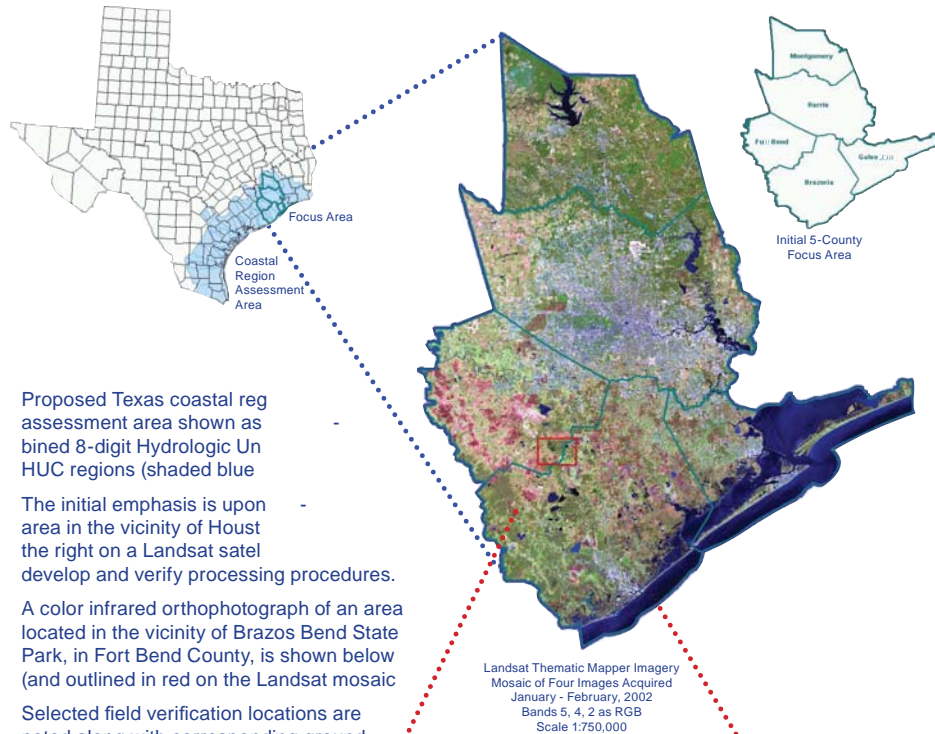


## STUDY AREA



Proposed Texas coastal region assessment area shown as binned 8-digit Hydrologic Unit Code (HUC) regions (shaded blue)

The initial emphasis is upon area in the vicinity of Houston on a Landsat satellite develop and verify processing procedures.

A color infrared orthophotograph of an area located in the vicinity of Brazos Bend State Park, in Fort Bend County, is shown below (and outlined in red on the Landsat mosaic)

Selected field verification locations are noted along with corresponding ground level photographs. Field verification photographs were obtained through the 5-county focus area.



Field Photography Acquired May 2004

USGS Color Infrared Digital Orthophoto 1997

Scale 1:40,000

## PURPOSE

EPA's approach is to integrate remote sensing imagery, geographic information system (GIS) data, existing field data, and *a priori* knowledge of depressional wetlands to estimate their extent, connectivity to other waterbodies and ecosystems, and ecological/hydrologic functions. This approach will focus on locating and quantifying the cumulative area of depressional wetlands, and modeling ecological/hydrologic functions and services. These functions and services include support for aquatic life use; decreasing the loss of human life and property damage from floods; providing fish and wildlife habitat; and supporting recreational use of the environment.

## ANTICIPATED RESULTS

- ▶ An improved (e.g., contemporary) description of depressional wetlands with regard to the location, spatial distribution, and ecological connectivity of such wetlands to other waterbodies and ecosystems.
- ▶ A quantitative estimate of ecological/hydrologic functions and services provided by this type of wetland, considering the following factors:
  - a) flood attenuation and protection
  - b) retention, accumulation, and transformation of runoff from agricultural, urban, or other areas
  - c) cumulative impacts of depressional wetlands loss
  - d) the impact of the loss of the diversity and interspersion of depressional wetland types, within the context of the larger landscape
  - e) impacts on the connectivity among ecosystems within the larger landscape, as a result of the loss of depressional wetlands
  - f) impacts on the refugial habitat for vertebrates, invertebrates, and vegetation communities
  - g) impacts on critical and sensitive habitat required for maintaining or increasing biological diversity throughout the larger landscape (i.e., impacts related to the establishment and spread of invasive/opportunistic species)
- ▶ A peer reviewed EPA report that succinctly describes vulnerable wetlands in the study area, and the degree to which they function and contribute to the ecology of the broader landscape.



Unique remote sensing and GIS data sets are being explored and assessed for their accuracy and applicability to the goals of the project. For example, Light Detecting and Ranging (LIDAR) data [above, right] have potential for determining the landscape position of certain wetland areas [yellow arrows], under certain conditions.

## METHODOLOGY

Definitions of wetlands are usually based upon three primary attributes: 1) periodic flooding or saturation, 2) hydric soils, and 3) hydrophytic vegetation. We are addressing each component individually and in various combinations.

A combination of existing GIS maps and multiple dates of remote sensing imagery are being used to develop a contemporary mapping and assessment of wetlands based upon these components. Previous wetlands mapping efforts are also used.



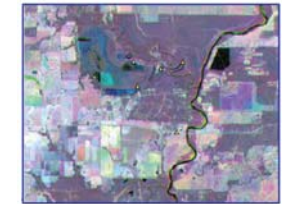
Periodic Flooding

Multiple dates of satellite imagery are being used to map the presence of water and saturated soil. Lake and stream channel GIS data may also be useful where water might be obscured by forested wetlands.



Hydric Soils

Soils maps (SSURGO) are being used to identify hydric soils. Various soil parameters, such as percent clay and drainage, are also being studied for their use in predicting wetlands.



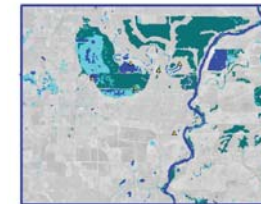
Hydrophytic Vegetation

Multiple dates of satellite imagery are being used to thematically classify vegetation that appears spectrally similar to known wetlands. A three-season composite of Landsat imagery is shown.



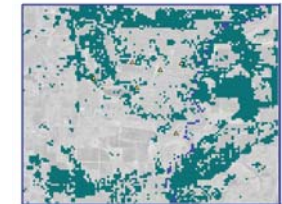
National Wetlands Inventory (NWI)

U.S. Fish and Wildlife Service mapping of wetlands was conducted in the mid-1980's using aerial photographic interpretation and selected field checks. Many changes are apparent on more recent imagery.



National Land Cover Data (NLCD)

U.S. Geological Survey mapping of land cover in 1992 found the mapping of wetlands in this region very difficult. The NLCD mapping relied extensively upon the earlier NWI interpretations.



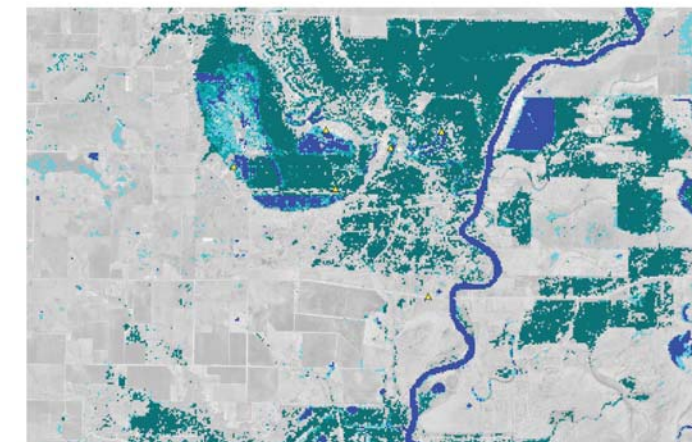
GAP Vegetation Associations

Satellite imagery from 1992 were also used by the GAP Analysis Program to map vegetation. The original 30-meter results were then aggregated to 90-meter cells, as shown above.

## INTERIM RESULTS

Initial thematic classifications of the multi-season Landsat imagery show results similar to earlier mapping efforts. Standard spectral classification and more advanced classifiers, making use of collateral GIS data sets, are being compared.

The use of recent satellite and aerial imagery will allow the efficient update and assessment of wetlands over a large area. Detailed accuracy assessments will be undertaken for selected areas to ensure that data quality criteria can be documented.



Preliminary Mapping of Wetlands and Water 2002

Scale 1:40,000

### LEGEND

- Water
- Emergent Wetlands
- Shrub Wetlands
- Forested Wetlands

Notice: Although this work was reviewed by EPA and approved for publication, it may not necessarily reflect official Agency policy.