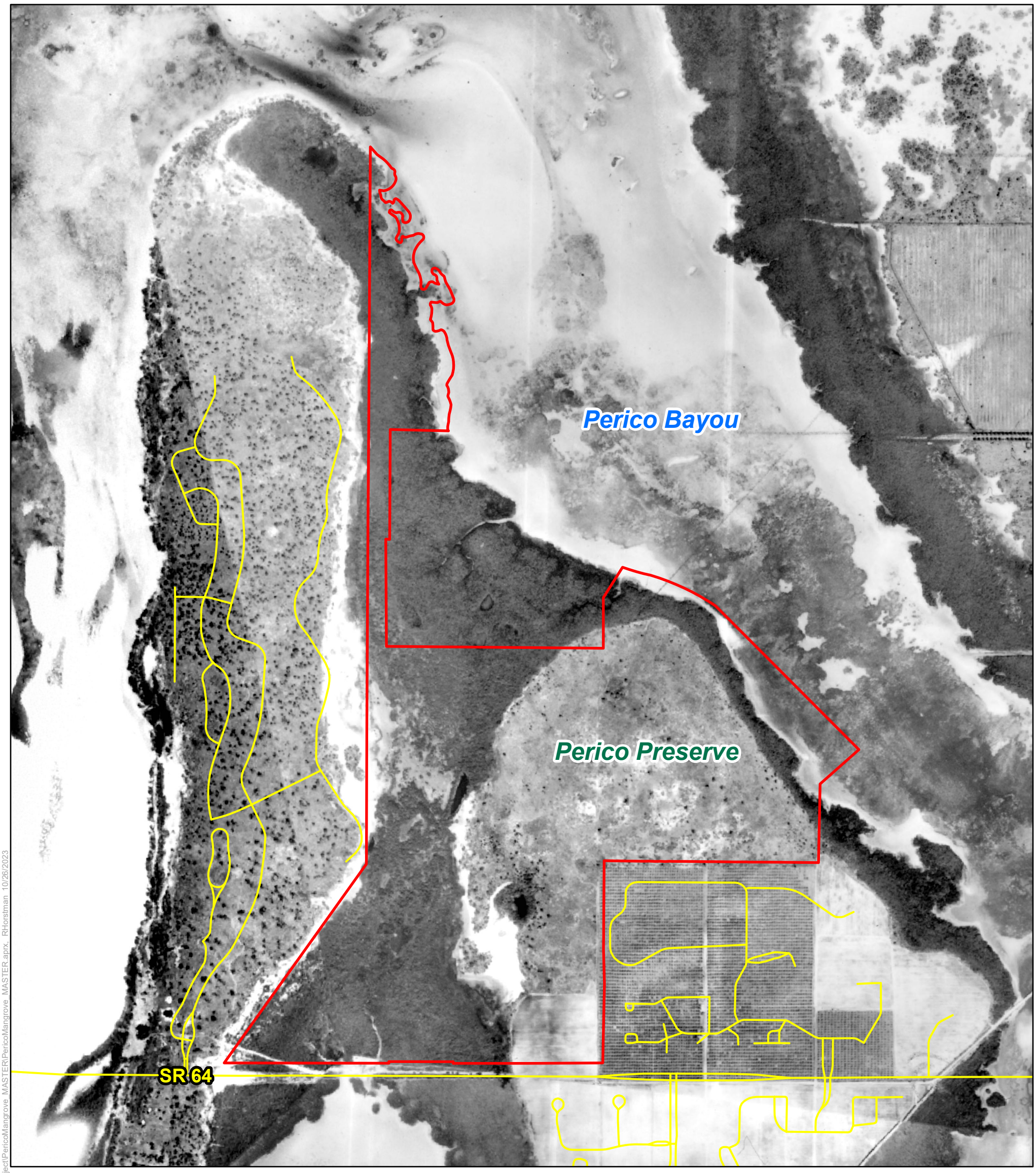


Manatee County Parcel
Roads (2023)

Aerial Year: 1940s

SOURCE: Manatee County GIS

ESA

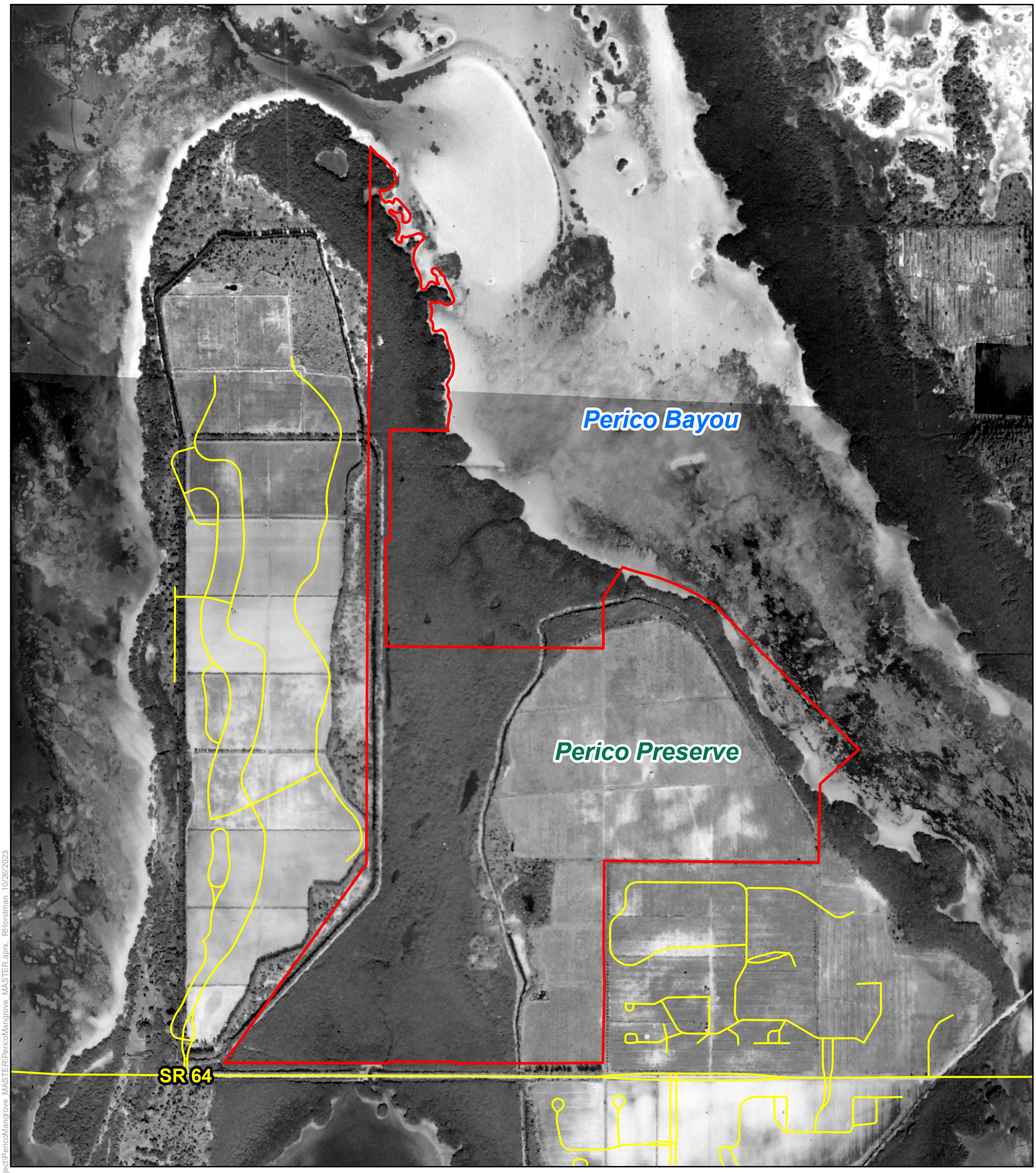
N

0 600 1,200
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida



Manatee County Parcel
Roads (2023)

Aerial Year: 1958

SOURCE: Manatee County GIS

ESA

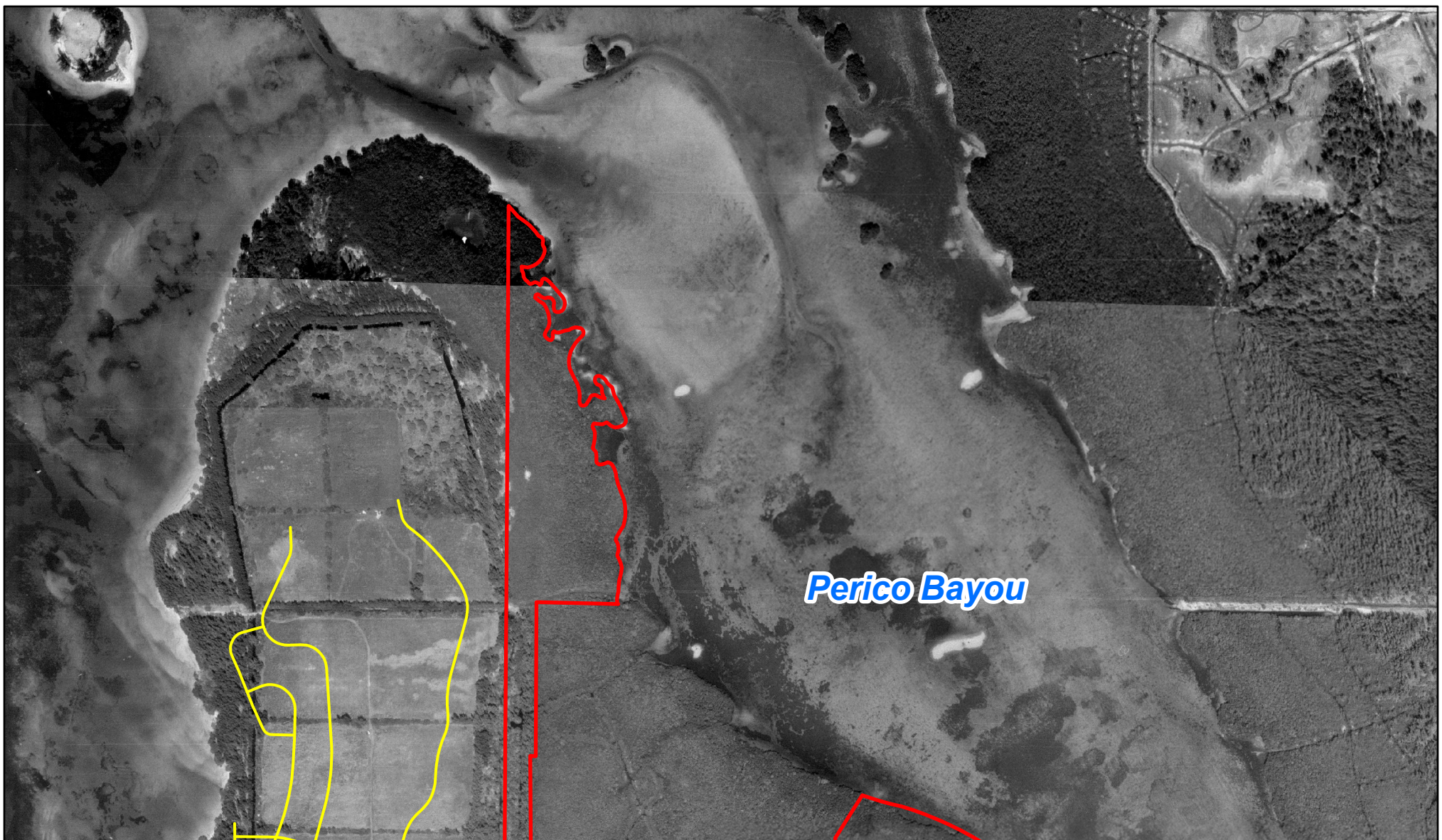
N

0 600 1,200
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida



Manatee County Parcel
Roads (2023)

Aerial Year: 1973

SOURCE: Manatee County GIS

ESA

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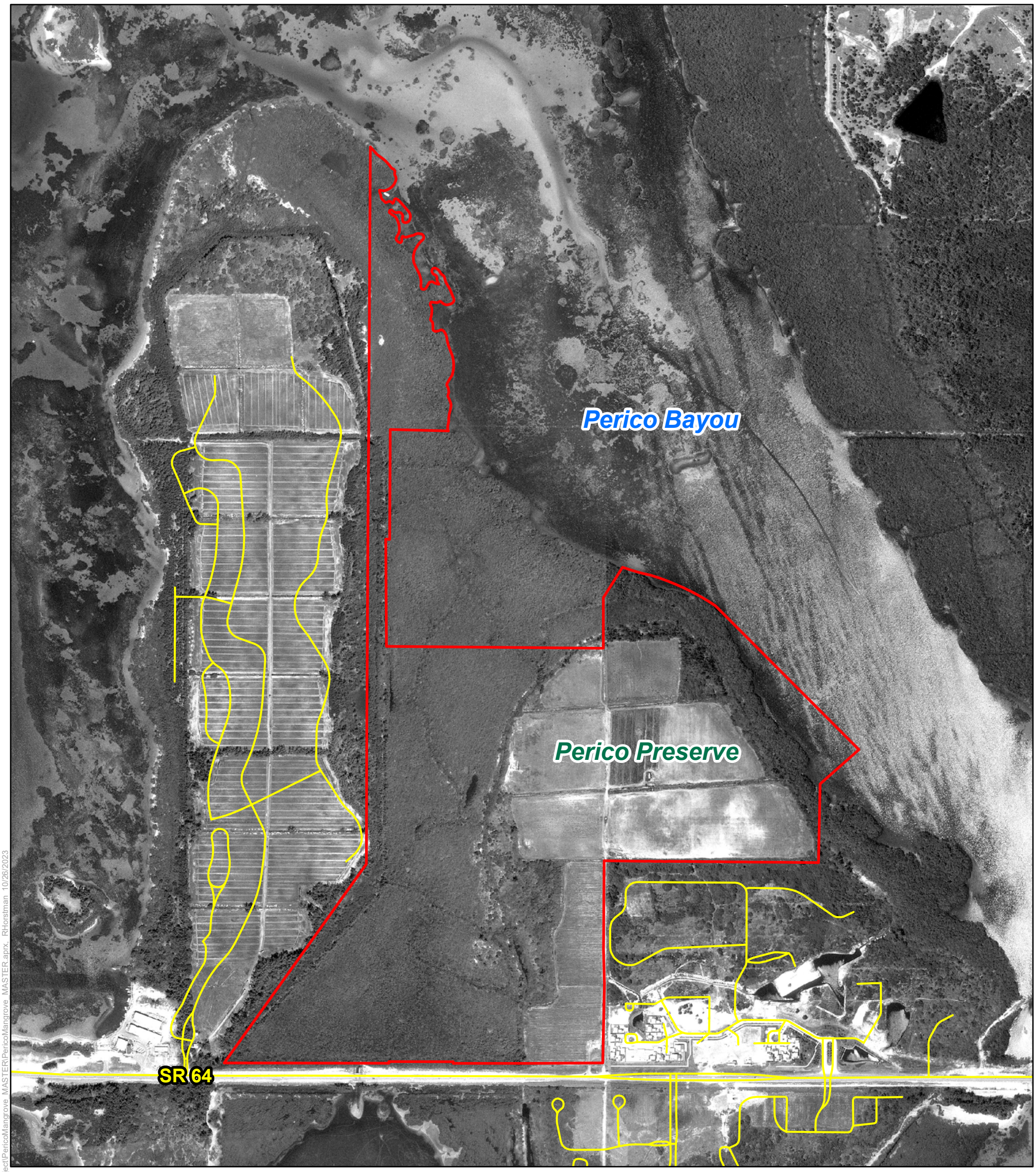
0 600 1,200
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida



Manatee County Parcel
Roads (2023)

Aerial Year: 1984

SOURCE: Manatee County GIS

ESA

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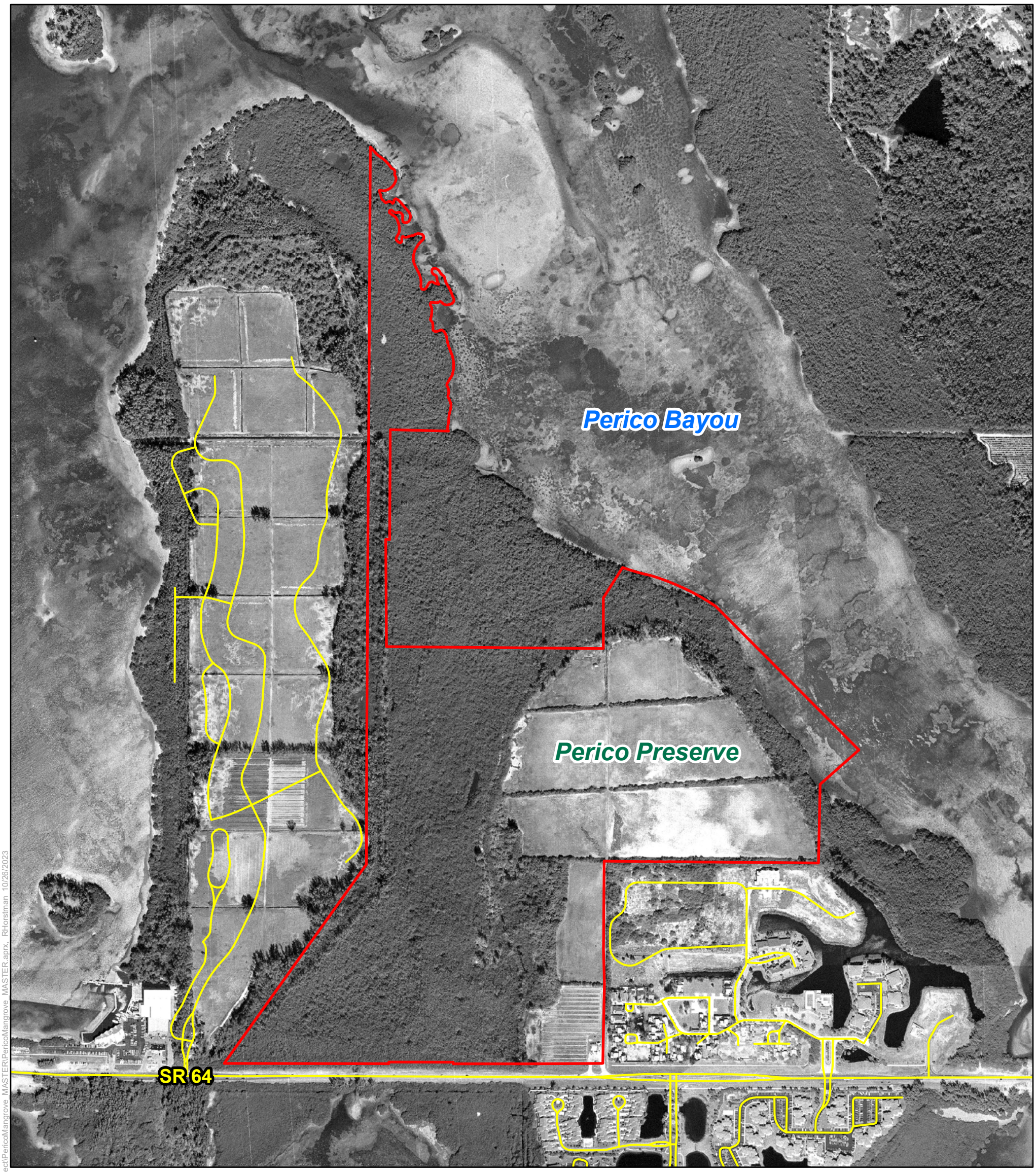
0 600 1,200
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida



Manatee County Parcel

Roads (2023)

Aerial Year: 1994

SOURCE: Manatee County GIS

0 600 1,200

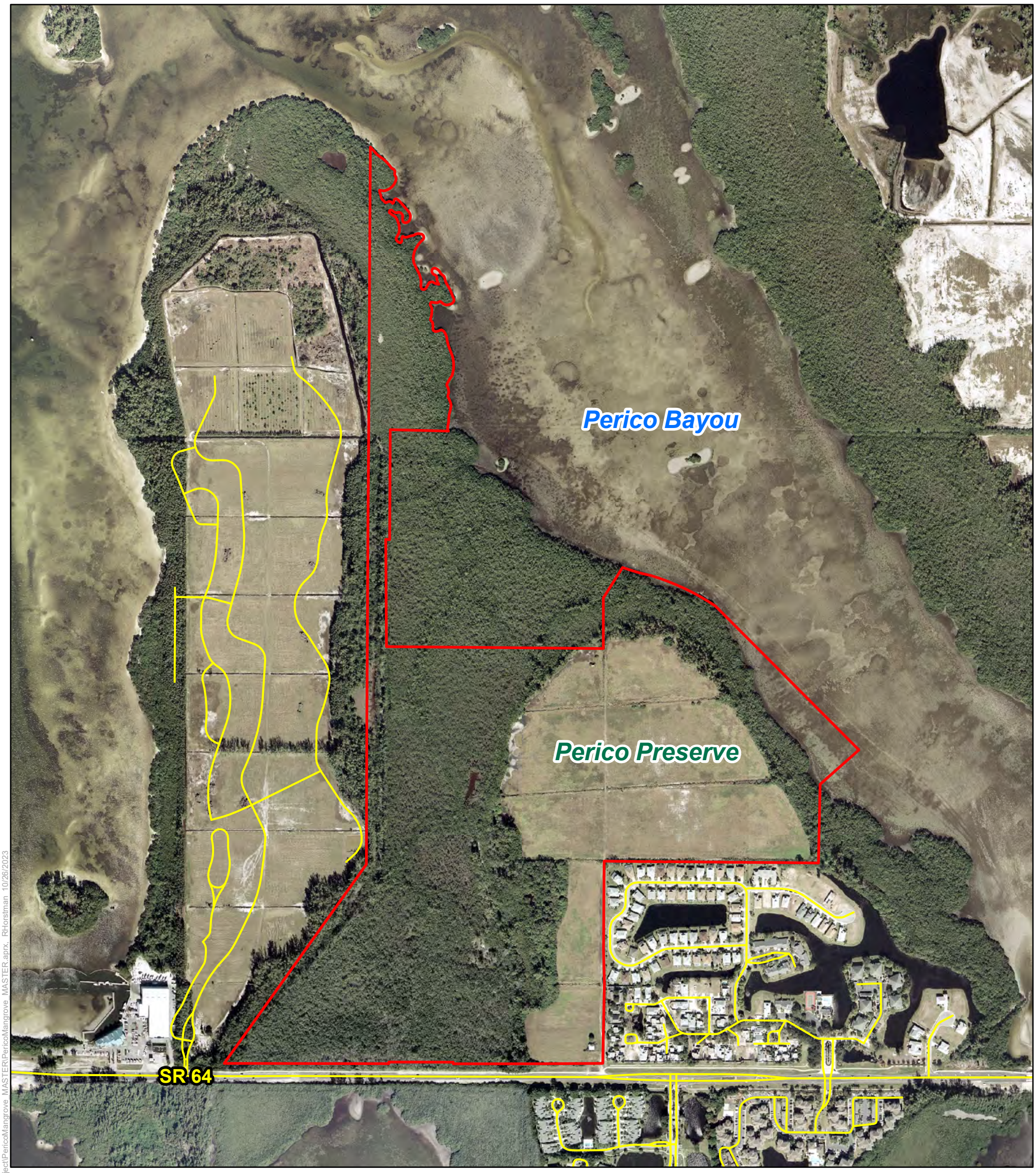
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida

Path: U:\GIS\GIS\Projects\2021xxx\D20210102 9_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER.aprx, RHorstman, 10/26/2023



Manatee County Parcel

Roads (2023)

Aerial Year: 2003

SOURCE: Manatee County GIS

ESA

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0 600 1,200

Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida

Path: U:\GIS\GIS\Projects\2021xxx\D20210102 9_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER.aprx, RHorstman 10/26/2023

Perico Bayou

Perico Preserve

SR 64

Manatee County Parcel

Roads (2023)

Aerial Year: 2006

SOURCE: Manatee County GIS

ESA

N

0 600 1,200

Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida

Path: U:\GIS\GIS\Projects\2021xxx\ID202101029_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER.aprx, RHorstman 10/26/2023

Manatee County Parcel
Roads (2023)

Aerial Year: 2008

SOURCE: Manatee County GIS

ESA

N

0 600 1,200
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida

Path: U:\GIS\GIS\Projects\2021xxx\D20210102 9_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER aprx, RHorstman 10/26/2023

Manatee County Parcel

Roads (2023)

Aerial Year: 2012

SOURCE: Manatee County GIS

ESA

N

0 600 1,200

Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida

Path: U:\GIS\GIS\Projects\2021xxx\D202101029_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER.aprx, RHorstman 10/26/2023

Manatee County Parcel
Roads (2023)

Aerial Year: 2015

SOURCE: Manatee County GIS

ESA

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0 600 1,200
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida

Path: U:\GIS\GIS\Projects\2021xxx\D20210102 9_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER aprx, RHorstman 10/26/2023

Manatee County Parcel
Roads (2023)

Aerial Year: 2017

SOURCE: Manatee County GIS

ESA

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0 600 1,200
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida

Path: U:\GIS\GIS\Projects\2021xxx\D20210102 9_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER.aprx, RHorstman 10/26/2023

Manatee County Parcel
Roads (2023)

Aerial Year: 2020

SOURCE: Manatee County GIS

ESA

N

0 600 1,200
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida

Path: U:\GIS\GIS\Projects\2021xxx\D20210102 9_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER.aprx, RHorstman 10/26/2023

Manatee County Parcel
Roads (2023)

Aerial Year: 2021

SOURCE: Manatee County GIS

0 600 1,200
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida

Path: U:\GIS\GIS\Projects\2021xxx\D20210102 9_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER.aprx, RHorstman 10/26/2023

Manatee County Parcel
Roads (2023)

Aerial Year: 2023

SOURCE: Manatee County GIS

ESA

N

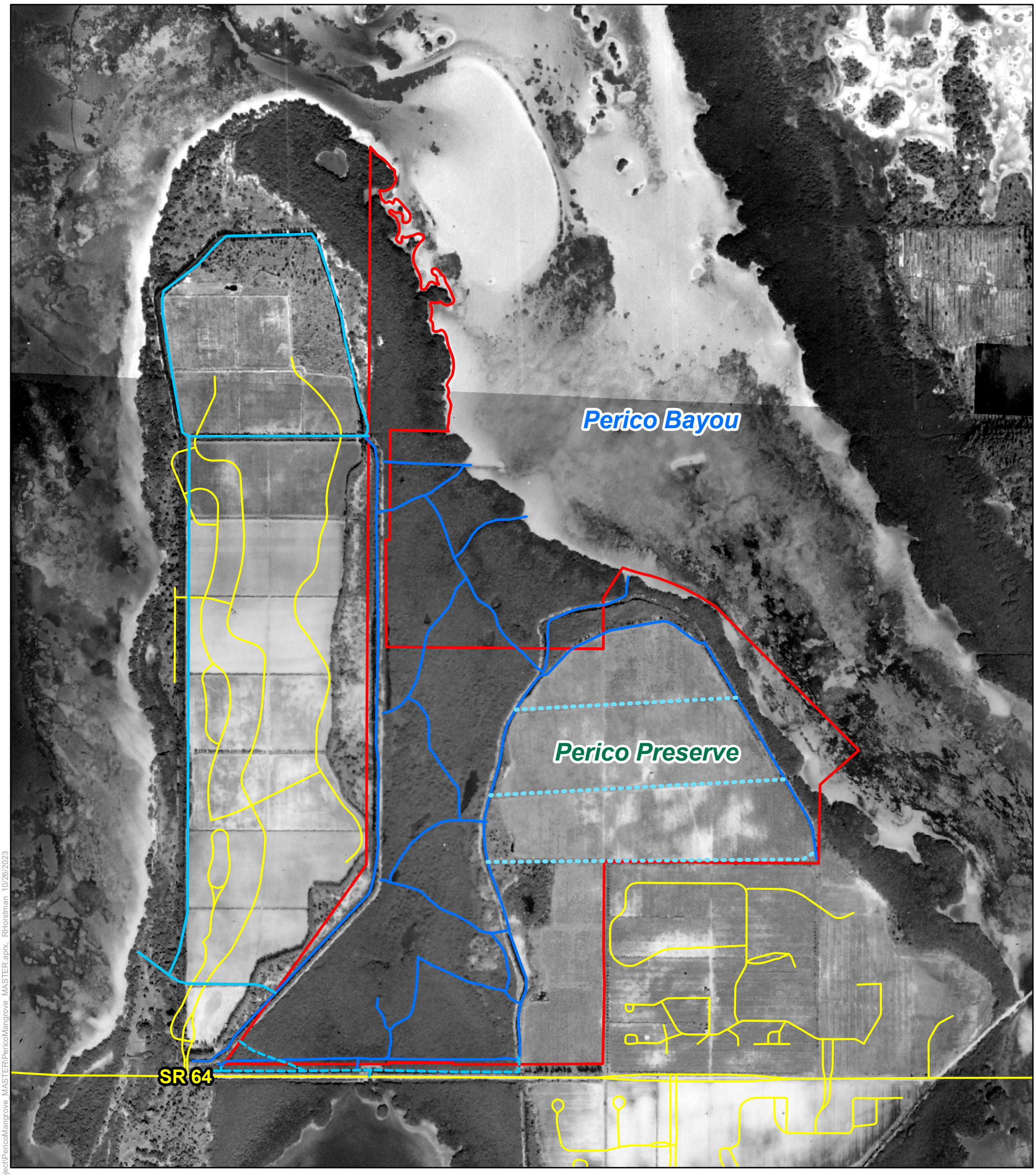
0 600 1,200
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 1 - Historical Aerial Images

Manatee County, Florida

Path: U:\GIS\GIS\Projects\2021xxx\D20210102 9_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER.aprx, RHorstman 10/26/2023



- Manatee County Parcel
- Roads (2023)

Approximate Ditch Locations

- 1958-1973
- 1958-2008
- 1958-2011
- 1958/1973-Current

Aerial Year: 1958

Path: U:\GIS\GIS\Projects\2021xxx\D202101029_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER.aprx, RHorstman 10/26/2023

SOURCE: Manatee County GIS

ESA

N

0 600 1,200

Feet

Perico Preserve Mangrove Habitat Restoration

Figure 2 - Ditch Network

Manatee County, Florida

Perico Bayou

Perico Preserve

SR 64

Manatee County Parcel
Roads (2023)
Approximate Ditch Locations
1958-1973
1958-2008
1958-2011
1958/1973-Current

Aerial Year: 1973

SOURCE: Manatee County GIS

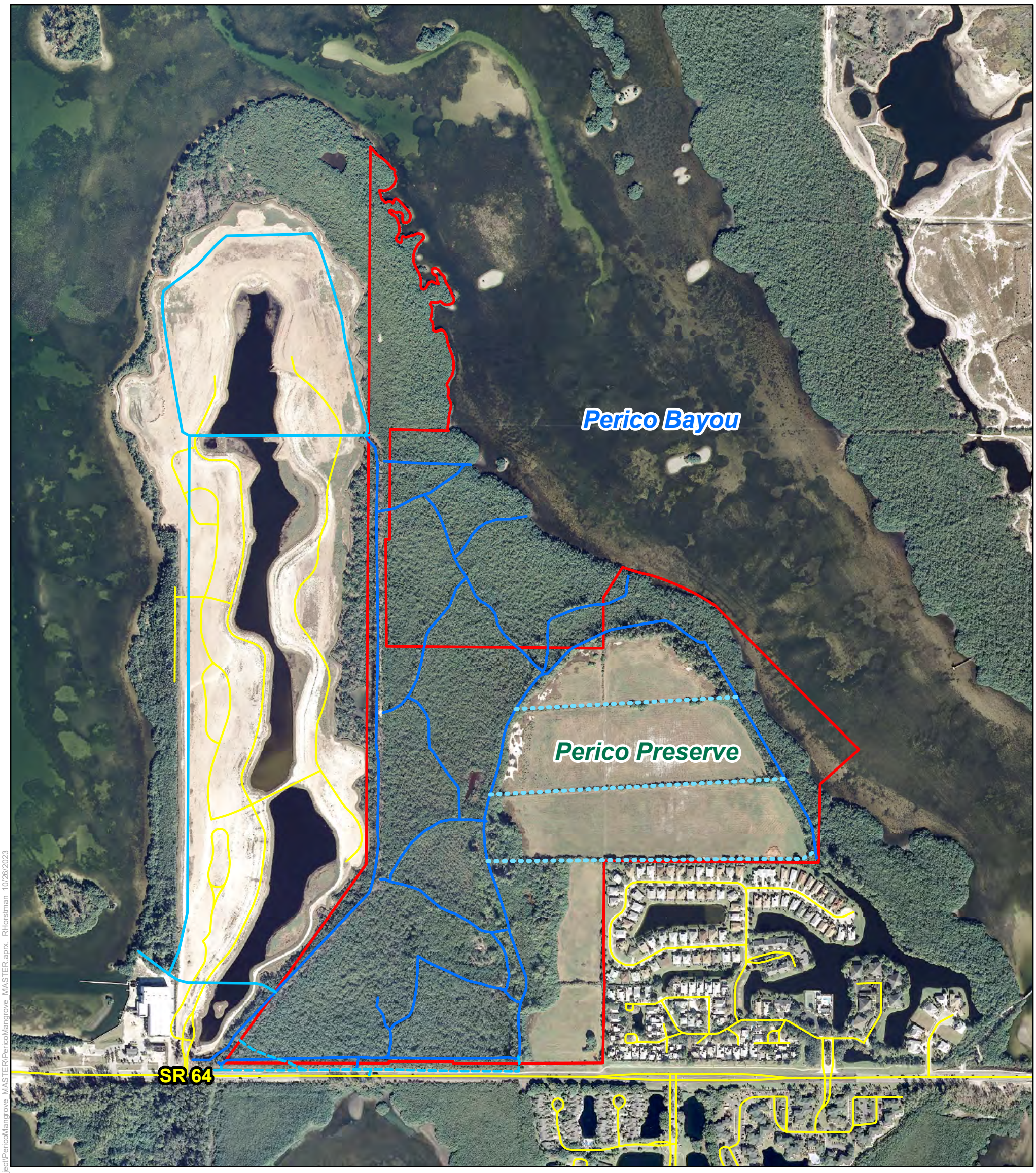
0 600 1,200
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 2 - Ditch Network

Manatee County, Florida

Path: U:\GIS\GIS\Projects\2021xxx\D202101029_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER.aprx RHorstman 10/26/2023



Manatee County Parcel
Roads (2023)
Approximate Ditch Locations
1958-1973
1958-2008
1958-2011
1958/1973-Current

Aerial Year: 2008

Path: U:\GIS\GIS\Projects\2021xxx\D20210102 9_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER aprx, RHorstman 10/26/2023

SOURCE: Manatee County GIS

ESA

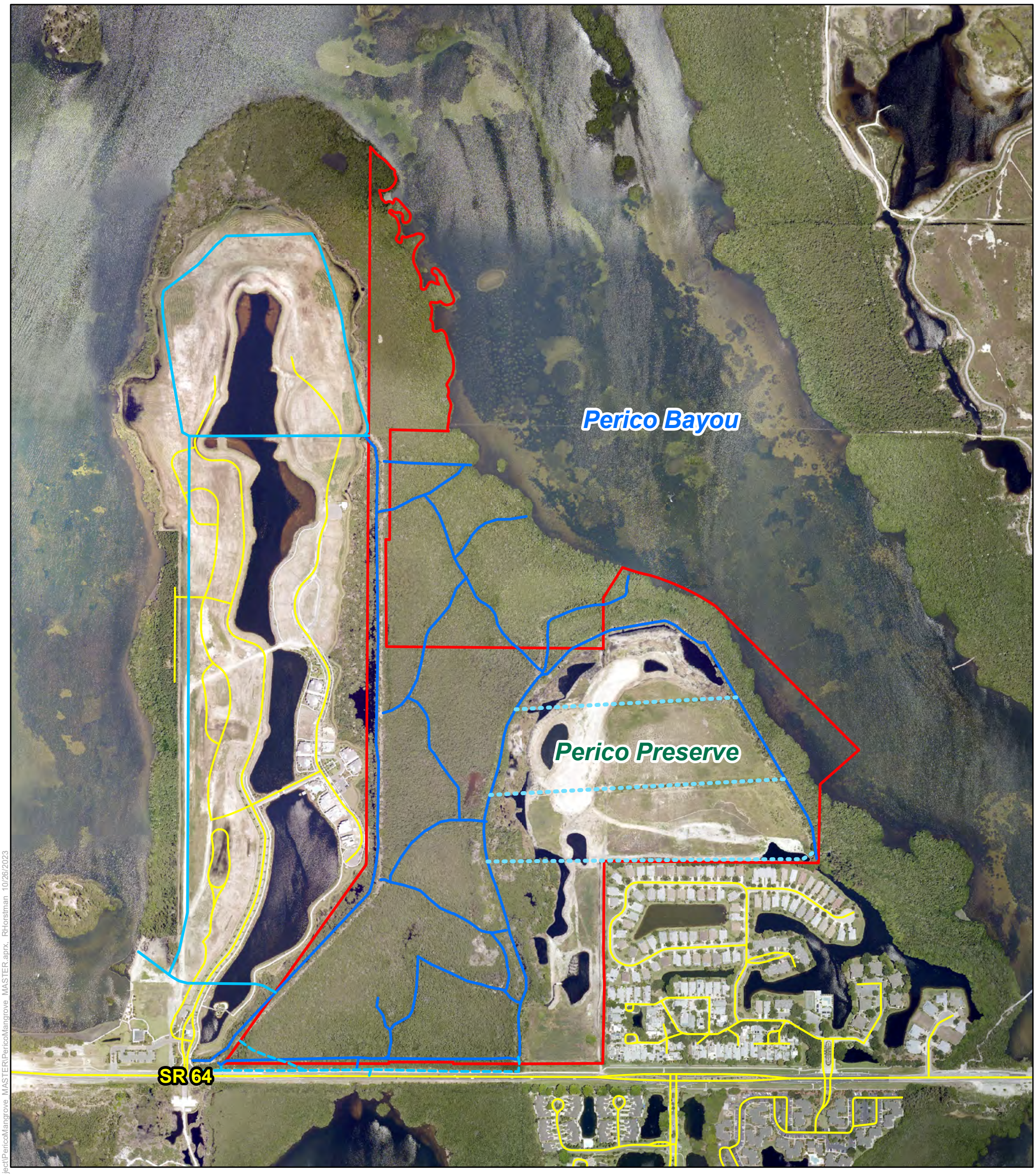
N

0 600 1,200
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 2 - Ditch Network

Manatee County, Florida



- Manatee County Parcel
- Roads (2023)

Approximate Ditch Locations

- 1958-1973
- 1958-2008
- 1958-2011
- 1958/1973-Current

Aerial Year: 2012

Path: U:\GIS\GIS\Projects\2021xxx\ID202101029_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER.aprx, RHorstman 10/26/2023

SOURCE: Manatee County GIS

ESA

N

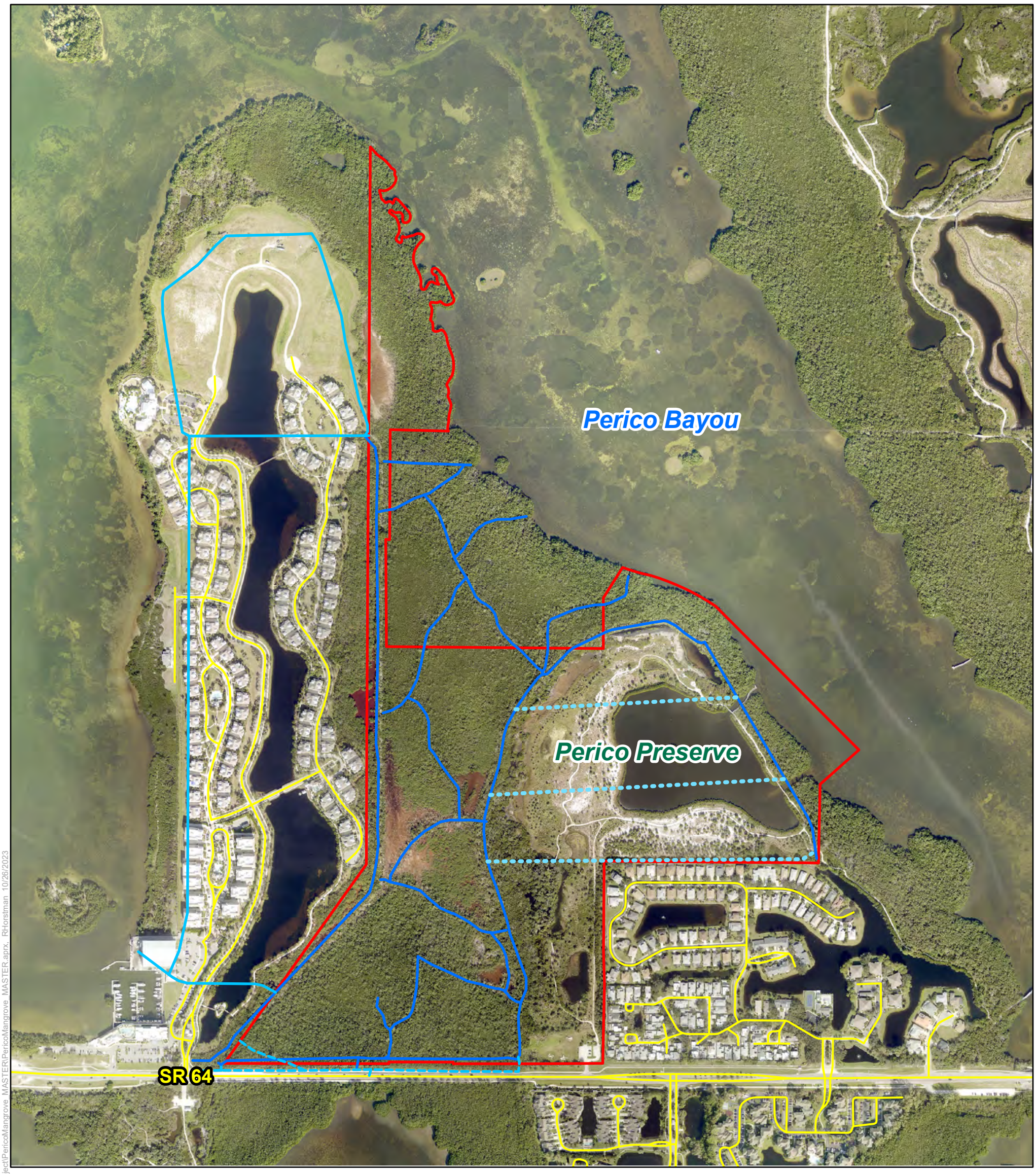
0 600 1,200

Feet

Perico Preserve Mangrove Habitat Restoration

Figure 2 - Ditch Network

Manatee County, Florida



Manatee County Parcel
Roads (2023)
Approximate Ditch Locations
1958-1973
1958-2008
1958-2011
1958/1973-Current

Aerial Year: 2023

Path: U:\GIS\GIS\Projects\2021xxx\D20210102 9_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER.aprx, RHorstman 10/26/2023

SOURCE: Manatee County GIS

ESA

N

0 600 1,200
Feet

Perico Preserve Mangrove Habitat Restoration

Figure 2 - Ditch Network

Manatee County, Florida

Perico Bayou

Perico Preserve

SR 64

Manatee County Parcel

Roads (2023)

2007 LiDAR Derived Digital Elevation Model (USGS)

Elevation (ft NAVD88)

18.343418121338

-5.7579216957092

SOURCE: Manatee County GIS

ESA

N

0 600 1,200

Feet

Perico Preserve Mangrove Habitat Restoration

Figure 3 - 2007 Topography

Manatee County, Florida

Path: U:\GIS\GIS\Projects\2021xxx\D202101029_04_Perico_Mangrove_Dieoff\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER.aprx RHorstman 10/26/2023

Perico Bayou

Perico Preserve

SR 64

Manatee County Parcel

Roads (2023)

2018 LiDAR Derived Digital Elevation Model (USGS)

Elevation (ft NAVD88)

20.4543

-1.14685

Path: U:\GIS\GIS\Projects\2021xxx\D202101029_04_Perico_Mangrove_Dieofft\03_Project\PericoMangrove_MASTER\PericoMangrove_MASTER.aprx, RHorstman 10/26/2023

SOURCE: Manatee County GIS

ESA

N

0 600 1,200

Feet

Perico Preserve Mangrove Habitat Restoration

Figure 4 - 2018 Topography

Manatee County, Florida

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Perico Preserve Mangrove Habitat Restoration

Figure Summaries (Task 1)

The following summaries describe the conditions observed on the prepared figures.

Figure 1 - Historical Aerial Images

Figure 1 is a set of 14 pages showing the changes in land cover and use from the 1940s until the most recent aerial imagery collected in 2023. A brief description of the visible signatures included for each year below.

- 1940s – Perico Island is largely untouched with coastal pine flatwoods, mangrove swamp, and salterns dominant. The predecessor to State Road 64 is the primary observation of man-made infrastructure and citrus groves are the most dominant land use change within the area.
- 1958 – This image source provides an imagery date of 1948/1958 but appears to be a collection of aerial photographs collected between 1948 and 1958. On this image, most of the pine flatwoods had been converted to agriculture and significant drainage alterations are apparent along the agriculture fields and mangrove swamp fringes. Between the mangrove swamps and agriculture fields, the ditch construction included a ditch-berm complex separating the mangrove systems from the adjacent uplands. Saltern habitats appear to have been severely impacted by ditch/berm construction. Improvements had been made to State Road 64, but the Anna Maria Bridge had not been constructed yet. Based on the lack of the Anna Maria Bridge, which was completed in 1957, this image appears to include photography prior to 1956.
- 1973 – Additional improvements to State Road 64 are apparent and the Anna Maria Bridge is complete. Minimal land conversion had occurred, but agriculture uses appeared to be changing. The citrus groves east of Perico Preserve have been cleared and that land appeared fallow. The most significant landscape level alteration observed was the completion of mosquito-control ditching throughout the mangrove habitats. The linear ditches and dredge spoil mound signatures are apparent within the mangrove habitats.
- 1984 – Primary changes observed were the conversion of agriculture lands to more intensive row crops to the west of Perico Preserve and the start of construction activity (e.g., clearing and excavation) east of Perico Preserve on the former citrus grow lands.
- 1994 – Agricultural activity continues to change switch between crops/uses. The development of the “Perico Island” subdivision is more than 50 percent complete east of Perico Preserve and the “Perico Bay” development (currently Atrium Bristol Bay) appeared to be complete south of State Road 64.
- 2003 – Development activity appeared to be idle and agricultural activity appeared to be reduced to minimal use.

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- 2006 – Minimal land use or cover change is apparent between 2003 and 2006. It's important to note that the mangrove habitats appear to be minimally changed since the completion of the mosquito ditch construction.
- 2008 – Significant land alteration is apparent west of Perico Preserve with the conversion of the agriculture fields to the initial stages of the Harbour Isles residential development. The perimeter ditch system was filled or relocated, ponds were excavated, and filled was placed for future building sites. At least one hydrologic cut has been made in the large berm along the western edge of the mangrove swamp. Agriculture fields within Perico Preserve remain fallow. The mangrove swamp canopy appears healthy and unchanged.
- 2012 – Additional residential infrastructure is apparent at Harbour Isles and the first buildings are visible. The first phase of habitat restoration at Perico Preserve is underway by Manatee County with. The mangrove swamp canopy appears healthy and unchanged.
- 2015 – Additional buildings are constructed at Harbour Isle, but the overall development footprint remains unchanged. The first phase of restoration at Perico Preserve is complete and the unconnected basin at Rookery at Perico Preserve has been constructed. The mangrove swamp canopy appears largely unchanged with minimal observation of potential mangrove canopy thinning in isolated areas.
- 2017 - Additional buildings are constructed at Harbour Isle, but the overall development footprint remains unchanged. Construction of both phases of restoration at Perico Preserve has been completed and the Rookery at Perico Preserve tidal connections were complete. The mangrove swamp canopy appears largely unchanged with more pronounced canopy thinning and mortality observed within the central portion of Perico Preserve.
- 2020 – Construction at Harbour Isle slows with the most prominent construction occurring at the marina. Restoration activities at Perico Preserve have switched to maintenance and adaptive management activities. Restored habitats appear to be progressing. Significant areas of mangrove mortality and thinning are apparent within the central portion of Perico Preserve and at the northern tip of the Manatee County parcel adjacent to Harbour Isle. The observed signatures show areas of complete mangrove mortality in black mangrove habitats.
- 2021 – No significant land use changes were apparent. The areas appearing to suffer thinning in 2020 appear to be dead in 2021 and expanded areas of thinning are apparent.
- 2023 – No significant land use changes were apparent. Mangrove areas suffering mortality appear to increase in size and thinning appears to have expanded.

Figure 2 – Ditch Network

Figure 2 is a set of 5 pages showing the approximate locations and connectivity of drainage and mosquito control ditches within and adjacent to the Perico Preserve parcel. ESA digitized the ditch network utilizing over 18 sets of aerial imagery and United States Geological Survey (USGS) LiDAR-derived digital elevation models (DEMs) from 2007 and 2018/2019. The ditch network has been broken into four ditch classifications based on the time the ditches appeared and disappeared from aerial imagery. The DEMs were utilized to map ditches present currently since mangrove canopy cover has obscured many of the ditches. It is noted that the current existing ditches are often apparent on current

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aerial imagery based on the presence of aerial signatures indicating the large red mangroves that grow along the ditches.

The ditches are classified as follows:

- 1958 – 1973: These ditches were the southernmost ditches located adjacent to the State Road 64 alignment that were filled during the construction of State Road 64.
- 1958 – 2008: These agriculture ditches were constructed on the west side of Perico Island and were removed/filled when Harbour Isles was constructed.
- 1958 – 2011: These agriculture ditches were constructed within the current Perico Preservation restoration site and were removed/filled as part of the restoration activities.
- 1958/1973 – Current: These ditches include the mosquito control ditches within the mangrove swamp and the perimeter ditch network. These ditches still exist but cuts have been made in various locations to alter hydrologic patterns.

Figure 3 - 2007 Topography

Figure 3 depicts topography based on the DEM derived from LiDAR point collection completed in 2007. The locations of ditches and berms are visible within and along the perimeter of the mangrove swamp.

Figure 4 - 2018 Topography

Figure 4 depicts topography based on the DEM derived from LiDAR point collection completed in 2018/2019. The locations of ditches and berms are visible within and along the perimeter of the mangrove swamp. Note that the symbology (color ramp) used for the 2007 and 2018 DEM depiction is different, primarily due to the variation in scale between 2007 and 2018/2019.