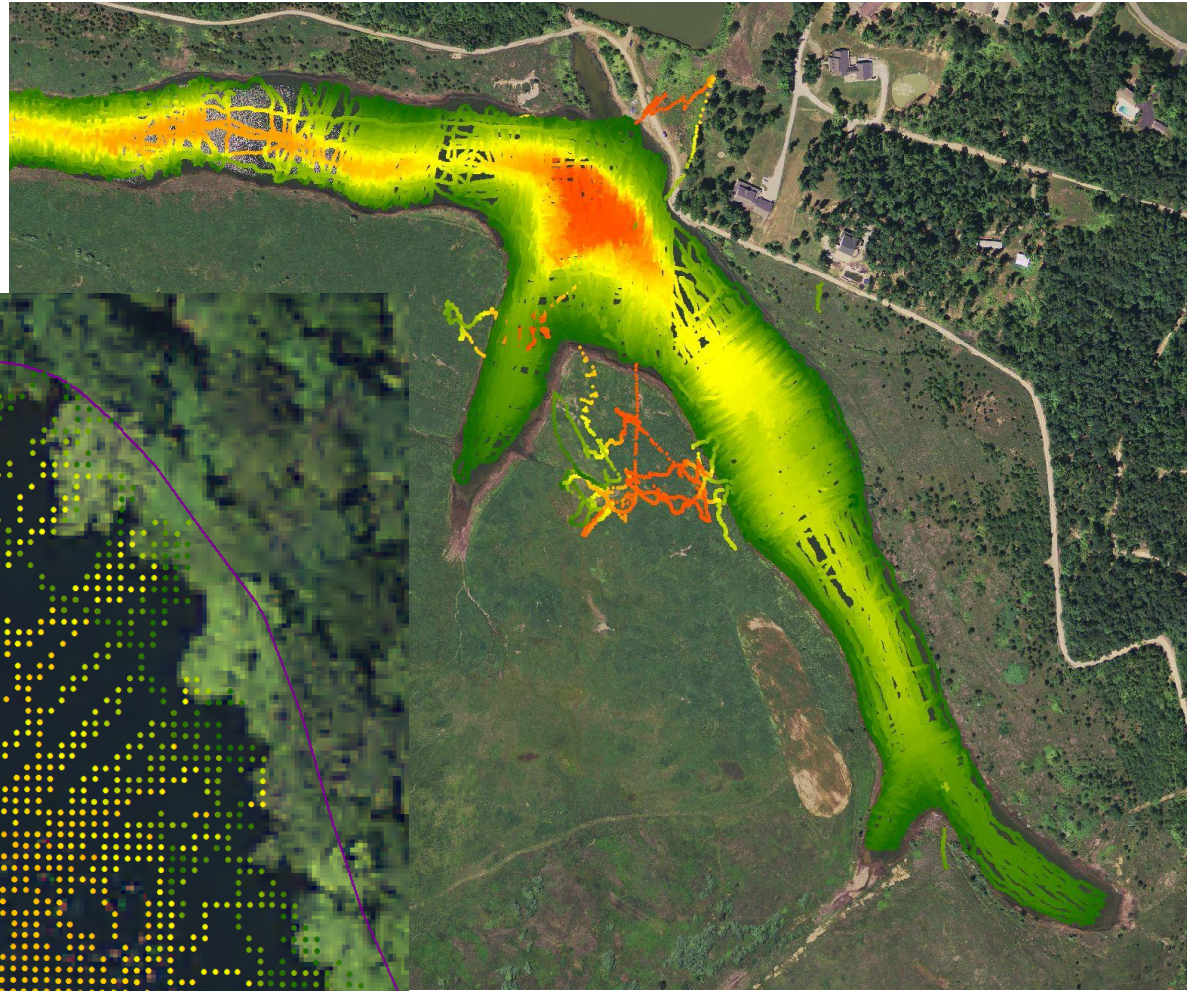
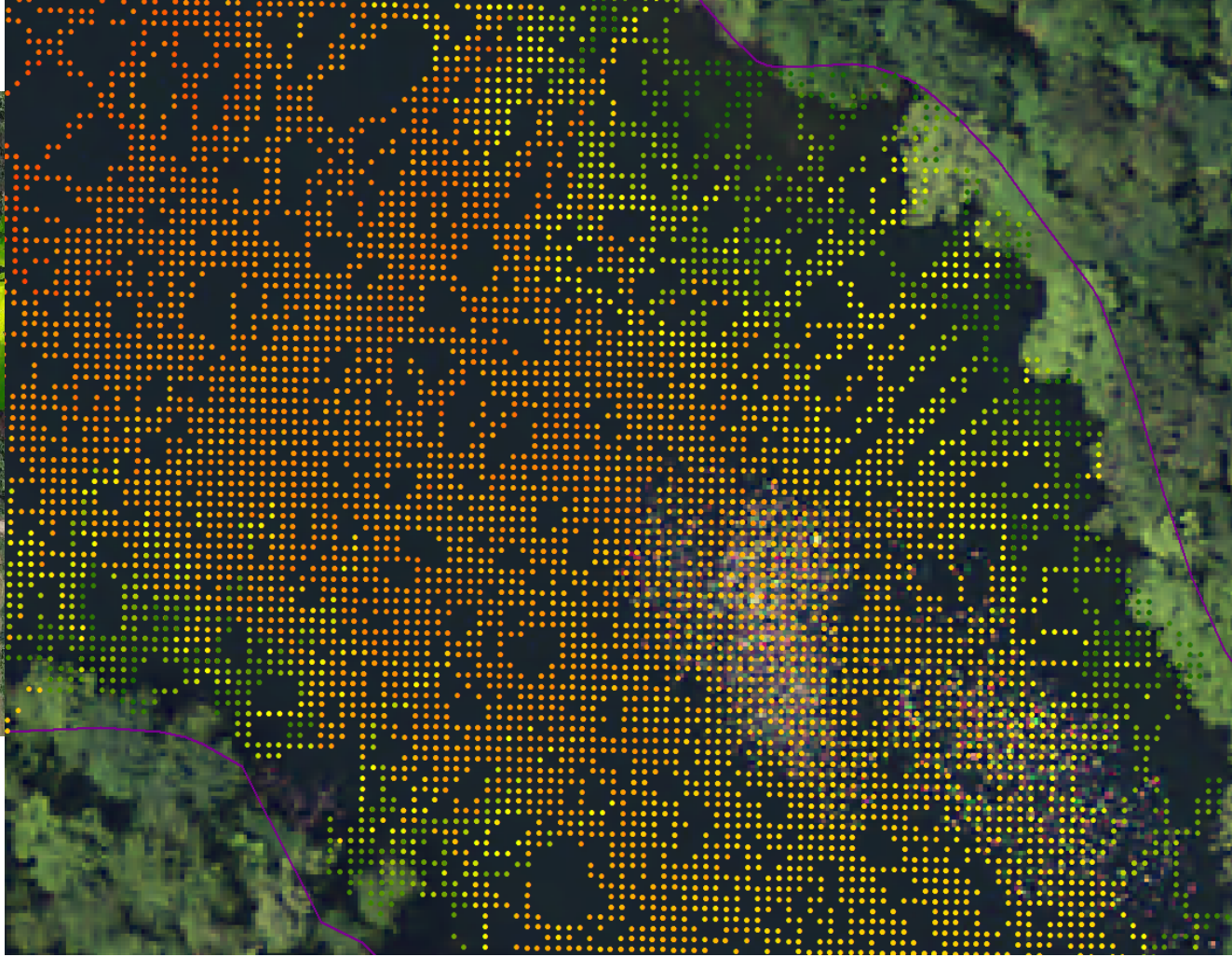
# Process: Delete (3)
arcpy.Delete_management(v211_Layer, "")

# Process: Rename
arcpy.Rename_management(AirstripnonCon1_Merge, A2, "")

# Process: Delete (2)
arcpy.Delete_management(A1, "FeatureClass")

# Process: Rename (2)
arcpy.Rename_management(A2, A1_2_, "")
```





IDW (Inverse Distance Weighted)

$$\hat{Z}(s_0) = \sum_{i=1}^N \lambda_i Z(s_i)$$

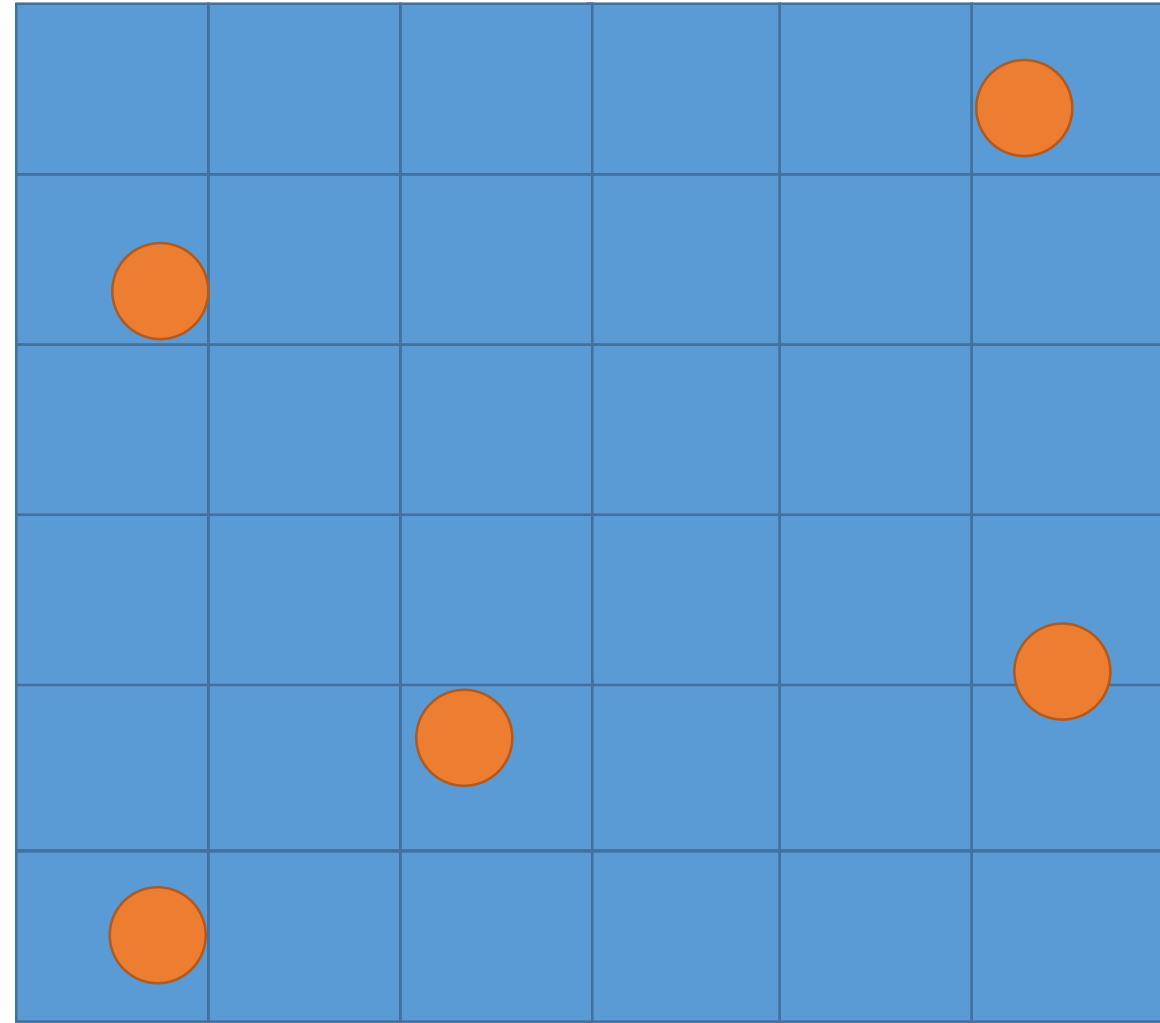
Where:

$\hat{Z}(s_0)$ is the value we are trying to predict for location s_0 .

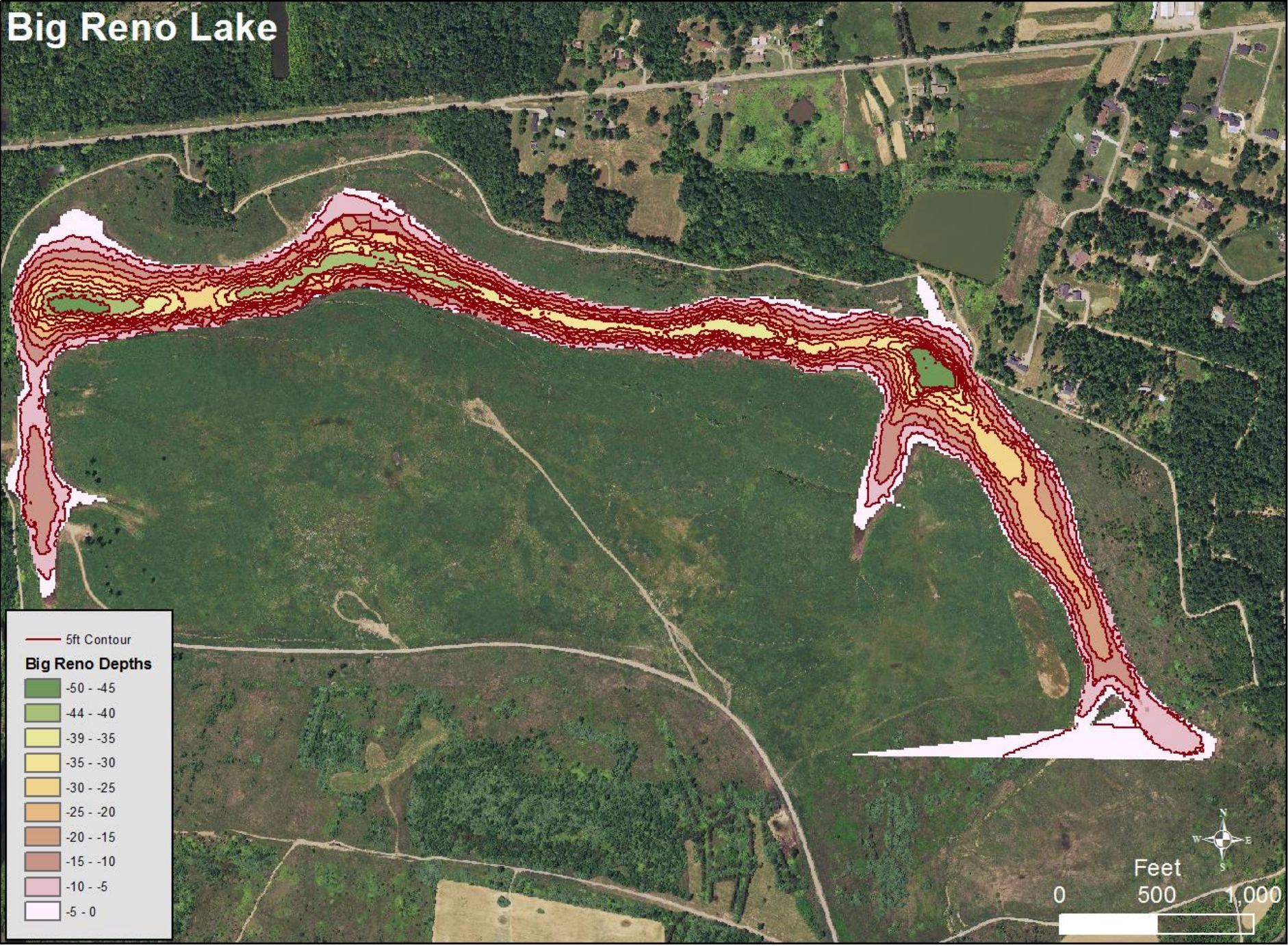
N is the number of measured sample points surrounding the prediction location that will be used in the prediction.

λ_i are the weights assigned to each measured point that we are going to use. These weights will decrease with distance.

$Z(s_i)$ is the observed value at the location s_i .



Big Reno Lake



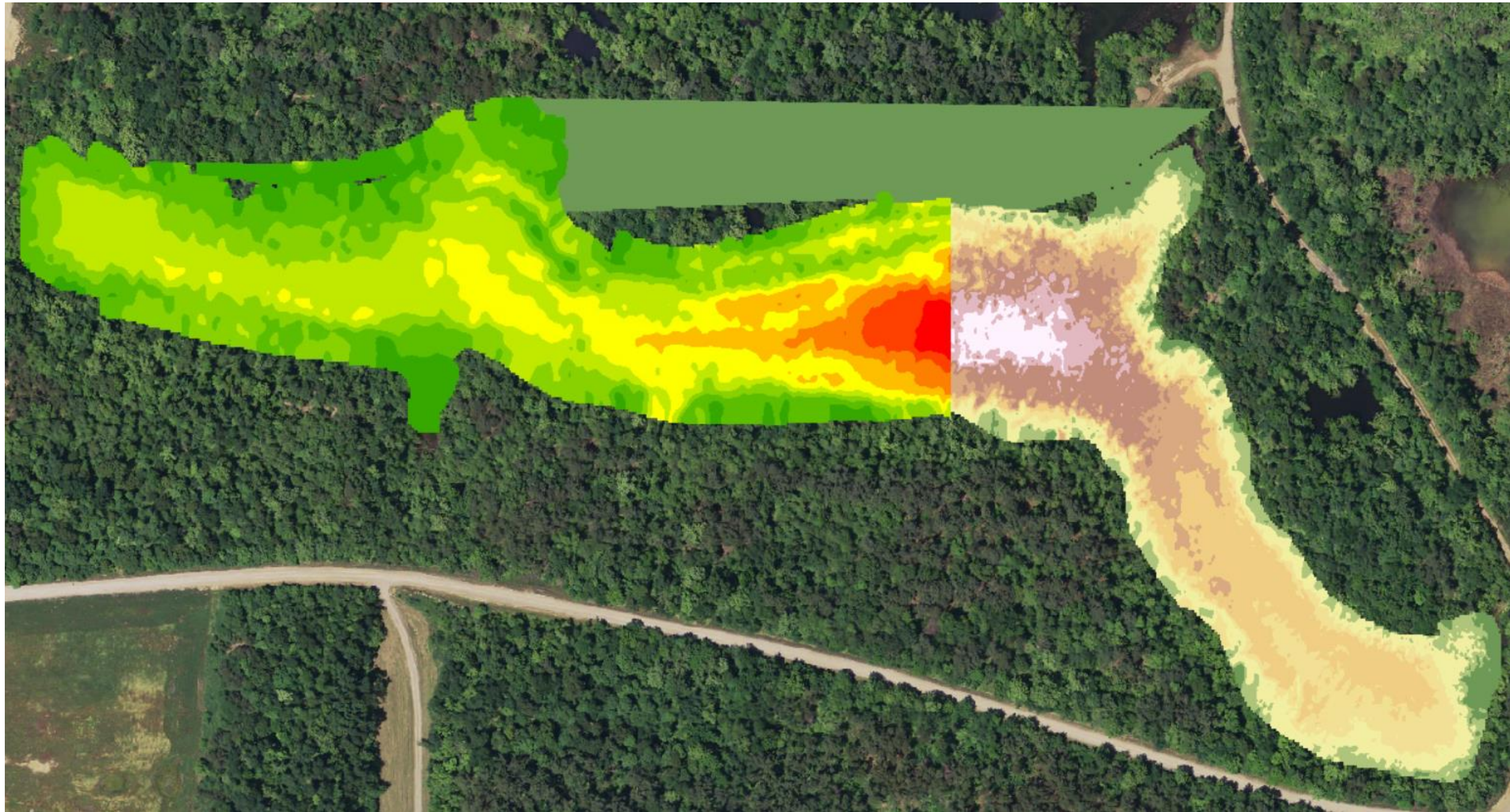
Focal Statistics or Filter (Low)

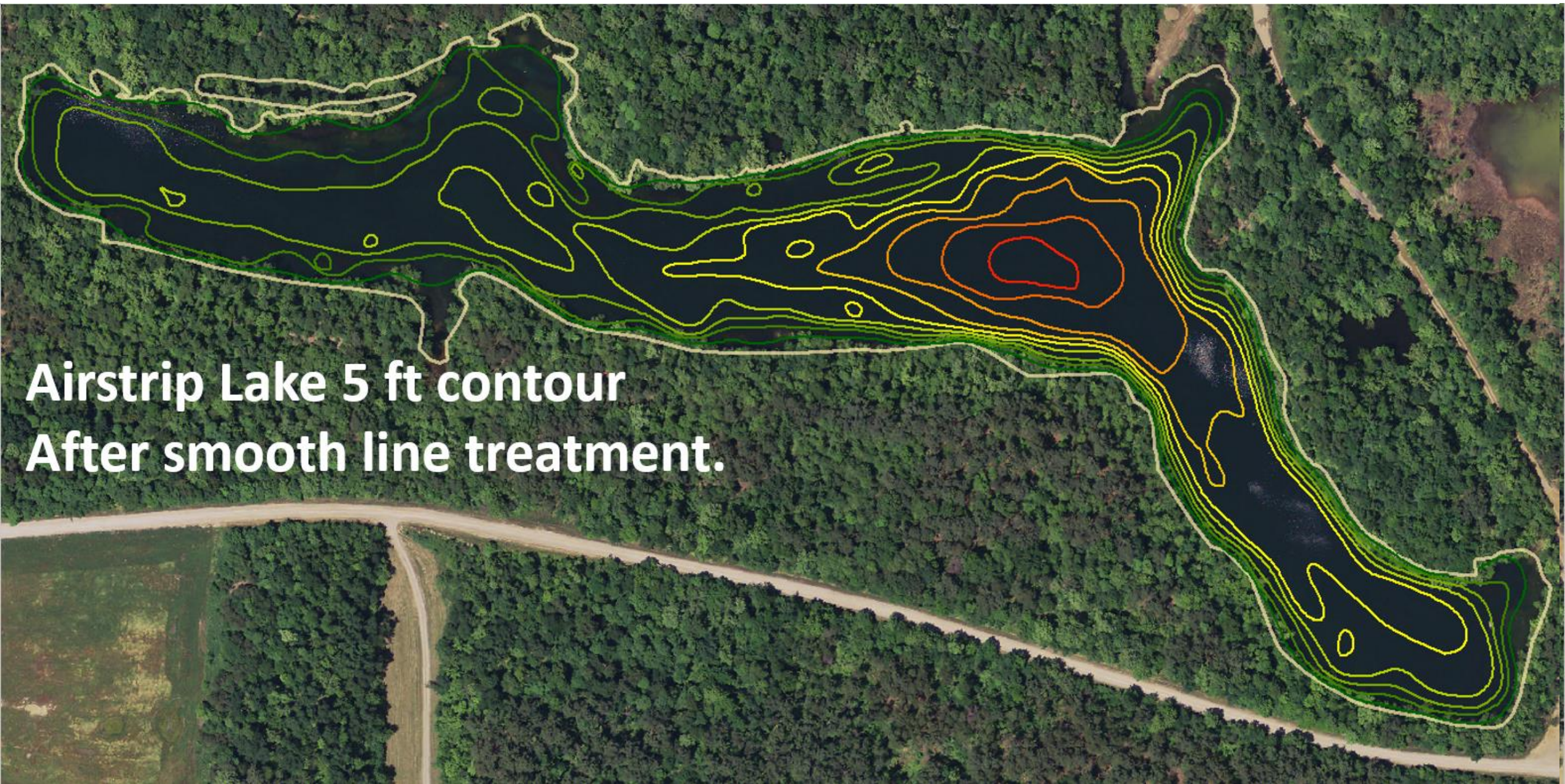
To calculate the center cell.
Calculate the average the cells
in the 3x3 window.

$$\begin{aligned}\text{Value} &= ((7+5+2)+(4+8+3)+(3+1+5))/9 \\ &= 38/9 \\ &= 4.2\end{aligned}$$

7	5	2
4	8	3
3	1	5

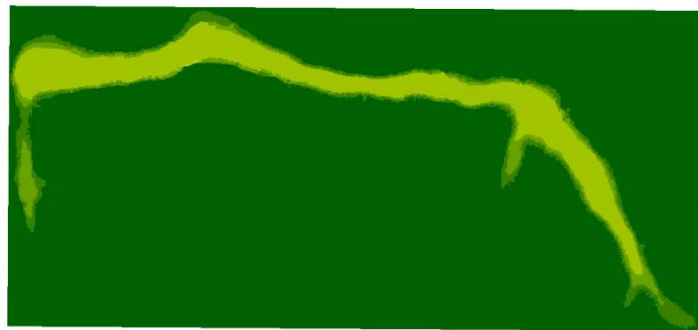
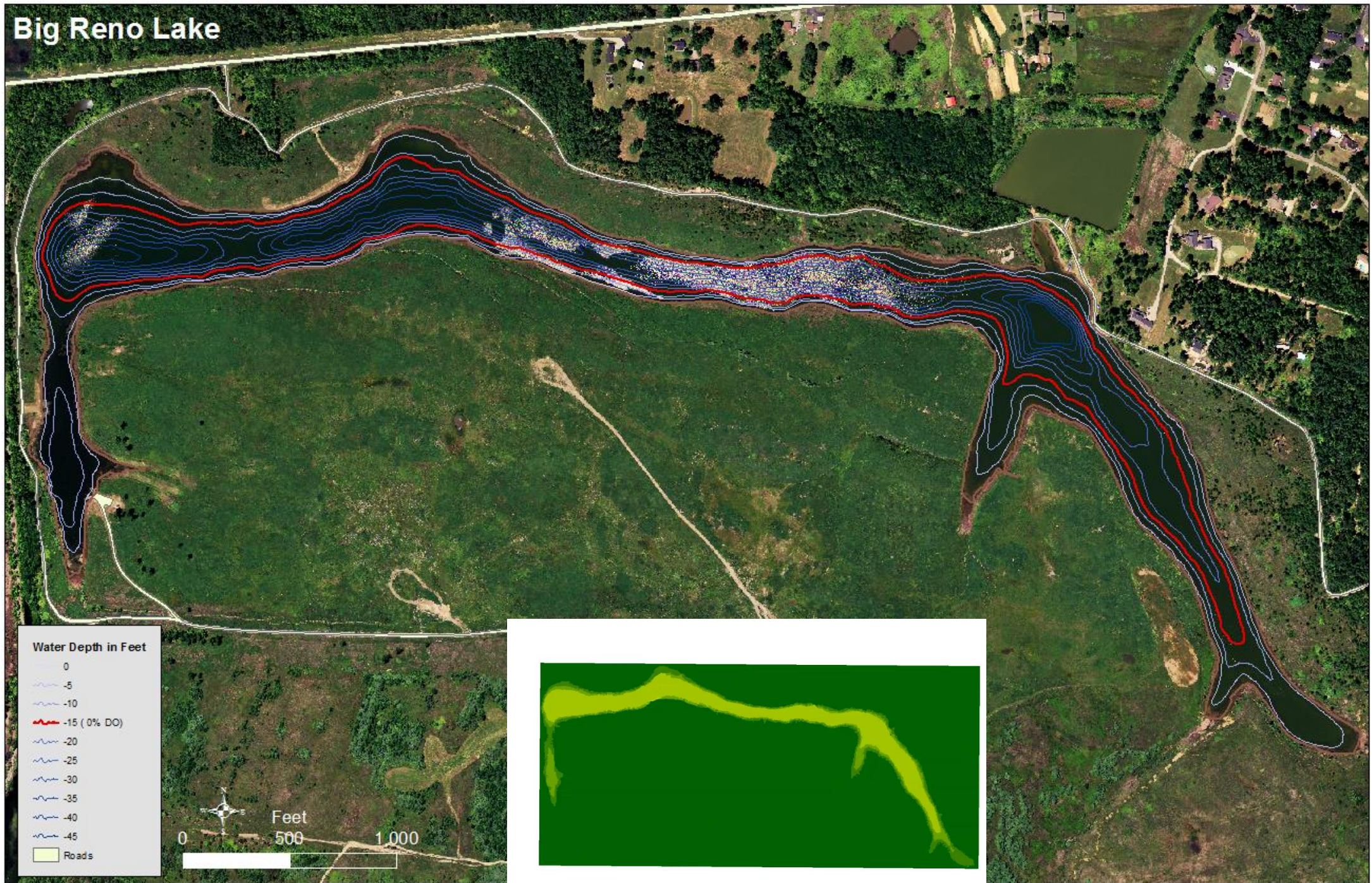
7	5	2
4	4.2	3
3	1	5





**Airstrip Lake 5 ft contour
After smooth line treatment.**

Big Reno Lake



Lessons Learned

- 1) Slow ping rates down (The bottom of lakes are pretty boring)
- 2) Depths less than 2ft are not very accurate.
- 3) Do concentric rings when gathering data. (eliminates a lot of post processing)
- 4) Once comfortable with the process make longer recordings
- 5) Don't map rivers when they are flooding.



