

Questions and Answers About: Status and Trends of Wetlands in the Conterminous United States 2004 to 2009

I. Background

Question 1: Why are wetlands important?

Answer: Wetlands provide a multitude of ecological, economic and social benefits. They provide habitat for fish, wildlife, and a variety of plants. Wetlands are nurseries for many saltwater and freshwater fishes and shellfish of commercial and recreational importance. Wetlands are also important landscape features because they hold and slowly release flood water and snow melt, recharge groundwater, act as filters to cleanse water of impurities, recycle nutrients, and provide recreation and wildlife viewing opportunities for millions of people.

Question 2: Why is the Fish and Wildlife Service determining the status and trends of the Nation's wetlands?

Answer: The Fish and Wildlife Service is the principal Federal agency that provides information to the public on the extent and status of the Nation's wetlands. Under the provisions of the Emergency Wetlands Resources Act (Public Law 99-645), the Service is required to update wetland status and trends studies of the Nation's wetlands at ten year intervals and report to the Congress*. To date, there have been five national reports on wetland status with this study being the latest. A special five-year report completed in 2005 was required by the President, so this report provides an update for the last five years.

Question 3: Does this study include natural as well as human-induced gains and losses?

Answer: Yes. The study includes sampling and analysis of natural and human-induced wetland and deepwater habitat gains and losses in the conterminous United States between 2004 and 2009.

Question 4: How are the wetlands data collected?

Answer: For each sample plot, aerial imagery is analyzed and annotated in accordance with procedures published by the Fish and Wildlife Service. The results are compared with previous era imagery, and any changes were recorded. The differences between the data sets are analyzed and a statistical estimate of the change is produced. Field verification is done to confirm the findings.

Question 5: What are the different types of wetlands included in the study?

Answer: The three major kinds of wetlands or water bodies include: 1) freshwater (palustrine), 2) saltwater (marine or estuarine), 3) deepwater (lakes and other deepwater habitats). For analysis and reporting, these types of wetlands were further divided into subcategories such as freshwater forested, freshwater emergent, estuarine and marine intertidal.

* A five-year report, required by Presidential Directive, was completed in 2005.

Question 6: Are small sized wetlands included in the study?

Answer: Yes. The minimum targeted delineation size for wetlands was one acre (0.40 ha). However, results from this and past status and trends studies indicate that the actual size of wetlands detected was smaller than the target and routinely included features of 0.1 acre (0.04 ha).

Question 7: What was the level of field verification for this study?

Answer: Field verification was completed for 898 (18 percent) of the sample plots distributed in 42 States. Field work was done primarily as a quality control measure to verify that plot delineations were correct. Verification involved field visits to a cross section of wetland types, geographic settings, and plots with different image types, scales, and dates. All field verification work took place between May 2009 and September 2010.

Question 8: Where can supporting technical documentation be found?

Answer: Supporting technical documentation, as well as previous iterations of wetlands status and trends reports, can be found at: <http://www.fws.gov/wetlands/StatusAndTrends/>.

II. Study Findings

Question 1: What are the major findings of the study?

Answer: The study indicated that there were an estimated 110.1 million acres (44.6 million ha) of wetlands in the conterminous United States in 2009. Nearly 95 percent of all wetlands were freshwater and five percent were in the marine or estuarine (saltwater) systems. Although the losses of 551,870 acres of wetlands exceeded the gains of 489,620, the change was not statistically significant. The rate of wetland reestablishment increased by 17 percent from the previous study period (1998 and 2004) and conversely, the wetland loss rate increased 140 percent during the same time period. As a consequence, national wetland losses have outdistanced gains.

Question 2: What were the observed changes in vegetated freshwater wetlands?

Answer: All vegetated freshwater wetlands (forested, scrub/shrub, and emergent) experienced an average annual net loss of an estimated 41,200 acres, a 50% decline in the rate of loss from the prior five-year study. The estimated net loss was 185,300 acres, with emergent and shrub wetlands experiencing a net gain while forested wetlands experienced a large loss.

Question 3: What type of wetlands suffered the largest losses?

Answer: Freshwater forested wetlands lost an estimated 633,100 acres, their largest losses since the 1974 to 1985 time period.

Question 4: Did estuarine wetlands change?

Answer: Yes. Estuarine intertidal vegetated wetlands experienced a 110,900 acre loss. Salt marshes were lost at 3 times the rate from the previous era. The majority of these losses, 83%, were to deepwater bay bottoms or open ocean through natural processes.

Question 5: What caused the wetland changes?

Answer: The reasons for the overall decline in wetland area were complex and potentially reflected economic conditions, land use trends, changing wetland regulation and enforcement measures, conservation initiatives, the impacts of the 2005 hurricane season, and climatic changes. There have been a number of successes in conservation, protection, and reestablishment of wetlands. Wetland gains were due to agricultural conservation programs, wetland reestablishment and creation involving partners, land retirement programs, and the creation of freshwater ponds.

Question 6: Does the study provide information on wetland quality?

Answer: No. This report did not draw conclusions regarding trends in the quality or condition of the nation's wetlands. Rather, it provided data regarding trends in wetland extent and type, and it provided baseline information to facilitate ongoing collaborative efforts to assess wetland condition. Further examination of wetland condition on the national level has been initiated by the Environmental Protection Agency in conjunction with the Fish and Wildlife Service and other Federal, State and Tribal partners.

Question 7: What part of the United States experienced the greatest loss of wetlands?

Answer: The southeast United States, primarily freshwater wetlands of the Atlantic and Gulf coastal plain and the Lower Mississippi River, experienced the greatest losses. Losses were also observed in the Great Lakes States, the prairie pothole region, and in rapidly developing metropolitan areas.

Question 8: Was there evidence of climate change effecting wetlands?

Answer: Yes. Losses of estuarine emergent (salt marsh) and changes in marine and estuarine non-vegetated wetlands reflected the impacts of coastal storms and relative sea level rise along the coastlines of the Atlantic and Gulf of Mexico. The effects of sea level on wetlands are subject to considerable uncertainties. However, recent changes in non-vegetated intertidal wetlands (beaches, bars and shoals) along the South Atlantic and Gulf of Mexico indicated considerable instability and change. Coastal environments continue to face a variety of stressors that can interact with climate-related processes and potentially increase the vulnerability of coastal wetlands.

In the freshwater systems, changes in climatic conditions that affect water conditions (wetter, drier) will have a substantial impact on species that utilize wetlands and other ecological services wetlands provide, and will make efforts to reestablish wetlands more challenging. The report identified wetland types that most likely exhibited observable physical change due to climate processes in this study.

Question 9: Why is some silviculture considered a loss? Why isn't it a conversion from one wetland type to another through forest management?

Answer: Silviculture is the practice of establishing or growing forests. Many wetland forests are considered to be in silvicultural land use and remain as wetland. The loss of wetland to silvicultural upland use involved drainage, ditching, filling or impoundment of water that destroyed wetland hydrology. Activities associated with silviculture such as drainage or filling to plant or promote tree growths, road construction for access to trees, construction of staging areas for tree harvesting or loading may contribute to wetland loss.

Question 10: How was the report peer reviewed?

Answer: Peer review is one of the important procedures used to ensure that the quality of published information meets the standards of the agency and the scientific community. The use of a transparent process, coupled with the selection of qualified and independent peer reviewers, improves the quality of government science while promoting public confidence in the integrity of the government's scientific products. Due to the technical complexities and of the Wetlands Status and Trends project and the ramifications of the resultant report, the Service has instigated a series of technical oversight panels to review scientific configuration, data collection and protocol issues, and a peer review process with select subject matter experts for the report findings and conclusions. These panels include a Technical Review and Inspection Team, Statistical Oversight Panel, and External Expert Subject Matter Peer Reviewers.

Peer review typically evaluates the study design, the quality of data collection procedures, the robustness of the methods employed, the appropriateness of data presentation and discussion, the extent to which the conclusions follow the analysis, and the strengths and limitations of the overall product. The Service's Peer Review Plan can be found at:

<http://www.fws.gov/wetlands/Docs/InformationQualityPeerReviewPlan.pdf>.

III. Users of the Information

Question 1: Why is the Service's status and trends data important?

Answer: The wetland extent information presented in this report has important uses by resource managers as they interpret the role that wetlands play on the national landscape. This study was designed to supply scientific information to resource specialists and decision makers about wetlands resource trends and provide partner organizations with data to help guide decisions on wetland-related issues such as reestablishment and enhancement, endangered species habitat availability, possible changes resulting from climatic change, strategic habitat conservation and ecosystem management planning. Wetland status and trends data continue to be used extensively by Federal, State, local and Tribal governments to develop wetland conservation strategies and strategic management actions, and to validate performance toward halting loss and reestablishing wetlands.

Question 2: Why do we need wetland status and trends information?

Answer: Status and trends information provides contemporary data about wetland loss and gains. Continued monitoring of wetland resources has been widely considered essential for identifying changes in the wetland community type and spatial extent, and guiding additional research or management actions. This information combined with historical perspectives increases our understanding of landscape patterns and processes.

Up-to-date status and trends information is needed to periodically evaluate the efficacy of existing Federal programs and policies and identify national or regional wetland issues.

Question 3: Who are the customers for the wetlands data and how do other agencies or outside groups use it?

Answer: Wetlands status and trends data produced by the Fish and Wildlife Service is used widely inside and outside of the Federal government. The Service uses status and trends data and reports for its own resource priority setting. Other government agencies and private sector organizations use status and trends data for their analyses of government policy and for setting internal guidelines. There has been keen interest in the findings about wetland trends since the Supreme Court decisions in 2001 and 2006 that narrowed the interpretation of the scope of waters and wetlands protected by the Clean Water Act*. Previous information on wetland trends pre-dated the 2006 Rapanos and Carabell decisions (Rapanos v. United States and Carabell v. United States) and changes in the wetland regulatory process. Several of the States have used status and trends information in the establishment of policy and legislation designed to protect wetland resources.

IV. Gulf Coast Events

Question 1: Does this study include wetland changes resulting from hurricanes along the Gulf Coast since 2005?

Answer: Yes. This study measured wetland trends in the conterminous United States between 2004 and 2009. Since 2004, there have been several severe hurricanes that struck the coastline along the Gulf of Mexico and these data afford an indication of wetland area changes sustained as a result of those storms hitting coastal areas.

Question 2: Does this study address the impacts of the Deepwater Horizon Oil Spill in the Gulf of Mexico in 2010?

Answer: No. Data on any wetland losses resulting from the Deepwater Horizon oil spill are not included in these results, although the incident served to highlight the ecological and economic importance of these marine and estuarine resources.

* The 1977 amendments, the Clean Water Act of 1977 [P.L. 95-217]

V. About Freshwater Ponds

Question 1: Why does FWS include ponds as wetland?

Answer: The wetland classification system described by Cowardin *et al.* (1979) recognized ponds as an important component of the aquatic ecosystem and included them within a larger system of freshwater wetlands. This classification system for wetlands is the agency standard as well as the Federal Geographic Data Committee national standard for wetlands monitoring and reporting.

Question 2: What does this study say about the increase in open water ponds?

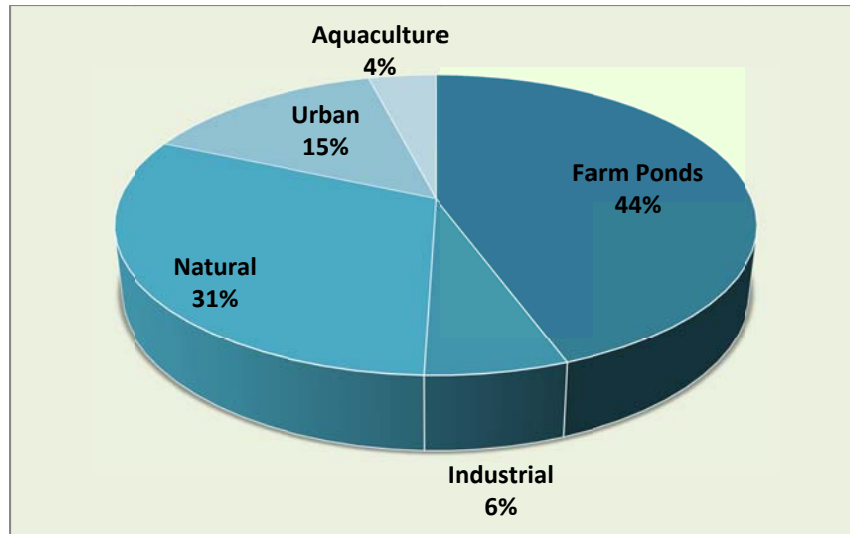
Answer: There was a net increase of 207,200 acres of freshwater ponds between 2004 and 2009, and this contributed a 3.2 percent increase in the extent of freshwater wetland ponds nationally. Past practices of replacing lost wetlands (of any type) with small permanent ponds has been discouraged. However, data from this study indicated that freshwater pond creation outdistanced increases of most other wetland types (except freshwater emergent) and was still a component of wetland reestablishment and creation strategies.

Question 3: What is the issue with ponds?

Answer: The increase in the number of ponds has raised issues regarding the ability of open water wetlands to replace other natural wetlands. Currently, there is no clear consensus in scientific literature about constructed ponds providing functional equivalency for lost wetlands. Freshwater ponds, like many other types of wetlands, have the potential to provide multiple ecological functions as supported by a number of scientific studies. However, there are also numerous examples in the scientific literature that cited ponds as less desirable.

Question 4: What additional information about open water ponds and pond types came from this study?

Answer: This study incorporated a method for further categorizing the physical characteristics and ecological characteristics of freshwater ponds on the landscape. Additional descriptive categories for freshwater ponds were included, and the information was intended to provide users with additional insights about what types and how many ponds were created over time. These freshwater pond categories and the distribution of each type are shown below. An estimated 83% of ponds created since 1998 have remained as open water.



Percent occurrence of freshwater pond types; 2009.

Urban ponds and farm ponds increased in area while aquaculture ponds and ponds with natural characteristics declined since 2004. Although the assessment of the qualitative aspects of these pond types was beyond the scope of the study, the report highlighted issues regarding the types of wetlands that have been reestablished or created.

Question 5: Will created freshwater ponds become vegetated wetlands?

Answer: While the ultimate goal of constructing some open water wetlands is unknown, this study found that 83% of freshwater ponds present in the status and trends survey in 1998 retained open-water, pond-like characteristics in 2009.

Question 6: How does the current Status and Trends Report wetland delineation method (the Cowardin method) avoid including those ponds or other water - or wet-features of land that really do not qualify as?

Answer: The Service's Wetlands Status and Trends Study is a scientific approach to monitor the nation's wetlands using a consistent, biological definition. Cowardin *et al.* (1979) recognized ponds as an important component of the aquatic ecosystem and included them within a larger system of freshwater wetlands. This classification system for wetlands became a Service Standard (1980) as well as the Federal Geographic Data Committee standard for wetlands monitoring and reporting (December 17, 1996).

Water features excluded from the Status and Trends study as non-wetland include the following:

- Stock watering tanks
- Swimming pools
- Industrial waste pits

- Stormwater drains
- Garden ponds or fountains (Koi or Coy ponds)
- Water treatment facilities
- Municipal or industrial water storage tanks
- Sewage treatment facilities (other than wetlands filtration systems)
- Water cooling towers or tanks
- Road culverts or ditches
- Other “ephemeral” waters

The Service identifies wetlands and deepwater habitats primarily by the analysis of high altitude imagery. The features listed above can be accurately and consistently identified by unique geometric shapes, size, geographic location and surrounding land use, and proximity to industrial, municipal or residential structures. Wetland image analysts are responsible for ecological integrity of the delineation process. These analysts are highly trained, skilled, and experienced wetlands interpreters familiar with wetland ecology, classification, and ecological change detection techniques.

VI. Wetland Quantity and Quality

Question 1: How will information on wetlands acreage trends be linked to wetland condition assessment?

Answer: The U.S. Environmental Protection Agency (EPA), in collaboration with States, Tribes, the Service, and other Federal partners will conduct the first-ever National Wetland Condition Assessment (NWCA) in 2011. The NWCA is designed to build on the success of the Service’s Wetland Status and Trends Report. Just as this report characterizes wetland acreage by category across the conterminous U.S., the NWCA will characterize wetland condition nationwide for many of the same wetland classes. When paired together, the two efforts will provide the public and government agencies with comparable, national information on wetland quantity and quality. The wetland quantity information produced by this report provides data on wetland acreage gained or lost annually, where the greatest gains and losses are occurring, and what wetland types are most vulnerable to loss. The NWCA will provide detailed information on wetland quality by wetland type and area of the country, providing additional clarity into the implications of the acreage gains and losses.

Question 2: How will the NWCA assess wetland quality?

Answer: EPA in collaboration with committed Federal, State, Tribal and academic experts from across the country, developed standard methods for collecting wetland data and assessing wetland condition for the conterminous United States. Detailed information on the NWCA technical approach can be found in the documents at:
<http://water.epa.gov/type/wetlands/assessment/survey/>.

VI. Sampling and Statistics

Question 1: Why is a sampling approach used to account for wetland acreage?

Answer: Wetlands are a scarce habitat type and their distribution is not uniform across the landscape. To conduct a comprehensive inventory would be prohibitively expensive. Consequently, the Service is determining wetland acreage status by using a statistical sampling approach that involves more than 5,000 plots, each four square miles in area.

Question 2: Imagery used for this study ranged between 2004 and 2009. How were statistical estimates constructed when the time period between observations was not five years?

Answer: Imagery dates for all sample plots were tracked by the statistical software measuring the amount of area change and difference in time between Time 1 and Time 2. Start and end dates were normalized making the effective date of the study 2004 and 2009 with a 4.5 year mean differential between target dates.

Question 3: Previous Wetlands Status and Trends studies utilized 4,682 sample pots while this study used 5,048 sample plots. Why the difference?

Answer: This study was augmented by adding sample plots to form a coastal stratum along the Pacific coast of Washington, Oregon, and California. Working in cooperation with the EPA and NOAA, this sampling stratum was incorporated as part of the national sampling effort to provide estimates of estuarine and marine wetlands not included in the original sample design and provide a more complete estimate for these wetland types nationally. This was done in conjunction with the project manager and the project statisticians to ensure equitable spatial coverage and retain sampling integrity.

Question 4: This report shows an estimate of 110.1 million acres of wetlands in 2004, while 107.6 million acres were reported in the previous report. Why is there a difference?

Answer: The acre estimate from the previous report had a coefficient of variation of 2.8 percent. The acre estimate from this report has a coefficient of variation of 2.7 percent. The difference between the two estimates is about 2.5 million acres which is less than the coefficient of variation of 2.9 million acres. We can speculate on the cause for the difference, but as long as the estimates are within the statistical range of error (+ or - 2.9 million acres), the estimate is considered valid. The current report explains this difference.

Question 5: Why are there differences between the National Resources Inventory (NRI) conducted by NRCS and the Wetlands Status and Trends Report from FWS?

Answer: The FWS and the NRCS both collect data on wetland changes. Each agency has a different mission and different legislative mandates. Each program has evolved with the assistance of spatial sampling experts and resource specialists, and each has incorporated programmatic

goals to collect the needed information requested by the respective agencies. This study samples wetlands on all lands in the conterminous U.S. regardless of land ownership. NRI concentrates on rural, non-federal agricultural lands. There also are some other important differences, including how sampling was conducted in coastal regions and temporal differences in monitoring cycles.

Question 6: What statistical reliability is provided with the area estimates?

Answer: The Service has always tried to produce statistical estimates with the coefficient of variation associated with those estimates in its Wetlands Status and Trends reports. For this study, the Service generated statistical estimates and the coefficient of variation for each of those estimates.

VII. Quick facts from the report

Total number of all wetlands = 110.1 million acres of wetlands.

- Freshwater wetlands = 95 % or 104.3 million acres
- Saltwater = 5% or 5.8 million acres

Wetlands compose 5.5 % of the surface of the conterminous U.S.

Net loss = 62,300* acres between 2004 to 2009 = 4.5 years

Average annual net loss = 13,800* acres

VIII. History of wetland change tracked by FWS

1950s to 1974 = 458,000 acres average annual net loss

1974 to 1984 = 290,000 acres average annual net loss

1984 to 1998 = 59,000 acres average annual net loss

1998 to 2004 = 32,000 acres average annual net gain

2004 to 2009 = 13,800* acres average annual net loss

September 28, 2011

* Not statistically significant.