East FOUNDATION

BUILDING AN ASSET MANAGEMENT GEODATABASE FOR RANCHING

Matt Crawford, GISP

East Foundation

- East Family Legacy
  - Tom T. East and Alice Kleberg
  - Robert and Lica East
- Mission
  - Research
  - Education
  - Outreach

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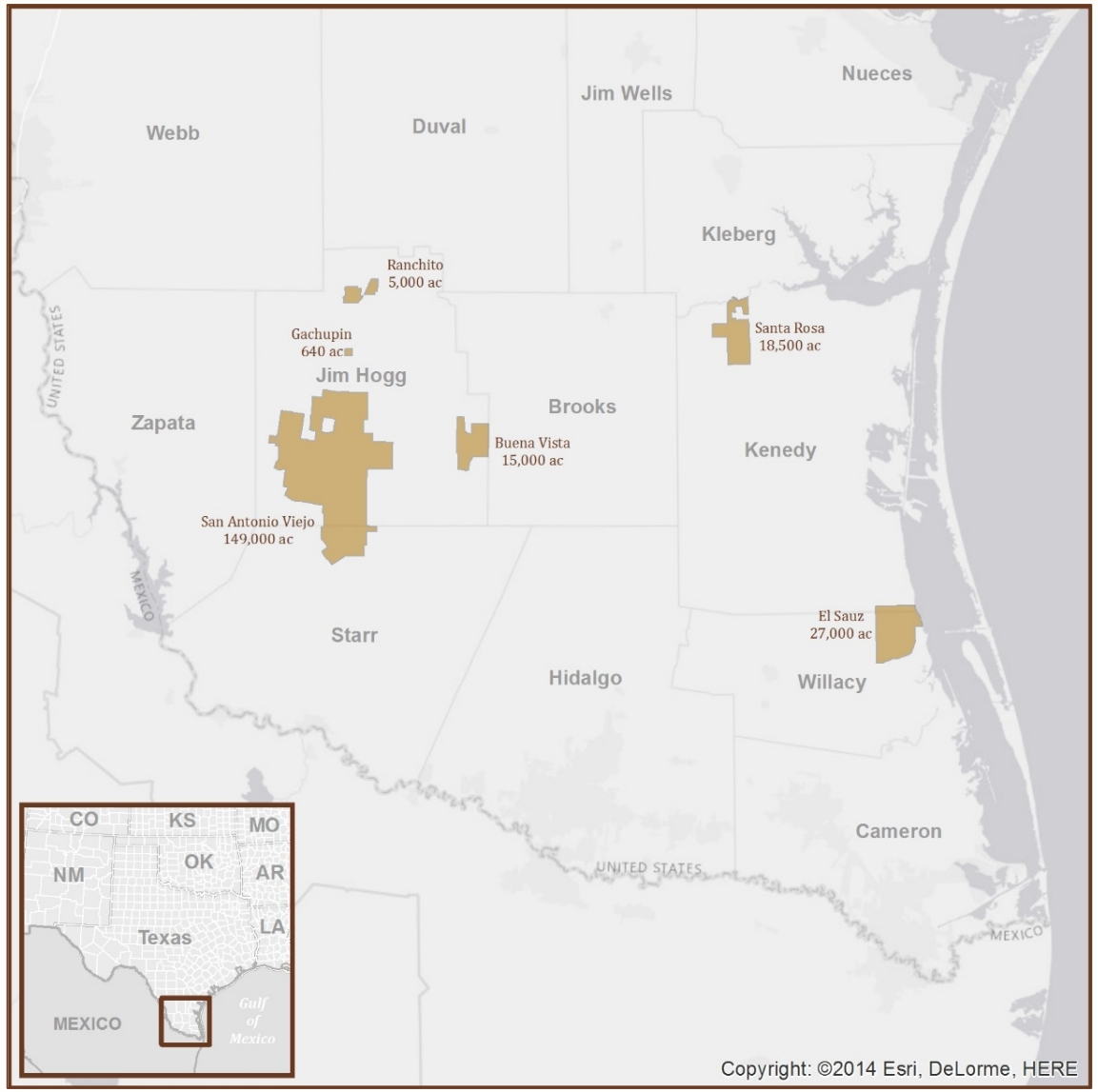

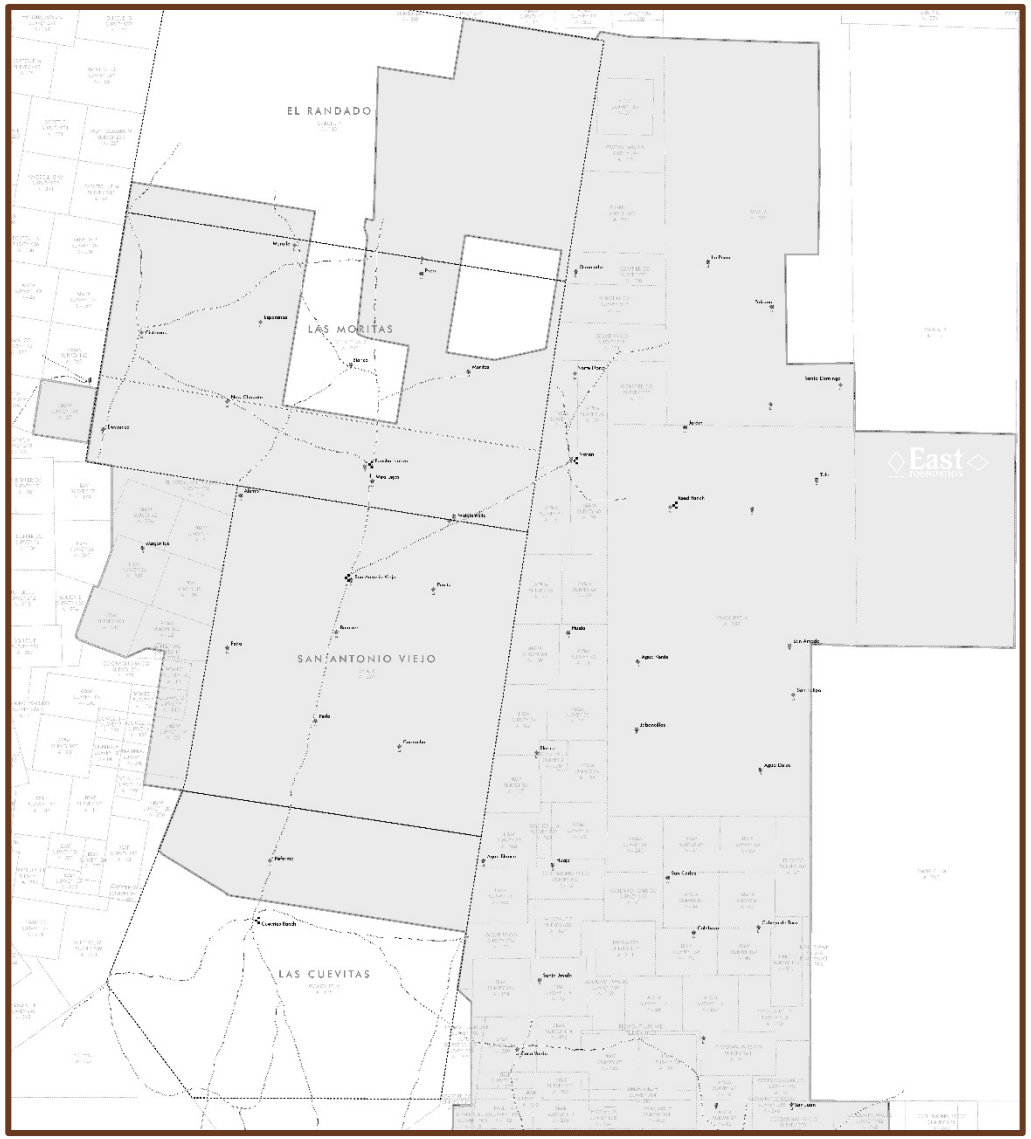

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Scope of Work

- Design, build, and implement a geodatabase
  - **Perform inventory of East Foundation assets and incorporate into GDB**
    - Compile existing GIS data sources and convert into ESRI compatible formats
    - Use high resolution imagery to digitize features and assets
    - **Where appropriate, use GPS to inventory assets in the field**
  - Develop metadata for GIS layers
  - Develop quality controls for geodatabase
  - Develop data standards for external and internal data
- Provide geospatial support
  - Provide geospatial training
  - Provide guidance and encouragement for staff using GIS products
  - Provide support for research projects within the Foundation
  - Develop multiple user interfaces for East personnel to access and interact with GIS

Design Geodatabase

- Interviews with East Foundation staff
  - Features to be collected
    - Fences, roads, and wells
  - Attributes of features
    - Construction materials
    - Condition of features
    - Installation dates
    - Water wells
- Meetings with IRNR GIS team
  - Database structure
  - Naming conventions

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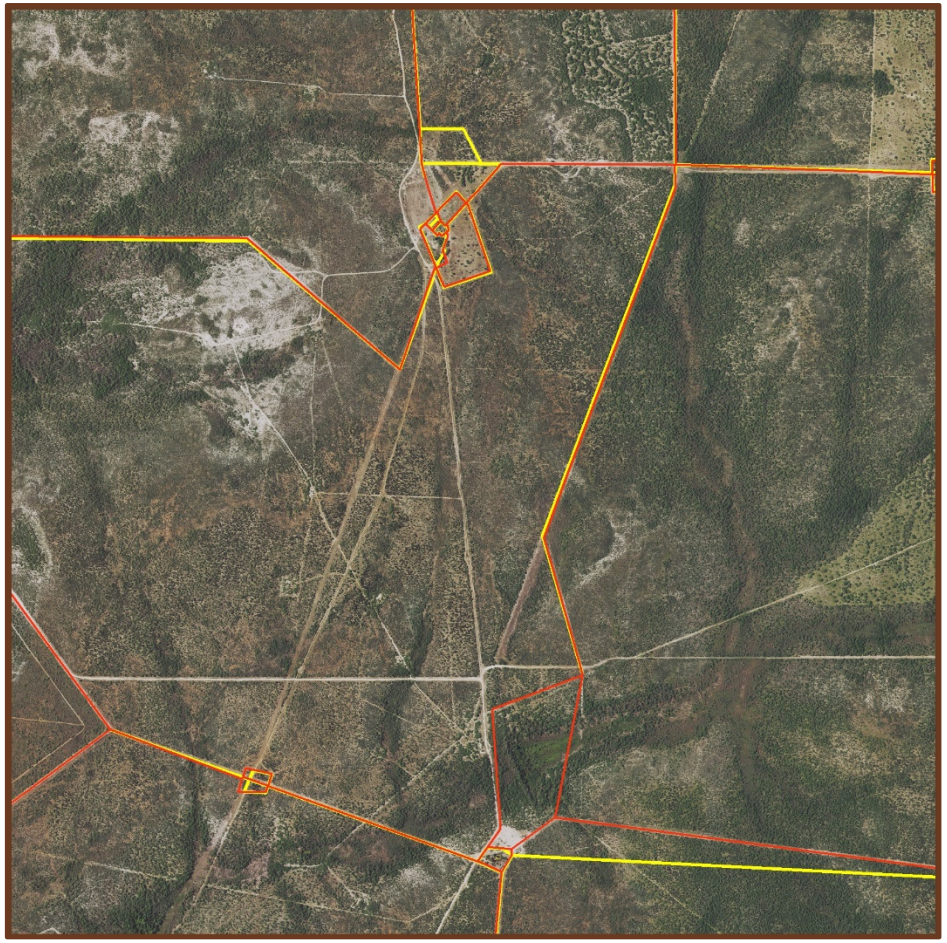
Perform inventory of East Foundation assets

- Compile existing data
  - Global Mapper
    - Fences
    - Water wells
  - Interoperability Extension
    - Converted all existing data into ESRI formats
    - Projected all data into NAD 83 Zone 14 N
- Assessing accuracy
  - Remote sensing
  - GPS data collection



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Perform inventory of East Foundation assets (cont.)

- Digitize features from imagery
  - NAIP Imagery 2012
    - Image server from TNRIS
    - Available at project launch
    - Countywide mosaics
    - Resolution = 1 meter
    - Digitize roads
    - Landscape scale analysis

Scale = 1: 1,000

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Perform inventory of East Foundation assets (cont.)

- Digitize features from imagery (cont.)
  - Acquisitioned imagery from 2013
    - Municipalities in South Texas
    - Acquired February 2014
    - Created image service
    - Resolution - 9 inch
      - Jim Hogg County
      - Starr County
    - Resolution – 12 inch
      - Willacy County
    - Digitize most assets

Scale = 1: 1,000

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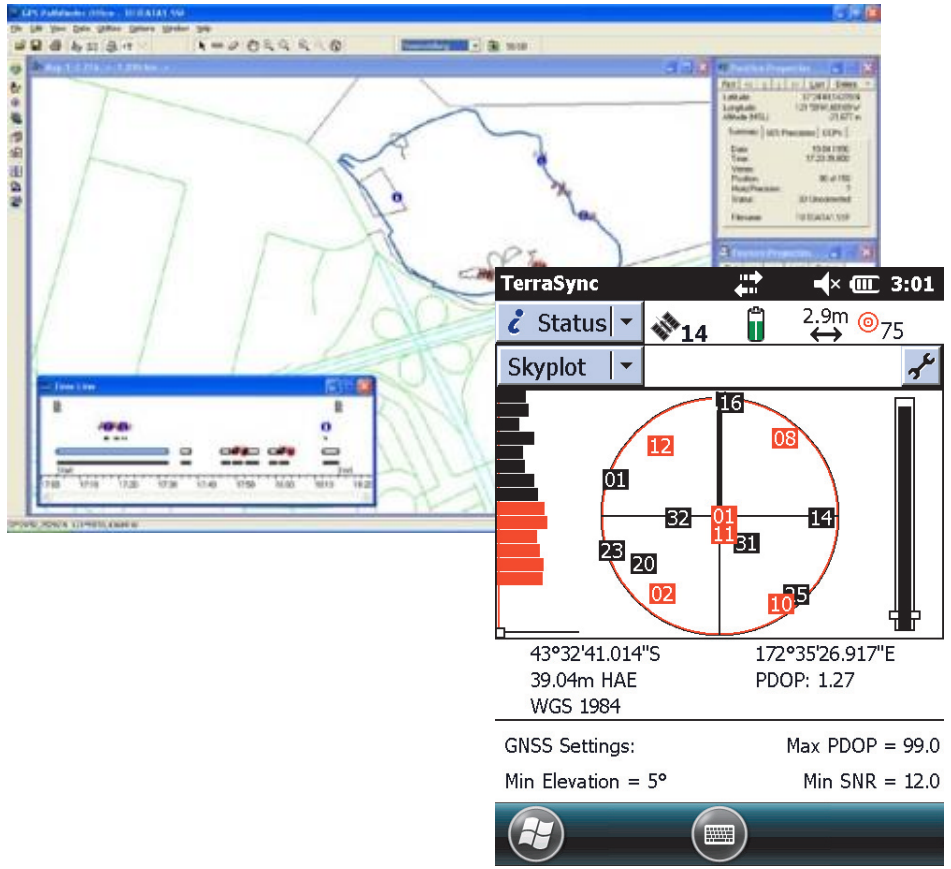
Perform inventory of East Foundation assets (cont.)

- Where appropriate, use GPS...
  - GPS Hardware
    - Trimble
      - Yuma 2 with Pro 6T receiver
        - Tablet
        - Range pole with receiver
      - GeoExplorer 5T
        - Handheld units
        - Smaller than Geo XT

Perform inventory of East Foundation assets (cont.)

- Where appropriate, use GPS... (cont.)
  - GPS Software
    - Trimble TerraSync
      - Installed on all units
    - Trimble Pathfinder Office
      - Installed on Yuma
      - Installed on office PC



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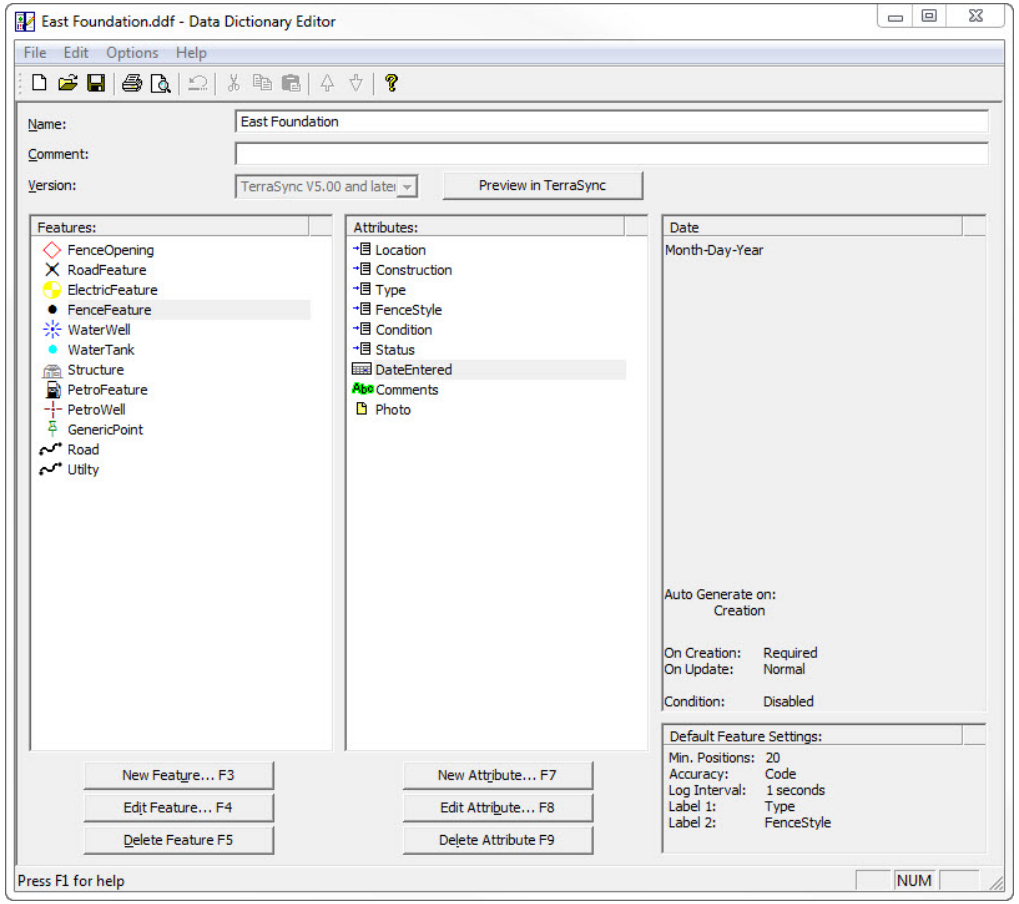
Perform inventory of East Foundation assets (cont.)

- Where appropriate, use GPS... (cont.)
  - Development of GPS data dictionary
    - Built in Pathfinder Office
      - Match geodatabase
      - Simple
      - Changed according to database needs
        - Adding new features
        - Adding new menus
        - Adding photos



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Perform inventory of East Foundation assets (cont.)

- Where appropriate, use GPS... (cont.)
  - Fieldwork
    - Field tests
      - December 2013
        - Initial field test of equipment and dictionary
        - Minor adjustments to data dictionary
      - January 2014
        - First major data collection effort
        - Looked at 60 miles of fence
        - Adjust fieldwork logistics and protocols

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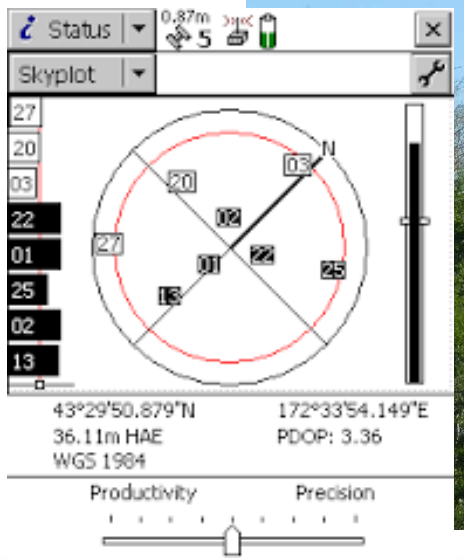
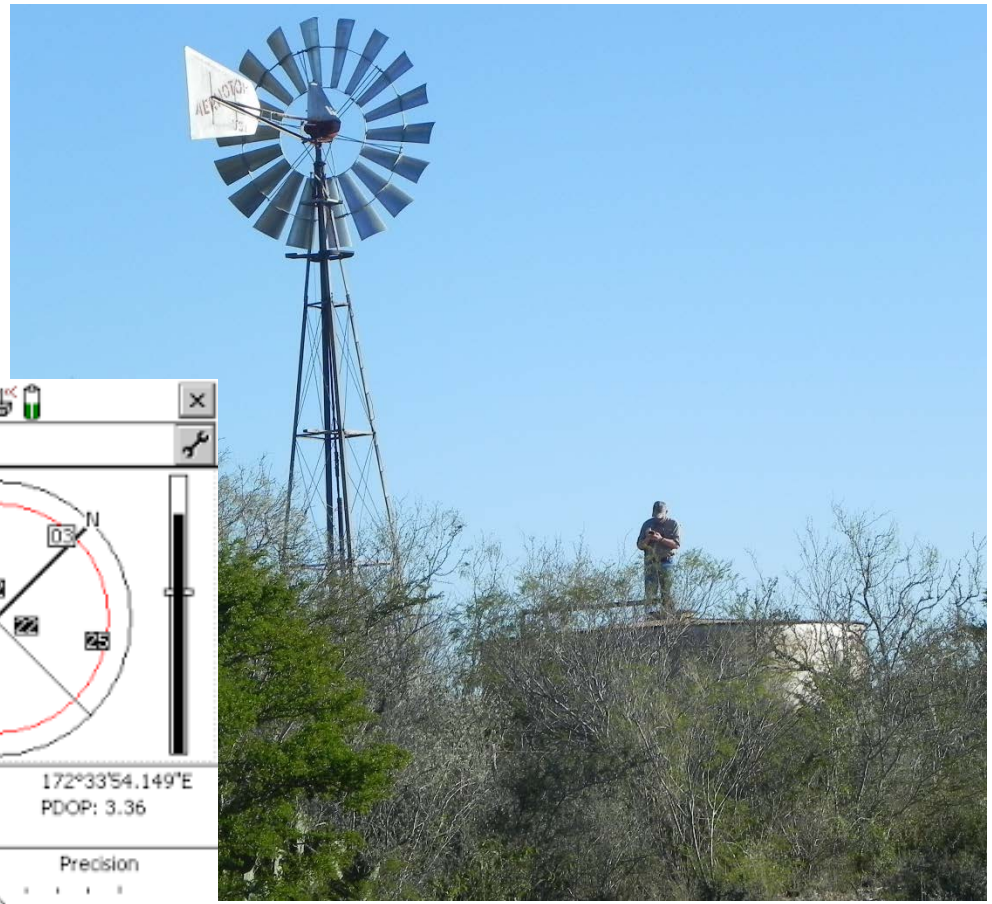
Perform inventory of East Foundation assets (cont.)

- Where appropriate, use GPS... (cont.)
  - Fieldwork
    - Protocol
      - Most features collected as points
      - GPS logging set to 1 sec
      - Features captured for 20 sec
      - PDOP
      - Always take a photo
      - Generic points
      - Changes over time





Perform inventory of East Foundation assets (cont.)

- Where appropriate, use GPS... (cont.)
  - Fieldwork
    - Assets collected
      - Infrastructure
      - Utilities
      - Historical features
    - Total collection efforts
      - 681 miles of fence
      - 1,667 gates
      - 280 water wells
      - 676 miles of road

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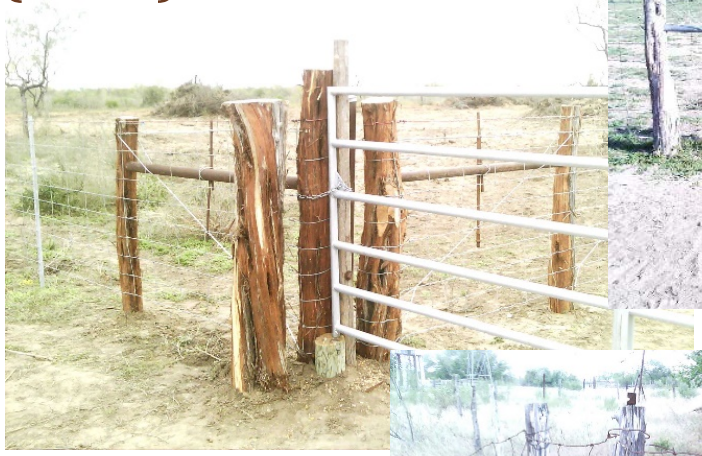
Perform inventory of East Foundation assets (cont.)

- Where appropriate, use GPS... (cont.)
  - Fieldwork
    - Infrastructure
      - Fence features
        - Braces (H, N, Pull Posts)
        - Corners
        - Intersections
        - Direction changes
      - Fence attributes
        - Style (King Ranch, High, Barb Wire)
        - Condition (Good, Fair, Poor)
        - Status (Normal, Needs Repair, Abandoned)

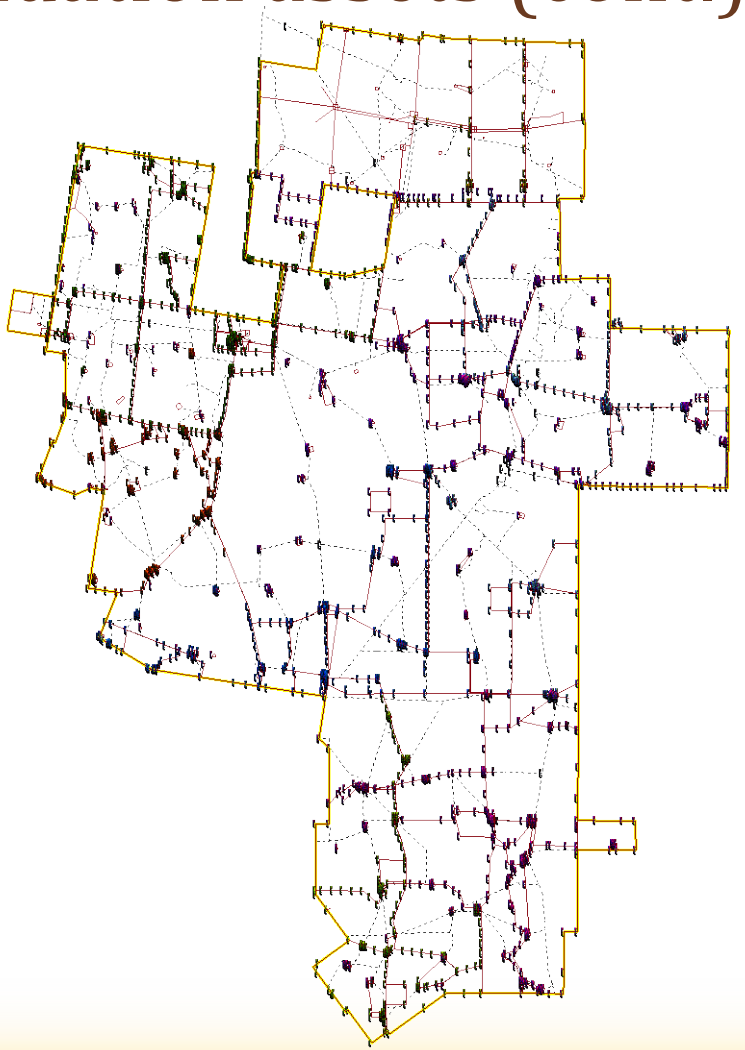


Perform inventory of East Foundation assets (cont.)

- Where appropriate, use GPS... (cont.)
  - Fieldwork
    - Thousands of locations
      - Gates
      - Water wells
      - Water tanks
      - Electric meters
      - Risers
      - Property markers
      - Trash
      - Rain gauges/Weather stations
      - HALO emergency landing zones

Perform inventory of East Foundation assets (cont.)

- Where appropriate, use GPS... (cont.)
  - Fieldwork
    - San Antonio Viejo ~ 149,000 acres
      - 13 week-long field trips between January and September
      - 452 miles of fence
      - 1,205 gates
      - 191 water wells



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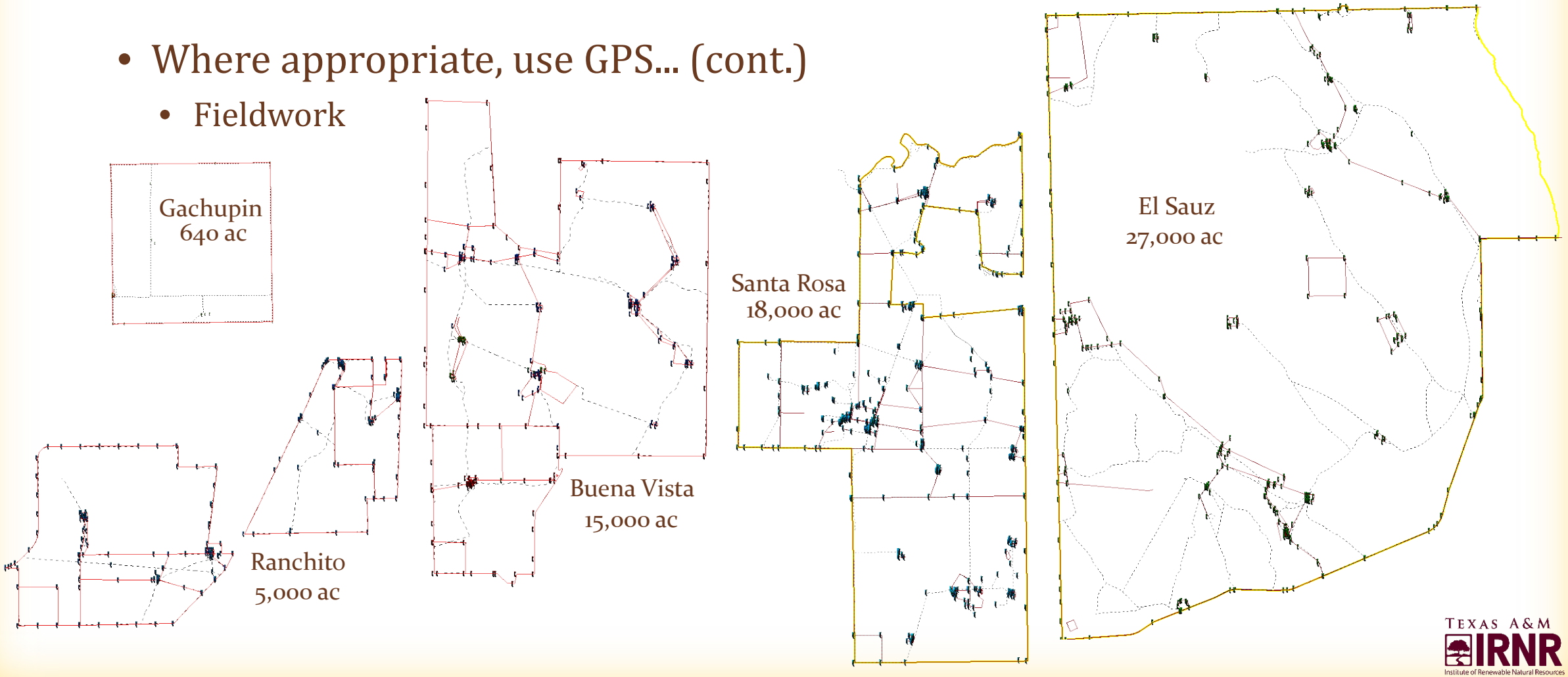
Perform inventory of East Foundation assets (cont.)

- Where appropriate, use GPS… (cont.)
  - Fieldwork



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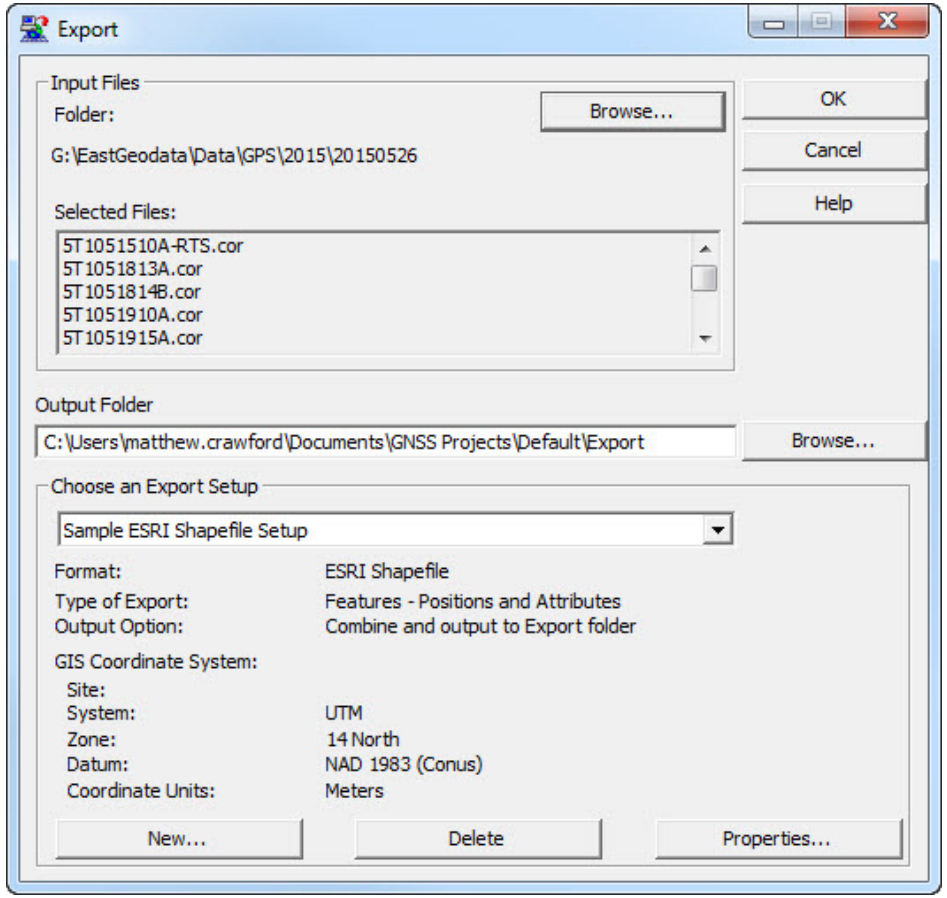
Incorporate assets into geodatabase

- Post-processing
  - Pathfinder Office
    - Data transfer
    - Differential correction
    - GDB export compatibility



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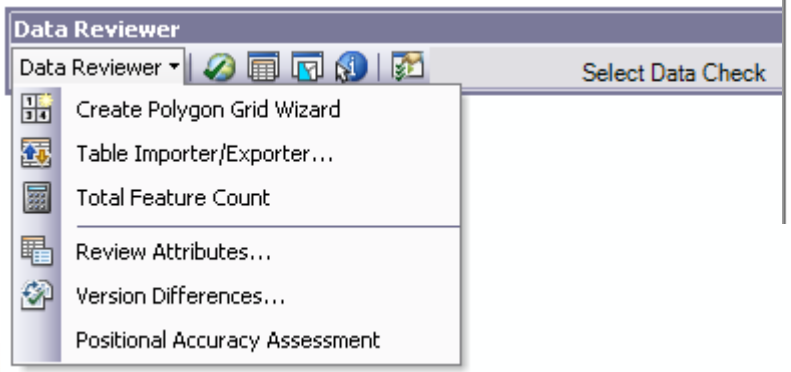
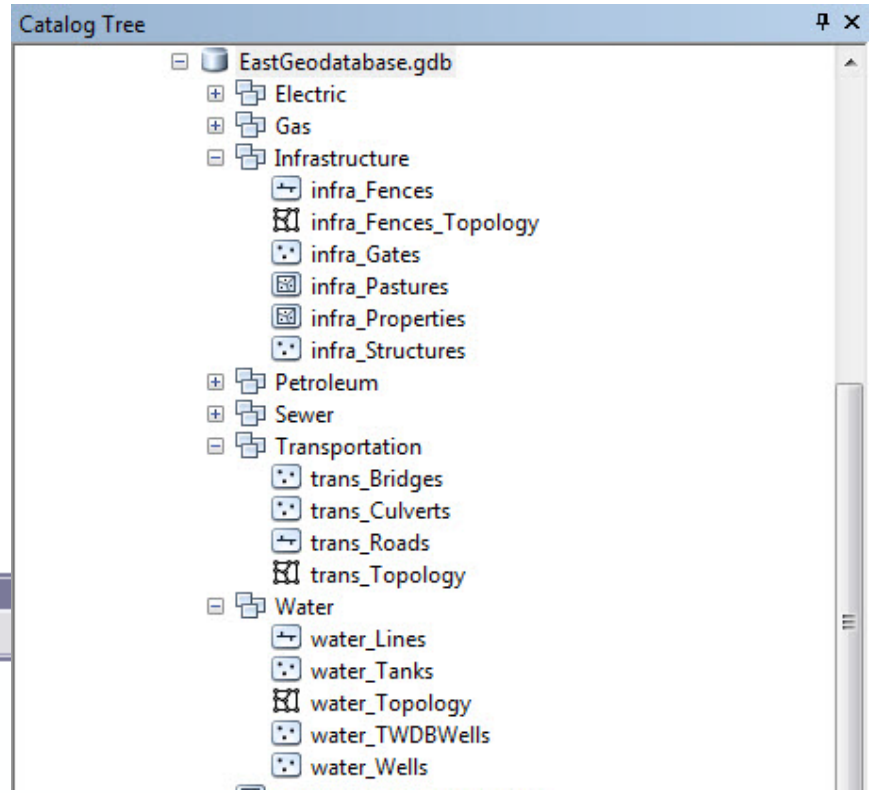
Incorporate assets into geodatabase (cont.)

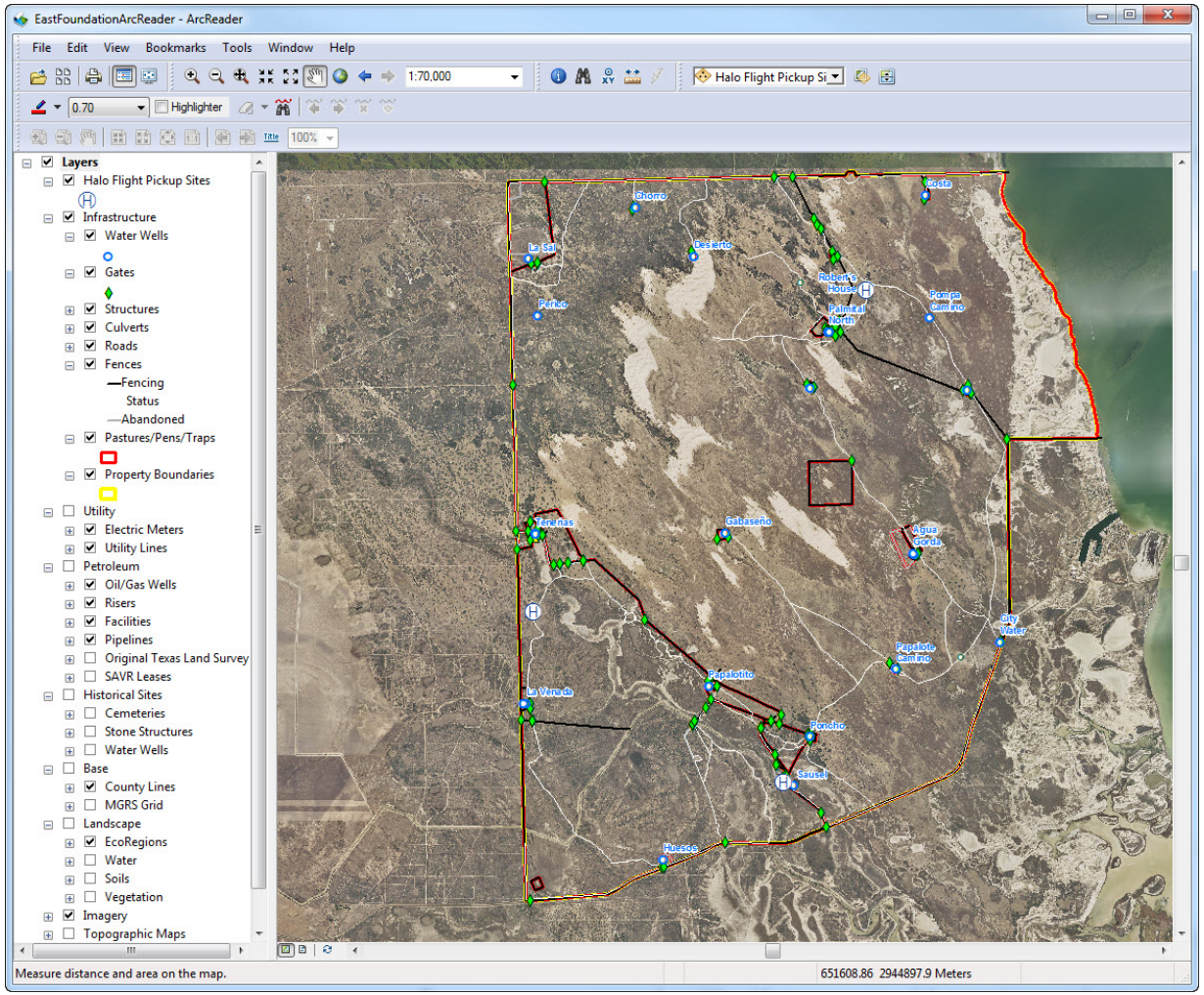
- Post-processing (cont.)
  - Geodatabase population
    - Existing features
      - Adjusted locations to match
      - Populated attributes
        - GPS location attributes
        - GPS location photos
    - QA/QC





Management of assets

- ArcReader
  - Desktop viewing
  - Query information
  - Calculate information
  - Report discrepancies



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Management of assets (cont.)

- ArcGIS app
  - Mobile viewing
  - Real-time location information
  - Calculate distances
  - Report information with location

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Management of assets (cont.)

- Future Management
  - Collector for ArcGIS
    - Updating information and attributes
      - Damaged locations
      - Lock combination changes
      - Gate replacement
      - Water well is undergoing maintenance
    - Adding new features and information
      - Infrastructure
      - Utilities
      - Security incidents

Management of assets (cont.)

- Future Management (cont.)
  - Research
    - Wildlife movement tracking
    - Research plot management
    - Precipitation effects on wildlife

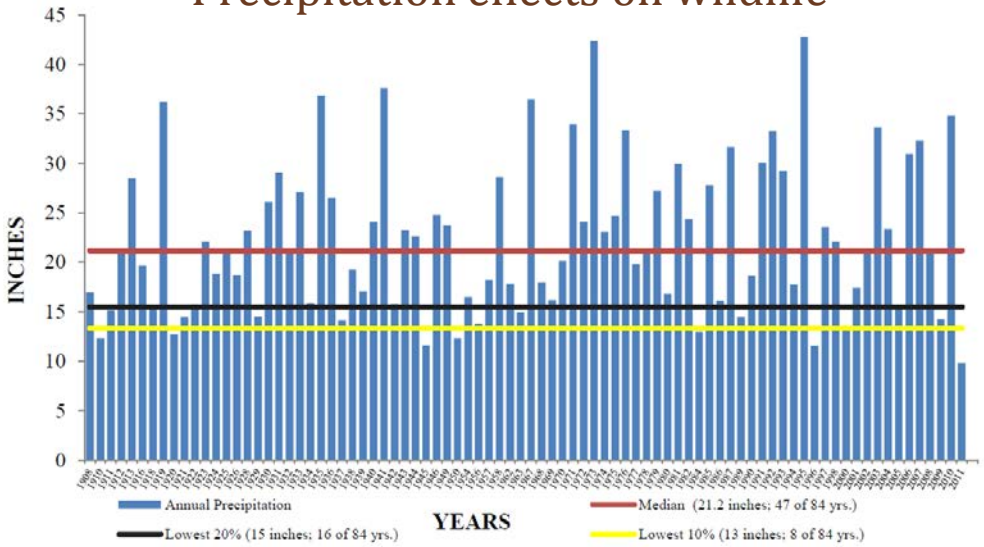

Figure 1. Historical annual rainfall at the NOAA Hebbronville, TX site

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Management of assets (cont.)

- Future Management (cont.)
  - Livestock
    - Grazing management
    - Stocking rates
    - Herd movement tracking

Conclusion

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