I. Project Title
Monitoring of rangeland plant compositions and soil surface type on Cal Poly grazing pastures using Assessment, Inventory, and Monitoring (AIM) plots and the newly developed app, LandPKS.

II. Project Completion Date
December 30, 2019

III. Student(s), Department(s), and Major(s)
(1) Katie White, Animal Science, Animal Science
(2) Sarah James, Animal Science, Animal Science

IV. Faculty Advisor and Department
Dr. Marc Horney, Animal Science Department

V. Cooperating Industry, Agency, Non-Profit, or University Organization(s)
Agricultural Research Service (ARS)

VI. Executive Summary
The purpose of this project was to conduct field trials to determine the ease of use, efficiency, and information content of the LandPKS app, using complete AIM plots for comparison. The LandPKS app has the potential to be widely used by public, private, and nongovernmental entities to monitor rangeland conditions. This includes places that have limited access to resources and trained staff for monitoring efforts including in countries like Kenya, Namibia and Mongolia.

The group concluded that the Stick Method, the methodology used by the LandPKS app, held up comparatively to the Assessment, Inventory, Monitoring (AIM) Method. The key differences between the two are two key factors:

1. The Stick Method does not require plant identification and does not provide plant identification support. While the AIM method requires plant species identification and provides embedded information tables to allow for plant name identification. This difference was established intentionally when the creators made the Stick Method to allow ease of use in developing countries. This difference holds potential tradeoffs. Not identifying plant species allows ease for untrained rangeland monitors and provides enough data to help make management objectives but could limit later research or environmental change information that plant species names could potentially provide.
2. Between the Stick Method and the AIM Method the data collection methods change and therefore much of the data collected cannot be easily compared between the two. The Stick Method and AIM Method both collect data using these assessments: General Site Information, Line Point Intercept, Plant Height, Basal and Canopy Gap, Plant Density, and Soils Stability. Although both these assessment types use the same core methods to collect data the Stick Method’s execution is so simplified, data cannot be directly compared between the two. Data cannot be easily compared but the interpretation of the data is very similar allowing management objectives to be created.

The group also identified shortcomings of the LandPKS app. Some of these are listed below:

(1) In newest update, deleting plots is not functioning as quickly as possible. Deleted plots stay on the app for extended periods of time before disappearing.

(2) Stick Method Data forms do not closely resemble data collection on the app. Therefore, it is not easy to transfer data collected in paper form to the app. Another major identifiable issue with data recording is that the app supports more functions than the manual includes. The original goal of this app was to simplify the functions for untrained rangeland monitors but the more the creators add to this app the further training is required to use the settings. These additions are good for trained individuals but can become confusing to newer monitors.

(3) The app has lots of helpful aids for soil collection methods but has very little plant information help. The app uses photos of general plant classes but does not include plant type descriptions to help determine plant classes. Example in the land cover section, the grass image refers to perennial grasses and not annual grasses. California is predominately annual grasses so this image in the app does not work well in our area.

VII. Major Accomplishments

(1) With completion of the project, the group established a total of six Assessment, Inventory, Monitoring plots on Cal Poly Ranches. These plots were established using the recommended Hub and Spoke design in addition to the intersecting transect design. The intersecting transect design is used to compare AIM monitoring plot design to the LandPKS intersecting designs layout. The Hub and Spoke design plot establishment were additions to the intersecting transects for later Animal Science class use.

(2) Successfully compared the Stick Method for monitoring rangeland condition to AIM methods. It was determined that both methods are competitively accurate when being used to identify management objectives. If using data to collect research information, the Stick Method does not collect enough identifiable information and therefore for research purposes the AIM method should be performed.

(3) Information findings from this report are being provided to ARS to help assist with the development of the LandPKS app. Changes in future updates might be in part to research conducted by this project.

VIII. Expenditure of Funds

The total expected budget was $2,170.53. Travel to Swanton Pacific Ranch was not accomplished throughout the year due to timing conflicts. Therefore, no travel expenses were used. The remaining funds were budgeted to cover all other operating costs totaling $1,445.99. These funds purchased relevant research equipment to establish the six AIM plots and to purchase a computer for data collection.
IX. Impact on Student Learning

The project allowed us to complete a short-term project by comparing the LandPKS system to the AIM method and assess their two data collection systems. In the process of completing this project, we established the groundwork for a long-term rangeland research project that can be developed in later years by other rangeland management students. Both of us were able to make use of all equipment purchased by these funds and now later undergraduates will be able to benefit from this equipment and can establish their own rangeland projects or continue this long-term project. We are thankful for the Baker Koob Endowment for allowing our “Learn by Doing” and all later research that might benefit from the research equipment purchased.