

The State of the Science on Compensation Performance

Trends, knowledge gaps, and directions for future study

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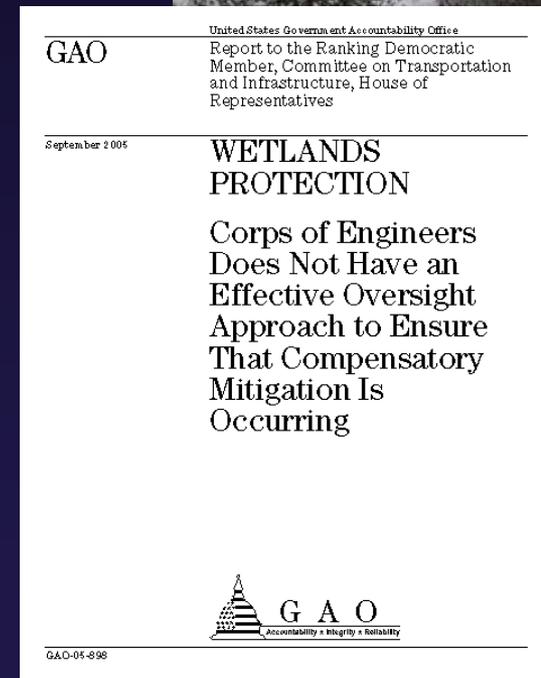
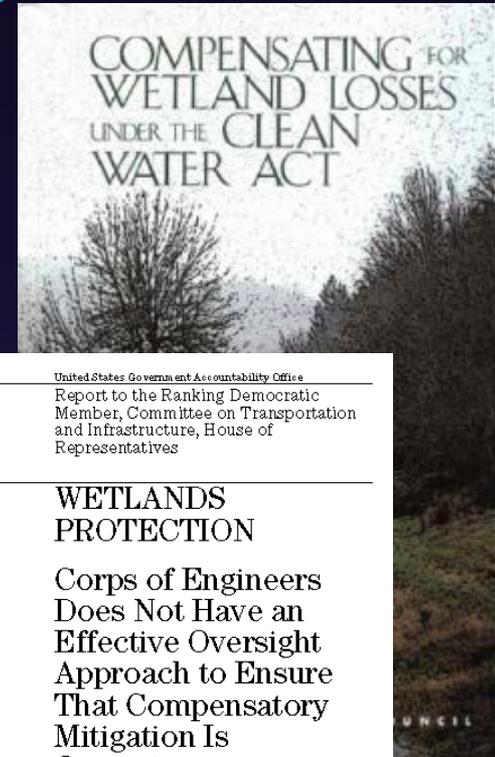
Overview

- Background
 - Mitigation history
 - Compensation performance
- Questions for study
- Approach
- Results
 - Temporal trends
 - Geographic trends
 - Third-party mitigation
- Problems with evaluating ecological performance
- The State of the Science
- Long-term approach



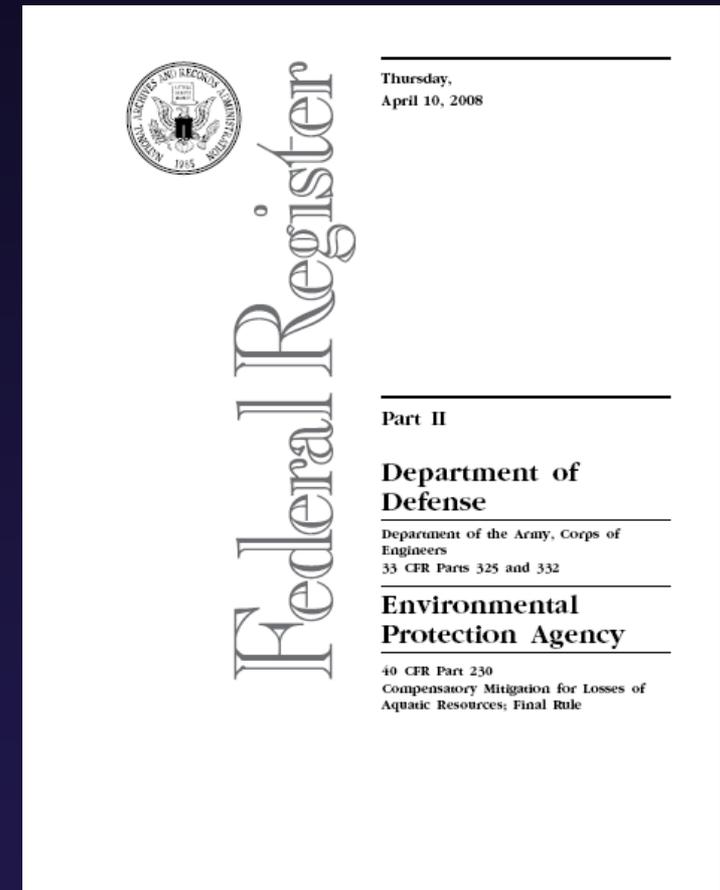
Compensatory mitigation

- **Methods:** restoration, establishment, enhancement, and preservation
- **Mechanisms:** mitigation banks (MB), in-lieu fee (ILF), and permittee-responsible mitigation (PRM)
- **Past problems with performance**
 - 2001 NRC Study:
 - Lack of success due to a variety of factors, most prominently noncompliance and lack of effective performance standards
 - 2005 GAO Report:
 - Call for increased monitoring requirements, including periodic compliance checks



2008 Mitigation Rule

- Sustainable, ecologically effective compensatory mitigation
- Equivalent standards, including more effective performance standards and monitoring
- Use of best available science
 - Addresses all applicable NRC recommendations
- Places greater emphasis on compensation for stream impacts
- Encourages use of MB and ILF programs
 - Considered less risky than PRM



Administrative and Ecological Performance ⁵

- Compensatory mitigation programs must perform in 2 ways:
 - *Administrative*: ensuring compliance with permit conditions
 - *Ecologically*: resulting in effective replacement of aquatic resource functions
- Periodic assessments of performance can expose problems and help to improve mitigation programs.



Questions for this study

- How well has the administrative and ecological performance of mitigation programs been measured since 2000?
 - Methods used?
 - Recent vs. old sites?
 - How performance defined and measured?
- How does this vary by:
 - Time period (pre- and post- Mitigation Rule)?
 - Geographic location?
 - Aquatic resource type?
 - Mitigation mechanism (MB, ILF, PRM)?
 - Mitigation method (restoration, establishment, etc.)?
- Which of these areas are lacking most in research?
 - What *don't* we know?

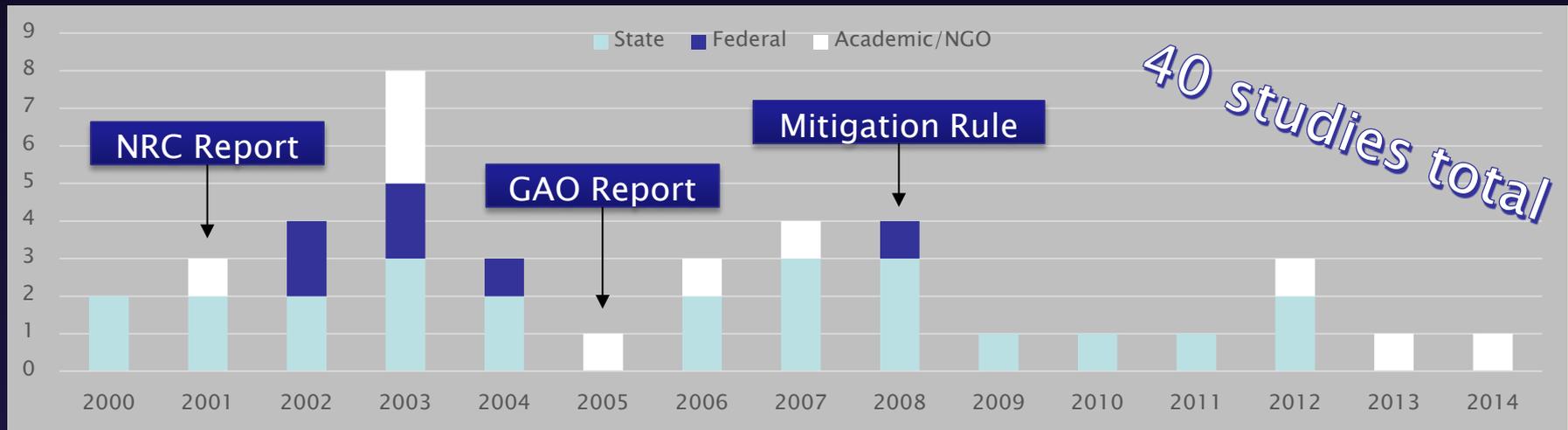


Approach

- Comprehensive review of all studies of administrative and ecological mitigation performance published since 2000:
 - Both governmental and peer-reviewed academic publications
 - Must include multiple mitigation sites – no case studies – and not just voluntary restoration
- Relevant data pulled from studies and summarized in a spreadsheet
- Shapefiles created in ArcMap to show spatial extent of studies.



Temporal trends, authors and funding



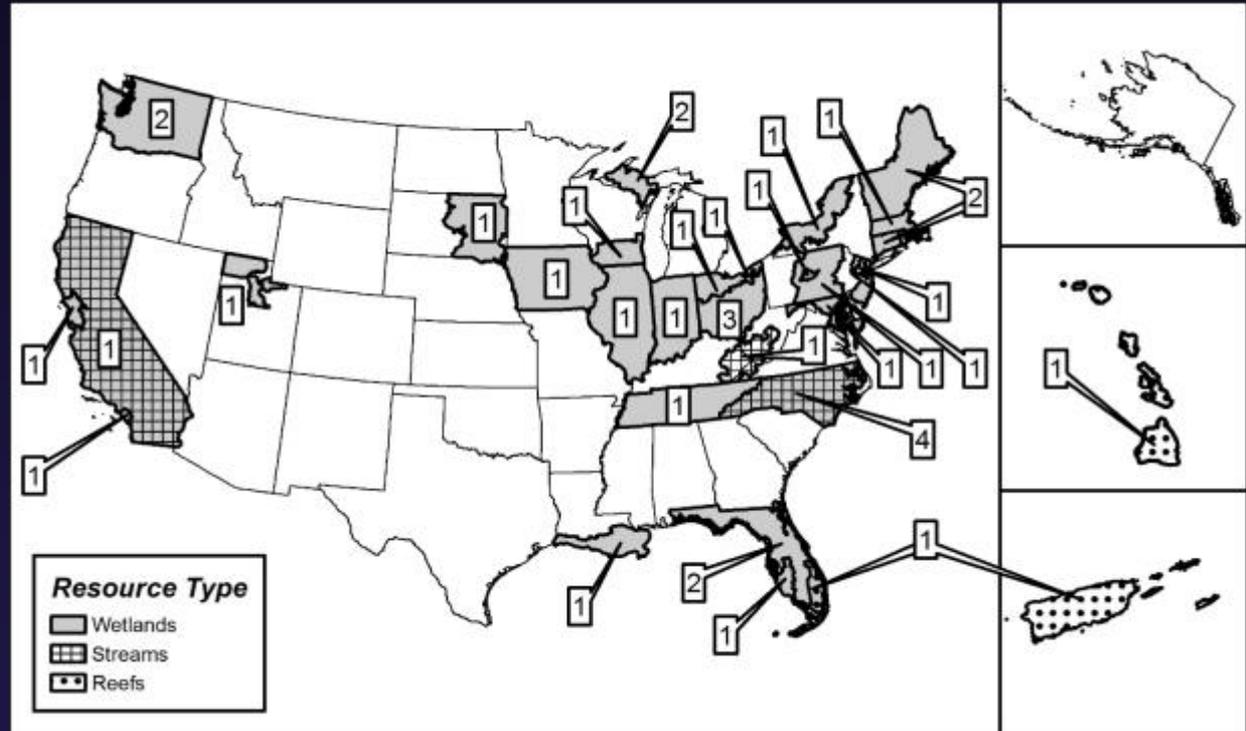
- Despite spikes following 2001 and 2005 reports, number remains low in the years since the release of the 2008 compensatory mitigation rule.
 - Only 3 studies have investigated sites constructed after the 2008 Rule.
 - Major need to evaluate compensation performance, especially post-Rule
- Government authored publications account for 75% of all studies, but decline considerably following 2008–09 economic downturn
 - EPA Wetlands Program Development Grants remain available, but many state wetlands managers suggest that staff time constraints are a major factor.

Geographic trends and resource type

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Studies are strongly concentrated in the northern and eastern US.

- Some areas stick out as highly underrepresented:
 - Upper Midwest
 - Southeast
 - Mountain West
- Study areas range from multiple states to smaller regions



Despite the greater emphasis placed on stream compensation performance under the 2008 rule, it remains unstudied in most of the country.

- Six studies of stream mitigation performance, but 4 are in North Carolina.
- One of these studies (Palmer & Hondula 2014) was very critical of stream mitigation performance, suggesting there is a need for further study.

Compensation mechanism and method

9 10

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Studies are focused on permittee-responsible forms of compensation; only 9 looked at third-party forms.

- Mitigation banks are investigated in 5 states, in-lieu fee programs in 4 states.
- Few compared third-party compensation to permittee-responsible.



Studies were focused on aquatic resource restoration (34) and establishment (33) as compensation, and frequently excluded other methods.

- 15 studies examined enhancement projects, and 12 examined preservation.

Study goals and approaches

- Until 2008, studies largely focused on compliance and net loss/gain:
 - Are sites being constructed in accordance with permit conditions? What is the mitigation rate?
- Since the 2008 Rule, focus has shifted to ecosystem function and performance:
 - How do compensation wetlands compare to natural wetlands? How much better are they than the most impacted, and how much worse than the least impacted?
 - Ways to address these questions are diverse, leading to diverse approaches in study methods.



Evaluating performance

- How do you measure performance?
 - 28 looked at vegetation
 - 19 looked at hydrology
 - 15 looked at soils
 - 13 looked at fauna/wildlife habitat
- Other contributors rarely evaluated
 - 4 (11%) looked at water quality
 - 10 (26%) looked at surrounding land use
- Only 10 (26%) compared to reference conditions, with diverse approaches:
 - Paired reference sites
 - From statewide condition assessment
- Different baseline conditions make comparisons across time and space challenging.



The State of the Science

- There remain several unanswered questions about compensation performance:
 - Is it getting better since 2008 Rule?
 - How are streams and other non-wetland resources doing?
 - Large geographic data gaps
- Approaches have changed in the last decade to focus more on ecological performance, but incompatible methods, as well as a slowdown in study frequency has made it difficult to evaluate compensation nationally.
- It's time to develop a *long-term vision* for compensatory mitigation program performance.

Long-Term Approach

- What we mean by a long-term approach:
 - Forums such as this webinar series represent an important tool in disseminating knowledge about the science and practice of ecological restoration, as well as shaping further research.
 - Regulatory agencies involved with compensatory mitigation should take this approach to evaluating and improving program performance as well.
- We recommend a long-term, programmatic approach which is:
 - customizable to state needs,
 - sustainable over very long time horizons, and
 - amenable to the interpretation of national trends.



Long-Term Approach

- Step 1: Adopt a Study Design
 - Should be tailored to address state needs while also allowing for comparison.
- Step 2: Organize Files in a Geospatial Database
 - Create electronic files of past permits, but also plan for future data entry
 - This step is essential for a long-term approach
- Step 3: Conduct Initial and Subsequent Evaluations
 - Studies should be conducted at regular intervals (5–10 years)
 - Use information from these evaluations to inform policy and regulatory changes.



Compensatory Mitigation Performance: The State of the Science

Evaluating the ecological and administrative performance of compensatory mitigation programs under §404 of the Clean Water Act is essential to ensuring that wetland functions are restored and protected. In this review of studies done in the last 15 years, trends show an overall decline in evaluations. The authors propose a process for stakeholders to develop a long-term approach to evaluating compensation performance.

By JOSEPH A. MORGAN AND PALMER HOUGH

Morgan, JM and PF Hough. 2015. “Compensatory Mitigation Performance: The State of the Science” *National Wetlands Newsletter* 37(6): 5–13

