Development of a Pollinator Habitat Assessment Tool in Maine's Wild Blueberry Landscape

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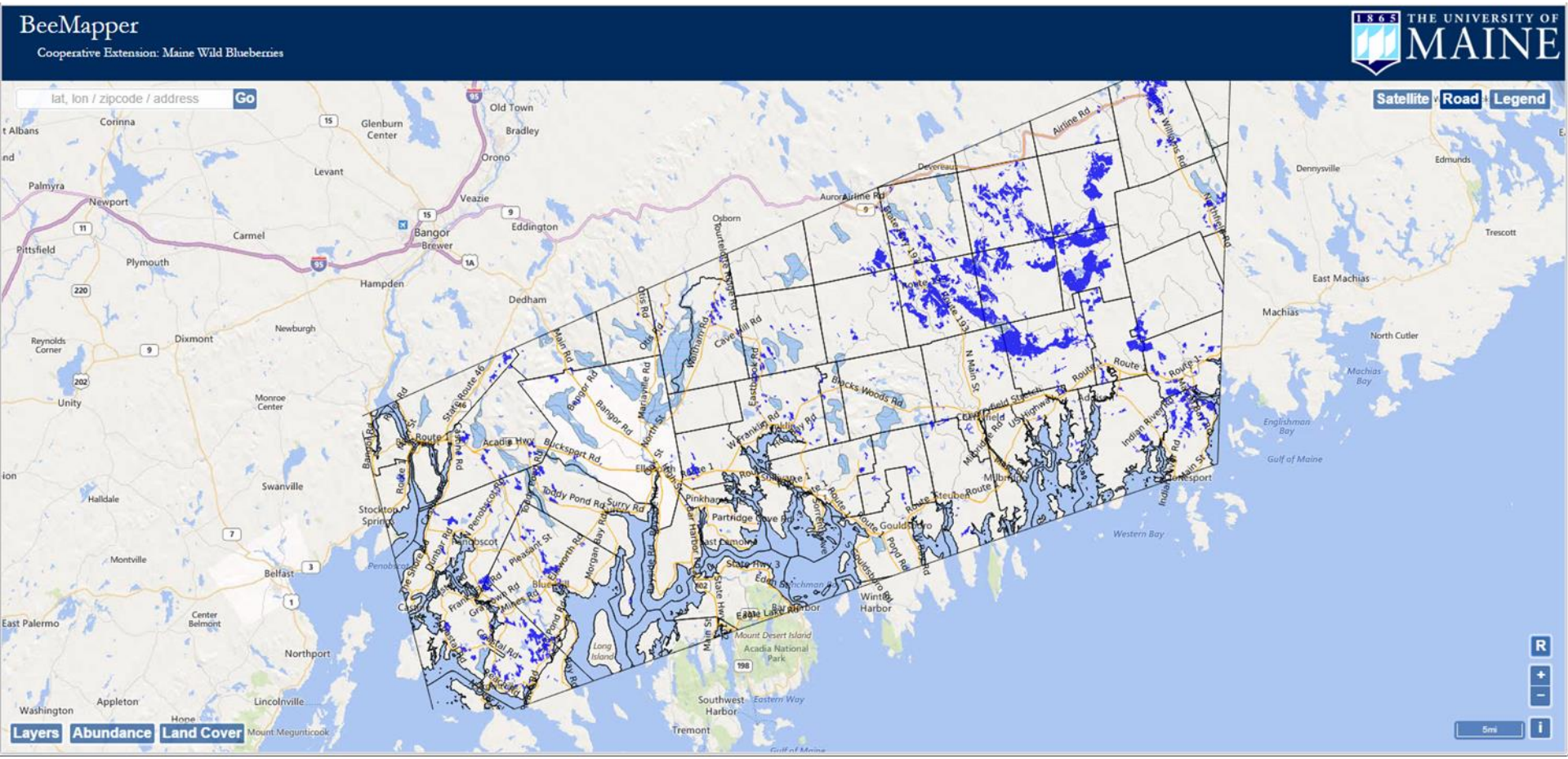
BeeMapper Web Tool



What is BeeMapper?

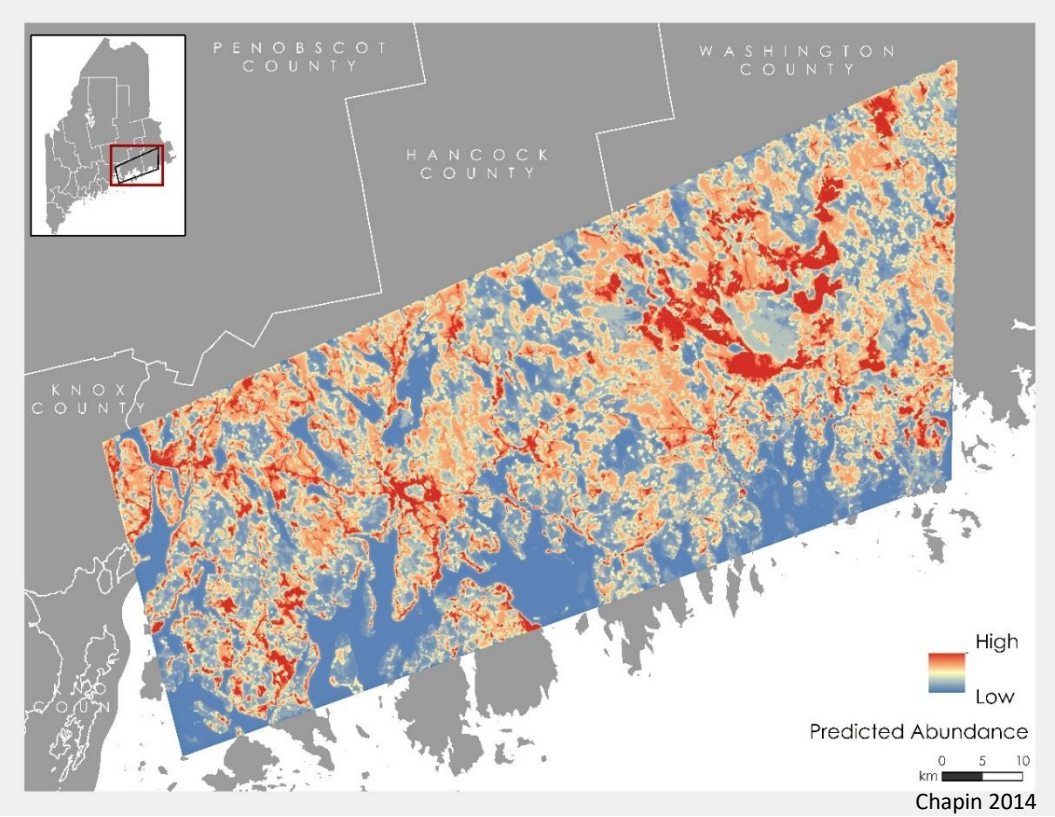
- Aim: to help growers assess wild bee habitat around their wild blueberry fields
- Target audience: Maine wild blueberry growers
- Features:
  - Maps
    - Land cover
    - Predicted wild bee abundance
    - Navigational aids
  - User's guide
  - Links for further reading

Why BeeMapper?

- Increasing reliance on honey bees may be unsustainable
- Need to understand contribution from wild bees
- How can we get the message out?
  - Make information publicly accessible
  - Display information in an intuitive manner

Photos: Wyman's of Maine, University of Maine

InVEST Crop Pollination Model

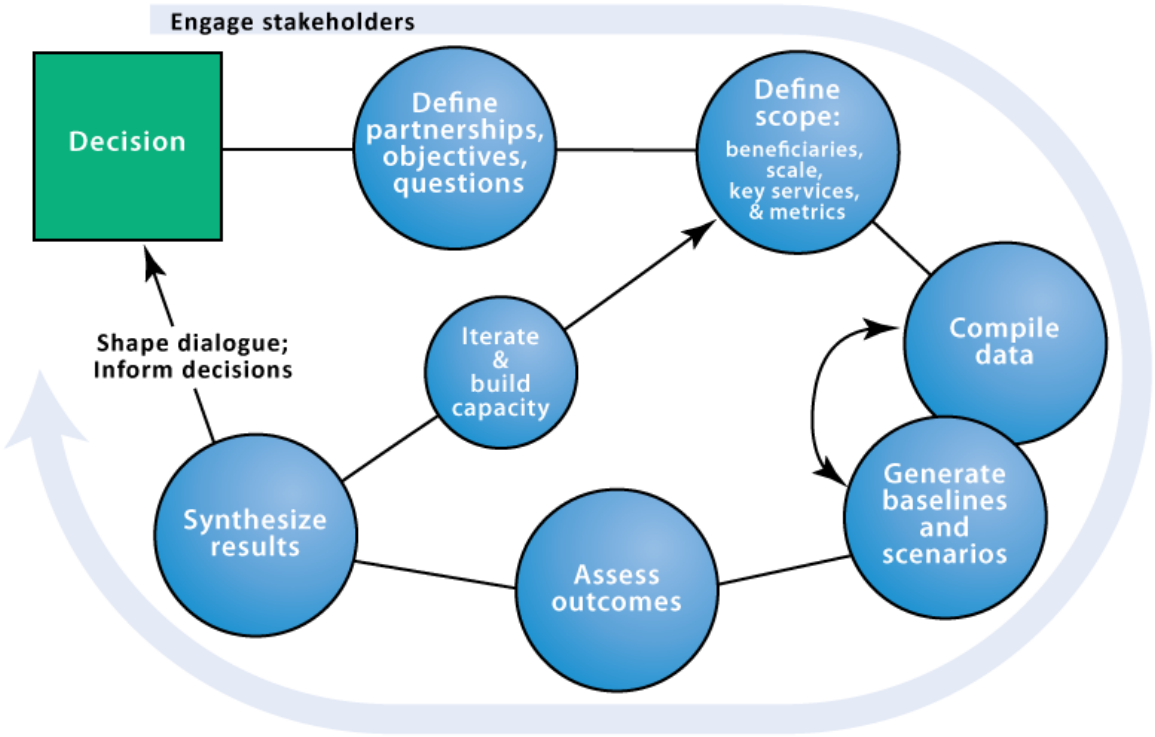


Chapin 2014

- Spatially explicit ecosystem service model
- Single snapshot, landscape scale

InVEST Crop Pollination Model

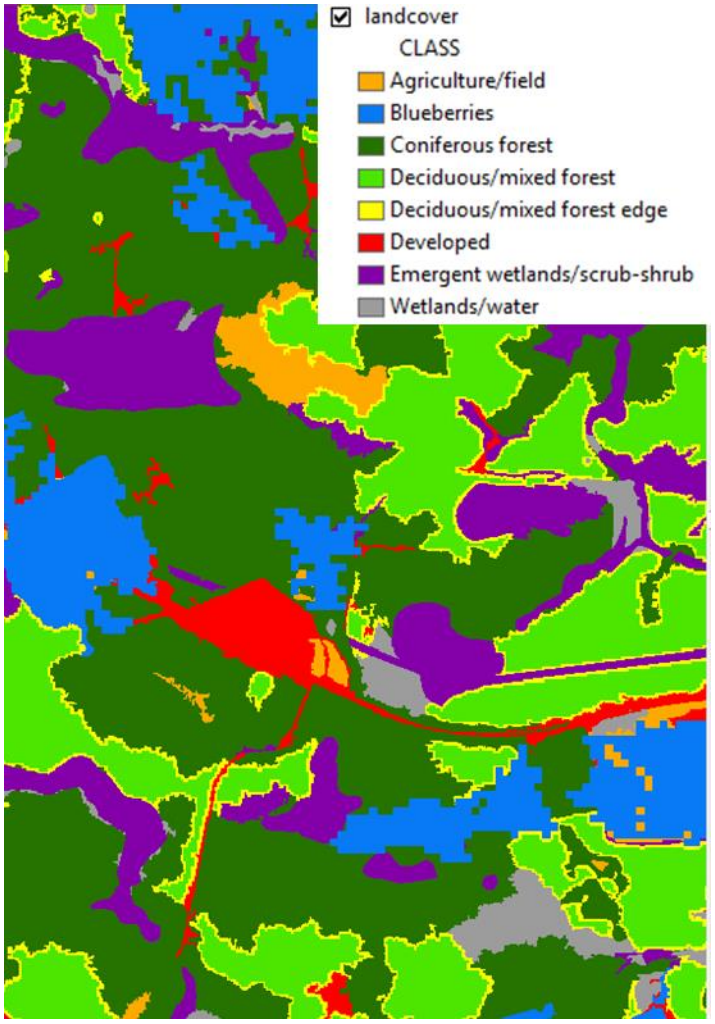
- Developed to inform decision making



InVEST
integrated valuation of ecosystem services and tradeoffs

InVEST Crop Pollination Model

- Input:
  1. Land cover data
     - 2004 MeLCD
     - 5 m resolution
     - 8 land cover types
     - Ancillary sources:
       - USDA CropScape
       - NWI
       - Roads, Railways



InVEST Crop Pollination Model

- Input:
  1. Land cover data
  2. Suitability values
     - Expert opinion survey (n=12)

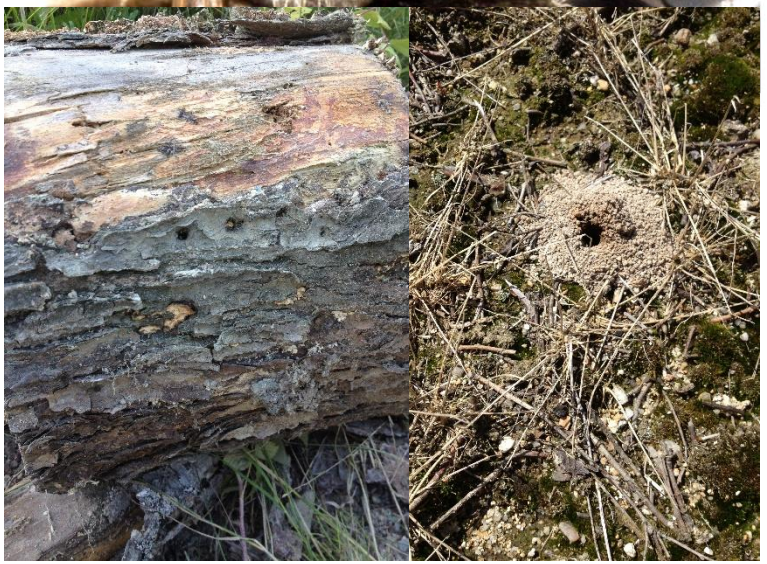
Table 3. Average (± standard deviation) scaled landcover suitability values assigned through expert opinion.

Landcover	Ground nesting	Cavity nesting	Spring forage	Early Summer forage	Late Summer forage
Deciduous/mixed forest, edge	0.9(0.17)	1.0(0.19)	0.9(0.24)	0.9(0.24)	1.0(0.22)
Developed/other	0.9(0.25)	0.6(0.30)	1.0(0.27)	0.9(0.26)	1.0(0.22)
Coniferous forest	0.5(0.23)	0.6(0.28)	0.1(0.24)	0.1(0.21)	0.1(0.29)
Deciduous forest/mixed forest	0.6(0.21)	0.9(0.22)	0.7(0.21)	0.5(0.29)	0.4(0.18)
Emergent wetlands/scrub-shrub	0.2(0.14)	0.4(0.24)	0.7(0.22)	0.6(0.25)	0.6(0.20)
Wetlands/water	0.1(0)	0.1(0.05)	0.3(0.20)	0.2(0.16)	0.5(0.18)
Agriculture/field	0.7(0.29)	0.2(0.18)	0.9(0.31)	0.7(0.27)	0.9(0.33)
Blueberries	1.0(0.25)	0.4(0.26)	0.4(0.29)	1.0(0.28)	0.5(0.26)

Chapin 2014

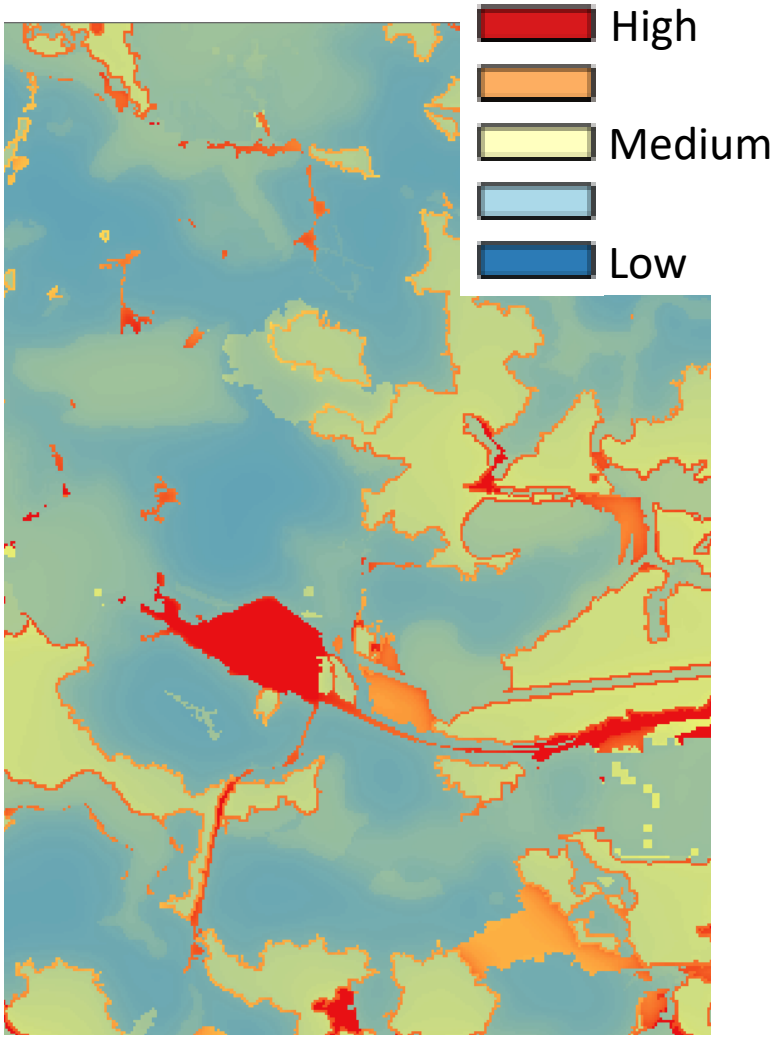
InVEST Crop Pollination Model

- Input:
  1. Land cover data
  2. Suitability values
  3. Bee species life history
     - Foraging distance
     - Nesting preference
     - Flight season



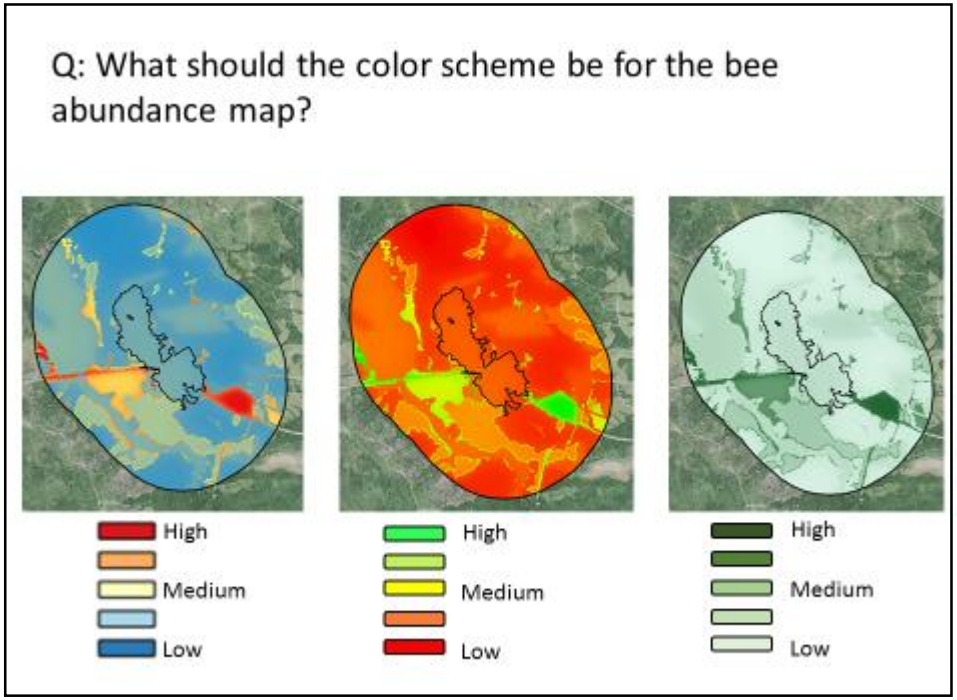
InVEST Crop Pollination Model

- Input:
  - Land cover data
  - Suitability values
  - Bee species life history
- Validation data from 40 fields
- Output: predicted wild bee abundance (10 m)

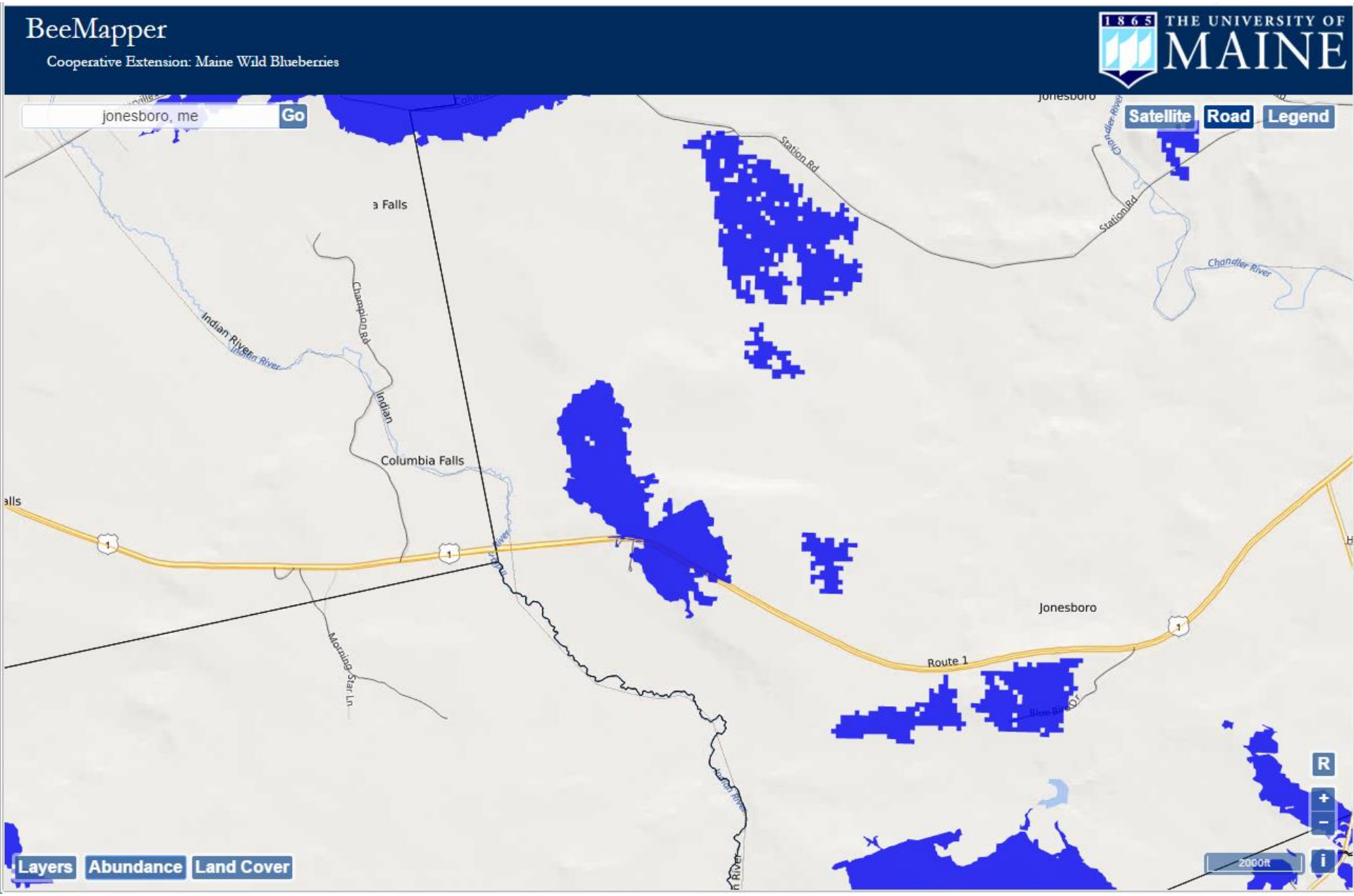


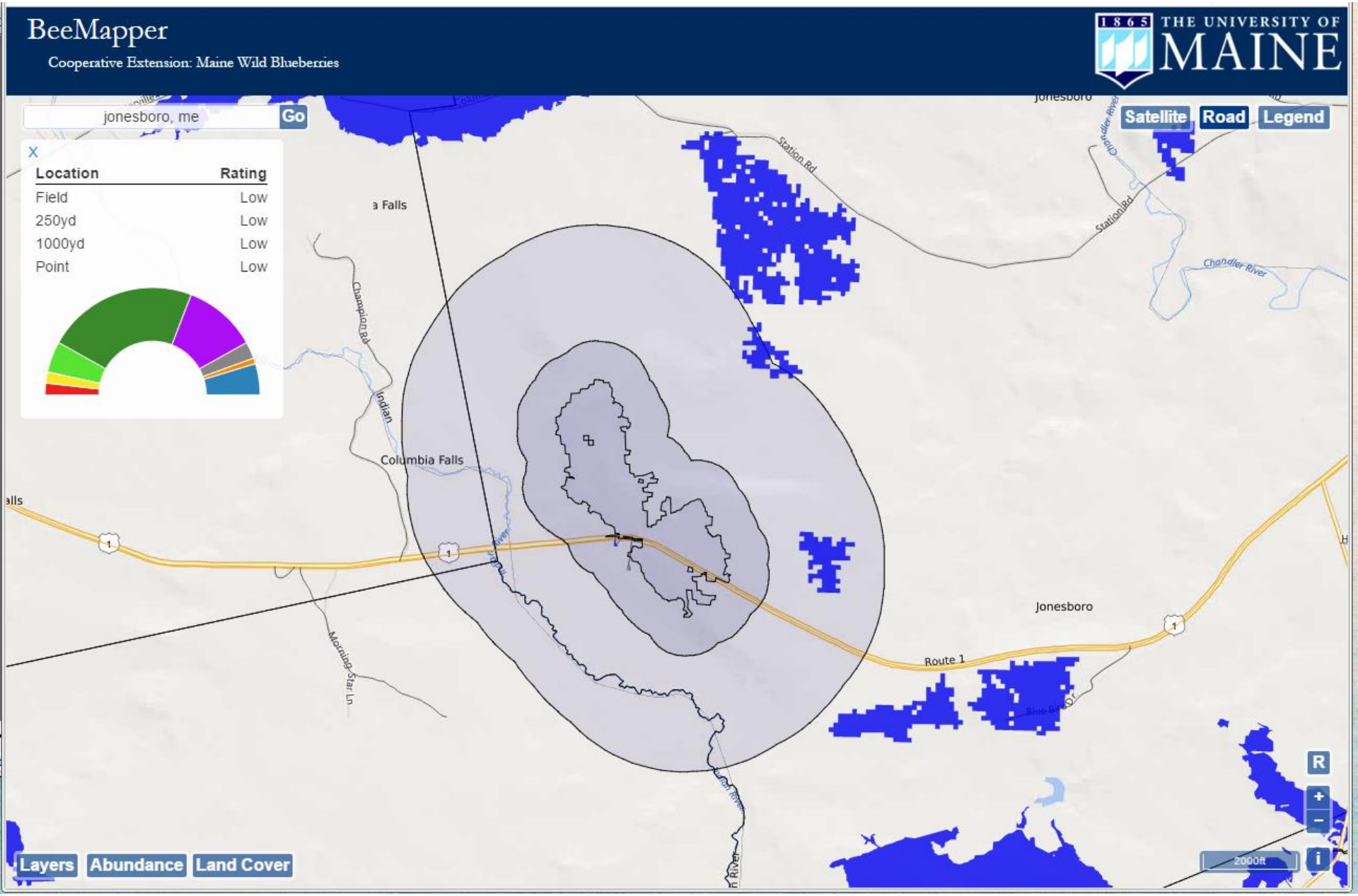
Participatory development

- 1st iteration: Small group presentation
  - Feedback:
    - more navigational aids
    - simple information
    - shaded color abundance map
- 2nd iteration: Booth at a large meeting
  - Spring Growers Meeting, March 2015



- 3rd iteration: Six 1:1 sessions
  - Growers using a variety of management practices, March 2015


BeeMapper
Cooperative Extension: Maine Wild Blueberries
THE UNIVERSITY OF MAINE
jonesboro, me
Go
Satellite
Road
Legend
Station Rd
Chandler River
Indian River
Champion Rd
Columbia Falls
Jonesboro
Route 1
Morning Star Ln
Layers
Abundance
Land Cover
2000ft


BeeMapper
Cooperative Extension: Maine Wild Blueberries
THE UNIVERSITY OF MAINE
jonesboro, me
Go
Satellite
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Location
Rating
Field
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250yd
Low
1000yd
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Point
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Columbia Falls
Jonesboro
Route 1
Station Rd
Chandler River
Champion Rd
Indian
Morning Star Ln
Layers
Abundance
Land Cover
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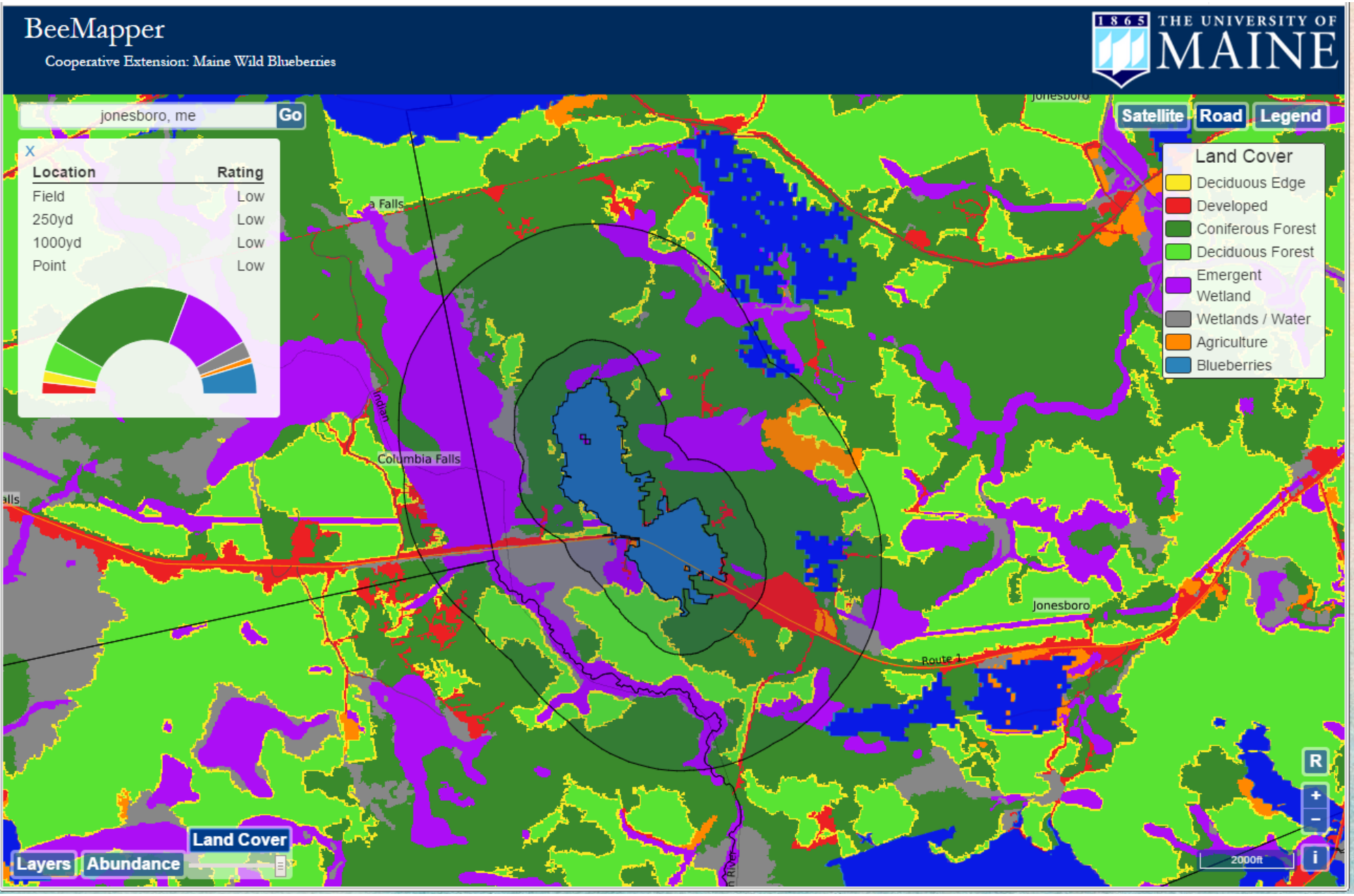
2000ft


BeeMapper
Cooperative Extension: Maine Wild Blueberries
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jonesboro, me
Go
Satellite
Road
Legend
X
Location
Rating
Field
Low
250yd
Low
1000yd
Low
Point
Low
Land Cover
Deciduous Edge
Developed
Coniferous Forest
Deciduous Forest
Emergent Wetland
Wetlands / Water
Agriculture
Blueberries
Columbia Falls
Jonesboro
Route 1
Land Cover
Layers
Abundance
2000ft
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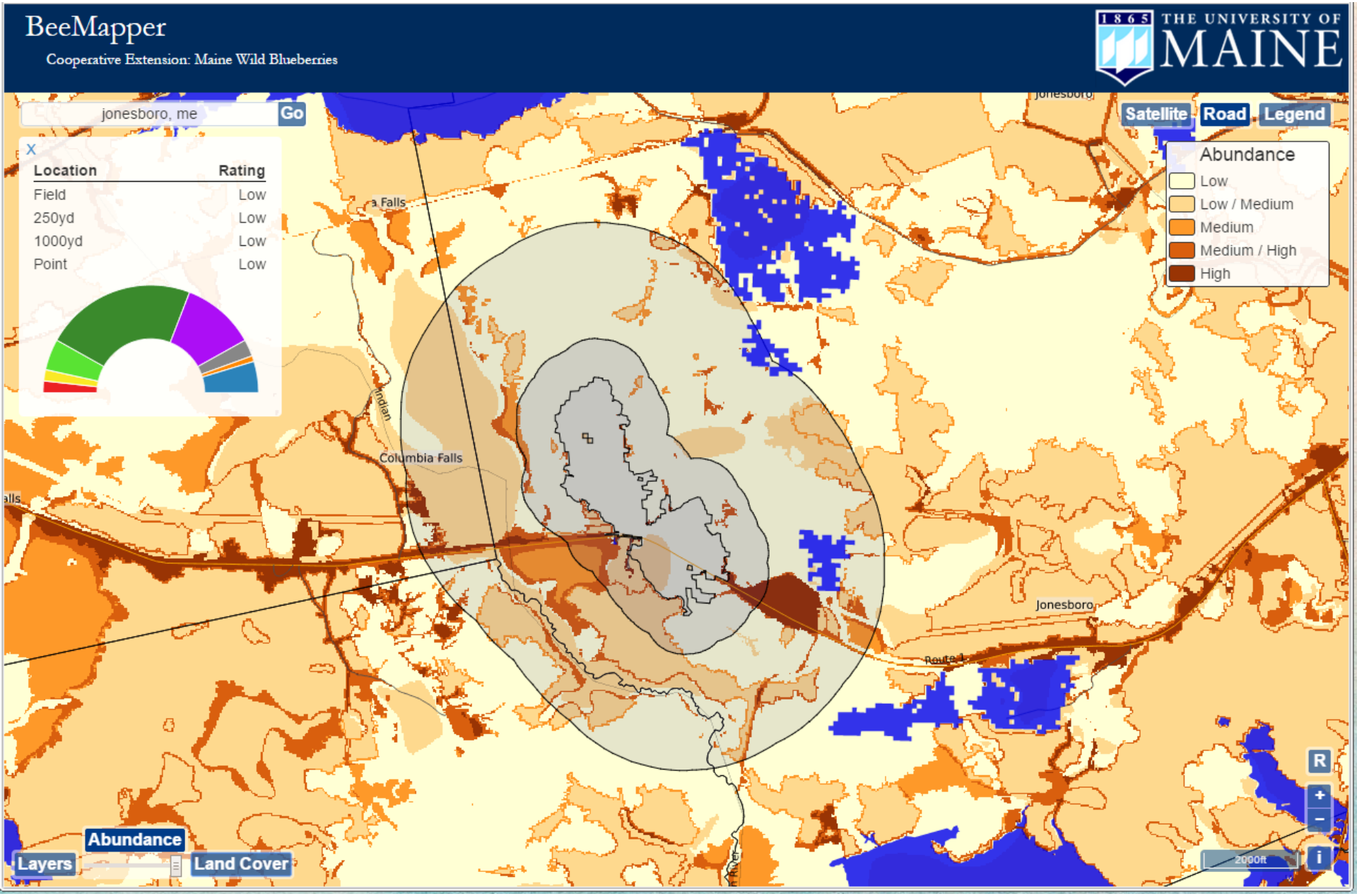
BeeMapper
Cooperative Extension: Maine Wild Blueberries
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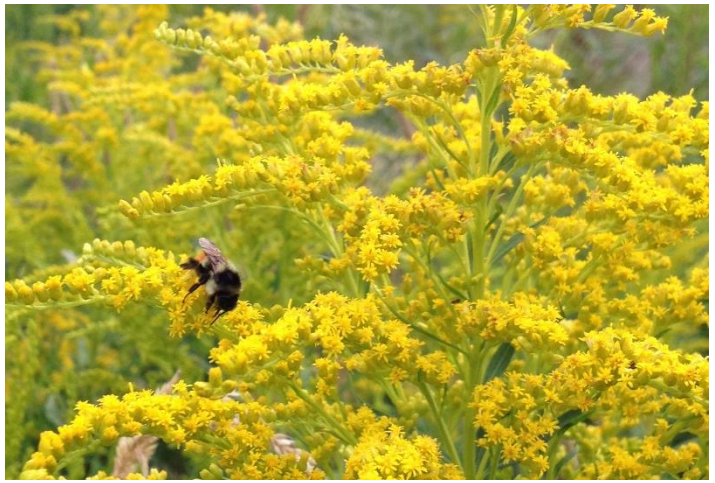
jonesboro, me
Go
Satellite
Road
Legend
Location
Rating
Field
Low
250yd
Low
1000yd
Low
Point
Low
Abundance
Low
Low / Medium
Medium
Medium / High
High
Columbia Falls
Jonesboro
Route 1
Abundance
Layers
Land Cover
2000ft

Translation to wild blueberry growers

- Sources of uncertainty:
  - Model performance
  - Accuracy at field scale
- How will growers use this data?
  - Honey bee hive placement
  - Pollinator conservation or planting placement



What's next

- More testing and development
  - More intuitive use and interpretation
  - Incorporating links for further reading
- Field surveys in 8 land cover types
- Application of InVEST in midcoast Maine growing region

Acknowledgments

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