Senator George J. Mitchell Center for Sustainability Solutions

- Optimism
- Celebrate diversity
- Solutions-driven
- Science
- People
- Personal: Support (financial and moral)

Conserving vulnerable waters: a portfolio-watershed approach

Aram JK Calhoun and colleagues
calhoun@maine.edu

Keynote

We must conserve vulnerable water resources through local, collaborative initiatives that support livelihoods of all biota.

We are not against industry or economic prosperity; We want to work towards a society that cherishes people, the planet, and the economy-all at the same time.

--anonymous but upset EPA employee

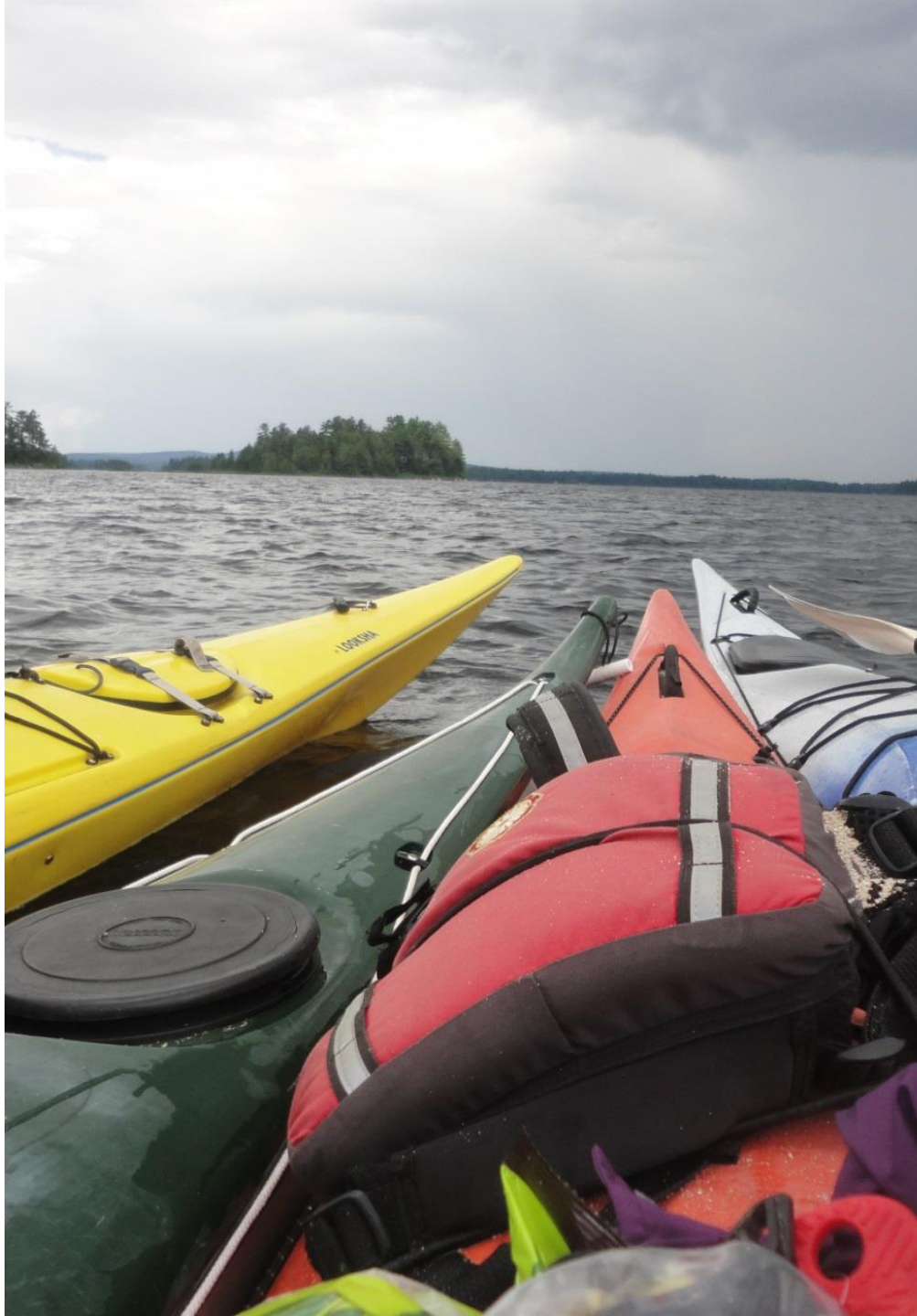
Outline

- Wetland regulatory framework
- Vulnerable wetlands
- Watershed-scale functions based on latest research
- Conservation challenges
- Example of conserving a vulnerable wetland


DIRIGO
MAINE

Navigable Waters

- *Ebb and flow*
- *Interstate commerce*
- *Permanent and flowing*



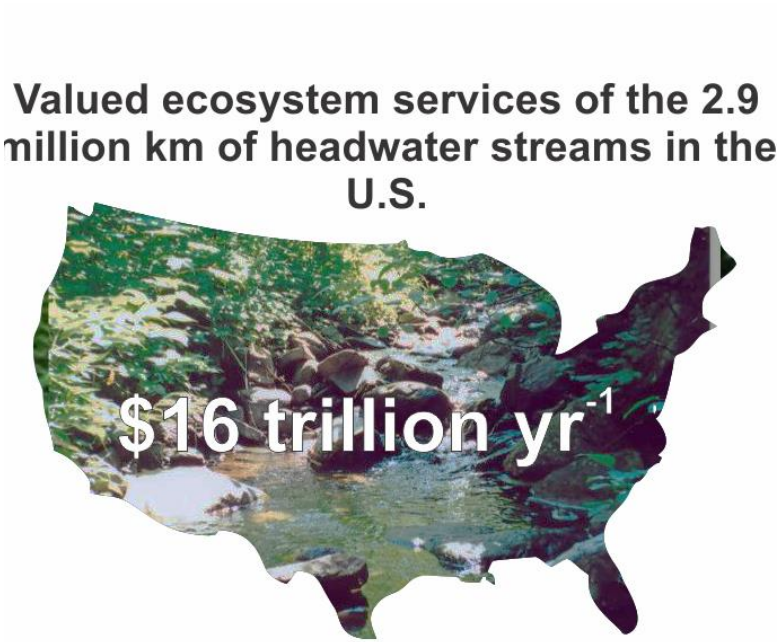
Vulnerable Waters or “Geographically Isolated Wetlands”

- Non-perennial streams: headwater streams
- Wetlands outside of floodplains
- Seasonal wetlands


Concern: current Federal and State Regulations fail to conserve the majority of vulnerable wetlands

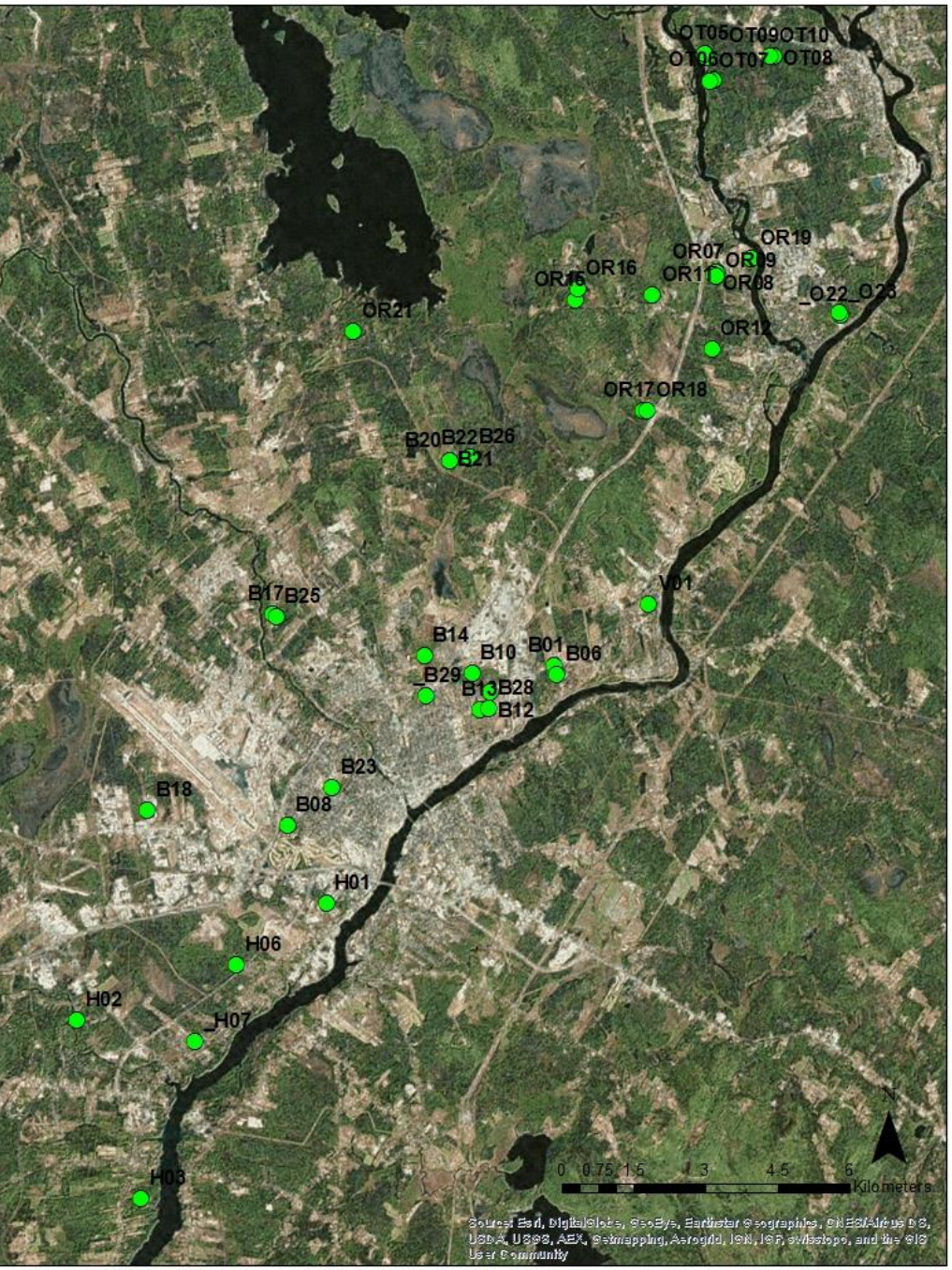
Why are vulnerable wetlands important?

Creed et al. Nature Geoscience



Meta-ecosystems

- Hydrology
- Ecology
- Biogeochemistry



Set of ecosystems connected by spatial flows of energy, materials and organisms across ecosystem boundaries

“Geographically Isolated wetlands”

Hydrology…

INVITED COMMENTARY

HP TODAY

HYDROLOGICAL PROCESSES
Hydrol. Process. **30**, 153–160 (2016)
Published online 13 September 2015 in Wiley Online Library (wileyonlinelibrary.com). DOI: 10.1002/hyp.10610

Geographically isolated wetlands are part of the hydrological landscape

M. C. Rains,[1]*
S. G. Leibowitz,[2]
M. J. Cohen,[3] I. F. Creed,[4]
H. E. Golden,[5] J. W. Jawitz,[6]
P. Kalla,[7] C. R. Lane,[5]
M. W. Lang[8] and
D. L. McLaughlin[9]

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Introduction

Since the US Supreme Court's 2001 *SWANCC* case (531 US 159), there has been significant focus on whether Clean Water Act (CWA) protections should be extended to so-called geographically isolated wetlands (GIWs); wetlands that are surrounded by uplands and lack readily apparent surface water connections to downgradient waters (Downing *et al.*, 2003; Leibowitz and Nadeau, 2003; Tiner, 2003a, b; see Mushet *et al.* (2015) for a history and critique of this term). Following the US Supreme Court's 2006 *Rapanos* case (547 US 715), interest in GIWs increased, with a more recent emphasis

Vernal Pool Hydrology

Andrew Reeve
Kelli Straka

Biogeochemical functions…

Geographically Isolated Wetlands are Important Biogeochemical Reactors on the Landscape

JOHN M. MARTON, IRENA F. CREED, DAVID B. LEWIS, CHARLES R. LANE, NANDITA B. BASU, MATTHEW J. COHEN, AND CHRISTOPHER B. CRAFT

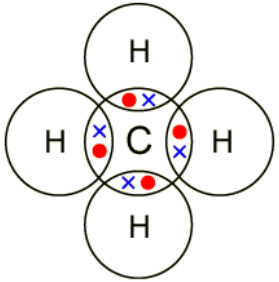
Wetlands provide many ecosystem services, including sediment and carbon retention, nutrient transformation, and water quality improvement. Although all wetlands are biogeochemical hotspots, geographically isolated wetlands (GIWs) receive fewer legal protections compared with other types of wetlands because of their apparent isolation from jurisdictional waters. Here, we consider controls on biogeochemical functions that influence water quality, and estimate changes in ecosystem service delivery that would occur if these landscape features were lost following recent US Supreme Court decisions (i.e., Rapanos, SWANCC). We conclude that, despite their lack of persistent surfacewater connectivity or adjacency to jurisdictional waters, GIWs are integral to biogeochemical processing on the landscape and therefore maintaining the integrity of US waters. Given the likelihood that any GIW contributes to downstream water quality, we suggest that the burden of proof could be shifted to assuming that all GIWs are critical for protecting aquatic systems until proven otherwise.

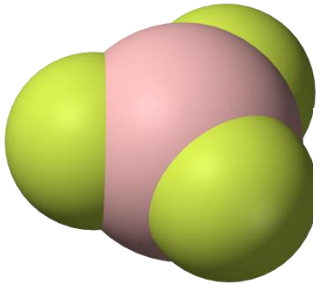
Keywords: geographically isolated wetlands, connectivity, adjacency, biogeochemistry, wetland protection

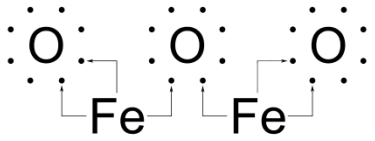
Wetlands exist along a continuum of hydrologic connectivity to surrounding upland and aquatic eco-

communities or undrained hydric soils surrounded by non-hydric soils." GIWs are formed by natural forces that create

Lydia Kifner
Aria Amirbahman
Aram Calhoun
Steve Norton
Krista Capps
Laura Podzikowski







Ecology

Conservation Biology Volume 20, No. 5, 1457–1465

Remarkable Amphibian Biomass and Abundance in an Isolated Wetland: Implications for Wetland Conservation

J. WHITFIELD GIBBONS,*†*** CHRISTOPHER T. WINNE,*† DAVID E. SCOTT,* JOHN D. WILLSON,*† XAVIER GLAUDAS‡, KIMBERLY M. ANDREWS,*† BRIAN D. TODD,*† LUKE A. FEDEWA§, LUCAS WILKINSON,* RIA N. TSALIAGOS,** STEVEN J. HARPER,*† JUDITH L. GREENE,* TRACEY D. TUBERVILLE,*† BRIAN S. METTS,*† MICHAEL E. DORCAS††, JOHN P. NESTOR,* CAMERON A. YOUNG,*† TOM AKRE,* ROBERT N. REED‡‡, KURT A. BUHLMANN,* JASON NORMAN,* DEAN A. CROSHAW,*§§ CRIS HAGEN,* AND BETSIE B. ROTHERMEL*

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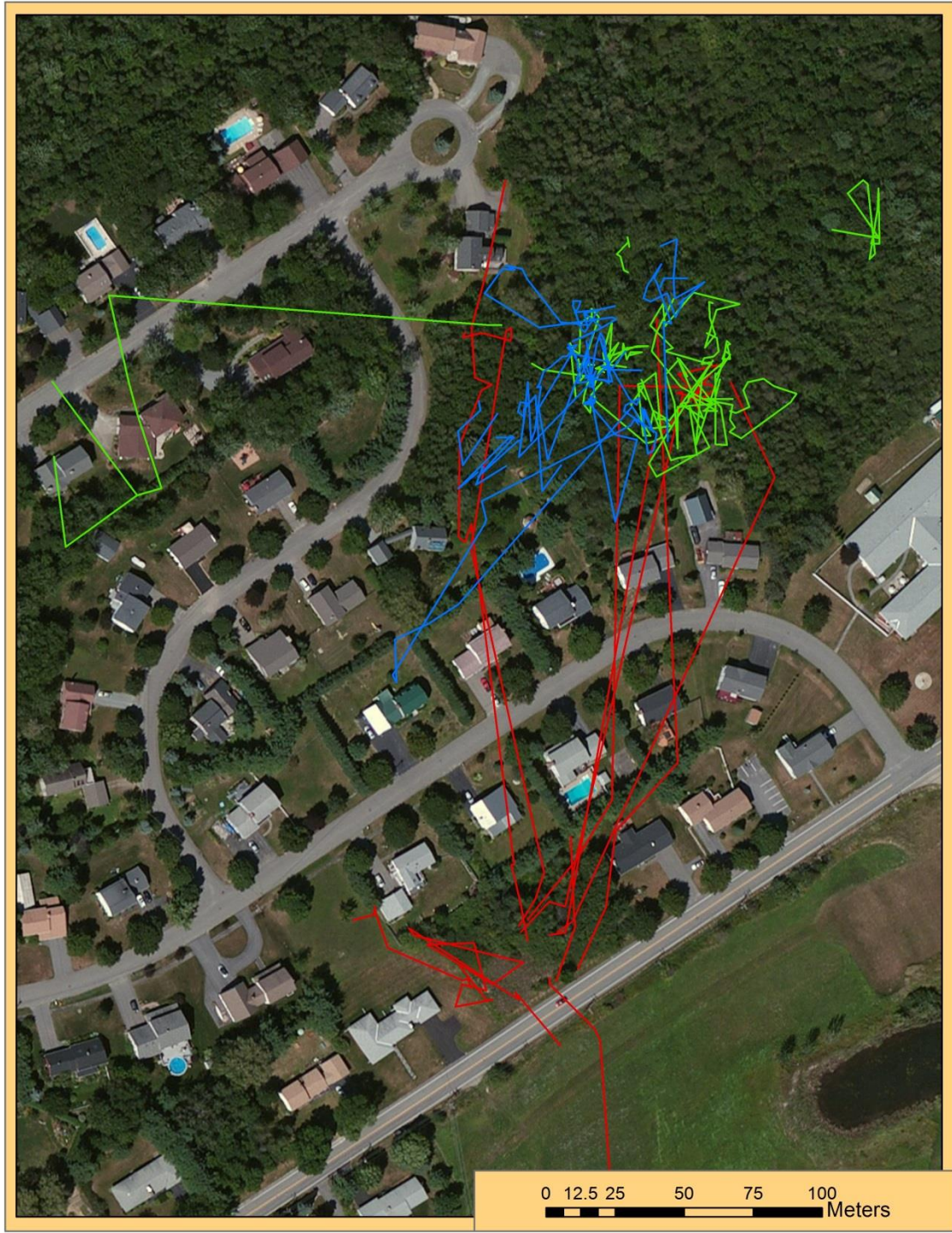
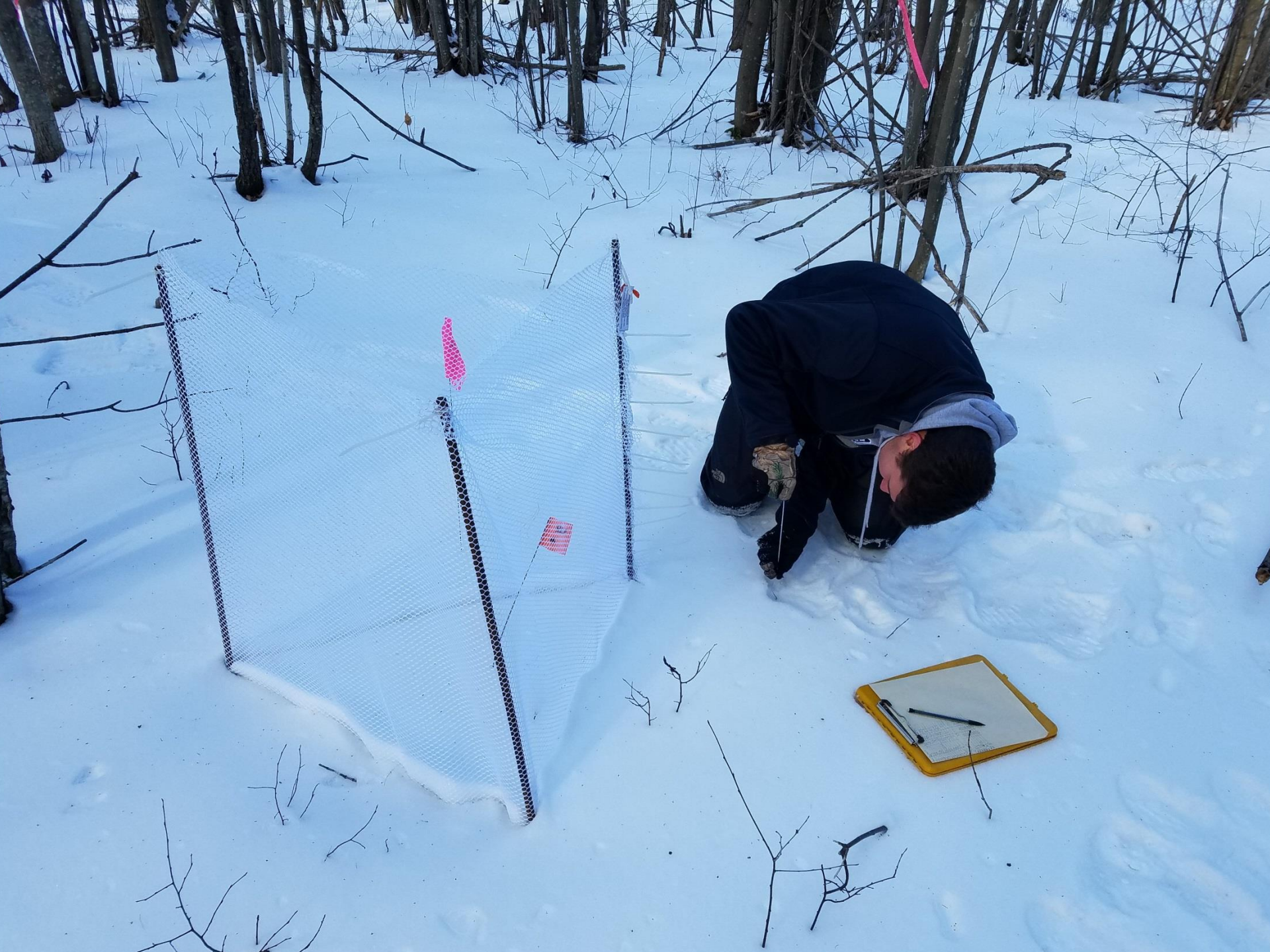
Photo: K. Hoffmann

Ecology

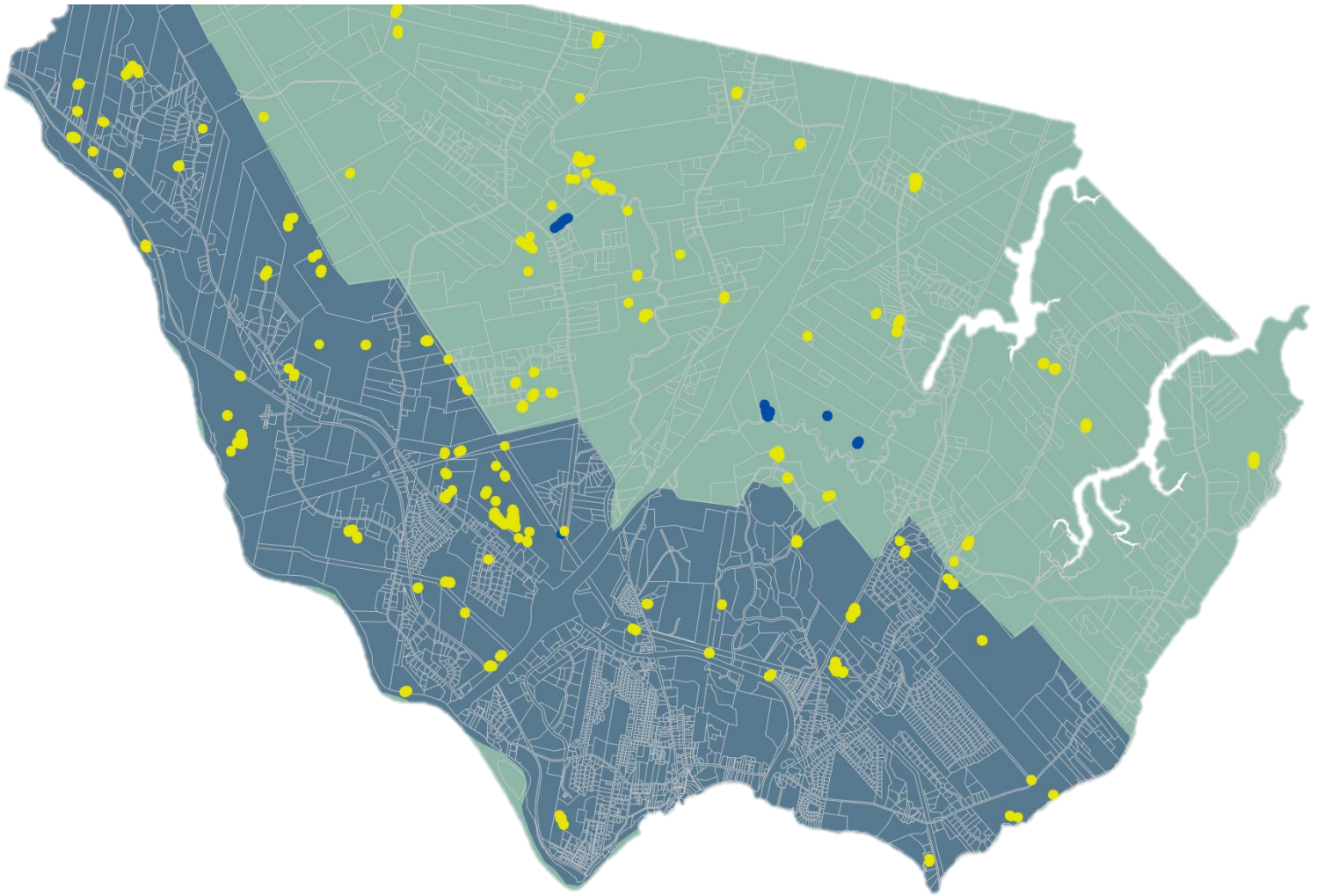
Carly Eakin
Luke Groff
Kris Hoffmann
Tom Hastings
Jared Homola
Dawn Morgan
Mac Hunter
Aram Calhoun


SB116SB113
SB135


0 12.5 25 50 75 100
Meters



Watershed Functions?



PERSPECTIVE

Do geographically isolated wetlands influence landscape functions?

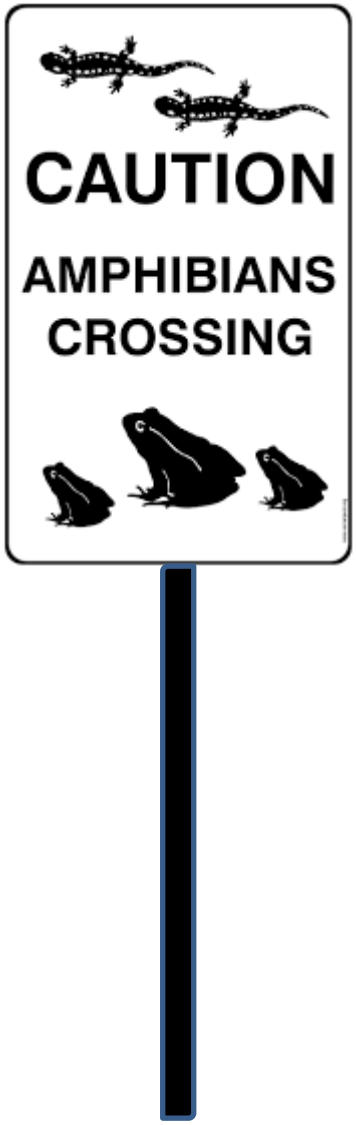
Matthew J. Cohen[a,1], Irena F. Creed[b], Laurie Alexander[c], Nandita B. Basu[d], Aram J. K. Calhoun[e], Christopher Craft[f], Ellen D'Amico[g], Edward DeKeyser[h], Laurie Fowler[i], Heather E. Golden[j], James W. Jawitz[k], Peter Kalla[l], L. Katherine Kirkman[m], Charles R. Lane[j], Megan Lang[n], Scott G. Leibowitz[o], David Bruce Lewis[p], John Marton[q], Daniel L. McLaughlin[r], David M. Mushet[s], Hadas Raanan-Kiperwas[t], Mark C. Rains[u], Lora Smith[m], and Susan C. Walls[v]

Edited by Dennis F. Whigham, Smithsonian Environmental Research Center, Edgewater, MD, and accepted by the Editorial Board December 28, 2015 (received for review June 29, 2015)

Geographically isolated wetlands (GIWs), those surrounded by uplands, exchange materials, energy, and organisms with other elements in hydrological and habitat networks, contributing to landscape functions, such as flow generation, nutrient and sediment retention, and biodiversity support. GIWs constitute most of the wetlands in many North American landscapes, provide a disproportionately large fraction of wetland edges where many functions are enhanced, and form complexes with other water bodies

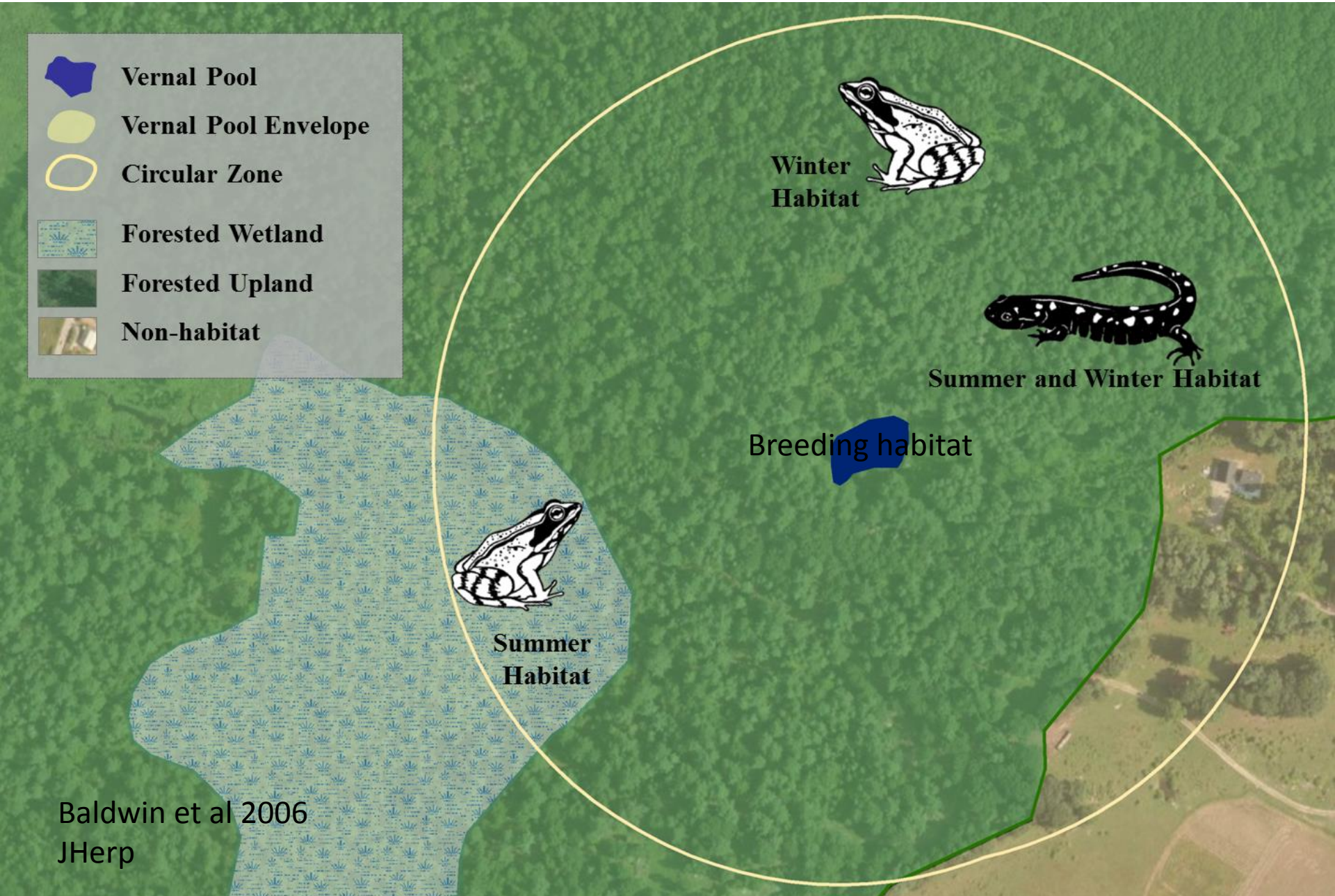
YES!!!

Challenges and the road to solutions



Managing at this scale is challenging….

Use diverse ecosystems…

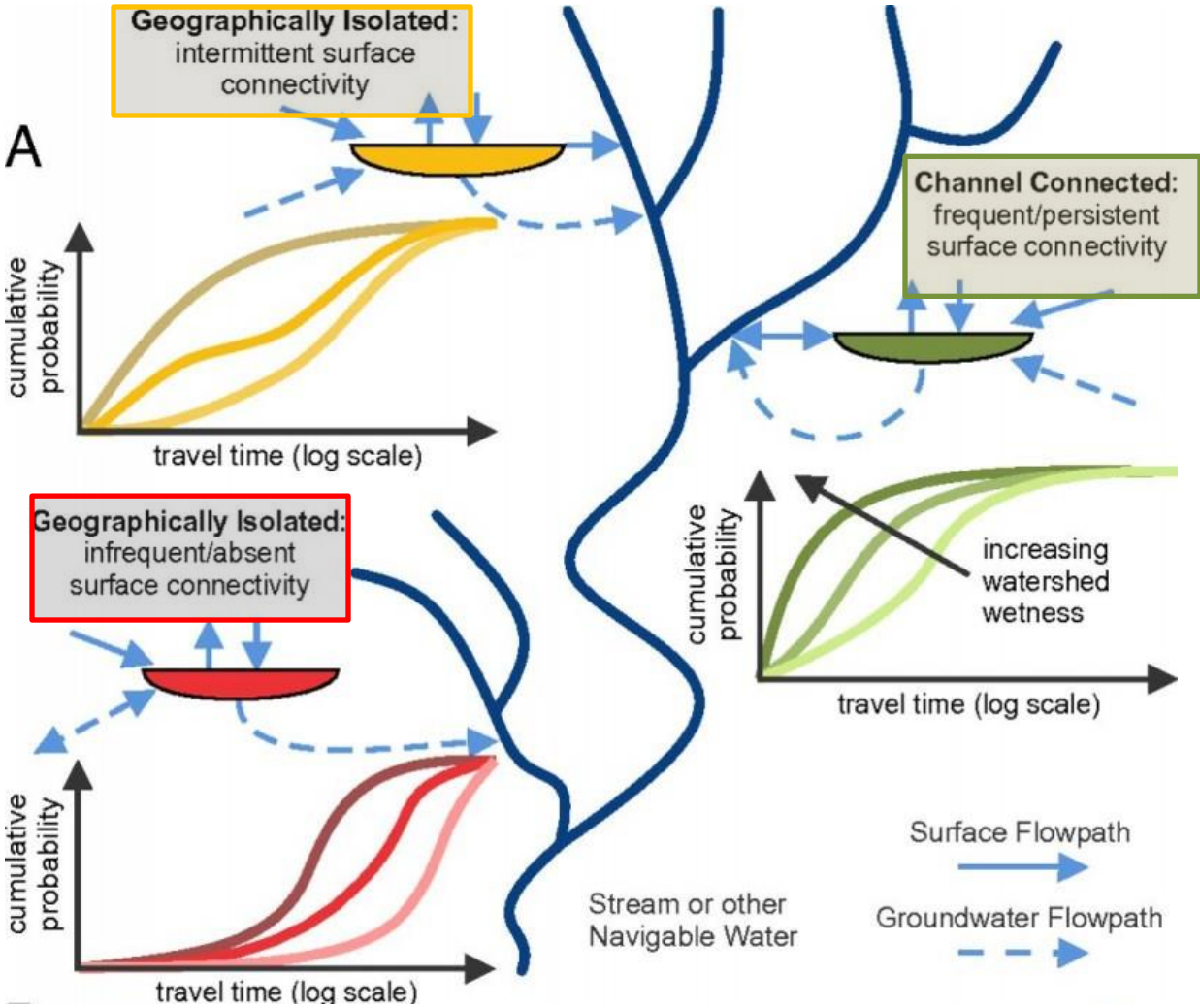


Baldwin et al 2006
JHerp

Varying degrees of connectivity

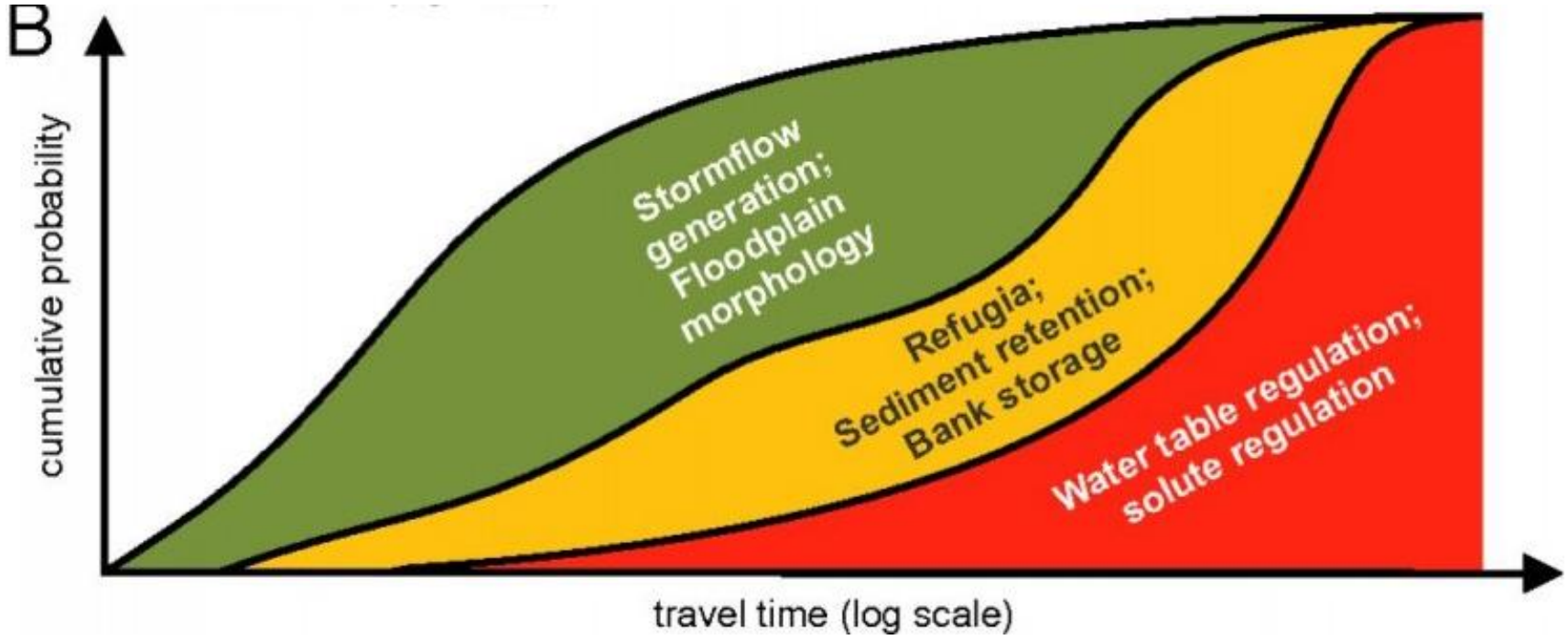
(Cohen et al. 2016)

- **Channel connected**
- **Intermittent connectivity**
- **Infrequent connectivity**

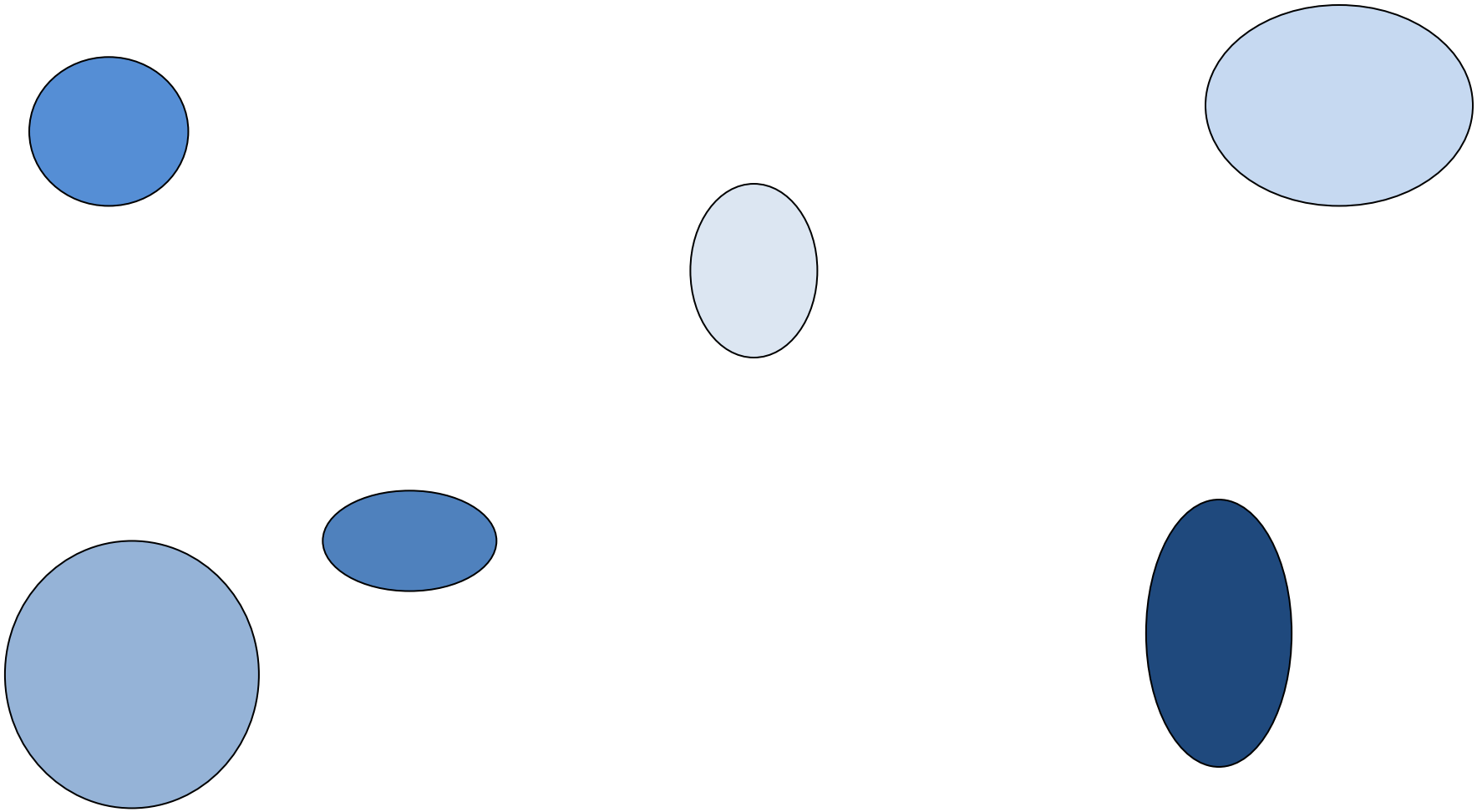


And Functions…..

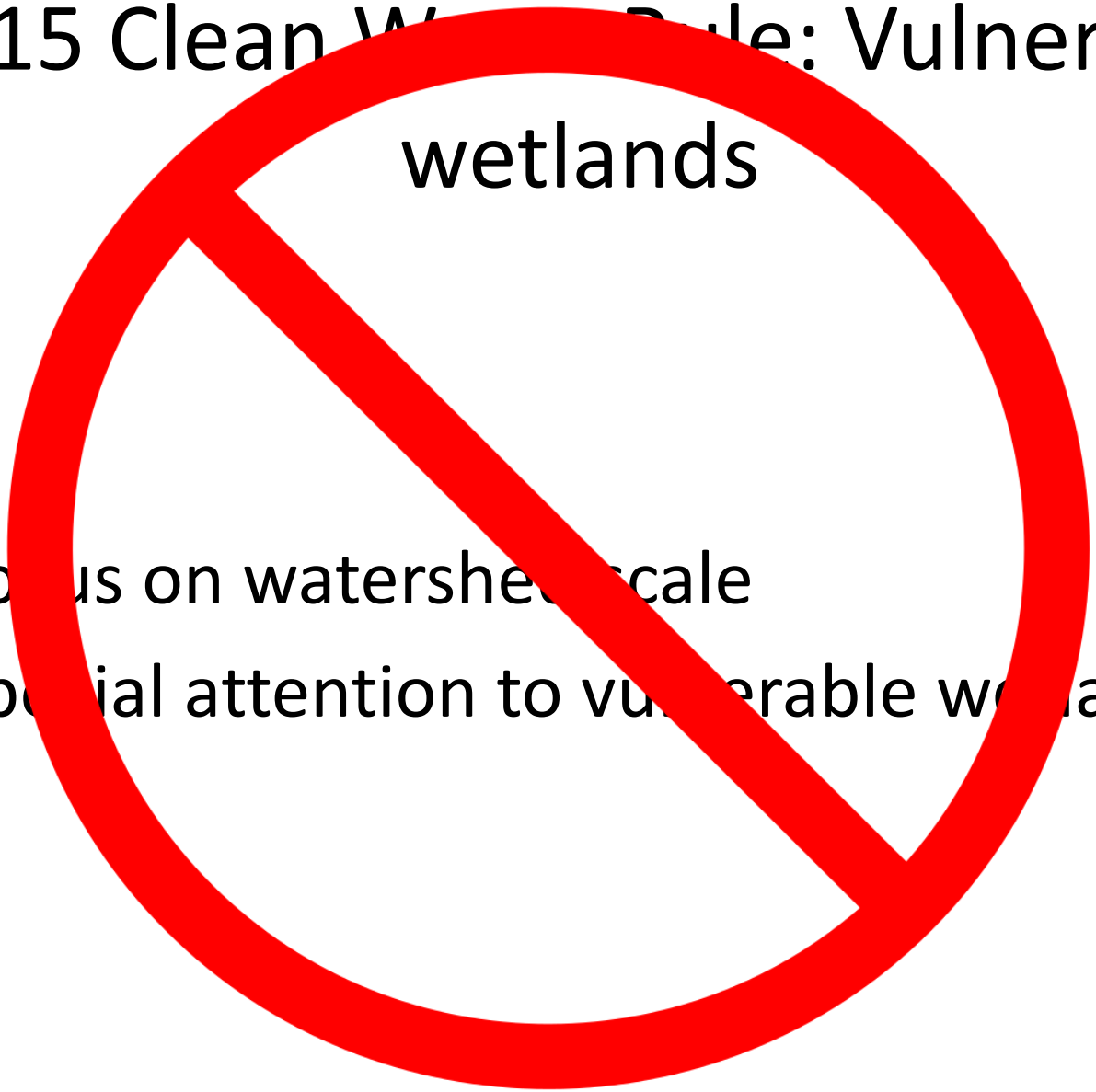
- **Channel connected**
- **Intermittent connectivity**
- **Infrequent connectivity**



Current regulations do not recognize meta-ecosystem functions



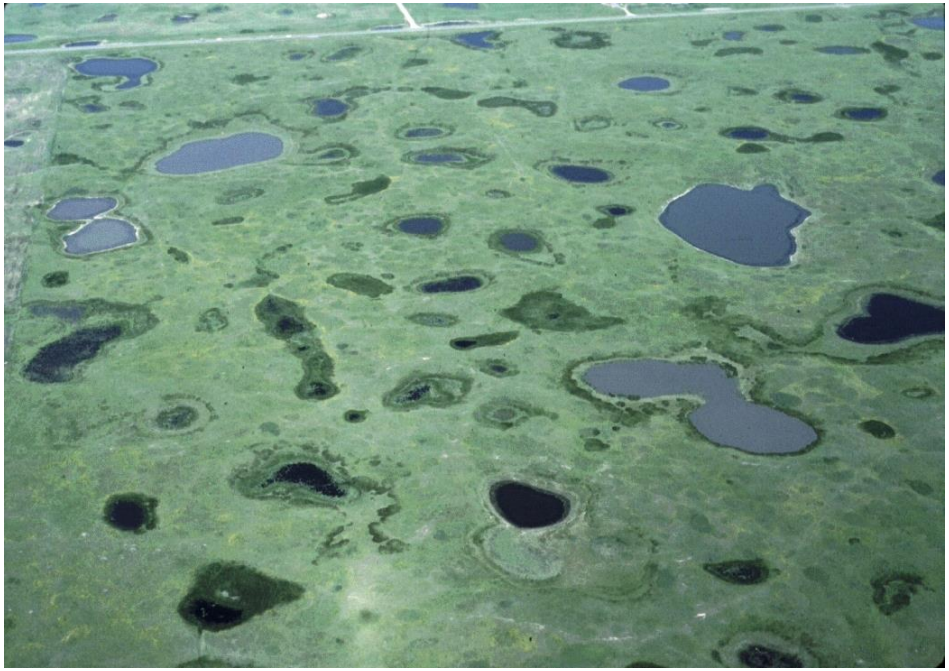
2015 Clean W[illegible]Rule: Vulnerable wetlands



- Fo[illegible]us on watershe[illegible]cale
- Sp[illegible]ial attention to vu[illegible]erable we[illegible]ands

Portfolio Watershed Approach

Frog's eye *and* **Bird's eye** views



Tried, but not true

- Traditional top-down regulation
- Incidental conservation
- Voluntary protection

Example of portfolio approach

Innovative approaches

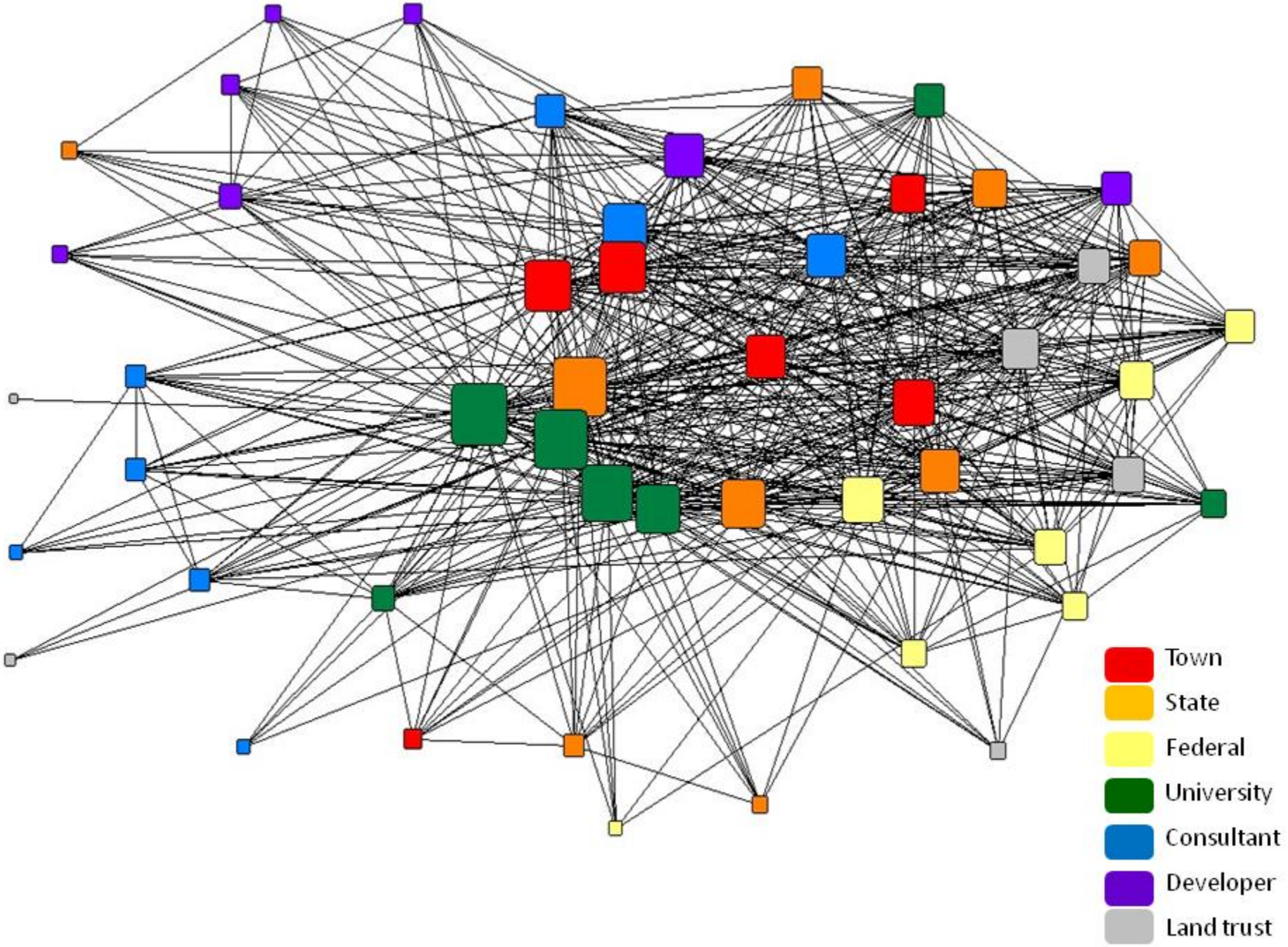
- Local “ownership” of strategies
- Local intelligence
- Flexibility
- Attention to socio-economic realities

Turning Contention into Collaboration

Stakeholder solutions

Levesque, VR, AJK Calhoun, KP Bell, and TR Johnson. 2017. Society and Natural Resources Vol. 30

- ✓ 6.5 years (60+ meetings)
- ✓ Development community
- ✓ Economists/Appraisers
- ✓ Biologists
- ✓ Citizens
- ✓ 2 towns, 7 state and federal agencies
- ✓ 2 Land trusts


Town
State
Federal
University
Consultant
Developer
Land trust

Beyond mapping...

Orono

Brunswick
Scarborough
Wayne
Readfield

Topsham

Yarmouth
Windham
Freeport
Cumberland
Bar Harbor

Vernal Pool Special Area Management Plan

February 2016 DRAFT

Prepared by: University of Maine – Orono

Contact Persons:

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Ruth M. Ladd
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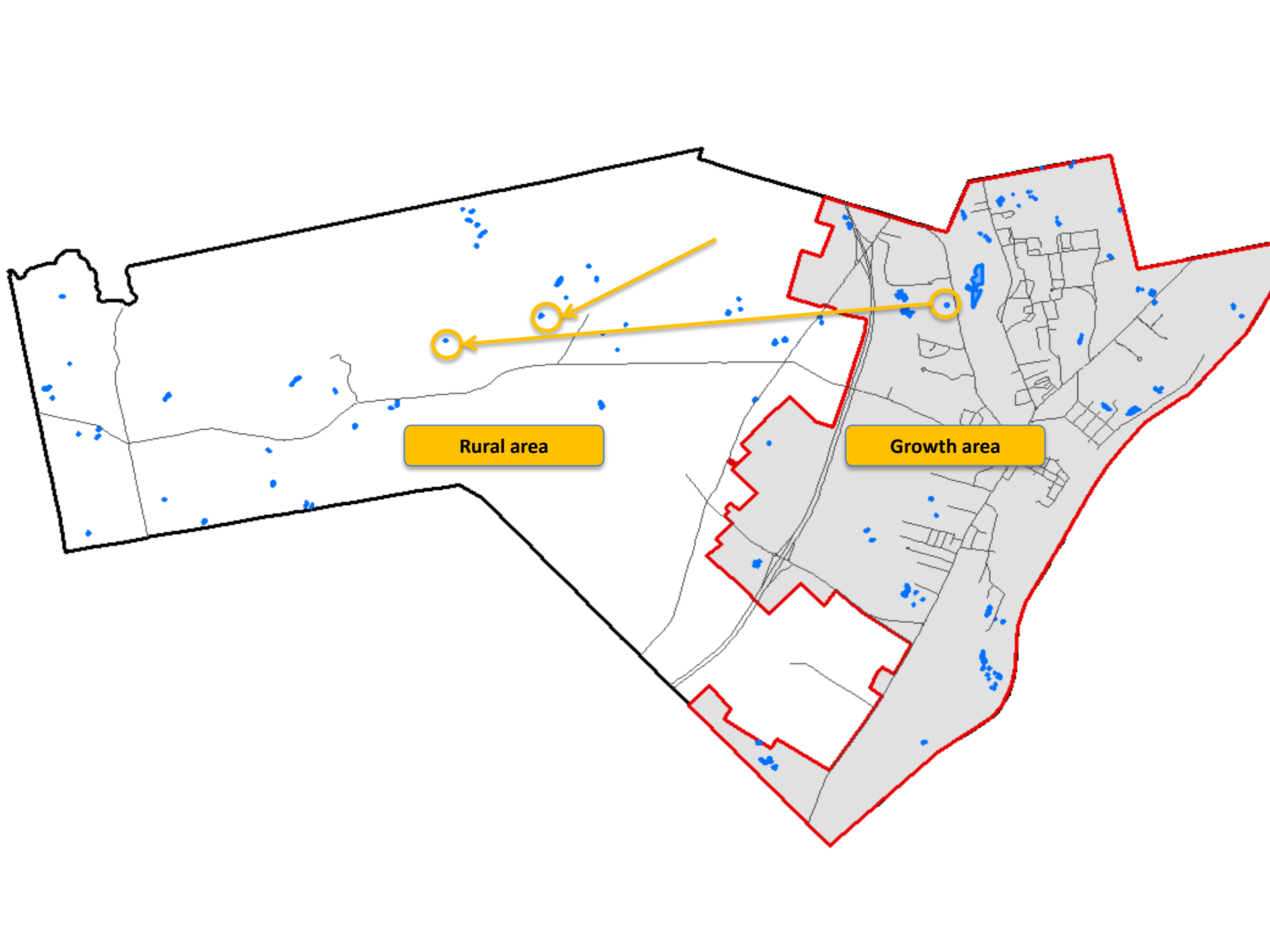
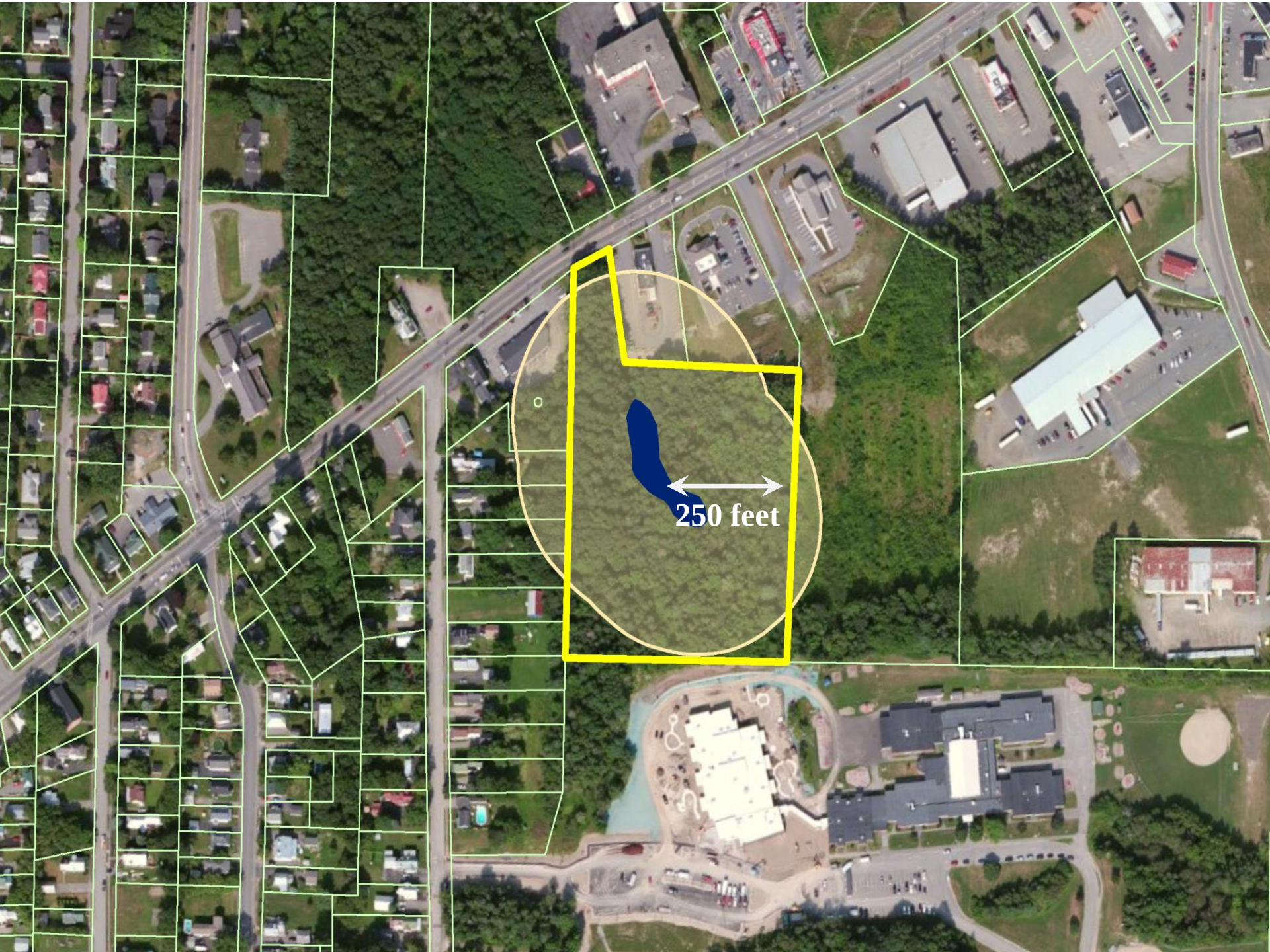
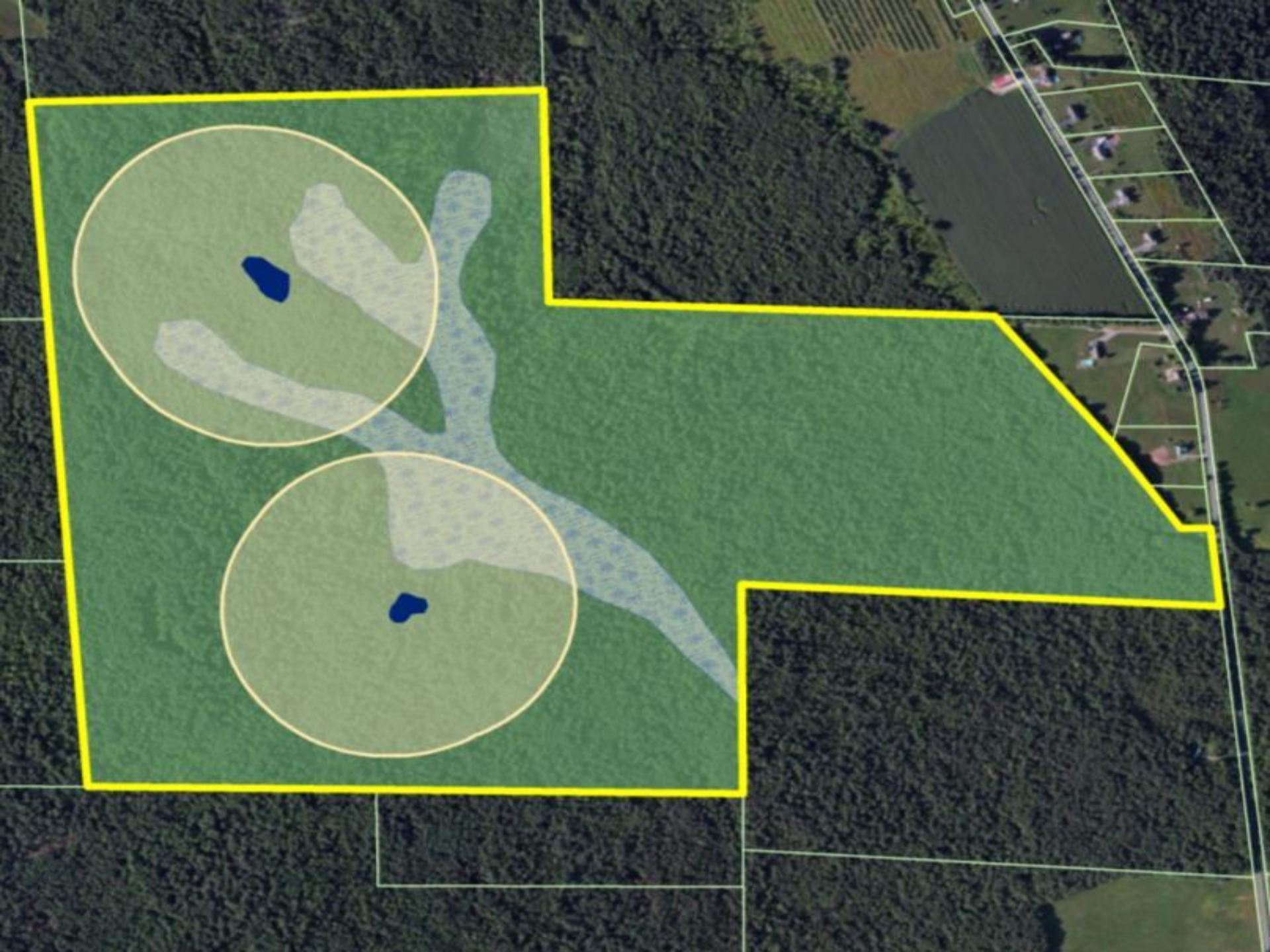

Rural area
Growth area


Rural /Growth Area Boundary
Rural Area
Designated Development Area


250 feet



- Town driven, optional mitigation tool;
- Better conserves vernal pools and local economies
- Treats vernal pools as meta-ecosystems
- Meets the mission of the CWA

Link to SAMP

http://www.nae.usace.army.mil/Missions/Regulatory/Vernal-Pools/

Colleagues and Funding

Faculty: Aria Amirbahman, Dana Bauer, Kathleen P. Bell, Krista Capps, Mac Hunter, Jessica Jansujwicz, Mike Kinnison, Cyndy Loftin, Bridie McGreavy, Eric Nelson, Steve Norton

Graduate Students: Jessica Balukas ,Carly Eakin, Luke Groff, Kristine Hoffmann, Jared Homola, Lydia Kifner,, Mitchell Jones, Vanessa Levesque, Laura Podzikowski

Photo credits: Kristine Hoffmann, Luke Groff, Dawn Morgan, Lydia Kifner, Tom Hastings, Aram Calhoun

Funding: National Science Foundation, Department of Wildlife, Fisheries and Conservation Biology, Center for Sustainability Solutions

Of Pools AND People

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Of Pools and People
www.vernalpools.me and Facebook


Discussion?

Maine VP SAMP Team

- University of Maine (**Bell, Calhoun, Hunter, Kinnison, Levesque, Loftin, Morgan,Owen**)
- US Army Corps of Engineers (**Ladd, Clement, McCarthy**)
- US Environmental Protection Agency (**Kern**)
- US Fish and Wildlife Service (**Mahaney**)
- Maine DEP (**Mullen**)
- Maine DACF (**Hertz, Puryear**)
- Maine DIFW (**deMaynadier, Shearin, Walker**)
- Topsham Economic and Community Development (**Shattuck**)
- Town of Orono, ME (**Richert, Gordon, Shepherd, Thompson**)
- Town of Topsham, ME (**Roedner, Melanson, Eyreman**)

And representatives from the following groups:

- Real estate and development community (**Howard, Spann, Wasileski**)
- Real estate appraisal (**Siegel**)
- Land trusts both local and regional (**OLT, BTLT**)
- Private consultant (**Eyreman**)

Wetlands
DOI 10.1007/s13157-015-0631-9

REVIEW ARTICLE

Geographically Isolated Wetlands: Rethinking a Misnomer

Wetlands (2015) 35:997–1003
DOI 10.1007/s13157-015-0691-x

REVIEW ARTICLE

Geographically Isolated Wetlands: Why We Should Keep the Term

Wetlands
DOI 10.1007/s13157-017-0887-3

SHORT COMMUNICATION

The Significant Surface-Water Connectivity of "Geographically Isolated Wetlands"

Aram J. K. Calhoun[1] · David M. Mushet[2] · Laurie C. Alexander[3] · Edward S. DeKeyser[4] · Laurie Fowler[5] · Charles R. Lane[6] · Megan W. Lang[7] · Mark C. Rains[8] · Stephen C. Richter[9] · Susan C. Walls[10]