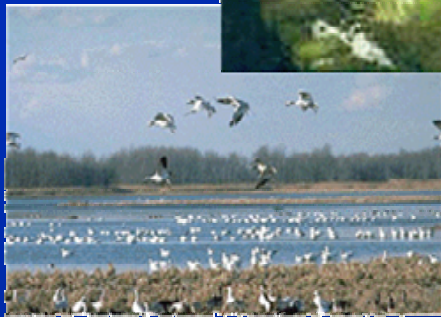
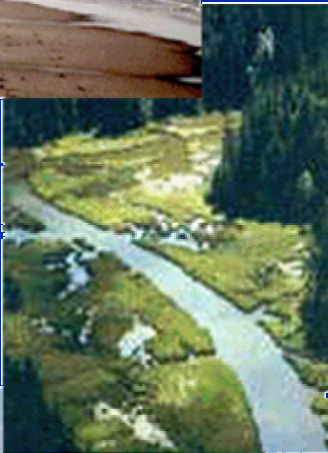
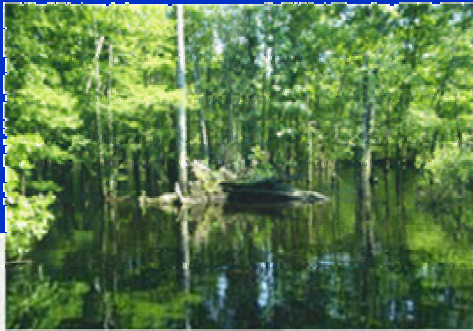


NATIONAL
WETLANDS
INVENTORY
(NWI)



Cross
Correlation
Analysis





Cross Correlation Analysis



Wetlands data do not go out of date because they are old.

They go out-of-date because of land use or water level changes.



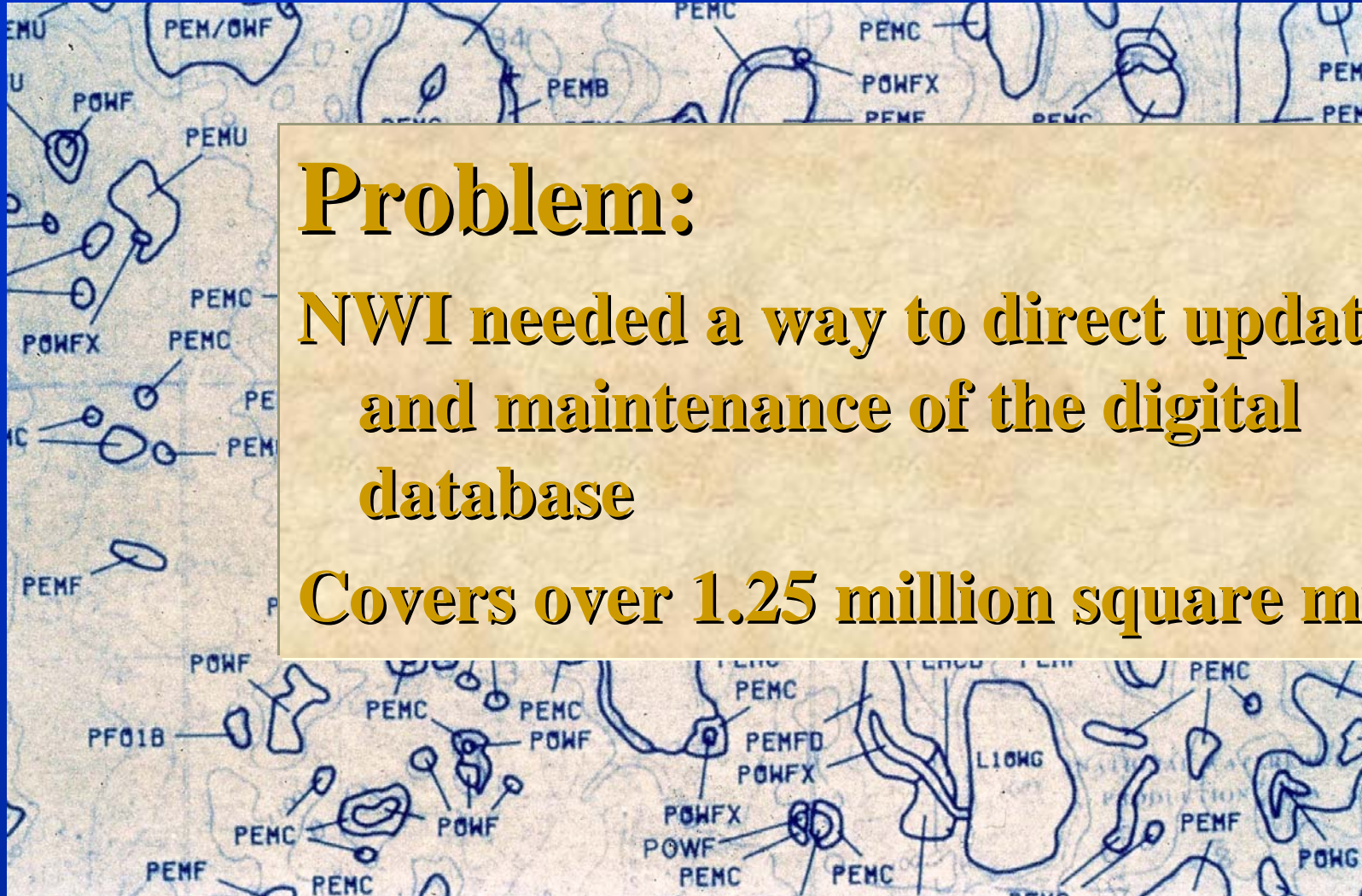


Cross Correlation Analysis

Problem:

NWI needed a way to direct updating and maintenance of the digital database

Covers over 1.25 million square miles





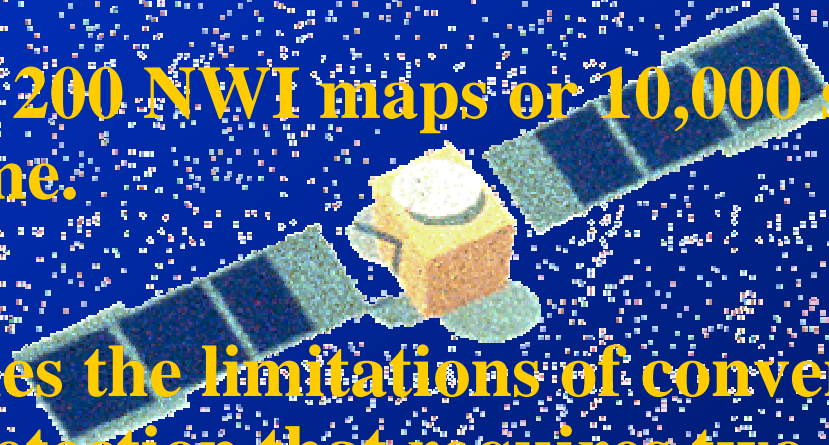
Cross Correlation Analysis

Why Cross-correlation analysis?

Identifies changes in NWI digital data with one satellite image

Analyzes 200 NWI maps or 10,000 square miles at one time.

Overcomes the limitations of conventional change detection that requires two satellite images.





Cross Correlation Analysis

What do you need?

- ✓ **NWI digital wetlands data**
- ✓ **New multispectral satellite image**



Cross Correlation Analysis

Step 1:

NWI data are superimposed on multispectral satellite images.

Data pixels for each wetland type are collected and filed separately.

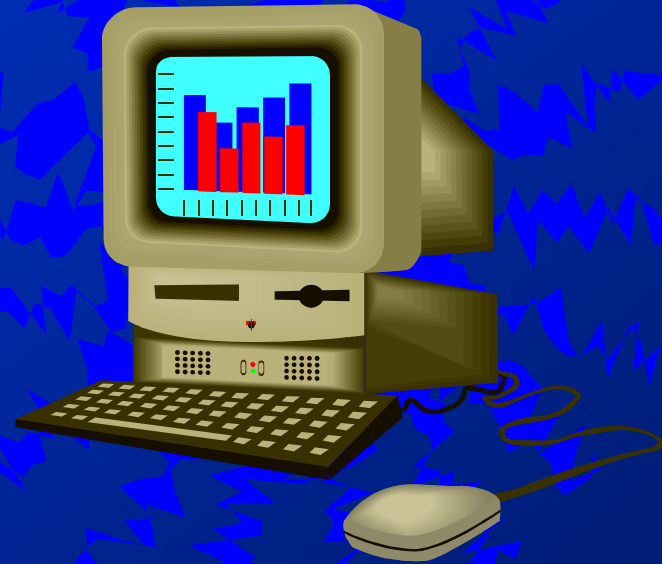
Maximum, minimum, and mean reflectance values from bands, 3, 4, and 5 for each wetland type are calculated.



Cross Correlation Analysis

Step 2

Data for each pixel in the set for a unique wetland type are compared against the maximum, minimum, and mean for the set.



Difference between the reflectance data for each pixel and the means are calculated.

Each pixel is assigned one of four probabilities of change: No Significant, Low, Moderate and High



Cross Correlation Analysis

Step 3

Each pixel is assigned a fill color and is displayed on the recent satellite image:

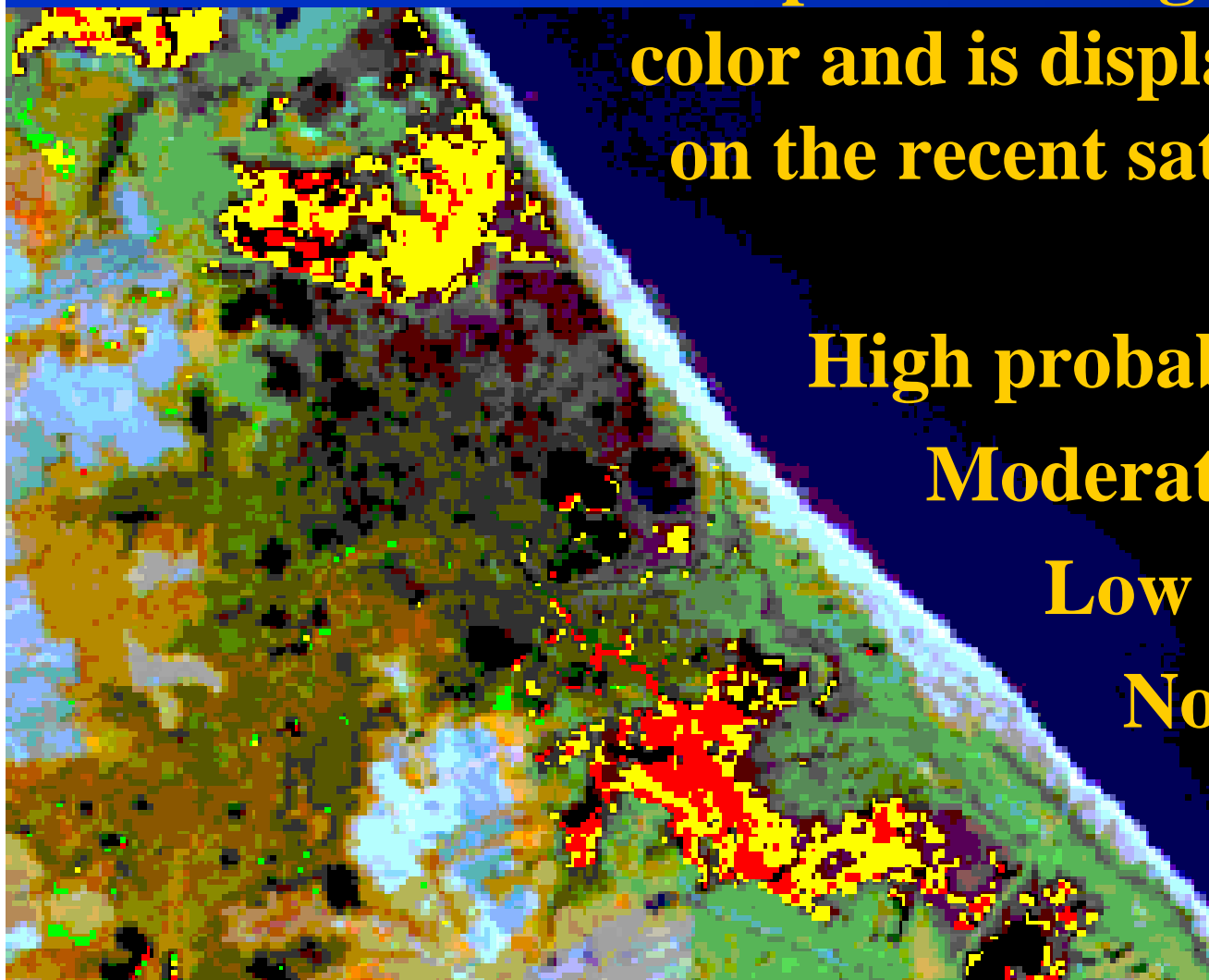
High probability = red

Moderate = yellow

Low = Green

None =

Transparent



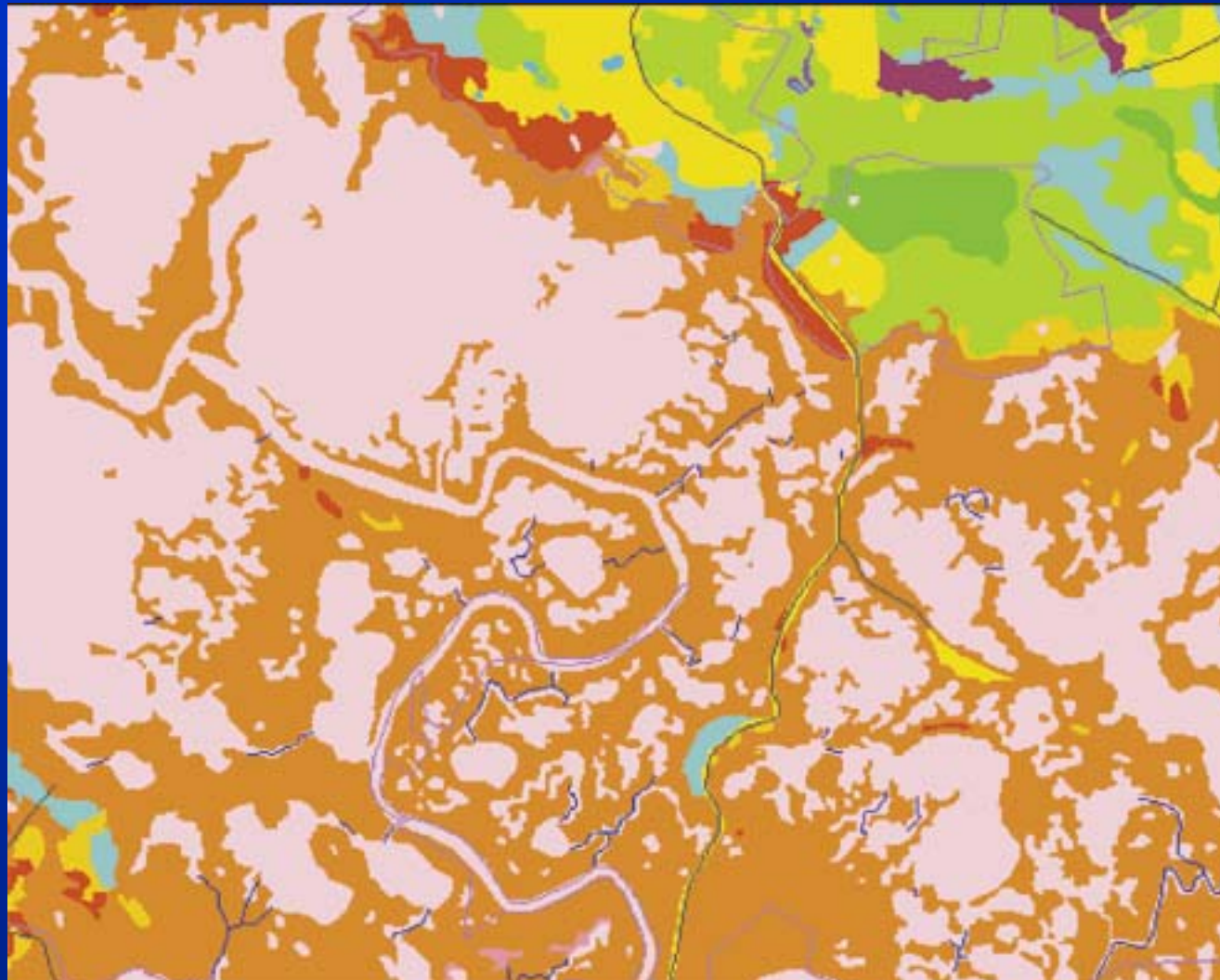


Cross Correlation Analysis

**NWI Map
Wetlands
Interactive
Mapper
(1980s photos)**

Blackwater National Wildlife Refuge, Maryland

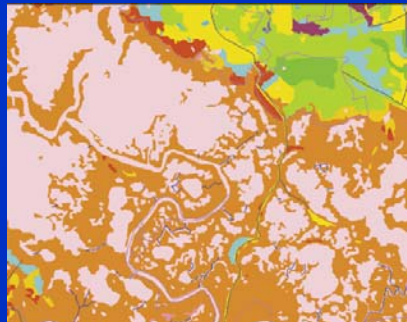
- E1UB
- E2EM1
- E2FO1
- E2FO4
- E2FO5
- E2US
- PEM1
- PFO1
- PFO4
- PSS1
- PUB
- Upland
- No Data Available
- ~ Streams
- ~ Roads
- ~ States
- ~ Counties
- Open Water
- ~ Refuges





Cross Correlation Analysis

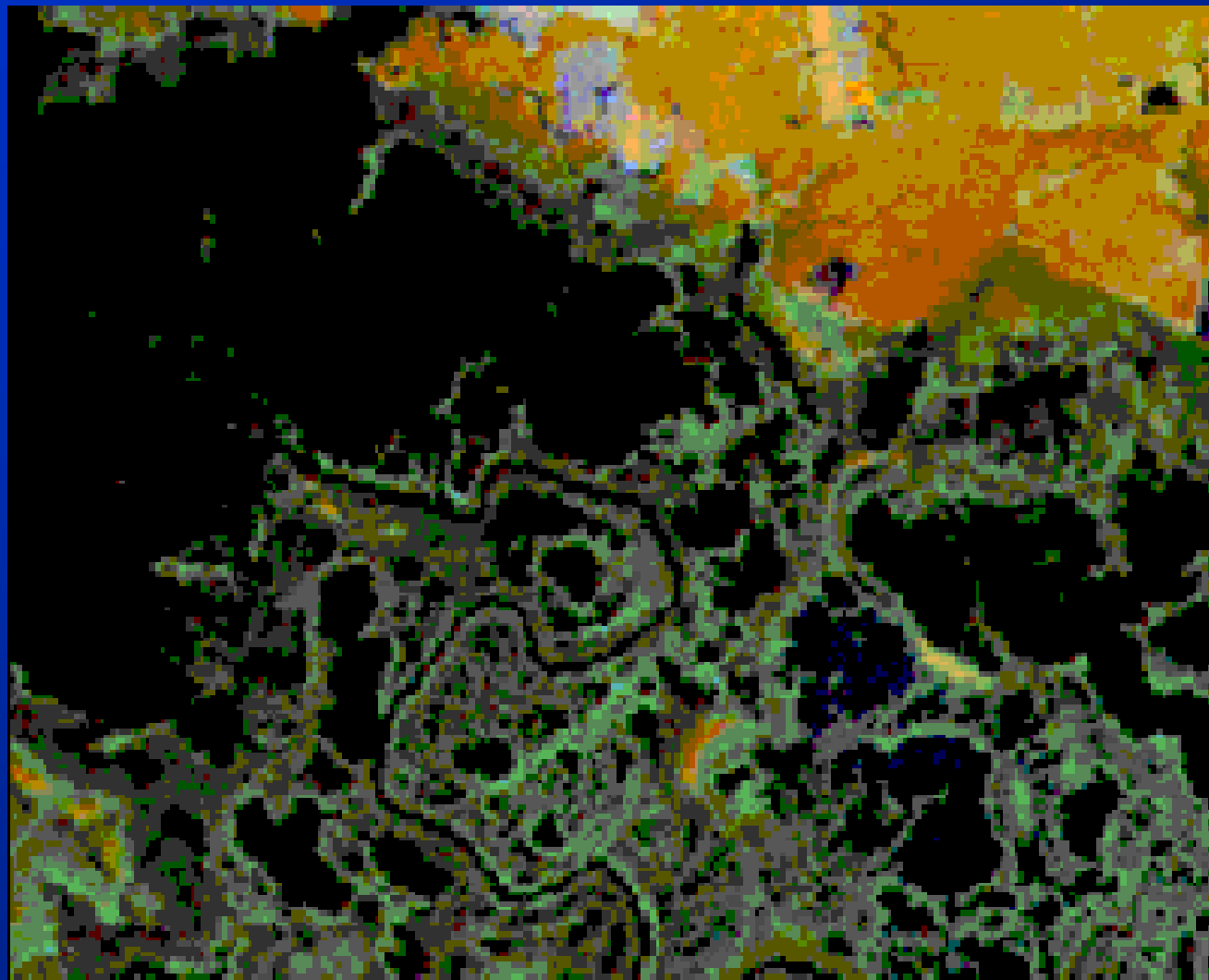
Blackwater National Wildlife Refuge, Maryland



Satellite Image

10/31/00

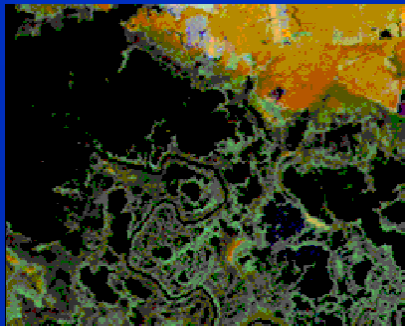
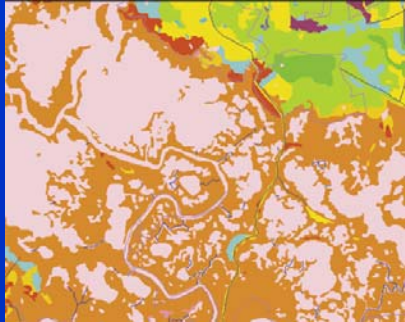
Bands 3, 4 & 5





Cross Correlation Analysis

Blackwater National Wildlife Refuge, Maryland

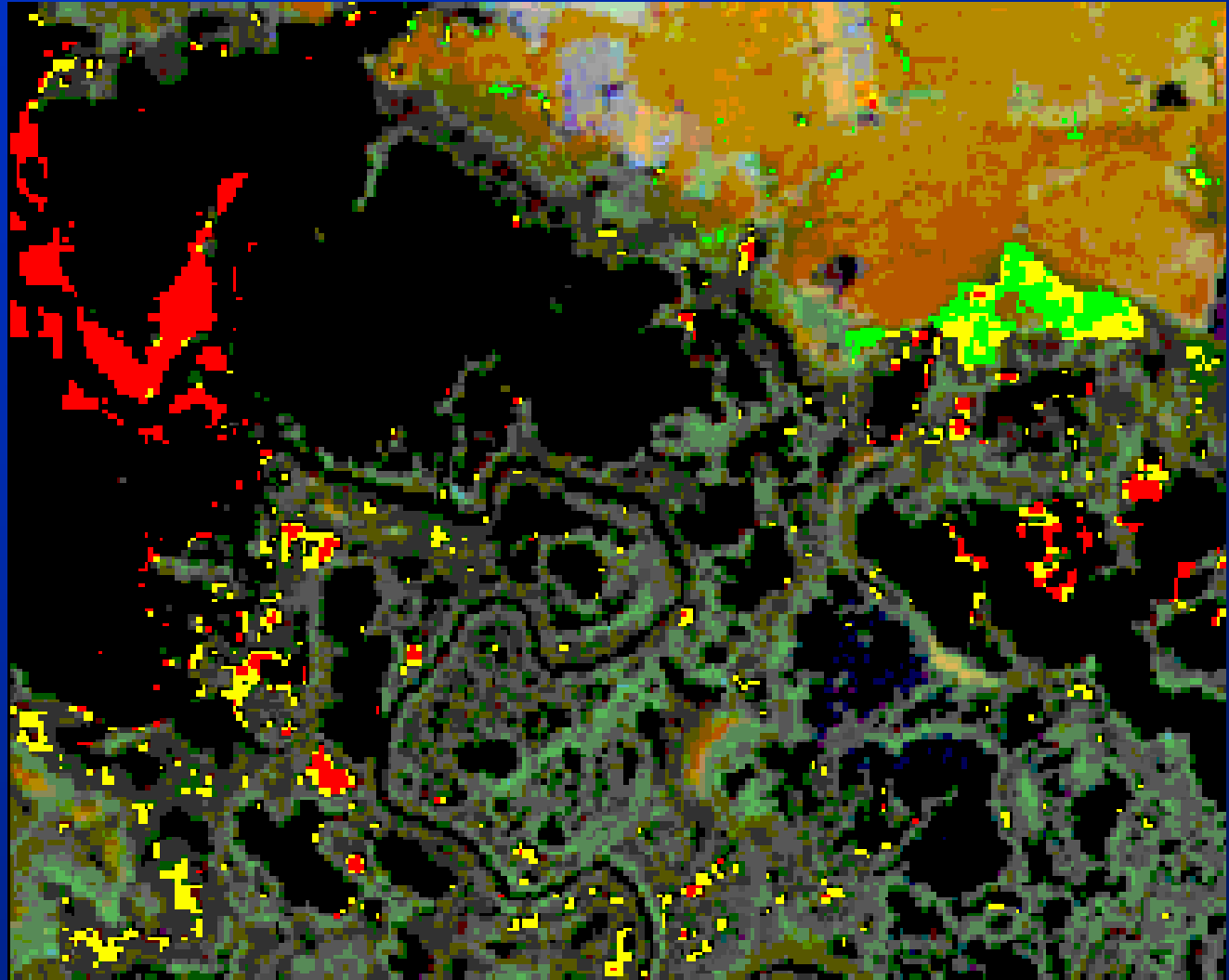


Probability of Change

Red: High

Yellow: Moderate

Green: Low





Cross Correlation Analysis

NWI Map East of Blackwater National Wildlife Refuge, MD

**Wetlands
Interactive
Mapper
(1980s photos)**

- E1OW
- E1UB4
- E2EM5
- E2FO4
- E2SS4
- E2US
- PEM5
- PFO1
- PFO4
- POW
- PSS1
- Upland
- No Data Available
- ~ Streams
- ~ Roads
- ~ States
- ~ Counties
- Open Water





Cross Correlation Analysis

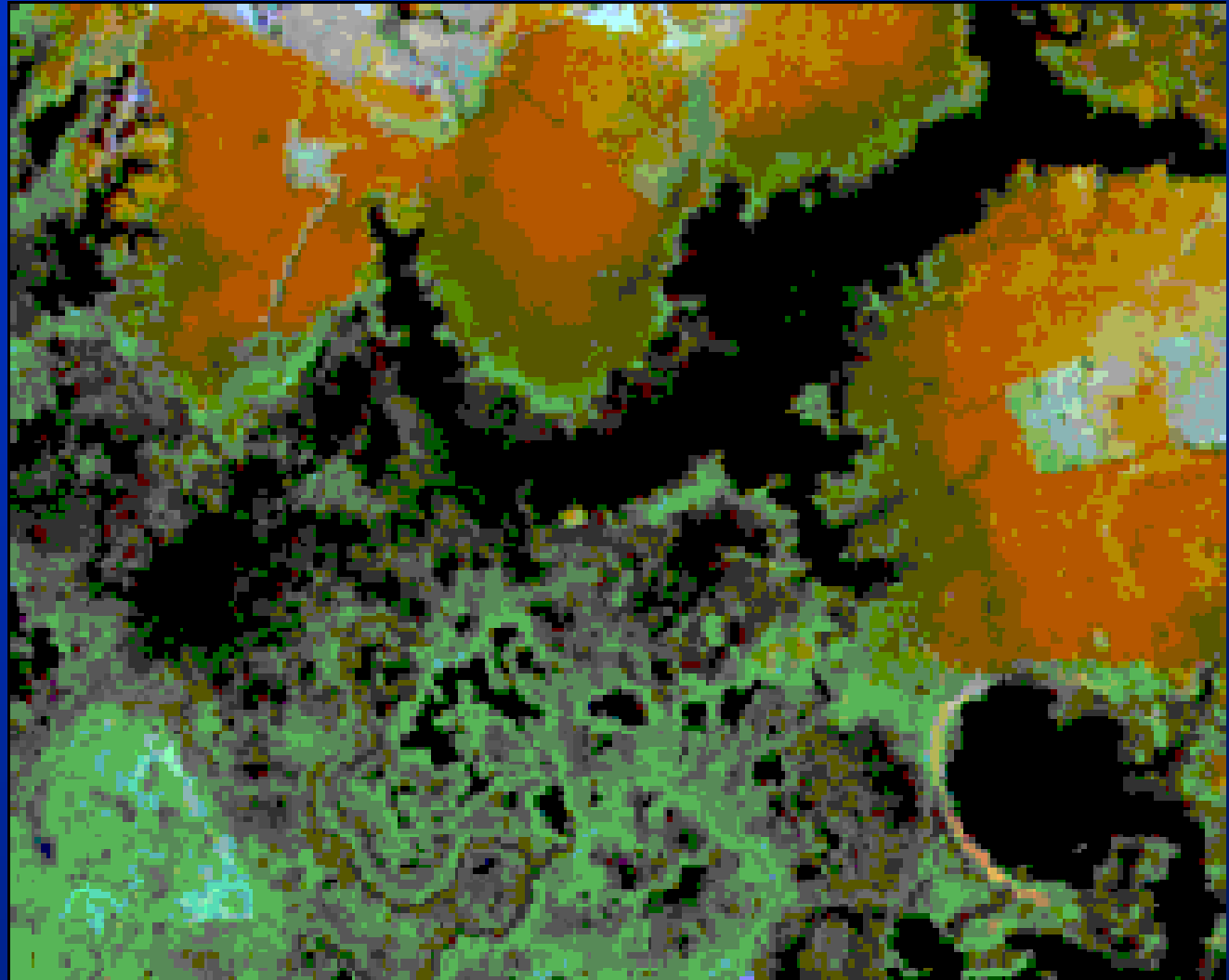
East of Blackwater National Wildlife Refuge, MD



Satellite Image

10/31/00

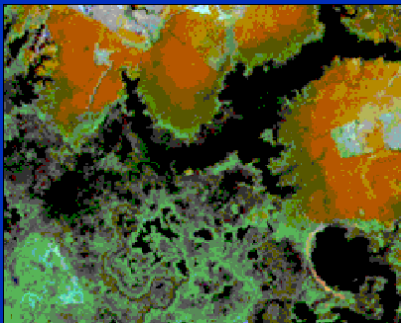
Bands 3, 4 & 5





Cross Correlation Analysis

East of Blackwater National Wildlife Refuge, MD

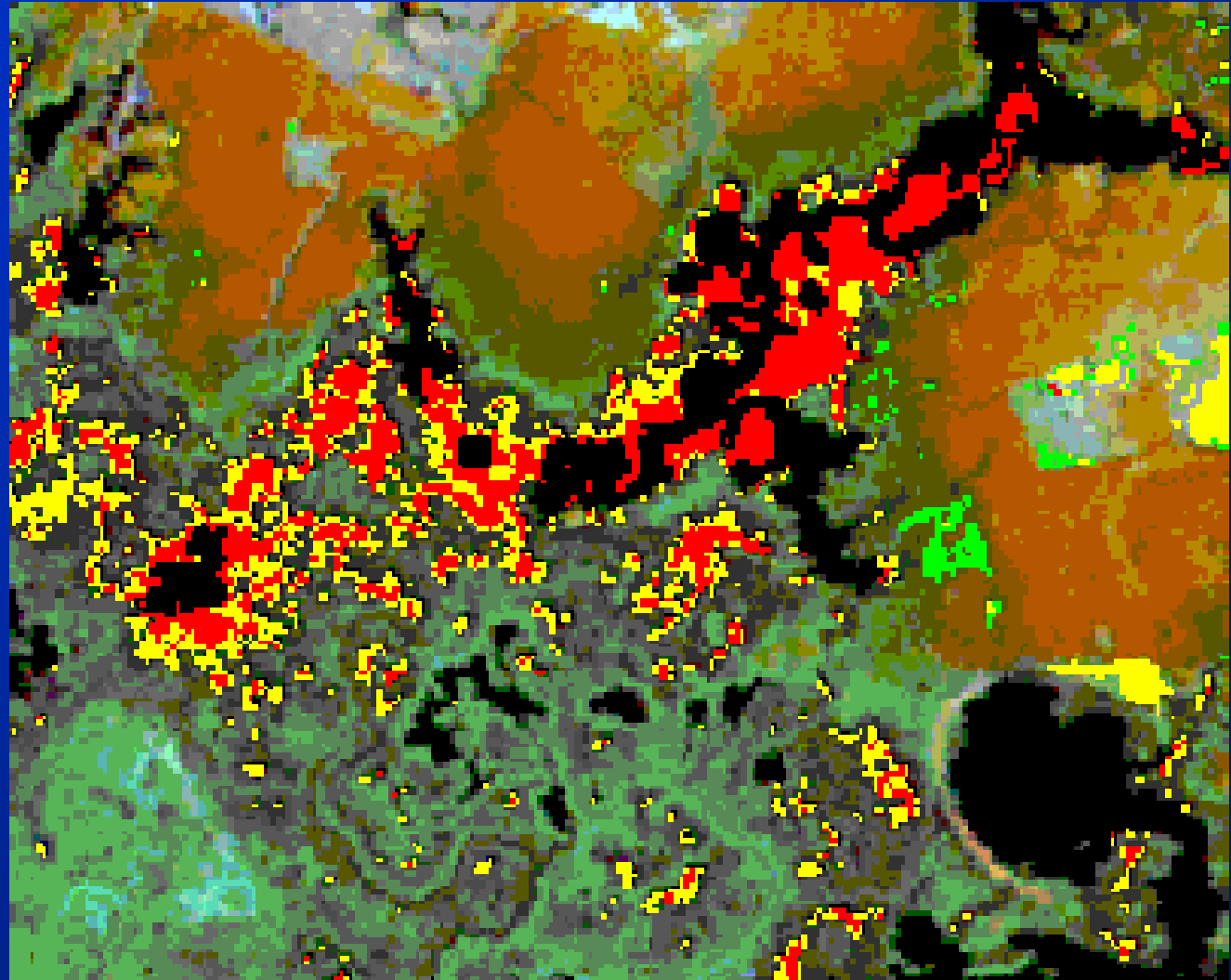


Probability of Change

Red: High

Yellow: Moderate

Green: Low





Cross Correlation Analysis

**NWI Map
Wetlands
Interactive
Mapper
(1980s photos)**

Prime Hook National Wildlife Refuge, Delaware

- E1UB
- E2EM1
- E2FO1
- E2FO4
- E2FO5
- E2US
- PEM1
- PFO1
- PFO4
- PSS1
- PUB
- Upland
- No Data Available
- ∕ Streams
- ∕ Roads
- ∕ States
- ∕ Counties
- Open Water
- ∕ Refuges





Cross Correlation Analysis

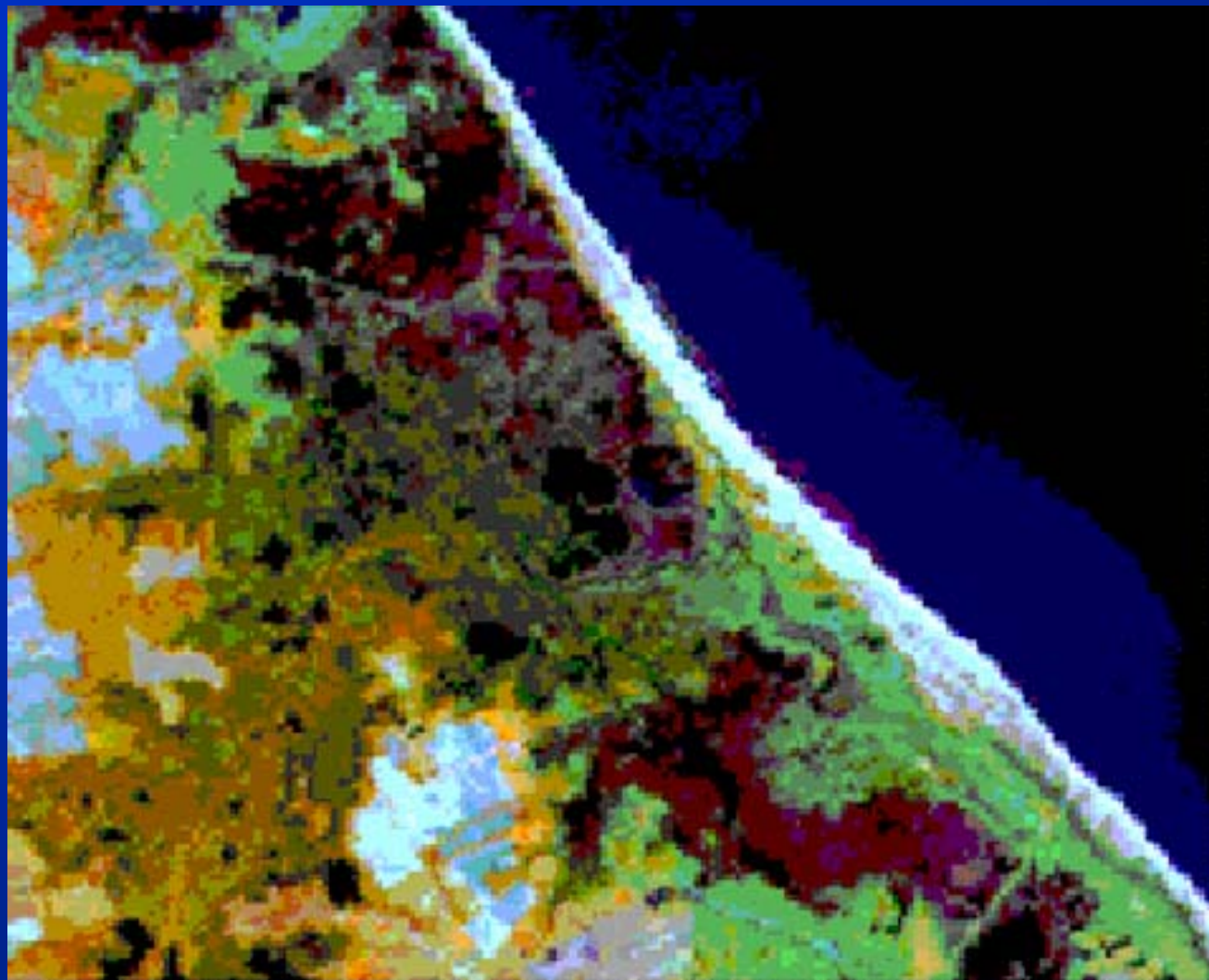
Prime Hook National Wildlife Refuge, Delaware



Satellite Image

10/31/00

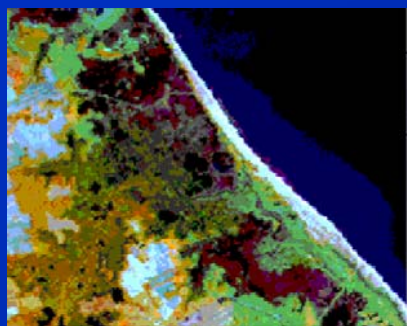
Bands 3, 4 & 5





Cross Correlation Analysis

Prime Hook National Wildlife Refuge, Delaware

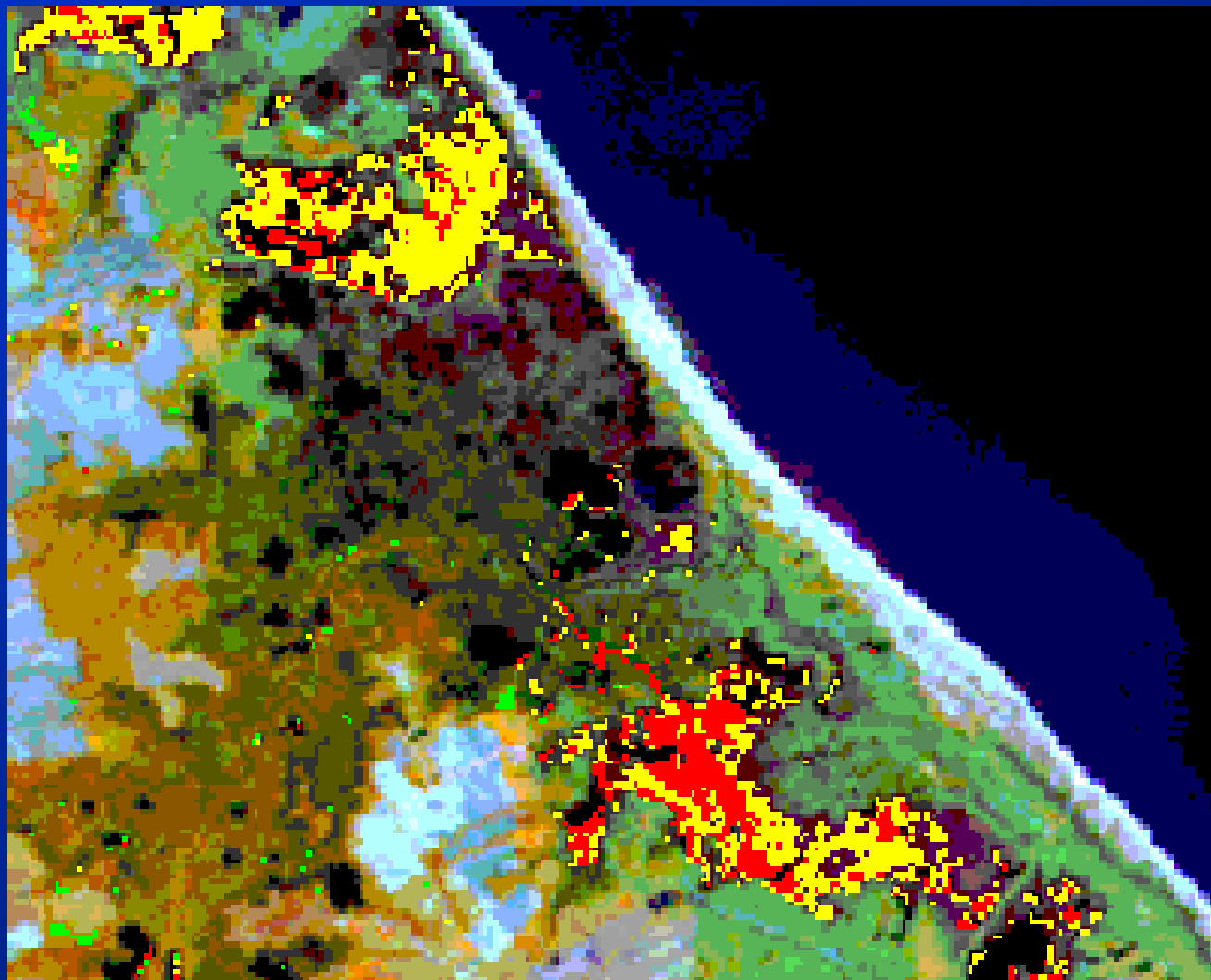


Probability of Change

Red: High

Yellow: Moderate

Green: Low





Cross Correlation Analysis

South of Port Norris, New Jersey

NWI Map
Wetlands
Interactive
Mapper
(1980s photos)

- E1OW
- E2EM
- E2FL
- PEM
- PFO1
- PFO1/4
- PFO4
- POW
- PSS1
- PSS1/EM
- Upland
- No Data Available
- /// Streams
- /// Roads
- /// States
- /// Counties
- Open Water





Cross Correlation Analysis

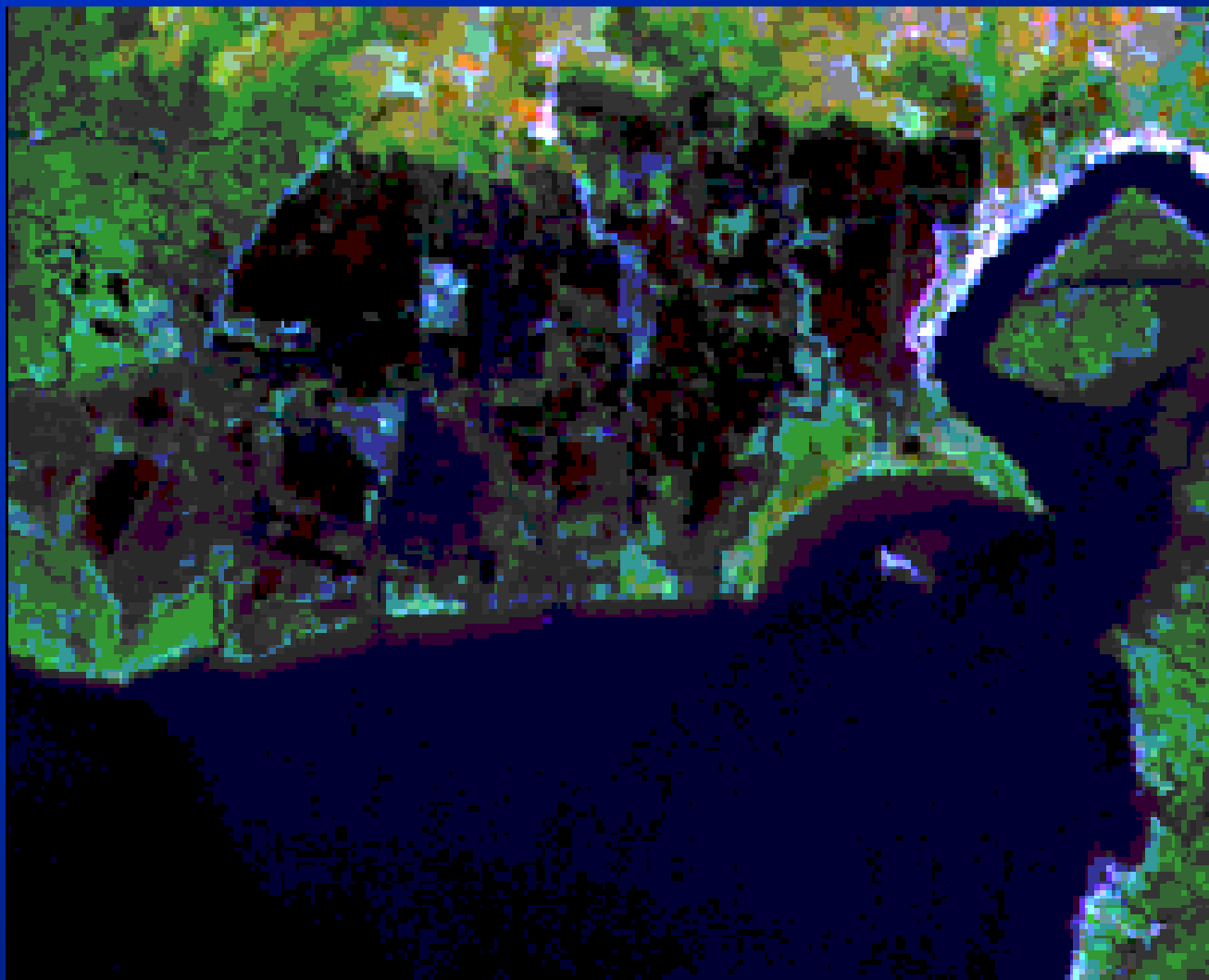
South of Port Norris, New Jersey



Satellite Image

10/31/00

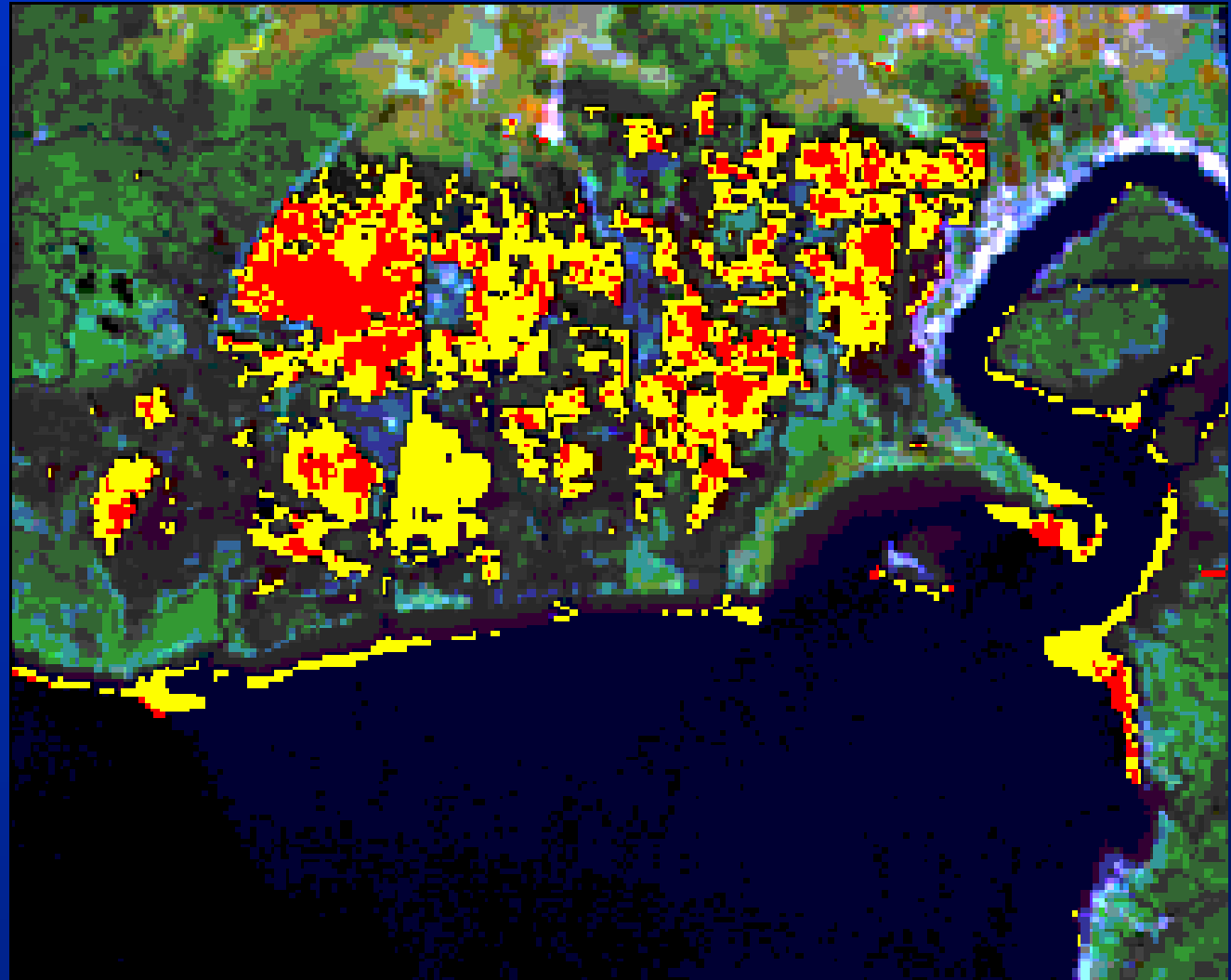
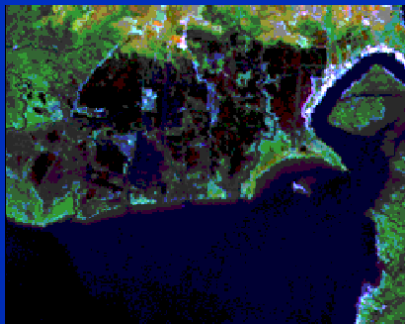
Bands 3, 4 & 5





Cross Correlation Analysis

South of Port Norris, New Jersey



Probability of Change

Red: High

Yellow: Moderate

Green: Low



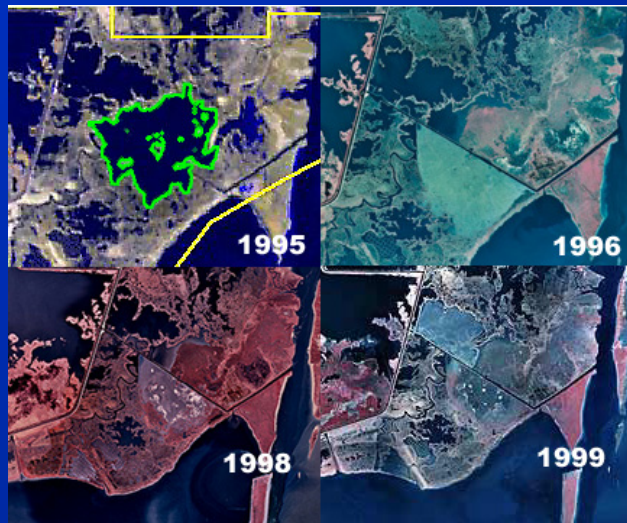
Cross Correlation Analysis

Additional potential uses:

**Identify areas where wetlands
have a high potential of being
lost or are being degraded**



Evaluate the success of mitigation efforts



**Identify places where existing wetland
regulations or policies are not
working**

**Identify areas where wetland
enforcement activities need to be
expanded**

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INVENTORY
(NWI)



Visit us on the Web at:

<http://wetlands.fws.gov/>