Sun Corridor Trail Development: Coconino National Forest, Arizona

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Graduate Practicum Report

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Abstract

The Sun Corridor Trail project is a multi-agency effort being coordinated by the SCTA [SCTA] to develop a multi-use recreational trail utilizing existing routes (trails and primitive roads) from Douglas, Arizona to Las Vegas, Nevada. The trail will link cities and towns, allowing residents easy trail access and providing locations for recreationalists to rest and explore while traveling along the route in its entirety. The route will travel through Arizona, California, and Nevada connecting over 41 cities and towns, 23 of which are located in rural areas. The trail has the potential to increase local economic spending, increase property values, and provide additional recreational opportunities for citizens and tourists. The process of linking existing routes to create the trail makes the project unique, speeds up implementation and saves a significant amount of money when compared with creating a new trail. The trail will primarily focus on meeting the needs of non-technical off-road cyclists such as ‘gravel cyclists’ and 'credit card tourists', and will also be viable for foot traffic, e-bike, mountain bike, and equestrian use in some sections. This practicum project consisted of identifying and proposing a potential route through Coconino County and the Coconino National Forest, collecting field data, mapping, participating in SCTA stakeholder meetings, assisting in managing social media and web marketing, and creating material for a future guide book.

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Introduction

The southwestern United States offers diverse opportunities for outdoor recreation and the abundance of these activities attract significant annual tourism (Outdoor Industry Association, 2017a). Many who reside in the states that make up the southwest live there, in part, because of the abundance of outdoor recreation opportunities. Arizona's residents are particularly involved in outdoor recreation. A 2016 study by the Outdoor Industry Association found that 59% of Arizona residents participate in outdoor recreation, which is a larger percentage of participation than most states (Outdoor Industry Association, 2017a). One large category of outdoor recreation in the United States is cycling, which is a popular form of outdoor recreation in Arizona as well. Two emerging trends for cyclists in the United States are a desire for routes that do not share the road with increasingly distracted drivers and, concurrently, an interest in opportunities that allow for increased exploration both on and off roadways because of technological advancements in 'all-road' bicycles commonly referred to as gravel bikes. An emerging issue for cyclists in the United States is the increase in distracted driving that is threatening the safety of road bikers. Distracted drivers are the cause of an increase in pedestrian and cyclist fatalities in the United States (Stimpson, Wilson, and Muelleman, 2013). Because of this, there is a growing desire among cyclists for bike routes that are physically separated from heavy vehicle traffic (Gulley, 2017).

The Sun Corridor Trail (SCT) is a new route being planned in the southwestern part of the United States whose recreational offerings attends to these trends. The SCT will be a long, multi-use route for outdoor recreationalists, and avoids busy roads by primarily utilizing existing trails and primitive roads currently managed by the United State Forest Service and other land managers. The SCT project is being facilitated by the Maricopa County Parks and Recreation Department, Pima County Natural Resources, Pinal County Trails and Open Space, the National Forest Service, and the Coconino County Parks and Recreation Department, as well as roughly twenty additional partnering organizations. This collective make up the Sun Corridor Trail Alliance (SCTA), who hope to link together some of the most scenic, and significant, regional trails in Arizona and neighboring communities along a burgeoning economic, transportation, and tourism corridor (Vonderscher, 2018).

The mission of the SCTA is to link significant regional trails along a burgeoning megapolitan corridor between Las Vegas, Nevada and Douglas, Arizona to promote recreation, economic spending, and tourism.

The SCTA proposes to define this route by utilizing existing trails, paths, and forest or other less-trafficked roads between population centers, highlighting tourist hubs as well as culturally and environmentally significant locations. This ensures users will be able to partake in recreational, touristic, and ecotourism pursuits. To best facilitate these recreational pursuits, the trail will be designed as a 'destination' route for credit card-touring cyclists utilizing gravel or 'all-road' bicycles, while also providing for a wider, multiuse demographic, such as hikers, runners, and local day-users. In this way, the trail will serve as a tourism draw for the state while offering economic growth to lesser visited, rural towns along its route.

The SCT will explore the cultural and environmental diversity of the southwestern United States while traveling to and through a variety of high-impact sites across Arizona. Though the trail will be designed primarily for an emerging but broad genre of cycling, it will also in many sections be appropriate for walking, hiking, running, E-biking, and equestrian use. The SCT will focus on meeting the needs and desires of 'all-road' cyclists and will also be branded as such. The route will not be optimized for horsepacking, bikepacking, or backpacking, specifically because the often-nearby Arizona National Scenic Trail [AZT] already meets the needs of these user groups. Instead, the trail is designed as a front- and sidecountry experience that will encourage users to explore and engage with local communities they travel through daily. These local resources may include hotels, motels, or hostels for overnight lodging; restaurants, eateries, bars, and coffee shops; and local public opportunities for trail users to immerse themselves in the cultures of the communities they travel through. Credit card tourists may choose to spend additional time exploring cities and towns that particularly interest them while riding the route.

Whereas much of the SCT pass through major metropolitan areas, such as the cities of Phoenix and Tucson, Arizona, who have ample cycling paths in place, the northern Arizona landscape is varied and presents a number of hurdles in route selection. A potential route connecting the Arizona communities of Williams, Flagstaff, and Sedona has been particularly vexing for the SCTA, primarily due to the complex network of USFS roads and few accessible, gravel cycling-appropriate pathways to navigate the Mogollon Rim. In this practicum project, I

drew on a range of recreational and geographic technologies to address the route selection and testing across these communities, as they have been, up until I joined the project, an impasse for the SCT. This practicum project provided field research data, maps, and clear route recommendations from which the SCTA can select appropriate, gravel and credit card touring routes to connect these communities with the SCT. Although this practicum project was situated in Coconino National Forest and Coconino County in Arizona, much of the work done here—including but not limited to the development of route typologies, selection methods, and clear inclusion and exclusion criteria—will aid in route development among other SCT regions. The remainder of this report is organized as follows: first, I review relevant literature that contextualizes the practicum and its pertinent dimensions. Second, I outline the methods used to meet the needs of the SCTA and its interests in routing between these communities in northern Arizona. Third, I present the results along with a maps and descriptions of recommended routes. Lastly, I provide a discussion that explains and evaluates the findings of this project, future implications, and a conclusion.

Literature Review

The Outdoor Industry's Economic Importance and Value

The outdoor recreation industry accounts for a substantial segment of the United States economy. The 2017 Outdoor Industry Association (Outdoor Industry Association, 2017b) report indicates consumers spent $887 billion on outdoor recreation annually. The industry generally makes up 2.2% of the United States gross domestic product (Highfill and Franks, 2019). Such consumer spending illustrates the value and centrality of outdoor recreation in the US culture and economy. The $887 billion in annual expenditures is more than both the Pharmaceutical industry ($466 billion) and Education industry ($278 billion) combined. Furthermore, this industry provides 7.6 million American jobs and 65.3 billion dollars in federal tax revenue (Outdoor Industry Association, 2017b). It is a vital part of the United States' economy and investing in outdoor recreation provides municipalities with economic growth.

The outdoor recreation industry is particularly valuable to the state of Arizona. As an example, the town of Superior, Arizona recently used trail—specifically, its location adjacent to the AZT—to revitalize their community, bringing business back into a vacant main street and increasing tourism. By working with their local mining company, they were able to acquire rights-of-way and a grant to conduct a tourism feasibility study which led to the town seeking bids for a 60 room hotel and conference space (Besich, 2020). The town also created a Waters and Trails Action Plan that included the development of multi-use trails and access into the Superstition Mountains, increasing tourism and bringing much-needed money back into the community (Besich, 2020).

In other words, the outdoor recreation industry is a crucial part of Arizona's economy. The Arizona Office of Tourism reported that in 2018, 21.2 billion dollars were spent by consumers on outdoor recreation in Arizona, and 59% of Arizona residents participated in outdoor activities (Outdoor Industry Association, 2017a). Arizona's tourism numbers are increasing. In 2018, domestic visitation reached an all-time high of 39.6 million people (Tourism Economics, 2019). In addition to revenue coming into the state, outdoor recreation employs approximately 201,000 people in Arizona, illustrating its significance to the state's workforce (Outdoor Industry Association, 2017a). Arizona is also an important aerial transportation hub. 49 million passengers enplaned or deplaned within Arizona in 2017, and 2.2 million of these

passengers were traveling internationally (Arizona Office of Tourism, 2018). Many of those people were visiting Arizona for leisure and tourism purposes, and the SCT has the potential to give these visitors a new way to experience the state. It is an additional opportunity for recreation, while also offering a unique method of transportation-based tourism.

In July of 2020, as part of the Destination Recovery Plan, the Arizona Department of Tourism stated that one of their key priorities is to reinvigorate and strengthen tourism in rural and tribal areas (Arizona Department of Tourism, 2020). Arizona Department of Tourism plans to develop campaigns to support tourism in destinations along the Arizona Scenic Trail and the Sun Corridor Trail (Arizona Department of Tourism, 2020). The Arizona Department of Tourism sees the value of a trail such as the SCT and the need for such a trail as we recover from the Covid-19 pandemic that has hurt rural economies in Arizona.

Bicycling

In the past year, 29% of Americans above the age of three rode a bike for recreation (People for Bikes, 2019). In addition, 47% of Americans want to ride bikes more than they currently do, and say that being near safe recreational trails and paths would help them do that (People for Bikes, 2019). Cycling also makes up a surprising portion of consumer spending. In 2016, 3.4 billion dollars were spent on cycling (Highfill and Franks, 2019); in 2020, those numbers are guaranteed to have increased—though reports are not yet available—due to an increase in interest related to the Covid-19 pandemic (Goldbaum, 2020). The bicycle has been a big part of the American experience and will continue to be utilized by Americans for transportation and recreation for years to come (People for Bikes, 2019).

The Covid-19 Pandemic has increased recognition of the importance of bicycles in the United States. The combination of people looking for safe, close-to-home outdoor recreation is now tied with a desire to avoid public transportation, and this has created a major boom in cycling participation and bike sales (Goldbaum, 2020). In May of 2020, one chain of bike shops in Phoenix, Arizona was on track to sell three times the amount of bikes they typically do annually (Goldbaum, 2020). With this has come some public policy changes, such as cities like New York, Seattle and Oakland closing sections of roads for bicycle and pedestrian use only (Goldbaum, 2020). The constraints of the pandemic has ignited the economic impact of the

cycling industry and the importance of bikes and bicycle infrastructure, and the bicycle will continue to remain important after the pandemic.

Gravel Cycling

Over the past few years there has been a new subcategory of bicycles gaining popularity; these are often called ‘gravel’ bikes. Gravel bikes are derived from road bikes with slackened head-tube angles, relaxed geometry, and a wide tire clearance (Gulley, 2017). These bikes are similar to hybrid and road bikes, but with a focus on both comfort and efficiency on dirt roads and nontechnical, unpaved paths. These bikes are designed to be almost as efficient on roads as road bikes are, while also being capable of off-road riding on dirt roads and mild singletrack trails. The bikes are likely gaining popularity because they are capable of being efficiently ridden on such a variety of terrain types. They are also thought to be gaining in popularity because some road bikers are choosing to ride on dirt roads due to the dangers of biking near heavy car traffic (Gulley, 2017). Unlike road biking, gravel biking has fewer rules for inclusion. The bikes that fit into the gravel bike category are diverse. Both a hardtail mountain bike with ‘skinny’ tires and an old or vintage road bike with wide tires could be considered a gravel bike, though more often than not they are designed around a comfortable, road bike inspired geometry with larger tires and gear ratios. Designing the SCT and its experience with this type of bike in mind is beneficial because it ensures accessibility for a wide variety of users. Hybrid bikes, vintage mountain bikes, vintage road bikes—and even new road bikes with proper tires—and modern gravel bikes can all use the same route, making it a space for a serious bike tourer traveling across the state as much as a family on a day ride with affordable mountain bikes. This also makes the experience significantly different than that offered by the AZT, in that the latter caters to technical backcountry users like ‘bikepackers,’ who typically need to outfit mountain bikes with expensive components and equipment to aid them in traveling unsupported across rough and oftentimes technical terrain for several days at a time.

Credit Card Touring

Credit card touring is a form of bicycle tourism that is popular in Europe and gaining popularity in the United States. Credit card tourists travel by bicycle between towns and cities with minimal equipment, purchasing food and staying in local lodging along their way. Credit card touring provides a unique, self-directed experience, and the tourists are able to immerse

themselves in the communities they travel through: “Credit card touring is a bite-sized way to experience the freedom of bike touring and achieve your own distance-riding goals while you’re at it” (Doan, 2020). Its unique transportation requirements provides alternatives for experiencing a land or cityscape when compared with a typical American ‘road trip’, and diversifies lodging requirements as tourists move from community to community in shorter chunks. Many countries in Europe have infrastructure that makes this type of travel easy, such as non-motorized routes between hostels that provide lodging and food specifically to credit card tourist (Doan, 2020). The SCT will be one of a few, but growing list of credit card touring routes that prioritize this type of travel in the United States, joining routes like the Great Allegheny Passage and C & O Canal Towpath Trail and the East Coast Greenway. It will be one of the first in the western United States.

Accessibility and Equity

Structural inequalities exist and influence outdoor recreation participation. In 2001 a group of researchers applied a multiple hierarchy stratification prospective to look at how people participate in outdoor recreation activities (Lee, Scott, & Floyd, 2001). The study accounted individuals’ socioeconomic status, race and ethnicity, age, and gender, all of which they expected to influence outdoor recreation involvement. The study found that these components often compound upon one another to positively or negatively influence outdoor recreation participation; in other words, the researchers identified how outdoor recreation participation is intersectional (Lee et al., 2001). As example, elderly non-Anglo females, who do not have a college degree, and who do not make more than $20,000 per year participate the least in outdoor recreation; while young Anglo males, who have a college degree, and who make more than $20,000 per year participate the most in outdoor recreation activities. Natural resource managers are still learning how outdoor recreation participation is influenced by socioeconomic status, race and ethnicity, age, and gender, and must work to make their facilities and recreational offerings more equitable. Outdoor recreation professionals need to provide services to everyone, instead of the groups that are culturally expected to participate in outdoor recreation the most.

Cycling is considered to be one of the most income-diverse outdoor recreation activities in the United States (Whitesell, 2019). A recent study determined that 50% of Americans have

access to a functional bicycle at their household (People for Bikes, 2019). Because of this, there should be a focus on increasing local opportunities for safe cycling and communities should work to promote bicycle ridership.

Additionally, companies in the bike industry have begun working to make cycling more inclusive and accessible. A recent video produced by the large bicycle component manufacturer, Shimano, highlights the 'Cycling for All' movement that aims to dismantle the idea that cycling is for the elite and only those who appear physically fit. The video promotes bicycle ridership for anyone of any background with any body shape (Shimano, 2021).

Electric Bikes

In addition to cycling being widespread and income-diverse in the United States, bikes can provide recreational accessibility for people with disabilities. Alternative and adaptive bikes, such as recumbents, hand bikes, and electric bikes (e-bikes) can provide opportunities to participate in outdoor recreation for people with a wide range of abilities. In recent years, e-bikes have become popular due to the assistance they provide to the rider, allowing them to navigate challenging terrain and ride greater distances, typically at faster speeds, than they might otherwise be able to on a traditional bike. E-bikes are, in many respects, not that dissimilar to a typical bicycle: "E-bikes typically resemble a standard pedal bicycle with the addition of a rechargeable battery and electric motor to assist the rider with propulsion" (MacArthur, Dill & Person, 2014, p. 3). A small survey of E-bike owners in North America conducted in 2014 found that 21% of the respondent's main motivations for purchasing an e-bike was because they had a medical condition limiting their ability to ride a standard bike (MacArthur et al., 2014). The same study claimed that one of the largest issues hampering mainstream use of e-bikes in North America is a lack of infrastructure and a lack of comprehensive policies governing their use (MacArthur et al., 2014). The SCT capitalizes on an equitable and diverse form of recreation, and the routes selected can maximize use for accessible and diverse-ability cycling technologies such as e-bikes. However, not all trails and communities in Arizona are e-bike friendly, thus requiring careful route selection.

Trails

Trails and Communities

Outdoor trail networks have been proven to increase tourism spending, local economic activity, and proximal property values (Whitesell, 2019). Trails provide access to recreational opportunities, which positively impact the physical and mental health of community members (Hassen, 2016; Harnik, 2006), and green spaces and the intentional incorporation of trail networks help cities create cohesive urban identities (Harnik, 2006). Green spaces and trails can also help cities and towns attract residents, which can increase local tax revenue (Harnik, 2006). Studies have gone so far as to claim that access to trails is the second most important reason that people chose to buy property in a specific location (Whitesell, 2019).

As noted, tourism—and specifically outdoor recreation—is already a big sector of the Arizona economy. Increasing the amount of multi-use trails that travel to and through a diverse array of communities can help to increase tourism visitation to underserved areas. This money can help rural communities to increase services for residents, and revitalize crucial aspects of communities, such as downtown restaurants. The Appalachian Trail is a paradigmatic example of a long distance trail that has brought visitors and money to rural communities. This trail sees more than two million visitors annually; many of whom are not ‘thru hikers’ despite the trail being largely designed and existing in the public imagination as intended for such, and generates 27 million dollars in local spending annually (Rails to Trails Conservancy, 2020).

Perimeter and Rail Trails

Perimeter Trails have become increasingly popular in recent years. Perimeter Trails are typically multi-use trails built around all or part of the perimeter of a single town or city. They provide opportunities to community members to travel and commute along them and they provide a close-to-home recreation experience outside. These types of trails help people to access the outdoors quickly, generally without having to drive long distances to trailheads. Prescott, Arizona has begun marketing their Perimeter Trail for tourism (City of Prescott, 2016) and using their Perimeter Trails as a draw to get visitors to spend more time in their communities and near their amenities. The Prescott Circle Trail, as example, is more than 55 miles long and highlights a diverse offering for hiking, biking, and equestrian use (City of Prescott, 2016).

Rail trails are recreational multi-use routes created by recycling old, decommissioned railroad beds or built parallel to an existing railroad. Rail trails are unique because they often travel directly between and through communities, are most often designed through the 'path of least resistance' across a landscape, and provide access to valuable amenities like downtown areas. Rail trails can provide an opportunity for sustainable tourism because visitors utilize human powered forms of transportation along the routes (Taylor, 2015). One of the most influential factors effecting the success of rail trails is the ability for local governments and local communities to work together and effectively collaborate to manage the routes (Taylor, 2015). Some rail trails are attracting significant tourism visitation in addition to local use, and those that see significant tourism are considered destination trails (Taylor, 2015). While there are numerous local and regional rail trails across the United States, some of which are commonly used for gravel cycling and credit card touring alike—such as the Katy Trail in Missouri—there are also active attempts at creating large, multistate rail trails as a form of sustainable tourism, such as the Great American Rail Trail (Great American Rail-Trail, 2020).

Both perimeter trails and rail trails are similar in that they generally focus on meeting the needs of multiple user groups and are accessible within communities. They can both offer opportunities for community members to commute along them and they can be an additional draw for tourism. The SCT will build off of the successes that perimeter trails and rail trails have had by using a similar multi-use structure and by allowing accessible interconnection between communities. The SCT will most likely use existing perimeter trails, such as in Phoenix, as sections of the overall route.

Risk Management on the Trail

Distracted drivers are the cause of an increase in pedestrian and bicyclist fatalities in the United States (Stimpson et al, 2013). Whereas in 2005 there were 18.7 bicyclist fatalities per 10 billion vehicle miles traveled, in 2010 those had increased to 24.6 bicyclist fatalities per 10 billion vehicle miles traveled (Stimpson el al, 2013). The trend of distracted driving is killing road-bound cyclists and increasing the risk of injury and death to those recreating and commuting on and near roadways (Stimpson et al, 2013). The SCTA plans for the route to avoid paved, trafficked roads whenever possible to ameliorate this key risk among users. The northern Arizona section of the SCT will need to be designed so as to remain consistent with the type of

terrain the trail is made up of in the southern section of the state. Much of the terrain and existing routes in northern Arizona being considered for the SCT are primitive and isolated. This practicum project worked to ensure a consistent trail experience for users in northern Arizona so users don't feel a need to bypass sections of the route using busy roadways. The SCT will rely on abundant existing trails, paths and forest roads crisscrossing the southwest and this practicum project helped to define which should be used for the route. With the right planning and interdepartmental collaboration, these routes could be optimized to connect population centers, further increasing the state's recreational opportunities.

Experience Economy

The SCT, starting with a deliberative and systematic route selection, has the potential to become a destination experience. The world's economy has evolved from a product-driven consumer base to an experience and activity-driven consumer interest (Pine and Gilmore, 1998). Today, people are less focused on material possessions and are becoming more interested in the experiences they can have and the time they can spend involved in activities (Gibbs and Holloway, 2018). This trail will provide a setting for people to construct their experiences from among a range of potential adventures. Coconino County provides incredibly diverse landscapes and terrain. The trail was designed with intentionality and the user's desired experience in mind specifically in this section. This practicum project helps the SCTA to create a cohesive experience for trail users and ensure that this section of the route fits in with the experiences that other sections provide. Designed and routed properly, it will flourish in the public's imagine and in reality serve a multiuse goal; one could easily imagine a group of friends spending a long weekend riding a section of the trail and also a lone adventurer, traveling end-to-end while engaging with the cultures and environments of the southwest.

Conclusion

The rich potentials that exist in the SCT begin with a carefully coordinated route selection process. The SCT aims to provide an accessible recreational cycling route from Douglas, AZ to Las Vegas, NV while benefitting communities in a variety of manners, including local use and tourism revenue. The existing web of trails, paths, and forest roads in the southwest provide a perfect setting and opportunity for designing such a trail that meets the vision of the SCTA. The route selection will avoid significant car traffic to provide safety to users. The route

selection process worked to best utilize existing infrastructure and highlight the environmental diversity of northern Arizona. It helped the SCT to best immerse trail users in the culture of the southwest making it unique and novel. The cohesive route designed by the well thought out route selection process ensured that the SCT can capitalize on the existing tourism base in the southwest and potentially bring in more visitors. Together these factors provide a solid basis for implementing this project's route selection process to bring all these key elements together.

Methods

Introduction and Overview

GIS Map Compositions, GIS Story Mapping, & Section Reports

The SCT Development practicum project involved creating map compositions using GIS, GIS Story Maps, and provided detailed Section Route Recommendation Reports. The project utilized a mixed-methods design, in that both qualitative and quantitative data was collected, analyzed, and reported. The final project consisted of two section reports and one final report that included information from both of the section reports. The section reports are made up of three key components:

(1) an Arc GIS map composition illustrating all routes tested and a map composition with the recommended route,
(2) a written report highlighting key findings along with a formal route recommendation, and
(3) a GIS StoryMap presenting the ArcGIS map and the route recommendation with pertinent additional material.

The practicum project will aid the SCTA in selecting one route through the Coconino National Forest and Coconino County. The first section report involved linking Sedona, AZ to Flagstaff, AZ. The second portion consisted of linking Flagstaff, AZ to Williams, AZ. After both of these section reports were completed, a final Coconino report was completed providing map compositions, and a written recommendation.

Data Collection Ethics

Adam Smath was the researcher conducting the SCT Development practicum project. He is also be the cyclist who collected field data and compiled it into the GIS Story Map as a final product. He wrote up a brief personal disclaimer that will describe his prior outdoor/backcountry experiences, his personal and cycling background, and any additional biases to inform the Story Map audience. His fieldwork was accompanied by a range of field notes (Emerson, Fretz, and Shaw, 1995); these included but are not limited to personal aspects, such as energy levels, frustrations, health, and specific stressors as a way to engage in a reflexive practice and account or acknowledge bias when researching the routes. These fieldnotes were used to inform thorough route reports.

Sampling and Site Selection

Adam Smath sampled the routes. The SCTA identified several of the trails and roads that Adam Smath collected data for, but he had the authority to add trails and roads to the study. This was done when he encountered appropriate potential—but yet-unidentified—routes in the SCTA's desired direction. Adam Smath also had the authority to omit specific trails or roads that he either could not physically or safely navigate (e.g., roads that were closed by the Forest Service, trails that he could not follow due to lack of a discernable direction). Adam Smath presented these roads and routes to the SCTA for approval before omitting them from the study.

Training, Education and Personal Preparation Prior to Collecting Data

Researcher Smath was fully trained in the necessary software and other forms of data generation prior to participating in data collection. Many of these, such as the GIS aspects of the study, are part of the training received through the Master's in Applied Geospatial Sciences course progression; while others, such as generating and reporting field data, were prepared with the researcher's graduate advisor. The researcher rode multiple proposed sections to 'enter the field,' and develop some insider knowledge prior to data collection, as can be common in field research (Emerson, Fretz, and Shaw, 1995). No sections of routes were ridden for the data collection portion of the project without communicating with either the Recreation Program Manager for the Coconino County district in the United States Forest Service or the Director of Coconino County Parks and Recreation, who provided insight into specific area risks and considerations.

The researcher maintained necessary physical training and conditioning prior to and while conducting the field research to ensure he was competent on a gravel bike and able to ride 12 miles within 1 hour on a relatively flat gravel road. This was the baseline cycling competency while not generating data, as the process was seen to be invariably slow when the data collection protocol was employed.

Data Security

All GPS, fieldnote, and audiovisual data was stored on a password-protected laptop and backed up on a 500GB external hard drive. All progress report documentation and transcribed fieldnotes were backed up on a Northern Arizona University Graduate Student (Adam Smath's) password-protected Google Drive. The original fieldnote pad and the external 500GB hard drive

were stored in a locked safe that is fireproof. No raw, unanalyzed data was shared outside of the researcher and faculty advisor overseeing the project. The only exception was if the researcher documented any possible criminal activity that needed to be provided to local police, the USFS, or game wardens (if this occurred, the SCTA and the faculty advisor were contacted). All results shared with the SCTA were anonymized and attended to for ethical representation. Results will become publically available only with the SCTA approving its release. As this study did not involve human subjects at any juncture, IRB approval was not required.

The Research Data

The logistical aspects of data collection are as follows. In collaboration with members of the SCTA, Coconino County Parks and Recreation, and the Coconino District of the US Forest Service, a network of potential routes were identified. Each route was tested for feasibility, accuracy, and the needs of the SCTA. Data collection was the means by which the two sections—Sedona to Flagstaff and Flagstaff to Williams, Arizona—were assessed. All data was collected by a single researcher to maintain consistency, and the researcher rode a route-appropriate 'Gravel Mountain Bike' on identified routes while deliberatively and systematically collecting data regarding these routes with a GPS unit, a digital camera, and a field-note pad and pencil.

The resultant data was necessarily both qualitative and quantitative in nature. And, there was static (e.g. field note text and photographs) and sometimes dynamic (e.g. videos) elements of the data included in the route recommendation reports.

This section is arranged as follows: first, I elaborate on the GPS data collected for this project. Second, I elaborate on how field notes will be employed to generate qualitative data. Third, I elaborate how on qualitative audiovisual data will be collected. After describing these three primary data sets, I describe how I attended to the reliability and validity concerns with each; describe how I analyzed each data set; and finally, explain how these data were reported on. This section concludes with the project timeline.

Quantitative Data

GPS Data. A GPS or Global Positioning System provides a user with positioning, navigation, and timing services (GPS.gov, 2020). A handheld GPS unit collects spatial data using satellites to determine its location. The device also stores a record of where and when it has

been in different places. Global Positioning Devices have been used for a variety of research projects due to their ease of use and accuracy when spatial data collection is necessary. This data is quantitative in nature; that is, data is collected, treated, and represented numerically. A GPS was used for this project through an application downloaded on a cellular device (IPhone 6). The Strava App was used to collect GPS data using the cellular device's internal GPS function. A more sophisticated GPS was not be needed, because the data collection was not need to be more precise than the cellular device can offer and because all data being used to create digitization for map compositions was cross-referenced with existing USFS data. The data collected is presented below. Much of the data allowed the field researcher to use the Selection and Exclusion Criterial (see appendix A) to determine whether routes were feasible or not.

The location data collected to provide accuracy was comparing the actual locations of the forest roads and trails tested to that provided by an Arc GIS map layer titled "USDA Forest Service, Southwestern Region "MVUM Roads" (USDA Forest Service, 2020). This layer provided the most recently digitized and surveyed locations of the forest roads in Arizona at the time of analysis. This layer helped the field researcher ensure that he had tested the proper routes, and allowed the researcher to make any necessary adjustments to the current locations of the roads while in the field for later map compositions.

Data Type	**Quantitative Data**	**How it is Measured**
GPS Data	Route Distance	Measured in Total Miles
	Average Moving Speed	Measured in Miles per Hour (MPH)
	Elevation Gain/Loss	Measured in Vertical Feet
	Accuracy	Compared to USFS Motor Vehicle Use Map for GIS Mapping

Qualitative Data

Fieldnotes. Fieldnotes were used to collect direct observations as well as describe the experience that the cyclist had riding each route. These notes followed the method explanation of Emerson, Fretz, and Shaw (1995), though with translations for the unique research format, as is common in any field research. As example, the researcher generated jottings while riding trails, and later expanded into fieldnotes; these jottings and expanded fieldnotes captured a range of topics, such as and including any issues that the researcher encountered or experiences in riding the route, or noting salient route details. These notes captured aspects of the routes that fell

outside the boundaries of data collectable through Strava, and also expanded on to tell the story of how the researcher experienced the terrain and the environment in an accessible narrative format.

These fieldnotes supplemented and expanded on GPS and visual data. Some were used to suggest omitting routes that had been initially chosen for research and/or additional routes that should be researched. The researcher aimed to focus on the following topics within his fieldnotes. Some route tests did not directly address certain components described below due to a lack of need to state their omittance.

Data Type	Qualitative Data	What is the Focus
Field Notes	Describe the Experience/Narrative	Broad narrative and discussion about what went well and what didn't along with level of physical demand and other notable aspects of the route; e.g., viewpoints and services
	Document route users	Perceived level of traffic, existence of other outdoor recreationalists, and amount of primitive camping/'boon docking'
	Document Perceived route maintenance level	To allow the field researcher to compare the experienced route maintenance level with the last known USFS operational maintenance level
	Navigational Ease / Observed Signage	To document the existence/lack of signage, if the field researcher struggled to follow the route or got lost
	Route Obstructions, Washouts, Damage	To document the existence of fallen trees, washouts, route redirections, significant damage requiring the field researcher to dismount the bicycle

Photographs. Photographs were taken and included in the route recommendation reports. These are static data to help with meaning making. Typically, the photo's location accompanied it in the route recommendation report. Many photos were taken to provide marketing material to the SCTA and they may have had no direct research component; however, photographs also functioned as data, such as to highlight aspects of a route that were best represented visually, and photos were specifically taken to accompany fieldnotes when they expanded on the dataset; e.g., to document severe rutting or other trail obstructions.

Data Type	Qualitative Data	What is the Focus
Photos	Highlight areas that are or are not aesthetically pleasing	To document graffiti, garbage, mountain views, desert landscapes, wild animals, etc.
	Capture unique historical, cultural, or environmental features	To document historical placards/cabins, cultural areas, natural artifacts, etc.
	Highlight unique features as a means of triangulating with field notes	To document examples of route use, provide an experience, existing traffic levels, etc.
	Provide marketing material for the SCTA	No Research Focus

Videos. Videos were occasionally used as part of the fieldnote generation process. When cycling many miles, videos were used to speed up data collection. The researcher narrated to the camera while capturing evidence of a unique data point, rather than stopping to retrieve his fieldnote pad and jotting down similar data content. The videos were sometimes proved to be useful in providing a visual dataset of a unique navigable feature or other relevant aspects of the route selection process. The videos were not directly included within the report.

Data Type	Qualitative Data	What is the Focus
Videos	Provide an audio narrative	field researcher self-interviews
	Capture large and moving prospective of the route	animals, visitors, weather, etc.
	Capture evidence of route traffic	route business, types of trail uses being experienced

Reliability and Validity

Data was collected using methods that are both reliable and valid using vetted technologies and data collection techniques, and the systematic combination of methods and triangulation of results to build a story for SCTA to interpret. The data allowed for meaning making from the stakeholders. GPS and audiovisual data was be captured using validated software that provided reliable mapping and audiovisual material. All GPS data was collected through Strava, a popular and validated cycling map software. All digital videos and photos were taken on the same Olympus Tough TG-5 4K digital camera. In the occasional event that the

camera battery died, an IPhone 6 camera was present as a redundant tool to capture images and videos. All routes were cycled on the same bike—a 2020 Trek Checkpoint AL3 with a 58cm frame, with the same tires and tire pressure—tubeless 700x38C Maxxis Rambler Tires inflated to ~45 psi front and ~55 psi rear. All field notes were generated and analyzed with the best practices articulated by Emerson, Fretz, and Shaw (1995), which is a widely-used and heavily-cited text on jottings and fieldnotes in research settings.

Analyses of Data

Methods of Analysis. GPS Data was downloaded from Strava as .GPX files. These GPX files were imported into ArcGIS to allow the researcher to confirm that the correct routes were tested. The GPS data also allowed the researcher to digitize sections of USFS roads. The researcher cross referenced GPS data with the USDA Forest Service Southwestern Region layer map provided by the USFS to digitize forest roads and provided additional metadata about the roads (e.g., traffic flow and road operational maintenance levels).

The fieldnotes were used in conjunction with the SCTA Selection and Exclusion Criterial (see appendix A) approved by the SCTA. Fieldnote descriptions were used to determine if routes met selection criteria, and thus identify whether or not routes were viable for inclusion in the final SCT Route.

The audiovisual material supplemented the field notes and also aided in meaning making within the Route Recommendation Reports. Photos of particularly high impact or problematic sections of routes were included to help the SCTA understand why certain recommendations were made. Photos of particularly suitable routes were also included to visually attest to their feasibility. Videos were not directly used as part of the route recommendation reports, but were used to confirm the accuracy of some narratives provided.

The Route Recommendation Reports' data was analyzed with the SCTA's mission and vision in mind to recommend a singular, semi-linear route through the project region. Needs and desires of the SCTA helped in the redevelopment the Selection and Exclusion Criterial (see appendix A) and a detailed final report will be presented to the SCTA with the research findings in the months following the completion of the project. The SCTA will be able to make their own

decision on the trail's route after the findings, and the final recommendation report is presented to them.

Steps to Support Continued Efforts. These methods were flexible in scope and were adjusted as needed during the practicum and as the SCTA vision for the project evolved. The SCTA had input—but not control—on how research was conducted to meet their needs and was communicated with during the process. Intermittent meetings took place with the SCTA to allow the researcher to communicate findings and provide progress reports.

Results Format

Two section route section recommendation reports and a combinative final route recommendation report were created to represent the results of the project. A GIS Story Map was created to present data and narrative together in a visual format. Arc GIS map compositions accompanied the GIS Story Maps and the recommendation reports. The map compositions presented the digitized forest roads and trails as color coordinated, based off of the determined USFS Operational Maintenance Levels from the June 2012 USDA Forest Service 7700-Transportation Management document. This allowed for the maps to show all tested routes which provided additional context for stakeholders. The combination of these documents accompanied a final route recommendation for the Coconino portion of the SCT. At the completion of the project a detailed, 45 minute presentation of the final Coconino Route Recommendation Report (Written Report & GIS Map Compositions) was presented to the graduate committee and the public. This presentation concluded with a formal recommendation for the trail's route based on articulated needs and desires. An additional 30 minute presentation will be delivered to the SCTA and accompanying stakeholders in the months to come after the project is completed.

Scope

The project focused on the Coconino section of the SCT in Arizona. The Coconino National Forest and Coconino County combined make up the Coconino section which this project is focused. This practicum project can later be an asset for the entire SCTA, but the focus was working with the Coconino County Parks and Recreation Department and the United States

Forest Service within the Coconino National Forest to develop this portion. The researcher's knowledge of the area's forest roads, trail networks, and local outdoor recreationalist preferences and concerns helped to inform the research.

Results

Data Analysis

Once all field testing of potential routes had been completed by the field researcher the data was organized and then analyzed. As described in the Methods section, the resultant data is made up of both qualitative and quantitative elements. Ultimately all data was assessed in order to determine what routes best meet the SCTA's desires by using the SCTA: Selection and Exclusion Criteria [See Appendix A].

Field notes were assessed to determine if any particular exclusion criteria had been met. Original GPS data including location, slope, speed, and elevation was assessed within Strava, the web application used in the field to collect and save the GPS data. This data was assessed to determine if particular routes had met any exclusion criteria stated within the SCTA: Selection and Exclusion Criteria [See Appendix A]. Any routes of significance receiving consideration were described in the Sedona to Flagstaff Route Recommendation Report or the Williams to Flagstaff Route Recommendation Report along with detailed description of any specific selection or exclusion criteria that may have been noteworthy.

GPS data was downloaded and converted to GPX files. The GPX files were saved to a computer and backed up to an external hardrive. The GPX files were added to a GIS Arc Map using the GPX to Features script tool. Once added each individual road, trail, or route was digitized using the Create Features function. Each route was digitized off of the original GPS breadcrumb location data. On a few occasions the field researcher retested short segments of routes to ensure accuracy after the initial field testing had completed.

The routes were digitized as accurately as possible and each route was cross-referenced during digitization with a variety of information. The most up to date United States Forest Service regional Motor Vehicle Use Map GIS layer package, pictures collected in the field, field notes, and on occasion Google Maps and/or CalTopo were used to ensure accuracy during digitization.

Each digitized route was recorded in the feature's Arc Map attribute table along with the Route ID (USFS forest road identification number), the route name (such as road names or route names) if applicable, the shape length, and the USFS Operational Maintenance Level that was

observed and experienced by the field researcher using the USFS Operational Maintenance Levels from the June 2012 USDA Forest Service 7700-Transportation Management document.

A final Arc Map and a variety of map compositions were created to show all field tested routes. Each tested route was delineated by color to illustrate the USFS Operational Maintenance Level observed and experienced by the field researcher. A map key provided information as to what each route color represents and a majority of the routes were labeled with their Object ID or USFS road ID number (short routes were not labeled to make the maps simple to read).

Additional maps of the Coconino National Forest area, the Sedona to Flagstaff area, and the Williams to Flagstaff area were created with the final route recommendations provided to illustrate the recommended routes.

Selection and Exclusion Criteria

As this practicum project was beginning to take shape it became obvious that some sort of framework for including and excluding tested routes would be needed. The framework needed to be based off of the needs and desires expressed by the SCTA. I attended SCTA stakeholder meetings and the Summit for Arizona Trails in February of 2019 where I listened to key SCTA stakeholders describe their visions for the trail. Notes from these meetings were compiled and used to develop the SCTA: Selection and Exclusion Criteria [see Appendix A]. The SCTA: Selection and Exclusion Criteria was used to contextualize data from field testing to aid in the construction of route recommendations. The SCTA: Selection and Exclusion Criteria provides specific 'critical failures' which helped to eliminate tested routes that were seen to not fit within the vision of the SCTA. The SCTA: Selection and Exclusion Criteria was used to inform and develop the route recommendations.

Route Recommendation Reports

Two Route Recommendation Reports were written upon the conclusion of field testing after all data was collected and preliminary maps had been created. These reports were relatively dense and provided detail about specific roads and trails to provide a basis for route recommendations. The reports described all tested routes that were deemed potentially feasible for gravel biking between the two terminuses in either sections. These reports also highlighted critical data that led to the provided recommendations using the 'SCTA: Selection and Exclusion

Criteria' [See Appendix A]. The route recommendation reports can be found in the appendices. The following is a summarization of the recommendations provided for the Sedona to Flagstaff and Flagstaff to Williams sections. Ultimately, only one set of forest roads and trails could be recommended to route the SCT through each section.

Field Testing

Field testing began on November 9th 2019 and was completed (including secondary testing) on March 7th of 2021. Strategies to improve testing efficiency and data quality were developed throughout the process by the field researcher. The field researcher took 2,150 digital photographs while field testing routes. Key photographs were included within the route recommendation reports. The field researcher and the project graduate committee members were aware prior to field testing commencing that regional seasonality, weather, and terrain would impact field testing and at times slow data collection. 363.76 miles of trails and forest roads were ridden by the field researcher on a route specific gravel bike while completing field testing for this project.

Map of All Tested Routes in Both Sections

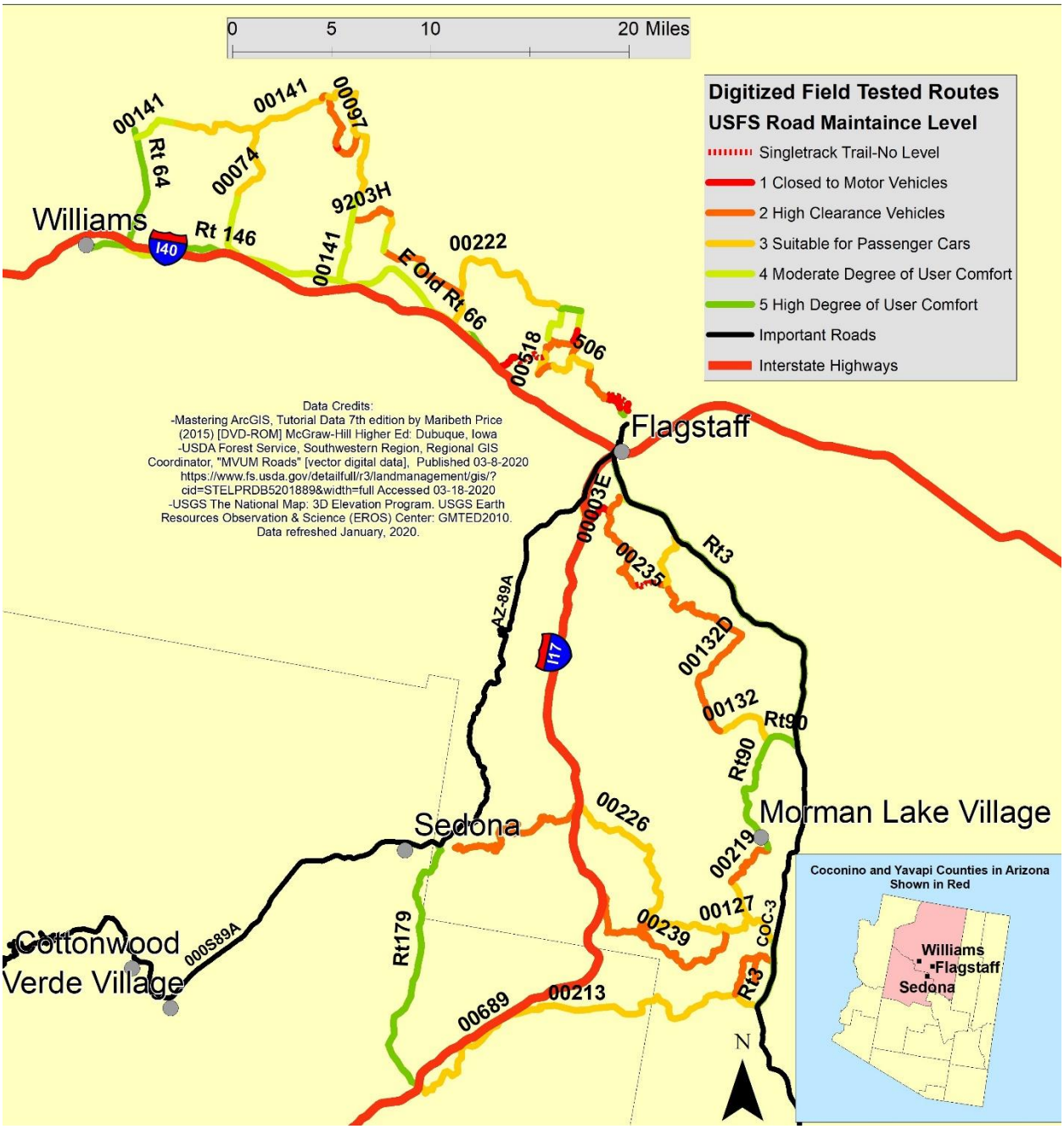


Figure 1: All tested routes between Sedona, Flagstaff, and Williams, Arizona. Route color illustrates the USFS maintenance level observed by the field researcher at the time of testing.

Sedona to Flagstaff Section

This section is topographically challenging to navigate due to the Mogollon Rim which bisects this section horizontally. The rim creates a drastic change in elevation- in some steep sections the rim climbs over 1,300ft in less than a half mile. The rim separates the Sedona red rock desert from Flagstaff's Ponderosa forests up on the Colorado Plateau. This section of the SCT is extremely biodiverse, experiences locally varying weather, and provides excellent opportunities for outdoor recreation. Though this section is very visually appealing, the varied terrain can make it treacherous to navigate.

There are only two efficient routes to connect Sedona to Flagstaff, primarily due to the steep walls of the Mogollon Rim. Interstate 17 connects the southern portion of Sedona—called the Village of Oak Creek—to Flagstaff, and State Route 89A winds its way down the Mogollon Rim into Oak Creek Canyon via tight switchbacks to connect the northeastern portion of Sedona to Flagstaff. Both these routes, though feasible for cars, are dangerous to walk or bike alongside because of the high speeds of vehicles and/or the lack of a sufficiently usable road shoulder. Trail systems navigating the Mogollon Rim between Flagstaff and Sedona utilize Federally-recognized Wilderness Areas, and are thus inaccessible to bicycles (USDA, 2021); because of these hurdles, it became necessary to identify a route from Flagstaff east-southeast to Mormon Lake Village, and then traverse west to Sedona.

Considered Routes

Two possible routes were deemed reasonable for consideration via field testing to connect Sedona to Mormon Lake Village, and two routes were deemed reasonable for consideration between Mormon Lake Village and Flagstaff. Both of the two routes from Sedona to Mormon Lake Village utilize the same collection of forest roads near Mormon Lake village to reach the town and these will be described separately as route #3. Each collection of primary routes will be presented, any SCTA: Selection/Exclusion Criteria will be listed, and a decision as to include or exclude in the SCT will be stated.

The primary routes from Sedona to Mormon Lake Village:

- Route #1: Schnebly Hill road (Forest Road 153)

- Route #2: Blue Grade road (Forest Road 689) to Stoneman Lake road (Forest Road 213)
    - Route #3: Forest Road 91 to Forest Road 219 to Mormon Lake Village

      -Both options in this section use the forest roads in Route #3 to reach Mormon Lake Village

      -Route #3 will be incorporated regardless of whether Route #1 or Route #2 are chosen.

The primary routes from Mormon Lake Village to Flagstaff:

- Route #4: Lake Mary Road [State Route 3]
- Route #5: Forest Road 132 and Forest Road 132D and Priest Draw Trail

Route Options

- ***Route #1: Schnebly Hill road (Forest Road 153)***

Description

This route option primarily utilized Schnebly Hill Road (forest road 153) to achieve the Mogollon Rim. Schnebly Hill Road is a regionally notorious road for off highway vehicle use or off-roading. The road provides access to hiking, mountain biking, climbing, and off-roading and the road and areas nearby were seen to be busy with these activities when the road was field tested. The road provides a unique vantage point down towards Sedona to the southwest. This route steeply climbs and traverses the Mogollon Rim until reaching Interstate 17 in about 12.5 miles. After crossing under I-17 this option follows forest road 226 for about 10 miles and then forest road 127 for about 7 miles before reaching the start of Route #3 which is used by both options in this section to complete the last 7 mile segment to reach Mormon Lake Village. Both forest road 226 and forest road 127 are mellow in comparison to the experience biking up Schnebly Hill Road.

Selection/Exclusion Criteria Met

Bike-ability and Seasonality were both concerns created by the field researcher's experience on these collection of forest roads. The field researcher was required to dismount from his bicycle more than twice along Schnebly Hill Road which is outlined as a critical failure

within the SCTA: Selection/Exclusion Criteria. Seasonality is also a concern as the conditions experienced by the field researcher along Schnebly Hill Road during March and April of 2020 were subpar; mud and snow covered significant portions of the road making the route difficult to bike on. Additionally, safety is a concern because the field researcher recorded encountering a large road washout and multiple rockslides along Schnebly Hill Road.

Include or Exclude in SCT

This route meets multiple exclusion criteria and should not be incorporated within the SCT route.

Route #2: Blue Grade road (Forest Road 689) to Stoneman Lake road (Forest Road 213)

Description

This route archives the Mogollon Rim less aggressively by venturing down route 179 to Blue Grade road, where the Mogollon Rim is less steep. The route provides impressive views of some of the most iconic red rocks of Sedona before crossing underneath I-17. A majority of route 179 provides a large bike lane. After I-17, Route 179 ends at a dirt road, which is forest road 618. This is travelled along for roughly ½ mile before the route turns left and climbs Blue Grade road (forest road 689). After gaining the top of Blue Grade road the route takes a right on to Stoneman Lake road (forest road 213). Stoneman Lake road is paved for about 5.5 miles before it reverts to a dirt surface at a three way intersection where Stoneman Lake road continues to the left and is followed. The road navigates around Stoneman Lake while continuing to climb before intersecting with Lake Mary road (state route 3) after about 8 miles. At this point this route turns left onto Lake Mary road and travels along a bike lane for 3.5 miles before forest road 91 appears on the left. At this point this route ends where it meets Route #3 which brings the trail user the rest of the way to Mormon Lake Village.

Selection/Exclusion Criteria Met

No exclusion criteria were met. It is noteworthy that 5.2 miles along route 179 does not have a bike lane. The SCTA could consider working with the Arizona Department of Transportation to see if a bike lane could be implemented along that section to make the route safer and more enjoyable to bike along.

Include or Exclude in SCT

This route should be incorporated within the SCT.

Route #3: Forest Road 91 to Forest Road 219 to Mormon Lake Village

Both Route #1 and Route #2 end at this route and will use the forest roads in this route to reach Mormon Lake Village. This route option is included simply to add clarity rather than including it within both route #1 and Route #2 and repeating all the information.

Description

This route connects both Route #1 and Route #2 to Mormon Lake Village from forest road 91. The route begins by following forest road 91 northwest for roughly 2 miles. Forest road 91 travels along the eastern edge of Broiler Park which is an old homestead and farm that is now a historic heritage site managed by the USFS. The route then turns right onto forest road 219. Forest road 219 climbs up an unnamed hillside and then crisscrosses the Arizona Trail a few times before cutting north and descending down a steep hillside to the southwestern of Mormon Lake Village. At the end of forest road 219 the route turns left onto Mormon Lake road (route 90) and follows this for about a mile before reaching the center of Mormon Lake Village.

Selection/Exclusion Criteria Met

No exclusion criteria were met.

Include or Exclude in SCT

This route should be incorporated within the SCT.

Route #4: Lake Mary Road [State Route 3]

Description

This route begins at Mormon Lake Village and ends at the intersection of Lake Mary Road and J.W Powell Road at the Flagstaff Urban Trail System [FUTS] which provides a multitude of routes to reach the center of Flagstaff. The route begins by traveling north on Mormon Lake Road (route 90). Mormon Lake Road is a paved lightly trafficked road with wide bike lanes on either side that connects Mormon Lake Village to Lake Mary Road. The road provides great views of the large grasslands surrounding Mormon Lake. The route follows

Mormon Lake Road for about 7.5 miles before intersecting with Lake Mary Road. At this point the route turns left onto Lake Mary Road. Lake Mary Road passes upper and lower Lake Mary to their west and provides great views of the open grassland areas around the lakes and the San Francisco Peaks to the north. The road provides a bike lane and has relatively heavy traffic at times, especially on weekends and holidays. The route remains on Lake Mary Road for roughly 18 miles until reaching J.W Powell Road and the FUTS.

Selection/Exclusion Criteria Met

No exclusion criteria were met.

Include or Exclude in SCT

This route should not be incorporated within the SCT. Though this route does not meet any exclusion criteria it doesn't meet the vision of the SCTA as well as Route #5.

Route #5: Forest Road 132 and Forest Road 132D

Description

This route begins at Mormon Lake Village and ends at the intersection of Lake Mary Road and J.W Powell Road at the Flagstaff Urban Trail System [FUTS], which provides a multitude of routes to reach the center of Flagstaff. The route begins by traveling north on Mormon Lake Road (route 90) similarly to Route #4. The route follows Mormon Lake Road for about 6 miles before turning left onto forest road 132. Forest road 132 is a gravel road that is traveled on for about 4 miles. At this point the route turns to the right onto forest road 132D. Forest road 132D is a bit rougher than forest road 132, likely due to recent fire damage, but it was sufficient for gravel biking. After 12.5 miles on forest road 132D, the road signage indicates the road reverts to forest road 132 again. Forest road 132 is continued along for roughly 1,700 feet until reaching an intersection with forest road 235. The route turns left onto forest road 235, and terminates after a few hundred feet at the Priest Draw Trailhead. The Priest Draw Trail is a short single track trail that is feasible for gravel cycling and provides access to popular bouldering areas. The route follows along the Priest Draw Trail for about 1.6 miles before reaching another trailhead and rejoining forest road 235. Immediately after rejoining forest road 235 the forest road turns right and climbs a gradual hill.

From here a series of relatively short forest roads are utilized to reach the outskirts of Flagstaff, AZ. After about 1 mile on forest road 235 the route takes a right onto forest road 762B and follows this road for roughly 1/3 of a mile before turning left onto forest road 762D. Forest road 762D climbs up a hillside for about a half mile before reaching a three-way intersection. The route takes a left at the intersection to follow forest road 762 for about a half mile traveling through a small prairie. At this point the route turns right onto forest road 3E. Forest road 3E climbs another small hill and is traveled along for about 3.5 miles before it reaches Frontier Road near the Flagstaff Airport. The route turns right onto Frontier road and takes this road for a half mile before ending at Lake Mary Road. From here the route turns left onto Lake Mary road and travels about 1 mile along it before reaching the end at the intersection of Lake Mary Road and J.W Powell Road near the FUTS.

Selection/Exclusion Criteria Met

No exclusion criteria were met.

Include or Exclude in SCT

This route should be incorporated within the SCT.

Sedona to Flagstaff Route Recommendation

It is recommended that the SCTA incorporate Route #2, Route #3, and Route #5 to create a single, semi-linear route for the SCT from Sedona to Flagstaff, Arizona.

The trail will begin at the intersection of route 89A and route 179 in Sedona by traveling east on Route 179. The trail follows along the side of Route 179 on a bike lane while providing spectacular views of the Sedona red rocks. After roughly 8 miles, route 179 reaches the Village of Oak Creek—a relatively small residential community with restaurants and commercial buildings at its center. From the Village of Oak Creek, the trail continues along the bike lane following route 179 for about 1.5 miles. At this point the trail passes the United States Forest Service Red Rock District Visitor Center. The bike lane ends here and the trail continues along route 179, heading south for 5.2 miles. Route 179 travels beneath I-17 before it ends at forest road 618. The trail leaves the paved surface of route 179 and begins down forest road 618 for ½ of a mile. After this ½ mile of forest road 618, a four way intersection is met where forest road

618 continues straight, forest road 689 is on the left and forest road 119 is on the right. The trail turns left onto Blue Grade road (also called forest road 689). Though the SCT doesn't travel to it, if one were to continue down forest road 618 they would reach Wet Beaver Creek—a high impact day-use site that provides swimming opportunities and a small picnic area.

The trail turns left onto Blue Grade road opposed to continuing down forest road 618 to Wet Beaver Creek, and after about 1 mile a cattle gate is reached. This gate is not locked, but must be closed by those passing through to ensure that cattle do not get out. Blue Grade Road continues past the gate, ascending the Mogollon Rim while following a tributary of Wet Beaver Creek. Blue Grade road continues after the cattle gate for about 7.5 miles before reaching Stoneman Lake road also called forest road forest road 213. The route turns right on to Stoneman Lake Road, which has a paved surface and little vehicle traffic. The route meanders northeast on Stoneman Lake Road for about 5.5 miles before the pavement ends at a three way intersection. Stoneman Lake Road continues to the left where forest road 229 begins to the right. The trail turns left to remain on Stoneman Lake Road, giving the rider spectacular views to the south. After 2.5 miles, Stoneman Lake road reaches the Stoneman Lake Overlook on the left where a small picnic area with a pit toilet and views down to Stoneman Lake and Stoneman Lake Village greet riders. The trail continues up Stoneman Lake Road, continuing to achieve the Mogollon Rim for another 6 miles before Stoneman Lake Road ends. Stoneman Lake road ends by intersecting with Lake Mary Road.

The trail then turns left on Lake Mary Road and takes the wide bike lane, heading north for 3.5 miles. At this point the route turns left onto forest road 91. Forest road 91 is a relatively well maintained and flat forest road which it traveled along for 4.5 mile. The latter part of this 4.5 miles travels along the eastern edge of Broiler Park which is an old homestead and farm that is now a historic heritage site managed by the USFS. The route then turns right onto forest road 219. Forest road 219 climbs up an unnamed hillside and then crisscrosses the Arizona Trail a few times before cutting north and descending down a steep hillside to the southwestern of Mormon Lake Village. At the end of forest road 219 the route turns left onto Mormon Lake road (route 90) and follows this for about a mile before reaching the center of Mormon Lake Village.

Mormon Lake Village is a rough midpoint between Sedona and Flagstaff and can be utilized as a stopping point. The Mormon Lake Lodge has cabins that can be rented for a night stay and there is a steak house and pizza place.

The route follows Mormon Lake Road for about 6 miles before turning left onto forest road 132. Forest road 132 is a gravel road that is traveled on for about 4 miles. At this point the route turns to the right onto forest road 132D. Forest road 132D is a bit rougher than forest road 132 likely due to recent fire damage, but it was sufficient for gravel biking. After 12.5 mile on forest road 132D the road signage indicated that the road reverts to become forest road 132 again. Forest road 132 is continued along for roughly 1,700 feet until reaching an intersection with forest road 235. The route turns left onto forest road 235 which appears to terminate after a few hundred feet at the Priest Draw Trailhead. The Priest Draw Trail is a short single track trail that is feasible for gravel cycling and provides access to popular bouldering areas. The route follows along the Priest Draw Trail for about 1.6 miles before reaching another trailhead and rejoining forest road 235. Immediately after rejoining forest road 235 the forest road turns right and climbs a gradual hill. Forest Road 235 travels just outside of Mountainaire providing occasional glimpses homes and cabins on the forest's edge.

From here a series of relatively short forest roads are utilized to reach the outskirts of Flagstaff, AZ. After about 1 mile on forest road 235 the route takes a right onto forest road 762B which the route follows for roughly 1/3 of a mile before turning left onto forest road 762D. Forest road 762D climbs up a hillside for about a half mile before reaching a three way intersection. The route takes a left at the intersection to follow forest road 762 for about a half mile traveling through a small prairie. At this point the route turns right onto forest road 3E. Forest road 3E is climbs another small hill and is traveled along for about 3.5 miles before it reaches Frontier Road near the Flagstaff Airport. The route turns right onto Frontier road which is followed of a half mile before ending at Lake Mary Road. From here the route turns left onto Lake Mary road and travels about 1 mile along it before reaching the end at the intersection of Lake Mary Road and J.W Powell Road near the FUTS. [see Figure 3]

Compared with the alternatives tested, such as navigating the Mogollon Rim on Schnebly Hill Road, this option is significantly more feasible and offers a wider season for gravel cyclists and credit card tourists to travel between Sedona and Flagstaff, Arizona.

Map of All Tested Routes in the Section

Figure 2: All tested routes between Sedona and Flagstaff, Arizona. Route color illustrates the USFS maintenance level observed by the field researcher at the time of testing.

Map of Recommended Route

Figure 3: Route Recommendation between Sedona and Flagstaff, Arizona. The Route Recommendation is marked by the red dotted line.

Flagstaff to Williams Section

This section navigates interesting terrain with considerably easier topography and less physically challenging cycling compared to the Sedona to Flagstaff section. This section of the SCT experiences locally varying weather that is subject to significant seasonal differences, and provides excellent opportunities for additional outdoor recreational pursuits. This section is also very visually appealing thanks to the prominent San Francisco Peaks to the north. The San Francisco Peaks include Humphreys Peak; at 12,633 feet it is the highest point in Arizona.

There is only one particularly efficient route to connect Flagstaff to Williams. Interstate 40 travels east and west between the two in a relatively straight line. Though Interstate 40 is feasible for cars and is occasionally used by expedition-style bike tourists, it is considered dangerous to walk or bike alongside because of the heavy traffic and the high speed limit. Short sections of various roads travel directly alongside parts of Interstate 40 and these are potentially feasible traveling via a gravel bike, but these frontage roads often abruptly dead-end or end by re-entering the Interstate. Thus, it is important to link roads and trails between these two communities.

Shortly after field testing in this area commenced, the field researcher became aware that the abundance of forest roads and trails allowed for many different potential routes to be considered and explored. Many of these possible routes where isolated and required covering large amounts of mileage to connect Flagstaff to Williams. It also quickly became apparent that weather in this part of Northern Arizona in particular changes fast and isolated open areas provide little to no protection from the elements. Because of this the field researcher chose to make Parks, AZ a midpoint for testing. The inclusion of Parks helped to ensure that possible routes were not too isolated and that there was at least one place between Flagstaff and Williams where a gas station could be utilized to shelter from adverse weather events.

Considered Routes

The primary routes from Flagstaff to Parks, Arizona:

- Route 1#: Mars Hill Trail to Forest Road 901K to Forest Road 222 to Forest Road 171 to Old Route 66 (only route in this subsection being considered)

The primary routes from Parks, Arizona to Williams, AZ:

- Route #2: Spring Valley Road (Forest Road 141) to Route 64
- Route #3: Spring Valley Road (Forest Road 141) to 74 to Deer Farm Road (Route 146) to Bearizona Boulevard
- Route #4: Old Route 66 to Deer Farm Road (Route 146) to Bearizona Boulevard

Route 1#: Mars Hill Trail to Forest Road 901K to Forest Road 222 to Forest Road 171 to Old Route 66

Description

This was the only route in this subsection between Flagstaff and Parks, AZ that was tested and found to be potentially feasible. This route begins at Thorpe Park near Flagstaff's historic down town. The route utilizes part of the FUTS to climb Observatory Mesa where the famous Lowell Observatory is located. Once achieving the mesa a series of forest roads are followed to reach forest road 901K which is routed alongside a buried gas pipeline. The route along the pipeline provides pretty views of the San Francisco Peaks and the smaller mountains towards Williams in the distance. The route then enters a small rural area called Baderville which is located near the base of Snowbowl Road along route 180. The route travels through Baderville on a collection of short paved streets before it joins route 180 heading west for a short stretch before reaching forest road 222 on the left. Forest road 222 I traveled along for roughly 6 miles before connecting with and following forest road 171 to its southern terminus near Bellemont. Bellemont is another rather small rural community and it is located directly on the northern side of Interstate 40. From here the route travels northwest on Old Route 66 for about 6.5 miles until reaching Parks, AZ.

Selection/Exclusion Criteria Met

No exclusion criteria were met.

Include or Exclude in SCT

This route should be incorporated within the SCT.

Route #2: Spring Valley Road (Forest Road 141) to Route 64

Description

This route begins in the Center of Parks, AZ and ends in the center of Williams, AZ. This route begins near at the Parks Deli at the intersection of Old Route 66 and Spring Valley Road (forest road 141). The route starts by leaving Old Route 66 and traveling north on Spring Valley Road. Spring Valley Road travels north through a collection of small rural communities before reaching and traveling along the western side Government Prairie. Government Prairie provides impressive views of the San Francisco Peaks in the distance to the east. After Government Prairie the road becomes and dirt surface and it reaches Spring Valley. The road continues passing by occasional ranches and providing views of Kendrick Mountain before reaching a three way intersection where Spring Valley road turns left and forest road 144 continues straight to the north. The route takes a left to stay on Spring Valley Road. The road passes through Red Lake Valley before the road turns back into a paved surface and climbing up to route 64. From here the route turns left onto route 64 and travels on a narrow bike lane along route 64 for roughly 5.5 miles before crossing underneath Interstate 40 and continuing another 2 miles and then reaching the center of Williams, AZ.

Selection/Exclusion Criteria Met

This route measures roughly 59.2 miles in length which exceeds the 55 mile maximum section length which is an explicit exclusion criteria stated within the SCTA: Selection and Exclusion Criteria. Additionally the 5.5 mile stretch of route 64 between Spring Valley Road and Interstate 40 was less than ideal for safe travel due to the busy traffic experienced along the road and the 65 mph speed limit. This route also didn't limit exposure to the elements and/or weather and provided prolonged exposure in Government Prairie and near Red Lake Valley.

Include or Exclude in SCT

This route should not be incorporated within the SCT.

Route #3: Spring Valley Road (Forest Road 141) to 74 to Deer Farm Road (Route 146) to Bearizona Boulevard

Description

This route begins by following the exact same collection of roads as Route #2 before venturing onto a different collection of roads. The same description as Route #2 will be provided until this route turns onto forest road 74.

This route begins in the Center of Parks, AZ and ends in the center of Williams, AZ. This route begins near at the Parks Deli at the intersection of Old Route 66 and Spring Valley Road (forest road 141). The route starts by leaving Old Route 66 and traveling north on Spring Valley Road. Spring Valley Road travels north through a collection of small rural communities before reaching and traveling along the western side Government Prairie. Government Prairie provides impressive views of the San Francisco Peaks in the distance to the east. After Government Prairie the road becomes and dirt surface and it reaches Spring Valley. The road continues passing by occasional ranches and providing views of Kendrick Mountain before reaching a three way intersection where Spring Valley road turns left and forest road 144 continues straight to the north. The route takes a left to stay on Spring Valley Road. 6 miles after passing the turn for forest road 144 the route reaches forest road 74 which is on the left at a three way intersection.

At this point this route separates from Route #2. The route takes forest road 74 which gradually descends for the next 4 miles passing a sandpit and then reaching the Elpaso Natural Gas Williams Station. From here forest road 74 becomes paved and travels through Pitman Valley and passing the USFS Pitman Valley Helicopter Base. The route then reaches Old Route 66, Deer Farm Road (also called route 146) and interstate 40 at milepost 171.

From here this route takes the same collection of roads as Route #4 (which is later described in this document) to reach Williams. The route travels along Deer Farm road passing an active Deer Farm open to the public and then a KOA campground before crossing over Interstate 40. Immediately after passing over Interstate 40 the route reached a four way intersection with no signage. The route turns right onto a road called Bearizona Boulevard (also sometimes referred to as Route 51A). After roughly 1.7 miles the route passes the Bearizona wildlife and safari park before reaching Route 64. Here the route turns left onto route 64 and travels along the roads shoulder for 2.3 miles before reaching the center of Williams, AZ.

Selection/Exclusion Criteria Met

This route measures roughly 60.2 miles in length which exceeds the 55 mile maximum section length which is an explicit exclusion criteria stated within the SCTA: Selection and Exclusion Criteria. This route also didn't limit exposure to the elements and/or weather and provided prolonged exposure to weather in Government Prairie.

Include or Exclude in SCT

This route should not be incorporated within the SCT.

Route #4: Old Route 66 to Deer Farm Road (Route 146) to Bearizona Boulevard

Description

This route begins in the Center of Parks, AZ and ends in the center of Williams, AZ. This route also begins near at the Parks Deli at the intersection of Old Route 66 and Spring Valley Road (forest road 141). This route closely parallels Interstate 40 which is preferable for access and safety. The route begins by travelling along the side of Old Route 66 heading west. After 3.5 miles the route passes by the Oakhill Snow Play Area which is a winter recreation site that provides picnic tables and short hiking trails. From here Old Route 66 passes through the southern edge of Pitman Valley and reaches a three way intersection with Deer Farm Road (also called route 146) and interstate 40 at milepost 171. From here this route takes the same collection of roads as Route #3 (which was previously described in this document) to reach Williams. That part of the route description will be reiterated here.

The route travels along Deer Farm road passing an active Deer Farm open to the public and then a KOA campground before crossing over Interstate 40. Immediately after passing over Interstate 40 the route reached a four way intersection with no signage. The route turns right onto a road called Bearizona Boulevard (also sometimes referred to as Route 51A). After roughly 1.7 miles the route passes the Bearizona wildlife and safari park before reaching Route 64. Here the route turns left onto route 64 and travels along the roads shoulder for 2.3 miles before reaching the center of Williams, AZ.

Selection/Exclusion Criteria Met

No exclusion criteria were met.

Include or Exclude in SCT

This route should not be incorporated within the SCT.

Flagstaff to Williams Route Recommendation

The recommended route for this section begins at Thorpe Park near Flagstaff's historic downtown. It begins by heading up the Thorpe Park Access Road for ½ a mile and then turns left onto the Mars Hill Trail. The Mars Hill Trail climbs for about 1.3 mile to the top of the Observatory Mesa and reaches an unlocked gate at an intersection with forest road 515. From here the trail turns right onto Forest Road 515 which is traveled along for about 1 mile before turning right into Forest Road 9113C. Forest Road 9113C gradually climbs over a rise and then reaches a three way intersection after ¾ of a mile. At this intersection the trail turns left onto Forest Road 506. Forest Road 506 is traveled along for 1 mile before the trail reaches another three way intersection. At this intersection signage indicates that Forest Road 506 continues left and 668D begins to the right. The SCT turns right onto 668D provides wonderful views of the San Francisco Peaks framed by the tall trees growing along the roadside. Forest Road 668D is traveled for ½ of a mile before reaching a four way intersection where a buried pipeline perpendicularly crosses Forest road 668D. Next the trail turns left onto Forest Road 9014K which parallels the buried gas pipeline. Forest Road 9014K is traveled for about ¾ of a mile before the road meets a fork. At this fork a road can be seen continuing straight beside the buried pipeline down a steep hill and another road veers left heading into the woods. Both roads at technically Forest Road 9014K, but the SCT route turns left and enters the woods on the less steep road. This road makes a wide switchback before reconnecting with the other route at the base of the hillside below. Thee tenths of a mile further down Forest Road 9014K the road ends at a locked gate with a 'no trespassing' sign. At this point the trail turns immediately to the right and reaches the rural area of Baderville and it follows a series of paved roads through a neighborhood. The area around Baderville provides amazing unobscured views of the San Francisco Peaks to the north which are a highlight of this section of the SCT.

Rudds Tank road is taken and then it veers right becoming N Chambers drive. N Chambers drive is followed for ¼ of a mile before the trail turns right onto W Suzette Lane. W

Suzette Lane is traveled along for about a half mile until the trail turns left onto N Bader road. N Bader road reaches a three way intersection with Route 180 after about .8 of a mile. Here the trail turns left onto Route 180. After traveling about 1,800 feet along the road shoulder of Route 180 the trail veers left onto Forest Road 222 directly after signage for the USFS Experiential Forest. Forest Road 222 is traveled along for roughly 6 miles providing occasional views towards Wing Mountain to the west and the San Francisco Peaks to the north where there are brakes in the trees until the road ends at an intersection with Forest Road 171. The trail turns left onto Forest Road 171 and stays on it until reaching Old Route 66 in about 3 miles.

Here the trail nears Bellemont which is a small community located directly on the northern side of Interstate 40. One can make a ½ mile excursion east on Old Route 66 to reach the center of Bellemont where food and water can be purchased from a gas station and shelter can be reached in the case of inclement weather.

From here the route travels northwest on Old Route 66 for about 6.5 miles until reaching Parks, AZ. Parks also has a small gas station that could be utilized for food and water and shelter could also be reached in the case of inclement weather. Shortly up Old Route 66 (1/2 mile) from there the trail passes the Old Route 66 Deli which is a great spot to stop for lunch along the route.

The trail then continues following Old Route 66 for roughly 5.5 miles traveling up and over Oak Hill before crossing through the southern portion of Pitman Valley which provides wonderful open views to the north of Sitgreaves Mountain. Old Route 66 then reaches a three way intersection with Deer Farm Road (also called route 146) and interstate 40 at milepost 171.

From here the trail travels along Deer Farm road passing an active Deer Farm open to the public, a series of small private ranches and then a KOA campground before crossing over Interstate 40. Immediately after passing over Interstate 40 the trail reaches a four way intersection with no signage. Though there is no signage the trail turns right onto a road called Bearizona Boulevard (also sometimes referred to as Route 51A). The trail then travels along Bearizona Boulevard for roughly 1.7 miles passing the Bearizona wildlife and safari park and possibly getting one quick glimpse to the left of the grazing bison within the park from afar before reaching Route 64. Here the route turns left onto route 64 and travels along the roads

shoulder crossing underneath the Williams town arch and reaching the center of Williams, AZ in 2.3 miles. [see Figure 5]

This route is less intense compared to the other tested options, but is by far the most feasible for incorporation in the SCT. The route provides an adventures experience to travelers while also traveling along sections of historic roads. Additional signage is recommended prior to incorporation in the SCT especially at the intersection of Deer Farm Road and Bearizona Boulevard where the field researcher experienced a lack of any road signage at the time of route testing.

Map of All Tested Routes in the Section

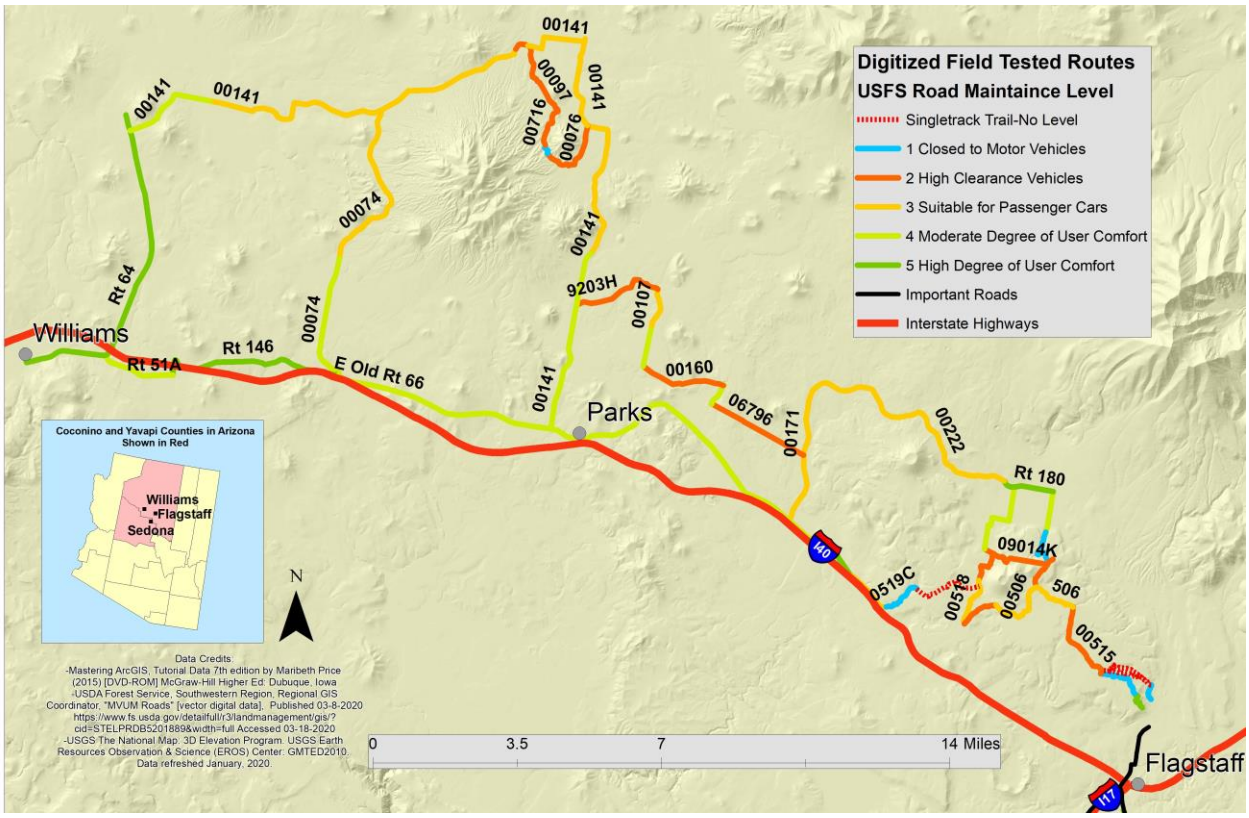


Figure 4: All tested routes between Williams and Flagstaff, Arizona. Route color illustrates the USFS maintenance level observed by the field researcher at the time of testing.

Map of Recommended Route

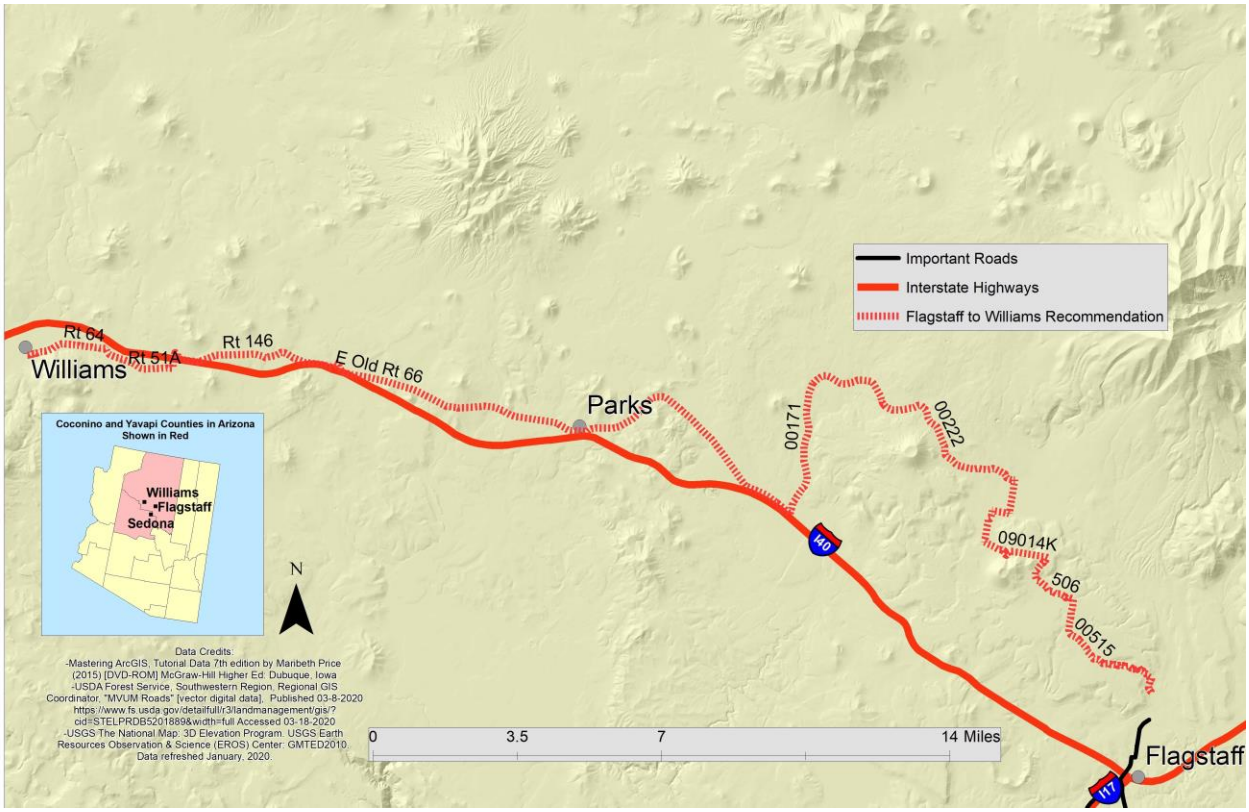


Figure 5: Route Recommendation between Williams and Flagstaff, Arizona. The Route Recommendation is marked by the red dotted line.

Map of Entire Recommended Route Sedona to Flagstaff to Williams

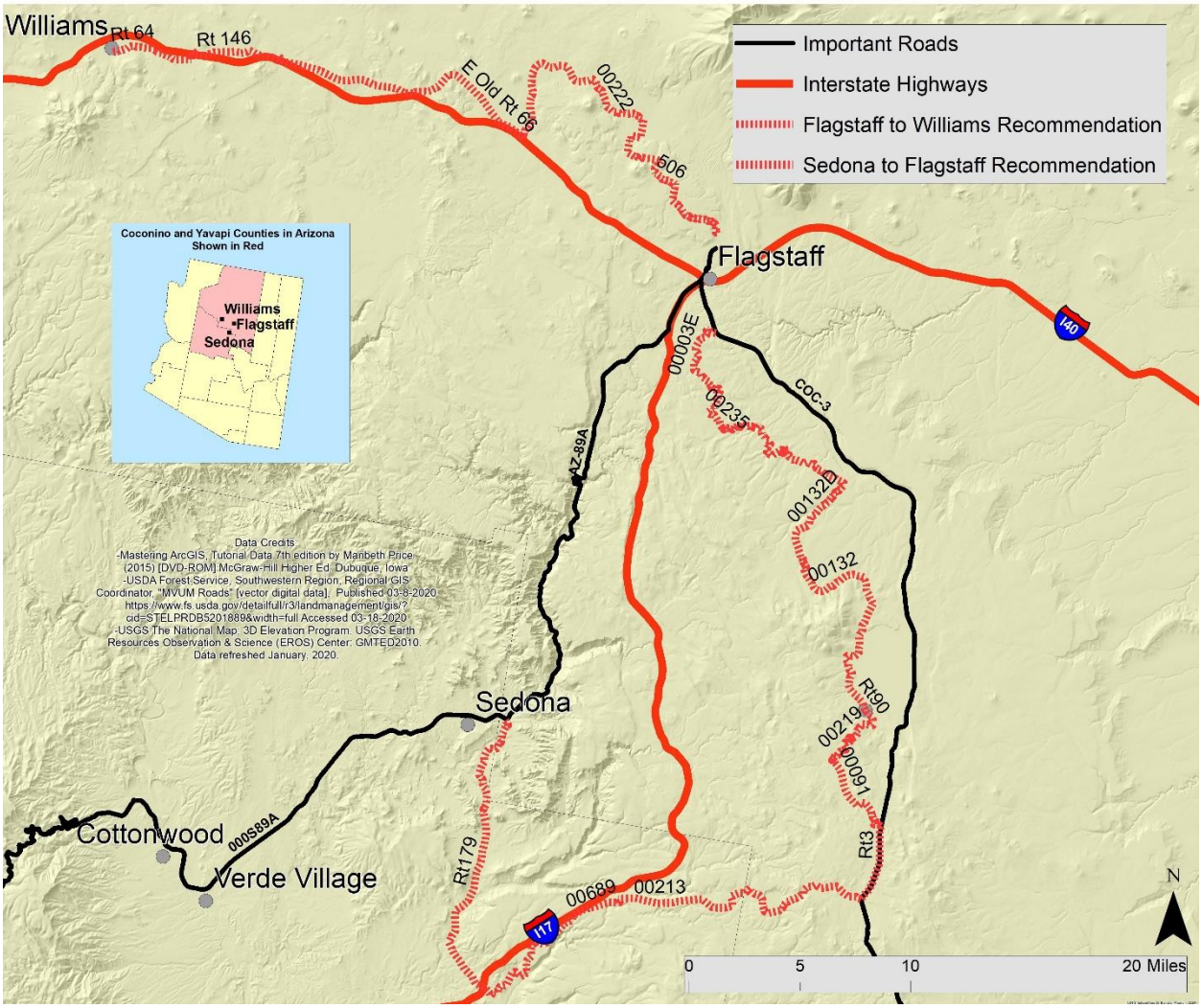


Figure 6: Entire Recommended Route marked by the red dotted line from Sedona, to Flagstaff, to Williams, Arizona.

Discussion

Introduction

The primary goal of this practicum project was to help define a single semi linear route through the Coconino County and the Coconino National Forest to be incorporated as part of the SCT. SCTA needs and desires were used to develop the SCTA: Selection and Exclusion Criteria which acted as a framework to help determine if existing routes fit the SCTA's vision. Potential routes were field tested and data was collected to help determine if they were suitable based on the SCTA: Selection and Exclusion Criteria. Route recommendations were developed based off of these findings and maps were created to show all tested routes along with the recommended routes. The researcher's involvement with the SCTA and personal knowledge of regional forest roads, trail networks, and local outdoor recreationalist preferences helped inform the research. A secondary goal of this project was to create a methodology/framework for the SCTA to utilize in other regions to ultimately create additional route recommendations. A tertiary goal was to potentially provide marketing material that could be used by the SCTA to market the route incorporation process or SCT as a whole.

This project met these goals. The SCTA: Selection and Exclusion Criteria was developed by attending SCTA stakeholder meetings and listening to the expressed needs and desires of the SCTA. The SCTA: Selection and Exclusion Criteria was also designed to be broad enough that it can be used in other regions to help determine the feasibility of possible routes for incorporation in the SCT. Route recommendations in the Coconino Section were created and presented along with maps that provided context. Lastly, ArcGIS map compositions and GIS StoryMaps (Sedona to Flagstaff StoryMap & Flagstaff to Williams StoryMap) were created, and photos were taken during field testing which can be used as marketing assets for the SCTA in the future.

The remainder of the discussion section will provide additional insight into the process used to develop the route recommendation reports, how the SCTA: Selection and Exclusion Criteria was created and applied to this project, what was learned, and future implications of this project.

Scope of Route Testing

Strategies to improve testing efficiency and to data quality were developed throughout the process by the field researcher. 363.76 miles were traveled on a route specific gravel bike to

test possible routes for this project. There were a few sections—in addition to the 363.76 miles—that were field tested using other means of transportation due to adverse weather conditions. As an example, on one occasion 20.38 miles of forest roads (Forest Road 219, 91, and 9473L) were tested on Nordic skis due to snow covering the route. A majority of these roads were later retested on the route specific gravel bike (Forest Road 9473L, and 91). Also, 8.60 miles of forest road 91 were first tested on a mountain bike instead of a route specific gravel bike because of wet, snowy conditions that were easier to navigate with wider tires. Lastly, 7.02 miles of Forest Road 141 were tested by gravel bike only after preliminary testing in a personal vehicle due to significant snowfall covering the route. The total route mileage tested, including those tested using other means of transportation, was 401.82 miles.

Route testing began in November of 2019 and concluded in March of 2021. A majority of the route testing took place during the late spring, summer, and early fall months. The field researcher learned a lot through this process. The field researcher was aware that weather conditions would limit when route testing could be completed, but it was found to be more limiting than first thought. He was surprised with how quickly conditions could change and how little conditions needed to deteriorate to bring a gravel bike to a halt. He learned that the SCT needed intermediate shelter points along its route in between major stopping points because of the regular occurrence of adverse weather. He was also surprised by the impact that snow and rain above the Mogollon Rim had on routes below the rim when significant precipitation or rapid thawing occurred.

SCTA: Selection and Exclusion Criteria

The SCTA: Selection and Exclusion Criteria (Appendix A) was developed out of a need for consistent route identification, and with input from the SCTA regarding desirable and undesirable attributes. The SCTA: Selection and Exclusion Criteria organizes the key desires of the SCTA and provides a framework for determining if a particular existing route fits within their vision for the SCT. These criteria were developed using these expressed desires prior to the SCTA formalizing its nonprofit structure with a Board of Directors and Advisory team. The recently defined SCTA Non-Profit board could revisit the SCTA: Selection and Exclusion Criteria to ensure it still meets the needs of the trail. Revisions of the criteria could occur and the

data collected and analyzed for this project could be reassessed and re analyzed using a revised criteria.

Northern Arizona provides topography that is challenging for any type of transportation. The area near Sedona, Flagstaff, and Williams has been challenging for those working to route the SCT and this project has used a framework to test and recommend a route through this section. I hope the SCTA: Selection and Exclusion Criteria can continue to be an asset to the SCTA that can be utilized in the future in other regions to continue developing the SCT.

Route Segment Difficulty Designation

The SCTA: Selection and Exclusion Criteria provided this project with a framework for selecting existing routes for inclusion within the SCT. The criteria helped to ensure that the SCT will provide users with a cohesive experience and that the route difficulty (physical challenge to ride a bike along, and terrain technicality) is relatively consistent in different regions. A consistent gravel cycling route difficulty scale had yet to be defined. A simple difficulty scale similar to that used in mountain biking or alpine skiing would be beneficial to further conceptualize and illustrate the desired experience for the SCT and it could be used as a key component of the final complete SCT map.

The International Mountain Bicycling Association (IMBA) uses an international difficulty rating system for mountain biking trails that used symbols and colors to delineate trail difficulty. Trail width, tread surface, average trail grade, maximum trail grade, and natural obstacles/technical trail features are assessed to assign trail difficulty ratings (IMBA, 2018). IMBA's difficult rating has assigned a white circle as the easiest trails, green circle for easy, a blue square for more difficult, black diamond for very difficult and double back diamonds for extremely difficult (IMBA, 2018). A similar difficultly rating system could be adapted for gravel cycling.

A gravel cycling organization in Arizona, AZ Gravel Rides has created a basic gravel road rating system. The difficulty rating system 'reflects the most typical sections of routes' and provides 5 categories each with a basic experience description, a recommended tire width, and examples of routes in the region that best illustrate each categories experience (AZ Gravel Rides, 2021). Incorporating the AZ Gravel Rides: Gravel Road Rating System and adapting

components of the IMBA: Trail Difficulty Rating System to better assess gravel roads could provide further insight as to the difficulty of tested and/or incorporated routes for the SCT to aid in creating a consistent user experience along the route's entirety. The final SCT trail map could also use the adapted difficulty rating system to indicate the difficulty of each incorporated route to inform trail users and help them plan their travel along the SCT.

Urban Gaps in the Recommended Route

One specific gap exists within the recommended route and it should be noted. The recommended route does not explicitly provide recommendations as to how the SCT should travel through the urban centers of Sedona, Flagstaff, and Williams, Arizona. These communities have existing pathways, bike paths, and pedestrian guardrails funneling visitors into and through their communities, and therefore identification of a specific 'route' is often self-evident or straightforward for the SCTA to propose. And, the SCTA: Selection and Exclusion Criteria was designed, within the scope of this practicum, to assess the connector routes between communities; these population centers cannot be evaluated well using the existing tool because it does not assess community-access streets and urban trail systems. A future project for the SCTA could be to create a separate assessment tool, linked with the tool introduced in this project, for assessing potential existing routes through urban areas. Such a tool could help the SCTA to ensure that existing routes within urban areas incorporated in the SCT highlight key tourist attractions and that it provides access to particular kinds of businesses such as hotels, local restaurants, grocery stores, local businesses, and bicycle shops.

Sedona to Flagstaff Area

The recommended route, with the addition of developing a 5.2 mile long trail or path paralleling a portion of Route 179—where there is not currently a bike lane—would be significantly more feasible and year-round for credit card gravel tourists to travel on between Sedona and Flagstaff, Arizona. As an alternative example, Schnebly Hill Road, though picturesque, is far too steep and rough for use as a gravel cycling route and if implemented as part of the SCT, it would likely cause trail users to venture off of the route seeking alternatives that are less physically demanding or taxing on their equipment. The use of Schnebly Hill Road

for gravel cyclists traveling on the SCT would make this region's trail experience feel fragmented from that on other sections, such as the areas near Phoenix where the SCT is planned to travel along flat paths paralleling water canals.

The recommended route for this section highlights the cultural and environmental diversity of this region while providing a cohesive and enjoyable trail experience. The route brings trail users by some of the most iconic red rocks in Sedona and along seldom traveled forest roads that provide unique viewpoints and prospective of northern Arizona. Mormon Lake Village momentarily brings travelers back in time with its rustic lodging, general store, and western steakhouse. The approach to Flagstaff provides views of the San Francisco Peaks as the trail makes its way to the outskirts of town. These features of the route highlight this region's beauty and enhance the experience the SCT provides to its users.

Flagstaff to Williams Area

The recommended route for this section, is most feasible for gravel cycling and credit card touring and highlights some lesser visited rural communities between Flagstaff and Williams. This route was the only option that didn't meet any exclusion criteria from the SCTA: Selection and Exclusion Criteria. If the SCTA chooses to incorporate these collection of forest roads and trails they should plan on developing signage along the route. Many intersections had little existing signage from the USFS and the intersection of Deer Farm road and Bearizona Boulevard had no existing signage at the time of testing which could lead to trail users becoming lost.

Readers might notice, looking at Figure 4 and Figure 5, that the field researcher did not field test existing routes south of Interstate 40 between Flagstaff and Williams. The field researcher independently made this decision due to the additional mileage this would likely add to the route, as the majority of well-developed forest roads are many miles to the south of Interstate 40 and make the route both extremely remote and impossible to connect the two communities in less than 55 miles. This is due to the existence of Sycamore Canyon Wilderness in which bikes are prohibited, the Sycamore Canyon which bisects the landscape to the south and the existence of the Camp Navajo National Guard Post south of Bellemont which obstructs forest roads running parallel close to Interstate 40. The field researcher also felt it would be beneficial for the SCT to travel along some of the well-maintained forest roads near the base of the San

Francisco Peaks that provide mesmerizing views and portions of Old Route 66 due to its historical significant.

The recommended route for this section highlights historical locations between Flagstaff and Williams and brings travelers through many quaint rural communities that see seldom visitation. Observatory Mesa provides exceptional views through the trees of Mount Elden and a relatively short section of the trail routed through the Baderville provides a quintessential view of the San Francisco Peaks towering directly above from its base. The route travels closely by Bellemont and Parks which can act as resupply points and the Route 66 Deli just to the west of Parks can act as a perfect lunch stop. The route fits the SCTA's vision the SCT and provides a novel experience to trail users.

Future Field Testing and Recommendations

This project focused on the Coconino National Forest and Coconino County area of the SCT. The project provided mapping and a recommendation for the SCT route in this region, and does not address other geographic regions where the SCTA anticipates the route will travel. However, a goal in this project was to provide a translatable method and framework for testing and recommending routes in other regions. In this section I will make recommendations for future route selection, based off my work in the Coconino region.

1. The SCTA should develop a curriculum, based off this project's selection and exclusion criteria, to provide route identification workshops across the state. These may be one or two day workshops in which an instructor teaches SCTA stakeholders how to use the methodology utilized by this project and the SCTA: Selection and Exclusion Criteria to evaluate existing routes in their own regions. Funding sources for these workshops could be secured by the SCTA through, as example, the Arizona State Parks & Trails' funding opportunities—notably the Safety and Environmental Education section of its Recreational Trails Program [RTP] grants.
2. The recently defined SCTA Non-Profit board should revisit the SCTA: Selection and Exclusion Criteria to ensure it still meets the needs of the trail and that it meets the needs of the trail in other regions. The SCTA should also think about creating a separate assessment tool, linked with the tool introduced in this project, for assessing potential existing routes through urban areas. Such a tool could help the SCTA to

ensure that existing routes within urban areas incorporated in the SCT highlight key tourist attractions and that it provides access to particular kinds of businesses such as hotels, local restaurants, grocery stores, local businesses, and bicycle shops

3. The SCTA could consider hiring a field researcher to apply the methods and framework used for this project to other regions along the SCT that do not yet have a recommended route. This individual could present findings to the SCTA Non-Profit board and work to further develop the SCT.

Conclusion

Historically, recreational trails have been developed and created with a desire to foster sublime individual experiences along aesthetic and culturally meaningful routes (National Park Service, 2018). The SCT is quite similar, but its routing along predominantly existing trails and paths, opposed to being built from the ground up, offers unique challenges. Each existing trail or path that will be linked together on the SCT was designed with particular experiences and users in mind, and thus the linking of these must be a deliberate exercise in negotiating a particular brand and experience for SCT users. In this project, I worked to create a cohesive user experience across the varied landscape of northern Arizona's Red Rocks and Coconino regions, while also developing a route selection tool that is translatable and relevant to other regions along the SCT route.

This project provided a method and framework for taking existing routes and determining what collection of them best fit the SCTA's vision. A substantial amount of time was spent field test existing routes, a lot was learned through the process, and a lot was gained through this effort. In the future I hope to continue helping the SCTA develop the SCT. I am optimistic that the route will soon be a premier recreational trail in the region and I personally can't wait to one day bike the SCT from end to end.

Appendix

Appendix A.

SCTA: Selection and Exclusion Criteria

Introduction

This document defines selection and exclusion criteria to aid the SCTA in identifying appropriate existing routes (e.g., trails, roads, forest roads, and pathways) for the SCT. These criteria can be utilized in sections or holistically for determining what existing routes may be viable for inclusion. This should be viewed as a working document that can be adjusted as the SCT takes shape; and, the flexibility built into it makes it germane for a wide range of geographic regions in Arizona. This document is arranged as follows: first, I outline selection criteria (i.e., traits relevant for inclusion in the SCT); second, I outline exclusion criteria that would make a potential route inadequate for the SCT; and third, I explain the role of the field researcher (i.e., route tester) in assessing potential routes for inclusion or exclusion. These three sections should be treated as a synergistic assessment model.

Selection Criteria

Selection criteria are attributes or traits of a potential route that support its inclusion in the SCT. These attributes are preferred because they enhance the SCT's primary user experience—in other words, these are attributes or traits that are conducive for and attractive to credit card touring gravel cyclists. A route does not need to meet all selection criteria in order to be included in the SCT. Each attribute is defined below, followed by a sample rating chart. These attributes can be rated by multiple testers on a scale of 1-5 (1 being of low quality/desirability and 5 being of high quality/desirability) or by the same tester over multiple visits to arrive at a consensus for route desirability.

- Aesthetics: The route is aesthetically pleasing. Reasons include environmental attributes such as presence of mountains, rivers, lakes, overviews, flora, etc.
- Experience: The route has opportunities for a novel experience for users. Reasons include unique environmental, trail, and community variations.
- Length: The route is an optimal length for users to bicycle between community stops at approximately 25-55 miles, depending on terrain. Multiple communities can be passed through at distances of fewer than 25 miles as long as users can complete a single day's efforts between approximately 25-55 miles.
- Traffic: The route sees insignificant vehicular traffic (>20 vehicles per hour) except when in communities. The SCTA desires for the trail to access communities along its length at regular intervals; therefore, sections will need to be near or on busy streets. Traffic should be minimized when bicycling between communities.
- Limited Exposure: Arizona has extreme weather variation and prolonged exposure is inevitable in some geographic regions. However, routes should be preferred where prolonged exposure to the elements is avoidable.
- Cultural Immersion: The route travels through areas that highlight the cultures and histories of the Southwest and provide opportunities for immersive experiences; e.g., stops at unique cultural and historical sites.

Attribute	Test 1	Test 2	Test 3	Test 4	Average
Aesthetics					
Experience					
Length					
Traffic					
Exposure					
Cultural Immersion					

Exclusion Criteria

Exclusion criteria are attributes that, if present, function as critical failures. Any route with attributes outlined in the exclusion criteria should not be considered a viable existing route for the SCT. Many of these listed attributes are unsafe for users and/or make a route not feasible for primary trail users. These attributes can be rated by multiple testers on a scale of 1-5 (1 being inconsequential and 5 being of highly consequential/necessary for immediate exclusion) or by the same tester over multiple visits to arrive at a consensus for route exclusion.

- Non-bikeability: The route is not traversable on a gravel bike (e.g., only ridable by advanced cyclists on technical mountain bikes/testers must dismount more than 2x per mile)
- Grade: The route has a sustained grade of 9% or more (a sustained grade is greater than ¼ mile)
- Seasonality: The route is not suitable for gravel cycling for seven months or more during an average year (e.g., due to seasonal damage/obstacles, dangerous weather, or mud/soil content that become non-bikeable)
- Speed: the route does not allow for efficient riding; e.g., field researchers are unable to travel at an average ≥ 8 mph in fair weather
- Land Management: Several forms of land management make it illegal or not feasible for the SCT to traverse, including:
    - Wilderness Areas: It is illegal to ride a bicycle in nationally designated Wilderness Areas in Arizona. Any potential routes that pass through designated Wilderness must immediately be excluded.
    - Private land ownership: Any potential route traveling through privately owned or State Trust land must be excluded if explicit and legal permission cannot be obtained.
- Safety: The route may be deemed potentially unsafe by the field researchers. Unsafe conditions may require periodic detours or full exclusion. Reasons for a route being unsafe include avalanches, rock and/or landslides, washouts, and other impassable obstructions; crime or presence of illegal activities; and, dangerous wildfire and/or wildlife activities.

When any of these attributes are identified by field researchers, they will document and notify the SCTA and, if necessary, relevant land managers to determine proper rerouting and risk mitigation strategies, if any.

Attribute	Test 1	Test 2	Test 3	Test 4	Average
Non-bikeability					
Grade					
Seasonality					
Speed					
Land Management					
Safety					

Field Researchers

All potential routes identified by the SCTA as links between communities should be tested by one or more field researcher(s). Field researchers must be trained to evaluate a potential route for presence of attributes that fall within the selection and exclusion criteria. The field researchers will bicycle all SCTA-identified routes and collect data to support or deny a route's inclusion on the SCT. Field researchers will fill out inclusion/exclusion evaluation forms and take field notes expanding on narratives relevant to selection/exclusion criteria. Field researchers will collect downloadable GPS data (e.g., with a bicycle computer linked to Strava or RidewithGPS) on distance, grade (slope), and the specific and average speeds at which the researchers travel the route. Photos and videos should be taken to highlight selection/exclusion criteria attributes when helpful; e.g., to illustrate aesthetics or risk management issues. Ratings and field notes should be compiled, condensed, and discussed among the SCTA and field researchers to arrive a consensus regarding inclusion or exclusion of a potential route.

Conclusion

These criteria should be used for guiding the route recommendation process, and the criteria—and field research processes—should be routinely revisited and assessed to ensure alignment with the SCTA's mission, vision, and the development of the SCT in manners relevant to its primary user groups.

Appendix B.

SCT Route Recommendation Reports

This section includes the SCT Route Recommendation Reports and supplemental photographs. These route descriptions are primarily written to match the direction that field testing was completed to enhance accuracy. Routes were all tested keeping in mind the fact that the SCT will be traveled in both directions. The directions in which routes are described in the recommendation reports may not match the directions in which they are described in the results section. The results section was written to allow for the descriptions and recommendation to be read traveling from Sedona, to Flagstaff, to Williams to provide clarity.

SCT Route Recommendation Report: Sedona to Flagstaff Section

Section Background

This Route Recommendation Report addresses the specific section of the SCT connecting Sedona, Arizona and Flagstaff, Arizona. This section is topographically challenging to navigate due to the Mogollon Rim, which dissects this section on roughly an east-west line with few access points. The Rim creates a dramatic change in elevation and separates the Sedona red rock desert from the Ponderosa forest up on the Colorado Plateau, where Flagstaff is located. This section of the SCT is extremely biodiverse, experiences locally varying weather, and provides excellent opportunities for outdoor recreation. Though this section is visually appealing, the varied terrain can make it treacherous to navigate.

Both Sedona and Flagstaff are major Arizona tourism destinations, popular with hikers, climbers, mountain bikers, and people visiting the Grand Canyon and other cultural sites in the area. Sedona is known for its red rocks and picturesque vistas. Flagstaff is larger in population and acreage than Sedona, and is near the San Francisco Peaks—at over 12,000 feet, they are the tallest mountain range in Arizona.

Due to the steep cliffs of the Mogollon Rim, there are only two efficient routes that connect Sedona to Flagstaff. Interstate 17 is the major pathway connecting the southern portion of Sedona—called the Village of Oak Creek—to Flagstaff, and State Route 89A winds its way from Sedona up Oak Creek Canyon and ascends the Mogollon Rim via tight switchbacks. Both these routes, though feasible for cars, are dangerous to walk or bicycle alongside because of the high speeds of vehicles and/or the lack of a sufficiently usable road shoulder. Cyclists who choose to navigate these roads do so at extreme risk to their wellbeing.

First Impressions

The SCTA and field researcher all independently identified that both Interstate 17 and State Route 89A are insufficient options for the SCT. Both these routes were viewed as too treacherous for the field researcher to safely test; they were excluded without any need for ground proofing.

One other common ‘road’ route was identified early on as a possibility for inclusion; this is a regionally popular 4x4 forest road called Schnebly Hill, or Forest Road 153. Schnebly Hill is

a popularly trafficked Off-Highway-Vehicle (OHV) road that ascends the Mogollon Rim by connecting northeastern Sedona to Interstate 17 and a variety of intersecting forest roads. This road was identified due to its popularity for the variable OHV terrain sometimes enjoyed by mountain bikers, its iconic views looking down towards Sedona's red rocks, and for its access to a variety of outdoor recreation sites along its path. The route was tested and viewed as unfavorable for credit card gravel cycling by the field researcher; this will be explained in more depth later in this section.

However, prior to commencing field research, the SCTA identified that it may be beneficial to find a midpoint between Sedona and Flagstaff so that users can travel shorter daily distances while navigating one of the more challenging sections in the state due to terrain and substantial elevation change between the two cities. Mormon Lake Village and its resort lodging and dining was an evident midpoint with proper accommodations for individuals traveling along the SCT. Mormon Lake Village is a rural town with many seasonal residents located near Lake Mary Road southeast of Flagstaff. Mormon Lake Village's seasonal amenities include a lodge and rental cabins for overnight guests, a traditional western 'saloon' and a pizza shop, and a general store for basic resupply. Mormon Lake Village was immediately marked for testing as an appropriate midpoint between Sedona and Flagstaff, if a feasible route navigating the Mogollon Rim put SCT users near it.

Primary Identified and Tested Routes

Hundreds of forest roads exist between—though not necessarily connecting—Sedona and Flagstaff, and many quickly become unfeasible or even dangerous to bike and/or hike. Preliminary field testing made clear that ease of riding and navigation were imperative when developing a single, semi-linear route between the two cities. As example, several potential forest roads were quickly ruled out by the field researcher because maintenance had ambiguously ceased along the route, they had become overgrown, or the roadbed was so rugged that travel became painfully slow. Other tested routes could possibly work, but would likely be circumnavigated by trail users because of nearby, easier pathways or give cause for users to become disoriented and lost due, to the difficulty of navigation and/or the challenging terrain. The most obvious routes on the map were sometimes in reality the most strenuous and complex.

Of the dozens of routes tested, two potential routes were field tested and assessed as viable for connecting Flagstaff to Mormon Lake Village; and, two routes were field tested and assessed as viable for connecting Mormon Lake Village and Sedona. The primary routes (not listing connectors) between Flagstaff and Mormon Lake Village were:

1. Lake Mary Road, which has a large bike path and is popular among cyclists but is a paved, trafficked route[Route 3], or:
2. Forest Road 132 and Forest Road 132D, which are graveled forest roads just south of Lake Mary Road.

The primary routes (not listing connectors) between Mormon Lake Village and Sedona were:

1. Schnebly Hill road (Forest Road 153), which is a popular and dramatic but heavily trafficked and rugged OHV road, or:
2. Stoneman Lake road (Forest Road 213) to Blue Grade road (Forest Road 689), which are graveled forest roads with less traffic but access Sedona via State Road 179.

Each route has its own pros and cons, and creating a single route recommendation was challenging even supported by data sets collected through copious amounts of time spent in the field.

Route #1: Flagstaff to Mormon Lake Village via Lake Mary Road

Regional maps make it seem that routing from Flagstaff to Mormon Lake Village is obvious and easiest via Lake Mary road. This route is how someone would drive a car between Flagstaff and Mormon Lake Village. The route is extremely simple to navigate and has obvious signage with few intersections. In other words, this route requires trail users to travel a bike lane on a paved road, and while there is a well-used bike lane, it is not physically separated from vehicle traffic. The bike lane enhances trail users' experiences, but regular pull-outs and lake access points mean RVs or distracted drivers are common and requires trail users to stay vigilant. The road is visually appealing, with expansive views of upper and lower Lake Mary and Mormon Mountain, and there are also occasional glimpses of the San Francisco Peaks to the North. This route is comprised mostly of Lake Mary road and then finishes its approach to Mormon Lake Village on Route 90, which also has a bike lane and has significantly less traffic than Lake Mary road.

The field researcher assessed his experience on this route as adequate. Due to the evenly graded and paved bike lane, the field researcher was able to travel from the southern outskirts of Flagstaff to Mormon Lake Village in roughly 2 hours and 10 minutes—less than half the time that the forest road option took. The problem with this route is the fact that it is not physically separated from the oftentimes heavy and fast vehicle traffic on a road with a 55 mph speed limit [See Appendix B1 and B2]. This route is roughly 26 miles in length and due to the heavy use of a paved, trafficked road it is not recommended for the SCT.

Route #2: Flagstaff to Mormon Lake Village via Forest Road 132 and Forest Road 132D

Flagstaff to Mormon Lake Village via Forest Road #132 and #132D is a less-obvious route than the Lake Mary road option, but it is relatively physically distanced and, notably, feels isolated from significant vehicle traffic in desireable manners.

This route took the field researcher roughly 5 hours to complete and required some map reading skills, though a GPS file and bike computer—or signage and a clear SCT guidebook—will ameliorate that problem for future users. This route has mixed and enjoyable, mildly rough dirt and gravel forest road terrain. It does require users to travel a two mile, single track trail called Priest Draw Trail that is closed to motor vehicles; this trail is nontechnical but may require

users to dismount their bicycles for short (less than 5 yard) distances while navigating rocks. This route provided a more remote and primitive experience compared to that experienced along Option 1.

This route travels as follows: it begins in Flagstaff near the Flagstaff Airport on Lake Mary road (Route 3). It takes Frontier road through a small rural area with a few homes, then cuts left before the Flagstaff Airport onto Forest Road 3E. After roughly 3.5 miles on Forest Road 3E the route turns left onto Forest Road 762. Forest Road 762 is traveled along for .7 miles before the route turns right at a fork in the road into Forest Road 762B. Forest Road 762B is traveled along for ½ of a mile and then outskirts of Mountainaire, where the route turns left onto Forest Road 235. From Forest Road 235 the route continues through an opening in a wooden fence onto to the Priest Draw Trail, which is a dirt single track trail through a popular rock climbing area and is closed to vehicles. This trail is relatively flat and smooth and provides climbers and hikers with access to limestone bouldering areas to either side of the draw (a seasonal creek flowing through a wide and shallow canyon).

The field researcher was forced to dismount twice along the Priest Draw Trail due to semi technical terrain. After the Priest Draw Trail the route follows Forest Road 132D which was, at the time of testing, a logging thoroughfare. The field researcher did not interact with any active logging operations or logging trucks on the route but theorized, based on observed signage and logging equipment, that users could encounter traffic when logging operations were actively working.

Forest Road 132D travels along the northern side of Mormon Mountain to connect to Forest Road 132 and then Route 90. Forest Road 132D was the roughest section of the route. Forest Road 132D appeared to have been partially affected by a forest fire in recent history, and the road showed evidence of significant heavy machinery traveling on it, likely to combat the fire. One distinct fire-line was noticed crossing the road [see Appendix B3]. Forest Road 132D also looked like it has been regraded improperly, because many bowling ball sized rocks had been dislodged along a half mile section along with rough washboard terrain [see Appendix B4]. Forest Road 132D travels within the Pinegrove Quiet Area, which is seasonally closed to vehicles (closed August 15th to January 1st) to minimize animal disturbances [see Appendix B5]. The road within the Pinegrove Quiet Area was significantly less maintained [see Appendix B6].

The route exits the Pinegrove Quiet Area onto Forest Road 132, which was a smooth gravel road. This road had some off-road vehicle traffic and major primitive roadside camping (colloquially referred to as ‘boondocking’). The field researcher noted approximately 8-12 camping sites being utilized in a short mile and a half section of Forest Road 132 before reaching Route 90. People camping along this stretch most likely use it as a no-cost alternative to Mormon Lake campgrounds while they access similar recreation opportunities to those around the lake.

Route 90 provides a picturesque, smooth ride to Mormon Lake Village; this was very enjoyable after some of the rough gravel sections of Forest Road 132D. Vehicle traffic was minimal as the field researcher only saw two cars pass before reaching Mormon Lake Village.

This route was fun for the majority of its length, while providing a bit of challenge and a need to keep a map handy. The opportunity to bike through an old burn zone provided beautiful views, matched with a few dangerous sections where snags were overhead. The field researcher personally liked this route a bit more than just riding along Lake Mary Road to Mormon Lake Village, but noted that rain or other inclement weather could have impacted his enjoyment of the route. This route is roughly 28 miles in length and due to its navigable and isolated qualities it is recommended for inclusion in the SCT.

Route #3: Schnebly Hill Road (Forest Road 153), Forest Road 226, and Forest Road 127

Schnebly Hill road (Forest Road #153) is a relatively evident route to navigate the Mogollon Rim from Sedona. This route navigates the Mogollon Rim by meandering up the side of a ravine while crisscrossing the old Munds Wagon Trail. The route was a historically popular cattle trail out of Sedona. This route is exceptionally scenic and popular with both hikers, mountain bikers, and, notably, off-road vehicle enthusiasts, including jeep tours from Sedona.

This route was originally identified by the SCTA as a tentative route during early drafting exercises because of its beauty and historical significance in the region. But, it was also noted that the steep and rugged nature of the road, and seasonality of the route, give reason for it to possibly be excluded. This route, therefore, is controversial and has multiple compelling reasons for inclusion and exclusion. Field testing was necessary in determining the feasibility of the route.

The field researcher attempted to ride a gravel-specific bicycle up Schnebly Hill Road on March 21st 2020. He began where Sedona pavement ends at the Huckaby Trail Head. His route plan was to ride up the road to its intersection with I-17 before turning around and descending the same route, thus testing its feasibility both directions. Despite being familiar with it's touristic popularity, the field researcher found the trailhead to be surprisingly busy. The Huckaby Trailhead parking lot was full and overflowing onto the connecting road, and hikers, cyclists, climbers, tourists, and off-road enthusiasts were sprawled about. Towards the bottom the route was busy with vehicle traffic, and on the lower half of the route the field researcher rarely experienced more than one to two minutes of cycling without an off-road vehicle passing by.

Jeeps, 4x4s, ATVs, UTVs, and jeep tours were encountered along the route [see Appendix B7]. The road did provide amazing views, distracting from the physically difficult, steep, and rough ride [See Appendix B8 and B9]. The field researcher found that a forest service gate was locked part way up the road to keep vehicles from proceeding. He cautiously passed the gate, as it was blocking traffic but no signage suggested that non-motorized traffic was not permitted. Beyond the gate the field researcher encountered multiple rock/landslides that obscured the route [see Appendix B10]. These slides provided insight that this route may not be as feasible as first thought, and provided physical evidence that the route may not be appropriate during wet seasons. Soon after passing the slides the field researcher encountered Casner Canyon 1, where water was flowing over the road [see Appendix B11]. The water was flowing across the road perpendicularly and appeared to be about 20-30 feet wide. The water appeared to be

shallow enough to ride a bike though, but the field researcher quickly found out this was not the case when he reached the middle of the water and his bike plunged deeper—the water level reached his handlebars before he quickly dismounted and forded through waist-deep water, dragging the bicycle in tow with one arm to the opposite shore. The water was described as bone-chillingly cold, and he hypothesized that rapid snowmelt had created the significant flow. It was unclear if this was the reason for the locked gate earlier on the route.

After this unexpected river crossing and navigating a few more small rockslides, the field researcher made it to the Schnebly Hill Vista [See Appendix B12]. Just beyond Schnebly Hill Vista the field researcher noted the novelty of being able to see both the snow-covered San Francisco Peaks on the northern horizon and Sedona's red rocks to the southwest. Not long after, the field researcher encountered significant ruts and snow covering the road, and the route became impassable [see Appendix B13], also lending physical evidence that this road may not be suitable for travel during the region's two wet seasons. While ascending the route up to this point, the field researcher dismounted his bike 14 times. At this point in the field test, unable to continue to ascend, the researcher turned around and descended the route.

The climb to Schnebly Hill Vista took the researcher just under 2 hours in moving time and the same descent took him about 40 minutes. The field researcher recorded at least two sections of the road where the grade was roughly 12°, and much of the road was between a 5° and 8° grade. The descent was described as painful, dangerous, and at times, biking felt reckless. The field researcher found himself being forced to stop every few miles to regain feeling and strength in his hands and to allow his bike's brake pads and brake rotors to cool down. On many occasions the field researcher was forced to narrowly pass vehicles due to his inability to stop. Passing vehicles on the rough narrow roads at such speeds was not enjoyable, but was preferred to hitting vehicles and/or laying the bike down in order to stop. It should be noted this route is often described in mountain biking and motocross guides in the region, but not in other cycling-specific materials.

When the field researcher reached the bottom of the road he recorded feeling personally very torn as to whether or not the road should be included. The route provided unique views and a novel perspective of Sedona, but was dangerous and painful on a gravel-specific bike. He hypothesized that the route would be fun to descend on a full suspension mountain bike with bigger tires and strong hydraulic brakes, but that climbing the same route on such a bike could take twice the time due to the weight and the less efficient pedaling created by suspension pedal sag.

After completing the field test, the field researcher remained in noteworthy pain for the two consecutive days following. Immediately after finishing the field test he developed a mild headache that became worse that night and did not subside for three days. His back, hands, wrists, ankles, neck, and forearms also ached for the next two days due to the physical toll the road had on his body, especially while descending.

The field researcher made a return field test on April 14th 2020, this time beginning off of Interstate 17 at the Schnebly Hill Road exit (320) above the Mogollon Rim, and rode to the point

where the Schnebly Hill road had been unpassable a month prior. This upper section of Schnebly Hill road was rather scenic and enjoyable. It was better maintained and paralleled the land boundary of Fox Ranch. The road passed over a river with a small dam [See Appendix B14], and then traversed over toward the Mogollon Rim, where the road had been unpassable during the previous attempt. The researcher noted how easy the riding was on the upper section of the road, and how well it was maintained minus a spot where a drainage culvert had partially collapsed [See Appendix B15].

The road was completely free of snow, excluding one quarter mile segment that appeared to remain in the shade. The field researcher felt confident, due to the lack of snowfall since the last field test in the area, that the road would now be completely passable and provide a better idea of what it would feel like in summer and fall months. This was not entirely the case.

Upon reaching his previous attempt's end-point, the temperature drastically warmed and the road turned to mud. The bike being used to test the route quickly became covered in mud so severely that the wheels ceased spinning [See Appendix B16]. The field researcher washed the bike in a pond to allow for field testing by bike to continue. This experience further solidified the researcher's sense that the road suffers from seasonal ridability and lack of consistent conditions.

Schnebly Hill road is the most iconic, strenuous, and generally well-known stretch in Option 3, but section also includes other roads that were tested to reach Mormon Lake Village from Sedona. It is important to note that Schnebly Hill road is approximately 12.5 miles long, and that 22 additional miles of forest roads must be traveled to reach Mormon Lake Village. Mormon Lake Village was chosen to be an intermediate point between Sedona and Flagstaff due to its location. Munds Park was considered as a midpoint between the two cities, but Mormon Lake Village was preferred due to the picturesque landscapes experienced in the area nearing the village and the well maintained forest roads. Forest Road 226 and Forest Road 127 account for about 15 miles, and an additional 7 miles of other forest roads must be traveled to reach Mormon Lake. The last 7 mile segment is later discussed in 'Route #5' and is shared by both the Schnebly Hill road option 'Route #3' and the Blue Grade road to Stoneman Lake road option 'Route #4'. The 7 miles consists of Forest Road 91 and Forest Road 219.

The riding encountered on Forest Road #226 and Forest Road #127 were less daunting than those had on Schnebly Hill road. Forest Road #226 begins at the terminus of Schnebly Hill road, at its junction with Interstate 17. Forest Road 226 travels southwest a distance of 10 miles until reaching Forest Road 127. The route has enjoyable ups and downs and a fairly well-maintained road surface [See Appendix B17]. The field researcher noted the ease of navigation experienced on the route thanks to the ample signage at intersections and the constant existence of forest service road markers. The road surface allowed for relatively consistent speeds to be maintained on the bicycle which was enjoyed by the field researcher. This road would be enjoyable in either direction.

Forest Road 127 from Forest Road 226 to Forest Road 91 was also a relatively enjoyable section to bike. The road passed through a few meadows which provided nice views of the forest [See Appendix B18], but the field researcher did state that substantial wind was occasionally

experienced in the large openings and that he felt exposed to the elements in the event of rain or thunderstorms, which commonly occur with little warning in this region as part of the monsoon season. Forest Road 127 ascends consistently until just before reaching Forest Road 91. The climb is not particularly steep at any one point, but it does achieve 500ft of elevation over about a 3.5 mile section.

Schnebly Hill road is steep, strenuous and requires a lot of physical excursion, and it only makes up 12.5 miles of this roughly 30 mile route between Sedona and Mormon Lake Village. Bikeability, Grade, and Seasonality were the three specific exclusion criteria of concern for this route option 'Route #3'. The route did not have a sustained grade of 9° or more for more than ¼ of a mile, but there was a one mile long section below the road closure where the field researcher was forced to dismount three times in a half mile due to the rough road conditions and steepness about a half mile below the seasonal closure gate. This route's conditions also proved to be heavily seasonally dependent. Conditions experienced by the field researcher suggested it does not allow for consistent 7 month use. In a lesser snowfall year it could possibly be useable between April and October or November, but this was not objectively experienced by the field researcher. Appendix A: The SCTA: Selection and Exclusion Criteria states that the need to dismount two or more times in any single mile of any route would meet the exclusion criteria and should be omitted from consideration. The combination of concern about seasonality and the fact that the field researcher's experience met at least one exclusion criteria excludes this route from further consideration.

Route #4: Stoneman Lake Road 213 to Blue Grade Road 689 to State Route 179

Stoneman Lake road (Forest Road 213) to Blue Grade road (Forest Road 689) to State Route 179 was a less obvious route compared to Route #3 (the Schnebly Hill road option). This was due in part to the fact that the roads involved are less popular, and the route passes Sedona to the southeast before turning sharply north on Route 179 to reach the city. This route was also less popular because the SCTA expressed a desire to avoid busy roads and sections that would require a trail user to travel along a non-physically separated road shoulder; Route 179 does not currently accommodate these desires.

Utilizing Stoneman Lake Road (Forest Road 213) to Blue Grade Road (Forest Road 689) to State Route 179 looks on paper as a more out of the way, longer, and less direct route when opposed to riding Schnebly Hill road, and in reality it is only about 15 miles longer. It also draws the trail user west into terrain that sees less recreation while providing a more gradual ascent or descent of the Mogollon Rim. This collection of forest roads and trails are relatively well maintained and easy to navigate, which makes it an enjoyable option for a novice and/or less serious recreationalist. This route also feels, for the most part, like a quintessential 'gravel bike ride'. Its distance, fun terrain that provides a well-matched challenge, and the vistas and perspective of the landscape were described by the field researcher as exciting and engaging.

This route also requires the trail user to travel through the Village of Oak Creek before meandering through the beautiful red rock desert to reach the city of Sedona proper. The Village

of Oak Creek is a small residential community technically outside of Sedona's city limits. It has many amenities for tourists and incredible views of some of the most iconic red rocks within the Red Rock Ranger District of the Coconino National Forest, and could be an alternative starting or stopping point.

This route description begins in Sedona at Tlaquepaque, which is a collection of art stores and shops. It is a fascinating place with lots of visible art built into its surroundings [See Appendix B19]. Tlaquepaque is located on Route 179 near the intersection with Schnebly Hill road. From here the route travels south on Route 179 towards the Village of Oak Creek. The route takes in several hills on a wide bike lane, with some sections are entirely separated from the roadway [See Appendix B20]. The road meanders through the red rock desert and provides amazing views of some of the most iconic red rock structures in Sedona, including Cathedral Rock, Bell Rock, and Courthouse Butte. This option travels Route 179 for about 14.5 miles heading south until crossing underneath Interstate 17 and beginning up Blue Grade road (Forest Road 689). Just to the south of the Village of Oak Creek spectacular views can be seen to the north. Heading in the opposite direction provides additional views and a grand entrance to Sedona and the Red Rock Ranger District of the Coconino National Forest [See Appendix B21].

The smooth bike lane continues south of the Village of Oak Creek for a while until reaching the Coconino National Forest Red Rock Ranger District welcome center. From this point south there is no bike lane and the speed limit increases from 35mph to 55mph. Up until this point the field researcher found the route feasible, enjoyable, and scenic and the route created no concerns. He felt that the route was equally environmentally and culturally immersive than that provided on 'Route #3' (the Schnebly Hill road option).

After the ranger station, without a bike lane, the route became more stressful and less enjoyable. This section is 5.2 miles long, and generally has small road shoulders that are between 6" and 12" wide. The shoulder regularly has a rumble strip, minimizing the useable surface for riding a bike along the side. Sections of the shoulder had crumbled and other sections were fully obstructed by bushes and tall grasses that had infiltrated the paved surface [See Appendix B22]. The field researcher felt extremely conflicted while riding this section of Route 179 because he found it difficult to determine whether or not he would personally rather ride Route #3 (the Schnebly Hill road option) or Route 179. He felt that the potentially dangerous vehicle traffic was much more of a threat to safety on Route 179, but that it was much less physically difficult and demanding than Schnebly Hill road.

The field researcher noted that a series of short forest road segments paralleled Route 179 and he attempted to utilize some of them to create a single route separated from the heavily trafficked surface of Route 179. He was unable to stitch together a collection of them to circumnavigate this section of Route 179. He noted that the SCTA could look into creating a singletrack or double-track separated from Route 179 that travels from the terminus of the bike lane to the junction with Interstate 17 for pedestrian and cyclist use as part of the trail development, or work with Arizona Department of Transportation and local land managers to complete the Route 179 bike lane to the road's terminus. After traveling the frustrating but

picturesque 5.2 miles, the route reaches Interstate 17. Route 179 travels underneath Interstate 17 before ending at Forest Road 618.

Forest Road 618 is a well-traveled road that leads into the wet beaver creek trailhead and day use area; trail users could stop here for a rest and swim. About a half mile down Forest Road 618 there is a four-way intersection and the route turns left and heads up Forest Road 689 (also called Blue Grade Road). Forest Road 689 was the original road connecting the Sedona area with Flagstaff. The field researcher experienced a washboard road surface and noted a significant amount of roadside primitive camping/boondocking along the first mile until he reached a closed gate. He also noted seeing a half dozen cows free grazing amidst the campers [See Appendix B23]. When the field researcher reached the closed gate he was required to dismount, pass through and then re-close the gate [See Appendix B24]. At this point the field researcher noticed views towards Sedona, Cottonwood, and Jerome to the southwest behind him which were described as 'spectacular' and noted as a highlight of that day's field testing.

From this point Forest Road 689 continues to climb in elevation, traversing adjacent hillsides. The road parallels Interstate 17, but surprisingly the distance and terrain eliminated the highway noise along most of its length. The road becomes very narrow while traversing a small ravine before passing both Blue Grade Tank and Watermelon Tank [See Appendix B25 and B26]. Just before reaching Stoneman Lake Road (Forest Road 213), Forest Road 689 passes an Arizona Department of Transportation site that appeared to house large machinery and cinders, likely to treat Interstate 17 during winter storms.

It is important to note that an early attempt to test Blue Grade Road/Forest Road 689 on 12/10/2019 was unsuccessful due to a road closure, thought to be due to flooding caused by snowmelt in the area [See Appendix B27]. At this time, many roads were briefly closed in the area for the same reason, including Schnebly Hill Road. This could pose future issues with route seasonality for the SCT, but any roads in this region could be affected by the same phenomenon.

Upon leaving Blue Grade Road, the route travels Stoneman Lake Road (Forest Road 213) northeast towards Stoneman Lake. This section is easily navigated and the road surface is paved, though much of the road is cracked and chipping [See Appendix B28]. Though the pavement wasn't smooth, it was easy to bike along at a good pace and provided some physical relief from the rough forest roads field tested in the region.

The field researcher spent a significant amount of time traveling along Stoneman Lake Road, both by bike and in his personal vehicle to access field test areas, and he noted seeing wildlife on multiple occasions. He noted, on various occasions, mule deer and coyote on the road. He recorded that he saw more wildlife along this section of road than any other road for purposes of field testing for the SCT.

Stoneman Lake Road travels about 5.5 miles and climbs about 1,000 feet before reaching an intersection and reverting to a dirt road surface. From there the road continues gradually uphill for the next 8 miles before reaching Lake Mary Road (Route 3). Along this route is the Stoneman Lake Overlook [See Appendix B29] with a pit toilet and picnic tables. A few other small, unmarked viewpoints above Stoneman Lake Overlook peer south over the lake towards

the Verde Valley [See Appendix B30]. After the lookouts, the route climbs a steep section of switchbacks, which at the time had a deep washboard surface that made traveling in either direction very bumpy and inefficient. This section of steep washboard switchbacks was estimated to last for about half a mile and average between a 6° and 8° grade with a roughly 45-foot long stretch reaching a max grade of 16°. This section was physically difficult, but even with the washboard surface the field researcher was able to complete the climb without dismounting the bicycle. Once reaching the top of the climb the road becomes flatter before reaching Lake Mary Road (Route 3) in about 3 miles.

The route then turns left and follows Lake Mary Road (Route 3) towards Mormon Lake Village [See Appendix B31]. The road had a relatively wide shoulder of between two and three feet, and the field researcher noted that though the road speed limit was 55 mph the traffic was so light that he felt safe and as if the shoulder was ample separation from vehicles in this area.

After traveling roughly 3.5 miles of Lake Mary Road (route 3) the route turns left onto Forest Road 91. Forest Road 91 is generally open to vehicles year-round and was seen to be popular with hunters and occasional primitive campers [See Appendix B32]. This section of the route testing was completed via mountain bike and XC skis, due to the significant snowfall at the time of testing. Many of the photographs and field notes were recorded with the snow and many of these routes were later retested in a vehicle or by gravel bike to verify accuracy.

Forest Road 91 travels through a collection of open meadows for a few miles before cutting right and traveling in a straight line along the border of Broiler Park. Broiler Park is a historic heritage site managed by the United States Forest Service. This is the point where the ‘Route #3’ (the Schnebly Hill road option) and ‘Route #4’ (the Blue Grade Road to Stoneman Lake Road option) meet. From this point forward both potential routes use the same series of forest roads and trails to reach Mormon Lake. That short connector route is described in ‘Route #5’ below.

This collection of routes to connect Sedona to Mormon Lake Village via Blue Grade Road and Stoneman Lake Road provided its own set of challenges. The primary concern that the field researcher had while testing the route was the existence of heavy vehicle traffic along 5.2 miles of Route 179 and the lack of a physical separation from the fast-moving vehicles. Otherwise, this route was relatively easy to travel along and felt like a gravel bike route thanks to the manageable forest road grades and the way in which the route transports the visitor from the desert to the ponderosa pine forest. The route, though longer than the Schnebly Hill Road route, is more easily navigated and provides a less aggressive experience to reach Mormon Lake Village. These collections of roads build a route that is roughly 45 miles long and did not meet any exclusion criteria from the SCTA: Selection and Exclusion Criteria [see Appendix A]. As such, it is recommended for inclusion in the SCT.

Route #5: Forest Road 91 to Forest Road 219 to Mormon Lake Village **(**these roads are used by all options)

Both the ‘Route #3’ (the Schnebly Hill Road option) and ‘Route #4’ (the Blue Grade Road to Stoneman Lake Road option) meet at the intersection of Forest Roads 91 and Forest Road 127. From this point forward both potential routes would use the same series of forest roads and trails to reach Mormon Lake Village.

After paralleling Broiler Park for roughly 2.5 miles on Forest Road 91, the route turns right onto Forest Road 219 [See Appendix B33]. Forest Road 219 meanders its way up about 300 vertical feet over 2 miles before reaching the top of an unnamed heavily forested hillside. At the top of the hill the road crisscrosses the Arizona Trail a couple of times over rocky terrain [See Appendix B34]. After leaving the Arizona Trail the route steeply descends about 400 vertical feet in about one mile [See Appendix B35]. This steep section is somewhat tough to navigate, but brings the trail user directly to the side of Mormon Lake Village. This section finishes by following Mormon Lake Road (Route 90) until reaching Mormon Lake Village in about half a mile.

Route Recommendation

It was difficult to select one collection of routes over others to create one semi-linear route linking Sedona to Flagstaff. This recommendation required ensuring that the route be feasible for credit card touring via a gravel bike, relatively easy to navigate, and that it would meet the desires of the SCTA while working with the SCTA: Selection and Exclusion Criteria [See Appendix A].

Ultimately, only one set of forest roads and trails could be chosen to route the SCT through this section of Coconino County. It is undeniable that Schnebly Hill Road is extremely rough and steep, and that it would likely be undesirable for many gravel cyclists. It is also known that Route 179 has a narrow road shoulder and vehicles speeding by is less desired by the SCTA. At least one explicit exclusion criteria from The SCTA: Selection and Exclusion Criteria [See Appendix A.] was met by the Schnebly Hill Road route. This was the half mile in which the field researcher was required to dismount his bicycle three times due to the rough road surface and steepness.

It is recommended that the SCTA incorporate Route #2, Route #4, and Route #5 to create a single, semi-linear route for the SCT from Sedona to Flagstaff, Arizona.

The route will begin by traveling from Sedona down Route 179 until reaching Interstate 17. At this point it will join Forest Road 618 for a short stretch before turning onto Blue Grade Road (Forest Road 689). After climbing to the top of Blue Grade Road the route turns right onto Stoneman Lake Road (Forest Road 213). The route meanders up Stoneman Lake Road, providing spectacular views to the south until it reaches Lake Mary Road. Lake Mary Road is traveled for a short stretch before the route veers left onto Forest Road 91. Eventually the route leaves Forest Road 91 and climbs up and over an unnamed hillside on Forest Road 219 before reaching Mormon Lake Village.

From Mormon Lake Village the route ventures up Route 90 to Forest Road 132. Forest Road 132 quickly turns into Forest Road 132D and then transforms back into Forest Road 132 again before reaching the Priest Draw Trail. The Priest Draw Trail provides a fun, flowy singletrack which is traveled along before ending at Forest Road 235. Forest Road 235 travels just outside of Mountainaire, providing occasional glimpses homes and cabins on the forest's edge. The route then cuts onto Forest Road 762D, which climbs up towards the outskirts of Flagstaff. Forest Road 762 is then taken to reach Forest Road 3E near the Flagstaff Airport before reaching Frontier Road which connects this route to Lake Mary Road just inside Flagstaff, Arizona.

This option would be significantly more feasible and offer a wider season for credit card gravel tourists to travel between Sedona and Flagstaff Arizona. The use of Schnebly Hill Road for gravel cyclists traveling on the SCT would make this region's trail experience feel fragmented and distinct from other sections, such as the areas near Phoenix where the SCT is planned to travel along flat paths paralleling water canals.

Recommendations for Development and Improvement

Prior to designating these collections of trails and forest roads as part of the SCT, the SCTA should communicate with the United States Forest Service to ensure they will allow the route on the land they manage. They should also see if the United States Forest Service may be willing to commit to maintaining any portions of the route within their jurisdictions. It would be beneficial for the SCTA and/or the Forest Service to provide signage along the route, especially at road and trail intersections.

Based on route field testing, the 5.2 mile section of Route 179 that is without a bike lane is the only portion of the recommended route that creates and concern for user safety and/or feasibility. All other roads and trails were sufficiently maintained for gravel cycling at the time of testing. If the SCTA were willing to undertake any further development of the route, it is recommended that they attempt make the southeastern end of Route 179 safer and more enjoyable for cyclists.

One possible solution could be continuing the existing bike lane from the USFS Red Rocks ranger district office along both sides of Route 179 until its southern terminus at its intersection with Interstate 17. Creation of a bike lane on both sides would require coordination with the Arizona Department of Transportation, but would open up Wet Beaver Creek to cyclists as well as offer a connector to Montezuma Well Road and communities to the south, such as Cornville, Cottonwood, and the Verde Valley with cycling in and around Sedona.

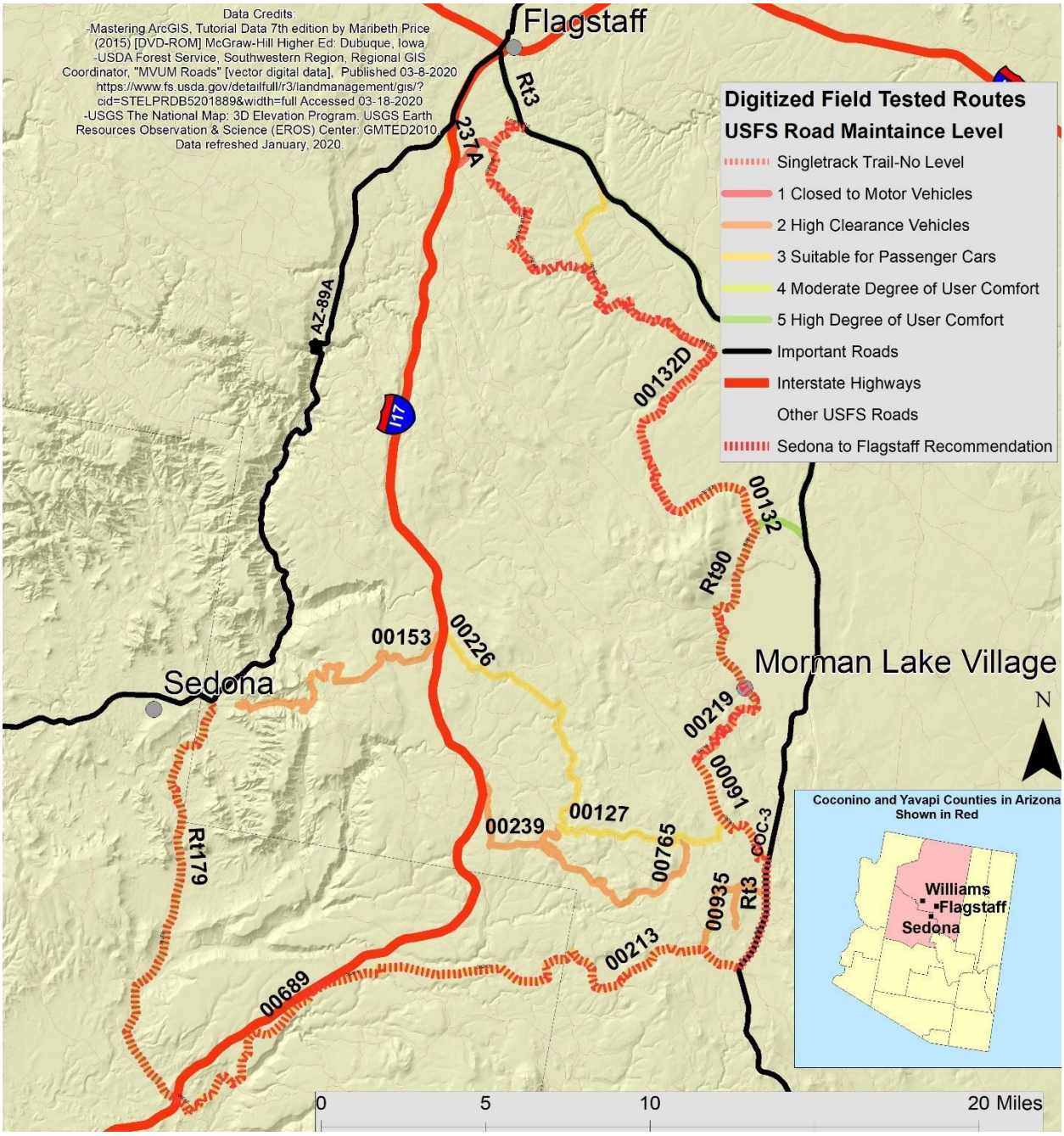
The other option could be to create a pathway separated from the road surface that runs parallel to the road on one side of Route 179. The terrain around both sides of Route 179 where a bike lane does not exist is relatively flat and few obstacles exist. Many short sections of forest roads parallel bits and pieces of the Route 179, and could be stitched together with a rudimentary pathway to negate the need for trail users to travel on the road surface unseparated from vehicles.

This could be used in both directions and provide recreational opportunities outside of those specifically within the scope of the SCTA.

Section Map Compositions

Map Composition Showing all Tested Routes in Section

Map Composition Showing the Recommended Route in Section



Appendix B.

SCT Route Recommendation Report: Flagstaff to Williams Section

Section Background

This Route Recommendation Report specifically addresses the Flagstaff, Arizona to Williams, Arizona section for the SCT. This section navigates interesting terrain and its topography is considerably easier to navigate and is less physically challenging compared to the Sedona to Flagstaff section. This section of the SCT experiences locally varying weather that is subject to significant seasonal differences, and provides excellent opportunities for additional outdoor recreational pursuits. This section is also visually appealing, thanks to the prominent San Francisco Peaks to the north. The San Francisco Peaks include Humphreys Peak, which at over 12,500 feet is the highest point in Arizona.

Both Williams and Flagstaff, Arizona see significant tourism. Williams is often utilized for lodging by travelers visiting the South Rim of the Grand Canyon, which is roughly 59 miles to the north. Williams is also home to a popular train that shuttles visitors to and from the South Rim of the Grand Canyon, and also Bearizona, which is a wildlife and safari park. Flagstaff experiences its own significant visitation a wide array of tourists, including but not limited to visitors on their way to or from the Grand Canyon, and the town is often a starting point for many expedition-style river trips that venture into the canyon for backcountry excursions. Both cities also see visitation by those traveling along historic Route 66, which weaves its way between the two cities as it crosses the country.

There is only one particularly efficient route to connect Flagstaff to Williams. Interstate 40 is an East-West thoroughfare cutting a relatively straight line between the two. Interstate 40 crests the Arizona Divide at 7,335 feet between the communities; this is the high point before descending either direction. Though Interstate 40 is feasible for cars and is occasionally—and sectionally—used by traditional bicycle tourists traversing the area, it is nonetheless relatively dangerous to walk or bike alongside because of the high speeds of vehicles and how busy the road typically is. Short sections of various frontage roads travel directly alongside parts of Interstate 40 that are potentially more feasible for safely traveling via a gravel bike, but these often abruptly dead-end or end by re-entering the Interstate; and, these are not particularly enjoyable ways of linking the communities.

Route 66 was, prior to the construction of Interstate 40, the historical connection between Flagstaff to Williams. Route 66 still exists and parallels parts of Interstate 40, but they often are one and the same, wherein Route 66 enters the I-40 for durations before leaving and running alongside again, hence its occasional use by traditional bicycle tourists. Some portions of historic Route 66 run parallel to Interstate 40 and are potentially feasible and enjoyable for gravel cycling and see little vehicle traffic. These parts were considered for inclusion within the SCT, and they may become more prominent as the SCT heads northwest toward Las Vegas, Nevada.

First Impressions

The SCTA and field researcher independently identified that Interstate 40 is not in consideration as a route, because it is insufficient at meeting the needs of the trail's intended users. Because of this, the field researcher omitted the route from consideration and did not test any section of Interstate 40. Some interest was voiced by individual stakeholders within the SCTA to try to include of parts of historic Route 66 because of the road's history and its accessibility. The SCTA did not express any additional, specific route interests for this section other than those related to route feasibility as described in the SCTA: Selection and Exclusion Criteria [See Appendix A].

The field researcher primarily used United States Forest Service Motor Vehicle Use maps of the region to draft possible routes between Flagstaff and Williams that were then tested.

Primary Identified and Tested Routes

Upon commencing preliminary field testing, it quickly became apparent that ease of navigation and bikeability were imperative to developing a single, semi-linear route between Flagstaff and Williams. Hundreds of forest roads exist between the two cities, and it would have been impossible to attempt to test all of them in the scope of this project. The remote location, elevation changes, and weather within this region created further challenges for the field researcher. Snow and rain impeded testing and limited the seasons that testing could occur. Unlike the Sedona to Flagstaff section, there was no obvious obstacle to surmount, so the field researcher could often travel widely and over long distances, and thus become isolated very quickly—which was of concern when weather changed. The field researcher took this into account and noted areas that were particularly exposed and could create dangerous conditions for trail users. As with other sections, the field testing aimed to help define a route that wouldn't likely be circumnavigated by trail users or give cause for users to become disoriented or lost due to the difficulty of navigation and/or challenging terrain.

The rather open terrain and the quantity of forest roads in the area led to the field researcher to test many roads that he hadn't initially intend to. By the end of field testing, the researcher had identified 9 different variations where tested routes could be linked together to connect Flagstaff to Williams. Not all variations were equal, though, and an ideal route will be described in this report.

Of several options tested, only one route leaving Flagstaff toward Williams, Arizona is presented and described in this route recommendation because it was the only option tested that worked for recreational use. This route passes through the town of Parks, Arizona. From the town of Parks—where Old Route 66 and Spring Valley Road (Forest Service Road #141) intersection—onward to Williams, three different options will be presented and described.

Each of these routes has its own strengths and weaknesses, and creating a single route recommendation was challenging even with data collected from copious amounts of time spent in the field.

Flagstaff to the Town of Parks (only route recommended from Flagstaff to Parks, Arizona)

Mars Hill Trail to Forest Road 901K to Forest Road 222 to Forest Road 171 to Old Route 66

There were technically three different routes that were tested and could be considered, all leaving Flagstaff's historic downtown towards Williams, Arizona, but the other route options were inadequate. First, Mars Hill Road begins with a very steep climb and connects to a decommissioned, unnamed forest road that can be reached by traveling a game trail from the Lowell Observatory, but this trail is not maintained for recreational use and may trespass on the Lowell Observatory's property. Second, a potential route begins at Thorpe Park and travels up the Thorpe Park Access Road before turning up the Mars Hill Trail. Only tenths of a mile later this route cuts right, off of the Mars Hill Trail, and follows a series of well-traveled game trails before connecting to the Observatory Mesa Trail, and then reaching the Mars Hill Trail again. This route is likely not entirely sanctioned and rather steep and difficult to navigate. Both of these options were omitted from consideration because of their lack of formal designation for recreational use by the City of Flagstaff or the United States Forest Service.

The route that remains is officially sanctioned for recreational use as part of the Flagstaff Urban Trail System [FUTS]. The route begins at Thorpe Park near Flagstaff's historic downtown. It starts by following the Thorpe Park Access Road, which is closed to motor vehicles and cuts through a disc golf course. The route then turns left and heads up the Mars Hill Trail. The Mars Hill Trail is part of the FUTS and gradually climbs up the side of the Observatory Mesa where the Lowell Observatory resides. The route continues on the Mars Hill Trail until intersecting with Forest Road 515 and the Tunnel Springs Trail [See Appendix B36]. The route then takes Forest Road 515 for approximately 1.2 miles. Forest Road 515 was found to be very flat and well maintained which allowed for easy travel. The route then turns onto Forest Road 9113C which parallels a buried gas pipeline for about 0.8 miles. Then the route turns left onto Forest Road 506 and travels on it for 1 mile. The route then turns right onto Forest Road 668D and travels directly towards the San Francisco Peaks, providing wonderful views which were framed by the trees growing along the roadside [See Appendix B37]. The route then reaches a junction and turns left onto Forest Road 901K. Up until this point all the forest roads and trails traveled were described by the field researcher as enjoyable and easy to navigate. The field researcher also noted that the well-maintained surfaces allowed for distance to be travelled at a relatively quick pace compared to many other forest roads. Forest Road 901K travels alongside a large, buried gas pipeline within a linear clearing, providing nice views to the distance. After a mile, Forest Road 901K reaches a steep sheer section that descends about 180 vertical feet in roughly 0.15 miles [See Appendix B38]. This short section is un-rideable on a gravel bike in either direction, and so steep that it couldn't be hiked by the field researcher without him using his hands and feet to navigate the terrain. Luckily there is a switchback located to the south side of Forest Road 9014K which allowed for the steeps to be avoided. This section would likely cause a gravel cyclist to dismount because of the loose cinders on the road surface, but it was successfully descended cautiously by the field researcher on one occasion [See Appendix B39]. Forest Road 9014K continues after the descent and then is blocked by a locked gate accompanied by a no trespassing sign placed by the gas pipeline company.

Directly to the right is Rudds Tank Road, which is a somewhat maintained paved road leading into Baderville. Baderville is a small collection of properties off of Route 180 at the base of Snowbowl Road. This area provided wonderful views of the San Francisco Peaks and is the closest that any tested routes get to the peaks [See Appendix B40].

A combination of short road segments were then used by the field researcher to re-access forest roads from this point. The field researcher traveled along Rudds Tank road to N Chambers Drive, to W Suzette Lane, to N Bader Road before reaching Route 180. The route travels along Route 180 for roughly a third of a mile before turning left onto Forest Road 222. Forest Road 222 was seen to be relatively popular with roadside camping/boondocking and provided a well-maintained road surface for gravel biking along with occasional views. The route travels on Forest Road 222 for roughly 6 miles before reaching Forest Road 171. The route turns left onto Forest Road 171 and travels along it for roughly 3 miles before reaching Old Route 66 just outside of the unincorporated community of Bellemont.

Bellemont is a small community directly off of Interstate 40 which provides some services to travelers. A gas station could be easily visited by someone traveling along the SCT to purchase food and water or to seek shelter from potential weather.

It should be noted that there was a route tested along Forest Road 6796, following a buried gas pipeline off of Forest Road 171 and travelling through some aesthetically pleasing terrain before reaching Government Prairie Road, but this route will not be included in the route recommendation report because it is difficult to navigate, isolated, and was seen by the field researcher to be too exposed to weather for consideration. The field researcher was caught in a thunderstorm while in the middle of a large grassland, and was more than 2 miles from tree cover in any direction.

From Bellemont the route follows Old Route 66 for approximately 7.5 miles. The field researcher was surprised by the lack of vehicle traffic along this section, and noted that it was interesting to gravel bike along such a historic section of road. This 7.5 miles was made up of two different road surfaces. The start and end were both paved and the middle of this portion was dirt. The dirt portion was surprisingly well maintained and the field researcher was easily able to maintain a good pace. This section was described as uneventful and sufficient.

The intersection of Old Route 66 and Spring Valley Road (Forest Road #41) is very close to the center of Parks Arizona [See Appendix B41 & B42] and where three separate route options were tested to reach Williams.

Three Options from Parks to Williams

- **Route #1: Spring Valley Road (Forest Road 141) to Route 64**
- **Route #2: Spring Valley Road (Forest Road 141) to 74 to Deer Farm Road (Route 146) to Bearizona Boulevard**
- **Route #3: Old Route 66 to Deer Farm Road (Route 146) to Bearizona Boulevard**

Route #1: Spring Valley Road (Forest Road 141) to Route 64

Spring Valley Road (Forest Road 141) to Route 64 is a straightforward route from Parks to Williams. Though it is long (roughly 30 miles), it is relatively easy to navigate. The route brings the trail user around Sitgreaves Mountain, which is a prominent mountain in the area.

This route travels up Spring Valley Road (Forest Road 141) and is paved for roughly 4.5 miles. Along this route are views of the San Francisco Peaks far to the northeast and Sitgreaves Mountain to the northwest. The route passes a few rural residential areas before turning into a dirt road and then reaching Spring Valley [See Appendix B43]. The road then travels approximately 3.5 miles with occasional ranches to either side before reaching an old wildfire burn area. Around this same point the route passes closely by the historic Spring Valley Cabin, now managed by the United States Forest Service. Signage cautions visitors about the possibility of weakened trees, stump holes and the possibility of flooding, though no direct evidence of this was seen by the field researcher. The route then travels another 2.5 miles before reaching a three-way intersection in an opening. The route turns left to remain on Spring Valley Road (Forest Road 141). The route then travels through another small rural area before returning to forested terrain.

> Note: The field researcher felt it crucial to note two significant experiences that occurred on this stretch of Spring Valley Road (Forest Road 141). On one field test the field researcher reached the area near the intersection with Forest Road 97 and found that a strong thunderstorm had encompassed the area. Due to isolation, the field researcher had no option but to wait out the storm in a large patch of trees of similar height off to the side of the road in a lightning position (a posturing often used by backcountry travelers to potentially minimize bodily harm caused by a direct or indirect lightning strike). The field researcher stayed in the lightning position for roughly 10 minutes before continuing to test the route as the imminent danger and proximity of the lightning had subsided. A few minutes later, about two miles further down Forest Road 141, a bolt of lightning struck the ground an estimated 12 miles away. The noise startled a small heard of cows that were grazing in the open range. The field researcher estimated that 12-14 cows were startled by the noise and then preceded to stampede in the direction of the field researcher from behind. The field researcher accelerated on his gravel bike and evaded the stampede after roughly a quarter mile.
>
> This experience illustrates the isolation and wild nature of this area. The field researcher considered this simply an unlucky occurrence, but felt that it needed to be included within the route recommendation report to ensure that the experiences on various routes were accurately described.

The route stays on Spring Valley Road (Forest Road 141) and makes no turns for the next 11 miles before reaching pavement. Along this section of road, prior to reaching pavement, the field researcher encountered a snake laying across the road. The field researcher narrowly avoided the snake and was able to capture a photograph from a safe distance [See Appendix 44].

The field researcher also noted seeing some animals far in the distance from the road that were either elk or deer.

The route becomes paved and continues an estimated 2.5 miles through a rural area up and over a saddle between two hills before reaching an intersection with Route 64. Route 64 is a relatively busy road that travels between Williams and the South Rim of the Grand Canyon. The route sees lots of tourism traffic and the speed limit is 65 mph. The majority of Route 64 into Williams has a somewhat wide breakdown lane [See Appendix B45] which made biking along it safer, but the traffic was moving so fast that wind from vehicles occasionally pushed the field researcher off of the road surface. The field researcher also noted the existence of 5 dead elk on the sides of Route 64 that suggested this section of road is dangerous to be on or around. The route travels alongside Route 64 for roughly 5.5 miles before crossing under Interstate 40 and descending to Williams.

All of the roads tested along this route had adequate surfaces and grades to meet the SCTA: Selection and Exclusion Criteria [See Appendix A]. No particular sections were too rough or steep to allow for gravel cycling.

This route created a concern for inclusion initially due to how isolated it is. The experiences that the field researcher had while traveling the route suggested that it might not be appropriate for inclusion within the SCT. In addition to the significant traffic on Route 64, isolation and exposure to weather were noted as possible reasons for exclusion even before analyzing the route. After GPS data was added into a GIS Arc Map of all tested routes for this project it was discovered that this option when digitized and measured is roughly 59.2 miles in length. Based on the SCTA: Selection and Exclusion Criteria [See Appendix A] this route should be excluded from consideration because it is over 55 miles in length.

Route #2: Spring Valley Road (Forest Road 141) to 74 to Deer Farm Road (Route 146) to Bearizona Boulevard

Spring Valley Road (Forest Road 141) to Forest Road 74 to Deer Farm Road (Route 146) to Bearizona Boulevard is the least obvious route of the three options and the most difficult to navigate. This route begins taking the same set of roads utilized by 'Route #1' (the Spring Valley Road (Forest Road #141) to Route 64 option). Because of this the same description will be provided until the route branches off onto Forest Road 74.

This route travels up Spring Valley Road (Forest Road 141) and is paved for roughly 4.5 miles. Along this route are views of the San Francisco Peaks far to the northeast and Sitgreaves Mountain to the northwest. The route passes a few rural residential areas before turning into a dirt road and then reaching Spring Valley [See Appendix B43]. The road then travels approximately 3.5 miles with occasional ranches to either side before reaching an old wildfire burn area. Around this same point the route passes closely by the historic Spring Valley Cabin, now managed by the United States Forest Service. Signage cautions visitors about the possibility of weakened trees, stump holes and the possibility of flooding, though no direct evidence of this was seen by the field researcher. The route then travels another 2.5 miles before reaching a three-way intersection in an opening. The route turns left to remain on Spring Valley Road (Forest

Road 141). The route then travels through another small rural area before returning to forested terrain.

Note: The field researcher felt it crucial to note two significant experiences that occurred on this stretch of Spring Valley Road (Forest Road 141). On one field test the field researcher reached the area near the intersection with Forest Road 97 and found that a strong thunderstorm had encompassed the area. Due to isolation, the field researcher had no option but to wait out the storm in a large patch of trees of similar height off to the side of the road in a lightning position (a posturing often used by backcountry travelers to potentially minimize bodily harm caused by a direct or indirect lightning strike). The field researcher stayed in the lightning position for roughly 10 minutes before continuing to test the route as the imminent danger and proximity of the lightning had subsided. A few minutes later, about two miles further down Forest Road 141, a bolt of lightning struck the ground an estimated 12 miles away. The noise startled a small heard of cows that were grazing in the open range. The field researcher estimated that 12-14 cows were startled by the noise and then preceded to stampede in the direction of the field researcher from behind. The field researcher accelerated on his gravel bike and evaded the stampede after roughly a quarter mile.

This experience illustrates the isolation and wild nature of this area. The field researcher considered this simply an unlucky occurrence, but felt that it needed to be included within the route recommendation report to ensure that the experiences on various routes were accurately described.

Note: The field researcher felt it crucial to note two significant experiences that occurred on this stretch of Spring Valley Road (Forest Road 141). On one field test the field researcher reached the area near the intersection with Forest Road 97 and found that a strong thunderstorm had encompassed the area. Due to the isolation the field researcher had no option, but to wait out the storm in a large patch of trees of similar heights off to the side of the road in a lightning position (a posturing often used by backcountry travelers to potentially minimize bodily harm caused by a direct or indirect lightning strike). The field researcher stayed in the lightning position for roughly 10 minutes before continuing to test the route as the imminent danger and proximity of the lightning had subsided. A few minutes later about two miles further down Forest Road 141 a bolt of lightning struck the ground an estimated 12 miles away. The noise startled a small heard of cows that were grazing in the open range. The field researcher estimated that 12-14 cows were startled by the noise and then preceded to stampede in the direction of the field researcher from behind. The field researcher accelerated on his gravel bike and evaded the stampede after roughly a quarter mile.

This experience illustrates the isolation and wild nature of this area. The field researcher considered this simply an unlucky occurrence, but felt that it needed to be included within the route recommendation report to ensure that the experiences on various routes were accurately described.

At this point this route option separates from 'Route #1' (the Spring Valley Road (Forest Road 141) to Route 64 option) and descends Forest Road 74. Forest Road 74 descends rather consistently for roughly 4.4 miles before crossing over a buried pipeline and the Elpaso Natural Gas Williams Station. At this point the route becomes paved and also connects with and briefly follows the Great Western Trail. Signage indicated that the route was on the Great Western Trail which appeared to be maintained by the United States Forest Service and is funded by the Off-Highway Vehicle Recreation Fund from the Arizona State Parks [See Appendix B46]. The route than continues 3 more miles through a few prairies until reaching an intersection with Old Route 66, Interstate 40, and Deer Farm Road (also called route 146).

From here this route option reconnects with the 'Route #3' (which is later described in this document) and takes the same collection of roads until reaching Williams. The route follows along Deer Farm Road (Route 146) for 4.5 miles. It passes an active deer farm along its route which is open to visitors [See Appendix B47]. This section slightly rises before descending back down and reconnecting with Interstate 40 and it provides a few great views of the peaks to the northeast [See Appendix B48]. At Interstate 40 this route crosses the highway on a bridge and immediately after reaches Bearizona Boulevard—also called route 51A. It is important to note that there was no signage present at this intersection to inform trail users what roads were being encountered. The route follows Route 51A for 1.7 miles, then passes the Bearizona wildlife and safari park before reconnecting with Route 64 [See Appendix B49 &B50]. Route 64 is followed on the road shoulder before reaching Williams in 2.3 miles. This section of road provided a historic feeling while descending into the town [See Appendix B51].

All of the roads tested along this route had adequate surfaces and grades to meet the SCTA: Selection and Exclusion Criteria [See Appendix A]. No particular sections were too rough or steep to allow for gravel cycling though it may be slightly undesirable to travel north on Forest Road 74 because the route consistently climbs for about four miles.

This route also created some concern for inclusion due to how isolated it was. The experiences that the field researcher had while traveling the route suggested that it might not be appropriate for inclusion within the SCT. Similar to 'Route #1' (the Spring Valley Road (Forest Road 141) to Route 64 option). After GPS data was added into a GIS Arc Map of all tested routes for this project it was discovered that this option when digitized and measured is roughly 60.2 miles in length. Based on the SCTA: Selection and Exclusion Criteria [See Appendix A] this route should be excluded from consideration because it is over 55 miles in length.

Route #3: Old Route 66 to Deer Farm Road (Route 146) to Bearizona Boulevard

Old Route 66 to Deer Farm Road (Route 146) to Bearizona Boulevard is the most obvious route of the three options and the easiest to navigate. The route is less adventurous than the other two, but significantly shorter and reaches Williams much faster than either of the other routes. This route closely parallels Interstate 40 which is preferable for access and safety, but less desirable due to occasional highway noise.

This route also begins at the intersection of Old Route 66 and Spring Valley Road (Forest Road 141). Instead of traveling up Spring Valley Road (Forest Road 141) as both 'Route #1' and

‘Route #2’ do, this route remains on Old Route 66 for roughly 6 miles until reconnecting with the last half of the ‘Route #2’ option at the intersection of Forest Road 74 and Deer Farm Road (Route 146) This 6 miles is easy to navigate and has a road surface of old, crumbling pavement that is sufficient for travel [See Appendix B52]. The route climbs a modest hill before descending to an open prairie alongside Interstate 40. The open prairie provides views of Sitgreaves Mountain and the San Francisco Peaks. The route then reaches the intersection of Forest Road 74, and Deer Farm Road (also called route 146).

From here this route option reconnects with the second half of ‘Route #2’ and takes the same collection of roads until reaching Williams. The route follows along Deer Farm Road (Route 146) for 4.5 miles. It passes an active deer farm along its route which is open to visitors [See Appendix B47]. This section slightly rises before descending back down and reconnecting with Interstate 40 and it provides a few great views of the peaks to the northeast [See Appendix B48]. At Interstate 40 this route crosses the highway on a bridge and immediately after reaches Bearizona Boulevard—also called route 51A. It is important to note that there was no signage present at this intersection to inform trail users what roads were being encountered. The route follows Route 51A for 1.7 miles and passes the Bearizona wildlife and safari park before reconnecting with Route 64 [See Appendix B49 &B50]. Route 64 is followed on the road shoulder before reaching Williams in 2.3 miles. This section of road provided a historic feeling while descending into the town [See Appendix B51].

This route was the only option not excluded by the SCTA: Selection and Exclusion Criteria [See Appendix A] because of the route length. This route, when digitized and measured based on GPS data, is roughly 42.4 miles in length. This is within the 55 mile maximum length for inclusion in the SCT.

Route Recommendation

The recommended route for this section begins at Thorpe Park near Flagstaff’s historic downtown. It begins by taking the Thorpe Park Access Road and then the Mars Hill Trail to achieve the Observatory Mesa. From here the route takes Forest Road 515 for a short distance before turning right into Forest Road 9113C. At the end of Forest Road 9113C the route turns left onto Forest Road 506. Next the route takes Forest Road 668D to 9014K which offers beautiful views of the San Francisco Peaks to the north. From here the route reaches the rural area of Baderville and it follows a series of paved roads through a neighborhood. Rudds Tank road is taken to N Chambers drive before turning onto W Suzette Lane. W Suzette Lane is taken shortly until the route turns onto N Bader road. At the end of N Bader Road the route reaches Route 180. The recommended route then turns left onto Route 180. After a short stretch of Route 180 the route starts down Forest Road 222. After about 6 miles Forest Road 222 the road ends at a three-way intersection with Forest Road 171. The recommended route turns left onto Forest Road 171 and stays on it until reaching Old Route 66. At Old Route 66 the recommended route turns left and remains on Old Route 66, passing by Parks, Arizona. The route follows Old Route 66 from Forest Road 141 to Deer Farm Road for about 14 miles. It then takes the Deer Farm

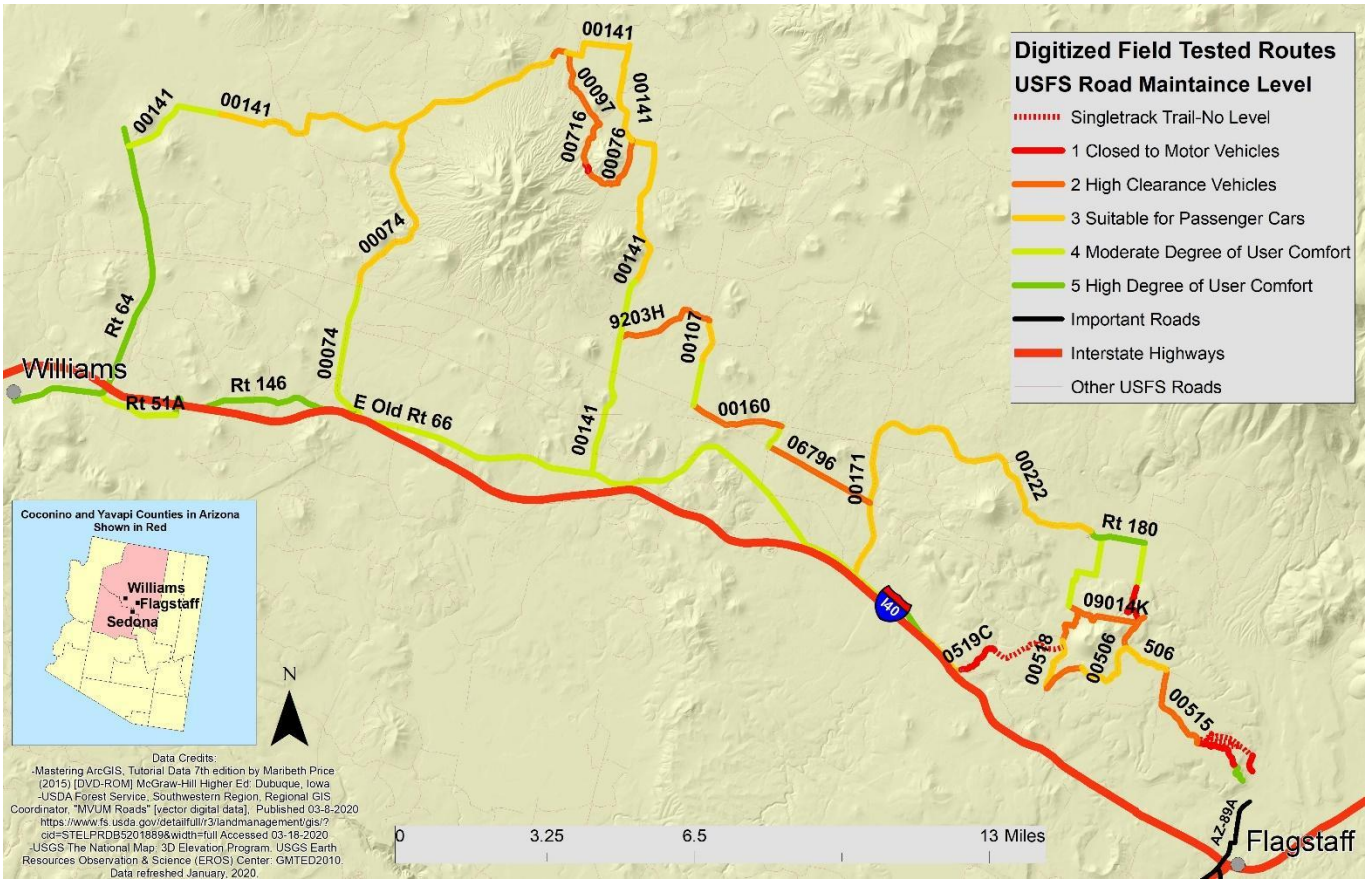
Road (Route 143) until meeting back up with Interstate 40. The recommended route crosses over Interstate 40 on a bridge and immediately turns right onto an unmarked forest road. This road is missing signage, but is called Bearizona Boulevard (also called route 51A). Bearizona Boulevard travels next to Bearizona and then deposits the trail user on Route 64 just outside of Williams. The recommended route follows along Route 64 on the road shoulder for 2 miles before reaching the center of Williams.

Recommendations for the Development and Improvement

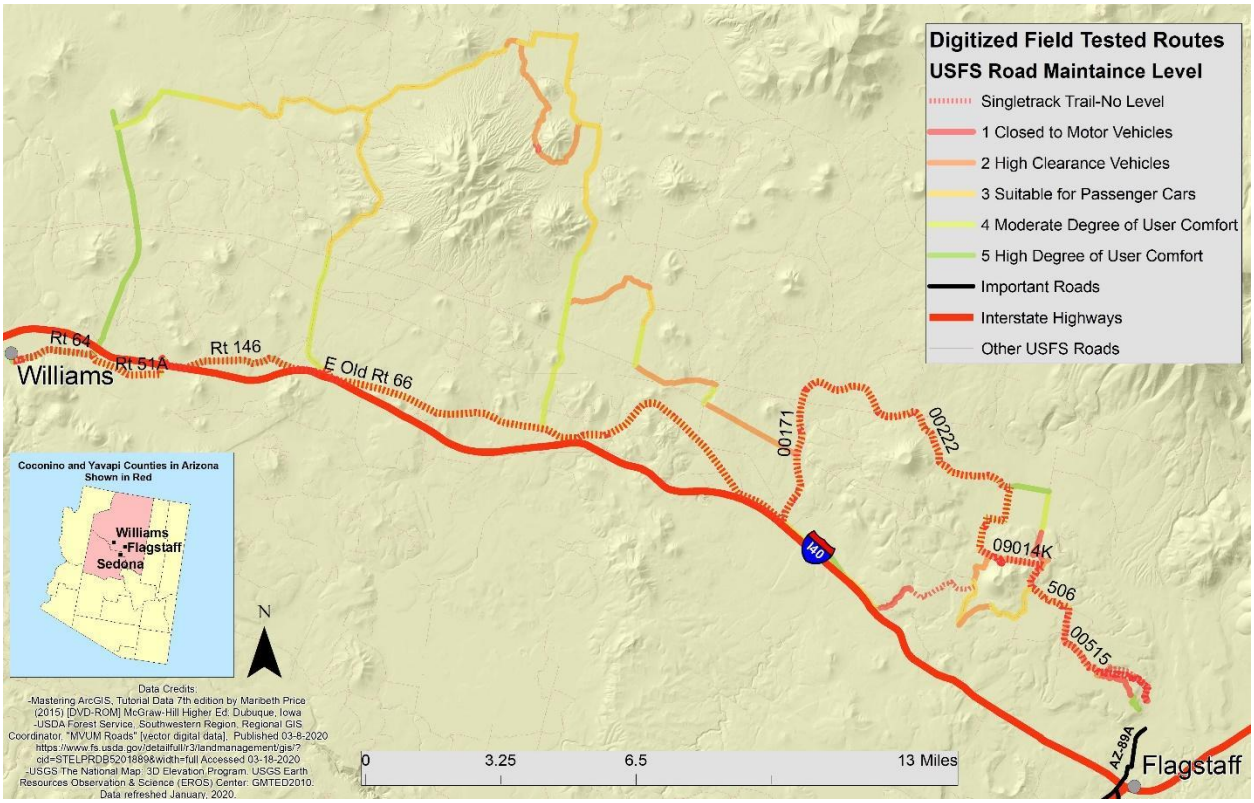
Prior to designating this collection of trails and forest roads as part of the SCT, the SCTA should communicate with the United States Forest Service to ensure they will allow the route on the land they manage. They should also inquire if the United States Forest Service may be willing to commit to maintaining any portions of the route within their jurisdictions. It would be beneficial for the SCTA and/or the Forest Service to provide signage along the route, especially at road and trail intersections. Other than signage and maintenance, no particular development or improvements are necessarily needed.

Section Map Compositions

Map Composition Showing all Tested Routes in Section



Map Composition Showing the Recommended Route in Section



Appendix B.

Photography

This section contains particularly pertinent photographs taken in the field in order to illustrate specifically appealing or problematic sections of tested routes. These photographs may or may not be accompanied by short summaries and/or specific locations.

B1.

Route 90 traveling south 4 miles from Mormon Lake Village

B2.

Lake Mary Road (route 3) traveling north roughly 6 miles from the center of Flagstaff, AZ being passed by a vehicle while cycling. The background shows additional vehicles and the foreground illustrates the bike lane width and lack of physical separation from vehicles.

B3.

This photograph shows a fire-line noticed by the field researcher that crosses Forest Road 132D and some of the fire damage to the local flora. The fire-line momentarily slowed travel along the forest road, but was interesting to see.

B4.

This photograph was taken by the field researcher looking south on Forest Road 132D. It shows a section of road that appeared to be hastily graded possibly during wildfire mitigation. Though it may not appear significant the rocks dislodged by the grading made this section painstakingly slower than the rest of the route.

B5.

Signage indicating the northern boundary of the Pinegrove Quiet Area on Forest Road 132D.

B6.

This photo illustrates the transition to the less maintained portion of Forest Road 132D once inside the Pinegrove Quiet Area. Particularly note the significant ruts and medium size rocks on the road surface.

B7.

Photo illustrating the density of vehicle traffic on Schnebly Hill Road. The vehicle in the foreground is ascending and a secondary vehicle is approaching in the distance descending the route. The field researcher was unable to capture a photo of the route when more vehicles were present because he was preoccupied with dismounting and removing himself from the road service to avoid blocking traffic.

B8.

This photo shows the loose rock that makes up much of Schnebly Hill Road's surface.

B9.

This photo shows the view back down Schnebly Hill Road towards Sedona. Note Sedona is visible to the left and red rocks can be seen to the right.

B10.

This image shows one of a few rockslides on Schnebly Hill road above the seasonal vehicle closure. The rock debris is seen on the right side of the road and the field researcher's bicycle is leaning against a large boulder that was likely part of the rockslide to provide scale.

B11.

This picture shows Casner Canyon 1 on Schnebly Hill road taken on 3/21/2020. The water was flowing quickly and eroding the road. The water is crossing the road perpendicularly on a hairpin corner and is roughly 20-30 feet wide and up to 36” deep in places. The water depth looks minimal in the photo. The field researcher found this depth out the hard way when he attempted to cross the flow by bike.

B12.

Schnebly Hill Vista looking back down Schnebly Hill Road south towards Sedona. Schnebly Hill Road can be seen on the left crossing the hillside and a little bit of Sedona can be seen in the background in the middle of the photo. The field researcher's route specific gravel bike is in the foreground.

B13.

This image was captured at the point where the field researcher found the top of Schnebly Hill Road to be impassible at an elevation of 6,450ft on 3/21/2020. Minimal snow had been observed up until this point. The temperature roughly 2,000 feet lower where the field researcher had begun the field test about 3 ½ hours earlier was about 50°F. This image illustrates the potential impracticability of including this road due to its seasonal change and the lack of consistent conditions during shoulder seasons. It is also important to note that 2020 was not an above average snow year in this region.

B14.

This photo shows scenic views along the top of Schnebly Hill road a few miles from Interstate 17. Schnebly Hill road runs along the foreground and Fox Ranch is in the background to the right. This photo also illustrates the slightly moisture in the soil making up the road. The picture was taken on 4/14/2020 at 10:09AM. Soon after this photo was taken drastic warming turned the road into mud which created very challenging terrain and slowed riding.

B15.

This picture shows a hole in the road where a metal corrugated culvert pipe for drainage caved in. The pipe runs perpendicularly under the road and appeared to collapse due to vehicles traveling on the road with the wet soft conditions.

B16.

Drastic warming turned the top of Schnebly Hill road into mud eventually impacting and stopping the field researcher's bike wheels from turning. This road should not be used if there is any evidence of moisture in the ground surface.

B17.

This image shows forest road 226 which was well maintained and well-marked. The road surface was perfect for gravel cycling and allowed for consistently fast speeds to be maintained.

B18.

This photograph shows open areas along Forest Road 127 allowing for views and creating space for some strong winds.

B19.

This is a picture of Tlaquepaque which is an arts and crafts village within Sedona. It is home to a variety of popular tourist attractions, art stores, restaurants, and new age vortex shops. It is located on Route 179 near the intersection with Schnebly Hill road just south of the junction of Route 179 and Route 89A.

B20.

This picture shows the wide bike lane provided on Route 179 heading south. The speed limit in this section is 35 mph and ample room is provided for cyclist. Cathedral Rock is the most prominent rock structure in the distance.

B21.

This shows the view seen within the Village of Oak Creek on Route 179 looking north while entering the red rocks.

B22.

This image shows a section of narrow, eroded road shoulder along highway 179. The picture was taken looking northbound roughly 3 miles south of the Village of Oak Creek. Directly to the right of the white line in the foreground a rumble strip limiting the width of the shoulder for bike tires can be seen.

B23.

This picture shows a cow free grazing amidst campers along the side of forest road 689. This cow and others made traveling along 689 a bit more challenging, but also quite fascinating to watch graze.

B24.

This is a cattle gate located roughly 1 mile up forest road 689. The road behind provides picturesque views as it climbs the hillside. The view to the south and southwest includes red rocks of Sedona, Cottonwood, and the hillside where Jerome resides in the distance.

B25.

This image shows forest road 689 traversing up the side of a small ravine before reaching Blue Grade Tank. The image was taken looking back down the road to the southwest. I-17 and a sliver of Cottonwood can be seen in the distance. Many blooming cacti can be seen growing along the roadside.

B26.

Blue Grade Tank located directly to the side of forest road 689.

B27.

Blue Grade Road #689 was closed on 12/10/2019. The closure was thought to be due to flooding caused by snowmelt in the area. This road could create an issue of seasonality for the Sun Corridor Trail.

B28.

Stoneman Lake Road #213 traveling northeast. The roads pavement was cracked and chipped, but still a nice change from the rough forest roads that much of this route travels along.

B29.

This picture shows the view from Stoneman Lake Overlook down to Stoneman Lake (dry at the time) and Stoneman Lake Village. Stoneman Lake Road 213 climbs the hill seen on the right side of this picture.

B30.

This was the view seen from the side of Stoneman Lake Road 213 looking southwest. Stoneman Lake and parts of Stoneman Lake Village can be seen in the foreground. A few cabins can be seen at the base of the cliff and to the right along the dirt road. Sedona's Red Rocks can be seen in the distance towards the center of the photo and the Stoneman Lake Overlook picnic site is the tan area in the middle of the tree line across the dry portion of lake.

B31.

This photograph shows the intersection of Stoneman Lake Road 213 and Lake Mary Road (route 3). There is a relatively wide road shoulder on Lake Mary Road and the field researcher experienced little vehicle traffic while biking long the road shoulder.

B32.

Entrance to forest road #91 off of Lake Mary Road. Lots of evidence of vehicle traffic was seen in the snow and it remained open despite winter conditions.

B33.

The intersection of forest roads 91 and 219 near Broiler Park. Signage states that Mormon Lake Village is 4 miles up 219. Forest road 219 is much less defined than 91 and ventures up an unnamed hillside.

B34.

Forest Road 219 crisscrosses the Arizona Trail for about a mile before 219 pulls northwest and descends towards Mormon Lake Village.

B35.

This image does a good job illustrating the steep decent down towards Mormon Lake Village on forest road #219. Mormon Lake can be seen on the horizon.

B36.

Intersection of the Mars Hill Trail, Tunnel Springs Trail, and Forest Road 515 on the Observatory Mesa outside Flagstaff. Forest road 515 is seen to the right after the gate.

B37.

Views from forest road 668D approaching the San Francisco Peaks seen framed by the trees in the distance.

B38.

Forest road 9014K where the old forest road descends 180 vertical feet in roughly 0.15 miles.

B39.

Loose cinders on the surface of a switchback allowing for travel around a steep sheer section for forest road 9014K.

B40.

Views of the San Francisco Peaks seen from Baderville on Rudds Tank Road.

B41.

A Texaco gas station located in Parks, AZ provided the field researcher shelter from weather during a thunderstorm. This could also be used by trail users for a resupply of food and water between Flagstaff and Williams.

B42.

The Route 66 deli café is located just to the west of Parks at the intersection of Old Route 66 and Spring Valley Road (forest road 141). This could also provide trail users with shelter from the weather if needed. It would be a great spot to grab lunch along the route!

B43.

Spring Valley located on Spring Valley Road (forest road 141). It is a low point with an open prairie and views to the north east of Kendrick Mountain which can be seen in this photograph directly to the right of the large tree in the foreground of the photograph.

B44.

A snake that was encountered laying in the middle of Spring Valley Road forest road 141 about 5.5 miles from Route 64. The field researcher later attempted to identify the snake and hypothesized that it may have been a Gopher Snake.

B45.

Wide shoulder along Route 64 where the speed limit is 65 mph and the road switches between 2, 3, and 4 lanes. The shoulder is this wide for roughly 70% of the distance between Spring Valley Road (forest road 141) and Interstate 40.

B46.

Signage along forest road 74 near the Elpaso natural gas station stated that the route was also part of the Great Western Trail.

B47.

A deer farm which is open to the public is located along the route on Deer Farm Road.

B48.

A spectacular view of the San Francisco Peaks and an old ranch along Interstate 40 can be seen from Deer Farm Road when looking in the direction of Flagstaff.

B49.

Bearizona is a wildlife and safari park located just outside of Williams. This route allows for a quick glimpse of the animals without the trail user having to pay to enter the park. This picture shows bison laying in a field within the park and visitors traveling within the park in their cars.

B50.

This is the entrance to Bearizona the wildlife and safari park.

B51.

This is the view from Route 64 just as the route enters the outskirts of Williams. The town feels very historic from this point of view thanks to the town arch over the road and the rail yard in the distance.

B52.

Old crumbling pavement on Old Route 66 between Parks, AZ and Williams, AZ.

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