

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

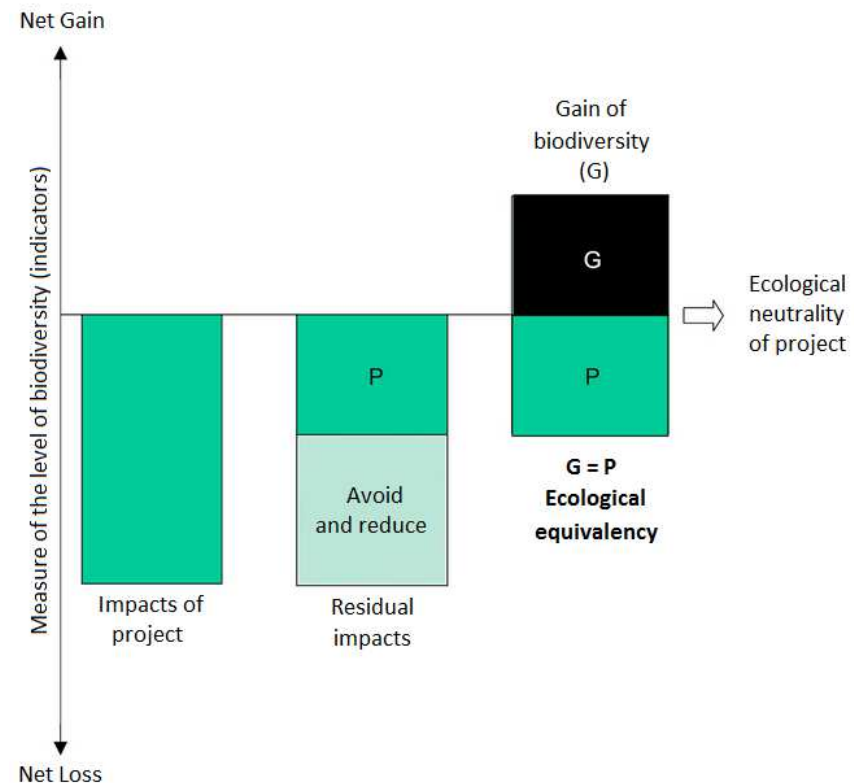
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12/05/2017

INTRODUCTION

Mitigation Sequence

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



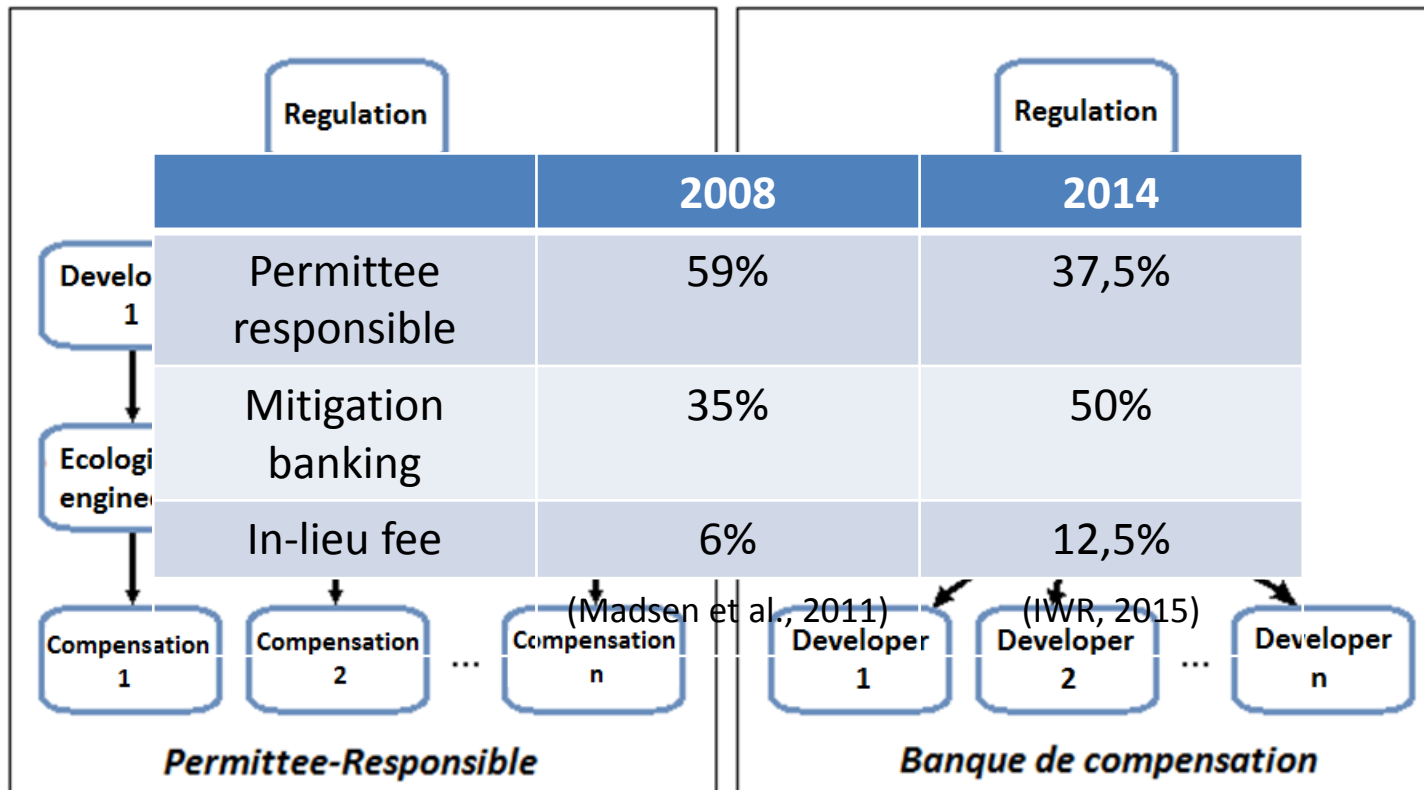
Compensation principles

- 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	Δ 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

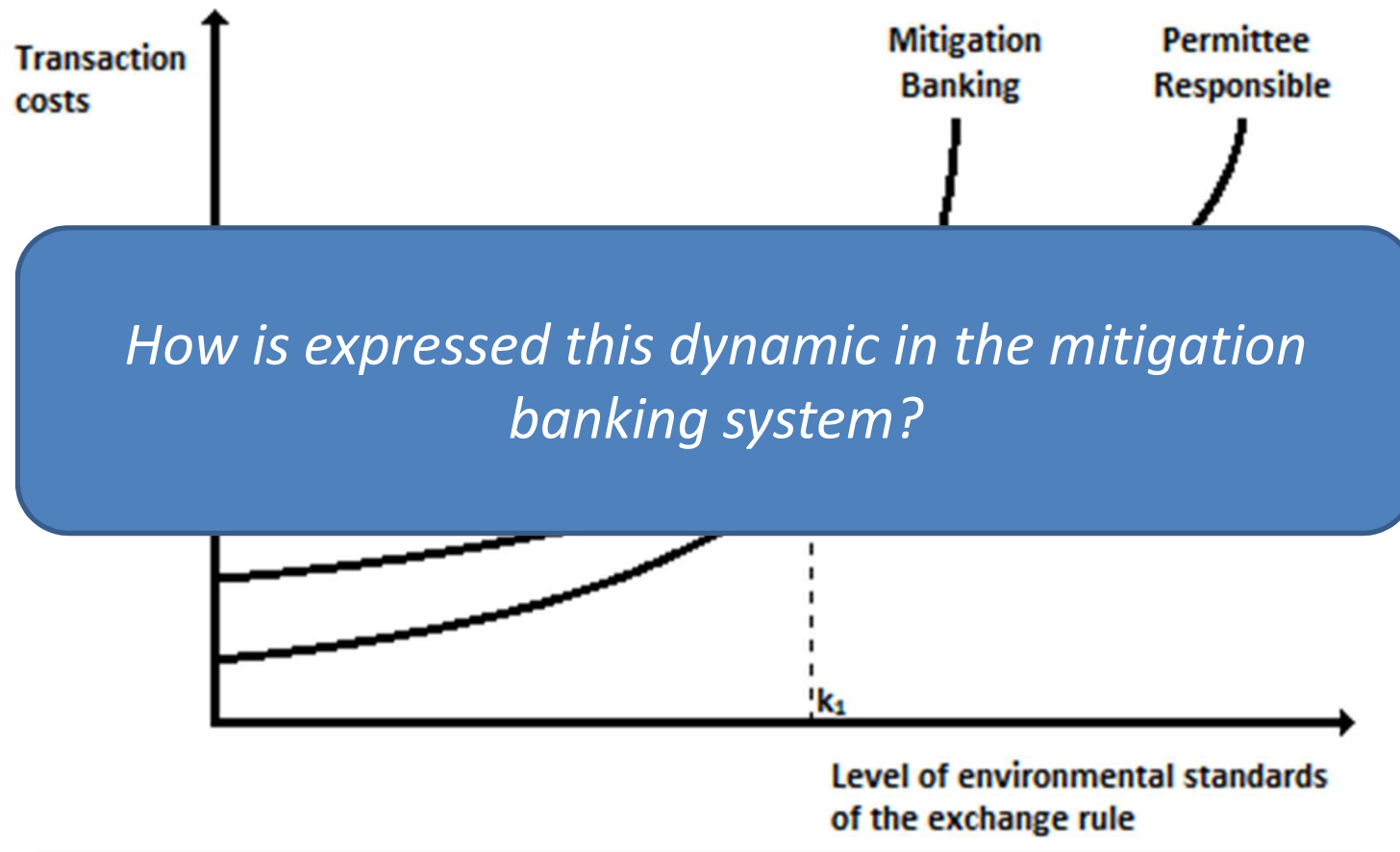
	Permittee-responsible	Δ Coûts de transaction	Mitigation banking
Regulatory uncertainty	Case by case equivalency criteria	>	Standardized and stable equivalency criteria
Environmental uncertainty	Action applied on limited surface Compensation started after the impact	>	Concentration of action on bigger 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:

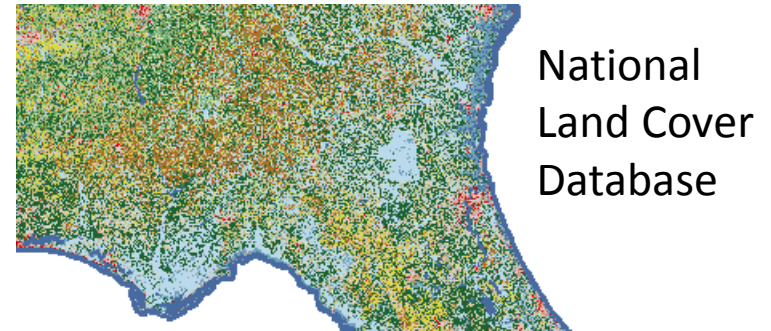
- Uncertainty
 - Environmental uncertainty
 - Behavioral uncertainty
- Asset specificity
 - Specificity of site of the natural capital
 - Location
 - Physical specificity of the natural capital
 - Ecological equivalency assessment
 - Specificity of the human capital
 - Mitigation action
- Frequency of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

Transaction cost economics



Data

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



USACE RIBITS

Data

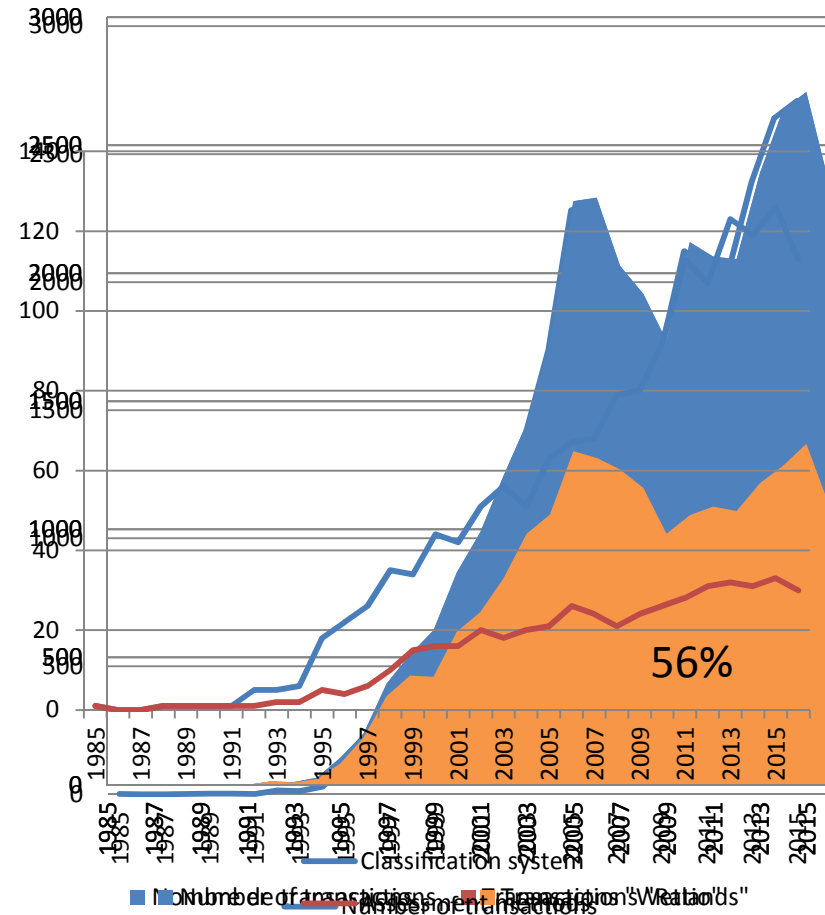
- Information about all mitigation system
 - Wetlands, Streams, Species
- Report for every action regarding a bank
 - 45368 actions (Initiated, Released, Withdrawn)
- Information on 1425 wetlands mitigation banks
 - Classification system
 - Assessment method
 - Service area – Crossed with NLCD
 - Mitigation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

RESULTS

Ecological equivalency assessment

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

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

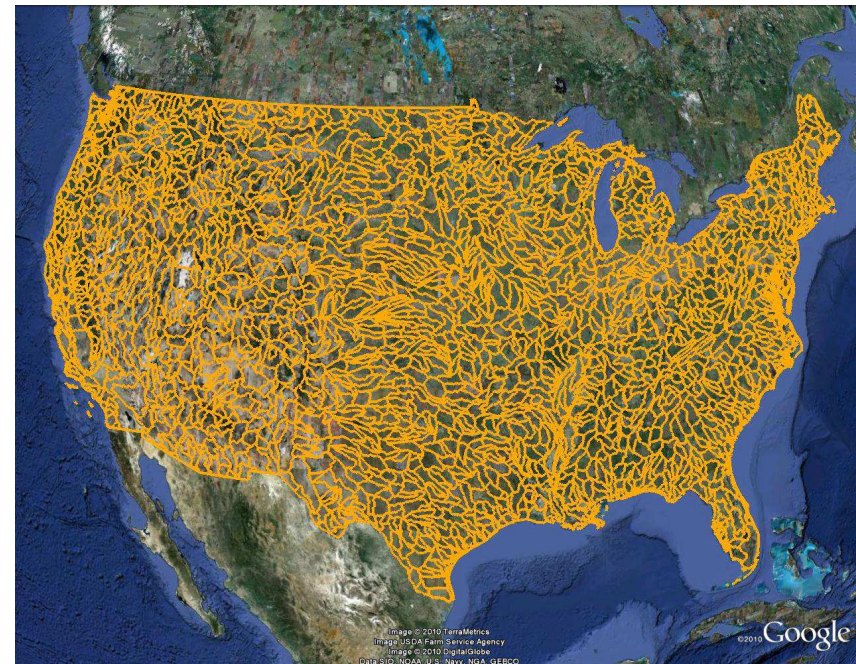


Service Area

- 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



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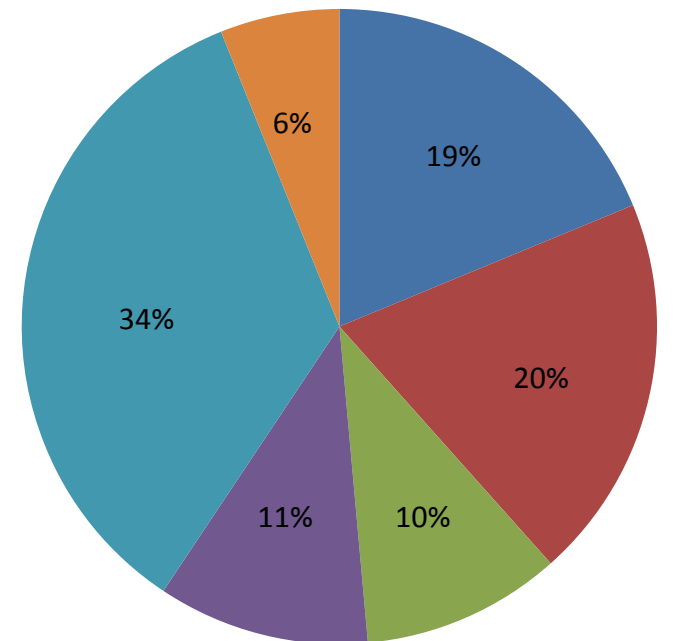
1985 1990 1992 1994 1996 1998 2000 2002 2004 2006 2008 2010 2012 2014 2016

— 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

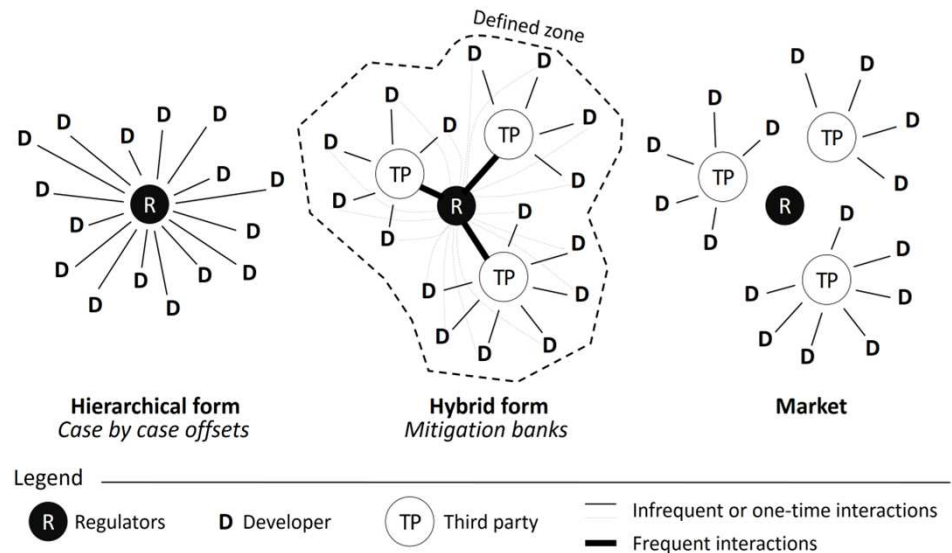


■ Unspecified ■ Preservation ■ Uplands (Buffer)
■ Enhancement ■ Restoration ■ Establishment

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



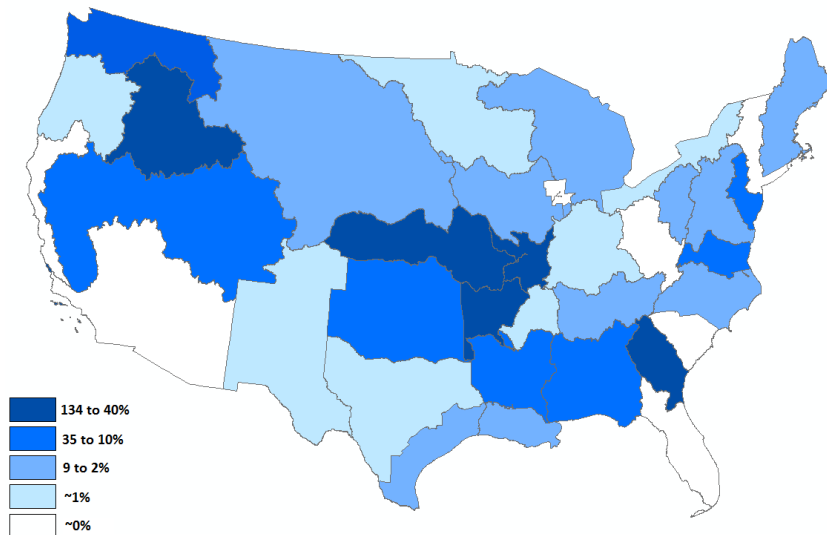
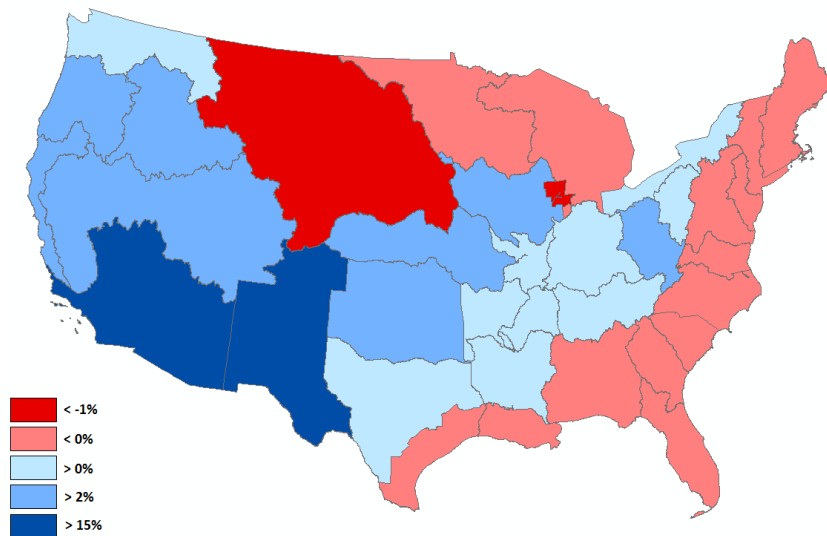
	Correlation
Bank Type	0,21 ***

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