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Geog 342
Final Remote Sensing Project
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EXECUTIVE SUMMARY

The primary objective of this project was to classify habitat into five broad categories along the American River between Highway 160 and Howe Avenue. Habitat categories were based on their importance to breeding white-tailed kites and included grasslands which incorporated annual and perennial grasses; shrubs including chaparral species such as scrub oak, ceanothus, chamise, and manzanita; woodland which included tree species such as oak, buckeye, cottonwood, sycamore, walnut, willow, and eucalyptus; water including the river, wetlands, and seasonal ponds; and unsuitable which encompassed all urban features as well as barren ground. At the conclusion of this project I hope to have developed an image that broadly classifies habitat along the riparian corridor of a section of the American River that can begin to identify important habitat features that are likely to be utilized by white-tailed kites. The resulting classification can then be used as a model to classify other, similar, areas along a riparian corridor.

After selecting an image of a section of the American River riparian corridor from the Sacramento 2009 imagery I attempted to classify the image into five classes using the Feature Analyst extension in ArcMap. First, I created five new feature classes, each named for one of the five habitat classifications. Then I selected training sets for each of the five feature classes. After I selected the training sets for each classification, I combined the individual classes into a multi-class layer and set up the learning parameters for Feature Analyst. I ran the initial feature classification.

After reviewing the results of the classification, I noted that each class had some features that were misidentified. First, I split out the classes to examine them individually and attempt to improve the errors in classification through clutter removal. For each class I selected a representative sample of features that were either classified correctly or incorrectly. I then reran the classification for each class using the One Button Learning tool and reevaluated the classification. The results of the clutter removal improved most of the classifications. The Grasslands and Unsuitable classes look fairly accurate, although shadows are still being misclassified as Water and Shrubs. Also, Shrubs were close to what the Woodland class should be, indicating that their spectral signatures are similar, or my training sets were not as precise as they could have been. Given these misclassifications, I attempted to remove more clutter on all the classes except Grasslands and Shrubs.

I manually deleted some misclassified features in the Water feature class. I did this by starting an editing session and simply selected features that were misidentified and deleted them. I repeated this process for Unsuitable and Woodlands. Next, I used the Add Missed Features tool to add features to the Woodland class. I then ran One Button Learning again to reclassify the Woodland feature class. The result was not what I had expected; almost every habitat feature was classified as woodland. I attempted this process again, changing the parameters, but the result

was not improved, so I decided to stop and move on due to time constraints. The final step was to combine the feature classes into a single layer that contained each of the five habitat types.

The output of the classification process for this project was a single layer that depicted the five habitat classes I initially chose to identify white-tailed kite habitat. The resulting layer combined the Grassland, Shrub, Woodland, Water, and Unsuitable features into a final classified image consisting of polygons that identify each of the five habitat classes. Learning was used to place unclassified areas and areas of overlap into a class. This layer can then be used to identify areas that are likely utilized by kites and areas that are likely avoided by kites. Unfortunately, I was limited by time. If more time were available I would have selected better training sets and adjusted the parameters for multiple iterations to determine the best combination for this project. Nonetheless, Feature Analyst is a powerful tool for image classification that can ultimately save the analyst time. However, the process is not automatic, it is imperative the analyst take the time to select high quality training sets, set up the learning process as precisely as possible, review each classification, make adjustments, and rerun the classification until the final, accurate product is produced.

