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Acoustic Ecology and Sound Mapping the University of Central Florida Main Campus

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ACOUSTIC ECOLOGY AND SOUND MAPPING THE UNIVERSITY OF CENTRAL FLORIDA MAIN CAMPUS

by

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ABSTRACT

"Acoustic Ecology and Sound Mapping the University of Central Florida Main Campus" explores the intersection of place and space, sound studies and acoustic ecology, visualization, and archives. The end result consists of a collection of "soundwalk" and stationary recordings conducted from 2016-2019 at the University of Central Florida (UCF) main campus in Orlando presented as an online Sound Map.This archive previously did not exist and provides a snapshot of the various sounds heard throughout the campus as well as a starting point and context for future research into this still-emerging field of acoustic ecology and sound studies. While the individual recordings help to provide a sense of place at the university, they also represent a benchmark from a public history standpoint to interpret sonic change over time.

For Vickie

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Acoustic Community: "Any system within which acoustic information is exchanged. A soundscape in which acoustic information plays a pervasive role in the lives of the inhabitants in that space."[1]

Acoustic Design: An interdisciplinary approach to providing recommendations for improving and ensuring healthful soundscapes.

Acoustic Ecology: "Acoustic ecology studies the relationships and interactions among humans and sounds in an environment, including musical orchestrations, aural awareness, and acoustic design. Acoustic ecology largely emphasizes human-centered inquiry."[2]

Anthrophony: Human-generated sound.

Anthropocene: The geological time period with humans as the dominant influence on the environment.

Biophony: "The collection of sounds produced by all organisms at a location over a specified time."[3]

Earwitness: Being present in the moment to directly hear sounds in the first person.

FGDC: Federal Geographic Data Committee

Geophony: "Sounds originating from the geophysical environment."[4]

Keynote: "The sounds of a landscape created by its geography and natural elements, including animal species and humans."[5]

NSDI: National Spatial Data Infrastructure

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[1] Barry Truax, *Acoustic Communication, 2nd Edition*, 2nd edition (Westport, Conn: Praeger, 2000). 66.
[2] Bryan C. Pijanowski et al., "Soundscape Ecology: The Science of Sound in the Landscape," *BioScience* 61, no. 3 (March 1, 2011): 203–16, https://doi.org/10.1525/bio.2011.61.3.6.
[3] Bryan C. Pijanowski et al., "Soundscape Ecology: The Science of Sound in the Landscape," *BioScience* 61, no. 3 (March 1, 2011): 203–16, https://doi.org/10.1525/bio.2011.61.3.6.
[4] Bryan C. Pijanowski et al., "Soundscape Ecology."
[5] R. Murray Schafer, *The Soundscape: Our Sonic Environment and the Tuning of the World* (Rochester, Vermont: Destiny Books, 1994). 10.

OSHA: Occupational and Health Administration.

Place: The meaning beings give to their physical surroundings (space) through embodied experience, including symbols, values, and emotions.

RICHES: (The Regional Initiative to Collect the Histories, Experiences, and Stories) of Central Florida.

Sign: In the Saussurean model of semiotics, the association formed between the signifier and signified combined form a "sign."[6] Within the Peircean model, there were three aspects: The "representamen," or "the form which the sign takes," the interpretant, the "sense made of the sign," and the object, a "referent that the sign refers to."[7]

Signified: The concept related by the signifier.

Signifier: The sound pattern produced by an object.

Sound Map: The sonic representation in the form of a map regarding a certain locale.

Sound Mark: Sounds that are unique to a location.

Soundwalk: A from of active participation in the soundscape. The essential purpose is to encourage the participant to listen discriminately and to make critical judgements about the sounds heard and their contribution to the balance or imbalance of the sonic environment.

Soundscape Ecology: "All sounds, those of biophony, geophony, and anthrophony, emanating from a given landscape to create unique acoustical patterns across a variety of spatial and temporal scales.[8]

Soundscape: "The collection of biological, geophysical, and anthropogenic sounds that emanate from a landscape and which vary over space and time reflecting important ecosystem processes and human activities."[9]

Techophony: The sounds generated from human machines and electronic devices. While this could also be categorized as anthrophony, it has begun to gain its own category in regard to technology.

UCF: The University of Central Florida

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[6]Daniel Chandler, *Semiotics: The Basics*, 2 edition (London; New York: Routledge, 2007). 15.
[7] Ibid., 29.
[8] Pijanowski et al., "Soundscape Ecology."
[9] Ibid.

CHAPTER ONE: INTRODUCTION

"Acoustic Ecology and Sound Mapping the University of Central Florida Main Campus" explores the intersection of place and space, sound studies and acoustic ecology, visualization, and public history. The end result consists of a collection of "soundwalk" and stationary recordings conducted from 2016-2019 at the University of Central Florida (UCF) main campus in Orlando presented as an online Sound Map. This archive previously did not exist and provides a snapshot of the various sounds heard throughout the campus as well as a starting point and context for future research into this still-emerging field of acoustic ecology and sound studies. While the individual recordings help to provide a sense of place at the university, they also represent a benchmark from a public history standpoint to interpret sonic change over time.

My Background

My own awareness and interest in studying sounds began at a very early age and continues through field recordings, playing musical instruments, and researching cultural connections to place in terms of sound and music. As a young boy growing up in West Virginia during the 1970s, I had many opportunities to freely wander both rural and neighborhood areas where we lived and listen to nature. While on these "adventures," I would often become transfixed listening to the frogs, the sounds of the many insects and birds, and the running creeks, among many others. My favorite times were going fishing in our local pond on those summer afternoons and evenings and listening to the ever-present reverberating drone of the cicadas and just being in the moment. To this day, these are some of my most cherished

childhood memories. In 2015, a year after my father passed away, I journeyed back to that same pond on a late-June afternoon and sure enough, the cicadas were playing their songs! It was like being in a phenomenological time machine for me, as the area looked and felt very much as I remembered from my youth, as shown in Figure 1 below. Those old memories of wonderment came flooding back to my mind and I felt like an eight-year-old boy again fishing for bluegill with a sense of contentment. Indeed, sound can serve as a powerful phenomenon imparting a place with a sense of meaning.

Figure 1. North Hills Pond, Wood County, West Virginia

Photo by author, 2015

During my master's degree research, I conducted several oral histories for various projects including collecting stories of local business leaders in Central Florida present during the pre-Disney era that ended in 1968 with the establishment of Disney World. Often, interviewees would mention the sounds they heard growing up around the area, how traffic noise has increased over the years and eroded the quiet atmosphere they used to experience, and how many times they yearned to hear that earlier soundscape again. These stories seemed to relate to my own experience with the pond in West Virginia.

In another graduate course focused on digital media and documentary storytelling, we began the "History of Central Florida Podcasts" series. It consisted of fifty episodes, each one highlighting one or more artifacts that told a particular story. We each selected five museums and picked out several objects, then developed a narrative around them. The episodes ranged in content from 8000 B.C.E. right up to the present-day. Topics included ancient Native American societies who once inhabited the area, to trade networks, several different connections to wars, women's rights, the Jim Crow era of segregation and the Ku Klux Klan, and various tourist-related pieces. Each podcast included photography, audio sounds related to the subject, and interviews with local experts and scholars.

The sounds incorporated into the episodes helped bring the object to life and based on the feedback, consequently had the effect of increasing the listener's interest and sense of being in that moment. Sound also represented aspects of events in terms of place and time. In one episode in particular, we focused on the vernacular perspective of the 50 Mills district in Orlando. Several soundwalks along the bustling streets and recordings inside the multicultural restaurants

helped bring meaning to that particular place. It is one thing to listen to an announcer interview a subject, but when the end-user can see the object then hear a cannonball being fired or the sounds of a canoe padding down the St. John's River while listening to talks about the trading network created by Timucuan dugout canoes, listeners are transported back in time, no pun intended. The connection between place and sound really becomes evident. What started out as a semester-long project ended up becoming a nearly three-year labor of love as we all agreed to continue working on the project until completion, even though some of us had already graduated during that time. The results were well worth it as the series won two Hampton-Dunn awards for Internet Excellence and continues to attract followers, as evidenced by the monthly downloads and positive feedback from those new to the series.[10]

My master's thesis, "The Spatial Relationship Between Labor, Cultural Migration, and the Development of Folk Music in the American South: A Digital Visualization Project;" focused on the manner in which place influenced cultural exchanges and retentions in three distinct regions of the American South—the Chesapeake, Louisiana, and the Gullah-Geechee corridor of the East Coast, which extends roughly from Jacksonville, FL to Wilmington, NC. I really focused on the Gullah region because place was a defining factor in how cultural customs and traditions were retained, even in the face of the unimaginable system of slavery. The slaves who survived the Middle Passage and ended up in the Sea Islands off of Beaufort, South Carolina may not have held their freedom, but they did retain the memory of their home in Sierra Leone and the Bight of Benin. They carried with them in their minds the songs, traditions, and

[10] Robert Cassanello, *A History of Central Florida*, podcast video series, November 18, 2013-June 11, 2015. [http:// http://stars.library.ucf.edu/ahistoryofcentralflorida/].

spirit of their ancestors in spite of the cruel conditions they had to endure and today many of the same customs and folk traditions still exist in much the same manner in parts of the Gullah region as they do in Sierra Leone. I created an interactive multimedia visualization using a mapping tool that drew on these comparisons and told the story with a new perspective using digital tools.[11] The same can be said for presenting a soundscape of a campus in the form of a sound map for future scholars and public historians to access. A sound map can provide people with a fresh perspective on places they consider familiar or commonplace.

The connections between sounds, representation of place, and meaning are themes that run through all of my past and present research and are some of the reasons why I believe the study of sound is important.[12] So, too, is the connection between sound, semiotics, and phenomenology.

The Importance of Studying Sound

A logical question at this point is what is a sound? In addition, there is the differentiation between sound versus noise. Generally, many may consider sounds as audible stimuli that convey information and noises as those cues that are not pleasing, subjectively "unwanted sounds," or even as acoustic ecologist R. Murray Schafer asserted those "sounds we learn to

[11] Robert L. Clarke, "The Spatial Relationship Between Labor, Cultural Migration, and the Development of Folk Music in the American South: A Digital Visualization Project, 2014. https://stars.library.ucf.edu/cgi/viewcontent.cgi?article=5696&context=etd

[12] I was fortunate to be interviewed by Holly Baker for the Florida Frontiers history podcast. Florida Historical Society, "Florida Frontiers Radio Program number 352." August 9, 2019. https://myfloridahistory.org/frontiers/radio/program/352

ignore."[13] The question may seem simple enough on the surface, but in reality the range of answers can be more elusive than one would think and it can be hard to ontologically categorize sound. For instance, there is, and has been for some time, a debate whether a sound is strictly a combination of wavelengths similar to light waves that need the vibration of the ear to exist, or if they exist within the object that creates them. Philosopher Robert Pasnau explored the nature of sound itself, addressing this debate over whether it is a "quality of the object producing it" or the "result of the medium (hearing)." Pasnau argued that ultimately, sound should be thought of as a property of the object. The debate has a long history and has become what he terms the "standard view" of sound. In essence, tradition held that sound is a "result of the vibration that hits our ear." [14]

Casey O'Callaghan and Michael Stocker both take the analysis further, examining the process of object to ear transmission. Strict definitions are troublesome though, as O'Callaghan stresses that not only are sounds wavelengths, but they are also characterized by qualities such as pitch, timbre, and loudness. While Pasnau seems focused on attaching a sound within an object, O'Callaghan sees them as events that are transmitted through waves yet distinguishes the audible perception from the sound itself.'[15]

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[13] Barry Truax, *Acoustic Communication, 2nd Edition*, 2nd edition (Westport, Conn: Praeger, 2000). 95. R. Murray Schafer, *The Soundscape: Our Sonic Environment and the Tuning of the World* (Rochester, Vermont: Destiny Books, 1994), 4.

[14] Robert Pasnau, "What Is Sound?" *The Philosophy Quarterly* 49, no. 196 (July 1999): 309–24., pg. 316 Accessed 11/20/2019 2:23:00 PM.

[15] Casey O'Callaghan, "Constructing a Theory of Sounds," in *Oxford Studies in Metaphysics*, vol. 5, 2009.3, 20.

Stocker, to me, lays out the phenomenon the clearest by using data as examples and exploring the space/time variables between initial acoustic vibration, or what he deems "acoustical energy" at the source and our perception of the sound in our ear.[16] This raises the question of what occurs if there is no ear to intercept the vibration? Does that mean that no sound existed? Of course, humans do not have access to all frequencies, so in the case of dogs for example, they hear things we cannot, yet the sound still exists to the dog. In addition, evidence indicates that as humans age, usually beginning in the early twenties, their ability to hear certain frequencies decline.[17] That means that although younger people can hear higher frequencies, older persons may not.

In fact, this phenomenon has in some cases resulted in the weaponization of sound, for example against loitering youth in the United Kingdom in 2005. To combat the issue, shopkeepers and public institutions deployed "The Mosquito." This device emitted a high-pitched sound frequency that forced most under the age of 25 to leave the scene, while those older could not hear it and were not bothered.[18] This controversial tactic is an example of how sound can be used unethically. These sounds existed for the younger group, which would imply that objects produce them without everyone experiencing direct evidence.

Similar to the old question asking "if a tree falls in the woods and nobody is present to hear it, does it make a sound?" the definition of sound is a tricky question, since something like

[16] Michael Stocker, "What Is This Thing Called 'Sound?'" in *Hear Where We Are: Sound, Ecology, and Sense of Place* (New York: Springer, 2013)., 67-70.
[17] U.S. Department of Health and Human Services, National Institute on Deafness and other Communication Disorders, https://www.nidcd.nih.gov/health/age-related-hearing-loss.
[18] Mitchell Akiyama, "Silent Alarm: The Mosquito Youth Deterrent and the Politics of Frequency." Canadian Journal of Communication Vol 35 (2010), 455-471.

the sound of wind cannot truly be attributed to a specific object, but rather a collection of the natural phenomena of weather. Although, even then, one could argue that the sound we really hear is the movement of the tree leaves or grasses in the plains. My own view comes from a more semiotic perspective, meaning that a sound comprises part of a sign. That is, data emanating from another entity or signifier represented by a specific location or space and interpreted by the receiver as cognitive information. Together, they form a sign, which can be interpreted by the listener and help give meaning to a geolocation and provide a sense of place.

For the purposes of this project, I will define *place* aligning with Tim Creswell as the "meaning beings give to their physical surroundings (space) through embodied experience," focusing specifically on the sensory experiences of hearing the acoustical characteristics of an area, qualities that acoustic ecologists Michael Southworth and R. Murray Schafer labeled as a *soundscape*.[19] As acoustical characteristics of a particular space change over time, so does the embodied experience, or our potential relationship to that place. In *Orality and Literacy*, religious historian and philosopher Walter Ong outlined the historical transition of communication from orality to literacy and how the visual representation of the printed word gradually overtook the oral as a means to transmit knowledge.[20] In the process, the phenomenon of direct experience gave way to the fact that readers did not have to interact with the author or speaker directly. Hundreds of years might pass, for instance, yet the written words were still the

[19] Tim Cresswell, *Place: An Introduction*, 2 edition (Chichester, West Sussex, UK; Malden, MA: Wiley-Blackwell, 2014), 12, 19. R. Murray Schafer, *The Soundscape: Our Sonic Environment and the Tuning of the World* (Rochester, Vermont: Destiny Books, 1994), 9-10.
[20] Walter J. Ong and John Hartley, *Orality and Literacy: 30th Anniversary Edition*, 3 edition (London; New York: Routledge, 2012).

same, although cultural contexts might alter the interpretation and meaning over time. The same is not true of soundscapes as they are in constant flux due to environmental factors, adaptations within species populations, urban development, and technological changes. I would argue that with the advent of sound studies and new technology to analyze data, we are entering an era where "aurality" once again becomes just as important a factor in understanding a particular place as visual cues and written texts. The phenomenological aspects of cognitive association regarding sound and place will be further explored in Chapter 2.

In addition to documenting auditory experiences, soundscape recordings can also provide a Public History perspective of a place, becoming aural texts that allow one to hear change over time versus relying solely on visual artifacts and written narratives. When one thinks about the sounds that have become rarer or disappeared altogether just in the past twenty years, the result becomes a justification for recording the everyday sounds that exist around us. For example, the sounds of cash registers, typewriters, a modem connecting via a telephone line, the sound of a rotary telephone, or the sound of a slide projector shuffling film slides are sounds that many younger people will likely never hear again in their original context. As a photographer, I fully celebrate that visual works are a significant part of the historical record, but sound is also an important yet often overlooked aspect representing place and meaning. University special collections archives often curate multitudes of photographs showcasing the history of the campus over time, later becoming available for researchers. For example, one may want to draw comparisons between an institution's first founding years and later special events or milestone years. Such was the case with the University of Central Florida's 2013 fiftieth anniversary celebration. During June of that year, the John C. Hitt Library displayed campus photographs

dating from 1963 to the present-day, narrating the development of the campus since its founding.[21] Exhibit viewers could see the incredible growth the university experienced over the previous five decades and reminisce about past experiences, changes in the landscape, and see ideas for future development. In other venues, Public History scholars and local historical societies use overlays of vintage photographs atop recent views to visualize changing places over time. The value of these archives lies in the record of what came before in order to inform the understanding of the present, what is memorialized, and how society constructs a particular place, what Henri Lefebvre deemed, the "representations of space."[22] The production of space itself is a deliberate act and thus gives meaning to place, which presents the issue of what becomes part of the historical record.[23]

What of the aural history? Again, we have a plethora of visual cues, but say you were blind, for example? What would the UCF campus *sound* like to you? What is its unique sound mark? How could one identify change over time without the audible record if you relied on your ears alone? What impact would altering the *soundscape*—have on your daily mobility around campus or interpreting history by new building construction or destruction of natural habitat? Indeed, in a time when accessibility has become a key factor not only in physical campus design but also online courses, it is my assertion that recording the soundscape of the campus will not only create the historical aural baseline that currently does not exist, but might also inform future

[21] "UCF 50th Anniversary Events." https://www.ucf.edu/50/events/ (accessed June 10, 2019).
[22] Henri Lefebvre, *The Production of Space*, trans. Donald Nicholson-Smith, 1 edition (Malden, Mass.: Wiley-Blackwell, 1992), 33.
[23] Jeremy W. Crampton, *Mapping: A Critical Introduction to Cartography and GIS*, 1 edition (Malden, Mass: Wiley-Blackwell, 2010). 69.

land-use decisions, provide an archive for future research projects involving sound studies, and help showcase UCF's commitment to accessibility for all students. This is where acoustic ecology and acoustic design come into play and are the important aspects of this project.

The projects of "acoustic ecology" and "soundscape ecology" were initially comingled under the umbrella term "soundscape studies," referring to the relationship between organisms, communities, and their sonic environment.[24] In recent years, however, researchers separated the terms into two distinct fields. *Acoustic ecology* now focuses on human or urban environments, studying the relationship among humans and sounds within a particular environment, often referred to as *anthrophony*, or human-generated sounds. *Soundscape ecology*, on the other hand, encompasses "all sounds emanating from a given landscape to create unique acoustical patterns across a variety of spatial and temporal scales."[25] Bryan Pijanowski, et al, refer to these sounds as *biophony* (species sound) and *geophony* (earth-generated sound). *Acoustic ecology* now falls within the realm of urban design while *soundscape ecology* has come to focus on natural habitat conservation.[26] Barry Truax argues these sonic environments shape our "habitual relationship" within that environment. While these relationships might be negative or positive, the goal of acoustic design is to create a conscious, beneficial soundscape.[27]

The terms conscious and beneficial as they relate to acoustic design methods go beyond creating a pleasing, healthy, or inoffensive soundscape. There are practical considerations as

[24] Truax, *Acoustic Communication, 2nd Edition*.
[25]Pijanowski et al., "What Is Soundscape Ecology?"
[26] Ibid.
[27] Truax, "Sound, Listening and Place."

well. For instance, in 1969 Boston urban planner advisor Michael Southworth posited that for someone visually impaired, "the sonic environment changes rapidly, new sounds continually make the familiar seem strange" and "sound is the chief way of judging space for the blind and is most informative when it is the result of their personal interactions with an environment."[28] That is to say, their auditory *umwelt*, or personal sonic perception of the world, helps define their meaning of place. Jakob von Uexküll and Thomas A. Sebeok developed the concept of the Umwelt—the way the world is experienced by a particular organism, or in other words the phenomenal life world of the living creature. Their work gave rise to a new field called biosemiotics: the intersection of biology, semiotics, and philosophy. Uexküll stressed that since the umwelt remains subjective depending on species, each can have a vastly different experience of phenomena, even within the same environment.[29] Similar to each person's unique world view, the reality of our existence derives from our interpretation of the signifiers we encounter and their meanings. The same is true in the biosphere, which brings us back to soundscape studies.

The study of soundscapes, or acoustic and soundscape ecology, as a discipline is still a relatively young field compared with other sciences or humanistic traditions. Although the study of sound is not new, the scientific methods involved in recording the complexity of a soundscape within a particular area represents a shift in research. New technologies such as automated field recorders and digital analytic techniques to mine big data sets enable researchers to capture sound over time and analyze the results through spectrograms and other visualization methods.

[28] Southworth, "The Sonic Environment of Cities."
[29] Kalevi Kull, "Semiotic Ecology: Different natures in the Semiosphere," 354.

Prior to the mid- seventies, most studies focused on urban noise, leaving naturalists to explore the wildlife ecology.[30]

One such ecologist was Aldo Leopold, whose groundbreaking work helped usher in an awareness of wildlife conservation. Lacking recording devices to capture natural sounds, Leopold wrote a detailed description of the soundscape of the animals surrounding his farm in Baraboo, Wisconsin over the course of years during the 1940s, noting the specific calls of a variety of birds and other animals. Phenology, or the study of cyclic and natural phenomena, was central to Leopold's work. In 1948, shortly before his death, he wrote drafts of what would become the posthumous *A Sand County Almanac*, leaving a legacy as one of the first to keep a record in minute detail of the soundscape of a particular place. Leopold lamented how the progress of civilization destroyed natural habitat and even in 1941 could see a change in migration patterns of birds due to the destruction of marsh land surrounding his property.[31] For Leopold, the signal generated by flocks of geese did not simply signify there were geese nearby. Rather, he interpreted over time that their dwindling calls represented man's encroachment on their natural habitat. His legacy lives on via the Aldo Leopold Foundation where researchers continue to share his message of ecological consciousness.[32]

In 2012, with the assistance of the Cornell Lab of Ornithology's Macaulay Library collection, wildlife ecologist Stan Temple from the University of Wisconsin-Madison and

[30] Bryan C. Pijanowski et al., "Soundscape Ecology: The Science of Sound in the Landscape," *BioScience* 61, no. 3 (March 1, 2011): 203–16, https://doi.org/10.1525/bio.2011.61.3.6.
[31] Aldo Leopold, *A Sand County Almanac and Sketches Here and There* (New York: Oxford University Press, 1949). 162.
[32] The Aldo Leopold Foundation, homepage. https://www.aldoleopold.org/.

acoustic ecologist Christopher Bocast sought to recreate the soundscape that Leopold documented in 1940.[33] Their findings demonstrated that after seven decades, the bird chorus did not exist as Leopold heard it, inferring that either some species adapted and moved elsewhere or perhaps died out. The researchers attribute this to the increased anthrophony generated by "progress" in the area. Temple stated, "Aldo Leopold recognized that you can get a pretty good sense of land health by listening to the soundscape," going on to assert, "if sounds are missing and things are there that shouldn't be, it often indicates underlying ecological problems."[34]. Temple's statement shows that a signifier does not have to be an actual material thing or object but can also include the absence of any physical or auditory entity.

Twenty years after Leopold documented his work, Michael Southworth coined the term "soundscape," focusing mainly on urban environments and the impact of sound on city dwellers.[35] The focus at that time was noise pollution and finding acceptable levels of tolerable noise. Eight years later in 1977, R. Murray Schafer expanded and further defined the term soundscape with his volume, *The Soundscape: Our Sonic Environment and the Tuning of the World*, to include the "acoustical characteristics of an area that reflect natural processes."[36]

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[33] Terry Devitt, "Aldo Leopold's Field Notes Score a Lost 'Soundscape,'" accessed February 9, 2018, https://news.wisc.edu/aldo-leopolds-field-notes-score-a-lost-soundscape/.
[34] Terry Devitt, "Aldo Leopold's Field Notes Score a Lost 'Soundscape,'" accessed February 9, 2018, https://news.wisc.edu/aldo-leopolds-field-notes-score-a-lost-soundscape/.
[35] Michael Southworth, "The Sonic Environment of Cities," *Environment and Behavior* 1, no. 1 (June 1969): 49–70. There is debate on this subject, but I will attribute it to Southworth. Although others such as Schafer popularized the term, Southworth used it before Schafer's "Tuning of the World." Still others argue that the term predates Southworth and can be traced to the 1940s.
[36] Schafer, *The Soundscape: Our Sonic Environment and the Tuning of the World*. 10.
Pijanowski et al., "What Is Soundscape Ecology?"

Schafer defined three main components of the soundscape. *The keynote* refers to natural sounds created by the geography or climate of a place, including the earth elements such as wind and water, but also birds, insects, and other animals. *Sound signals* are the figure or foreground sounds that one listens to consciously, such as horns and sirens, that Schafer believes transmit messages to those who can interpret them, similar to Saussure's model. The third feature is a *soundmark*, which, similar to a landmark, establishes a particular place (umwelt) by projecting a unique quality that emits emotion in the listener. Schafer argued that soundmarks should be protected as they serve as the acoustic identity of a community. A prime example to consider is that within National Parks, the land is protected yet the soundscape is not.[37] This is one of the reasons for the growing attention to soundscape ecology as the increasing levels of human-generated noise impact not only other species, but also the experience of visitors within the parks.

A decade after Schafer's definitions, Bryan Pijanowski and Bernie Krause further refined the interpretation of biological and ambient sounds occurring within a geographic space. They argued that all sounds represent one of three categories: "Geophony" referred to non-biological sounds such as weather, a volcanic eruption, an avalanche, etc. "Biophony" describes sounds generated by animals, while "Anthrophony" references human generated noise.[38] Krause also began developing his acoustical habitat ambient or "Niche Theory" in the 1980s after a trip to the Amazon Basin. After recording 15-minute samples over the course of several weeks, Krause and

[37] Carlos Iglesias Merchan, Luis Diaz-Baltero, and Mario Soliño, "Noise Pollution in National Parks: Soundscape and Economic Valuation," *Landscape and Urban Planning 123*, 2014, 1–9.
[38] Pijanowski et al., "What Is Soundscape Ecology?"

his team discovered a "measurably stable acoustical bio-spectrum quite unique to that particular place—a sound key, similar to Schafer's definition of a soundmark.[39] While evaluating the spectrograms, they realized that when one organism stopped producing signals, another would take its place in the same frequency, producing its own signal. The team also discovered that moving the recording equipment even a short distance would produce a different sound key.

This signals that the umwelt for each area is unique to a specific location. Krause would later go on to use his recordings to produce musical scores which he deemed the Great Animal Orchestra."[40] The significance of this discovery becomes apparent when landscape changes due to geographic disturbances, human intervention in the form of deforestation or development, or even anthrophonic sounds that can cause a destabilization in the balanced sound key of a space. In other words, the sound spectrogram can indicate an unhealthy environment or signal change in physical terms, as Bryan Pijanowski argues, and Leopold ascertained in 1948 without the aid of computer technology.

Pijanowski and his team at Purdue University record in much the same manner as Krause, but their central purpose lies in soundscape conservation and activism in order to affect land use planning and protect the environment. Recording the biophony of a specific area over a period of years leads to revelations regarding the overall health of ecosystems and reflects the effects of global climate change. The world is also losing its natural sounds to more human-

[39] Bernie Krause, "Bio-Acoustics: Habitat Ambiance and Ecological Balance," *Whole Earth Review* 57 (1987): 14–18. 15.
[40] Bernie Krause, *The Great Animal Orchestra: Finding the Origins of Music in the World's Wild Places*, 1 edition (New York: Little, Brown and Company, 2012).

generated sound and Pijanowski argues that soundscapes are natural resources worthy of conservation and possess certain social and ecological values.[41] His work provides a framework for soundscape conservation based on the principles of landscape conservation. In this case, Pijanowski's work can be linked to linguist Roland Barthes. On one level, the recordings contain signifiers—the wildlife recorded, and signified. That is the denotation. But on a larger scale, when comparing recordings of the same area a decade ago and seeing on the visualization that there has been a loss of species, the connotation is that environmental impacts threaten species such as monkeys as well as other life forms.

Again, Pijanowski defines soundscape ecology as the "Biological, geophysical, and anthropogenic sounds that emanate from a landscape and which vary over space and time reflecting important ecosystem processes and human activities. This definition identifies soundscapes as an audible selection of the landscape and indicates the social and ecological significance of this resource.[42]

Values associated with soundscape conservation also include human health and well-being, wildlife impacts, sense of place, landscape interactions, and ecological integrity values. In regard to health and well-being, they stress that numerous studies show the connectedness between high decibel levels and hearing loss; chronic noise exposure can lead to stress, annoyance, cardiovascular effects, sleep disturbances, and decreased task performance.[43] Barry

[41] Personal conversation, University of Central Florida, November 1, 2017. https://events.ucf.edu/event/591049/seven-sonic-pathways-to-improve-the-planet/
[42] Sarah L. Dumyahn and Bryan C. Pijanowski, "Soundscape Conservation," *Landscape Ecology* 26, no. 9 (November 1, 2011): 1327, https://doi.org/10.1007/s10980-011-9635-x.
[43] Bryan C. Pijanowski et al., "Soundscape Ecology: The Science of Sound in the Landscape," *BioScience* 61, no. 3 (March 1, 2011): 203–16, https://doi.org/10.1525/bio.2011.61.3.6.

Truax spoke to this point as well when discussing the opposing methods of soundscape studies and noise studies. Noise studies traditionally take a negative approach in order to define "acceptable" levels versus "desirable" levels. Truax argues that these studies justify a gradual increase in noise levels that "people can adapt to negatively through gradual deafness and hearing loss."[44] When considering bio-acoustic habitats, an argument could be made that this same phenomenon applies to the biosphere as well as zoos and wetland areas. If humans experience hearing loss from increasing anthrophonic sound levels, it is fair to infer that other organisms with eardrums might experience the same phenomenon. Subsequently, semiotician John Deely argued that humans have an ethical obligation to care for every umwelt around the whole planet.[45]

Indeed, health factors comprise an important aspect in the value of sound studies. Musical composers will tell us that music is more than notes, it is the space between the notes that creates the real magic. In a soundscape, silence, or the lack of it, also becomes a consideration worth exploring. In this manner, Ken Cohen stressed the Native American belief that silence is a key component of health and well-being, particularly in today's noisy, stressful environment.[46] Similarly, Vietnamese Buddhist monk Thich Nhat Hanh echoed these concepts in his book, *Silence: The Power of Quiet in a World Full of Noise*.[47] Hanh's major point in his writing was that we all have what he calls an internal NST Radio playing inside our heads, an

[44]Barry Truax, "The Soundscape and Technology," *Interface* 6, no. 1 (1977): 8, 15.
[45] Deely, John, "Why the Semiotic Animal Needs to Develop a Semioethics," 2008.
[46] Ken Cohen, *Honoring the Medicine: The Essential Guide to Native American Healing*. Reprint edition. New York: Ballantine Books, 2006.
[47] Thich Nhat Hanh, *Silence: The Power of Quiet in a World Full of Noise*, Reprint edition (HarperOne, 2016).

acronym for Non-Stop Thinking. At some point, Hanh argues, we must learn to turn off the radio and be still in order that we may appreciate the beneficial sounds, whatever that may be to each of us.

Just as sound can be weaponized, some point out that silence, a necessary component of a healthy soundscape, can be commodified. Political philosopher Matthew Crawford's "The Cost of Paying Attention" raised this concern regarding the commodification of silence and the changing nature of public space.[48] He argued that as advertisers and those in control seek to "maximize their bottom line," our visual and aural environments become bombarded constant triggers to control "consumer" choices. The result is an ever-increasing race to see who is the loudest. Crawford points out how now one must pay for the luxury of silence and a break from ads. We see this in Crawford's airport lounge example, but also in smartphone apps where users can pay to "upgrade" to an ad-free interface. This trend is changing the way we think and experience our surroundings, in many cases interfering with the critical-thinking skills needed to address this phenomenon. Many people are simply choosing to create their own soundscape with earbuds and their own music as a way to distance themselves from this trend. George Prochnik conducted case studies and interviews to gain insight on why our modern society has become so loud. His results paint a picture of a sonic environment increasingly inundated with noise at ear-

[48] Matthew B. Crawford, "The Cost of Paying Attention," *The New York Times*, March 7, 2015, http://www.nytimes.com/2015/03/08/opinion/sunday/the-cost-of-paying-attention.html.

splitting decibel levels. Pronchnik looked at retail, restaurants, and concerts and interviews people from all walks of life to gain this perspective.[49]

One area to consider when examining the relationship between silence, sounds, and noise are areas such as prisons, factories, and hospitals where subjects are confined in often times close quarters. Weaponization of sound has not been limited to the U.K.'s use of "The Mosquito" previously referenced above. Consider the experience of prisons incorporating high-decibel noise levels or constant repetition of a single song at places such as Guantanamo Bay, Abu Ghraib, as well as other internment facilities. Such practices can easily be seen as a means of sonic torture used to influence behavior.[50] Ian Hill also pointed out that before entities such as OSHA regulated factory environments, workers often complained of the loud noise emanating from machinery throughout the industrial revolution and well into the twentieth century. I myself have experienced the onslaught of extremely high decibel levels of sound while working in restaurants for nearly twenty-five years. Not only are kitchens loud environments to begin with considering the loud clanking of pots and pans and thirty or so people working and yelling at fever pitch, but often the music in the dining areas can reach near-concert volumes. After ten or twelve hours of this exposure on a daily basis, hearing loss or permanent ear damage inevitably occurs.

Considering hospital soundscapes, James Mackrill, et al's study, "Exploring Positive Hospital Ward Interventions" aimed to research how sound contributes to patients' overall

[49] George Prochnik, In *Pursuit of Silence: Listening for Meaning in a World of Noise*. Reprint edition. Anchor, 2011.
[50] Ian Hill, "Not Quite Bleeding from the Ears: Amplifying Sonic Torture," *Western Journal of Communication* 76, no. No. 3 (June 2012): 217–35.

feeling of comfort in a hospital ward.[51] The authors argue that it is not enough to have an absence of sound (which is unrealistic) but rather to explore whether certain sound interventions could produce positive experiences when considering annoying sounds. The study used three sound interventions: Natural sounds (birdsong and water), SSS (white noise) and written sound information (SSI) that explained what each sound was so as to alleviate anxiety and thus reduce negativity.

The results indicated that SSI was the most overall effective, with natural sounds working in the majority of cases as well. White noise seemed be effective at night while during the day it was deemed as just another occupational noise. One limitation was the sample of 24 participants who were not actual patients but healthy people. This was done for ethical reasons. However, when people are patients they may be more or less sensitive to certain sounds, so while the study did have merit as a place to start, I find it problematic to relate the healthy sample's results to actual patients.

Another study explored the results of creating an hour of quiet time each day at the University of Kansas Hospital named the Transforming Care at Bedside (TCAB) initiative.[52] Patients complained about noise from medical equipment, food carts, opening and closing doors, construction, and staff noise. "Studies show that noise levels higher than 50 decibels cause physiologic changes that decrease healing and recovery and can increase length of stay."

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[51] Mackrill, J., P. Jennings, and R. Cain. "Exploring Positive Hospital Ward Soundscape Interventions." *Applied Ergonomics* 45.6 (2014): 1454–1460. *ScienceDirect*. Web.1459.

[52] "Quiet Time": AJN The American Journal of Nursing." *LWW*. N.p., n.d. Web. 5 Dec. 2016.

"Results also indicate disturbed sleep can affect a patient's ability to heal and can increase morbidity. Excess noise can increase gastric acid secretion, stimulate the cardiovascular system, and impair the ability to fight infections."[53] Their decibel rating was 70-80 at normal times and 60 during quiet hour, yet the EPA recommendation is 35-40 decibels for a hospital setting. "Many patients also commented they were frequently disturbed as they tried to sleep."[54] The solution consisted of creating a quiet hour from 12:30pm-1:30pm and later on after 11:00pm at night. The results indicated that this gave patients the ability to rest during the day and also obtain more restful sleep throughout the night. Anyone who has been a caregiver for a loved one in a hospital environment can relate to these findings, as I know from personal experience.

A relatively new method of focusing on sound in hospitals in order to create a more healthful environment is incorporating music therapy for patients. Kate Beever is one such therapist who balances a combination of quantitative and qualitative music to relieve stress, help stabilize heart rates, and create a more peaceful environment in emergency room setting, which she states is beneficial to not only patients, but also staff and family members. Other benefits include pain management through relaxation, emotional and memory connection in brain functions, and even creating tailored music for those suffering the effects of Parkinson's disease that help aid in their movement.[55]

These studies and examples seem to incorporate some of Truax's ideas on seeing the

[53] "Quiet Time : AJN The American Journal of Nursing," LWW, accessed December 5, 2016, pg.29.http://journals.lww.com:80/ajnonline/Pages/articleviewer.aspx?year=2009&issue=11001&article=00008&type=Fulltext.
[54] Ibid., 30.
[55] Interview with Kate Beever, ENG 6939: Sound, November 8, 2016. University of Central Florida.

relationship to people within a soundscape and designing urban or interior areas appropriately to create more sonically pleasing environments as opposed to the "Quiet Time" theories and older noise studies that aimed simply at reducing decibel levels. I would argue that utilizing both approaches might make the best sense, especially when considering our earlier reference to the umwelt discussion. We must be cognizant that other species inhabit these soundscape environments and high levels of noise without silence can interfere with their ability to communicate among each other and survive using signs and signifiers, which is the basis of semiotics.

Bridging the gap between soundscape ecology and semiotics, Almo Farina examined the relationship between soundscape ecology and semiotics in his work, *Soundscape Ecology, Principles, Patterns, Methods, and Applications*. In discussing communication theories in the context of the animal life and their natural environments, Farina stresses that all species, including humans, use signals to "avoid predators, find resources, and to find or adapt locations for reproduction."[56] His communication theory rests on the premise that "communication consists in the transfer of signals from an emitter that convey information to a receiver."[57] An important aspect of this transfer is the signal-to-noise ratio that can obscure the message the receiver decodes. According to Farina, several factors affect decoding of the original transmission:

[56] Almo Farina, *Soundscape Ecology: Principles, Patterns, Methods and Applications*, Softcover reprint of the original 1st ed. 2014 edition (Springer, 2016). 63.
[57] Ibid., 65.

- **Signal generation and transmission** (biophysical limits, biochemical limits, timing and location, environmental effects on emission, information content versus clarity)
- **Transmission through medium** (background noise, interfering signals, attenuation, absorption, information density, reflection and refraction)
- **Signal reception and processing** (biophysical and biochemical limits on reception, need to be attentive, other signals, short reception time, noise, jamming, pattern recognition needs)
- **Decisions based on the perceived signal** (other signals, choice time wasted, reasons for choice, need for choice, predator risk, parasite risk, physiological state, quality of signal, signal channel use).[58]

All of these factors play a role in the quality of signal transmission (signifier) between the sender and the message interpreted (signified) by the receiver. The conclusions drawn by analyzing this connection can help inform ethical land use decisions and drive environmental conservation efforts, not only for land, but also for the benefit of human and non-human organisms. In the wake of climate change and rapidly depleting species amid an ever-growing human population, soundscape ecology allows researchers to interpret the signs the earth and its inhabitants are sending in a new way and derive meaning from them to potentially prevent further disruption to the planet's interconnected ecosystems. That said, these concepts can also

[58] Farina, *Soundscape Ecology*. 65.

be translated into a public history project focusing more on acoustic ecology and cultural history preservation than on the more scientific methodology of soundscape ecology.

One of the fundamental aspects of doing public history is the collection, interpretation, and presentation of historical evidence to a public audience.[59] In the case of soundscapes, this evidence is fleeting, unlike items such as letters, buildings, and other artifacts that can stand the test of time. Soundscapes are always in flux, thus unless we record those particular combinations of sounds at that time, they are gone forever. Building an archive of these moments also allows future listeners to hear the change over time. This is the avenue I pursued with this project.

Genesis of this Sound Map Project

The genesis of my current research began during a doctoral graduate course working on two research projects exploring the soundscape of the University of Central Florida campus. During the first project, I focused on the mental and physical health impacts of sound, particularly on students. As one who deals constantly with tinnitus, I am keenly aware of how sounds can affect one's hearing and attentiveness. As an instructor, I informally observed that students who attended my morning classes seemed less distracted and able to concentrate more intently compared to my afternoon class students. While this phenomenon could also be contributed to eating too much pizza at lunch among other things, I wondered if there was a correlation between arriving on campus and immediately going to class (perhaps more focused)

[59]James B Gardner and LaPaglia, *Public History: Essays From the Field* (Malabar, Fla.: Krieger Pub. Co., 2004), 314.

as opposed to being bombarded with high levels of sound at the Student Union and other locations before attending class (and perhaps distracted and unable to focus).

With that question in mind, during the fall of 2016 I recorded a series of "soundwalks," producing a collection of data revealing sound exposure to a person walking from Colbourn Hall, through the Washington common area, the Student Union, and ending on the green common area opposite the CFE Arena between 11:30am and 12:30pm. Other soundwalks included the Library and pathways intended to provide tranquil walks. I used an Olympus DM520 digital recorder fitted with Roland Binaural Ear bud Microphones, producing a near three-dimensional sound file closely replicating the actual listening experience. I also recorded decibel data along with these soundwalks that produced some unexpected results in terms of perceived expectations of intended quiet/study space. Of course, not all university spaces are intended nor should be expected to provide quiet space, but where that is an expectation, a study such as this could help inform solutions to future building and acoustic design.

During these preliminary soundwalks, I observed many students multi-tasking with their smartphones, having conversations with people next to them, and experiencing the environment of marketing messaging near the Student Union. Many also simply blotted out the sound by wearing earbuds to create their own sonic environment. The question became whether or not one can truly focus on anything with so many simultaneous stimuli reaching the brain at one time. As I observed in my classes, students who had spent at least one to two hours on campus prior to class seemed to be less able to stay engaged and stop using their smartphones as opposed to those who had an earlier class. As expected, grades favored the morning class.

My results showed that recordings within the library exceeded 80 decibels in some areas and the spectrogram showed unexpected levels of low-frequency noise (perhaps due to HVAC equipment) and relatively significant levels of human voices. Also noticeable were areas where smartphone use and casual conversation (as opposed to group study areas) left little in terms of quiet space. Similarly, in the area immediately surrounding the CFE Arena (now renamed Addition Arena), decibel levels exceeded 80 dB and approached 90dB, due to the installation of an outdoor sound system. It is worth noting that the American Speech-Language-Hearing Association states that "any decibel level over 85 dB constitutes a hearing loss risk." (ASHA). While in itself these readings alone may not impose a health risk or impedance to study, according to conversations with my students living in the nearby residence towers the music can be heard inside the apartments that face the Commons. This meant that some of these students went elsewhere to find a quiet place to study or to what Jordan Lacey argues, "a response to withdraw due to constant bombardment of noise."[60] He goes on to argue that the situation is preventing the forming of social relationships because of the escape mechanism and that people are tuning out to the cacophony of sounds around them. Of course, loud versus quiet or pleasant versus unpleasant are relative terms depending on who (or what species) is doing the listening. It is not the intention of this dissertation to assign value judgements to various sounds, but simply to provide an informed collection for each listener to interpret on their own.

During the summer of 2017, Dr. Jonathan Beever and a team of graduate students from the University of Central Florida embarked on a grant-funded Liminal Space Soundscape Project

[60] Jordan Lacey, "We Need a New Relationship with Urban Noise," *The Conversation* (blog), August 19, 2015.

at UCF. We sought to understand the sonic space around campus in relation to the physical space. Most emphasis is on visual representation of place, and through our prior research, we wished to gain a greater perspective in regard to the soundscape. Do people perceive these areas as generating sounds that are simply noisy or are they pleasing, just as the visual perspective? In regard to the designated conservation areas, we were interested in studying the biodiversity in each space.

The project's key objective was to research the effects of human-generated sounds on non-human animal species. The second objective was to collaborate our research findings with key stakeholder partners in order to create a baseline soundscape that could potentially help influence future policy decisions. The third objective was to further our own understanding of soundscape ecology and how to analyze the data we collected in a visualization.

The first phase began in the summer of 2017 within the grounds of UCF and the second in the fall of 2017, exploring the liminal space at the Central Florida Zoo. The areas chosen on-campus included perceived natural spaces including the Arboretum, where people can take nature hikes through the natural habitat that includes gopher tortoises, a variety of bird species, foxes, and snakes, among many others. The second area fell within the proposed Solar Farm, located adjacent to Libra Drive on the south end of campus. Part of a large natural habitat, the proposed Solar Farm would clear fifty acres of wildlife habitat in order to install solar panels to generate power. In addition to addressing the ethical decision to clear fifty acres of natural green space in order to generate green power, the project is working in tandem with the UCF Arboretum staff to collect data in order to analyze the effects on the species impacted by the

construction of the panels. The third site, located between the Student Union and Memory Mall, contains a walkway with benches that meander through a cypress wetlands area, seemingly projecting an area of serenity in an otherwise noisy campus environment.

Prior to the start of the project, during the fall of 2016, the team conducted a series of soundwalks around the UCF campus. While walking, some members used binaural microphones as earbuds, some used smartphones, and others digital recorders. The purpose was to attune ourselves to the sounds that we normally pay no attention to. We amassed approximately thirty recordings that we then would listen to and visualize in spectrograms. The results were quite interesting as the areas that we thought were going to be quiet spaces at times seemed to generate the most noise. Others were the opposite. What became apparent is that in terms of land use, visual appeal sometimes overshadowed auditory considerations. Beautiful landscaping and fountains cannot sonically compete with droning heavy air conditioning fans and buses. The areas deemed “quiet space” often times were the loudest. Even in the library, decibel readings of 84 were not uncommon.

While this project is still on-going and has amassed an incredible amount of data with analysis still taking place, for me it is the project that really drove my interest in mapping out the sounds of the campus. I decided to create a sound map using the methodology of the soundwalk model.

Project Overview

Which brings us to a brief overview of the sound map itself. For a more detailed explanation, please refer to the "Methodology" chapter. Through a series of singular point recordings and "soundwalks" (more on that later), my dissertation project created a sound map of the UCF campus that provides a historical record capturing what R. Murray Schafer referred to as the *soundmark,* or the "unique sonic quality of a place that provides meaning to the listener."[61] I then created an online archive of these recordings using the ESRI ArcGIS Story Map platform to construct a visual map that could be later used for future research, perhaps under the umbrella of either the Center for Humanities and Digital Research or RICHES[62]. Such projects could include oral histories, additional soundwalks, or any other aural text that helps provide context to the meaning of place at UCF. In addition to the recordings themselves, I included a narrative explanation of each position as well as a photograph to help orient the end-user, as well as panes providing text from this writing to explain the theories and methodologies behind the work.

Chapter Outlines

So far, I have explained my background and interests in studying sound and discussed some of the key scholars and theoretical approaches in the field. In the next chapter, we will discuss campus design within the context of place and space theory, specifically phenomenology and embodiment as it relates to the soundscape studies. The original design proved itself a good

[61] Schafer, *The Soundscape: Our Sonic Environment and the Tuning of the World*, 9-10.
[62] RICHES stands for the Regional Initiative for Collecting the Histories, Experiences, and Stories of Central Florida. This is one of several digital humanities initiatives at the University of Central Florida.

choice as the University grew over the years to have one of the largest student body population in the country. The importance of this, as we will see, is that from a place theory perspective, acoustic design can influence the meaning and representation that students, faculty, and alumni experience over time being part of a population equivalent to a medium-sized city and moving through a wide typology of soundscapes.[63] I also outline a theoretical typology apparatus to approach sounds heard on campus and categorize them for consistency. Chapter three really gets into the heart of this entire endeavor—the methodology used to develop the digital portion of this dissertation project. We will look at project design, equipment, recording techniques as well as run through the completed product. Finally, we tie it all together in Chapter four with conclusions and observations, project design limitations, and opportunities for future research.

[63] Demographia. 2000 Census, Municipalities over 50,000: Ranked by 2000 Population. http://demographia.com/db-uscity98.htm

CHAPTER TWO: PLACE, SPACE, AND CAMPUS DESIGN

Introduction

Before moving into the explanation of the digital portion of this dissertation, it is important to discuss the relationships between place and space, campus design, and the sound map project. This chapter will explore a conceptual apparatus of place and space, discuss the University of Central Florida's campus design history and take a look at how those theories relate to soundscape studies and acoustic ecology through a typology of sounds common to any university campus.

There are many theoretical roadmaps available to interpret the concept of place in regard to soundscape studies, including semiotics, phenomenology, embodiment, and social constructivism, just to name a few. Each one helps shape our identity and provides meaning when considering a particular space. For me, the pond and the mountains are two spaces which transform into places of meaning because of my lived experiences there. Perhaps to someone else just driving through these areas with no historical connection to that particular space there would be a different connotation. They might just see a muddy body of water or lament that the roads have too many twists and turns, while others like myself call it home. Thus, home is a subjective notion based on our perceptions of a particular space that derives from our direct contact with the world around us. This is the essence of phenomenology and one way to interpret a sense of place and identity.

German philosopher Edmund Husserl founded the discipline of phenomenology, at least in western civilization. One could argue that the practice of being intentionally mindful regarding place based on sensory perceptions and direct lived experience dates at least as far back as Buddha.[64] Husserl himself drew this parallel to Buddhist thinking.[65] For the phenomenologist, one's world view stems from direct experience from our senses and in many ways defines our identity or relationship to events and places occurring around us. In essence, without direct experience, how can one know reality? For instance, one cannot truly describe what it is like to be at a baseball game without actually having been to one. In the same line of thinking, it would be difficult to analyze the complete nature of a particular place by only seeking out visual cues. In regard to soundscapes, then, without actually experiencing or recording those sounds one would have an incomplete representation of a particular place.

Phenomenologists would argue that sensory perception is required in order to grasp the complexity of a place and that the mind acts as an active agent in the process. The issue of intentionality, however, raises issues for others examining lived experience.

German philosopher, Martin Heidegger, for example wrote extensively about the concept of embodiment, or the way our senses, thoughts, feelings and bodies interact with the spaces we move through.[66] In "Building, Dwelling, Thinking," he argued that to dwell within our

[64] Huston Smith and Philip Novak, *Buddhism: A Concise Introduction* (New York: HarperOne, 2004). 29.
[65] Kwok-Ying Lau, "Husserl, Buddhism and the Crisis of European Sciences," in *Phenomenology and Intercultural Understanding: Toward a New Cultural Flesh*, ed. Kwok-Ying Lau (Cham: Springer International Publishing, 2016), 53–66, https://doi.org/10.1007/978-3-319-44764-3_4.
[66] Martin Heidegger, "Building, Dwelling, Thinking," in *Poetry, Language, Thought* (Harper and Row, 1971), 145–61.

environment is essentially to "be." We can relate to a particular place because we have a physical connection and occupy it. That relationship to place also translates to soundscapes and soundwalks. While recording a soundwalk, one is able to be completely cognizant of the sounds captured that otherwise might be lost or overlooked while moving through a physical space.

Building upon Heidegger, 20th century French phenomenologist Maurice Merleau-Ponty stressed that not every action taken is a direct result of intentionality based on senses. In *Phenomenology of Perception*, he wrote, "In so far as I have hands, feet, a body, I sustain around me intentions which are not dependent upon my decisions and which affect my surrounding in a way I do not choose…they originate from other than myself.[67] In other words, at times our actions derive from pure instinct without direct thought over conscious decision.

Consider the muscle memory, for example. A seasoned photographer does not think about how to operate a camera during a critical photo shoot. Instead, they are focused on capturing the shot in what Henri Cartier Bresson deemed "The Decisive Moment," or that moment where all the visual elements form to capture the essence of that particular place in time.[68] They are completely immersed in the experiences surrounding them, rather than on conscious decision-making skills. Likewise, a well-seasoned guitarist in an improvisational jam is not looking at their fingers in order to form a C chord, but rather is swept in the moment of music. The body takes over while the conscious mind is focused on other things—the music.[69]

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[67] Maurice Merleau-Ponty and Taylor Carman, *Phenomenology of Perception*, trans. Donald Landes, 1 edition (Abingdon, Oxon; New York: Routledge, 2013). 140.
[68] Henri Cartier-Bresson, *Henri Cartier-Bresson: The Mind's Eye: Writings on Photography and Photographers*, 1st edition (New York, N.Y: Aperture, 2005).
[69] From a conversation in HUM 5396, September 25, 2018 with Bruce Janz.

In these cases, whether caught up in the "decisive moment" of a photograph or the music one is completely immersed in, the commonality becomes the information flow taking place and being interpreted by the photographer or musician. In the case of recording soundscapes, it is the interpretation of the acoustic ecologist, while for the visually impaired, sounds can represent signs that help navigate their surroundings.

From the semiotician's perspective, the world is full of signs, such as an object, a word, or sound. Anything that conveys information could be interpreted as a sign, even the absence of a sign still conveys information. Although the study of signs dates back to the days of Plato and Aristotle, the two main founders of modern semiotics were Swiss linguist Ferdinand de Saussure and American philosopher Charles Sanders Peirce.[70] Working independently, they each developed their own models to analyze semiotics.

Saussure believed the study of signs to be based on a dyadic model. In his view, a sign needs both a *signifier* and *signified*. Each cannot exist without the other. The *signifier* describes the material or physical object, word, sound, etc. The *signified* refers to the interpretation conveyed by *signifier*. These interpretations can shift based on the interpreter. Meaning is a social construct, in other words, based on an agreed upon social system[71]. Saussure argued there is a structure or system in place where signs only have meaning in relation to something else, part of a larger whole where the value of a sign is relational.[72] The concept of "tree" only makes

[70] Daniel Chandler, *Semiotics: The Basics*, 2 edition (London; New York: Routledge, 2007). 33.
[71] Robert Hodge and Gunther Kress, *Social Semiotics*, 1 edition (Ithaca, N.Y: Cornell University Press, 1988). 123. Chandler, *Semiotics*. 65.
[72] Ferdinand Saussure and Roy Harris, *Course in General Linguistics*, Reprint edition (LaSalle, Ill: Open Court, 1998). 118.

sense in relation to a "bush." "Tall" only gains meaning in relation to "short." In other words, a sign has no independent inherent value in and of itself. It is only within the context of a relational system of signs, a structure, that it gains value[73].

Saussure's counterpart, Charles Sanders Peirce, argued that the true semiotic model was based on a triad. The first component, the *representamen*, refers to how a sign is represented, similar to Saussure's *signifier*. Some refer to the *representamen* as a sign vehicle. The second component, the *interpretant*, could be likened to the *signified*, or the concept or sense made from the *representamen*. Where Peirce differs from Saussure is the third component, *the object*. The *object* is what the sign stands for, or the *referent*. Peirce argued that all three elements are essential in order to create a sign. "The sign is a unity of what is represented (the object), how it is represented (the representamen), and how it is interpreted (the interpretant).[74]

Peirce also differed from Saussure in that he offered a typology of signs. He categorized three modes: *Symbolic*, *Iconic*, and *Indexical*, although over time he would further create sub-sets of these initial categories.[75] These refer to the relationship between the representamen and the object itself.

[73] Chandler, *Semiotics*.15, 19.
[74] Chandler, *Semiotics*, 29.
[75] Albert Atkin, "Peirce's Theory of Signs," ed. Edward N. Zalta, *The Stanford Encyclopedia of Philosophy*, no. Summer 2013 (n.d.), https://plato.stanford.edu/archives/sum2013/entries/peirce-semiotics/.

- **Symbolic mode**—The signifier does not resemble the signified because the meaning is arbitrary. One must learn the meaning, in other words. Language, traffic signs, and flags are all examples of the symbolic mode.
- **The Iconic mode**: The signified is perceived as resembling the signifier in some way such as a scale model, a zoo "natural habitat," or a portrait.
- **The Indexical mode**: There is a direct connect between the signified and signifier such as smoke/fire, etc., where we can use reasoning to make the connection. When lightning strikes, we don't need to wonder if there is a storm.[76] In the soundscape, we might consider when we hear a siren, we know there is an emergency.

Building upon the work of Saussure, linguist Roland Barthes added three other semiotic concepts that also relate to the study of soundscape ecology: *denotation, connotation*, and the *third meaning*. The first two—denotation and connotation—refer to the interpretation of the signifier. Barthes argues that the two cannot be separated. Denotation is the literal interpretation: If one records the sound of a train whistle, the denoted meaning is there is a train approaching. The connotative meaning is subjective and larger than the literal interpretation. Some might conceive the whistle and train as a sign of transportation, perhaps progress, or a disruption in the peacefulness of the countryside. Connotation becomes crucial in soundscape ecology studies since researchers seek the deeper meaning when creating spectrograms of their recordings. It is not enough to see the literal frequency of a bird call, but rather what is inferred in relation to the other frequencies. Barthes also explored an additional level in his concept of a *third meaning*.

[76] Chandler, *Semiotics*, 37.

Beyond communication and signification lies the third level of significance in relation to the signifier.[77] Barthes himself seems to suggest that what he terms the "obtuse meaning" is hard to express, yet one "knows" it, seemingly on an emotional level. In his description, he is using film as an example, saying the characteristics of the obtuse cannot be described verbally. They are a representation which cannot be represented.[78] I would argue that in relation to the soundscape, this equates with Bernie Krause's emotional response to the symphony of the wildlife acoustic soundscape.[79] It is not quantifiable, but one just "knows it." As I recorded my soundwalks and stationary recordings, I came to realize that what Barthes describes in discussing the rhetoric of the image applies to sound recordings. He relates that in an advertisement for Panzani tomato products, the imagery in the ad suggests a certain, "Italianicity," due to what is signified in the photograph with the produce and imagery. [80] I felt much of the same response in regard to sense of place while walking through the Student Union, the Memory Mall, the area near the Reflection Pond, recording the athletic games and hearing the skateboards and golf carts along the pedestrian pathways. There was a certain "UCF-ness" that I experienced while soundwalking that becomes evident in the recordings.

French Marxist philosopher and sociologist Henri Lefebvre referred to representations of space as "the relations of production and to the 'order' which those relations impose."[81] Spatial historian Richard White summed this up in "What is Spatial History" by relating that in other

[77] Roland Barthes, *Elements of Semiology*, trans. Annette Lavers and Colin Smith, Reissue edition (New York, NY: Hill and Wang, 1977). 54.
[78] Ibid, 64.
[79] Krause, "Bio-Acoustics: Habitat Ambiance and Ecological Balance."
[80] Barthes, *Image-Music-Text*. 47.
[81] Henri Lefebvre, *The Production of Space*, trans. Donald Nicholson-Smith, 1 edition (Malden, Mass.: Wiley-Blackwell, 1992)., 33.

words, these are constructed spaces defined by human action.[82] These built and natural spaces of that particular environment play a crucial role in determining "society's relationship to that space," or the spatial practice that Lefebvre refers to.[83] White clarifies this further by adding "movement of people, goods, and information through time and constructed spaces."[84] Martin Heidegger refers to this as embodiment, or the experiences one has within a place.[85] As we will see, UCF's design strategies purposely aimed for influencing the spatial practice of students. The number and location of buildings, the street layout and acoustic design decisions, and the representations of space, continue to influence the spatial practice and social interactions of the student body. These factors also influence the outcome of a mapping project such as this one. In the case of sound map recordings, the soundwalks capture the movement through space and as more are recorded, one can hear change over time.

A sound map also shares many characteristics of traditional maps in this sense in that they are representations of a particular place or subjects and as Jeremy W. Crampton argues, essentially become abstractions influenced by those who create the map.[86] For example, political borders are constructs on a map that many times change, as in times of war treaties, while the represented object—the physical land—may not. The same holds true for numerous concepts that can be visualized through maps such as voter precinct boundaries, social preferences, and

[82] Richard White, "What is Spatial History, Para 10.
[83] Lefebvre, *The Production of Space*. 33
[84] Richard White, "What is Spatial History?", Para 8, 17.
[85] Martin Heidegger, "Building, Dwelling, Thinking," in *Poetry, Language, Thought* (Harper and Row, 1971), 145–61.
[86] Jeremy W. Crampton, *Mapping: A Critical Introduction to Cartography and GIS*, 1 edition (Malden, Mass: Wiley-Blackwell, 2010), 9.

sounds. Each can change over time thus becoming not an absolute model, but a representation dictated by the cartographer's decisions or changing political circumstances. In the case of this project's sound map, my choice of recordings influenced the result. The archive is admittedly not all-inclusive, rather it serves as a window into the soundscape of UCF. The campus design itself also plays a key role in the outcome. The concentric layout of the built environment dictates not only the location of buildings, but also pedestrian walkways, vehicular traffic, and open spaces as well. As one of two universities in the United States featuring this design (the other being the University of California at Irvine), the history and theory behind the concentric model campus are important and worth spending some time discussing in order to better understand my project.

Campus Design

The University of Central Florida story began June 10, 1963, when the Florida legislature passed an act to establish a state university in east Central Florida in anticipation of rising enrollment throughout the state during the 1960s and 1970s. The new institution had no official name yet but was commonly referred to as the "space university" since the plan was to offer science and engineering degrees to help fuel the nearby NASA complex on the coast.[87] The first few years saw land acquisitions, fund appropriation efforts, and the establishment of the Board of Regents to guide the development process.

By 1965, the Board of Regents had acquired the land 13 miles east of Downtown Orlando to build the university and established its educational objectives. This included quality education

[87] Kenneth G. Sheinkopf, *Accent on the Individual: The First Twelve Years of Florida Technological University* (Florida Technological University Foundation, 1976), 3, 4.

initially focusing on undergraduate programs with the goal of establishing masters and doctoral programs in the future and growing the student body population from an initial 1500 enrollment in 1968 to 15,000 over the next ten years.[88] In March of 1965, the board approved the master design plan drafted by Associated University Architects that reflected these goals.[89] The design emphasized the "village concept," with five villages laid out in a concentric pattern around a central location, each with its own academic focus and hub. Several circular pedestrian pathways would form rings around each other and connect the villages. The idea was that one could walk easily from one to any other in a short time when needed. Vehicular traffic and parking would remain outside the perimeter of the main campus, ensuring a safer and more inviting pedestrian environment.

The same year saw the university's first official name: Florida Technological University, reflecting its science and research goals. The moniker would endure until late December 1978, when the institution was renamed the University of Central Florida to better represent the varied academic focuses of the growing curriculum. In October 1965, the Board of Regents hired the university's first president, Dr. Charles Millican, who independently shared the philosophy of the "village concept" as a way to foster a positive learning environment and also played a key role in its development. Prior to arriving at the "space university," Millican taught at the University of Florida, among other institutions, and served as Dean of Business Administration at the

[88] The actual student population would not surpass that goal until the fall of 1983, when it reached 15,648. For a complete listing of enrollments throughout the university's history, see "Historical Enrollment." https://ikm.ucf.edu/historical-enrollment/
[89] Sheinkopf, *Accent on the Individual*, 18-19.

University of Florida, Hardin-Simmons University, and the University of South Florida.[90] In addition to his business leadership, he also held a theological background and was a Baptist minister, qualities that would serve him well in his new position as he strove to reach out to students on a personal level.

In a speech at a local Chamber of Commerce meeting, Dr. Millican put forth his initiative of "Accent on the Individual," explaining that when a school grows to populations of 20,000 or more students, the potential for one to get lost in the crowd is real and can potentially be a detriment to student success. Instead, he argued, when you take a student body of 15,000 and break that down that into groups of 3000 or so with similar academic goals (a village), students are more likely to encounter familiar faces in their daily routines, establish personal relationships, and not feel like just another number in a crowd of 20,000 or more. He had experienced the "lost student" phenomenon at other universities and made it a point to interact with and learn the names of as many of the students as he could to make them feel welcome and part of the culture. Millican came to the university with the "Accent on the Individual" vision independently of the Board's master design plan and remarked on the coincidence.[91] From that point forward, the village concept has been a staple of campus layout.

[90] Sheinkopf, *Accent on the Individual*, 20-24.
[91] Sheinkopf, *Accent on the Individual*, 28.

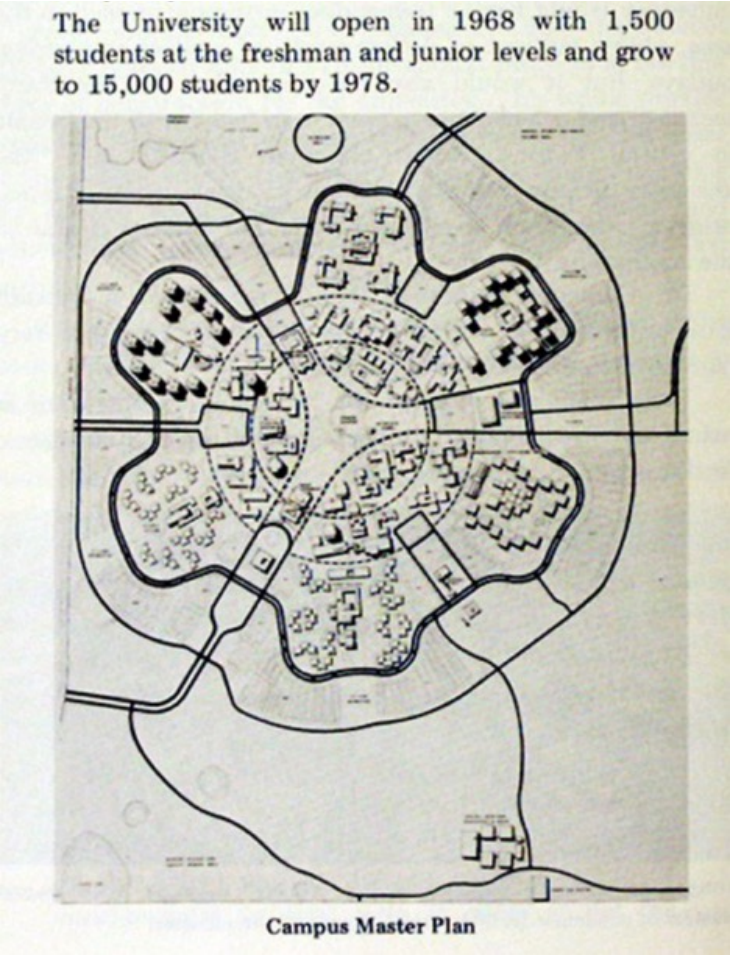

Figure 2. "The Village" design concept developed in 1965.

From “Accent on the Individual.”[92]

Figure 2 above shows the initial Campus Master Plan drawing developed by Associated University Architects in 1965. The current layout still bears a strong resemblance to the original idea of the Village Concept.

[92] Sheinkopf, *Accent on the Individual*. 28

By the fall of 2018, the University of Central Florida's student population ranked among the highest in the United States with over 68,000 students among 13 local and regional campuses as well as the online environment.[93] While the school has grown in population as well as physical size, the village concept still holds true on the main campus in addition to the system as a whole. As the academic offerings grew since opening in 1968, similar disciplines remained clustered in groups such as Arts and Humanities, Math and Science, Engineering, and the aptly named Athletics Village. The satellite campuses serve as their own villages such as the College of Medicine at Lake Nona, the Rosen College of Hospitality Management, and the digital media focus of the Downtown Orlando campus.

In terms of place, each village represents a unique locale and has the potential to bring together students of like minds, backgrounds, and interests to form a community among students. There is a cohesiveness and connectedness within each village that represents a specific sense of place within a student body of over 68,000, as Dr. Millican stressed in 1965. Each area of the sound map reflects these diverse aspects as well, from the soundwalks through the Global Studies building, the Student Union, or stadiums associated with the Athletic Village. In addition, the natural spaces represented by the Arboretum and the surrounding wetlands also provide a sonic glimpse into what Central Florida was like before widespread urban development.

[93] UCF Facts 2018-2019 https://www.ucf.edu/about-ucf/facts/ (accessed June 7, 2019).

A Typology of Spaces Within University Campuses

While the UCF campus layout represents a relatively unique design, within the plan also exists a wide variety of types of space common to the nature of university campuses in general. They can help provide a sense of place regardless of a concentric or grid-model layout, city, or location in the world .[94] In other words, a Student Union at UCF, the University of Alabama, or Trinity in Dublin share many of the same qualities in terms of student interaction, function, and creation of memory through a phenomenological lived experience while on campus.

This section offers a typology of campus spaces as a means to categorize them in a manner that can provide future researchers with a framework to identify and contextualize the soundscapes that occur within those spaces. This will help ensure consistency of methodology across multiple campus sound studies research projects. A quick note on semantics as there are a few terms one can use to describe the organization of subjects, including taxonomy and typology. "Taxonomy" generally refers to empirically observable characteristics and is associated more with biological classification while "typology" denotes classification according to types of things or subjective concepts.[95] In this case, I am using the term typology since this section describes the characteristics of campus spaces in a qualitative manner and is used most often in land use plans and other descriptions of space.

[94] Doreen Massey, "A Global Sense of Place," in *Space, Place, and Gender* (Minneapolis: University of Minnesota Press, 1994).
[95] Kevin B. Smith, "Typologies, Taxonomies, and the Benefits of Policy Classification," Policy Studies Journal, Vol. 30, issue 3, Sept. 2002. pp 379-395.

Every university has a master plan that outlines existing and future land use and built environment designs. Within these plans, each element provides goals, objectives, and policies while also sharing data, analysis, and categorizing spaces according purpose. That said, different terminology can be seen to represent the same kind of space depending upon the plan. For example, UCF's master plan refers to classrooms, research, and study space as "Academic," while the Delft University in the Netherlands uses "Creative Space" to describe any area dedicated to study, collaborations, lectures, and experimentation.[96] Others classify open space as passive or active, large or small, or differentiate between building courtyards and front entry areas.[97] For the purposes of the present discussion, a blending of various elements makes the most sense knowing that this proposed typology of campus spaces will form the basis of a long-term sound map study.

The longitudinal nature of this project also brings forth the variable of time. One can argue that within many of the types of space there are elements of a sustained nature and those that are more temporal dependent, or dynamic. Activities in a commons space, for example, can take the form of daily informal recreation or study, while at other times become the site of a one-time event such as a celebration of winning a championship. In addition, spaces can be characterized as interior or exterior, or belonging to both. Contemplative spaces are a prime

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[96] "2015-2025 Campus Master Plan Update – UCF Facilities Planning & Construction," accessed November 14, 2019, https://fp.ucf.edu/mp2015/.
Katja Thoring, Pieter Desmet, and Petra Badke-Schaub, "Creative Environments for Design Education and Practice: A Typology of Creative Spaces," *Design Studies* 56 (May 1, 2018): 54–83, https://doi.org/10.1016/j.destud.2018.02.001.

[97] "Open Space Typologies," The University of Denver, Land Use Plan Update 1, Appendix G, Fall 2007. https://www.du.edu/architect/media/documents/Intro.pdf

example. One can take time to think in a quiet place in the library or within the greenery of a meditation garden.

The typology table that follows takes these considerations into account and identifies each type of space within the matrix of sustained/dynamic and also interior/exterior (see Table 1 below). Some space types appear in more than one quadrant, while others fit into all four. Other scholars may choose different terminology or identify unique subclasses of space-use; however, I argue that all spaces encountered on a university campus fall into one of the categories below and are intended to represent an exhaustive classification within the broad categories of interior/exterior and sustained/dynamic designations.

In regard to the UCF campus specifically, it is worth noting that within each village, there exists a microcosm of each type of space. Each village has communal common areas, such as dining facilities, creative spaces, and areas dedicated to contemplative reflection time. In addition, each offers its own soundscape with respect to these spaces, as we will see in the Conclusion chapter. The creative space in the Arts and Humanities Village, for instance, varies widely from that in the Athletics Village or the STEM Village.

Let us now dig a little deeper into each category to provide the reasoning behind the structure. As stated, some of these classifications exist in one or more quadrants. Again, others may choose different terminology. With that in mind, what follows is an explanation of each space.

Table 1. A Typology of Spaces Within University Campuses

	Interior	*Exterior*
Sustained	Communal Contemplative Creative Digital Symbolic	Communal Contemplative Industrial Natural Pedestrian Recreational Symbolic Transportational
Dynamic	Personal Symbolic	Celebratory Personal Symbolic Transportational

Communal spaces encompass those that foster social interaction. Areas such as the Student Union, residence halls, and other common spaces such as the fitness center, food court and dining halls, and commercial plazas, for example. These areas fall both into the interior classification, such as the fitness center and food court, and also exterior such as the many restaurant patios on many campuses. There is also a temporal aspect of communal space as well,

and some of the activities can fall into other categories such as celebratory and recreational, depending on the season of the year. A football game, for instance, takes place in a communal space, with celebratory representation, but only occurs in the fall semester. Depending on the time of year, a commons area such as UCF's Memory Mall evokes contemplative sounds such as a ceremony honoring United States Veterans, while during Homecoming Week the space transforms into a pre-football game celebration.

Contemplative spaces, as alluded to earlier, occur within both interior and exterior spaces. These areas are intended to provide reflective quiet time, perhaps an area to think about one's writing, or simply think while experiencing a nature hike. Features of these spaces generally include pleasing landscaping, pedestrian pathways, seating areas, or perhaps water elements. For UCF, one of those areas is the Arboretum, where one can hike miles of wetlands and experience what Central Florida was like before becoming the site of the campus. The Reflection Pond is another multi-use space that often becomes a place of contemplation as well as celebration. Some campuses have chapels where those inclined can nurture their spiritual connections. For many, the quiet zones of the library provide this place, blending with the creative academic category.

Creative spaces include all those spaces related to academic and creative pursuits, such as instruction, reading, thinking, collaboration, and research.[98] Also falling under this umbrella are the areas dedicated to presentation of ideas through lectures and exhibits and those dedicated to

[98] Thoring, Desmet, and Badke-Schaub, "Creative Environments for Design Education and Practice," 65.

the arts, whether visual, performance, or musical in nature. Classrooms, libraries, and laboratories all are creative spaces as well as those personal spaces dedicated to quiet study.

Symbolic spaces relate to iconic places of meaning or events that are recognizable to all campus members and alumni, whether interior or exterior. They can also be considered sustained, such as a fountain, or dynamic such as a football game. Examples include the Knight statue in front of the alumni center at UCF, where past and present graduates gather for photographs during special events. Every campus has a gathering location such as this, such as the University of Florida's Bull Gator or Florida State's statue of their mascot Renegade with the word "Unconquered" written on the base, alluding to the Seminole Indians' successful fight against removal during the 1840s.

Digital spaces in this case encompass not only areas such as computer labs and technology centers, but also the virtual space occupied by online distance learning. Sense of place within the online community takes on a different sensory perception versus the traditional campus experience.[99] As an online professor myself, I can attest to the fact that students experience the concept of "campus" differently than those who are physically present on site. Some of my students consist of actively deployed military members, out-of-state-students, students at satellite campuses, and those who are faced with some accessibility issue, making the online experience a viable option.

[99] "The Micro Campus: A New Typology for Distance Learning," UNStudio, accessed November 14, 2019, http://www.unstudio.com/en/page/8183/the-micro-campus-a-new-typology-for-distance-learning.

Industrial space consists of those areas where mechanical, construction, or maintenance occurs. Spaces dominated by HVAC and groundskeeping are two key examples from any college campus.

Natural space includes those areas dedicated to conservation, hiking, waterways, and wetland, to name a few. In the case of UCF, the green spaces within each village, the Arboretum, and Lake Claire Recreation Area fall into this category.

Pedestrian spaces include the physical walkways within campus with no vehicular traffic. These areas tend in many cases to overlap with natural or contemplative spaces. The central component is that one can transverse through campus on dedicated pathways. I include bicycle and skateboards as pedestrian in this category because although they are a means to transportation, they are also representative of pedestrian-powered movement. I would also include wheelchairs in this category, whether manual or motorized.

Recreational space encompasses both organize and informal sports such as a football stadium, basketball arena, and baseball field. In addition, the fitness center or gymnasium provide a space for students to engage in physical activity. Communal areas, such as a common green space, can also transform into informal areas where people engage in a variety of recreation. In the case of UCF, the aforementioned Lake Claire Lake represents both a natural space and a recreational space with kayaking and paddle board rentals available to students.

Transportational space defines those areas where vehicular traffic occurs including cars, buses, golf carts, and motorcycles. Many campuses have roads within the campus design and many also have parking lots and garages, as well as bus drop off and pick up points. These spaces fall within the realm of Transportational.

Celebratory spaces consist of those areas dedicated to or perhaps transformed into spaces such as game-day tailgating, commencement celebrations, award presentations, victory rallies, and in the case of UCF, Spirit Splash in the Reflection Pond during Homecoming week.

Personal spaces can encompass a wide range of meaning. In the case of soundscapes, a personal space is created with one's earbuds while moving through other spaces. It could also refer to quiet areas that are contemplative.

This chapter has explored some of the relevant theories of place and space from a phenomenological perspective, campus design, and provided a framework in the form of a typology of spaces found on campuses. This lays the foundation for the next chapter discussing methodology of recording soundscapes. In the final chapter, I will revisit this typology and analyze the project within the scope of this theoretical apparatus. Now, it is time to move into the methodology of recording the soundscapes.

CHAPTER THREE: METHODOLOGY

Introduction

Now that we've discussed the origin and background of the dissertation project, it is time to put those theories into play and integrate the digital component—the Sound Map and its creation. This chapter will revisit my initial research questions and objectives, the process of selecting the appropriate presentation platform, the recording/technical process, and discuss the building of the online archive.

As with any technological endeavor, there were learning curves and stumbling blocks along the way, what David J. Cohen and Roy Rosenzweig refer to as the "Promises and Perils" in their 2006 book, *Digital History: A Guide to Gathering, Preserving, and Presenting the Past on the Web*. Among those factors they identified were *capacity, accessibility, flexibility, diversity, manipulability, interactivity*, and *hypertextuality* (non-linearity). They also observed five potential problems that digital historians may encounter: *quality, durability, readability, passivity,* and *inaccessibility*.[100] In the case of this digital project, sounds that had not been recorded and archived are now accessible to the public or researcher. It is interactive, flexible, and hypertextual in that viewers can move around the site as they wish and interpret their own narrative. There is also a diverse cross-section of campus places and voices represented in the map. In terms of perils, durability and inaccessibility are two areas of long-term concern that I

[100] Daniel J Cohen and Roy Rosenzweig, *Digital History: A Guide to Gathering, Preserving, and Presenting the Past on the Web* (Philadelphia: University of Pennsylvania Press, 2006), 3.

have. First, durability refers to being able to read files or actually run the programs as technology changes. I ran into this issue with my master's thesis mapping project due to the program being phased out and Google Earth no longer supporting open access. Which is where the inaccessibility issue is relevant as use of proprietary software can present a stumbling block for digital researchers. That said, the key to overcoming these ever-present challenges is to keep at it, make adjustments along the way, and move forward. I will further analyze the end result in the next chapter, but for now will explain my theory and process of designing and building the tool.

A disclaimer is in order at this point regarding specific platforms and technical equipment. Technology by nature is always in flux, with new devices coming to market and software being upgraded or becoming a victim of planned obsolescence. As Cohen and Rosenzweig stressed, this raises the question the durability in some digital humanities endeavors. With that in mind, I will mention the equipment and software that I used for this particular project, but the reader should be aware when using proprietary tools that they may disappear or compromise your sound map project. One should always research the best current tools for the needs of the job rather than necessarily relying on what is presented on these pages. What follows is an explanation of my choices and processes based on the objectives listed below.

Research Questions

The over-arching objective with this project was to record the sonic environment of campus and create a foundational sound map that could provide historical value moving forward

in regard to hearing change over time. In other words, capture its unique soundmark(s) as a reference tool.

Regarding change, the issue that I wanted to specifically focus on spoke to the question of aural history. Again, we have a plethora of historical visual cues such as photographs, buildings, books, and other artifacts housed in special collections that all serve well to provide a sense of how campus changed over the years since 1963. Yet how could one fully represent change over time without the audible record? From the perspective of those visually challenged or perhaps those researchers interested in sound studies, the current historical archive leaves out much information vital to the narrative. If you only could rely on your ears, how would the UCF campus *sound* to you? How could one fully identify change over time without the audible record? What impact, if any, would altering the soundscape have on your daily mobility around campus or interpreting history by new building construction or re-purposing natural habitat? With these questions in mind, I began looking into sound mapping tools.

Platform Selection

The project required a platform that I and other researchers could build upon in the future. While exploring sound maps, I became enthralled with the London Sound Survey and wanted to emulate that feel in my web component.[101] I liked the way viewers could move through the sound map hypertextually while also gaining an understanding of the content of the material they were listening to. I also wanted to eventually be able to include other's recordings,

[101] London Sound Survey. https://www.soundsurvey.org.uk/

as the London Sound Survey does. However, this has taken years to accomplish. The site contains portions relating to methodology, background on the content producers, and lists of resources and technical advice for those wishing to begin recording in this manner (see Figure 3 below).

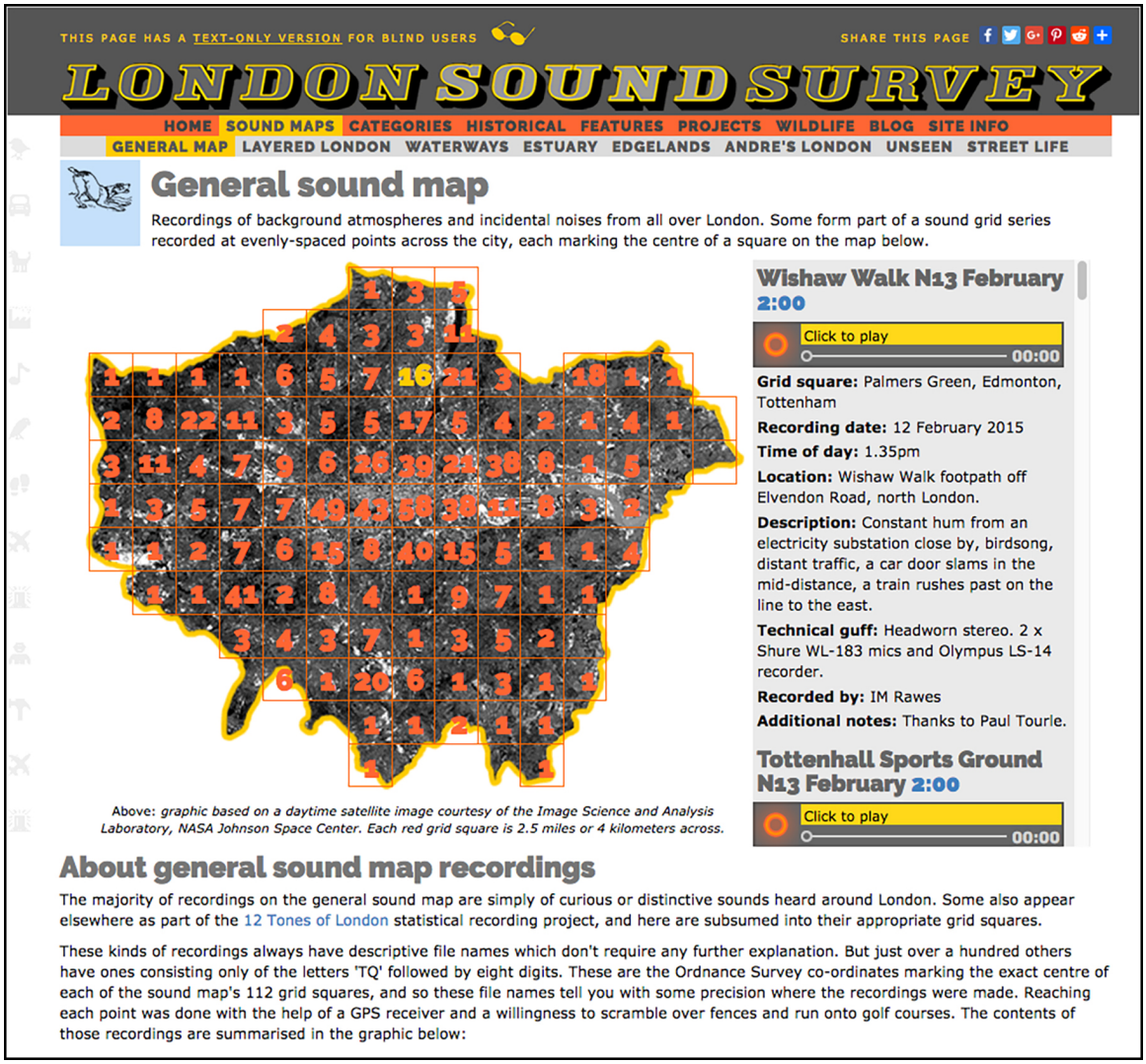


Figure 3. London Sound Survey. Courtesy Ian Rawes. Creative Commons Attribution Non-Commercial https://www.soundsurvey.org.uk/.

I looked at several options and found that many were based on Adobe Flash, as the London project is based upon. The issue with this platform was that Flash is being phased out as a technology due to security concerns by 2020. Given my previous experience with digital scholarly work deemed unusable due to obsolescence, that narrowed the practical options down quite a bit since I wanted this project to have the chance of longevity.[102] Many platforms exist to create a sound map, including U-Mapper, Map Maker, and ArcGIS, to name a few.

I concluded ESRI's ArcGIS Story Maps tool would best serve my needs. There are several different options within the ArcGIS suites, some requiring a yearly subscription at varying price points between $500 and $1500. However, the ArcGIS Online platform is one that is free to educators and includes the free Story Maps application as well as Journal, Cascade, and Map Series. All of these applications allow mapping and visualizations, but Story Maps Tour is one of the few that allow audio inclusion in a manner that suited my needs. Signing up was a straightforward process and once set up, I was able to begin exploring my options and view the galleries of previous projects (refer to Figure 4. below).[103]

[102] Information on Adobe Flash phase out can be found at the link below: https://fortune.com/2017/07/25/adobe-flash-media-support-web/
[103] For more information visit the ESRI ArcGIS Online Overview and homepage: https://www.esri.com/en-us/arcgis/products/arcgis-storymaps/overview

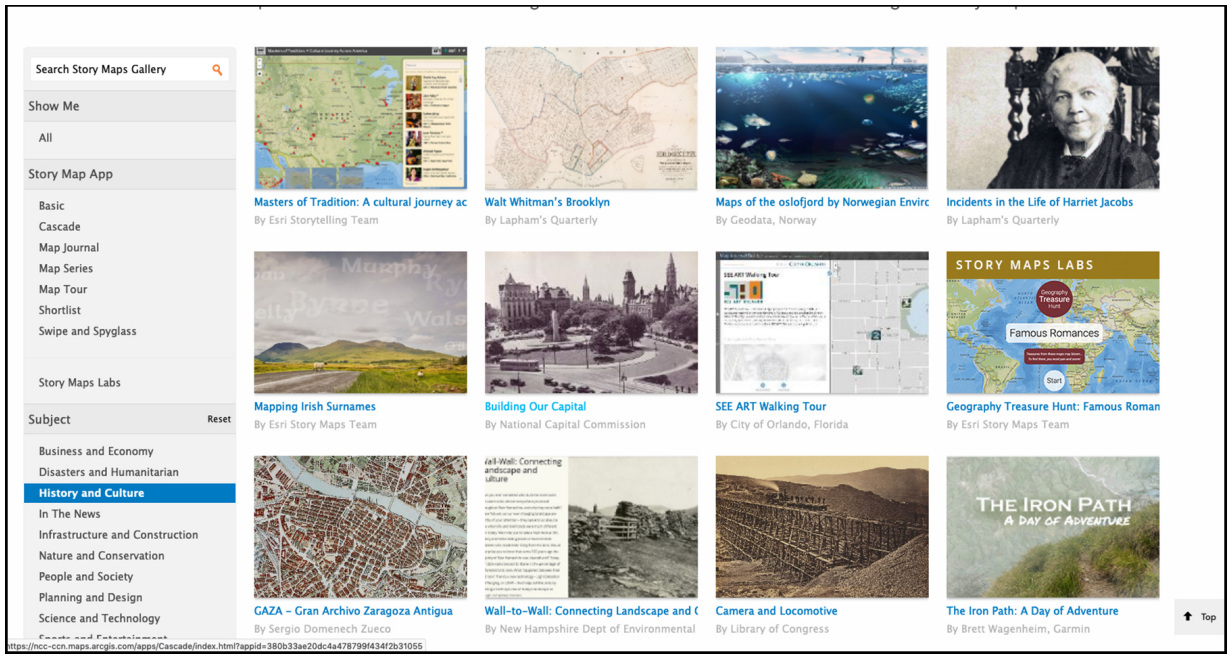


Figure 4. ArcGIS Online Story Maps Gallery

https://storymaps-classic.arcgis.com/en/gallery/#s=0

Recording Process and Data Collection

One of the first considerations regarding methodology was developing a plan for recording and data collection. There were many questions and issues that arose while exploring my options. Would this be an archive of one-minute recordings taken each hour every day at different times as in the Liminal Space project or should I strive for a less-empirical representational study? Perhaps I could record a collection of soundwalks similar to the London Sound Survey? Finally, what equipment would best fit the requirements of my goals?

The most important question was how to capture the unique aspects (if there were any) to the concentric design layout of the university's physical layout, which is quite large. After long consideration, I opted to focus on the village layout in order to highlight the concentric nature of the design rather than conduct big-data collection. I would also incorporate both stationary and longer soundwalk recordings that I would conduct myself. This decision defined my process in that I would a) record everything myself as opposed to utilizing a crowd-sourcing recording smartphone app and b) that it would not be an exhaustive all-inclusive approach to the sound map. I was okay with that aspect since over time I came to see this project more from a cultural Public History documentary perspective rather than an empirical data experiment. I also had concerns of relying on others to obtain my data as there are so many variables involved such as consistent recording levels, lack of wind control when using a smartphone, and the logistics of collecting the files. Since the archive did not exist at the time, future research could continue to add to the project and develop those aspects as opportunities arose. Perhaps a crowd-sourced project will occur, but for the purpose of this dissertation, that was not going to be a component. Long-term, I envisioned this project as part of the RICHES umbrella project at the University of Central Florida, where future digital humanities scholars could continue sound studies and add to the database.

Recording Equipment

Once I had settled on a data collection plan, I needed to determine the recording equipment that would best suit the task. There are many recording devices available today from smartphones to hand-held digital recorders to large-capacity professional stationary field units,

such as Wildlife Acoustics' Song Meter SM4 that all are capable of producing excellent results. I worked with the SM4 in the previously mentioned Liminal Spaces project and liked the results.[104] It has become one of the industry standards in the fields of acoustic and soundscape ecology. However, the issue for me came down to its lack of portability and cost. The SM4 is priced just below $1000 as of this writing, which put it out of range for my budget and purpose. Its primary purpose is collecting large data sets day after day and amassing terabytes of information. That was not my intent in this case. Smartphones are a great choice for quick recordings or sound-checking a location, but again for this project I was looking for more flexibility in terms of microphones, wind mitigation options, and listening devices. In the end, I decided that portable hand-held recorders would fulfill my requirements in terms of sound quality, size, as well as being a more affordable option.

[104] https://www.wildlifeacoustics.com/products/song-meter-sm4

Figure 5. The portable field recording kit used for this project.

There are a number of quality hand-held digital recorders on the market these days. Some feature a few more bells and whistles than others and like smartphones, most produce high-quality results. I researched offerings from Marantz Professional, Zoom, Roland, Sony, and Tascam. Ultimately, I selected the Tascam DR-40 Linear PCM Recorder due to its functionality, capacity, and adjustable on-board stereo microphones (refer to Figure 5 above).[105] The Tascam

[105] Linear PCM stands for Linear Pulse Code modulation, a method used to encode uncompressed, or lossless, audio data in a linear manner versus a sampling pattern ensuring a more complete representation of the subject. In other words, it captures the whole spectrum similar to the way a digital camera uses RAW format as opposed to the compressed JPEG format where full spectrum pixels are discarded each time the file is altered and saved. Over time, the data becomes compromised. Not so with LPCM. https://www.techopedia.com/definition/10707/linear-pulse-code-modulation-lpcm

features 4-track recording capability, phantom power, and XLR inputs for attaching external condenser or dynamic microphones making it ideal for not only this project, but also to use to record music directly from a mixing console or making multi-channel field recordings, say at a musical performance. The adjustable microphones are incredibly sensitive, and as such it is advisable to use a windscreen when working outdoors to avoid ending up with unusable recordings due to high wind levels. For most of my recordings, I used this recorder with the internal microphones set as shown in Figure 5 to capture a wide field of sound. When set to the inward, or narrow position, the recordings become more unidirectional, which is good for events such as lectures or capturing oral histories. To ensure high quality recordings, I also used a pair of Sony MDR-7506 Professional Studio Monitor headphones while capturing sound to not only get a better sense of what was being recorded, but also to detect unacceptable wind levels and avoid unwanted feedback, allowing me to re-record on-site. There is nothing worse in field recording than to get back home and find you have unusable files.

While the Tascam worked exceptionally well for my purposes, I also wanted to produce more dynamic sound walks and have the ability to incorporate a low-profile device when recording athletic events or just walking around campus. I had previously used an Olympus DM-520 digital recorder for lectures and oral histories, but I required a higher storage capacity and right when I began this project, that unit decided to stop working. Consequently, I purchased the updated model, the DM-720. It is the silver recorder shown in Figure 5 above paired with a set of Roland CS-10EM Binaural Microphone/Earphones, shown with the windscreens installed. When

recording with binaural microphones, what you hear out of your left ear will record on one channel and vice-versa with the right ear channel, producing an audio file that puts the listener right in the middle of the action. When a skateboarder rides by, for instance, the listener can hear them approaching from one direction and move through the channels to the other as they pass. The realistic nature of the recordings can also capture two different conversations on each channel. The first few times one hears the playback using headphones, the result can be a little unnerving. I used this setup for many of the soundwalks I recorded.

In addition to the recording devices and microphones, I rounded out my "on-location kit" with a few very important essentials for this kind of documentary work. The first was a LaCie four terabyte portable hard drive attached to my MacBook Pro to back up the files after recording and transferring them to the laptop. After years of working as a freelance travel photographer, I knew the importance of backing up files while still on location. SD cards get lost, files get erased by mistake, and laptops seem to crash right at the worst time. I backed up all files to the laptop, the backup drive, and a third time to a cloud server. I used Dropbox, but of course there are many good options available. This also helped later on when building the website since all the files were already online.

The next piece of essential gear was a backup battery kit that would keep everything going in the event I had an extended recording session. I did have one instance years ago where I was on a photo shoot in Bogota, Colombia and all my batteries failed. I learned the hard way to never let that happen again. In order to stabilize the recorders, in some instances I used a Gorilla Pod, which is the small tripod on the right in Figure 5. This ingenious piece of equipment can

serve as a standard three-legged tripod, can wrap around a pole, or be placed anywhere you can insert one of the legs. I used this for recording and taking photos many times where I wanted to have the equipment higher than my reach and I was faced with a challenge. This tool solves that issue. The last, and probably most essential pieces of additional gear: my notebook and pen.

Notebooks are critical for field work, whether created via a smartphone app or a traditional paper Moleskine like the one pictured in Figure 5. Each entry logged time of day, recorder information, weather conditions, location, notable sounds, and of course the sound file data. All of this information was transferred to an Excel spreadsheet to help organize all of the information collected and streamline the data upload into the Story Maps Platform. I will discuss that process in more depth shortly. It may sound like a lot of gear to haul around, but all of the kit described above fits into a small lightweight backpack and is efficient when creating soundwalks and stationary recordings.

Field Recording

Over the course of this project, I created approximately one hundred and fifty sound files along with location photographs and field data, the majority obtained during the spring of 2019. However, a few in the archive do date as far back to 2016 when I first began recording soundscapes on campus. As mentioned before, I recorded both soundwalks where I would transverse along a route between locations while others were stationary recordings taken at various points inside buildings or along a path. In all cases, I recorded at the maximum quality, in most cases raw files to ensure future durability. As stated before, compressed files degrade

each time one opens and saves them, so with the raw files one always has a "clean copy" of the original. I tried to keep the majority of the stationary recordings between one to two minutes in length, not only for manageable file size but also to keep listener interest. The soundwalks ranged from two minutes to just over ten minutes in some cases and feature a variety of different soundscapes along the university's pedestrian paths.

From the beginning, location choices were important considerations for the final outcome of the project. During initial planning, I set a goal of recording along the main concentric paths through campus: Gemini Boulevard, Apollo Circle, Mercury Circle, and Pegasus Circle, along with additional recordings throughout the Athletics Village and the Arboretum natural spaces. The logic behind this was to fairly represent the "Village Concept" campus design and also to provide a wide array of sonic examples. I then needed to determine the frequency (as in quantities, not wavelength) and duration of each recording. At first, I contemplated creating several recordings of each site throughout the day in order to provide a more detailed representation over time. The soundscape would obviously change based on the hour of day, the student population, weather, etc. After careful consideration, however, this plan seemed impractical for my purpose in creating the archive. Facilitating that outcome would have required many recorders set up or consider employing crowdsourcing to obtain the level of detail. There are smartphone applications that can perform this function, but again the primary goal was to create a representative body of recordings to act as a cultural public history database and foundation for future recordings, not to conduct an empirical research study. Hence, I was approaching the project with more of an ear toward acoustic ecology as opposed to the more scientific soundscape ecology. With this in mind, I decided that I would conduct the recordings

myself using the portable kit as outlined in the previous section and accept the fact that the sound map would not be an exhaustive case study.

The collection would contain both the "urban," built environments of campus as well as "natural" managed spaces. Of the fourteen-hundred and fifteen acres that comprise the main campus, roughly eight hundred consist of wetlands, lakes, wildlife habitat, and forested walking trails in an area known as the Arboretum. Access to much of this land requires permission from the Office of Landscape and Natural Resources as there are endangered gopher tortoises, snakes, and plants located throughout these areas. While working on the Liminal Space recording project in 2017, I met John Guziejka, a biologist and urban forester at the Department of UCF's Landscape and Natural Resources who was very helpful in gaining access to the recording sites used to represent the natural spaces of the sound map. Their department has also been amassing sonic data for approximately ten years to help them analyze the changing nature of these environments. It is my hope that future collaborations will help develop the sound map into an even more dynamic representation of place by incorporating more of this data into the archive.

Once I had determined my general plan of action, it was time to begin the process. Over the course of roughly a month, each recording day I would spend hours on campus walking around with my headphones and digital recorders collecting soundscapes and listening. One of my committee members, Dr. Scot French, would refer to these outings as "going on a sound safari." The term seemed to fit. I focused on the areas surrounding the unique concentric circles while representing the village concept. The building locations I chose to record were those that are high-profile and easily recognized by alumni, a group who I hope will hear about this project

and be able to transport themselves, recognize familiar sounds, and remember what it was like when they walked around campus.

My goal was to represent each "village," highlighting the soundmark of that place. The built environment locations I focused on were the general areas containing the buildings of the College of Arts and Humanities; Math, Engineering, and Science; Health and Wellness; dormitory areas; Greek Park; the Athletic Village, and the central core such as the Student Union, John C. Hitt Library, and Millican Hall. Other areas included the Lake Claire Recreational Area and the aforementioned spaces managed by the UCF Landscape and Natural Resources Department.

For many of the soundwalks, I used the Olympus DM-720 due to its compact nature and ability to pair with the Roland binaural microphone/earbuds. The Roland earbuds were fitted with wind reducing screens as well. Most of the stationary recordings were captured with the TASCAM DR-40, due to the high level of microphone sensitivity and because the twin microphones are adjustable, which allowed me to tailor the recording to the situation. If a more unidirectional outcome is desired, then the microphones are flipped inwards towards each other. For omnidirectional results, they are positioned outward creating a more stereophonic effect.

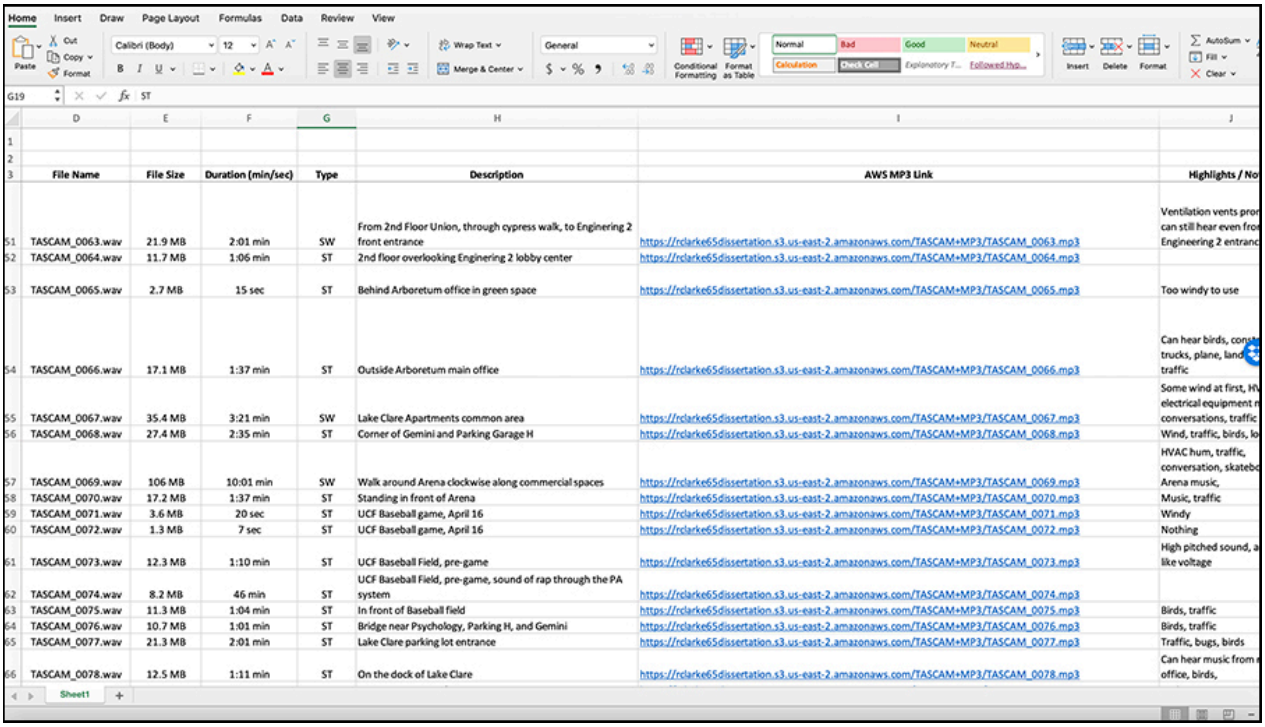
When capturing around the built areas, some of the recordings feature interior sounds such as people interacting in hallways or common areas, while others were taken at building entrances to get a balance of the anthrophony and biophony that exists on the campus. In some cases, the Techophony, or technological sounds, took center stage such as the air conditioning

systems or many construction cranes present during the Spring of 2019. Still others feature the various natural sounds heard around campus and in each village.

I photographed each location or shot a representative picture of a sound walk since that is a requirement for building a Story Maps Tour site. I will go into more detail in the next section, but essentially the picture serves as the layer to add narrative text and embed a link to the audio files. All photographs were taken with an Apple iPhone X, which comes with a robust camera featuring options that reduce glare, provide scene selections, and manual camera mode. Most smartphones these days have amazing camera options, and this made the mobile nature of the recording process easier as opposed to lugging around an SLR camera setup. The results turned out great and reproduced well on the Story Maps Tour site.

Once I had finished recording and taking notes for the day and also made sure I had transferred and backed everything up, I drove back to my home office to log the file information into a spreadsheet and copy the files to the cloud server. There are many options for these tasks such as Google Drive, iCloud, Dropbox, and Soundcloud among others. I happened to use Dropbox for the sound files, which was a choice that had some consequences later on when building the site and I eventually had to create a space on Amazon Web Services using their S3 application because the other cloud options did not provide accessibility to ArcGIS, even though they were stored in publicly shared folders. For the photos, Story Maps requires that they reside in a publicly shared location as well on Flickr, Instagram, or You Tube (if you are incorporating video into the project). I chose to use Flickr since I already had an account. I will talk more about the cloud options when discussing the challenges in the next section on the buildout.

For keeping all my data organized, I used an Excel spreadsheet. Again, while there many options for creating spreadsheets, Excel is the choice that Story Maps plays well with if the desire is to load the data in a CSV file as opposed to manually adding it to the project. Since I was planning on adding individually, this was not a concern of mine, but I did use Excel in case of any future implications or needs. I categorized each file by date, time, equipment used, file name, file size, duration, type (soundwalk or stationary), description, MP3 link, highlights/notes, village, weather, quality, and backup confirmation.



	File Name	File Size	Duration (min/sec)	Type	Description	AWS MP3 Link	Highlights / No
51	TASCAM_0063.wav	21.9 MB	2:01 min	SW	From 2nd Floor Union, through cypress walk, to Enginering 2 front entrance	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0063.mp3	Ventilation vents pro can still hear even fro Engineering 2 entranc
52	TASCAM_0064.wav	11.7 MB	1:06 min	ST	2nd floor overlooking Enginering 2 lobby center	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0064.mp3	
53	TASCAM_0065.wav	2.7 MB	15 sec	ST	Behind Arboretum office in green space	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0065.mp3	Too windy to use
54	TASCAM_0066.wav	17.1 MB	1:37 min	ST	Outside Arboretum main office	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0066.mp3	Can hear birds, con trucks, plane, land traffic
55	TASCAM_0067.wav	35.4 MB	3:21 min	SW	Lake Clare Apartments common area	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0067.mp3	Some wind at first, H electrical equipment conversations, traffic
56	TASCAM_0068.wav	27.4 MB	2:35 min	ST	Corner of Gemini and Parking Garage H	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0068.mp3	Wind, traffic, birds, l
57	TASCAM_0069.wav	106 MB	10:01 min	SW	Walk around Arena clockwise along commercial spaces	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0069.mp3	HVAC hum, traffic, conversation, skateb Arena music,
58	TASCAM_0070.wav	17.2 MB	1:37 min	ST	Standing in front of Arena	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0070.mp3	Music, traffic
59	TASCAM_0071.wav	3.6 MB	20 sec	ST	UCF Baseball game, April 16	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0071.mp3	Windy
60	TASCAM_0072.wav	1.3 MB	7 sec	ST	UCF Baseball game, April 16	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0072.mp3	Nothing
61	TASCAM_0073.wav	12.3 MB	1:10 min	ST	UCF Baseball Field, pre-game	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0073.mp3	High pitched sound, a like voltage
62	TASCAM_0074.wav	8.2 MB	46 min	ST	UCF Baseball Field, pre-game, sound of rap through the PA system	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0074.mp3	
63	TASCAM_0075.wav	11.3 MB	1:04 min	ST	In front of Baseball field	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0075.mp3	Birds, traffic
64	TASCAM_0076.wav	10.7 MB	1:01 min	ST	Bridge near Psychology, Parking H, and Gemini	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0076.mp3	Birds, traffic
65	TASCAM_0077.wav	21.3 MB	2:01 min	ST	Lake Clare parking lot entrance	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0077.mp3	Traffic, bugs, birds
66	TASCAM_0078.wav	12.5 MB	1:11 min	ST	On the dock of Lake Clare	https://rclarke65dissertation.s3.us-east-2.amazonaws.com/TASCAM+MP3/TASCAM_0078.mp3	Can hear music from r office, birds,

Figure 6. Excel Recording Data Log

Figure 6 above shows the completed Excel file. If you look closely towards the left on the sheet above, you will notice that I recorded the original files in WAV format to ensure the

highest quality. These are uncompressed, similar to a digital camera shooting in RAW format. I then had to run the WAV files through a conversion application to create MP3 files, then loaded them to my Amazon Web Services S3 site so that Story Maps could link to them. I used Audacity to adjust and normalize sound levels, then the free Switch application to convert to MP3, but a quick web search will yield many other options. These have always worked for me and are very accessible with tutorials available on the technology learning website Lynda.com, as of this writing.

Creating the Sound Map

After much consideration, I chose to employ the Story Maps Tour application, a part of the ArcGIS Online platform. As I've stated prior, this decision was based on the long-term longevity considerations as ArcGIS is an industry standard system and their Online option is a free system, utilizing their hosting services.

The design of the system is fairly straightforward to those new to creating GIS-based mapping projects, with tutorials and a generally user-friendly backend interface. Once you create an account, there are many options to create a map-based project. After exploring the gallery of example projects and deciding which one would best suit my needs, I chose the Story Maps Tour. I came to this decision after viewing several walking-tour based examples of various cities. Many included audio narratives of each featured tour location, so I felt this would serve as a good way to incorporate soundwalks and recordings alongside photos of my chosen campus sites. The other variations of the application include Cascade, Map Journal, and Map Series.

Each has its own layout style and are good options for featuring more narrative features, interactivity with photographs, or incorporating video. However, some of the other variations do not handle audio files, with the exception that Story Maps Series can embed a Story Maps Tour with audio with an upcoming upgrade. Story Maps Tour has that capability as long as you are willing to do a bit of HTML coding. This is also true of tailoring the application for specific needs such as font variations, custom logos, and hyperlinks. The basic shell does not include these features but will allow for limited customization with HTML, so with a little research and coding, you can produce your own look and feel to your project. That said, much of the work we do in digital humanities relies on technology that can be both beneficial and frustrating at the same time. The process of creating the sound map fell within this range due to version upgrades over the project's development that at times rendered some features unusable until the next upgrade.

The first step to creating a Story Maps Tour is creating the account. Once that happens, users can login and are taken to a screen similar to the one shown below in Figure 7, the dashboard for all initial project creation and where the account owner can launch the desired tour to add content such as maps, pictures, and audio.

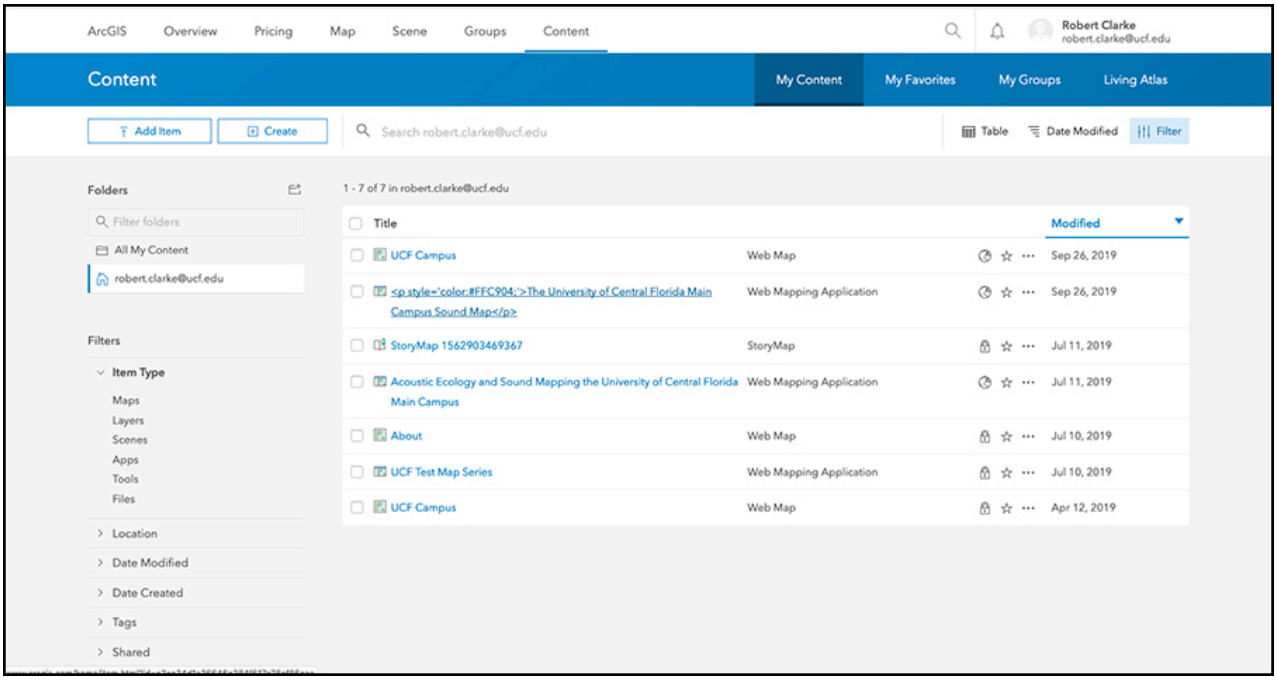


Figure 7. ArcGIS Online Account Page

Upon the initial launch of a tour, the user is then asked to begin populating media files, in most cases photographs. The image I chose for the start of this project was an aerial view of the UCF campus showing the concentric layout, as shown in the left pane of Figure 8 below. In the right pane, a dialog box asks to choose a basemap for the entire project. You can see that the choices run the gamut from full imagery to a "Google Maps" style photo to topographic maps. I chose to customize this feature and use the image on the left as my basemap. This meant that all future images I entered would be geo-tagged to my chosen map with its own numbered icon, provided location services and GPS is enabled on the camera device. If they weren't automatically transferred, there is an option to geotag them manually.

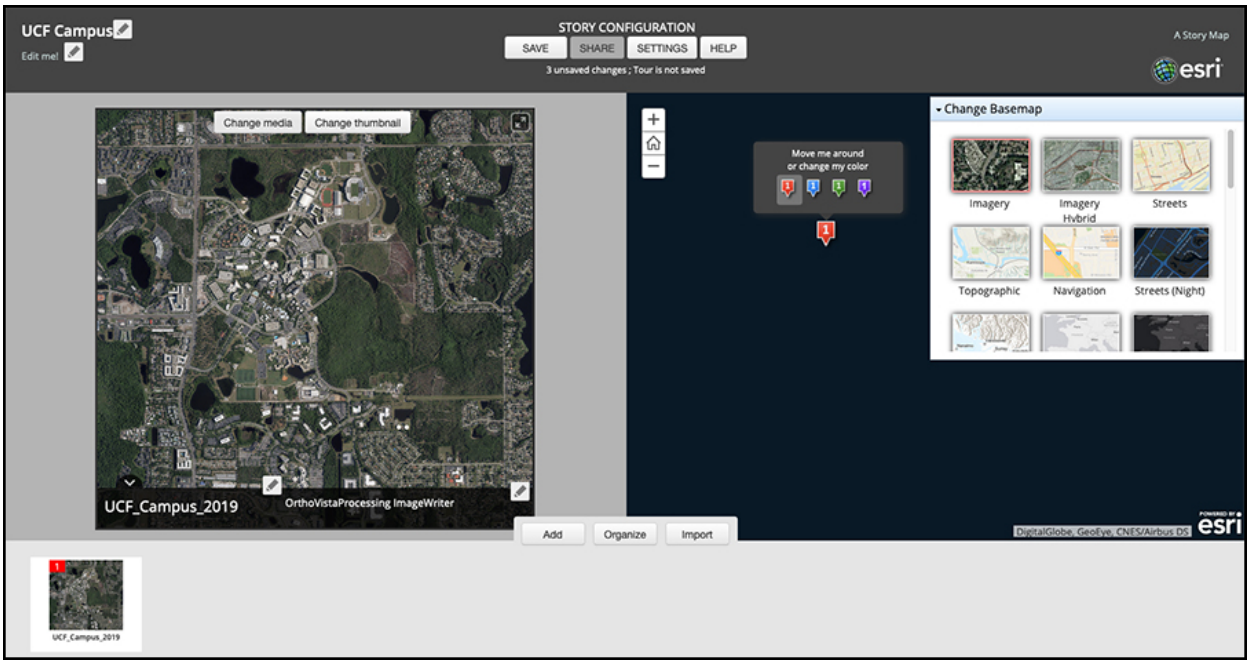


Figure 8. Story Maps Tour Initial Home Page

Once the base image is set, it is time to create the title and hit save. In the top heading, there are four tabs that, along with the three at the bottom, comprise the navigational tools in the editing mode. They are pretty self-explanatory in Figure 8, but there are a few things to know about the process. When you hit save, obviously it saves the project. When you hit share, you make your work public, so anyone can see it. I chose to have it public so that I could check my progress on multiple browsers and device platforms. I would just have one editing tab open along with one public tab open and each time I made a new save, then simply go to the public tab and refresh to see how it looked to the rest of the world.

When you click on the "Settings" tab, the dialog in Figure 9 below opens up. The first section deals with the layout. There are three available layouts in this version of Story Maps Tour. Side Panel features the photographs front and center with narrative text in the left pane.

The Three Panel option put the main basemap in the right pane with the selected thumbnail in the left and the remaining thumbnails in a scrollable bar at the bottom. The third option, Integrated, is just what it alludes to: a hybrid of both.

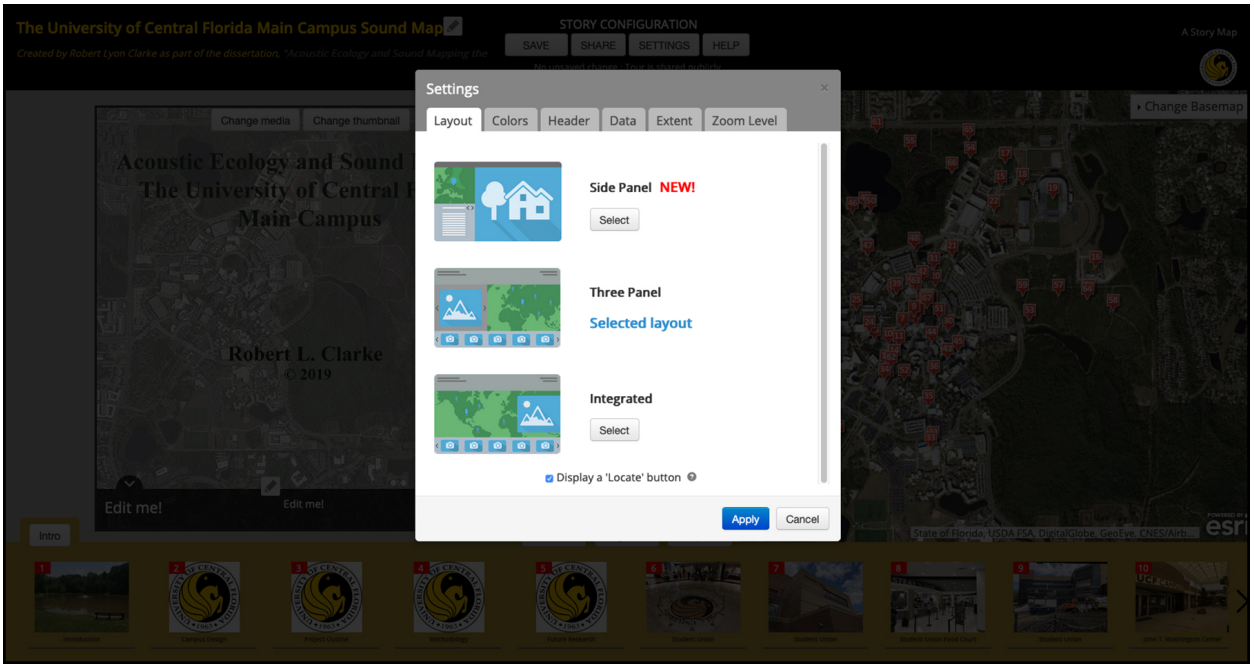


Figure 9. Story Maps Style Preference Dialog Box

I chose the Three Panel option for a few reasons. First, it left the basemap in a stationary position on the right-hand side and the individual popups didn't become the star of the show. Second, the other two options were good choices if photography was the main draw to the site, which in this case it was not. The last reason, and most importantly, is that not all the options supported adding sound files at the time I was building the sound map. I believe ESRI corrected the issue since, but obviously for me that was the critical concern.

The other tabs in the Settings box change the look and operation of the site. In the Colors tab, users can choose from several pre-determined themes or chose to create their own color scheme. I thought it appropriate to use the official hex colors listed in the UCF Style Guide since I was incorporating the logo as well.[106] The Header tab is where you can add the logo of your choice in the right-hand corner. The Data, Zoom, and Extent tabs all deal with the way the basemap and photos interact. I chose to keep the default values since I wanted the whole map to be visible at all times during user interaction.

Now that I had the basic shell, it was time to begin populating with images and linking to the sound files. This is where things got interesting. There are two ways to populate images into a Story Maps Tour: local hosting on their servers where you upload an image directly or you specify an online repository such as Flickr. There are advantages and disadvantages to both, but I would not find that out until too late and had to redo everything. When you upload an image directly, that becomes the hosted layer and you cannot add more multimedia such as audio recordings. So, after uploading my images and realizing I could not add audio, a web search revealed that issue. I must import them from Flickr in order to be able to have the ability to link to audio. So, I deleted everything and transferred all the photos from Dropbox to Flickr and began the import, as shown in Figure 10 below. Even though the images in Dropbox were in a public folder, apparently the two platforms do not communicate well, as I would find out later when trying to link the audio files. One final note is that you are limited to 70 images of import

[106] Central Florida Team Color Codes. https://teamcolorcodes.com/ucf-knights-color-codes/
University of Central Florida Brand Identity System: https://www.ucf.edu/brand/brand-assets/logo-identity-system/

at the time of this writing, however multiple Story Maps can be linked together under the Story Maps Series App, which is undergoing revisions to allow sound files to transfer over between the two platforms.

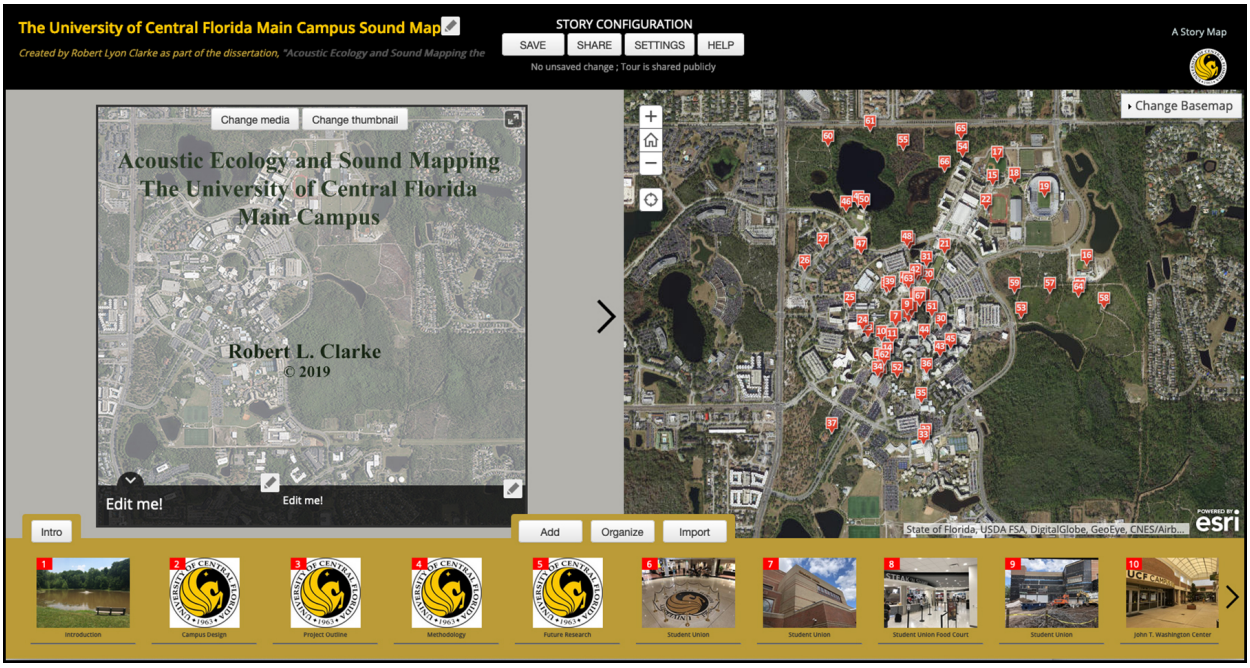


Figure 10. Story Maps Editing Interface

Once the color selection, layout, and photos were imported via the link to Flickr, I could then begin to add the audio as seen in the other audio-centric projects in the Story Maps Gallery. In order for audio to be included, one must manually create the HTML as shown in Figure 11 below with a link to a publicly accessible source. I thought the Dropbox public folder would be compatible, but it turned out that most of the common cloud services including Apple iCloud, Soundcloud, and Google Drive do not work with this system. After researching the problem, much of the issue comes from the other proprietary platforms that want you to only use their products and not stemming from ArcGIS itself. This is the same issue I ran into when my thesis

project was rendered unusable when Google decided that Google Earth could no longer be incorporated in platforms without a subscription. With Story Maps Tour, the specific problem I was having was that after coding the HTML link to the audio, it would work perfectly during a test. Then, after saving the site and opening a public version, the audio would either be deleted or would indicate there was something there but was it was not accessible. When visiting the help forums, it appeared I was not the only one having this issue. Apparently, during a recent upgrade to the platform, the ability to add an audio file had inadvertently been deleted and the indication was that the development team would address the issue during the next rollout, which took place in August 2019. Thankfully, the issue was resolved.

In the meantime, the cloud audio files still did not play when clicked. After much frustration, I opened an Amazon Web Services account and signed up for their S3 app. When I tried those links in my HTML code, it finally worked. I later discovered that the coding in the Dropbox files would not translate into Story Maps Tour and ArcGIS had dropped support for Google Drive incorporation. Apple's iCloud server worked at first, then after saving and sharing to the public site they would not register. The link from iCloud was not a "clean" link, meaning it had to go through proprietary channels in order to function properly, which it did not in this case. The Amazon Web Services account worked seamlessly as the publicly accessible link I needed and at that point I could finally begin populating the site with audio clips. Figure 11 below shows the HTML coding used to add an audio clip to the photo layer.

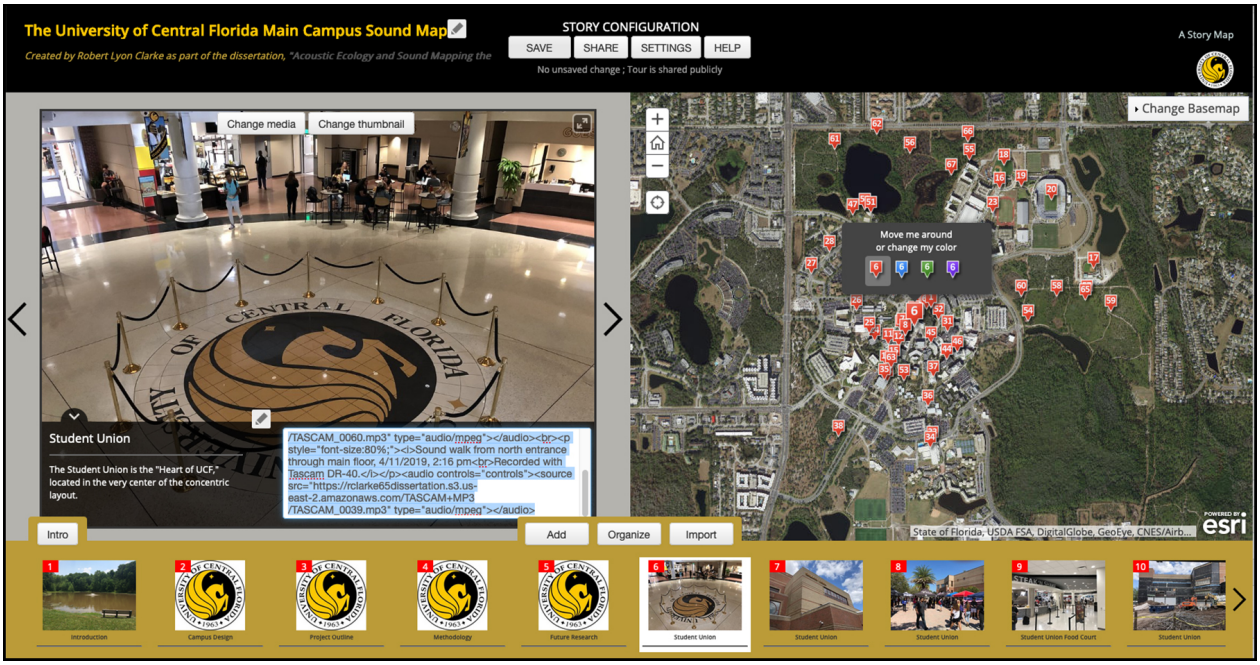


Figure 11. Story Maps Customization

With the audio issue finally resolved, I could then turn my attention to the look and feel of the site. As mentioned before, the color scheme chosen reflects the university's main colors. I incorporated one of the official logos per the instructions on the branding website. I also added a link into the main header where viewers could click and be taken to the final published dissertation if they wished to read more about the project.

In order to make the sound map more representative of my entire work, I added five slides to the beginning of the series: Introduction, Campus Design, Acoustic Ecology, Methodology, and Conclusions. The text is limited to one thousand characters, but the point was to provide a snapshot of each dissertation chapter so if a user just went to the website, they could understand the scope of the project in a nutshell, without reading a lengthy paper. Digital historian David Staley has long advocated that a visualization, or in this case, an "audiolization,"

if you will, should stand on its own without further explanation and can convey information in a more dynamic manner than text alone.[107]

With the upgrades to the Story Maps Series application in August 2019, the ability to incorporate a Story Maps Tour as a tabbed section within a larger umbrella project became possible because the audio would now transfer over correctly. Prior to this, it did not. With that in mind, I designed a tabbed Story Maps Series application that features tabbed headings across the top of the header that reflect each chapter of the written dissertation. The advantage of this was a more logical representation of that component, with the added ability to upload unlimited text. In this case I could present a summary of each chapter, along with citations, on each tab. In this way, one could simply navigate to the "Acoustic Ecology and Sound Mapping the University of Central Florida Main Campus" homepage and be able to read a brief version of my theory, methodology, and conclusions and then view the sound map, understanding the entirety of the dissertation project without reading the written document (see Figure 10). [108]

The Sound Map

After many months of work, the Sound Map was complete. When I did decide to incorporate a link to the map within the tabbed Story Maps Series platform, it gave the entire online component a more complete, narrative feel, which is something I wanted to achieve from

[107] Personal conversation with Dr. Staley, HASTAC Conference, Orlando, Florida, November 4, 2017.
[108] "Robert Lyon Clarke, "Acoustic Ecology and Sound Mapping the University of Central Florida Main Campus." Homepage.
http://www.arcgis.com/apps/MapSeries/index.html?appid=a418a44049d0472191d295c12b266cd8

the beginning. This is one aspect that drew me to the London Sound Survey in the first place in that I could move among tabs and learn about the project and then click on the maps and other resources in an intuitive manner. I was also able to incorporate a tab where others could contribute to the project, with vetting of course. Figure 12 below shows the look of the map within the larger narrative structure.

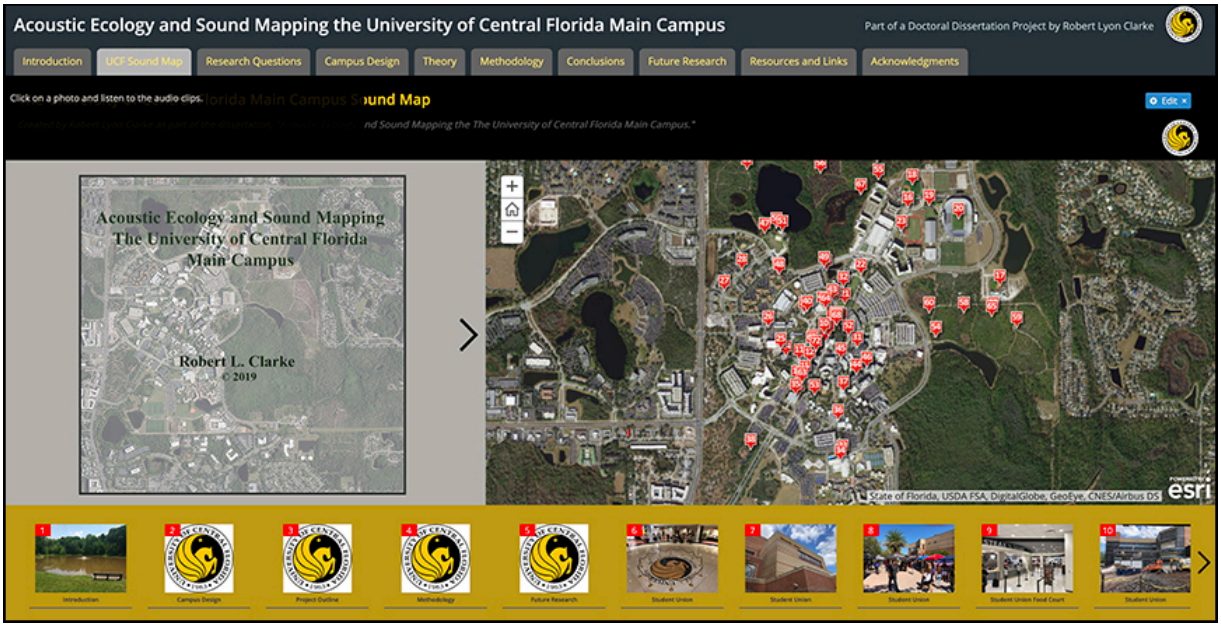


Figure 12. Story Maps Series Sound Map

In addition to being able to incorporate the map, I was also able to add significant parts of the written portion into each tabbed pane. Figure 13 below shows the Introduction home page where I was able to transfer my introduction from this document to that site, complete with interactive links to the podcast interview and sound files related to my background.

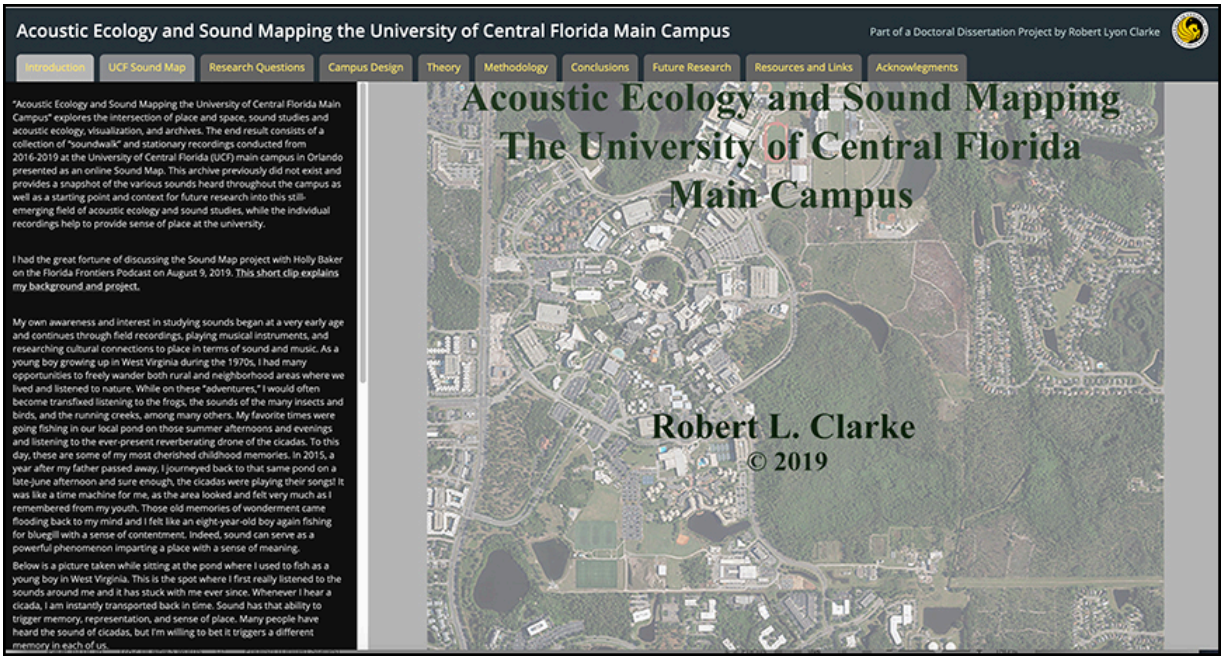


Figure 13. The Story Maps Series Home Page

Under the methodology tab, I was able to include the bulk of this chapter in addition to providing links to various items mentioned within the text. That ability makes the methodology portion more dynamic than simply reading about the process. Users can link to the items or websites I discuss in real time while reading, thus rendering the pages more dynamic when viewed. One of my favorite parts about the entire methodology section, and actually the whole project, was that nearly every photograph that appears within the site and these pages was one that I took, photoshopped, and included to provide more context. In the case of the sound map, they were needed in order to have a layer to build upon. In the case of the shot in Figure 14 below, I think it helps those who may be new to the process to see what kind of kits others use to record soundscapes. My kit, of course, may not work for all conditions or needs, but for soundwalks and stationary recordings it fit the bill very nicely.

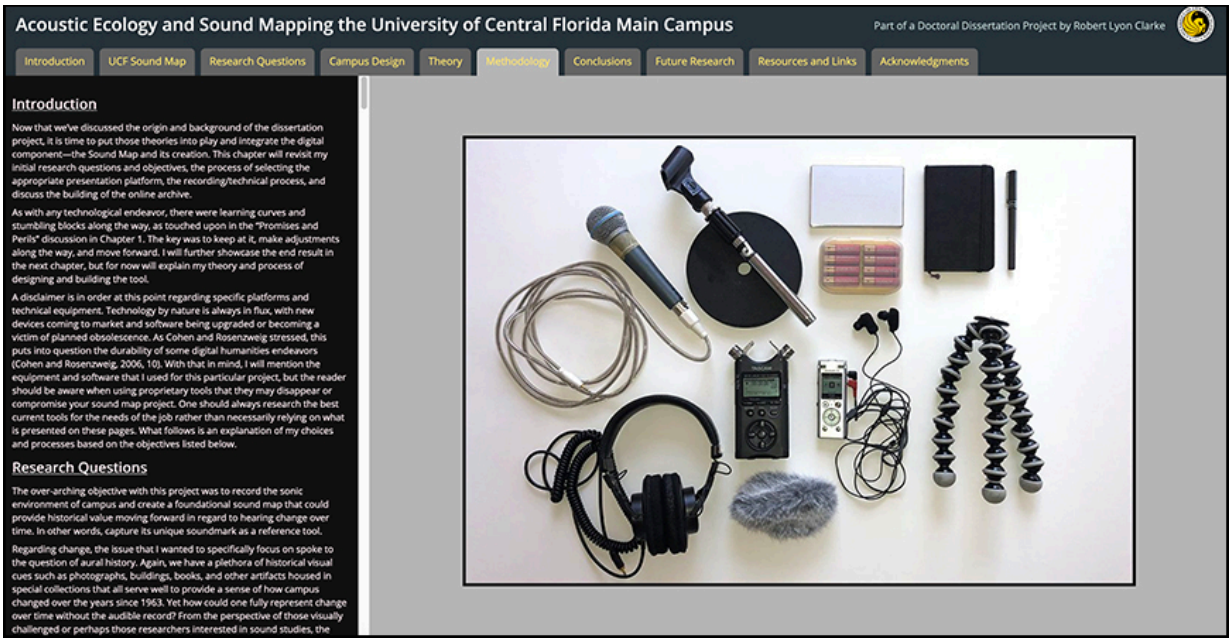


Figure 14. Story Maps Series Methodology page

CHAPTER FOUR: BRINGING IT ALL BACK HOME

"Sometimes it's not enough to know what things mean, sometimes you have to know what things don't mean as well."

-Bob Dylan[109]

I consider myself, first and foremost, a historian who has chosen to explore digital humanities and sound as a way to impart clarity and insight into questions that text and visual ques alone cannot provide. Historians have always focused their attention to the concepts of place, space, and time. Far before digital technology brought the added benefits and possibilities such as accessibility and metadata to research, scholars studied maps and explored how places and people change over time. Today, digital mapping tools such as GIS allow historians to visualize large datasets using their geo-temporal aspects, revealing patterns that can add a fresh perspective or functionality to a topic otherwise not possible.

The study of sonic environments and soundscapes is one such example. I have always been drawn to sound, whether music, the sound of crickets, or the dawn chorus on our mountain. As a musician, I try to represent, or at least pay homage to, the past in regard to ancient ballads, mountain music, and traditions. For me, the question always arises "I wonder what this sounded like a hundred years ago." As a scholar, I have had the good fortune to meet and collaborate with Bill Ferster, author of *Interactive Visualizations: Insight Through Inquiry*," who stressed there is

[109] *Masked and Anonymous (2003) - IMDb*, accessed October 27, 2019, http://www.imdb.com/title/tt0319829/characters/nm0001168.

always a story to be told and as historians, it is our mission to reveal it in a manner that engages the audience.[110] A visualization is one tool that can accomplish this task, and in many ways, perhaps the best tool that can tell the story in terms of big data, such as in the case with sound recordings over time. It may seem oxymoronic to use a visualization to relate sound, but perhaps this project is more of what I term an "auralization."

Sound Map Analysis

The sound map created with this project constitutes that "auralization." In Chapter 2, I proposed a typology of campus spaces forming a framework to guide recording and categorizing campus soundscapes, not only at UCF, but other university environments as well. The benefit of this method is not only to create collections of campus sounds, but to adhere to a common terminology of space. One cannot compare apples to oranges, as they say, so it becomes vital to apply a standard methodology when recording and archiving the collection.

One such resource for a controlled metadata vocabulary is the Federal Geographic Data Committee's Geospatial Standards.[111] Using these guidelines provides the method to allow geospatial data sharing across multiple entities, such as universities as well as adhering to the guidelines of the National Spatial Data Infrastructure, or NSDI, developed in 2013 in order to provide sustainability and accessibility of data collections. ESRI's ArcGIS platform also has a metadata standard of their own. Users can optionally choose to adopt the FGDC standards

[110] Bill Ferster, *Interactive Visualization: Insight Through Inquiry* (Cambridge, MA: MIT Press, 2013).
[111] "Geospatial Standards — Federal Geographic Data Committee," accessed November 15, 2019, https://www.fgdc.gov/standards.

within the platform itself.[112] It is essential to incorporate metadata within the archive since as the collection grows, individual recordings remain accessible through search but also tags help quantify the volume of recordings in each type of space or by sound type. This further strengthens the longevity of the historical record, which in turn allows tracking change over time as the collection grows. Currently, the scope of the archive is admittedly narrow, but over time will come to reflect seasonality, time of day, and allow listeners to become an earwitness in better understanding how the university soundscape adapts and changes over time in the face of growth.

It is also worth mentioning that there exists a tension between intended land use and the actual soundscape of certain areas. Aside from the historical record aspect, the land use policies referenced in Chapter 2 often take into consideration the visual ques, such as landscaping, pleasing pathways, or efficient buildings. Yet, soundscape considerations appear to either not be part of the equation or at least not weighted as much as they could be in decision making. The representational role of sound plays an integral part of how one experiences campus space, getting back to phenomenology, and helps shape our sense of place.

For example, the overall campus landscaping design is both beautiful and impressive, including many trees, green spaces, and seating areas between buildings. Yet, during a sound walk from building to building, one hears much industrial noise in the form of HVAC and the hum of power stations due to their location, often near entrances. One such instance can be heard

[112] "Metadata Styles and Standards—Help | ArcGIS for Desktop," accessed November 15, 2019, http://desktop.arcgis.com/en/arcmap/10.3/manage-data/metadata/metadata-standards-and-styles.htm.

in recording number forty-one; a sound walk from the Business Administration building to the Reflection Pond. At the beginning one feels as though an airplane is about to take off with the echoes of high-decibel fans ringing out in the industrial space in between the B.A. Building and the Technology Commons Center. By the end, the listener enters a contemplative space and hears the tranquil splash of the Reflection Pond fountain and birds singing; a large variation in sound during a three-minute walk. This is also the case in the sound walk from the now demolished old Colbourn Hall to the cypress boardwalk (#3). The walk begins in front of Colbourn Hall along the pedestrian pathway, entering the communal space of the John Washington Center, continuing on to the entrance of the Student Union. Recorded just before noon, the soundscapes captured in that part include conversation, echoes from the built environment, and the cacophony of sounds in the common area at the Student Union. As one passes through to the since renovated outdoor patio and cypress boardwalk, the industrial sounds once again become evident. This is in stark contrast to the visual stimuli one experiences. The walkway is designed as a peaceful place to transverse through or sit on the many benches, but the soundscape hinders that contemplative design intent. On the other hand, the bustle heard in the beginning at Colburn Hall has since given way to a large green space where one hears birds and cicadas. People also use it as a recreational space, evidence of the changing characteristics within campus and another validation in the value of recording the historical soundscape over time.

Other sound marks do reflect design intent. For example, creative space sounds lie at the very heart of the university experience. These sounds refer to those heard during lectures, conversations outside of the classroom setting such as during soundwalks through an academic building, where students collaborate in library group study areas, as well as common areas within

academic buildings that allow for group interaction within disciplines. Several recordings belong to this space type including the soundwalk through the Library (#11), the hallway activity of Nicholson School of Communication (#35) and Classroom Buildings 1 and 2 (#37 and #39). Communal areas that overlap with creative spaces include the Psychology Building atrium (#27), the entrance of the Global Studies Building (#63), and the lobby area of the Engineering 2 Building (#28). The conversations heard during these recordings vary in type as well, not surprising since these spaces are part of different villages. While in NCS for instance, one hears history conversations through the recording, while in Engineering the students are working on models, and the Global Studies recording reflects the multi-cultural dimension of campus.

Research sounds are also included in the creative space typology and part of many university campuses. These soundscapes showcase some activity beyond the normal academic sounds of lectures, studying, or group study. In a sense, they could also be integrated with technology, but for the purposes of this typology they are distinct. Examples of these sounds are the beakers clanking in laboratory experiments, centrifuges separating blood, or the creation of tangible inventions in engineering schools. One pertinent example is that of the Henry M. Goldman School of Dental Medicine at Boston University. On the fifth floor, the students shape dentures, practice filling cavities, and mold crowns in a lab using mannequin heads with state-of-the art technology. The sound of the drill bits humming and the laser machines carving the final crowns fall into this category.[113] To hear that level of dentistry at one time creates a memory and sense of place for the students of that lab.

[113] From personal experience visiting the campus with the author's stepdaughter, Dr. Corrine Kunkle, while she was a dental student at Boston University, May 2017.

Sense of place really becomes apparent when listening to the soundscapes emanating from symbolic spaces. Every campus has those areas that become iconic to faculty, students, and alumni. The key word in this case is "become." A particular space becomes symbolic through the shared lived experience of those who move through that space over time and develop a special relationship to that place. Soundscapes of sporting events often fall into the symbolic category, with prime examples being the Florida State University's chant during the tomahawk chop of the fans rooting for the Seminoles or the Oklahoma Sooner's fight song "Boomer Sooner" playing while the Boomer Schooner rides on the field after a touchdown. These are iconic sounds that bring meaning to a specific stadium. In the case of UCF, Spectrum Stadium is nicknamed "The Bounce House" for a reason. Built with metal bleachers instead of concrete, when the fans start stomping their feet in a long-standing tradition of team support, the entire stadium shakes. Television networks comment on this phenomenon during virtually every televised game. To hear the sound of 45,000 people jumping up and down on metal bleachers is quite a memorable experience and one that brings a sense of place to that particular stadium, particularly for alumni watching on television. They can feel that connection because they've heard that soundscape.

What became apparent during the creation of the sound map is that although all sounds occurred on the campus grounds, there was no single soundmark. Instead, what I heard was many soundmarks depending on which area of campus one moves through. The above referenced stadium experience is one such example. Is that a representation of the entire campus? Of course not, there are many others. Additionally, within each village in the campus design, there exists soundmarks unique to that space while other sounds are common throughout the campus. The sounds emanating from green spaces generally share similar characteristics with

each other, while others, such as those heard outside of the Addition Arena are unique to that particular location, just as with the stadium example.

Another interesting example of why recording everyday sounds is a worthy consideration can be related in the following anecdote. In a recent August 2019 social media post, a UCF alumni posted a picture of a sand parking lot surrounded by a forest of trees and no buildings in sight, with the exception of an older arena in the background with a pond in front of it.[114] That picture was taken in 1994 from the rooftop of the Student Union facing north. The arena has since been rebuilt as Addition Arena, the pond filled in, and the sand parking lot was transformed into Memory Mall in the early 2000s. The response to this before and after photograph sparked a large response from alumni who related stories of getting their car stuck in the mud during a rainstorm or getting their shoes sandy while walking to classes. They had been there in that lived experience and the picture brought that sense of place back to them in an instant. The same can be said of a soundscape.

Reflections

I began this dissertation process with the goal of creating a representation of what campus sounded like in 2019, building upon the experience of my past digital projects and positioning myself in the scholarly trajectory of sound scholars Michael Southworth, R. Murray Schafer, Bernie Krause, Barry Truax, and Bryan Pijanowski. Tuning ourselves to the world and becoming aware of our sonic environment allows us to have a recorded historical record that can not only

[114] Twitter, @UCF August 15, 2019. https://twitter.com/ucf/status/1162126318546407424

help tell a narrative story of change over time in terms of history, but perhaps also inform us of environmental issues like concerns over species populations or the impacts of climate change on campus. It is my goal to create a body of work that can help influence or at the least help inform future land use decisions and provide students and alumni a means to connect to place. UCF's stated policy regarding university development is focused on growth, so the balancing that aspect with conservation of wetlands and natural spaces becomes an important consideration.

Along this journey, I explored semiotics, phenomenology, and embodiment in regard to place theory. At this point, the reader may say, so what? The semiotician may ask, "What is the relationship between your project and the concept of signs? I would counter with the fact that every sound I recorded contains information that can be interpreted as representing a specific place in time and imparting meaning. For instance, one soundwalk recorded in 2016 captures the sonic environment outside of the now-demolished original Colbourn Hall, which housed the offices of the College of Arts and Humanities. That space does not exist anymore, yet today that site is a field filled with the sounds of birds as opposed to students and faculty recorded in 2016. It represents a completely different place for them in relation to someone who used that building five years ago. Still other recordings capture contemporary political and religious beliefs, ethnic diversity, as well as provide a glimpse into one of the campus "soundmarks" as of 2019. Future recordings may capture an entirely different soundscape. It is that type of sonic change that I am interested in documenting for the historical record.

As I was recording, I observed the behavioral patterns of students and faculty on campus. Many wore their own earbud headphones to create their own soundscapes and avoid the noise of

construction or landscape maintenance. From a phenomenological standpoint, they may take themselves out of the natural campus sonic environment yet create their own interaction with place. From a practical standpoint, they can do this in large part due to the pedestrian nature of campus design, with the exception of the rare, rouge out-of-control skateboarder, of course.

In so far as the theoretical aspect of embodiment, I can only speak to my own experience. As I was recording, I experienced places that I have been moving through for the past ten years with a new perspective. Truly listening to the sounds around us opens up a whole new way of understanding place. I never realized how loud the air conditioning systems at the building entrances were, for instance. Or the diversity of sounds walking from the Student Union to Millican Hall. My physical experience while moving through these spaces opened up a new understanding of the campus, its design, and how people negotiate that space, or the spatial practice that Henri Lefebvre and Richard White spoke to.

While building out the sound map, what became apparent was the diverse nature of sounds on the campus. The areas represented by the natural spaces stand in many ways as a complete contrast to those of the built environment. While this may seem obvious at this point, it may be that in the future these places will be repurposed for parking or perhaps more student housing. In that case, these recordings remain as a testament to the historical record of the campus.

I place my project in the historical record that will serve primarily as a benchmark of a collection that previously did not exist as well as providing a typology of campus spaces as a framework for future researchers to explore sonically. While admittingly the collection is not an

exhaustive archive with every single aspect of the soundscape represented, that was not my intention during this first phase of the project. As I stated in the introduction, my purpose was rather to create a cultural public history presentation as opposed to a big data empirical research project. I believe I achieved that goal with the sound map and website. There are others pursuing the scientific methods of soundscape ecology and I hope to assist them in their analysis in the future and perhaps link the sound map to their results.

My experience with the ESRI Story Maps Tour and Series turned out better than I had expected while going through the process, even though as Cohen and Rosenzweig repeatedly wrote, there are promises and perils of doing digital scholarly work. One of the main issues was incompatible technology across proprietary platforms. At one point, I became worried that the website would not function as I had hoped, but at that point I was too invested to switch gears. Luckily, ArcGIS routine upgrades solved many of the issues with HTML coding not saving and displaying the audio controls. Also, I was able to finally find compatible cloud-based platforms that would function properly with Story Maps Tour and Story Maps Series.

Part of my research was finding out the history of the campus design. It is evident that Dr. Millican and the architectural design team had representation of place in mind from the beginning of the process in creating the physical layout of campus. Their purpose was to influence the spatial practice, or social relationship to the space, of the student body and also the interactions between faculty and students. In doing so, they created a path for the students on campus to potentially develop a different relationship and meaning of place compared to, say, a grid system with vehicular traffic or long walks between buildings. The concentric design and

pedestrian nature also influenced the unique acoustic nature of campus. While there are some vehicle sounds in the recordings, mostly golf carts, the majority reflect human voices, birds, and anthropogenic sounds such as air conditioning fan motors, man-made fountains, or even the crack of a baseball bat hitting in a run.

Bringing it all back home, my childhood is where I started listening. The pond in West Virginia and hearing the bugs and sounds of nature. Listening to my parents, grandparents, and great-grandparents while growing up tell stories of family history and times that have passed still resonate today. Today, I record the sounds, and for those who have experienced the UCF campus, that may be what home represents in a sense, or perhaps a memorable experience that influenced them in some way that they do not yet realize.

Future Research

It is my hope that this work will inspire others to continue the creation of sound maps at UCF in order to add to the archive that now exists. One of my goals is to continue to add to this particular collection and grow it in size and scale in the manner as Ian Rawes has done with the London Sound Survey. This takes years of recording, but it would be exciting to hear how the campus will have changed over the next say, ten years or so with construction, perhaps a larger student body, and the rapid change in technology of sound. When I think that in 2004 smartphones did not exist, I often wonder what those soundwalks (sound safaris) I took for this project would have sounded like at that time or even in 1968 when the University held their first

classes. No students texting, perhaps more conversations (or not), or even just hearing the then-current musical hits of the late sixties being played over transistor radios in front of the Library.

Another key piece of research I wish to pursue is the survey of students. Originally, I had decided to initiate a survey of both sighted and sighting impaired students in order to analyze their sonic perceptions of campus. I wanted to know if there was a difference in how they navigated their way based on sound, or whether this was not an issue. In speaking with a few sight impaired people on campus, I found that they did in fact use sound signals as a way to find their way, a process some call wayfaring. As I was going along creating the sound map, it seemed as though that particular research and the current project were two separate focuses and so I decided to keep the survey portion for future work. I did obtain the IRB, so perhaps I can revisit that project soon. Finally, as I mentioned earlier, I also look forward to working with those analyzing the big data soundscape ecology projects because those can inform of a changing environment on a scientific level using sound as the measuring tool.

Thank you for listening.

APPENDIX A: PERMISSIONS

Re: Linking to the London Sound Survey

Ian Rawes <soundandhistory@gmail.com>
Fri 10/4/2019 5:21 PM
To: Robert Clarke <Robert.Clarke@ucf.edu>

Dear Robert,

Thanks ever so much for your email and interest in the London Sound Survey. You would be very welcome to include screenshots of any of my webpages in your dissertation, including those featuring sound maps. Please just credit them to the London Sound Survey - the license type to mention is a Creative Commons Attribution Non-commercial.

Good luck with your work and if you put anything online please send me the link - I always learn something from seeing and hearing what other recordists do.

Best wishes,
Ian Rawes
The London Sound Survey

On Fri, Oct 4, 2019 at 6:29 PM Robert Clarke <Robert.Clarke@ucf.edu> wrote:

> Hello Ian,
>
> My name is Robert Clarke and I am a PhD student at the University of Central Florida in Orlando.
> I am in the process of completing my dissertation project, a sound map of the university campus.
> I've really gotten much inspiration from your site!
>
> My question is this: I have referenced your site in my writing, but I would also like to add a screen shot of the Survey map if possible. I would not be using any of the recordings, just a static screen shot.
>
> Please let me know as I will have to show I had your approval to use copyrighted material.
>
> Best,
> Robert Clarke
> Robert.Clarke@ucf.edu

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