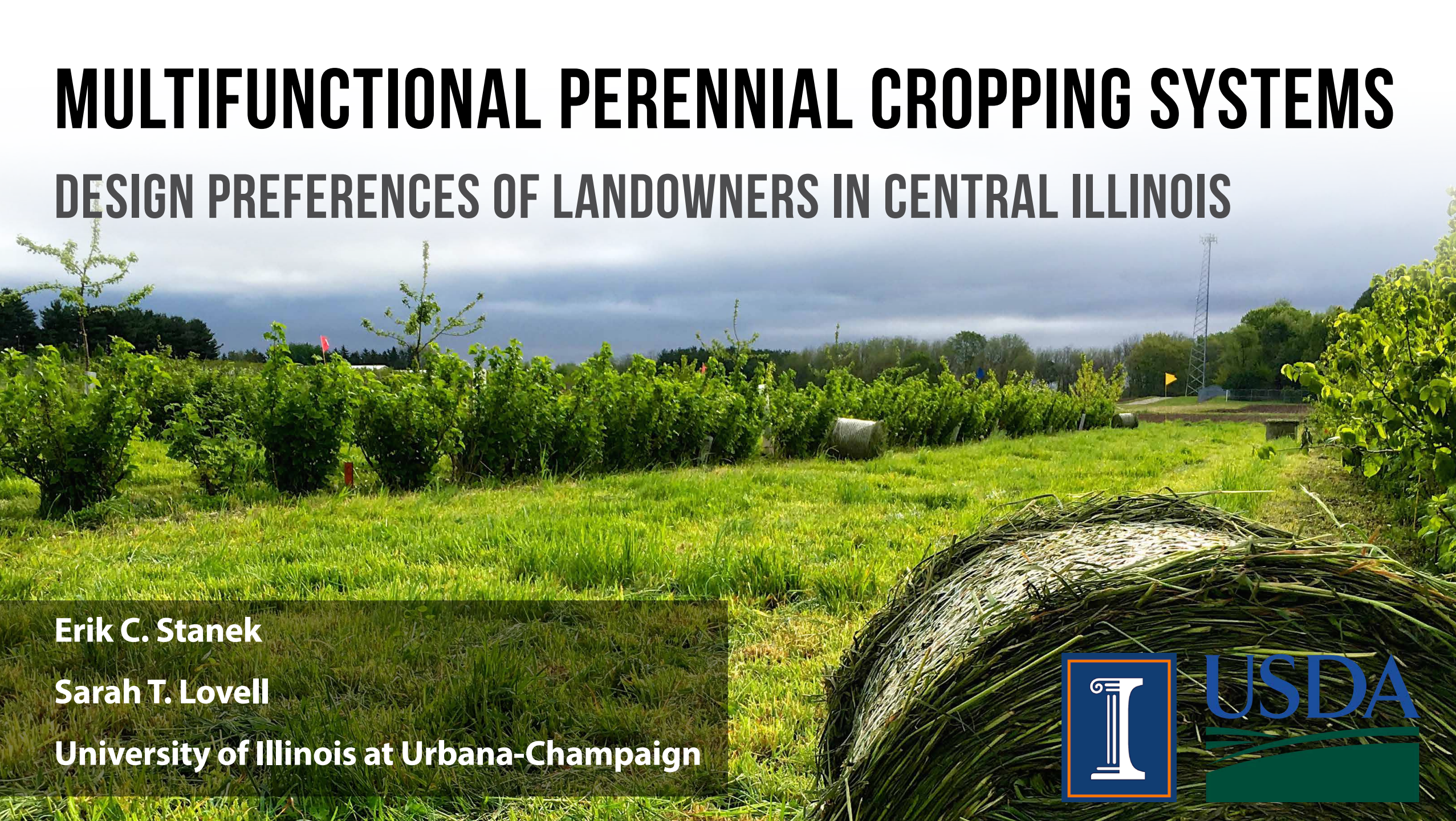
MULTIFUNCTIONAL PERENNIAL CROPPING SYSTEMS

DESIGN PREFERENCES OF LANDOWNERS IN CENTRAL ILLINOIS



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Todays discussion

1. Agroforestry potential in Central Illinois
2. The design of agroforestry systems for landowners
3. Landowner preferences, motivators, and barriers
4. Improving conservation and agroforestry use

Cover & below photo courtesy of Kevin Wolz

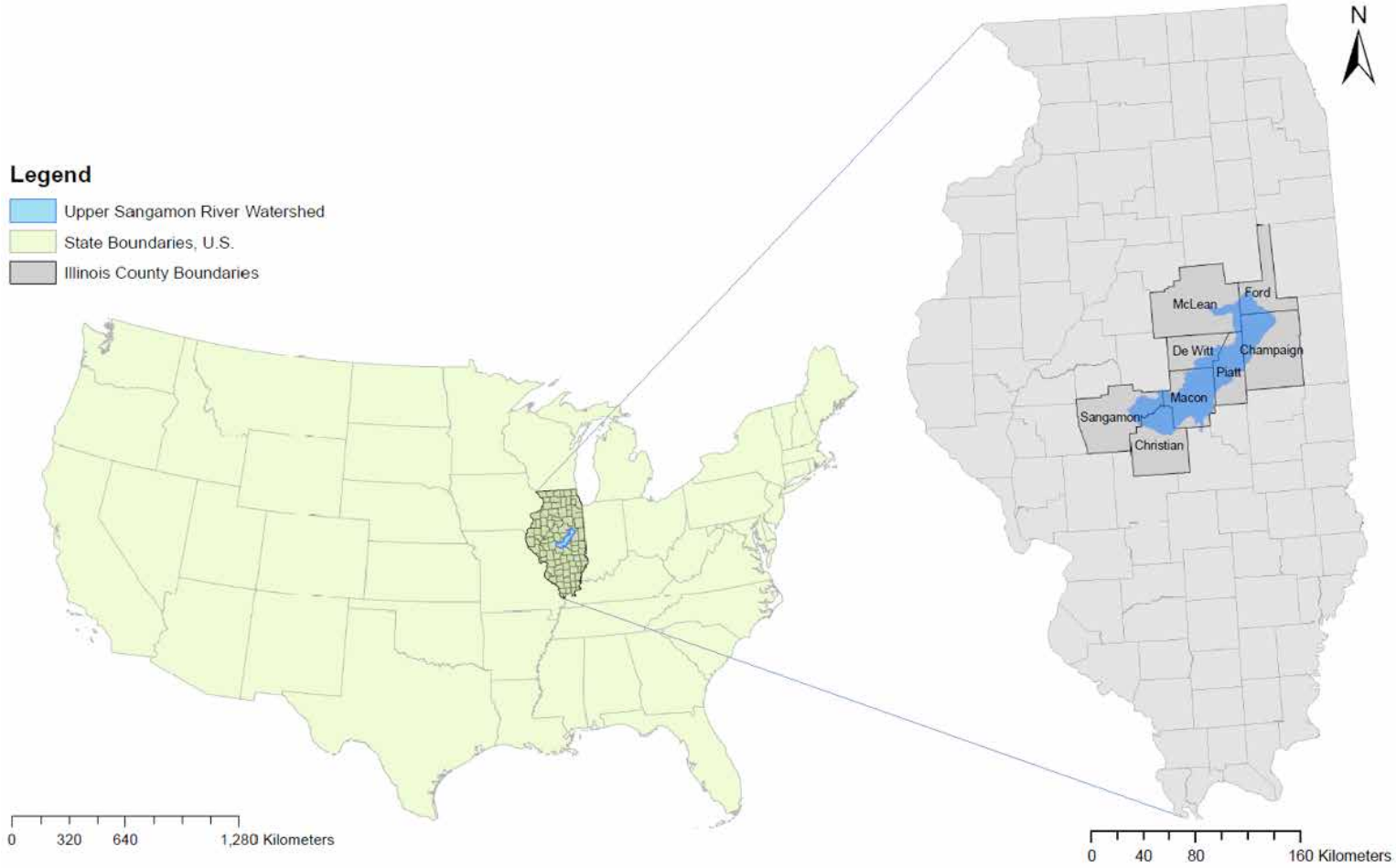
We know agroforestry…

…But what are multifunctional perennial cropping systems (MPCs)?

How can we make this a reality for landowners?

Understanding Central IL landowners

- Previous work surveyed ~100 Central Illinois landowners about MPCs
- Highest potential adopters were young, valued conservation, willing to learn.
- Biggest barrier was lack of informationw



Improve information for landowners

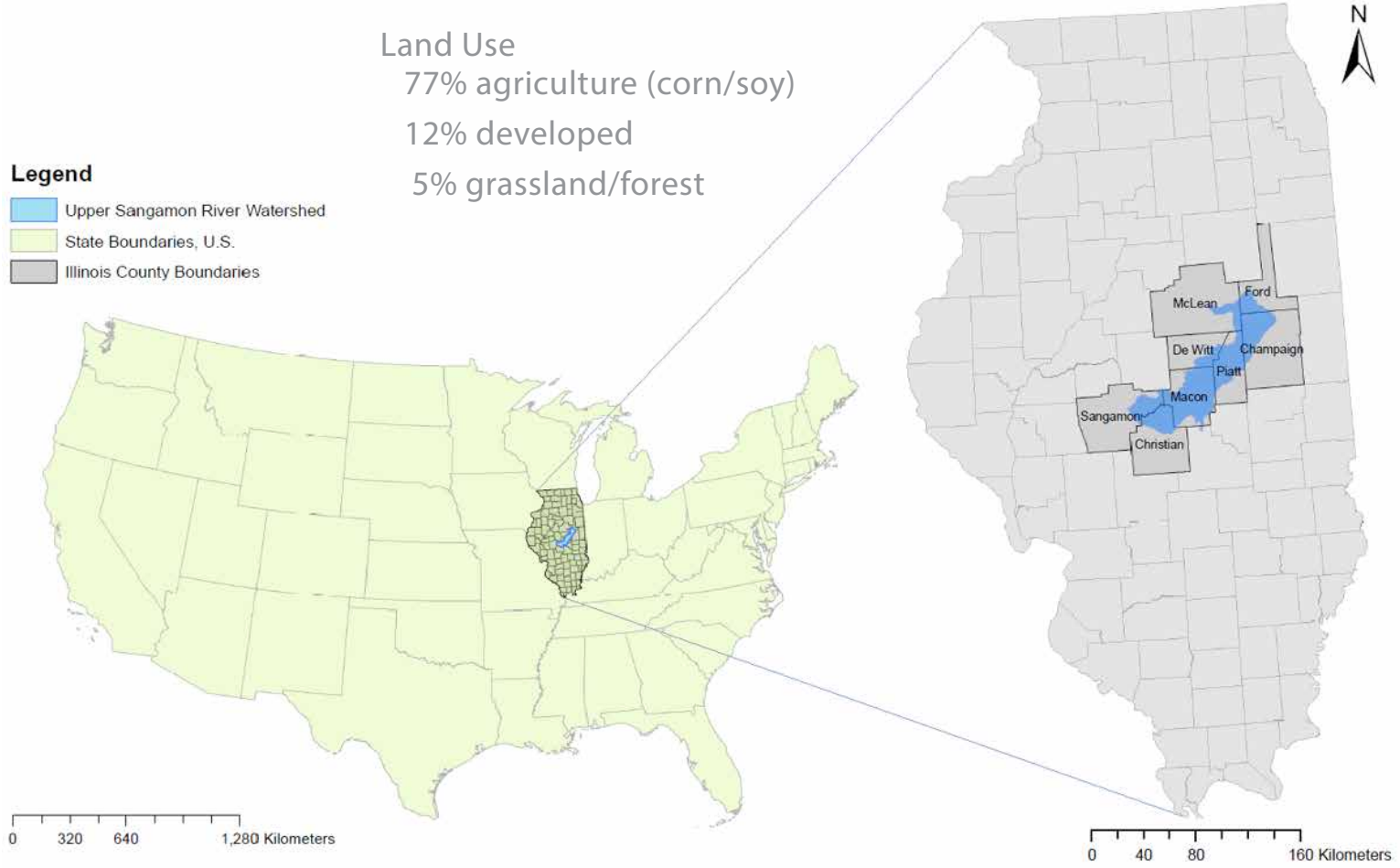
Source: Mattia *et al.* 2016, Identifying barriers and motivators for adoption of multifunctional perennial cropping systems by landowners in the Upper Sangamon River Watershed

Research questions and methods

- How can we improve design and in turn advance research?
- What is the preferred agroforestry design?
- What are the motivators and barriers to adopting agroforestry?
- What more information do landowners need?

Design for landowners, with landowners

- 15 landowners within the Upper Sangamon River Watershed
- Landowner ages between 29 to 78
- Eight are full-time farmers of some type



Mattia *et al.* 2016

Creating MPCs from landowners goals

Initial Meeting

- Visit the land and identify areas to be used
- Understand wants and needs
- Outline goals for MPCs

Building Scenarios

- Used normative scenario design
- Plausible and reasonable situations that could and/or should exist in the future.
- Collaborative process to achieve a novel agricultural system

Source: Nassauer, J.I., Corry, R.C. 2004, Using normative scenarios in landscape ecology

Three scenarios guided design

Production

- High production of woody crops
- Mechanically harvestable
- Simplicity

Conservation

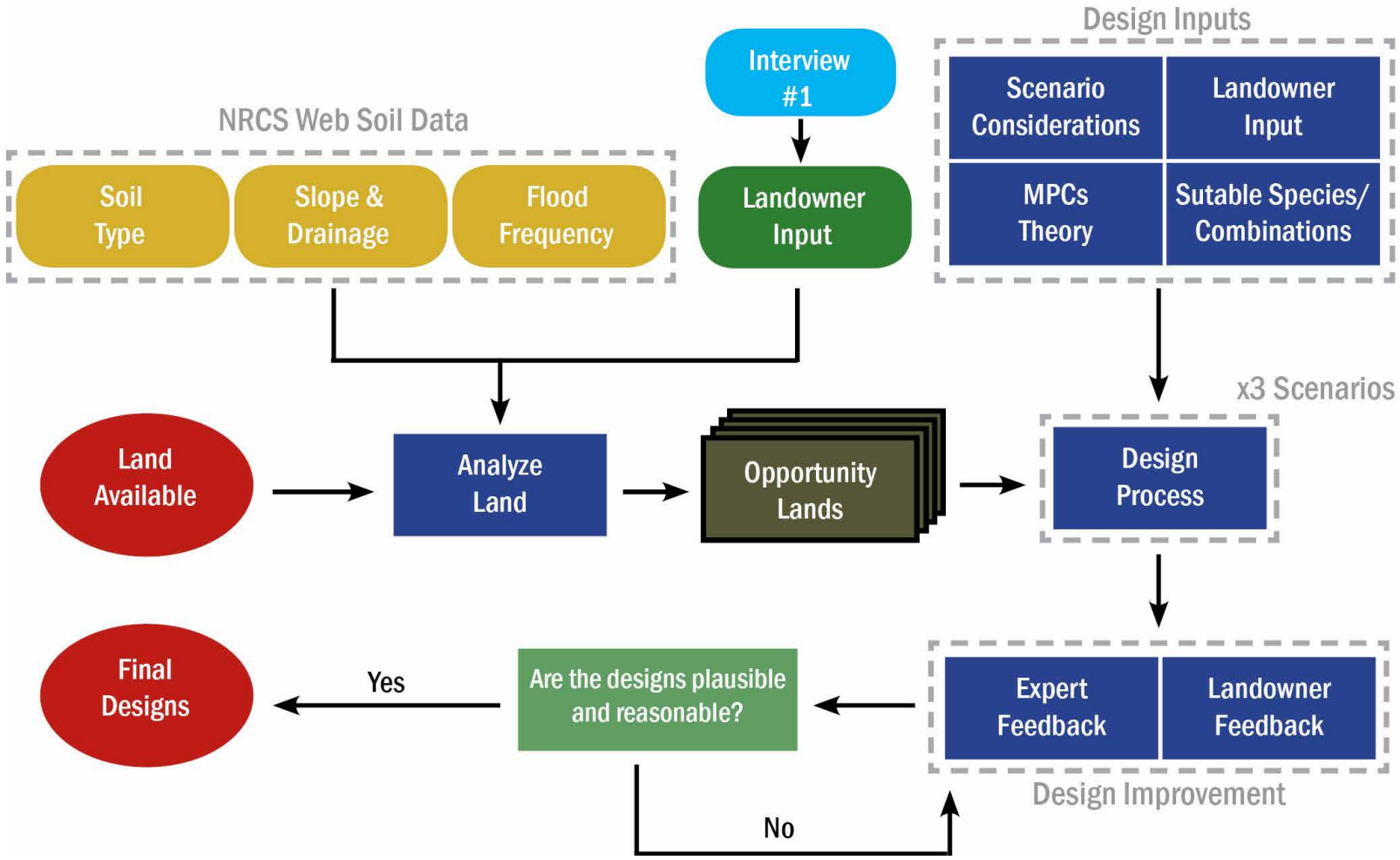
- Use of native species
- High diversity
- Eligible for conservation programs

Cultural

- Visually beautiful
- Recreation and experience
- Research and education

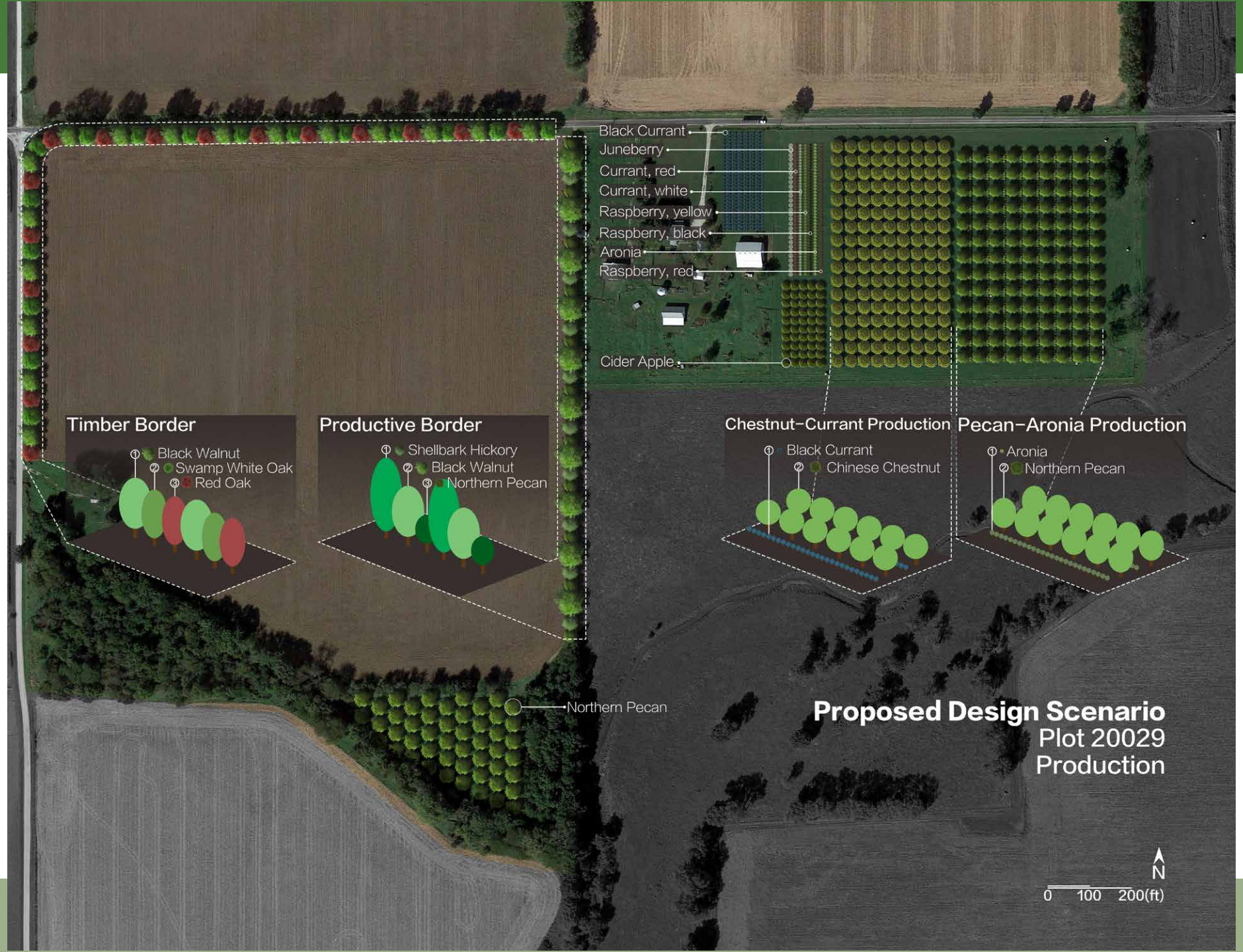
How are the designs created?

Design workflow aims to meet landowner needs

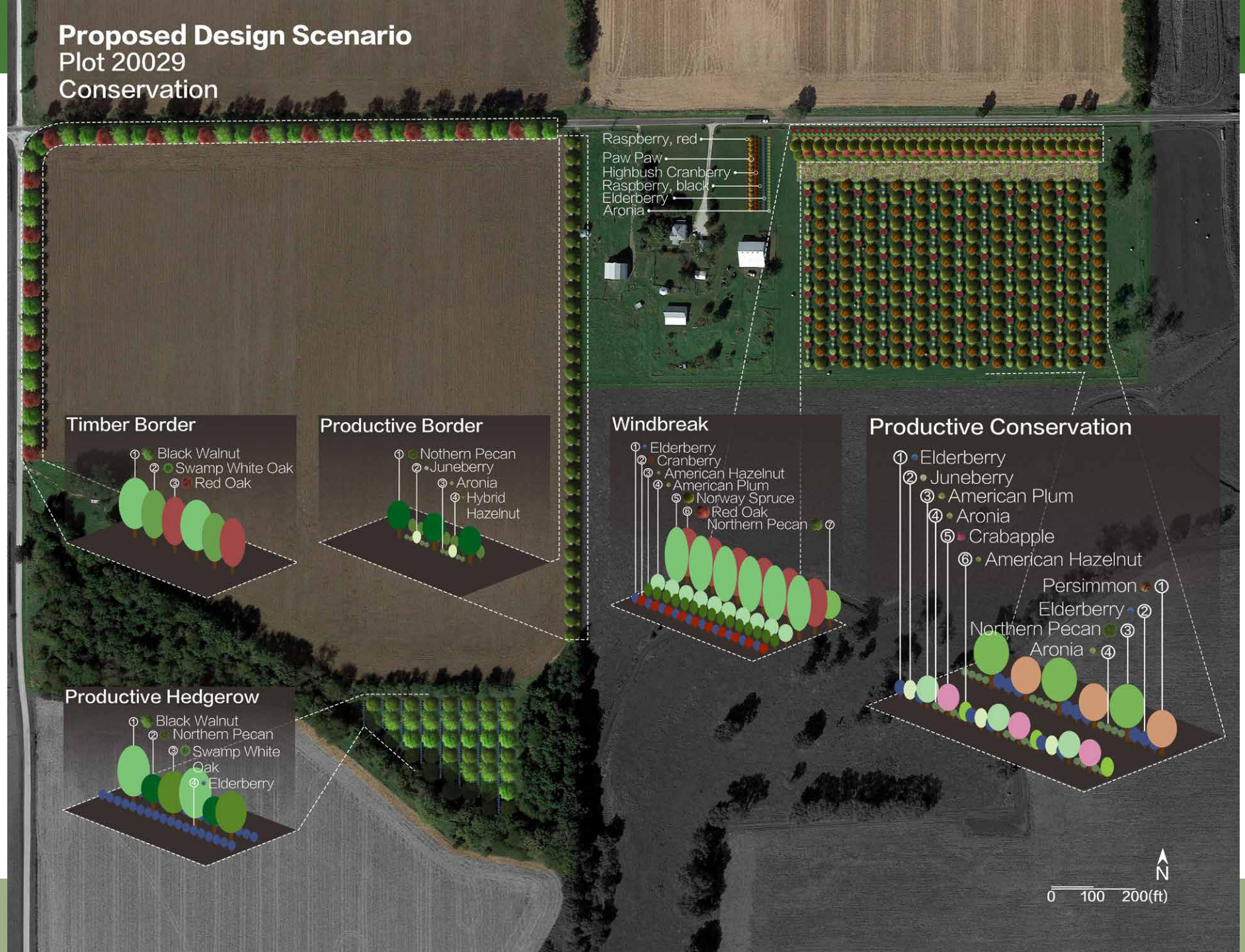


What do the designs look like?

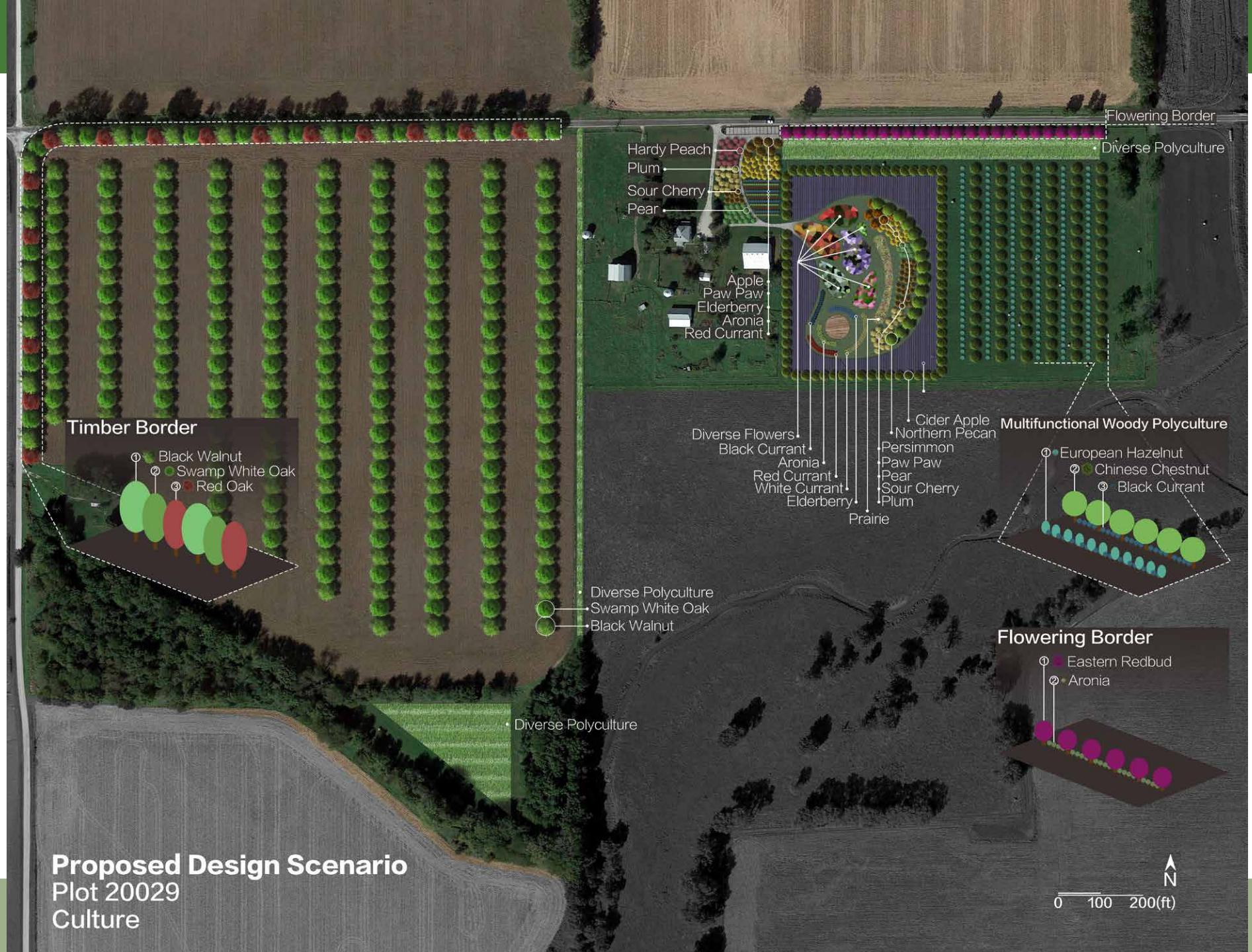
Production


Black Currant
Juneberry
Currant, red
Currant, white
Raspberry, yellow
Raspberry, black
Aronia
Raspberry, red
Cider Apple
Timber Border
Black Walnut
Swamp White Oak
Red Oak
Productive Border
Shellbark Hickory
Black Walnut
Northern Pecan
Chestnut–Currant Production
Black Currant
Chinese Chestnut
Pecan–Aronia Production
Aronia
Northern Pecan
Northern Pecan
Proposed Design Scenario
Plot 20029
Production
N
0 100 200(ft)

Conservation



Cultural


Flowering Border
Diverse Polyculture
Hardy Peach
Plum
Sour Cherry
Pear
Apple
Paw Paw
Elderberry
Aronia
Red Currant
Timber Border
① Black Walnut
② Swamp White Oak
③ Red Oak
Diverse Flowers
Black Currant
Aronia
Red Currant
White Currant
Elderberry
Prairie
Cider Apple
Northern Pecan
Persimmon
Paw Paw
Pear
Sour Cherry
Plum
Multifunctional Woody Polyculture
① European Hazelnut
② Chinese Chestnut
③ Black Currant
Diverse Polyculture
Swamp White Oak
Black Walnut
Diverse Polyculture
Flowering Border
① Eastern Redbud
② Aronia
N
0 100 200(ft)
Proposed Design Scenario
Plot 20029
Culture

What do the landowners think?

Narrowing in on preferences

Design materials provided

- Designs x3
- MPCs Information Book

Interview #2

- Preferences, motivators/barriers, adoption potential, building an **optimal design**

Results indicate production is most important

Preferred design by landowners (rank frequency)

Rank	Production	Conservation	Cultural
1	**8**	4	3
2	3	**10**	2
3	4	1	**10**
Interest score	3.6	3.2	3.4

Likert Scale Rating

1	2	3	4	5
Not at all interested would not adopt	Slightly interested, would adopt very little of the design	Somewhat Interested, would adopt some of the design	Moderately interested, would adopt a good amount of the design	Extremely interested, Would adopt most or all of the design

Results show value in working face to face

Likert-scale rating

1	2	3	4	5
Not at all	Slightly	Somewhat	Moderately	Extremely

Higher MPCs familiarity

- Before and after: 2.53→3.53

Higher MPCs adoption likelihood

- Before and after: 3.53→4.13

Usefulness of the design process

- Supplemental guide was most useful (average of 4.73)

13 out of 15 participants said they plan to adopt MPCs

How much of a barrier/motivator are the following?

0	1	2	3	4	5	6
Not at all	Slight	Somewhat	Moderate	Very	Extreme	Persuades me to adopt or not

Top Motivators

1. Growing high-value, edible crops (4.73)
2. Improving pollinator & wildlife habitat (4.46)
3. Productive use of marginal land (4.4)

↓

Ten participants stated this become more important after the study

Top Barriers

1. Lack of infrastructure for post-harvest processing and packaging (4.13)
2. Time and labor requirements (3.8)
3. Three tied (3.6)
   - »Lack of markets
   - »Lack of harvesting equipment
   - »Unfamiliarity with products/enterprises

Continuing to move forward

Future Work

- Field days and work with extension
- Long-term Field Trials with Select Participants
- Planning and Management Guide

Research needed

- Building lots of Markets
  - » “I would, if there was a market”
- Harvest machinery adapted to common systems (species mixing)
- Improving funding opportunities for systems

Why should the general public care about agroforestry design?

Marginal lands offer significant returns

- 7% of land was classified as marginal and suitable for MPCs
- 56% reduction in soil erosion by converting to MPCs

(Mattia *et al.* 2017, *In review*)

Marginal soils identified (**Source:** *Mattia et al.* 2017, *In review)*

Rethinking how we do “conservation”

#1 practice in Illinois is CP1- Establishment of Permanent Introduced Grasses and Legumes (176,656 acres)

Total CRP for Illinois as of May 2017

# of contracts	#of farms	Total acres	Total rental $	Avg. rental/acre
78,748	43,678	895,862	$161,815,000	$181

CRP monthly summary – May 2017, USDA

For this study:

- Average time spent per farmer roughly 10 hrs.
  - » Each farmer costs $500

Cost to design agroforestry on all Illinois CRP farms = $21,839,000

This is a one time investment, CRP is each year

Acknowledgments

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Research and design

- All of the MPCs study participants
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- Matt Wilson
- Chloe Mattia

Expertise and outreach

- Jay Hayek, Doug Gucker, and all of the UIUC Extension
- The Institute for Sustainable Energy and Environment at UIUC
- Savanna Institute