The University of North Florida Through Time: An Evaluation of Land Use Through Geospatial Techniques

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ABSTRACT

The University of North Florida (UNF) was founded in 1972 on a 1000-acre tract of land in southeastern Jacksonville. Since then, the university has grown to 28 buildings, five residence halls, with an all-time high of 17,000 students. This study examines the comprehensive footprint growth of the UNF from 1970 to 2017. Utilizing remotely sensed aerial imagery and GIS techniques, we map and measure the expansion of infrastructure, as well as the loss of natural areas on campus. In light of the university's approaching 50th anniversary, our geospatial analysis provides the framework by which we chronicle the history of UNF's expansion.

Keywords: Jacksonville, Florida, land use, visual analysis, historical imagery, spatial history, remote sensing, GIS

INTRODUCTION

Spatial history offers a unique opportunity to converge geospatial technologies with traditional social science and humanities disciplines (Delaney 2009). This study utilizes Geographic Information Systems (GIS) to chronicle the development of the University of North Florida (UNF) since its groundbreaking in the early 1970s. Remotely sensed aerial imagery, in five to ten-year time series, are analyzed to track land use changes over time. By digitizing the footprint growth of campus, we map and measure the expansion of infrastructure, as well as the loss of natural areas. To enhance the narrative of our findings, each digitized map is accompanied by a brief summary of major campus changes, as well as UNF historical photography. As such, this study offers a unique and data driven approach to the recounting of UNF's history.

State University System of Florida

In 1954, the Florida Board of Control appointed a Council for the Study of Higher Education, which subsequently established the Florida junior college system (Schafer 1982). One year after the council's founding, the junior college system had expanded from five to 28 local colleges, all established in rural areas. However, the most populous regions of the state were still severely lacking in state universities, including the city of Jacksonville. In response to this shortage, state legislation authorized the founding of the University of South Florida in 1956, the first state university in almost seventy years. From 1960 to 1969, seven more state universities were established across Florida (Table 1). The University of North Florida was the last of the six state universities founded during this boom (see Figure 1).

Florida's Universities	**Location**	**Founded**
Florida State University	Tallahassee	1851
University of Florida	Gainesville	1853
Florida A&M University	Tallahassee	1887
University of South Florida	Tampa	1956
New College of Florida	Sarasota	1960
University of Central Florida	Orlando	1963
University of West Florida	Pensacola	1963
Florida Atlantic University	Boca Raton	1964
Florida International University	Miami	1965
University of North Florida	***Jacksonville***	***1969***
Florida Gulf Coast University	Fort Myers	1991
Florida Polytechnic University	Lakeland	2012

Table 1. State University System of Florida, including primary city and date founded.

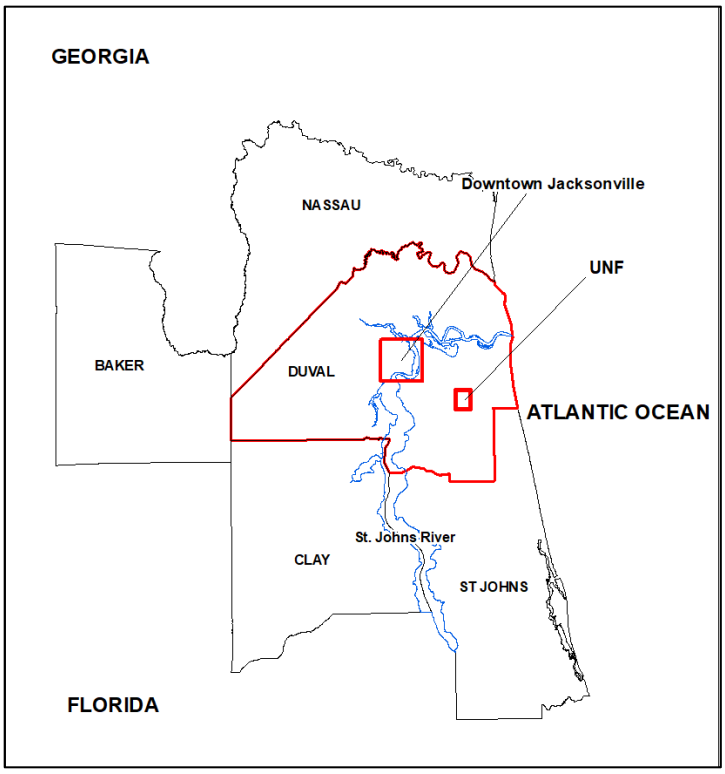

Figure 1. Northeast Florida, downtown Jacksonville, and UNF.

UNF Founding

In 1950, Duval County had approximately 304,000 residents. Ten years later, the northeast Florida's largest county had grown to approximately 455,000 residents (see table 2). According to Florida State Senator John E. Matthews Jr., Duval County was "the most educationally starved community of its size in the nation" (Brady, n.d.). In 1962, approximately 50% of Florida high school graduates enrolled in Florida colleges. Duval County significantly lagged behind the state average, with only 32% of the county's high school graduates enrolled in Florida colleges (Schafer 1982). Two years later, Duval County high schools were disaccredited due to funding issues, overcrowding, and safety issues (Crooks 2018). J.J. Daniel, whom the UNF Administration building would later be dedicated to, chaired a commission in 1965 to investigate the consolidation of Duval County and the city of Jacksonville. In 1968, the county and city consolidated, and the process of revitalizing the city began (Crooks 2018).

Year	Florida	Duval County
1950	2,771,305	304,029
1960	4,951,560	455,411
1970	6,789,443	528,865
1980	9,746,324	571,003
1990	12,937,926	672,971
2000	15,982,310	778,879
2010	18,801,310	865,628
2019	21,477,737	957,755

Table 2. Population of Florida and Duval County each decade since 1950 (FCIT 2005; U.S. Census n.d.; U.S. Census 2019).

In 1963, Florida State Senator John E. Matthews Jr. introduced the first of three higher education bills to authorize a four-year state college in Duval County (Brady n.d.). On February 3, 1969, the Jacksonville City Council declared that south Jacksonville would become home to the University of North Florida. The site selection process was contentious, as many community members advocated for the University to be placed in downtown Jacksonville. Downtown advocates voiced concern that the southside location, which the University would eventually occupy, was inaccessible to urban residents (Brady, n.d.). Despite opposition from African American community leaders, the University board opted to purchase land in the undeveloped suburbs, due to the prohibitive costs of urban land (Brady n.d.). It is notable that as of 2017, only 10% of UNF students are black, while approximately 30% of Jacksonville residents are black (UNF 2017a; U.S. Census 2019).

The University of North Florida is located in what is known as the Southside, east of the St. Johns River and southeast of downtown Jacksonville. The UNF groundbreaking occurred in 1971 on a 1000-acre plot of land. Two property expansions occurred in 1996 and 2005 under Presidents Adam Herbert and John Delaney, respectively. The 1996 expansion added 150 acres to the northern edge of campus. Eleven years later, UNF acquired another 250 acres to the southeastern corner of campus (Hills 1995; Hills 2005). The University currently owns approximately 1400 acres, of which roughly 200 have been developed.

The University of North Florida welcomed its first class in 1972, the city of Jacksonville's sesquicentennial (UNF n.d.a). At UNF's opening, Jacksonville had approximately 528,000 residents (see Table 2). The University opened with only four major buildings, which accommodated approximately 2000 students and 117 faculty (UNF n.d.a; Table 3). At the time, the average age of UNF faculty was two years younger than of the students (UNF n.d.b). One year later, 35 students received degrees at the University's first graduation.

Year	UNF Enrollment
1972	2,027
1982	5,500
1992	9,268
2002	13,470
2012	16,201
2019	17,117

Table 3. UNF enrollment since 1972 (UNF n.d.c; UNF 2020)

UNF Conservation

Since UNF's founding there has been significant effort to protect a sizeable portion of campus natural areas from development. In 1970, UNF was declared a bird sanctuary by the Florida Game and Freshwater Fish Commission (UNF n.d.d). Furthermore, land along the west side of campus, named the Sawmill Slough, has remained undeveloped. In 2006, this 382-acre tract of land was formally designated a wildlife preserve by the UNF Board of Trustees and President John Delaney, officially protecting the natural areas from any developments in subsequent campus expansion (UNF n.d.d). In 2006, Preserve Curator Chuck Hubbuch created the Campus Natural Assets Inventory. In accordance with Florida Natural Areas Inventory, at least eight different habitats have been identified on UNF property including: High Pine and Scrub, Pine Flatwoods, Freshwater Forested and Non-Forested Wetlands, and Riverine (UNF n.d.e).

METHODOLOGY

Data Acquisition

Aerial imagery for this study was provided by UNF Geography Professor Dr. Chris Baynard and Robert Richardson, Director of Academic Tech Services at the UNF College of Computing, Engineering and Construction. The original imagery sources are Labins.org and the Florida historical map library, an online database of Florida maps compiled by the University of Florida's George A. Smathers Library. In order to accurately calculate land use changes, this study used the highest quality available imagery. As such, the increments between years analyzed are not uniform. The aerial imagery acquisition years chosen for this study are 1977, 1980, 1983, 1988, 1994, 1999, 2006, 2011 and 2017. Overall, this study analyzed nine individual years, spanning a 40-year period.

Figure 2. Shifting aerial imagery of UNF in 2006. (GIF can be accessed at https://drive.google.com/drive/folders/1X7pGX9oymEk-VIzfVOEZt9qBQ_fG8IDy?usp=sharing

UNF commissioned a flight over the campus in 2006 to capture high quality aerial imagery. Figure 2 showcases the highest image quality for an aerial image used in this study. As seen in the 2006 aerial photo of UNF's campus, individual buildings, trees, and parking spaces are easily discernible features. As such, the 2006 aerial imagery allowed the most accurately digitized features in this study.

UNF boundary data was acquired from maps in the 1972 and 1995 UNF comprehensive master plans. The University Library's Special Collections Department provided access to all UNF master plans. UNF staff member Robert Richardson provided the third boundary. We acquired parcel data from the Florida Department of Revenue and using clip tools extracted the parcels pertaining to UNF. The extract by mask tool in ArcMap 10.7 was used to clip out imagery to the corresponding campus boundary for each given year.

Land Use Classification

Each aerial imagery file was used as a base map to digitize landscape features into five distinct categories: Forest, Water, Open Area, Infrastructure and Major Roads. We followed the same method for each image in our dataset. Table 4 describes each land use type.

Land Use Categories	**Descriptions**
Forested Areas	Mixed and pine forest, wetland, scrubland
Bodies of Water	Lakes, retention ponds
Open Areas	Cleared land, temporary dirt roads, recreational trails
Infrastructure	Buildings, paved parking lots
Major Roads	Paved, permanent roads

Table 4. Land use categories and descriptions in this study.

UNF land is comprised of several water bodies including retention ponds, lakes, wetlands, and streams, primarily located throughout the Sawmill Slough Preserve. For this study, only large natural

and manmade lakes and retention ponds are classified as bodies of water. For continuity purposes, nonpermanent streams and ravines throughout the Sawmill Slough Preserve have been classified as forest. Similarly, nonpermanent unpaved roads were designated as open areas. Roadways are not classified as major roads unless they are paved. Open areas also include cleared land due to construction and all recreational trails located throughout the undeveloped natural areas of campus. Infrastructure includes all campus buildings, parking garages, and paved parking lots.

Data Analysis

This study utilized ESRI ArcMap Desktop 10.7 software. Boundary images and parcels were loaded into ArcMap and subsequently digitized. All of the imagery data used in this study were projected to the same coordinate system, WGS_1984_17N. The aligned boundaries were traced over the ESRI base map (known as heads-up digitizing) resulting in digitized boundary polygons. Next, the aerial images were loaded into the map with the new boundary polygon. The raster image was clipped to the boundary via the extract by mask tool. In total, three boundary shapefiles were created, in accordance with the 1995 and 2005 campus expansions.

Next, the imagery was digitized into five classes: Major Roads, Infrastructure, Open Area, Forest, and Water. The same process for digitizing the boundaries was used for creating the five class shapefiles. Each year's imagery had five class shapefiles. In total, 45 new shapefiles were created. Each shapefile was edited and traced over their respective areas to create different polygons. To ensure that every area within the UNF boundary was accounted for, vertices from each category were snapped to the vertices of the surrounding categories. As such, each shapefile had the minimum number of polygons needed to represent each category.

After merging, the calculate geometry tool was used to determine the total acreage of each shapefile. Each category's percentage total was calculated by dividing the polygon sum by the total acreage of that year and multiplied by 100. See equation 1 below:

Equation 1.

$$P = \frac{polygon\ sum}{total\ acreage}\ x\ 100$$

where P equals the percent of UNF's total land use.

The percentages calculated reflect the acreage calculated in the GIS software. As such, the total acreage, specified in Table 2, varies slightly from the total acreage detailed in the UNF Master Plans (it is unclear how UNF arrived at its totals). Acreage was calculated for this study by following the vertices on the boundary polygon, and then continuing the same steps detailed above.

After all the categories were merged and the formula for each shapefile had been calculated, the newly digitized image was set into layout view. In layout view, the same template was used for each map. Finally, the maps were individually exported as a jpg and a pdf.

RESULTS

Our calculations show that by 1977, UNF property totaled 970 acres (see Figure 2). Major roads and infrastructure occupied 1.4% and 5% of UNF's total land area, respectively. Open area

accounted for approximately 6.3% of UNF total land area, slightly higher than infrastructure. This is largely due to multiple construction projects, including the construction of Lake Oneida and academic facilities directly outside of the campus core. Five years after UNF's opening, three additional academic buildings were constructed, nearly doubling classroom space (UNF n.d.b).

86.2% of UNF's campus remained forested, while water covered another 1.1%. Lake Oneida was designed as part of a twelve-mile nature trail system created by UNF Distinguished Professor and founder of the Sawmill Slough Conservation Society, Robert Loftin. (UNF n.d.f). The UNF nature trails opened in early 1973 and were officially recognized as National Recreational Trails by the U.S. Department of Interior in 1977. The UNF Nature Trails were officially renamed the Robert W. Loftin Nature Trails after his passing in August 1993. Pictured in Figure 2 is the original campus Boathouse which opened in 1973 as a food service building (Leake 2016). However, in 1978, a fire destroyed the building, and it was reconstructed two years later in the same campus location (Leake 2016).

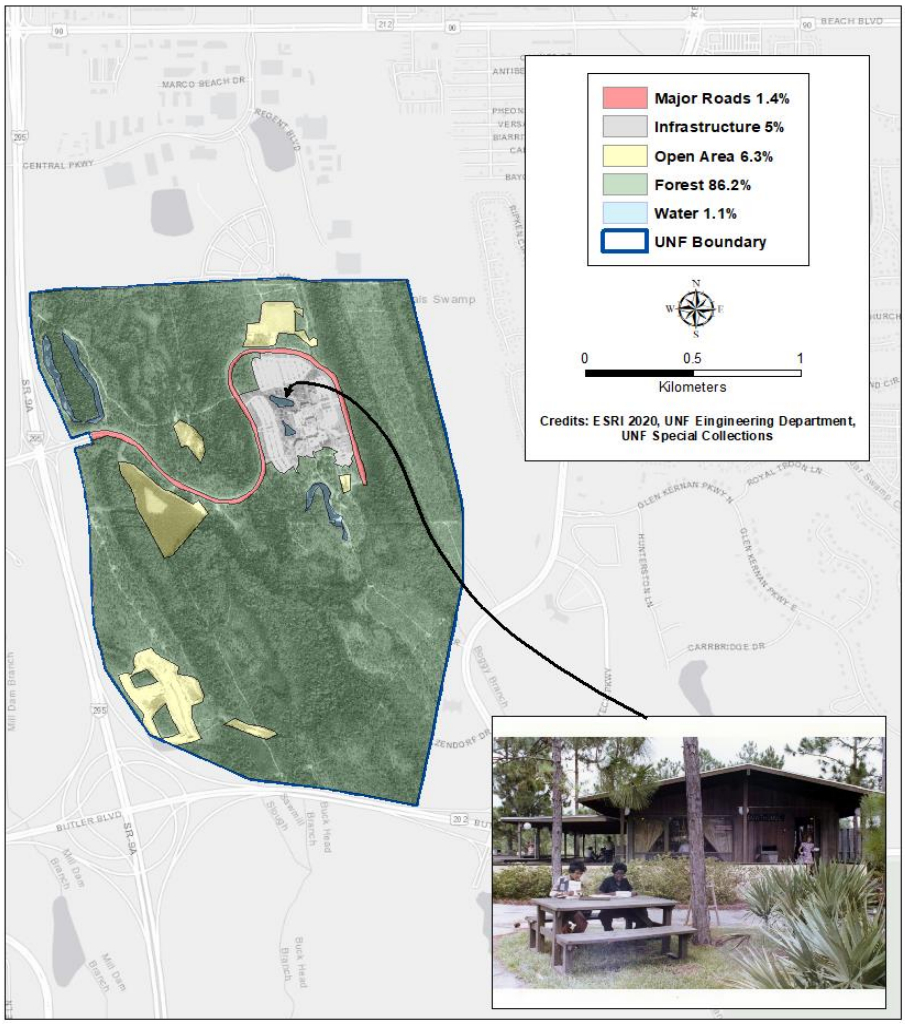

Figure 2. 1977 UNF land use map and photo of the original campus boathouse.

Photo reference: UNF 1977.

Figure 3 approximates major roads and open area as 2% and 3.1% of UNF total land area, respectively. Infrastructure accounts for roughly 6.5% of UNF total land area, the most notable development being the newly constructed library. Approximately 85.2% of campus land remained forested and another 3.2% of UNF's property was covered by water, most notably due to the completion of Lake Oneida and Lake Surprise (see Figure 3). Lake Oneida was a prominent recreational feature of the UNF Nature Trails, in part, due to the completion of the lake boardwalk.

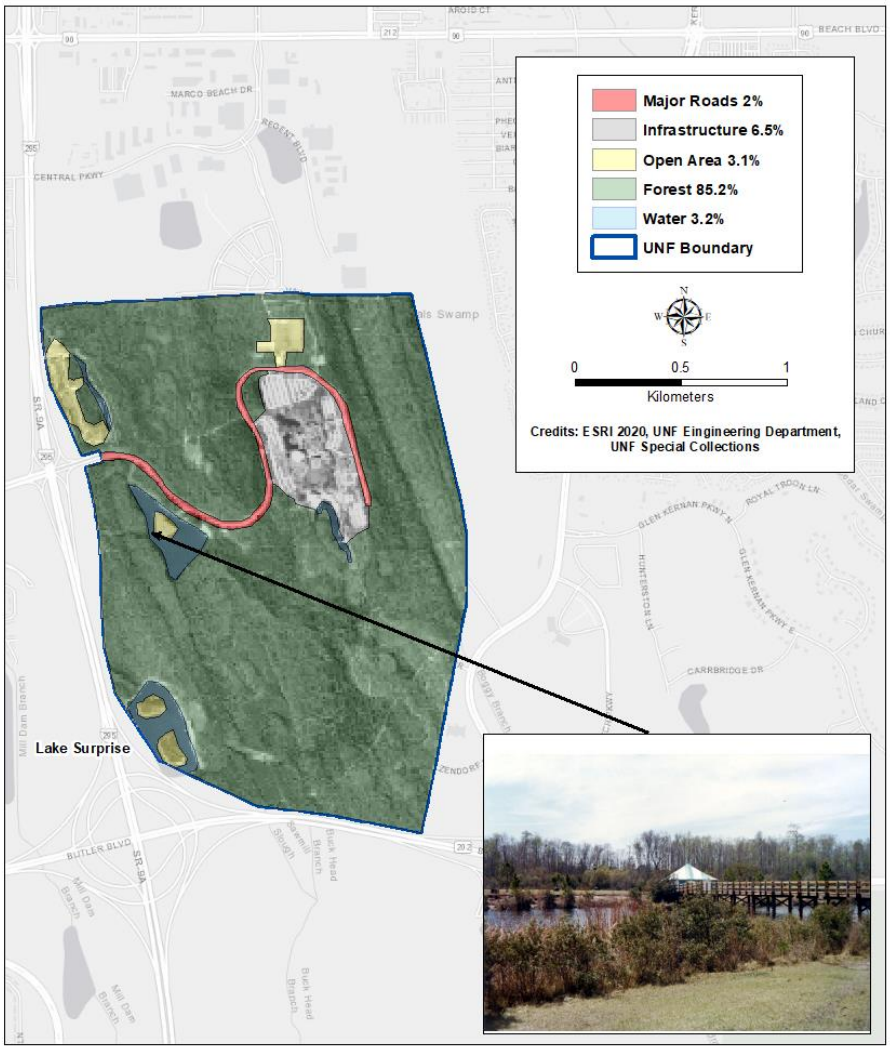

Figure 3. 1980 UNF land use map and photo of Lake Oneida. Photo reference: UNF 1980.

By 1982, the UNF student body had grown to approximately 5,500 students (Table 3). Two years later, the University admitted its first freshman class (UNF n.d.c). Figure 4 shows that forests occupied 84.6% of UNF land while water covered roughly 5.1%. The increase in water from 1980 to 1983 is due to the completion of a third manmade lake in the northwest region of campus. In 1983, major roads and open area accounted for 2% and 1.5% of UNF land usage, respectively. Roughly 6.8% of UNF land was occupied by infrastructure. Pictured in Figure 4 is the UNF Boathouse, a recreation and dining hall, located in the campus core. In 1978 a fire destroyed the original Boathouse; the newly constructed replacement opened in 1980 (UNF n.d.g).

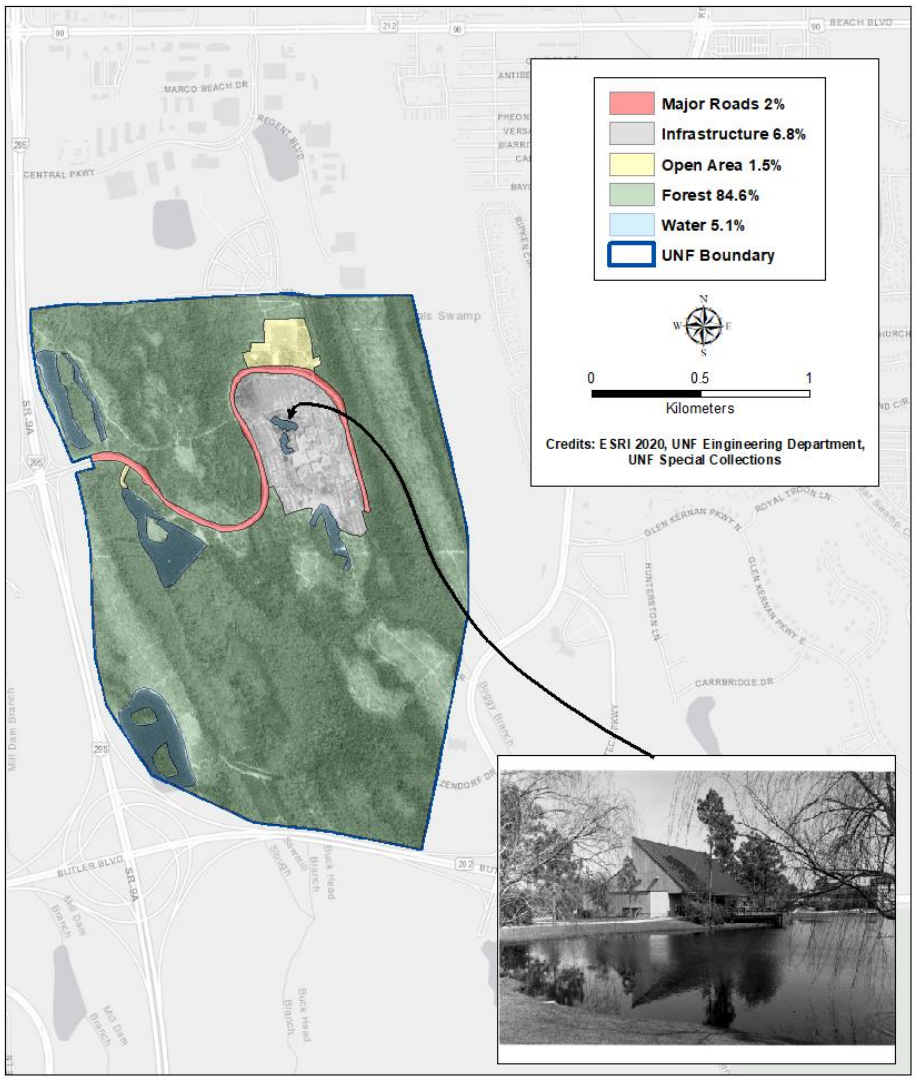

Figure 4. 1983 UNF land use map and photo of the rebuilt campus boathouse. Photo: UNF 1982.

By 1988, infrastructure has increased to 7.1% of UNF's total land area. Figure 5 approximates major roads and open area at 2.1% and 3.4% of UNF's total land use, respectively. 82% of UNF land remained forested, while water covered another 5.4%. In 1984, UNF admitted its first freshman class (UNF n.d.b). To keep up with increasing enrollment and the demand for on-campus living, Osprey Village, UNF's first student housing building opened one year later (UNF n.d.b). In 1989, Osprey Hall opened, a $3.7 million, 250-bed residential building (UNF n.d.h). Other notable developments include the establishment of the UNF College of Health and groundbreaking for the UNF Student Center, located in the campus core (UNF n.d.b). In 1988, the John E. Matthews Jr. opened, honoring the former state senator instrumental in UNF's founding (UNF n.d.b). Pictured in Figure 5 is the construction of the Aquatic Center, a major development of the recreational and athletic facilities located in the northern part of campus.

Figure 5. 1988 UNF land use map and photo of Aquatic Center construction. Photo: UNF 1987.

By 1992, the UNF student body had grown to nearly 9,300 students (Table 3). In 1994, major roads and open area both account for 3.1% of UNF land area. Notable is the completion of the campus loop road which encompasses the campus core. 78% of UNF land remained forested, while 5.6% is covered by water. Infrastructure accounts for approximately 9.8% of UNF land use. Enrollment in 1994 reaches 10,000 for the first time in UNF's history. To keep up with increased demand for on campus housing, Osprey Landing opens in fall of 1994 (UNF n.d.b). Pictured in Figure 6 is the construction of Osprey Landing, a housing development located in the campus core. Other notable developments include the opening of UNF Arena and groundbreaking for the College of Health building (UNF n.d.i).

Figure 6. 1994 UNF land use map and photo of construction at Osprey Landing. Photo: UNF 1994.

In 1996, UNF acquired 150 acres of land along the northern edge of campus, increasing the property total to roughly 1,150 acres (Hills 2005). Our calculations show UNF property totals 1200 acres. The newly acquired land expanded campus grounds up to Central Parkway providing easy access to campus from the north side. As stated in UNF's 1993-2003 Master Plan, the northern parcel of land was considered an ideal placement for future intercollegiate and recreational facilities (Hills 1995). Figure 7 approximates major roads and open area at 3.1% and 2.4% of UNF's total land area, respectively. Water covers roughly 4.5% of UNF's property, while forest amounts to roughly 77.7% of the university's total land area. Figure 7 also shows infrastructure has increased to approximately 12.3% of UNF's total land area. New developments at UNF include the opening of two residential halls along the southern portion of the campus core, Osprey Landing and Osprey Cove (UNF n.d.b). By 2002, UNF enrollment had risen to nearly 13,500 (Table 3). Pictured in Figure 7 is the construction of the Athletic fields in the northern parcel of campus.

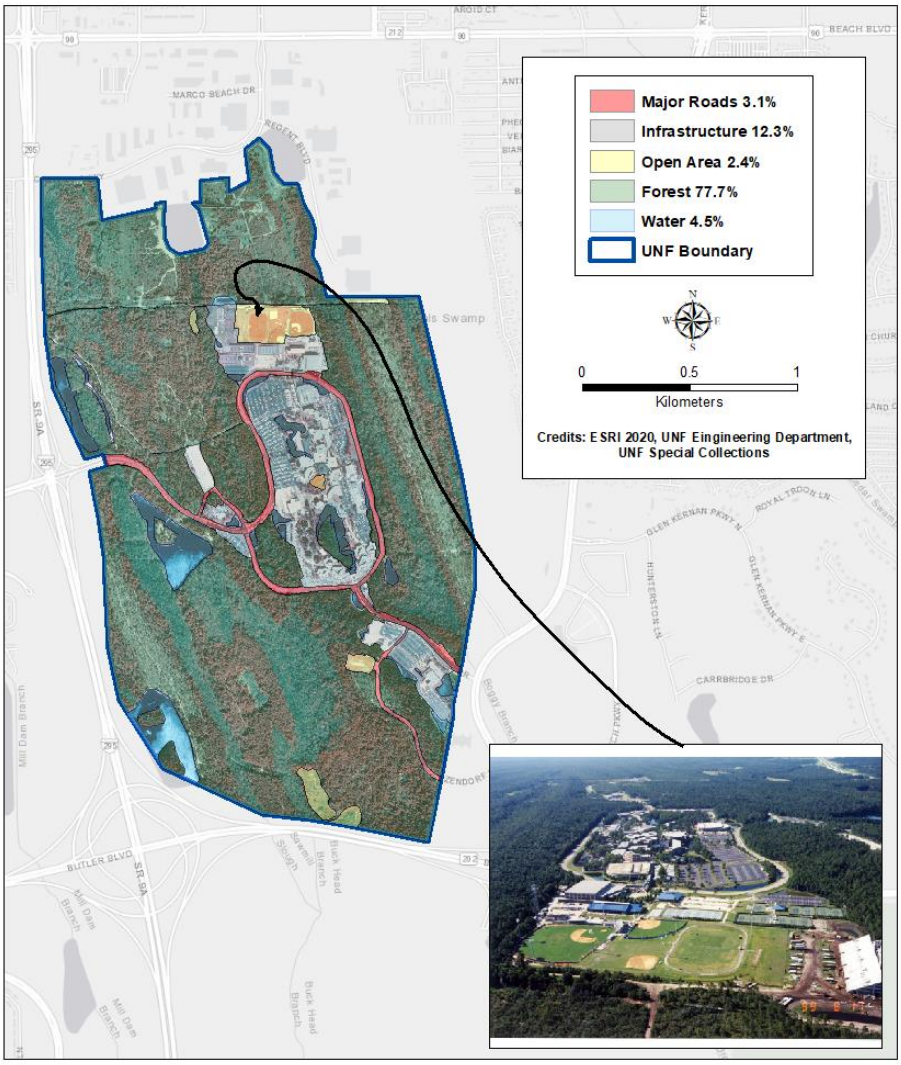

Figure 7. 1999 UNF land use map and air photo, looking from north to south, of athletic fields and the rest of campus. Photo: Smith 1999.

In 2005, UNF acquired 250 acres of land in the southeast corner of campus. According to UNF campus master plans, this expansion increased the property total to roughly 1400 acres (Hills 2005). Our calculations estimate UNF property totals 1,343 acres (see Table 2). The 2006 aerial imagery, utilized in Figure 8, does not fully extend to the southeast corner of the newly expanded University grounds. The missing imagery makes up an entirely undeveloped portion of the southeastern edge of campus. As a result, Figure 8 shows a slight decrease in forested area from Figure 7, despite there being an overall increase in acreage. Major roads and infrastructure account for 4.1% and 12.7% of UNF's total land area, respectively. Open area and water each account for 4.7% of UNF's total land area, while approximately 74% of UNF remains forested. Planned developments for the southeastern edge of campus include the expansion of administrative buildings and satellite physical facility plants (Hills 2005). The most significant area of infrastructure buildout occurred in the northern portion of UNF property. The northern parcel expansion includes recreation and

athletics fields, including Hodges Stadium (Hills 2005). Also pictured in Figure 8 is the construction of the Library addition located in the central campus core.

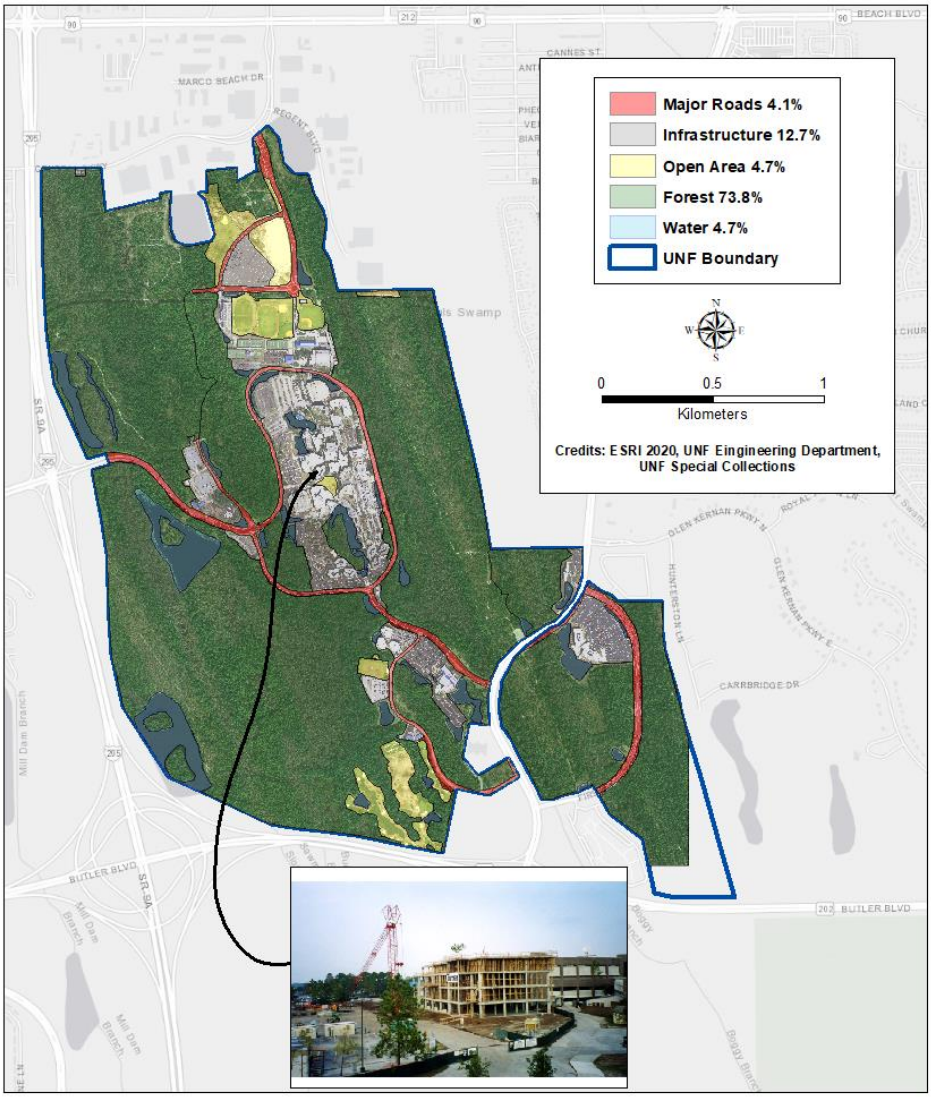

Figure 8. 2006 UNF land use map and photo of the library addition construction.
Photo: Smith 2004.

Our calculations show that by 2011, UNF consisted of 1,367 acres. Major roads and open area show no change from 2006, both accounting for 4.7% of UNF's total land area. The completion of Eco Road located along UNF's western edge, provides congestion relief for the campus core. Roughly 70.5% and 5.9% of UNF remains forested and covered by water, respectively. By 2011, infrastructure has increased to 14.2 % of UNF's total land area. By 2012, UNF enrollment topped 16,200 students (Table 3). The construction of additional campus housing along the eastern edge of campus provides an on-campus housing option for the University's growing student body. Also pictured in Figure 9 is the new UNF Student Union, opened in 2009, located in the northern part of the campus core (Anonymous 2009).

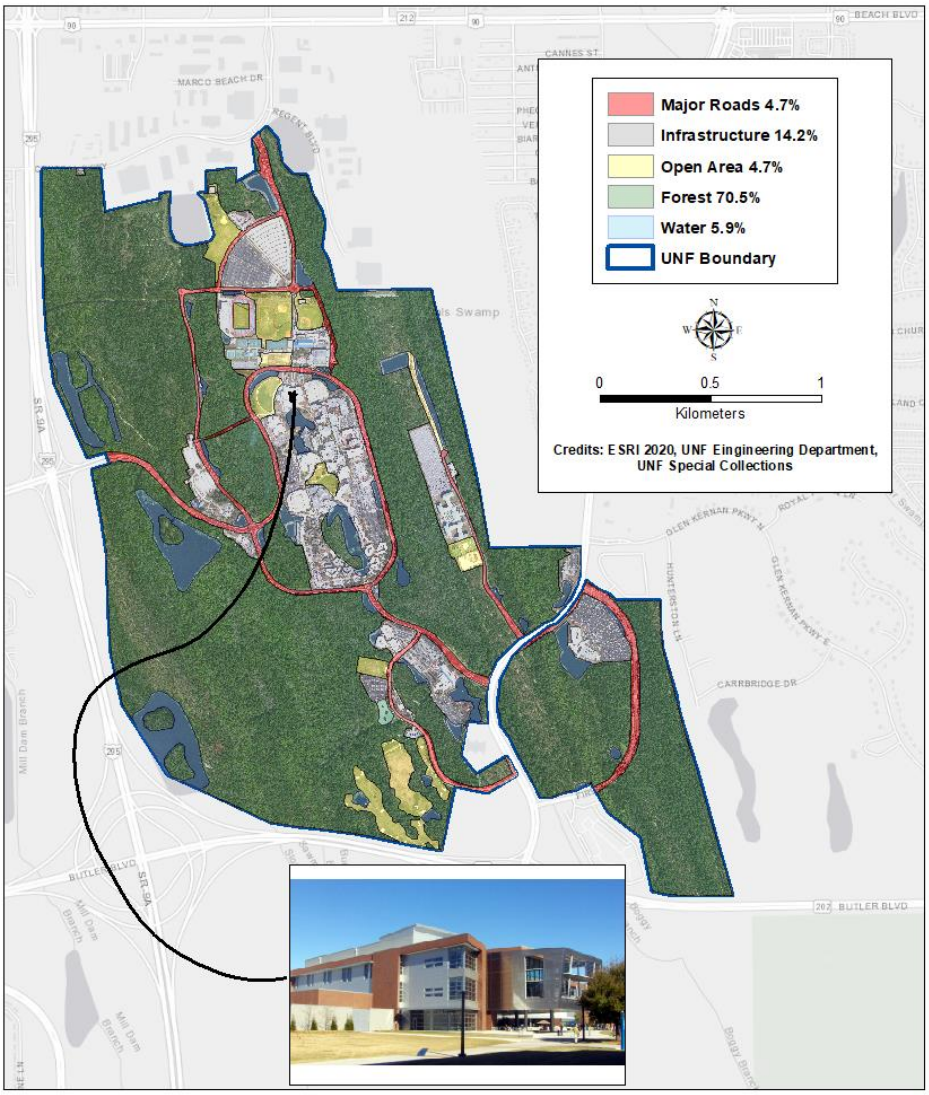

Figure 9. 2011 UNF land use map and photo of the UNF Student Union. Photo: Lansing 2010.

According to UNF, by 2017, the University had developed on approximately 200 acres of its nearly 1,400 acres (UNF n.d.d). Our most recent analysis of land use (see Figure 10) agrees: infrastructure accounts for 14.8% of UNF's total land usage. The most notable infrastructure developments in Figure 10 are the opening of the 75,000 sq. ft. Student Wellness Complex and the state-of-the-art Biological Sciences Building (UNF n.d.a; UNF n.d.j). Pictured in Figure 10 is the renovation to Skinner-Jones Hall, a centrally located academic building. Skinner-Jones Hall was named after the prominent Jacksonville family who, in 1968, donated 500 acres of land for the University to be built on (UNF n.d.k). All major infrastructure developments in Figure 10 take place in the campus core. Major roads and open area account for 4.1% and 4.5% of UNF's property, respectively. 4.8% of UNF remains covered by water, while 72.1% remains forested.

Figure 10. 2017 UNF land use map and photo of the emerging Skinner-Jones Hall. Photo: UNF 2017b.

DISCUSSION

Overall, this study finds significant changes in land use over the last forty years. Table 4 displays the percentage of total UNF acreage devoted to each land use category in selected years. Table 5 displays UNF's land use categories for each year's imagery data in acres. As seen on Tables 4 and 5, the total acreage category changes three times. Changes in total acreage impact the percentages of each land use category regardless of any actual changes to the campus footprint. Therefore, when analyzing land use trends from 1977 to 2017, Table 5 more accurately depicts overall changes in land use.

Year	Major Roads	Infrastructure	Open Area	Forest	Water	Total Acres
1977	1.4%	5%	6.3%	86.2%	1.1%	970
1980	2%	6.5%	3.1%	85.2%	3.2%	970
1983	2%	6.8%	1.5%	84.6%	5.1%	970
1988	2.1%	7.1%	3.4%	82%	5.4%	970
1994	3.1%	9.8%	3.1%	78.4%	5.6%	970
1999	3.1%	12.3%	2.4%	77.7%	4.5%	1,120
2006	4.1%	12.7%	4.7%	73.8%	4.7%	1,343
2011	4.7%	14.2%	4.7%	70.5%	5.9%	1,367
2017	4.1%	14.7%	4.4%	72%	4.8%	1,367

Table 5. Categories of land use at UNF by *percentage*, in selected years since 1977.

Year	Major Roads	Infrastructure	Open Area	Forest	Water	Total Acres
1977	13.4	48.5	60.7	836.6	10.8	970
1980	19.8	63.3	30.0	826.5	30.4	970
1983	19.2	65.5	14.9	820.6	49.8	970
1988	20.8	68.9	32.6	795.5	52.2	970
1994	30.4	95.4	29.7	760.4	54.1	970
1999	34.2	137.3	27.4	870.1	51.0	1,120
2006	54.8	170.5	63.6	990.8	63.3	1,343
2011	64.6	193.8	63.9	964.4	80.3	1,367
2017	56.0	201.3	59.4	984.3	66.0	1,367

Table 6. Categories of land use at UNF by *acres*, in selected years since 1977.

Major roads, such as the campus loop road, expanded gradually from 1977 to 2011. However, 2017 shows a slight decrease in major roads (see Table 5). This is likely due to increased tree cover in the 2017 aerial photography. Increased tree cover impeded the view of roads, likely also slightly increasing the forest category, in the digitization process. Despite the apparent slight decrease of major roads in 2017, the overall trend of gradual increase of roadways is confirmed by campus master plans.

Infrastructure has also increased steadily over the last forty years. In 1977, 48.5 acres of UNF land was infrastructure, approximately 5% of UNF's total property. Forty years later, approximately 15% of UNF property has been developed, despite the fact that the campus added nearly 400 acres since the 1970s. As of 2020, UNF has grown to 28 buildings and six residence halls in order to accommodate an all-time high of approximately 17,000 students.

Open areas have fluctuated from year to year, likely due to the fact that, in some years, imagery is taken shortly after land is cleared to prepare for new buildings and parking areas. However, the overall open area category percent change is negligible. For example, in 1977, 6.3% of UNF land was open area. By 2017, open area is reduced to 4.4% of UNF land (see Table 4). 6.3% of 970s acres and 4.4% of 1367 acres accounts for a difference of less than one acre (see Table 5).

While the percent of forested land on UNF's campus has steadily declined over the last forty years, forest acreage has actually increased. This can be directly attributed to the development of

infrastructure, major roads and open areas in proportion to the 1996 and 2005 property expansions. From 1977 to 2017, UNF acquired approximately 400 additional acres of land (Hills 1995; Hills 2005). Table 5 shows that forested acreage at UNF increased by roughly 148 acres over the same forty-year period.

Lastly, water cover at UNF has steadily increased since 1977. Table 4 and 5 displays a slight decrease in the water category from 2011 to 2017. As the same bodies of water are present in both images, this slight decrease is likely due to variation in aerial image quality used in the digitization process.

Study Limitations

As with any research project, this study did encounter limitations. Due to varying image quality from 1977 to 2017, subjective decision making was required in the digitization process. To ensure consistency across the digitization process, only one person digitized the aerial imagery into categories. Still, this co-author made decisions that others might have made differently. Limitations also occurred in calculating the total acreage of UNF based on boundaries. Most notably, the 2006 aerial imagery cuts off at the southeastern portion of the UNF boundary. Therefore, the calculated acreage for 2006 is 1,343. The aerial imagery for 2011 and 2017, the other years with the same boundary, are calculated at 1,367 acres.

UNF documents claim that the campus was "approximately" 1000 acres from groundbreaking to 1995. Our calculations found each boundary, during that period of time, to be 970 acres, about 30 acres less than described. Due to the imprecise language used in reference to the boundary totals in UNF documents, we are reasonably confident our digitization totals do not represent a boundary error of significance. Also, notable, the digitized boundaries are created from hand-drawn boundary maps. As such, loss in acreage might also be explained due to error in the maps themselves.

CONCLUSION

UNF has grown steadily over time, taking a mostly forested landscape and converting parts of it to lakes, buildings, and roads. UNF documents claim that University owned land currently approximates 1400 acres, of which roughly 200 have been developed (UNF n.d.c). This approximation is in line with our finding that, as of 2017, infrastructure makes up 201.3 acres of UNF land (see Table 5). UNF's campus remains primarily forested. Early UNF documents demonstrate that campus leaders prioritized retaining as much of the natural environment as possible. Indeed, the University went to the trouble of creating Sawmill Slough Preserve, which accounts for 383 of UNF's 984 forested acres (UNF n.d.d). To showcase the changes to UNF's campus over a forty-year period, Figure 11 displays the 2017 imagery overlayed on the 1977 imagery. The images used in Figure 11 are not clipped to the boundary, therefore land outside of UNF's borders can also be seen.

Figure 11. Shifting ariel photo of UNF from 1977 to 2017. (GIF can be accessed at https://drive.google.com/drive/folders/1X7pGX9oymEk-VIzfVOEZt9qBQ_fG8IDy?usp=sharing

Today the city of Jacksonville has the largest area of any city in the contiguous United States and it is the most populous city in the state of Florida, with approximately 957,755 residents (COJ 2020). As of 2019, UNF has approximately 17,000 enrolled students, of which, nearly 4,000 gradate each year (UNF n.d.a). With an annual economic impact of almost one billion dollars, the University of North Florida has expanded to be a meaningful and lasting institution for Jacksonville residents.

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