Regional Food Systems in the NE United States:
Status, Possibilities, and Food Security

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Tufts University
• Dueling Food Systems (?)
• Trends in the Northeast U.S.
• Setting the Baseline, Considering the Future
• Challenge of Interdisciplinary work
Do we have two food systems?
Local can imply *Distance*
Relationships & markets
Number of Operating Farmers Markets

Source: USDA-AMS-Marketing Services Division
Direct to Consumer Sale of Food: Top 10 States

Direct Sale (% of Total Sales)

State

RI MA NH CT VT NJ ME AK NY HI

255 Farmers’ Markets
7,691 Farms
0.154 million acres harvested

239 Farmers’ Markets
92,900 Farms
23.7 million acres harvested
Share of the food system?

Impact on food security?
(Household and regional)
Interest in Northeast despite long-term agricultural challenges:

<table>
<thead>
<tr>
<th></th>
<th>1925</th>
<th>2007</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Farms</td>
<td>50,033</td>
<td>8,136</td>
</tr>
<tr>
<td>Land in Farms</td>
<td>5.16 million acres</td>
<td>1.34 million acres</td>
</tr>
<tr>
<td>Cropland</td>
<td>1.64 million acres</td>
<td>0.53 million acres</td>
</tr>
</tbody>
</table>

Quiz Question: Which Northeast state is this??
Comparative Advantage to Achieve Low Food Cost

Specialization

Economies of Scale

Input/Output Efficiency
Nearly Complete Externalization of Non-Production Costs

Environmental Degradation

Health Impacts (direct and indirect)

Economic Opportunity
Getting back to Regional...

- Maine to West Virginia
- Supply chains
- Farms are the start
- Consumers are the end
Enhancing the Food Security of Underserved Populations in the Northeast U.S. through Sustainable Regional Food Systems (EFSNE)

Funded by USDA/NIFA (Global Food Security Program)
Prepared for the March 26, 2013 PD Meeting, Washington, DC

Grant No. 2011-68004-30057
Northeast AFRI-GIS Project Sites and Collaborating Institutions

- Rural Study Sites (DE, NY and VT)
- Metro Study Sites

Metro Study Sites:
- Charleston
- Baltimore
- Pittsburgh
- Philadelphia
- New York
- Syracuse

Rural Study Sites:
- Charleston
- Baltimore
- Syracuse
- Pittsburgh
- Philadelphia
- New York
- Rural Sites (DE, NY and VT)

Collaborating Institutions:
- USDA
- PENNSTATE
- Columbia University
- NESAWG
- Tufts University
- University of Vermont
- East-West Center
Supply Chains

Processing/Distribution

Access in Communities  Farm-level Production
## Land and Land Use in NE

<table>
<thead>
<tr>
<th>Land in Farms</th>
<th>Northeast</th>
<th>U.S.</th>
<th>Share</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>26.1</td>
<td>922.1</td>
<td>2.8</td>
</tr>
<tr>
<td>Cropland</td>
<td>12.1</td>
<td>309.6</td>
<td>3.9</td>
</tr>
</tbody>
</table>
Northeast regional mean agricultural land area, 2001-2010

- Forages and field and grass seeds (animal feed)
- Other land in farms (not in production)
- Field crops (animal feed)
- Pasture land (grazed)

- Grains
  - Vegetables
  - Oils
  - Protein foods
  - Fruit

- Food crops grown in nurseries

% of total agricultural land in the Northeast:
- 0
- 19
- 37

- Grains
  - Oils
  - Vegetables
  - Protein foods
  - Fruit
Crop Diversity in the Northeast

More than 300 different crops grown (includes feed, food, non-food, “other”)

- Corn (grain)
- Soybean
- Corn (silage)
- Wheat
<table>
<thead>
<tr>
<th>Category</th>
<th>Regional Self-Reliance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grains</td>
<td>8</td>
</tr>
<tr>
<td>Proteins</td>
<td>8</td>
</tr>
<tr>
<td>Vegetables</td>
<td>28</td>
</tr>
<tr>
<td>Fruit</td>
<td>19</td>
</tr>
</tbody>
</table>

Reliance = (regional production / regional consumption) * 100
<table>
<thead>
<tr>
<th>Vegetable Group</th>
<th>Regional Self-Reliance (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dark Green</td>
<td>12</td>
</tr>
<tr>
<td>Starchy</td>
<td>44</td>
</tr>
<tr>
<td>Red and Orange</td>
<td>13</td>
</tr>
<tr>
<td>Other</td>
<td>34</td>
</tr>
<tr>
<td>Fruit Group</td>
<td>Regional Self-Reliance (%)</td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------------------</td>
</tr>
<tr>
<td>“Commonly Eaten”</td>
<td>17</td>
</tr>
<tr>
<td>Berries</td>
<td>54</td>
</tr>
<tr>
<td>Melons</td>
<td>13</td>
</tr>
</tbody>
</table>
On a fluid milk equivalent basis, the region is about 75% self reliant for dairy

Northeast Regional Production from Meat Animals (mean, 2001-2010)

Seafood: 448 (44%)
Beef: 664 (16%)
Pork: 891 (15%)
Chicken: 1,478 (29%)
Fluid milk is a regional product;
Other dairy products are not (necessarily)

On a fluid milk equivalent basis, the region is about 75% self reliant
Clustering of higher or lower yields and stability of yields over time
Geospatial Crop Modeling

- Current production
- Production Scenarios
  - Water use
  - Land use change
  - Climate change
- Questions:
  - How much land?
  - Highest potential yield?
  - Production constraints?
  - Resource needs?

Results aggregated to the county-level
Three crops to be simulated (potatoes, corn, wheat)
Water-limited (WL) and non-limited (NL) scenarios

[Map showing potato yield (Mg/ha) for different counties with color-coded scales for yield ranges.]
Cropping System Linkages

USDA-NASS, Cropland Data Layer
3-year Production Footprints

ME  Total Cropland  214,000 ha

NY  Total Cropland  1,746,000 ha

MD  Total Cropland  569,000 ha

2007 Census of Agriculture

2008-2010
Urban & Peri-Urban Agriculture Assessment
If we are to grow more food within the region, where would that occur?

How would such shifts be impacted by drivers like climate change, dietary shifts, etc.?

How are production and consumption changes likely to be affected by policy??
How does this type of work get done?

“Emergent Learning Community”
(Clare Hinrichs, Penn State)
PROD Team Meetings
Keeping in Touch

Data sharing and file versioning are very real challenges.

Our PROD group has had a conference call every 2nd Friday since March 2010.
Other Learnings

1. Student interest and engagement greater than anticipated
2. Work at community level requires substantial effort—uneven results
3. Adaptive management is key to daily problem solving
4. Teams learning to utilize new methods from unrelated disciplines
Average density 2006: 1.75

Legend
1: if knew of this individual in 2006
2: if ever cited this person’s published work
3: if had working relationship with (in local or regional foods)

Note colors represent k-core
Average density
2006: 1.75
2010: 10.94
2012: 18.29*

*t-stat: (9.92) 2012/2006

Legend
Line colors show intensity of interaction
Node colors represent k-cores

GFS Project Network: 2012 (Stephan Goetz)
Thanks!