USING GEOSPATIAL METHODS TO VISUALIZE FISCAL DATA
AT THE ARIZONA BUREAU OF LAND MANAGEMENT

by

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A Practicum
Submitted in Partial Fulfillment
of the Requirements for the Degree of
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Alan A. Lew, Committee Chair
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ABSTRACT

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by
Kayla Delores Resnick
Northern Arizona University, December 2016
Flagstaff, Arizona
Dr. Alan Lew, Thesis Professor

This practicum established a methodology for importing fiscal data from the Bureau of Land Management Budget Office into a geospatial framework using ArcMap software. Fiscal year 2015 data was retrieved from the BLM Arizona Budget Tool and imported using independently created Cartesian coordinates. Supporting data was obtained from additional BLM employees in the Geospatial and Budget offices, as well as internal BLM documents, scholarly articles, and class texts.

The purpose of this study was to aid the BLM in achieving their strategic goals by spatially connecting on-the-ground accomplishments to economic data. This was achieved by assigning individual coordinates to each of BLM’s field and district offices, then performing a variety of analyses on the imported data. The result is a visual representation of budget allocations and spending, aiding BLM officials in appropriately planning and evaluating both their workload and operational expenditures.
Dr. Alan Lew  
Interim GPR Dept. Graduate Programs Coordinator  
Geography, Planning, and Recreation Department  
Northern Arizona University  
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PO Box: 15016  
Flagstaff, AZ 86011-5016

Dear Dr. Lew,

It is my privilege to write this letter of contribution for Ms. Kayla Resnick, graduate student at Northern Arizona University (NAU). When I first learned that Ms. Resnick was looking for a capstone project for her Master of Science in Applied Geospatial Sciences, I was hopeful she would be able to work on a project I've seen a need for within Bureau of Land Management (BLM) Arizona for some time.

Tracking planned work, program accomplishments and associated budget allocations is important to BLM Arizona financial management. Ms. Resnick's project provided a tool for displaying planned and completed work and budget resources geographically. Translating this financial information into something visually, easily used and understood will go a long way for management and staffs' understanding of our financial and performance management across the state.

Ms. Resnick has made a significant contribution with her geospatial analysis and presentation of the fiscal year 2015 budget and performance data for BLM Arizona. Even though these databases, codes, and budget process were completely new to Ms. Resnick when we began discussions, she quickly understood the agency's key business and the outcomes our agency was hoping to see. She came to our state office in downtown Phoenix several times to meet with the Budget staff, Geographic Information System staff, and the Deputy State Director to learn Arizona BLM's organization structure, funding situation and program elements. It has been almost ten months since we first met with her on this project and I am impressed she was able to turn a huge amount of financial and performance data into geospatial maps as well as designed a process that we can use in budget and performance planning for future years.
Ms. Resnick has a very positive personality and it is very pleasant to work with her. She asked very good questions during our meetings with her and has demonstrated her geospatial capabilities and project management skills throughout the project. Her final presentation was very clear and has helped our leadership team to focus on certain program areas and issues within BLM Arizona. We are very happy Ms. Resnick worked with us for her capstone project and hope that her thesis will be well received.

Sincerely,

Deborah K. Rawhouser  
Arizona Associate State Director  
Bureau of Land Management
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Acknowledgements

I dedicate this practicum to the family and friends who have supported me throughout my academic career. Thanks also to my professors and advisor at NAU, and the patient, intelligent staff at the Arizona BLM.
Chapter 1: Introduction

1.1 Objective

This practicum was undertaken to aid the Arizona Bureau of Land Management (BLM) in obtaining operational excellence and achieving their strategic goals by spatially connecting on the ground accomplishments to budget and fiscal data. The result is a visual representation of budget allocations and spending, connected geospatially to Arizona BLM Field Offices across the state.

1.2 Background

The BLM is a federal agency tasked with “sustaining the health, diversity, and productivity of America’s public lands” (BLM.gov 2012) This involves careful management of National Monuments and Wilderness Areas while regulating various activities such as grazing, recreation, timber use, commercial leases, and energy development. The BLM has an operating budget of over $1 billion and is unusual among federal agencies in the fact that it brings in more revenue than it spends.

The duties of the BLM are carried out across the United States by a hierarchy of Federal, Regional, State, District, and Field offices (Figures 1 & 2). Within Arizona, there is one state office, four district offices, and eight field offices. In addition, the state of Arizona hosts four national monuments/conservation areas, as well as the National Training Center. For the purposes of this project, data was primarily considered at the district and field office levels (Figures 1 & 2).
Figure 1. Arizona District Offices
Figure 2. Arizona Field Offices
The research and data collection for this study were conducted at the Arizona State Office in Phoenix, Arizona under the authorization of Deborah Rawhouser, Associate State Director. Extensive additional council was provided by several individuals in two areas: the Budget Office and GIS Department. An in-depth discussion of the data procured for this project will be provided in Chapter 3, but a brief discussion of the information provided by each department is appropriate here.

The Budget Office, under the direction of Budget Officer Man-Yun Chin, coordinated access to BLM Arizona’s “Budget Tool”. This tool has been implemented by the Arizona BLM in recent years to track obligations and expenditures, and allows employees across the state to enter and track fiscal information. In additional to dollars planned and spent, the Budget Tool utilizes a workload measure known as PMDS, or Performance Management Data Systems. These are quantitative goals in a variety of units that can be applied statewide. Careful use of this tool produced the comprehensive tables of Fiscal Year 2015 financial data to be spatially integrated.

The spatial component of this project was accomplished with the effective guidance of Marisa Monger, GIS Specialist, and the rest of her team. The majority of the spatial data used in this study was downloaded from the publically available “Arizona Mapping Products” page (BLM.gov 2016) and imported into ArcMap 10.3 on the report author’s personal computer. These materials include boundary feature classes for both field and district offices, national monuments, and other areas of interest. A small amount of data was also downloaded from a secure BLM server via Citrix. Marisa Monger was also instrumental in supplying general BLM information, including Strategic Goals, organizational charts, and additional GIS knowledge.
1.3 Purpose

The purpose of this practicum was to develop a method for spatially integrating BLM budget data into GIS software. After development, the method can be used to aid BLM officials in making and executing fiscal and workload decisions. This is partially accomplished through pattern recognition and domain knowledge, which are greatly aided by the visual representations of the data.

This practicum is also in line with the BLM Arizona Strategic Goals, which encourage operational excellence through budget effectiveness (Figure 3). In order to achieve these goals, the BLM aims to “Implement budget monitoring tools to track expenditures, and in combination with workload accomplishment data, to monitor cost effectiveness” (BLM 2012: 5). By incorporating both workload and spending data, this study and its deliverables provide valuable insight into how the budget is being planned and executed.
Aside from the professional purpose and goals of this project, it is the report author's intention that this practicum be useful and provide quantifiable benefit to the practicum agency. In addition, it should demonstrate many of the skills acquired over the course of the M.S. in Applied Geospatial Sciences graduate program.

1.4 Research Questions

- **How well is the BLM of Arizona planning and executing their budget?**
  This question examines budget obligations for fiscal year 2015. Each BLM field and district office report on spending in a variety of ways. Obligations are categorized by physical location, activity and spending type.

- **How well is the BLM of Arizona planning and executing their workload?**
  This question examines workload tracking targets and achievements. These figures measure work completed by defined categories, and can be combined with fiscal data to determine if costs are being accurately estimated.
1.5 Deliverables

There are several components included in the results of this study. First, the BLM receives a comprehensive document outlining procedures for integrating the spatial and fiscal data. This report will allow for future data to be compiled and analyzed with a similar methodology. Spatial data in the form of a geodatabase is also provided, and contains all spatial data created and used in a shareable XML format. These spatial files can be uploaded onto secure servers and viewed by BLM GIS specialists and technicians.

Accompanying the physical deliverables of this practicum is a limited analysis of the project results in relation to the research questions. Over the course of this study, patterns and questions emerged in the data that illustrate the strategies the BLM might implement to get full use of this study. For example, the Tucson field office is highlighted in multiple figures as one that fails to achieve its expectations. After spotting this pattern, one can go back to the fiscal data and discover what precisely is affecting the field office and determine if an intervention is needed.

In this manner, the outcome of this project creates a method for managing data, produces real data, and simultaneously illustrates how the data can be further employed. Therefore, this project satisfies the author’s personal goal of providing functional and beneficial conclusions to the BLM in appreciation of their data, time, and expertise.
Chapter 2: Literature Review

Presenting the intentions and results of this practicum as related to historical and theoretical context is a complex task. The project was requested by Deborah Rawhouser, Associate Director of the Arizona BLM, who believed that there would be value in having the fiscal data spatially displayed. In addition, the ability to compare data from across the state in multiple categories is highly beneficial to the budget office. This practicum represents the first time the Arizona BLM has compiled data in this way, but GIS technology has been spatially demonstrating many types of data for quite some time.

With this in mind, it is helpful to consider the existing literature on the topic. To begin, this literature review will examine the large-scale context of this project by briefly examining the history and importance of visual data. Moving then from general to specific, a discussion of GIS use by government officials is in order. This section will highlight use of GIS by government agencies of all sizes, and is particularly interesting in light of the third and final piece of this literature review: an analysis of GIS use at the Arizona BLM and how it relates to their strategic goals.

Anyone familiar with GIS understands that the world of geographic information systems includes far more than maps and tables. Indeed, in 1997 Danny Dorling and David Fairbairn published *Mapping: Ways of Representing the World*, which encourages readers to consider the theoretical frameworks needed to contextualize the geographical world. A main point from this text is that maps are vehicles that communicate incredible amounts of information on the creator of the map, the intended audience, and the people being depicted (Dorling & Fairbairn 1997). This idea of maps
being representative of more than simple visual data is a good introduction to the strategy of using maps to display non-spatial data, as in this practicum.

Published in 2002 and referencing the book cited above was L. John Old’s article on *Information Cartography: Using GIS for Visualizing Non-Spatial Data*. This text describes the history of representing non-spatial data (beginning with trade winds and monsoons) geographically, and notes that it is a “relatively recent practice” (Old 2002: 7). The financial data in this practicum is certainly non-spatial, but becomes spatially referenced through its connection to the ArcMap feature class boundaries. Therefore, it somewhat straddles these discussions, resting somewhere between the non-spatial and truly spatial data.

As “somewhat spatial” data, the results produced from this practicum can be figured into the dialogue of GIS use in government offices. This is a concept that has been well documented, beginning in the mid-90’s with Mary Brown’s article on *An Empirical Assessment of the Hurdles to Geographic Information System Success in Local Government* (1996) and continuing through to recent years. Most of the literature on this topic does seem to be geared toward local or municipal governments, but much of the information is still relevant to GIS use at the BLM. One reasons is because the national BLM organization gives a great deal of control over GIS practices to the state offices, which in turn utilize field office data. For example, in *The GIS Guidebook for Local Government Officials* (Fleming 2005), many of the authors address concerns that are not unique to local governments. Contributor Donald Oliver explains the challenges that many government offices have in distributing resources to their constituents, an issue the BLM could certainly face while delivering services efficiently and cost-
effectively. Oliver states that GIS technology can help governments “do more with less” (Oliver 2005: 61). By using the information and figures in this practicum, the Arizona BLM can determine which field offices are most productively managing their budgets and workload, and encourage lower performing offices to also “do more with less”.

Moving explicitly now to the BLM literature on GIS management, several internal documents influenced this practicum. Among them are a breakdown of the Arizona BLM Strategic Goals as well as a Geospatial Strategic Plan covering fiscal years through 2020. Within the Strategic Goals Summary is the “Operational Excellence” standard. This goal includes Budget Effectiveness as a key component, attempting to “Implement budget monitoring tools to track expenditures and, in combination with workload accomplishment data, to monitor cost effectiveness” (BLM 2012: 5). This practicum falls very cleanly into this category, helping situating it as part of the BLM’s larger mission.

The Arizona BLM Geospatial Strategic Plan includes an objective from the National BLM Geospatial Strategic Plan (BLM 2007:1), stating the following:

“Managers, resource specialists, analysts, researchers, and policymakers recognize that geospatial information is critical for managing the public lands – for understanding the natural resource relationships, environmental interactions, social and economic impacts, and environmental performance.”

This quote indicates that the BLM understands the importance of geospatial data, while also speaking to its far-reaching implications. Also evident in this document is a historical framework for the use of GIS at the Arizona BLM, noting that Arizona “led the BLM at that time in applying [GIS] technology” (BLM 2016: 1). Since these early days, the Arizona BLM has lagged in its adaptation of technology, and is no longer considered
among the top most GIS savvy states (BLM 2016:1). This practicum and other similar GIS based projects can begin to close that gap, bringing the Arizona offices up the level of their national peers.

Overall, this practicum fits within and adds to the literature on visualizing economic data, using GIS in government offices, and utilizing advanced GIS technology at the Arizona BLM. There are a wealth of opportunities for additional research, beginning with the incorporation of additional data from other years but also including the possibilities of new GIS tools, models, or compilations.

Chapter 3: Methodology

3.1 Introduction

This chapter examines the project data in considerable detail and discusses the procedures and methodology for the spatial integration of the 2015 fiscal data. The data processes are documented chronologically and include figures where appropriate. Regarding the spatial data, all creation and manipulation was handled by the ESRI ArcMap 10.3.1 suite. ArcMap and ArcCatalog function relatively seamlessly with Microsoft Office products, allowing for simple coordination of the fiscal Excel data and spatial ArcMap files.

The methodology featured in this chapter was developed after multiple previous attempts were unsuccessful. These early trials will also be examined, as they were an integral part of the formation of this study. A dictionary of terms is available in Appendix A.
3.2 Data

There are two main data components of this practicum: the spatial (ArcMap) and fiscal (Excel). These will be described and defined in this section, though more complete dataset sample can be found in Appendices B and C. All fiscal data referenced in this report was provided by the BLM, and was either by retrieved from the “Budget Tool” or received by personal communication via email. The majority of the spatial information is publically available from either the BLM or other spatial databases. All data manipulation was completed on the author’s personal computer, using the software previously mentioned.

3.2.1 Spatial Data

The term spatial data in this practicum refers to any data used in ArcMap to set-up and visualize the fiscal data. This includes boundary feature classes such as the state boundary, district offices, and field offices (Figures 1 & 2). In the BLM, each of the district and field offices are given a 10 digit identification code. These codes each start with the same four digits, and can be broken down as follows:

In the example above, the first four digits identify that the location is in Arizona. The next digits (Co, in this case) denote the Colorado River District, and the last two digits signify that the location is within the Kingman Field Office boundary. These codes
are important, as they are the basis for the connection between the spatial and fiscal data. Each of the codes represent a physical office and boundary, but are also the BLM billing entities or “funds centers” and are referred to as such in the budget tables (Table 1).

Within ArcMap, each funds center has both a spatial location and a set of attributes. For every entry, the attributes include the identification code, administrative name, type of office, global ID, and shape area information. In addition, each location has been assigned by the report author a Cartesian coordinate or (x,y) point representing the latitude and longitude at the center of the area.

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<th>Longitude</th>
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*Table 1. Funds Centers and their Cartesian coordinates*
An essential note about spatial information references the first entry in the table above, known as Funds Center LLAZ9xxxxx. This funds center is the BLM State Office, located in Phoenix, Arizona. This office does not fit neatly into the district/field hierarchy, and has different responsibilities and fiscal concerns. It behaves differently spatially as well, and does not have the typical boundaries of the other offices. In order to visualize spending at this office, an alternative solution was needed.

The best resolution was to create a separate “shape” within ArcMap and set it spatially to the west of Arizona (Figure 4). Geographically, it is located within California, but for the purposes of this practicum, this square represents spending and obligations from the Arizona State Office. The State Office square is not included in all analyses, but is used when the comparison it provides is helpful, as when comparing workload achievement measures across the entire state (Figure 6).
A limited amount of additional spatial data was consulted over the course of this study. This data includes feature classes of Wilderness Management Areas, National Monuments, and conservation areas. This data was primarily utilized to verify results, with examples being found in Chapter 4: Results (Figure 8).

The entirety of the spatial data for this practicum is stored in a geodatabase called BLM.mdb created by the report author. The data share a common UTM coordinate system: NAD 1983 UTM Zone 12N. They use the Transverse Mercator projection and the 1983 North American Datum.

### 3.2.2 Fiscal Data

The fiscal data is primarily comprised of two separate data tables. The first is a 29,550 KB Excel file known as “Master Budget”. Master Budget was received via email from Man-Yun Chin, Budget Officer.

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<td>Fed W Sys&amp;Dmd Det</td>
<td>15XLI199AF</td>
<td>$11.49</td>
<td>-116.0000000</td>
</tr>
</tbody>
</table>

**Table 2. Master Budget table sample**

Several important pieces of information are available in this table.

The first column of interest is Column B, titled Funds_Center. This funds center refers to the BLM identification code referenced earlier. Column C, just to the right of the Funds_center, is titled SubActivity. Subactivities are general BLM categories describing...
essential programs such as Administrative Support, Law Enforcement, Wildlife Maintenance and Annual Maintenance. The codes of interest chosen for this study by Rawhouser and her team are:

- L1020 Rangeland Management
- L1210 Wilderness Management
- L1220 Recreation Management
- L1711 National Monument and Conservation Areas

Continuing to the right in the Master Table are the PEs, or Program Elements. This is a category similar to subactivities that provides more specific billing information. These PEs are used in combination with the PMDS tracking system in order to quantify workload targets and accomplishments. Each PE has a unit of measurement attached, as demonstrated below:

- BH - Inventory Abandoned Mine Sites (site)
- FH - Process and Manage special recreation permits (permits)
- EE - Issue grazing permits/leases (permits)
- JA - Apply shrub/grass vegetation (acres)

Master Budget Columns E and F represent another important data classification. The first (Column E) is Major Object Class. These digits are the first two characters parsed from Column F, the Budget Object Class (BOC). Budget object classes distinguish between labor costs (codes beginning with 11 and 12) and operations costs (all other BOCs). These figures were used in analyses that can be found in the results discussion in Chapter 4.

Accompany the Master Budget Table is one other significant table, called “2015PMDS”. This table was also received via personal email communication from the BLM budget team, and contains information on the Performance Management Data
Systems (PMDS). Among the columns in this table are the familiar Cost Center, SubActivity (or Budget Activity), Program Element, and the author created Latitude and Longitude entries. Two new and meaningful columns are Target and Actual, which demonstrate the PMDS workload goals and achievements, respectively.

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
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<th>Latitude</th>
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</thead>
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<td>5</td>
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</tr>
<tr>
<td>7</td>
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<td>HI</td>
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<td>-116.1870000</td>
</tr>
</tbody>
</table>

Table 3. 2015PMDS Table sample

3.3 Procedures

In line with the stated purpose of this practicum, the principal procedural goal required the integration of fiscal data into a spatial framework. This was accomplished by adding the Cartesian coordinates to the budget tables and converting those coordinates to individual points within ArcMap. Other technical tasks included formatting data, completing joins/relates, and producing results. Each of these endeavors is examined in this chapter.

It was determined that the best way to visualize how successfully the BLM is managing their budget and workload was to display the data at the field office level. Ideally, the result would show how each field office compares to its neighbors across the state as well as the state as a whole. The initial strategy was simply to import the Excel budget tables into ArcMap and complete a join based on the location code. Unfortunately, there are multiple budget entries for each spatial location, requiring a
“one-to-many” join. In most one-to-many joins, only the first entry is correctly joined, which is exactly what happened when this strategy was attempted.

After much discussion with the BLM GIS team, the idea of creating the Cartesian points for each field office was reached. A single point (Table 1 and Figure 4) near the center of each field office was selected and the coordinates were assigned to each field office in both the Master Budget and PMDS tables. In order for ArcMap to correctly import the data, it is critical that latitude and longitude are separate columns and both columns are formatted as numbers with eight decimal places. For large tables (such as the Master Budget Table), it is also helpful to set the print area in Excel to avoid bringing in unnecessary cells.

Once the Excel data is formatted correctly, the application can be closed as the rest of the process is completed using ArcMap. In ArcMap Version 10.3.1, Excel tables can be added directly from the familiar “Add Data” button, and the navigation window allows for the selection of a particular workbook sheet. After the table is added, it is possible to right-click on the table and select “Display XY Data”. After making this selection for the budget table, the Excel entries appear as stacked points at their assigned (x,y) coordinate.

From this stage, ArcMap can easily export the points into a standalone feature class or geodatabase, which allows for far greater functionality. To achieve useful results in this study, the next order of business was to join the existing spatial field office boundaries to the newly created budget points feature class. This was accomplished using a spatial join and selecting the option that joins each point to the polygon that
contains it. The join can be summarized by average or sum, depending on the desired output.

![Figure 5. Excel data points](image)

The product of the spatial join is a polygon feature class that mirrors the field office boundaries while incorporating the budget table information as point counts in addition to the selected sum and/or average. This new feature class can then be displayed using ArcMap symbology tools. For example, a graphic can be created illustrating the total amount of dollars spent by each field office by selecting the “sum” option, or demonstrating the average PMDS achieved by each field office by selecting instead for “average”. The example below highlights the percent of PMDS workload
measures each field office (including the State Office) achieved in 2015 (Figure 6). A more detailed discussion of the graphics and results is contained in Chapters 4 and 5.

Figure 6. Results example: Percent of PMDS achieved per Field Office

Chapter 4: Results

4.1 Results Outline

The results of this practicum aim to answer the two defined research questions:

- How well is the BLM of Arizona planning and executing their budget?
This section examines three categories of data.

1) FBMS spending per field office by sub-activity
   • 1020 – Rangeland Management
   • 1210 – Wilderness Management
   • 1220 – Recreation Management
   • 1711 – National Monument and Conservation Areas

2) Direct and Indirect costs
   • Indirect costs: P, X, Y
   • Direct costs: all others

3) Budget Object Codes for labor and operations
   • Labor: 11 & 12
   • Operations: all others

   How well is the BLM of Arizona planning and executing their workload?

This data examines PMDS target and actual achievements per Field Office.

1) Overall PMDS achieved at state, district, and field office level

2) PMDS achieved per specific program element
   • BH – Inventory abandoned mine lands (sites)
   • FH – Process and manage special recreation permits (permits)
   • EE – Issue grazing permits/leases (permits)
   • JA – Apply shrub/grass vegetation (acres)

The following chapter develops the answers to these questions and presents the appropriate results graphically. Each category above is a separate analysis and together they paint a well-rounded picture of the Arizona BLM Fiscal Year 2015 financial data.

4.2 Budget Results

With a view towards answering this question, the first issue explored involves the integration of the Financial & Business Management System (FBMS) data. This data includes general spending, procurement, obligations, and expenses. The results are in dollar amounts, making them very easy to compare across field offices. BLM employees
were particularly interested in FBMS spending within four specific subactivities: Rangeland Management, Wilderness Management, Recreation Management, and National Monuments/Conservation Areas. As an example, the 1020 Rangeland Management map is presented here. Additional graphics can be found in Appendix D.

The graphic above illustrates the FBMS obligations across the state of Arizona, specific to Rangeland Management and categorized by field office including national monuments (Figure 7). The values range from $12,328 at the Grand Canyon National Monument to over $968,000 at the State Office. Therefore, it is easy to determine that a significant amount of Rangeland Management funds are spent by the State Office, though the Arizona Strip Field Office isn’t far behind.
Graphics such as the Rangeland Management example are especially meaningful to BLM officials who fully understand the implications of such spending. These visuals are particularly compelling as a series, clearly illustrating patterns and comparing field office spending across multiple categories. In the above example, it is easily noted that each field office reports Rangeland Management obligations. This does not hold true for all four of the FBMS categories, a fact clearly displayed by the National Monument and Conservation Area graphic. It is immediately obvious that three of the western field offices do not report any spending in this category, which is a relief as they do not contain monuments or conservation areas.

The second dataset employed to explore the BLM budget management strategy draws attention to two types of spending: direct and indirect. Direct spending references costs “directly” associated with a project including materials and labor.

Figure 8. 1711 National Monuments and Conservation Areas
Indirect spending, on the other hand, consists of costs associated with a project but not directly tied to it such as safety gear, computer hardware, and office supplies. These obligations are connected to specific cost centers, but not often to particular projects or entries. Direct versus indirect spending graphics are most valuable when compared side by side, as in the example below.

A final analysis performed to examine the budget also uses contrasting financial obligations and a labor versus non-labor dichotomy. In the original Master Budget Table, the budget_object_class field (BOC) differentiates between labor and operations costs. Labor costs are exactly what they sound like, the billable labor costs of employees performing BLM activities. Costs that are not directly associated with labor are known as operations or “ops” and are also most helpful when viewed as a set (Appendix D).

4.3 Workload Results

Evaluating workload is a task exclusively suited to the PMDS schematic. There are two principal methods for exhibiting these results; they can be viewed as an overall percent achieved across the state, or broken down by Program Elements (PEs) of interest. The first example provides a nice overall picture of goal achievement at both
the field and district office levels, illustrating that the majority of Arizona achieved greater than 90% of their PMDS targets in FY2015.

![Percent of PMDS Achieved](image)

*Figure 10. Percent of PMDS targets achieved per district, field office.*

Within the BLM, a common format for displaying percentage data is demonstrated by the graphic above. In internal documents, the BLM uses yellow, green, and red to illustrate achievements above 110%, between 90-110%, and below 90%, respectively. Additional versions of this graphic, including a gradient, can be found in Appendix D. The above image is also an excellent example of the value of this practicum, as the field offices that are not underachieving workload targets are very apparent. This allows for BLM officials to explore the possible explanations for this, and determine how significant the issue truly is. A more thorough breakdown of the questions raised by these results can be found in Chapter 5: Discussion.

The second strategy for visualizing PMDS data is explore specific Program Elements of interest chosen by BLM. For instance, PE code BH refers to the inventory of abandoned mine sites and is quantified by the number of sites. According to the
2015 PMDS table, field office targets range from 5-100 sites. Each field office has a target and actual PMDS record, and can be represented neatly using the percentage of BH PMDS accomplished across the Arizona field offices.

![Figure 11. Percent of PMDS targets achieved for PE code BH.](image)

In the above figure, which does not use the BLM color scheme, it is clear the Hassayampa field office is falling short of its goal, while the rest of the state is performing well (Figure 11). The Grand Canyon National Monument is considered “null”, as no abandoned mine sites were targeted nor inventoried. While this example is limited to BH spending, three other figures were produced demonstrating other PE codes of interest. These figures can be analyzed as a set, and any field offices consistently performing under expectations can be investigated. In addition, these percentage graphics can be displayed alongside FBMS spending figures, demonstrating exactly how much money each field office spent in achieving their goals.
The practicum results discussed above represent a sample of the figures produced for the BLM. The reasons for this will be developed more fully in Chapter 5: Discussion, but it is worth mentioning in this section that the main intention of this report is to demonstrate the methodology behind the graphic production and explore some of the questions raised by the figures and their implications.

**Chapter 5: Conclusions**

5.1 Discussion

The purpose of this practicum is to present the Arizona BLM State Office with a visual representation of their fiscal year 2015 budget data. The representations were requested by Deborah Rawhouser, Arizona Associate State Director, who felt they would aid in budget evaluations and decision making. The graphics produced by this practicum are not nearly as useful to individuals unfamiliar with BLM procedures and expenditures, so the following discussion section will examine how a BLM employee might be able to utilize the results. Other implications for the data will also be mentioned, while a general project summary will be saved for Chapter 6: Reflection.

In Chapter 4: Results, a discussion and image (Fig. 9) of PMDS percentages achieved across the state by both field and district offices was presented. The field office graphic serves as an excellent case study for understanding how this data could be used by a BLM budget officer. As a reminder, a copy of the figure is below.
Recalling the BLM percentage scale, the green field offices achieved between 90-110% of their PMDS targets. The red field offices, on the other hand, have underperformed and achieved less than 90% of their overall target. The Tucson field office (indicated with a large blue arrow) is one of these underachieving offices, reporting completion of 48% of its PMDS goal in 2015 (Figure 12).

A BLM budget office might see the figure above and immediately wonder “What’s going on with Tucson?” This question encapsulates the major accomplishment of this practicum: the opportunity to spot an issue and dig deeper to find the true cause. In this case, one can refer back to the 2015PMDS table, filter the location code for the Tucson field office, and discover exactly what is holding Tucson back from achieving more
satisfactory results. A sorted sample from this table is available below, and a quick consultation of it exposes significant shortcomings in the first three entries. Of these, two are coded as Program Element MA: evaluating recreation areas.

<table>
<thead>
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<th>PE</th>
<th>PE Description</th>
<th>FA Budget Activity</th>
<th>FA Budget Activity Name</th>
<th>Cost Center</th>
<th>PMDS Target</th>
<th>PMDS Actuals</th>
<th>Difference</th>
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<td>Evaluate Recreation Areas</td>
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<td>National Monuments &amp; Cons. Areas</td>
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</table>

Table 4. Tucson PMDS target and actual values

Evaluating recreation areas is measured in acres, therefore the difference between target and actual values can be extreme. In the example above, several thousand acres have gone unevaluated. To a BLM employee, this would be quite meaningful. Perhaps there are good reasons that the Tucson field office did not prioritize this PE, or maybe they are truly falling short. This insight allows budget officials to make more informed decisions, and accordingly evaluate the performance of their field offices.

Aside from the case study cited above, the results of this practicum provide many opportunities for BLM employees to spot unusually high or low performing field offices and look more deeply into the issues causing the variance. If a field office consistently performs above expectations, officials can attempt to adopt their best practices and learn from them. This could lead to better performance statewide, or perhaps even nationally.
Yet another potential use for the data produced by this practicum is to track changes over time. This project presents a snapshot of the fiscal data in 2015. For FY 2016, the BLM made several changes to how programs and activities are billed, allocating even more money down to the field offices to be dispersed. Using the methodology presented in Chapter 3, the 2016 fiscal data could be analyzed and then compared to the project data to see if the changes were successfully adapted.

It is clear that there are numerous analyses that can be completed using the results of this practicum. Ideally, BLM employees can use this project as a template for future work, and continue to add functionality and comparison tools. Regarding the practicum research questions posed in Chapter 1, the report author can postulate that the BLM appears to be effectively managing both their budget and workload. This practicum provides them with an additional tool to monitor their fiscal data, allowing them to answer these questions definitively.

5.2 Recommendations

One challenge that presented itself over the course of this study was the question of project scope. There are several opportunities for future work available using the methodology and data used in this practicum, as well as a handful of possible improvements to the results. This section includes a brief discussion on both of these closely related topics.

Regarding directions for future work, one idea that stands out is to reconfigure the results so the information gathered is more meaningful. This could be achieved in a variety of ways. For example, the FBMS spending per field office could be normalized to ensure the results are comparing “apples to apples”. The data could be reworked and displayed as FMBS dollars spent per BLM employee, or even general population. Along
similar lines, the PMDS percent achieved data could be categorized to compare workload measures with similar units. Though the BLM uses the data across all program elements, it could be useful to see acres compared only to acres, versus to sites, agreements, and leases.

As the BLM has been utilizing economic data for many years, it has certain standards in place about how that data should be used and displayed. While many of these standards (such as templates and alpha-numeric codes) do translate well to spatial data, others do not. The BLM standard for displaying percentage data with red, green, and yellow symbology is likely adequate for graphs and pie charts, but does not present visual data well. The graphic that highlights PMDS achievement across field offices (Figure 10) does not differentiate between the 48% of workload measures achieved by Tucson and the 88% from the Lake Havasu Field Office. Gradients, such as those used in Figures 7, 9, and 11, are a more successful way of displaying this type of data.

Therefore, recommendations for future work include taking the data in new and meaningful directions as well as reevaluating current standards for displaying digital information. Other ideas for future projects mentioned elsewhere in this practicum involve the incorporation of future fiscal data to track changes across time, and creating new tools or buttons to automate some of the processes used to achieve the practicum results.

5.3 Reflection

There can be little doubt that this practicum produced valuable information for the Arizona BLM as they strive to manage their fiscal decisions effectively. Several members of the BLM team expressed their appreciation for the project, and felt very grateful that someone had taken the time to complete it. The results have been
presented to several staff members at the Arizona State Office, and there are plans to present it to a larger group of managers from across the region. It will be demonstrated as one tool in an arsenal for understanding fiscal data, and will contribute to the idea that the state of Arizona BLM takes technology and GIS contributions seriously. For these reasons, this project can be considered a success.

On a more personal level, the report author can confidently state that many skills were mastered over the course of this project. First came the clear need to professionally interact with BLM staff members from multiple departments including budget, GIS, personnel, and even facility management. Schedules had to be coordinated for progress report meetings, and demonstrations arranged in advance. Equipment had to be maintained, serviced, and finally returned.

Technically speaking, this practicum was an opportunity to demonstrate the skills learned during two years of rigorous GIS coursework. Insight was drawn from several Northern Arizona University classes, particularly those focusing on programming, geodatabases, and GIS methods. Many steps in this process required the consultation of class texts or internet resources, and knowing where to find necessary information proved to be a very useful skill. Problem solving was another valuable competence strengthened while completing this practicum; a small sample of the issues faced over the course of the project include: incomplete data, inefficient equipment, and evolving expectations.

Understanding that the results of this practicum are most useful as a methodology and framework, rather than a set of deliverables, was another key point to accept. BLM officials work with these numbers and categories for years, and have a very
good eye for catching interesting patterns and results. The intention of this practicum was to provide them with something they could use and benefit from, and that has been achieved.

References


Appendix A: Dictionary of Terms and Acronyms

2015PMDS: Data table containing PMDS targets and achievements

BLM: Bureau of Land Management

BOC: Budget Object Class, Type of spending category, demonstrates labor and operations budget costs

FBMS: Financial & Business Management System, Budget, procurement, obligations, and expenses

GIS: Geographic Information System

Master Table: The master budget Excel table, includes raw data, all expenses and obligations

PE: Program Element, 2 digit tracking codes tied to PMDS to measure workload

Relevant PEs and their measurement units:

- BH – Inventory abandoned mine lands (sites)
- FH – Process and manage special recreation permits (permits)
- EE – Issue grazing permits/leases (permits)
- JA – Apply shrub/grass vegetation (acres)

PMDS: Performance Management Data System, Workload tracking method with multiple units of measurement including acres, projects, buildings, evaluations, agreements, permits, and sites

Subactivity: General BLM categories describing essential programs such as Administrative Support, Law Enforcement, Wildlife Maintenance and Annual Maintenance

Relevant subactivities:

- 1020 – Rangeland Management
- 1210 – Wilderness Management
- 1220 – Recreation Management
- 1711 – National Monument and Conservation Areas
## Appendix B: Master Table Sample

Tucson Field Office, PE: EE, JA, and BH

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<th>Total Obligations</th>
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<td>4</td>
<td>0</td>
<td>-110.78600000</td>
<td>31.96700000</td>
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</tbody>
</table>
Appendix D: Graphics

The above graphics represent the percent of PMDS achieved, in total across all PE categories, for district, state, and field offices.

The above graphic represents percent of PMDS achieved across the state, per field office, using a gradient to specifically identify percentages.
BH – Inventory Abandoned mine lands (sites)
Percent of PMDS Achieved

FBMS Spent

FH – Process and Manage Special Recreation Permits (permits)
Percent of PMDS Achieved

FBMS Spent
EE – Issue Grazing Permits/Leases (permits)

Percent of PMDS Achieved

FBMS Spent

JA – Apply Shrub/Grass Vegetation (acres)

Percent of PMDS Achieved

FBMS Spent
FBMS Spent per Subactivity

1020 – Rangeland Management

1210 – Wilderness Management

1220 – Recreation Management

1711 – National Monument and Conservation Areas
Direct and Indirect Spending per Field Office

Direct Spending

Indirect Spending

BOC Labor and Operations Costs

Labor

Operations
### Appendix E: Practicum Timesheet

<table>
<thead>
<tr>
<th>Dates</th>
<th>Meeting</th>
<th>Independ.</th>
<th>Notes</th>
</tr>
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<tbody>
<tr>
<td><strong>Dec 2015</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dec 9th</td>
<td>10</td>
<td></td>
<td>With Deb, setup internship (Phonecall)</td>
</tr>
<tr>
<td>Dec 17th</td>
<td>60</td>
<td></td>
<td>Deb, Monica, Other budget</td>
</tr>
<tr>
<td>Dec 21st</td>
<td>60</td>
<td></td>
<td>Fingerprint, background forms</td>
</tr>
<tr>
<td><strong>Jan 2016</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Jan 7th</td>
<td>60</td>
<td></td>
<td>Monica, Richard, onboarding work</td>
</tr>
<tr>
<td>Jan 20th</td>
<td>60</td>
<td></td>
<td>Monica, finished up onboarding, worked at BLM</td>
</tr>
<tr>
<td><strong>Feb 2016</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feb 3rd</td>
<td>120</td>
<td></td>
<td>Monica, Marisa, Deb, Dana. Setup Citrix, discussed objectives</td>
</tr>
<tr>
<td>Feb 17th</td>
<td>60</td>
<td></td>
<td>Accessed everything from home, familiarized with Citrix</td>
</tr>
<tr>
<td>Feb 24th</td>
<td>60</td>
<td></td>
<td>At BLM office, reviewed field/district office naming conventions</td>
</tr>
<tr>
<td><strong>March 2016</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mar 3rd</td>
<td>60</td>
<td></td>
<td>At BLM: citrix, budget tool work</td>
</tr>
<tr>
<td>Mar 7th</td>
<td>90</td>
<td></td>
<td>At home, formatting budget data, setting up .mxd</td>
</tr>
<tr>
<td>Mar 9th</td>
<td>30</td>
<td>120</td>
<td>Meeting with Marisa</td>
</tr>
<tr>
<td>Mar 16th</td>
<td>30</td>
<td></td>
<td>New plan, (x,y) coordinates</td>
</tr>
<tr>
<td>March 19th</td>
<td>30</td>
<td></td>
<td>Research</td>
</tr>
<tr>
<td>March 23rd</td>
<td>60</td>
<td></td>
<td>Created match field office table, added (x,y) data. Went to BLM (no desk).</td>
</tr>
<tr>
<td>March 30th</td>
<td>75</td>
<td></td>
<td>Spatial join with (x,y), field statistics</td>
</tr>
<tr>
<td><strong>April 2016</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apr 5th</td>
<td>45</td>
<td></td>
<td>Completed PMDS target/actual map</td>
</tr>
<tr>
<td>Apr 10th</td>
<td>30</td>
<td></td>
<td>Completed total budget spent map</td>
</tr>
<tr>
<td>Apr 14th</td>
<td>60</td>
<td></td>
<td>Review, update preparation</td>
</tr>
<tr>
<td>Apr 15th</td>
<td>60</td>
<td></td>
<td>Internship progress update, Deb, Monica, Marisa.</td>
</tr>
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<td><strong>May 2016</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>May 31st</td>
<td>60</td>
<td></td>
<td>Started creating specific PMDS maps</td>
</tr>
<tr>
<td><strong>June 2016</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>June 1st</td>
<td>30</td>
<td></td>
<td>1210 map, reviewed join</td>
</tr>
<tr>
<td>June 3rd</td>
<td>60</td>
<td></td>
<td>Met with Marisa at BLM 11-2, updated laptop</td>
</tr>
<tr>
<td>June 5th</td>
<td>60</td>
<td></td>
<td>Wrote 1 page project summary</td>
</tr>
<tr>
<td>Date</td>
<td>Time</td>
<td>Task</td>
<td></td>
</tr>
<tr>
<td>------------</td>
<td>------</td>
<td>----------------------------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>June 6th</td>
<td>30</td>
<td>Cleaned out email, downloaded fixed budget data from Monica</td>
<td></td>
</tr>
<tr>
<td>June 7th</td>
<td>60</td>
<td>Added WMA, NM to budget table, computed lat,long</td>
<td></td>
</tr>
<tr>
<td>June 8th</td>
<td>45</td>
<td>Brought new budget data into ArcMap, created 2 maps.</td>
<td></td>
</tr>
<tr>
<td>June 9th</td>
<td>30</td>
<td>Finished creating new maps, lat long table</td>
<td></td>
</tr>
<tr>
<td>June 10th</td>
<td>60</td>
<td>Meeting with Marisa and Monica and BLM</td>
<td></td>
</tr>
<tr>
<td>June 11th</td>
<td>180</td>
<td>Created presentation, verified data</td>
<td></td>
</tr>
<tr>
<td>June 12th</td>
<td>60</td>
<td>Worked on presentation</td>
<td></td>
</tr>
<tr>
<td>June 13th</td>
<td>120</td>
<td>Produced PE maps with new data, continued presentation</td>
<td></td>
</tr>
<tr>
<td>June 14th</td>
<td>60</td>
<td>Produced BOC maps with new data, finished presentation</td>
<td></td>
</tr>
<tr>
<td>June 15th</td>
<td>60</td>
<td>Presentation</td>
<td></td>
</tr>
<tr>
<td>June 22nd</td>
<td>60</td>
<td>Formatted new spreadsheet, started adding new lat,longs</td>
<td></td>
</tr>
<tr>
<td>June 27th</td>
<td>90</td>
<td>Finished adding x,y to new spreadsheet of 400,000+ records</td>
<td></td>
</tr>
<tr>
<td>June 29th</td>
<td>60</td>
<td>Brought new budget spreadsheet into ArcMap</td>
<td></td>
</tr>
<tr>
<td>July 1st</td>
<td>60</td>
<td>Setup PMDS spreadsheet, brought it into ArcMap.</td>
<td></td>
</tr>
<tr>
<td>July 5th</td>
<td>60</td>
<td>Finished PMDS maps</td>
<td></td>
</tr>
<tr>
<td>July 6th</td>
<td>30</td>
<td>PE code maps (FBMS)</td>
<td></td>
</tr>
<tr>
<td>July 7th</td>
<td>90</td>
<td>Finished FBMS by PE, started PMDS by PE</td>
<td></td>
</tr>
<tr>
<td>July 8th</td>
<td>45</td>
<td>PMDS by PE</td>
<td></td>
</tr>
<tr>
<td>July 12th</td>
<td>75</td>
<td>FBMS 1210, 1220, etc</td>
<td></td>
</tr>
<tr>
<td>July 13th</td>
<td>45</td>
<td>Started the indirect/direct</td>
<td></td>
</tr>
<tr>
<td>July 14th</td>
<td>60</td>
<td>Finished direct and indirect</td>
<td></td>
</tr>
<tr>
<td>July 20th</td>
<td>30</td>
<td>Labor and Non-labor</td>
<td></td>
</tr>
<tr>
<td>July 23rd</td>
<td>60</td>
<td>Presentation work</td>
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<tr>
<td>July 26th</td>
<td>45</td>
<td>Continuing presentation/figures</td>
<td></td>
</tr>
<tr>
<td>August 2nd</td>
<td>60</td>
<td>Complete presentation, organize notes for meeting</td>
<td></td>
</tr>
<tr>
<td>August 3rd</td>
<td>45</td>
<td>Meeting notes</td>
<td></td>
</tr>
<tr>
<td>August 4th</td>
<td></td>
<td>Meeting with Monica</td>
<td></td>
</tr>
<tr>
<td>August 8th</td>
<td></td>
<td>Adding state squares</td>
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<tr>
<td>August 13th</td>
<td></td>
<td>Meeting prep</td>
<td></td>
</tr>
<tr>
<td>August 14th</td>
<td></td>
<td>Meeting prep, notes, what’s going on with Tucson?</td>
<td></td>
</tr>
<tr>
<td>August 15th</td>
<td></td>
<td>MEETING CANCELED</td>
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<tr>
<td>Sept. 2016</td>
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<td>Review</td>
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44
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<th>Activity</th>
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<tbody>
<tr>
<td>September 13th</td>
<td>30</td>
<td>Advisor meeting, practicum discussion</td>
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<tr>
<td>September 19th</td>
<td></td>
<td>Practicum outline, literature review</td>
</tr>
<tr>
<td>September 24th</td>
<td></td>
<td>Outline, literature review, abstract</td>
</tr>
<tr>
<td>September 26th</td>
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<td>Introduction, Background</td>
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<td>September 27th</td>
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<td>Background</td>
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**October 2016**

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<th>Hours</th>
<th>Activity</th>
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<tr>
<td>October 3rd</td>
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<td>Introduction: purpose, outcome, research questions</td>
</tr>
<tr>
<td>October 5th</td>
<td></td>
<td>Finished introduction, started methodology</td>
</tr>
<tr>
<td>October 6th</td>
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<td>Methodology Data</td>
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<tr>
<td>October 8th</td>
<td></td>
<td>Spatial and Fiscal Data</td>
</tr>
<tr>
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<td>Finished up spatial/fiscal data, started Procedures</td>
</tr>
<tr>
<td>October 11th</td>
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<td>Finished Methodology, started Results</td>
</tr>
<tr>
<td>October 12th</td>
<td></td>
<td>Results</td>
</tr>
<tr>
<td>October 13th</td>
<td>30</td>
<td>Meeting at BLM with Deb, Monica, Marisa. Practicum document.</td>
</tr>
<tr>
<td>October 14th</td>
<td>90</td>
<td>Draft finalization, editing.</td>
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</table>
Appendix F: Meeting Notes – Project Summary

Objective

The objective of this project is to aid the Arizona Bureau of Land Management (BLM) in obtaining operational excellence and accomplishing their strategic goals by connecting on the ground accomplishments to budget and economic data. The result is a visual representation of budget allocation and spending, connected geospatially to Arizona BLM Field Offices across the state.

Summary

To fulfill the requirements of my M.S. in Applied Geospatial Sciences from Northern Arizona University, I am completing a project requested by Deborah Rawhouser, Associate State Director for the BLM. Rawhouser requested a geographical representation of fiscal year 2015 budget data, allowing her to more easily visualize budget spending and allocations in Arizona. These representations would allow her to answer important questions about the state budget, such as:

1) How well are we planning and executing our budget?
2) How well are we planning and executing our workload/labor?

My project endeavored to answer these questions by connecting raw budget data records to the Arizona Field Offices in which they were accomplished and producing visual maps representing these relationships.

Procedure

The procedure for this project was completed in several steps involving budget tables and spatial data. For the spatial data, the results were requested at the field office level. There are several field offices covering the state of Arizona, each supervised by a district office. Within these field offices are other areas of fiscal interest, including national monuments and wilderness management areas. Each of these areas has a provenance code, which is one of several pieces of information found in the fiscal 2015 budget tables. The tables were secured from “the Tool”, a BLM specific application that allows for the exportation of data based on a variety of search criteria. For the purposes of this project, all entries for all field offices in 2015 were selected and exported.

In order to connect the data tables to the field offices and create a visual representation, a join needed to be completed. Unfortunately, a simple join was impossible due to the cardinality of the relationship, so another solution was needed. Ultimately, I determined the best way to join this data was to determine a centralized latitude-longitude point for each field office, and add columns to the data table containing this information. Then, the (x,y) data could be brought into ArcMap as a table, and a point file could be created. This file contains a “stack” of points in the center of each field office, which can then be spatially joined to the polygons themselves.

The result of this spatial join has allowed me to produce several maps to help the BLM visualize their spending and project completions, color coded by category. These maps include:
total spending by field office, percentage of work elements completed, and maps of specific program achievements. At this point in the project, I am producing the last of my maps and bringing in additional budget data as it becomes available. There is also still a great deal of documentation to do, as well as presentations to the BLM staff budget and geospatial staff.
April 14th, 2016 Meeting Notes

Questions

1. How well are we planning and executing our budget?
2. How well did we plan and execute our workload?

Outcome

1. Can be viewed by management to make budget decisions.

General Steps

1. Format and export budget data
2. Joining budget data to spatial data
3. Compiling and displaying useful results

Accomplished

1. Format and export budget data
   I. Exporting
      a. Fiscal year 2015
      b. All funds centers, budget activities, and program elements
   II. Formatting
      a. Very little required for the raw data
      b. Creating parsed fields (codes?)

2. Joining budget data to spatial data
   I. One to Many join – cannot be simply joined in ArcMap
      a. Averages can be produced per category, but they require a lot of manual work.
      b. No clear way to visualize
   II. Give each cost center an (x,y) and use a spatial join
      a. Determine an (x,y) coordinate for each FIELD OFFICE
      b. Add 2 fields to Excel (Latitude, Longitude)
      c. Bring (x,y) data into ArcMap
      d. Create layer from points
      e. RESULT: There is a “stack” of points in the center of each field office. One for
         each entry in the budget table.
      f. Complete a spatial join with Field Office feature to budget table.

3. Compiling and displaying useful results
   I. Symbolize by category
   II. Refer to existing color codes for percent.
Produced

1. Percent of PMDS Achieved (PMDS Actual / PMDS Target) -- Workload
   I. Values range from 96 percent to 132 percent
   II. Includes all program element and budget activities

2. FMBS Spent in Total
   I. In dollar amount

Issues

1. Currently dealing only with Field Offices. Districts are not calculate individually, neither are WMA, State office, or other unusual areas.
   - Partly a data issue
   - Still working on the best way to combine this data
   - Total lines in the FY 2015 table vs. ArcMap budget
     (see RED in Budget Workspace)

2. Some manual calculation still necessary (adding x and y to the MATCHED excel table).
   - It’s relatively quick, but there must be a better way.

3. What to produce to answer the original questions

4. How to make this usable for someone else?
   - Programming a tool using Visual Basic?

5. Everything still on my machine (budget data from tool, spatial data from BLM public access website).

June 14th, 2016 Meeting Notes

Objective

The objective of this project is to aid the Bureau of Land Management (BLM) in obtaining operational excellence and achieving their strategic goals by spatially connecting on the ground accomplishments to budget and economic data. The result is a visual representation of budget allocation and spending, connected geospatially to Arizona BLM Field Offices across the state.

Questions

1. How well are we planning and executing our budget?

2. How well did we plan and execute our workload?

Presentation

1: Designed this presentation to “Tell a Story” about the BLM Budget for FY 2015. Examines PMDS targets and achievements, FBMS Spent per field office, Percent of PMDS achieved by
Program Element, FBMS Spent per Sub Activity, Direct and Indirect PE costs, and BOC labor and non-labor costs.

2: Over the entire state, 98.9% of total PMDS were completed. Approximately 69,500 PMDS were not accomplished.

3: Where did we fall short? District PMDS visual demonstrates that the Gila District Office achieved 70% of its target.

4: Within the Gila District, the Tucson Field Office recorded the lowest amount of PMDS achieved. However, it’s “average” percent of PMDS accomplished shows that it failed in a couple of specific areas, versus overall low achievement.

5: This slide highlights the issues faced by the Tucson Field Office

6: Total spent accomplishing PMDS = $225,327,776. The vast majority was spent at the field office level, with the district and state level spending far less.

7: Total spent per field office, with Tucson spending the greatest amount. The Lower Sonoran Field Office (and the Grand Canyon National Monument) spent the least amount of FBMS dollars.

8: Percent of PMDS accomplished per field office for 4 specific PE codes – BH, FH, EE, JA. This data includes the National Monuments and Wilderness areas within the Field Office boundaries, which does affect the results.

9. For example, PE (EE) was underwhelming. The Red zones, under 90%, range from 0 (Tucson Field Office) to 43% (Hassayampa).

10. Next is FBMS Spent per Field Office on various Budget Activities.

11 – 13: Self-Explanatory. The Null values are areas that did not record any records for that sub activity.

14: Introduces new maps. This is Direct and Indirect PEs using only the fixed costs.

15: Indirect fixed costs per cost center. District and state office are together, next to the field office visual. Light blue – dark blue – purple – black

16. Same information as previous, but now displayed as a percent.

17 – 18: Same as above but using direct fixed costs instead of indirect.

19: BOC labor costs per cost center.

20: BOC non-labor costs per cost center.

**Issues**

1. Still want to make sure Field/State/District information is being displayed adequately.

2. Complete more common sense checks (percent adding to 100, etc.)

3. Need to organize spatial and budget data.

4. Will begin comprehensive documentation to include maps, tables, data dictionary, processes.
August 4th, 2016 Meeting Notes

Questions for Monica

1) General – Total budget = $76,688,745
   Confirmed in Master.xlsx and BLM Budget Points shapefile

2) Slide 4 – Are these acronyms correct? PMDS, FBMS, PE, BOC

3) Slide 6 – Checking numbers on PMDS Achieved.
   State Office: 428,505/410,903 = 104%
   Colorado River District Office – 4,998/5,243 = 95%
   Tucson Field Office – 126,429/263311 = 48%
   (Confirmed in ArcMap and 2015PMDS.xlsx using G02 + G03)

4) Slide 8 – FMBS and PMDS % by Program Element (BH)
   Safford Field Office FBMS = Null?
   (Confirmed in Master.xlsx. No entry for BH in the Safford Field Office G01 + G11)
   Hassayampa Field Office PMDS = <90?
   Average Actual 59 /Average Target 75 = 79%
   Is average misleading when there is only 1 entry per field office??

5) Slide 11 – FBMS and PMDS % by Program Element (JA)
   Kingman Field Office FBMS = $-1,229? (Confirmed in Master.xlsx)

6) Slide 15 – FBMS Spent 1220 Recreation Management
   Grand Canyon National Monument = $0? (Confirmed with Master.xlsx)

7) Slide 16 – FBMS Spent 1711 National Monument and Conservation areas
   Null values vs. $0. Is this because they don’t have national monuments, vs didn’t spend anything on them?
   No, Lake Havasu has Cactus Plain Wilderness Area. Confirmed no entries in Master.xlsx.

8) Slide 17 – Direct and Indirect Spending per Field Office
   Yuma Indirect (Co2 PE codes non P, X, Y = $467,551 (confirmed with Master.xlsx)

9) Slide 18 - BOC Labor and Non-labor
   Yuma Labor (Co2 BOC 11, 12) = $1,582,903 (confirmed with Master.xlsx).
October 13th, 2016 Meeting Notes

Project Update

1 – Introduction: Hello!

2 – Objective: To aid the Bureau of Land Management (BLM) in obtaining operational excellence and achieving their strategic goals by spatially connecting on the ground accomplishments to budget and economic data. The result is a visual representation of budget allocations and spending, connected geospatially to Arizona BLM Field Offices across the state.

3 – Questions and Outcome

4 – Data

5 – Part 1: How well are we planning and executing our workload? This is how I’ve tackled this issue, and what’s coming up next in the presentation.

6 – Percent of PMDS Achieved: Total State Budget = 76,688,745.

   At the District Office Level:
   Colorado River District Office: 95%
   Arizona Strip District Office: 100%
   Phoenix District Office: 151%
   Gila District Office: 326%
   At the Field Office Level:
   Concerns about Tucson and Lake Havasu.

7 – Breakdown of Field Office PMDS % Achieved, including State Office.

8 – What’s going on with Tucson? A brief look into what’s causing Tucson’s 49% of PMDS achieved. It mostly comes down to Evaluating Recreation areas within National Monuments and Conservation centers.

9 – BH: Inventory abandoned mine lands. Right: What percent of BH PMDS each field office achieved. Left: Total obligations spent achieving the percent. This data comes from two different charts, one specific to PMDS_2015, and the other is the Master Budget List. This is why we see Safford Office achieving a percent of their PMDS, but coming up null in their total obligations.

   Hassayampa: Achieved 79% of the target (57/75). Spent $75,665 in this endeavor.

10 – FH: 1 entry for the Kingman Field Office for BH in the Master table. They spent $431 on repairs/maintenance.

11 – EE: A known struggle?

12 – JA: This one is strange. There are two field offices with NEGATIVE obligations. It is, per Monica, a “reverse labor accrual”, and is due to payroll.

13 – Part 2: How well are we planning and executing our budget?

14 – FBMS spent on 1020 Rangeland Management. Includes State Office.
15 – 17: Same

18 – Direct and Indirect Spending Per Field Office (including State Office).

19 – Labor and Ops spending per Field Office (including State Office)

**Codes**

- PMDS achieved per specific program element
  - BH – Inventory abandoned mine lands (sites)
  - FH – Process and manage special recreation permits (permits)
  - EE – Issue grazing permits/leases (permits)
  - JA – Apply shrub/grass vegetation (acres)

- FBMS spending per field office by sub-activity
  - 1020 – Rangeland Management
  - 1210 – Wilderness Management
  - 1220 – Recreation Management
  - 1711 – National Monument and Conservation Areas