Wetland Alternations
Wetland Alterations

- **Water Level**
  - draining
  - channeling
  - construction of dams
  - filling
  - water extraction
  - highway construction

- **Nutrient Level**
  - sewage
  - agricultural runoff
  - sediments
Wetland Alterations (cont.)

- **Other Human Disturbances**
  - discharge of toxic substances
  - acid mine drainage
  - mineral extraction (phosphates, gravel, sand)
  - peat extraction

- **Natural Disturbances**
  - subsidence
  - drought
  - hurricanes
  - erosion
  - biotic effects - "eat-outs"
Swamp Lands Act - Effects

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<thead>
<tr>
<th>YEAR</th>
<th>STATE</th>
<th>ACRES</th>
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<tbody>
<tr>
<td>1849</td>
<td>Louisiana</td>
<td>9,493,456</td>
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<td></td>
<td>Alabama</td>
<td>441,299</td>
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<td>Arkansas</td>
<td>7,686,575</td>
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<td></td>
<td>California</td>
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<td></td>
<td>Illinois</td>
<td>1,460,164</td>
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<td>Iowa</td>
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<td></td>
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<td>26,372</td>
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<td>Wisconsin</td>
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<td>1960</td>
<td>Minnesota</td>
<td>4,706,503</td>
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<td></td>
<td>Oregon</td>
<td>286,108</td>
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<td></td>
<td><strong>TOTAL</strong></td>
<td><strong>64,895,415</strong></td>
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Draining Agriculture Lands

Undrained Soils

Ditching

French Drain
Draining Agricultural Fields

Draining Wetlands for Irrigation

Dick Gersib
Installing French Drains
Trend of Drained Agricultural Land

![Graph showing the trend of drained agricultural land from 1890 to 1990. The line of best fit is represented by the equation y = 0.49x - 935.52 with an R^2 value of 0.95.](image)
Historical Wetland Loss - Iowa / California

[Graph showing the loss of California's wetlands from 1850 to 1977]

[Graph showing the loss of Iowa's natural marshes from the early 1800s to 1980]
Wetland Lost in California

Originally, the Central Valley of California was very different than it is now. Tufa lakes held water in a basin with a surface area approximately four times the surface area of Lake Tahoe. Buena Vista and Kern Lakes also held water as runoff accumulated from the Sierra Nevada. The rivers and streams that flowed into the Central Valley were lined with bottom-land forests composed of willow, sycamore, oak, elder, poplar, and alder; lush stands of wetland grasses and tules dominated the valley floors and prairies (Handley, 1992). Prior to the mid-1800’s, about 4 million of the 13 million acres that made up California’s Central Valley were estimated to be wetland.

Figure 9. Wetlands of the Central Valley of California, circa 1850 (left) and 1990 (right). (Source: U.S. Fish and Wildlife Service, Status and Trends, unpbl. data, 1994)
Agricultural Impacts to California Wetlands
Wetland Alterations

- **Water Level**
  - draining
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  - construction of dams
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  - water extraction
  - highway construction

- **Nutrient Level**
  - sewage
  - agricultural runoff
  - sediments
Channels in Coastal Wetlands
Historical Wetland Loss - Coastal

Coastal Wetland Loss in U.S.

- 0.2% loss/Yr
- 0.5% loss/Yr

Years


Millions of yrs

10, 7
Residual Development in Coastal Wetlands
Coastal Wetland Conversions
JFK Airport Setting
JFK Airport Runway/Wetland Conflict
Highway Construction in Wetlands
Wetland Alterations

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Agricultural Runoff
Wetland Alterations (cont.)

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  - subsidence
  - drought
  - hurricanes
  - erosion
  - biotic effects - "eat-outs"
Mining Impacts

*Peat Mining in a Wetland/Montane*  
*EPA Region 8, Paul McIver*
Bottom-Land Tree Harvest

Timber harvest in a bottom-land forested wetland. (Photograph by R. Daniel Smith, U.S. Army Corps of Engineer Waterways Experiment Station.)
Timber Harvest in Wetlands
Natural Wetland Creation/Subsidence
Coastal Wetland Natural Creation
Natural Subsidence
Nutria “Eat-Out”
Acid Mine Drainage
Wetland Loss in U.S.

Percentage of Wetlands Acreage Lost, 1780's-1980's

Twenty-two states have lost at least 50 percent of their original wetlands. Seven states—Indiana, Illinois, Missouri, Kentucky, Iowa, California, and Ohio—have lost over 80 percent of their original wetlands. Since the 1970's, the most extensive losses of wetlands have been in Louisiana, Mississippi, Arkansas, Florida, South Carolina, and North Carolina.

Historic Wetland Distribution

FIGURE 3: WETLAND DISTRIBUTION CIRCA 1780’s

FIGURE 4: WETLAND DISTRIBUTION CIRCA 1980’s
Total Wetland Loss

215 Million Original Acres

54% LOST

46% REMAINED IN THE MID 1970'S (99MIL ACRES)
## Wetland Conversions

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Agriculture</td>
<td>87%</td>
<td>54%</td>
<td>37%</td>
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<tr>
<td>Urban</td>
<td>8%</td>
<td>5%</td>
<td>48%</td>
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<tr>
<td>Open Water/Barren</td>
<td>--</td>
<td>--</td>
<td>15</td>
</tr>
<tr>
<td>Other</td>
<td>5%</td>
<td>41%</td>
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History of Wetland Regulations

- 1849 - Swamp Land Act (Amended in 1850, 1860)
- 1890 - Rivers and Harbors Act (Amended in 1899).
- 1960 - Supreme Court broadly construes RHA to include industrial waste.
- 1967 - Fish and Wildlife Coordination Act.
- 1968 - MOU between DOI and ACOE.
- 1970 – Supreme Court upheld denial of RHA permit for ecological reasons.
- 1970 - Executive Order 11574.
- 1972 - Federal Water Pollution Control Act.
- 1975 - Court Cases expand CWA into wetlands.
- 1975 - ACOE Regulations in Phase.
  - I } 1975 - Tidal and Waters used for commercial navigation.
  - II} 1976 - Tributaries to Phase I and lakes > 5 acres.
  - III} 1977 - All waters of U.S.
History of Wetland Regulations (cont.)

- 1977 - CWA Amended.
- 1977 - Executive Order 11990.
- 1977 - ACOE Amends Regulations.
- 1979 - U.S. Attorney General - EPA Authority of Jurisdictional Issues
- 1981 - Executive Order 1229
- 1983 - ACOE Proposed Reforms
- 1983 - EPA Resists.
- 1984 - Court Case - ACOE Concedes
- 1986 - ACOE Amends Regulations.
- 1989 - MOU Between ACOE and EPA - jurisdiction.
- 1990 - MOU Between ACOE and EPA - mitigation.
- 1992 - Court Cases - Isolated Wetlands.
- 1993 - Court Case - CWA regulates excavation.
- 1995 - Amendment to Nationwide Permits
- 2001 - Supreme Court rules on “Isolated Wetlands”