

Investigating the standardization and spatial  
redistribution mechanisms under market forces in the  
market-based system for wetland compensation in the  
United States

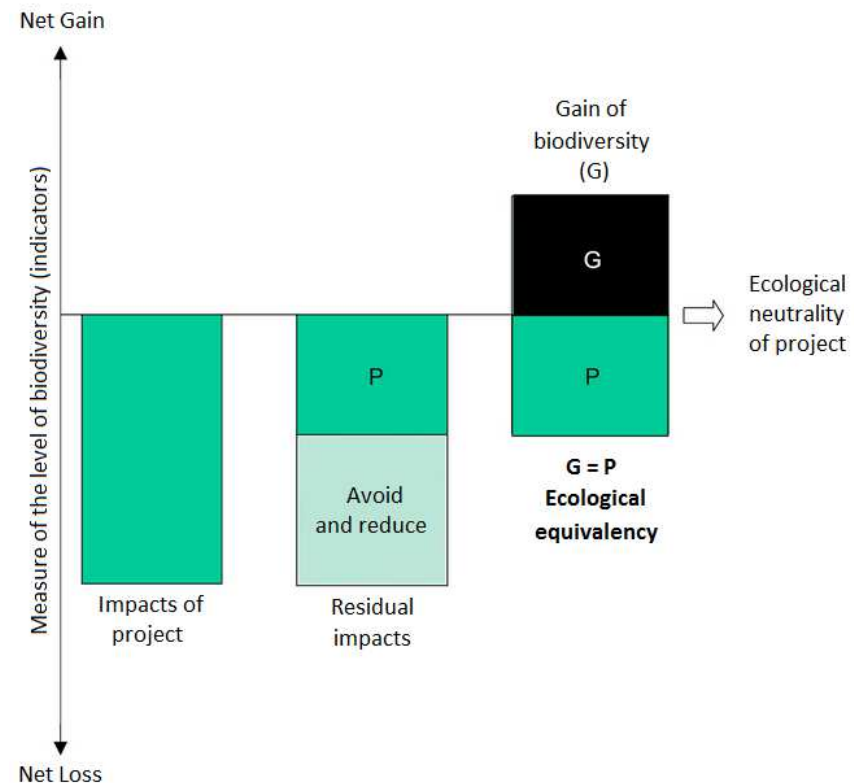
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12/05/2017

# **INTRODUCTION**

# Mitigation Sequence

- Section 404 of the Clean Water Act (1972)
- Mitigation sequence
  - Avoid
  - Reduce
  - Compensate
- Objective :  
« No-net-Loss » of wetlands



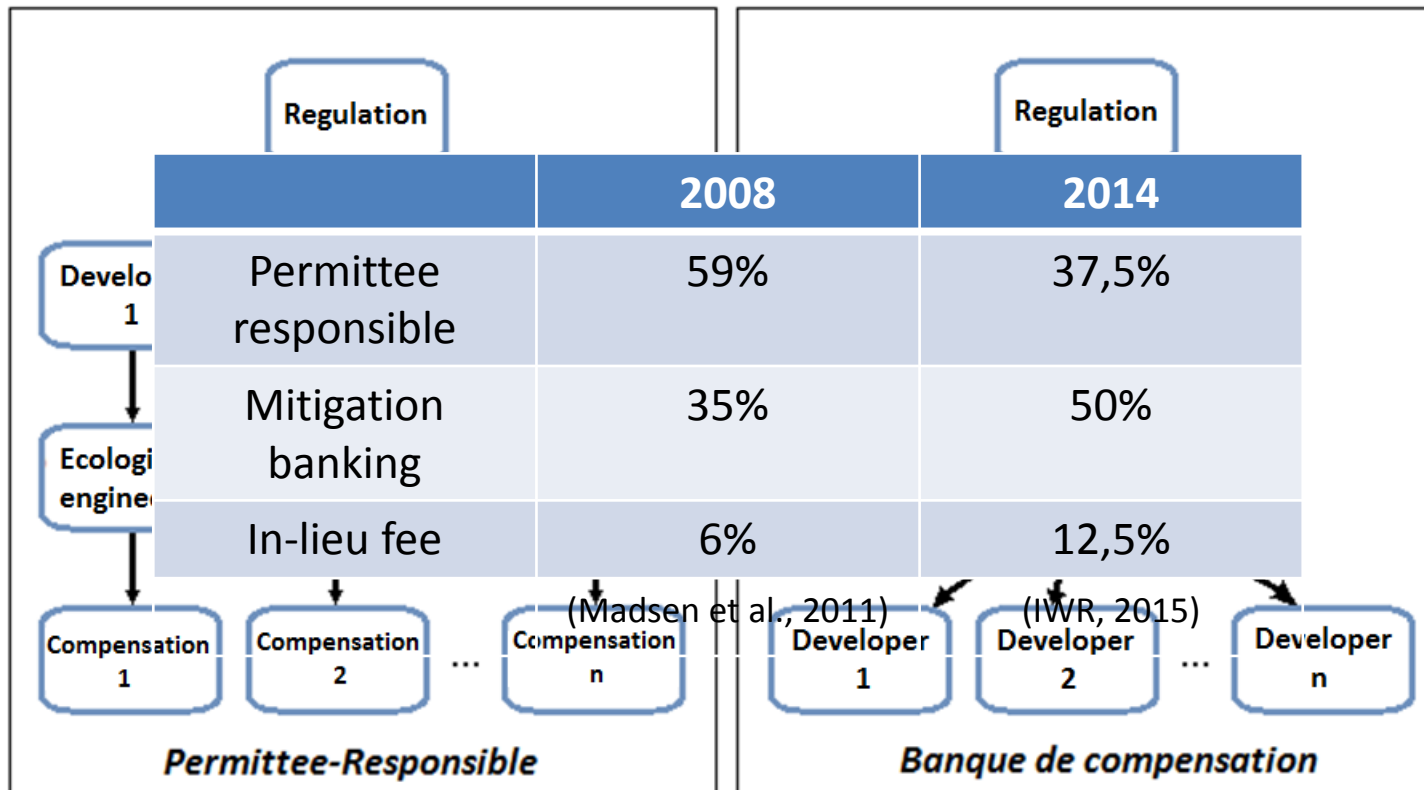
# Compensation principles

- How to reach a *no-net-loss* of wetlands ?
  - Mitigation actions
    - Preservation, Enhancement, Restoration, Creation
  - Location of the compensatory measure
    - *On-site* or *Off-site*
  - Assessment of ecological equivalency
    - *In-kind* ou *Out-of-kind*
- The choice of institutional arrangement to organize compensation?
  - *Permittee-responsible*
  - *Mitigation banking*
  - *(In-lieu fee)*

# Emergence of mitigation banking

- Ineffectiveness of compensation (NRC, 2001 ; GAO, 2005)
  - Kentula et collaborateurs (1992):
    - Oregon: 58 permits, 74 ha lost, 42 ha compensated
    - Washington: 35 permits, 61 ha lost, 45 ha compensated
  - Reject of the ineffectiveness of the system on the command-and-control organisation of mitigation
  - Pressure from developers for the simplification of procedures
    - Call for more market-based incentives
    - 1991 : first mitigation banks in Florida et en Georgia (Robertson, 2004)

# Mitigation banking



What consequences on compensation principles?

- Mitigation action
- Location
- Assessment of ecological equivalency

# **MATERIALS AND METHODS**

# Transaction cost economics

- Arbitration between two institutional arrangements is based on the minimization of transaction costs
- Transaction costs are difficult to observe and can't be anticipating for non-existing alternative arrangement

**Link between transaction costs and characteristics of the transaction**



# Transaction cost economics

Transaction characteristics:

- Uncertainty
  - Environmental uncertainty
  - Behavioral uncertainty
- Asset specificity
  - Specificity of site of the natural capital
  - Physical specificity of the natural capital
  - Specificity of the human capital
- Frequency of the transaction

# Lightering transaction costs

	Permittee-responsible	$\Delta$ Coûts de transaction	Mitigation banking
Site specificity	On-site compensation	>	Compensation in a service area
Physical specificity	In-kind equivalency	>	Equivalency through credit system
Dedicated asset	On identified project	>	Several hypothetical projects
Human capital specificity	Specific knowledge for one compensatory restoration	>	Specific knowlede for the bank
Brand specificity	Reputation at stake for every project	>	Reputation at stake for one bank

# Lightering on transaction costs

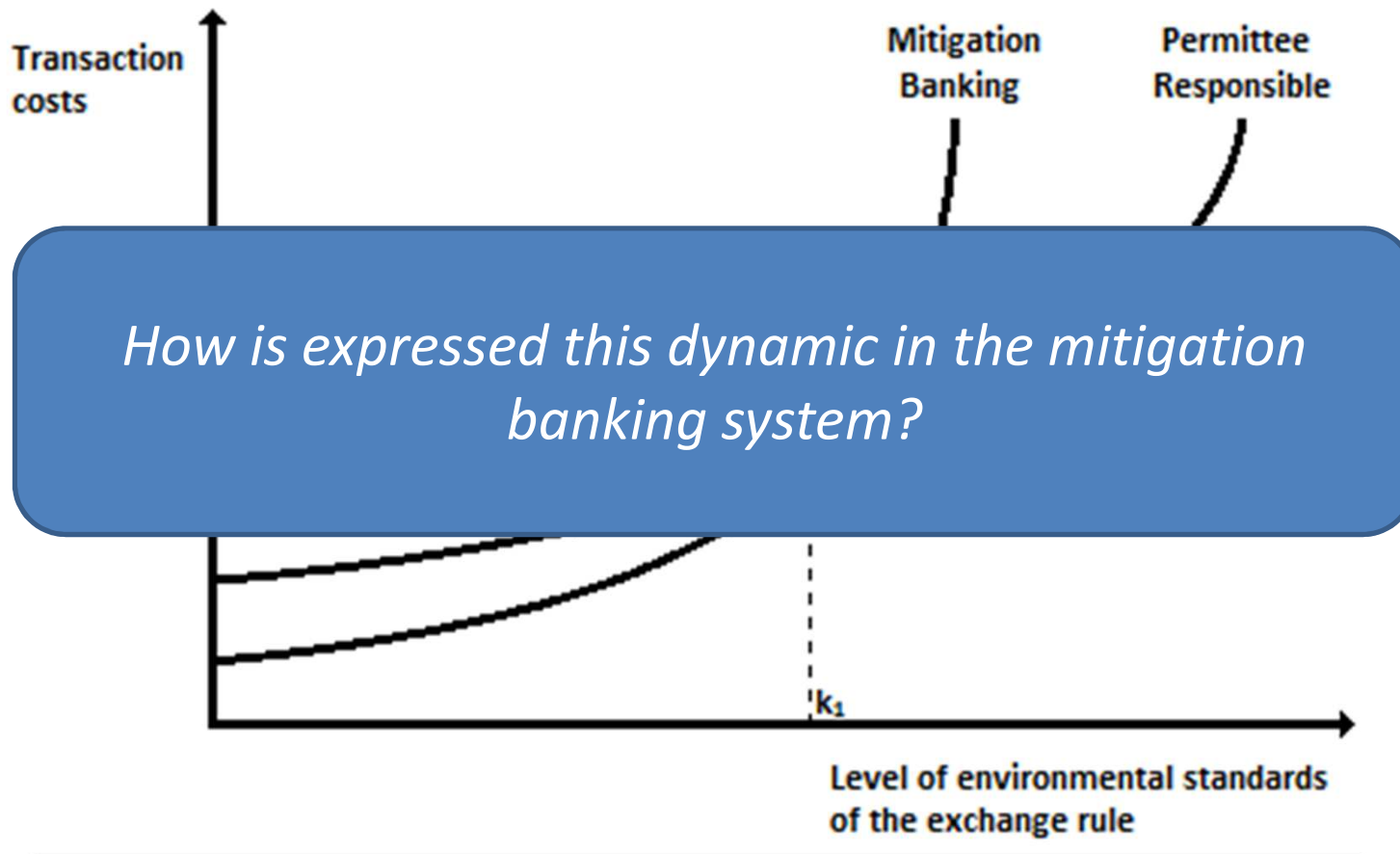
	Permittee-responsible	$\Delta$ Coûts de transaction	Mitigation banking
Regulatory uncertainty	Case by case equivalency criteria	>	Standardized and stable equivalency criteria
Environmental uncertainty	Action applied on limited surface Compensation started after the impact	>	Concentration of action on bigger surface Compensation started before the impact
Behavioral uncertainty	Developer responsible both for impact and compensation	>	Developer responsible for impact only
Frequency of transaction	As many partner as transaction	>	Reduction of partners

# Transaction cost economics

Transaction characteristics:

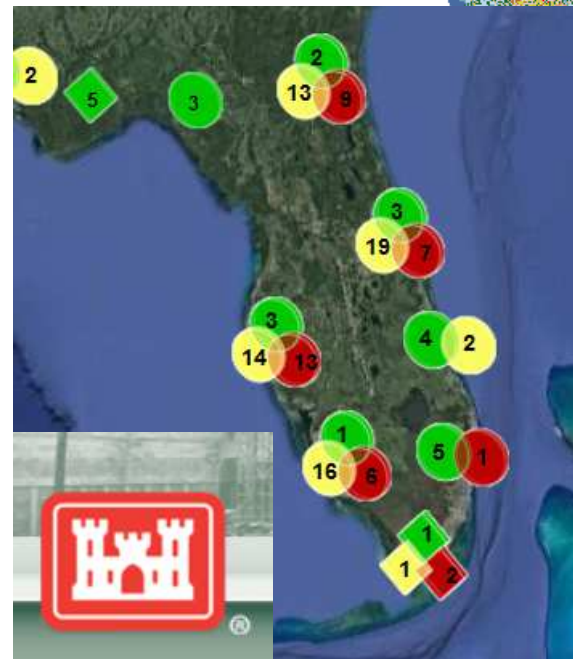
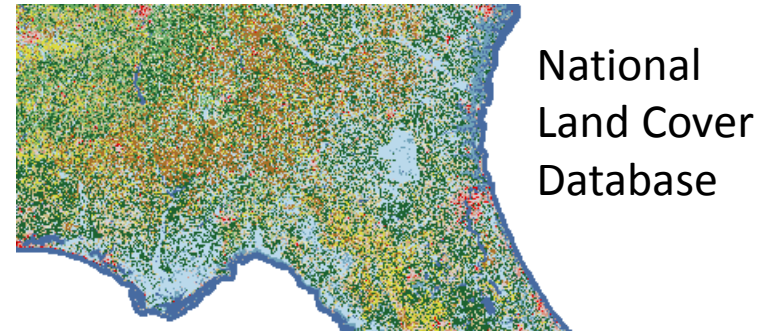
- Uncertainty
  - Environmental uncertainty
  - Behavioral uncertainty
- Asset specificity
  - Specificity of site of the natural capital
    - Location
  - Physical specificity of the natural capital
    - Ecological equivalency assessment
  - Specificity of the human capital
    - Mitigation action
- Frequency of the transaction

# Transaction cost economics



# Data

- USACE – Regulatory In Lieu Fee and Bank Information Tracking System
- National Land Cover Database



# Data

- Information about all mitigation system
  - Wetlands, Streams, Species
- Report for every action regarding a bank
  - 45368 actions (Initiated, Released, Withdrawn)
- Information on 1425 wetlands mitigation banks
  - Classification system
  - Assessment method
  - Service area – Crossed with NLCD
  - Mitigation type

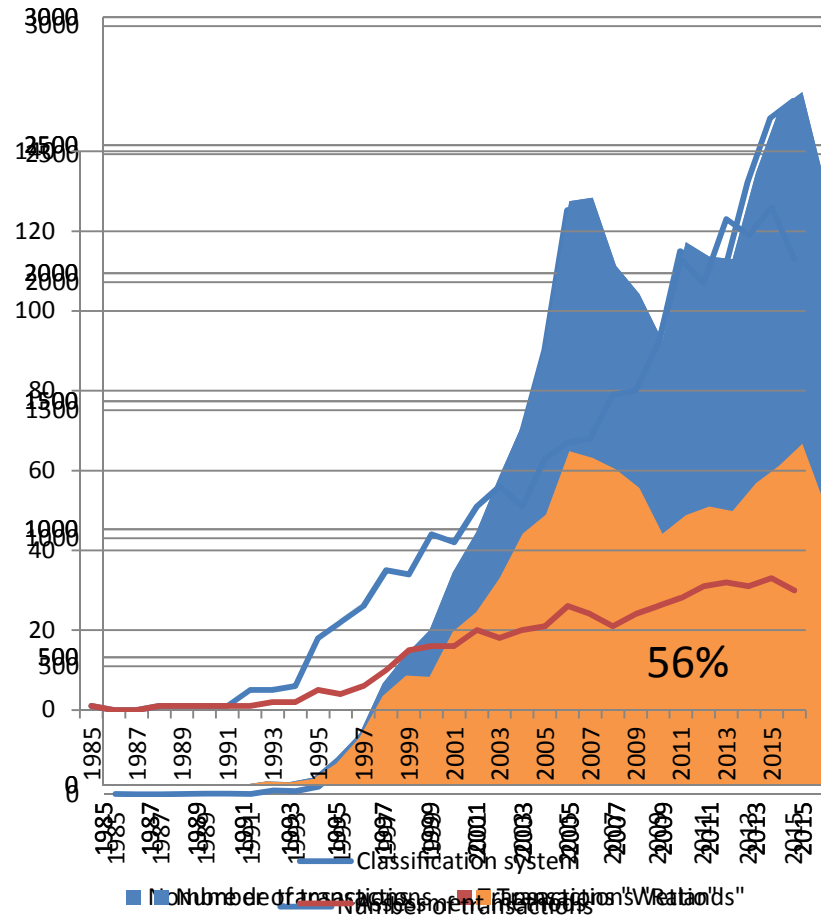
# RESULTS



# Ecological equivalency assessment

- How to control equivalency?
  - Credit classification system
  - Assessment methods

	Correlation
Classification system	-0,09 ***
Assessment method	0,05

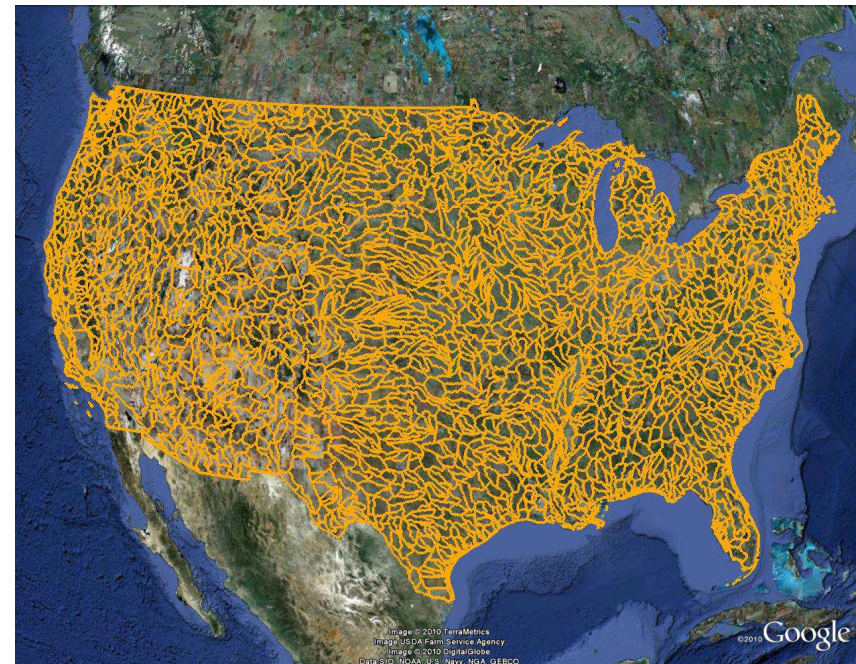


# Service Area

- Size of market
  - No change in time
  - Based on watershed consideration

	Correlation
Size of service area	-0,007
Evolution of wetlands	0,001
Evolution of urban area	0,03

100000



1

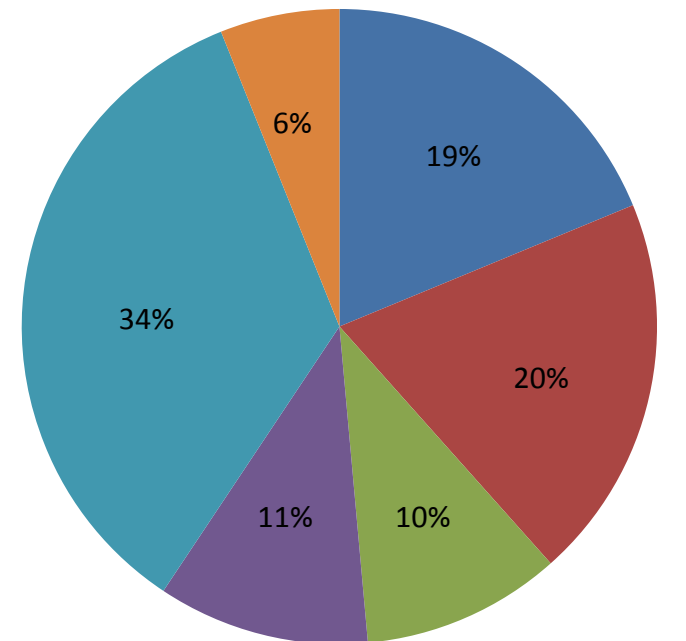
1985 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016

— Service Area Surface

# Mitigation Action

- Preservation
  - No gain of surface or function
- Enhancement
  - Gain of function
- Restoration or Creation
  - Gain of function and surface

	Correlation
Action	-0,11 ***
Number of action	0,18

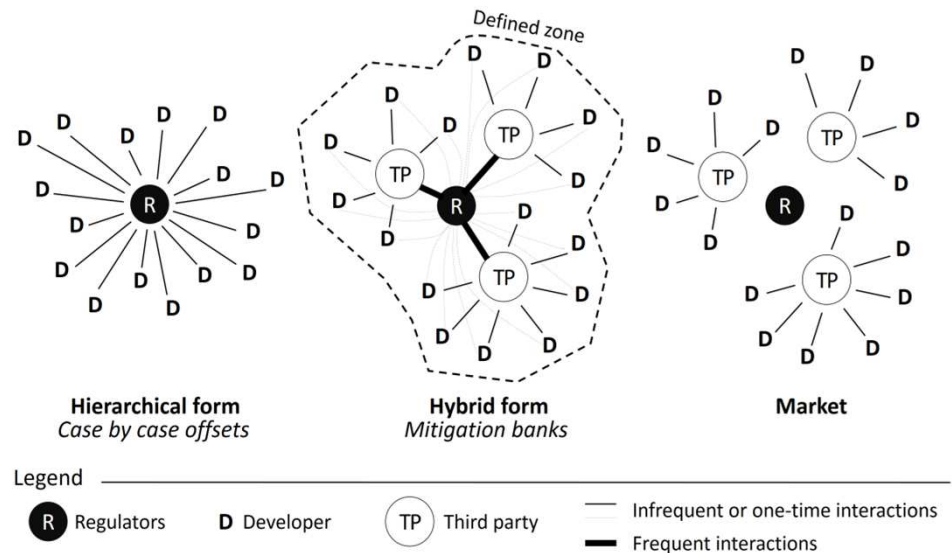


■ Unspecified   ■ Preservation   ■ Uplands (Buffer)  
■ Enhancement   ■ Restoration   ■ Establishment

# Hybrid Form

- Different type of mitigation banks

Bank type	#Banks
Single-Client	206
Combination Public/Private	24
Private Nonprofit	19
Public Commercial	84
Private Commercial	710



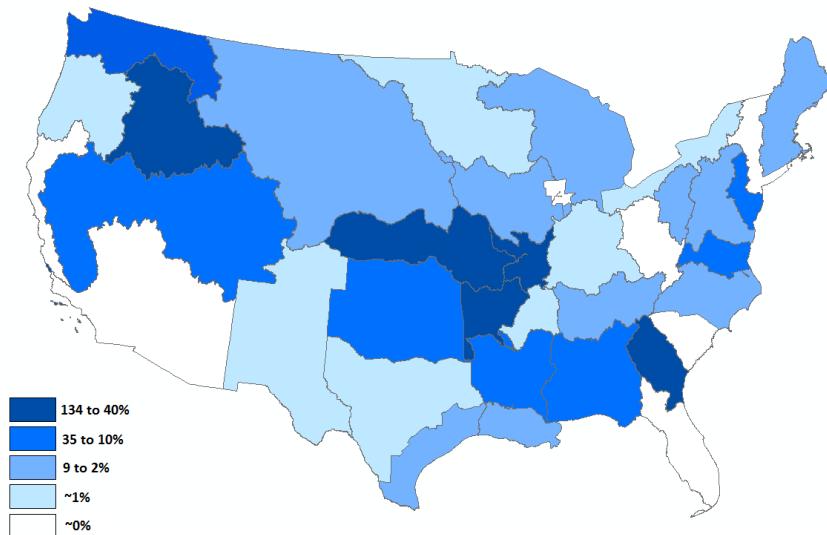
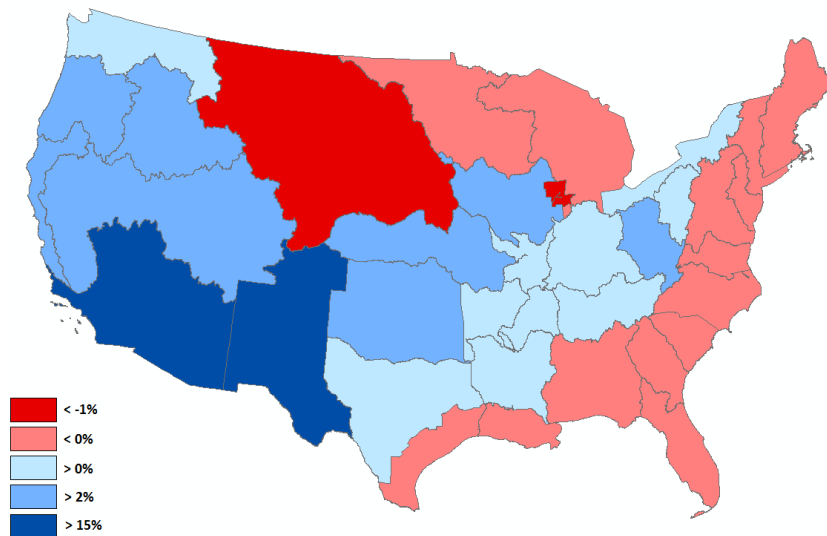
	Correlation
Bank Type	0,21 ***

# **CONCLUSION AND DISCUSSION**

# Conclusion

- Equivalency assessment
  - Increasing number of systems and methods
  - ~50% of transaction concern low equivalency criteria
- Service area
  - Market defined on ecological principle
- Mitigation action
  - 41% of action implies no gain of surface
- Comparison with previous system
  - Is no-net-loss achievable?

# Discussion



- Decrease of wetland is slowing down
  - Role of Mitigation banking?
  - Study limited to surface
- Different systems depending on districts?
  - Ex: 30% preservation in New England and 0% in Baltimore
  - Ex: 4892 credits sold in St. Paul and 1 in Albuquerque