ALL ABM:
The BREE Land Use and Land Cover Model & BMP Adoption

VT EPSCoR BREE

PTAC Meeting

November 28, 2017

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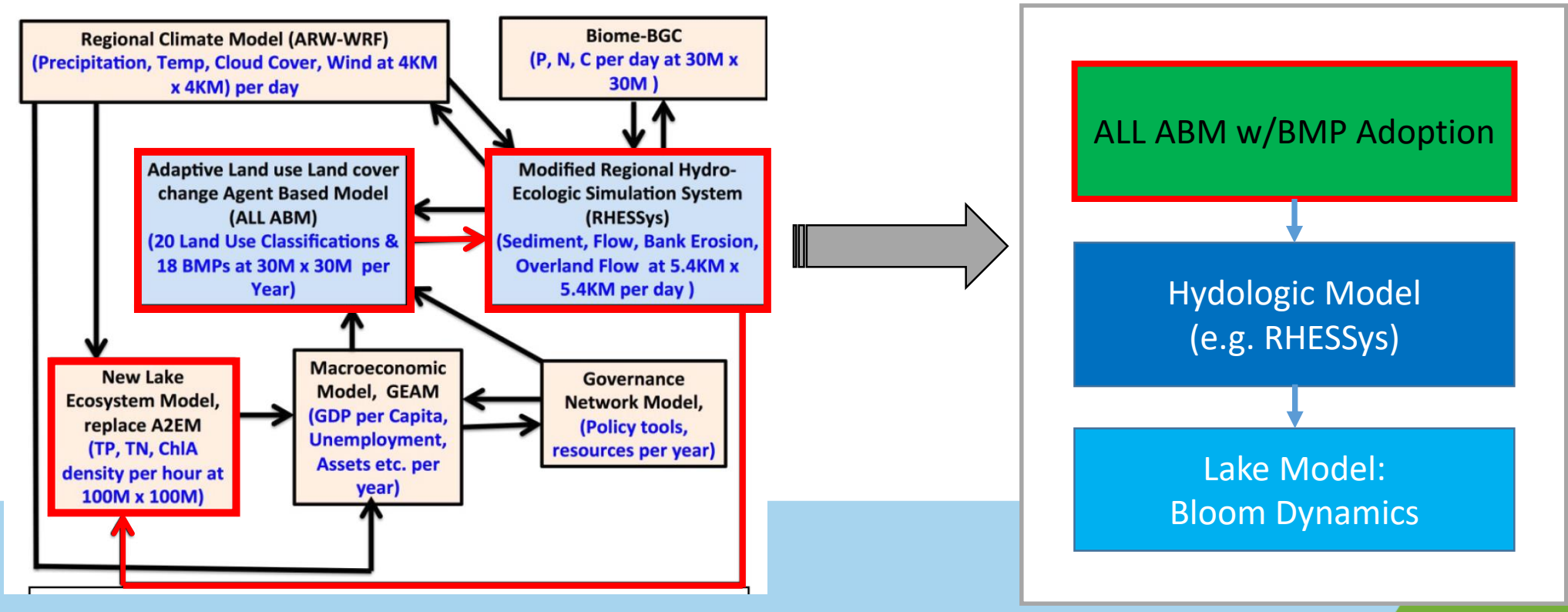
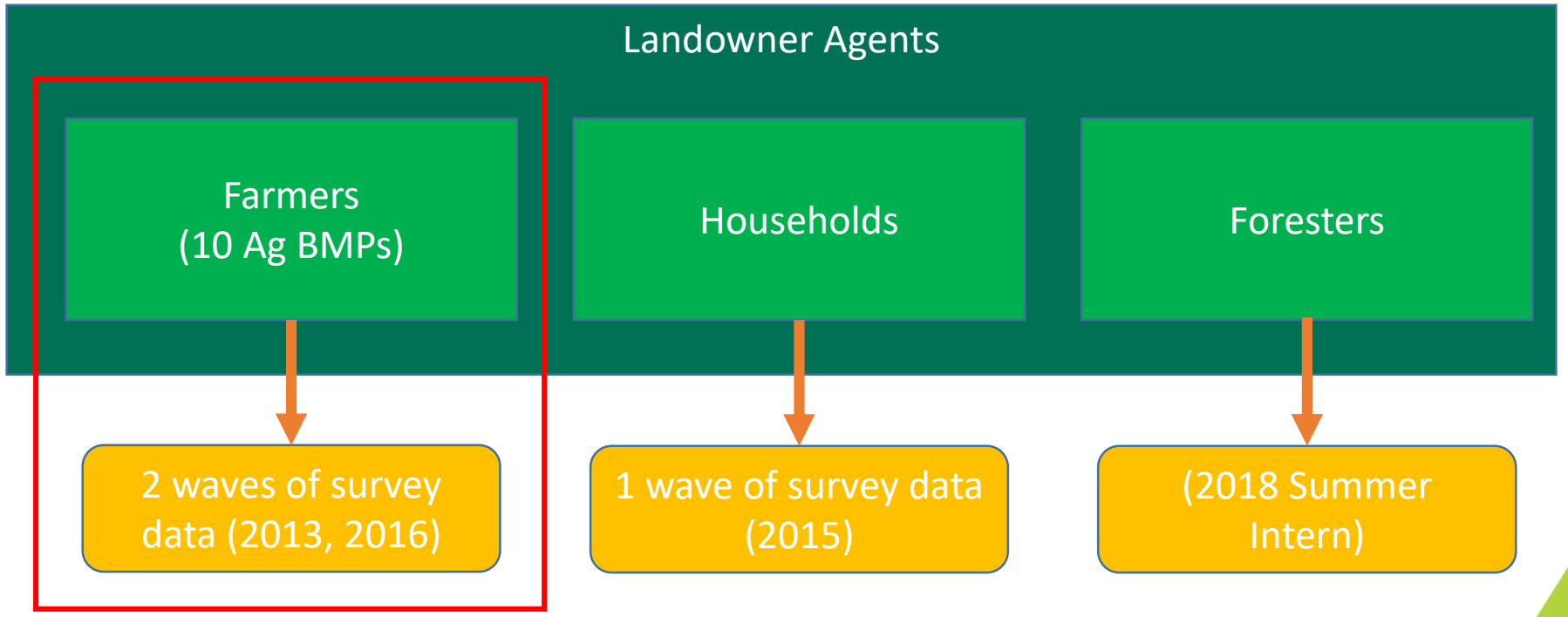
BMP Adoption within ALLABM: Objective

Milestone: Demonstrate BMPs are being adopted within the ALLABM (Goals 2.1.1) and that water quality is affected downstream.



BMP Adoption within ALLABM: Data



Farmer Survey

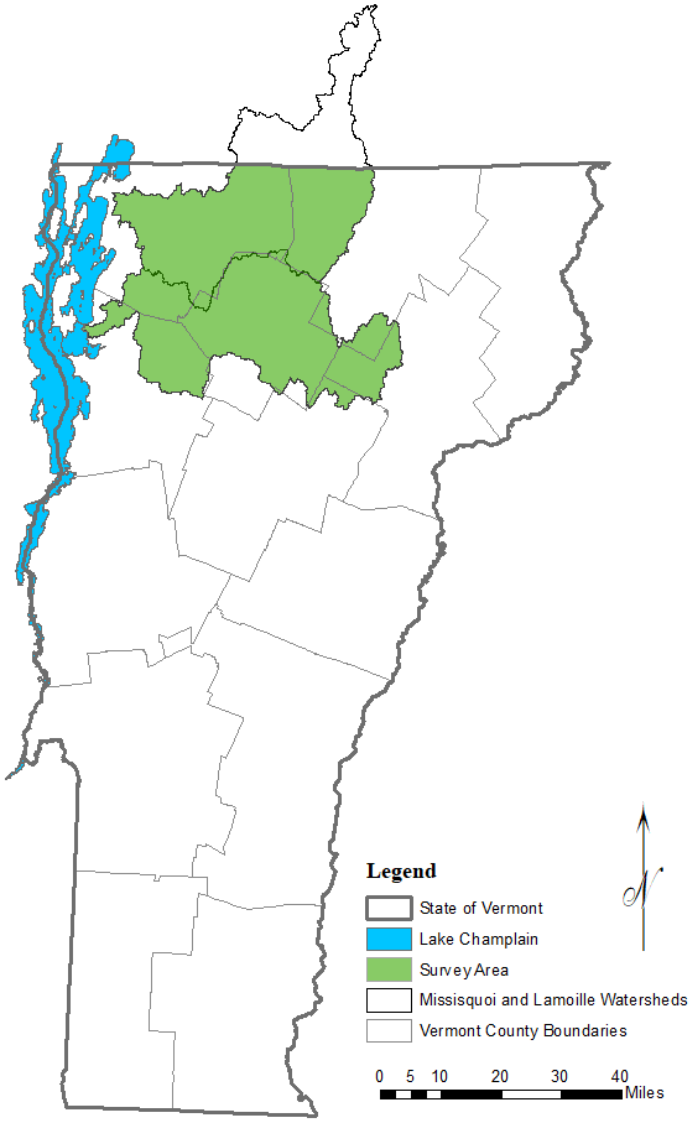
Wave 1: 2013

- 80 Observations
- (61% response rate
- 6.96 confidence interval
- 95% confidence level

Wave 2: 2016

- 115 Observations
- 81% response rate,
- 4.03 confidence interval
- 95% confidence level

Panel Set = 56



US Ag Census

2012 USDA Census of Agriculture

- County Level data

County area weighting to determine watershed level statistics

Survey Weighting by

1. Farm Size (area, acres, three categories)
2. Certified Organic Production Management

BMPs By Agent Type

Best Management Practice Intervention	Type
Planned crop rotations	Agricultural
Soil test at least every 3 years	Agricultural
Strip Cropping	Agricultural
N, P, & K applications at rates recommended by soil tests	Agricultural
Buffers at field edges	**Agricultural**
Cover Cropping	**Agricultural**
Reduced tillage (strip, zone, and no)	**Agricultural**
Applying manure at recommended rates and times	Agricultural
Applying fertilizer at recommended rates	Agricultural
Incorporating manure and fertilizer as quickly as possible after application	Agricultural
Manure spreading setbacks (from water bodies and private/public wells)	Agricultural

Best Management Practice Intervention	Type
Rain barrels	Household
Rain garden	Household
Permeable pavement/pavers	Household
Infiltration trenches	Household
Tree box filters	Household
Green roofs	Household
Constructed wetlands	Household
Bioretention without underdrain, or raingarden	Municipal
Bioretention with an underdrain connecting to storm sewer	Municipal
Tree pit/cell/box	Municipal
Infiltration/storage trench	Municipal
Infiltration/storage basin	Municipal
Dry well	Municipal
Dry detention pond/basin (surface, non-infiltration)	Municipal
Vegetated or Grass swale	Municipal
Gravel-bed wetland	Municipal
Shallow surface wetland	Municipal
Wet detention/retention ponds	Municipal
Cistern (200+ gal.)	Municipal
Rain barrel (30-55 gal.)	Municipal
Green roof	Municipal
Pervious/porous pavement (asphalt, concrete, etc., designed for stormwater infiltration and storage)	Municipal
Pervious/porous pavers (blocks, bricks, designed for stormwater infiltration and storage)	Municipal
Gutter/downspout disconnection to vegetated area	Municipal
Road drainage such as culverts and ditches	Municipal
Road drainage with storm sewer/pipes	Municipal

BMP Adoption within ALLABM: Data Needs

Data we Have

- VT EPSCoR Survey data from Farmers, Households, Municipalities & Institutions
- Geo-located NRCS BMP Adoption 2000-2008
- CRP & CREP data (*in progress*)

Validation Data Needs

- Geo-located NRCS Adoption Data: 2000-Present
- Similar data from Vermont Agency of Ag, ANR & DEC
- Conservation Easement duration and distribution

Farmer BMP Adoption Models:

Method 1: Logistic Regression

Subset of survey questions used to generate correlation based logistic regression equations to simulate adoption practices

Method 2: Bayesian Network Analysis

Subset of survey questions used to generate supervised and unsupervised Bayesian networks to predict influence & likelihood of adoption

Method 3: Structural Equation Models

Subset of survey questions used to generate Structural Equation Models (SEM) based on the Theory of Planned Behavior (Ijzen, 1985)

Method 4: Conjoint Analysis

Subset of questions related to economic incentives used to determine rational actor behavior

Method 5: Evolutionary Algorithm

All survey questions used to determine factor groups that influence likelihood of adoption

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