

PROPOSED VULNERABILITY ASSESSMENT PROCESS

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WHAT TO ASSESS

Natural Areas

- Use ecosystem vulnerability process already developed.

Developed/Urban areas

- New approach needed!

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MODIFICATIONS TO VULNERABILITY ASSESSMENT PROCESS: URBAN AREAS

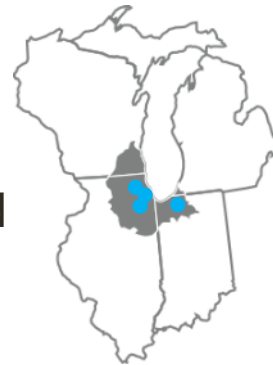
1. Assess **species vulnerability** to climate change

- Done for entire Chicago Wilderness area
- Area-wide scientist/manager expertise incorporated
- Draft done by small team, wider group reviews



2. Assess **urban forest vulnerability** to climate change

- Done at the municipal level
- Local/municipal forester/planner expertise incorporated
- Workshop setting



STEP 1: AREA-WIDE SPECIES ASSESSMENT

1. Assess **tree species vulnerability** to climate change



2. Assess **urban forest vulnerability** to climate change

PROPOSED SPECIES LEVEL FRAMEWORK

1

- Identify species to assess

2

- Combine model information to assess climate impacts

3

- For species not modeled, provide climate impact information based on hardiness zones or natural distribution range

4

- Assess adaptive capacity

5

- Assess vulnerability and uncertainty

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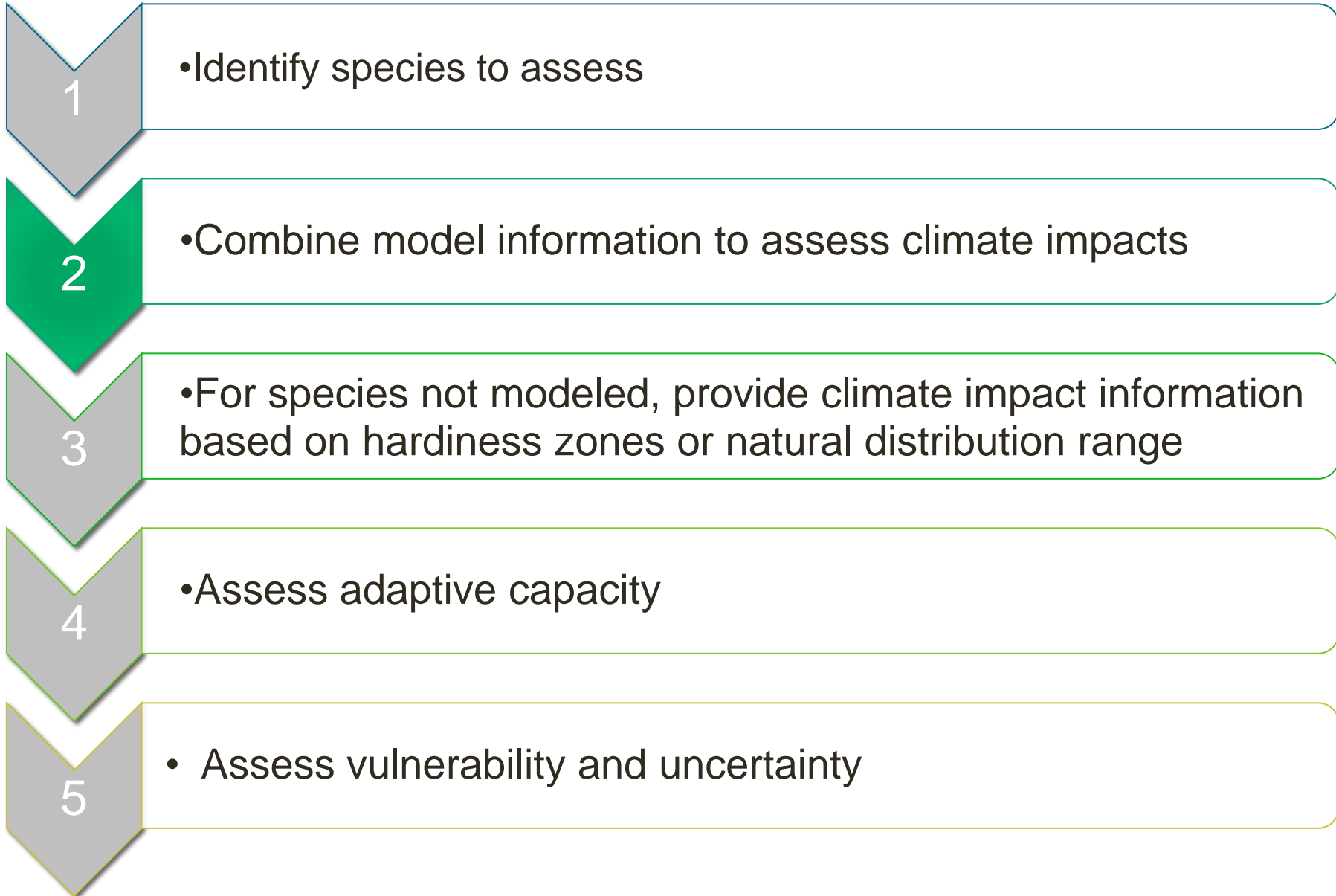
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- Assess vulnerability and uncertainty

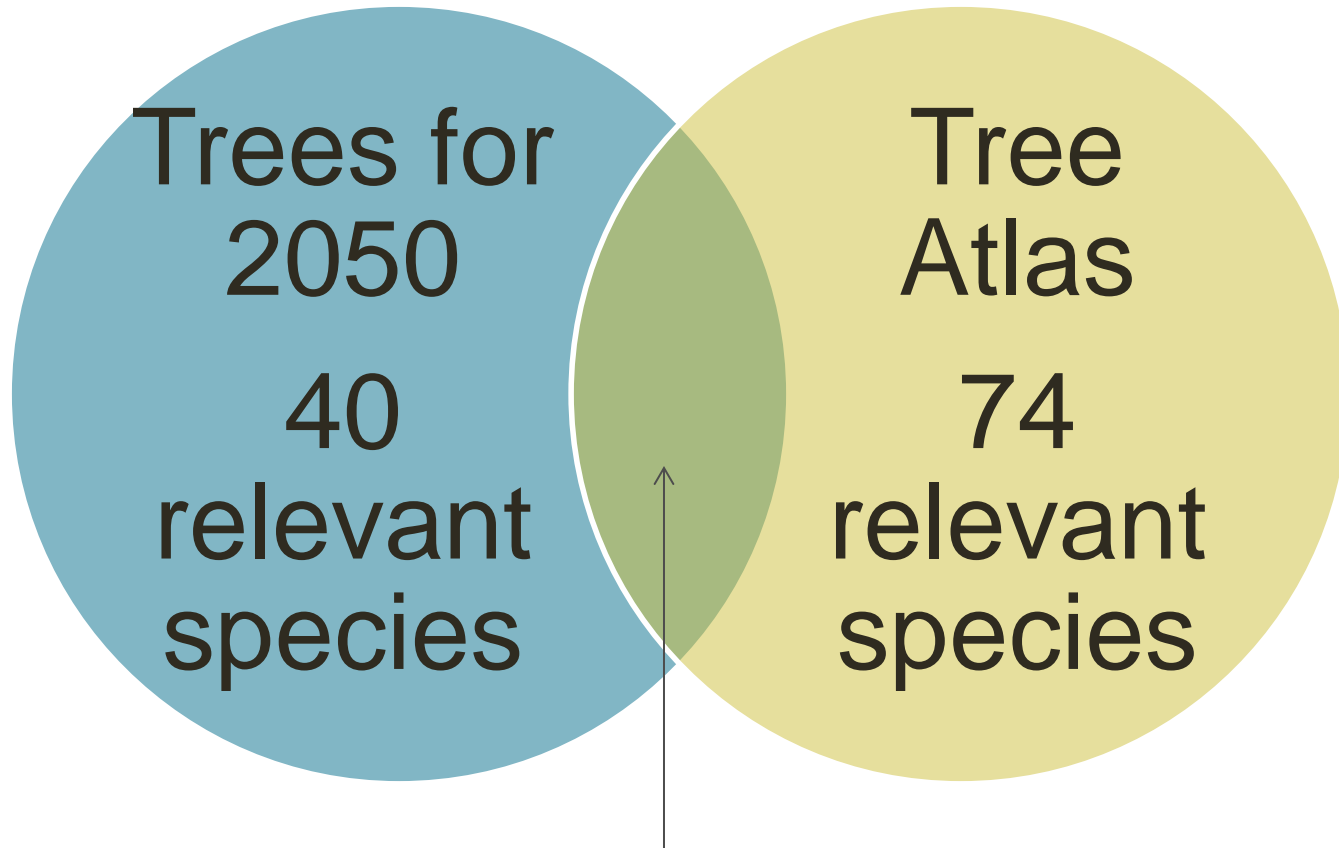
WHAT SPECIES TO ASSESS?

- List developed based on:
 - what species are **common in the area** (tree census)
 - what's **currently recommended** for planting (RTI/city of Chicago list)
 - what species have **model information** available

PROPOSED SPECIES LEVEL FRAMEWORK

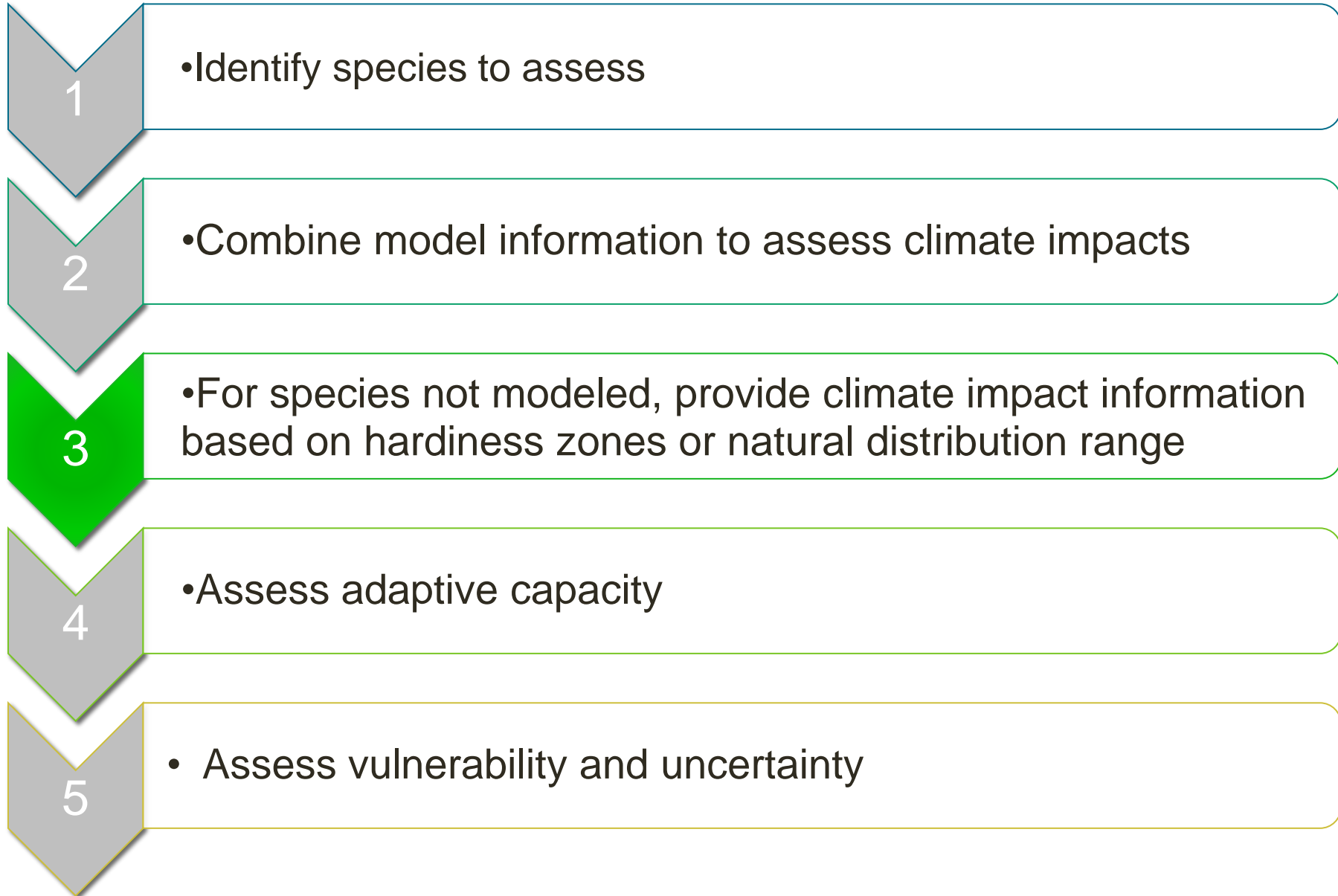


MODEL INFORMATION AVAILABLE



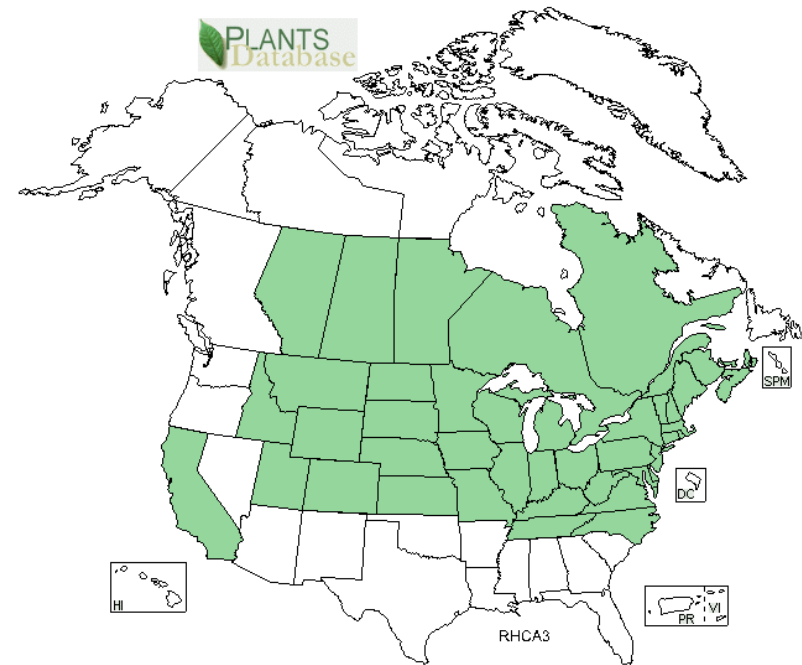
23 species modeled by both

PROPOSED SPECIES LEVEL FRAMEWORK

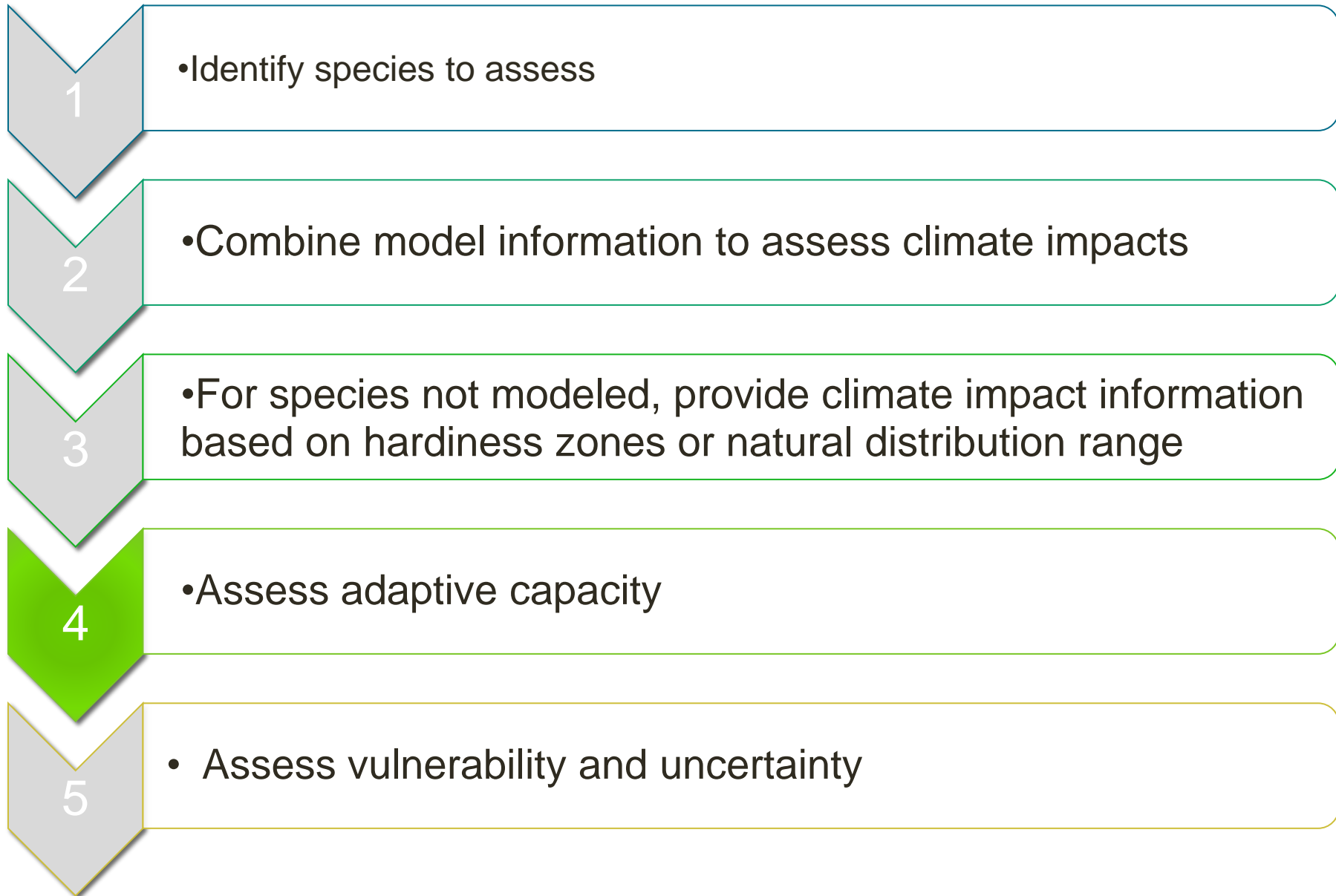


SPECIES WITH NO MODEL INFO

- Includes many invasive species (buckthorn, honeysuckle) and shrubbier species (lilac, yew)
- Use heat/hardiness zone maps or PLANTS database ranges?



PROPOSED SPECIES LEVEL FRAMEWORK



MODIFYING FACTORS (ADAPTIVE CAPACITY)

- Developed by Louis Iverson's group
- Two Types:
 - Disturbance factors (external stressors)
 - Biological factors (life history traits)
- Factors scored on a scale from -3 (lower adaptive capacity) to +3 (higher adaptive capacity)
- Information gleaned from primary and secondary literature

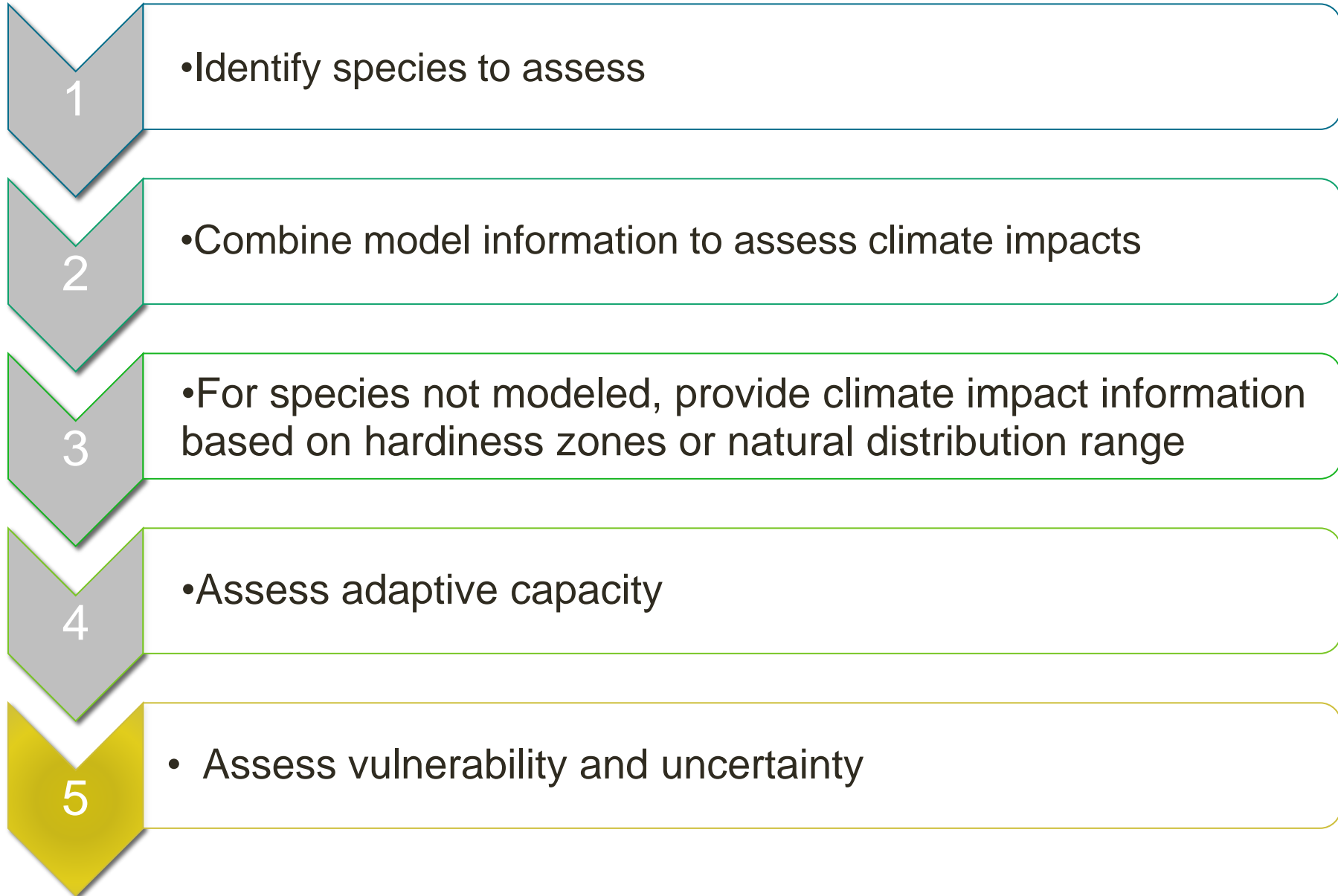
DISTURBANCE FACTORS-PLANTED AREAS

- Disease
- Insect pests
- Browse (less of an issue, but keep?)
- Invasive plants (delete for planted species?)
- Drought
- Flood
- Wind
- Fire topkill (delete)
- Harvest (delete)
- Temperature gradients
- Pollution (place more emphasis)
- Add: Salt tolerance, others?

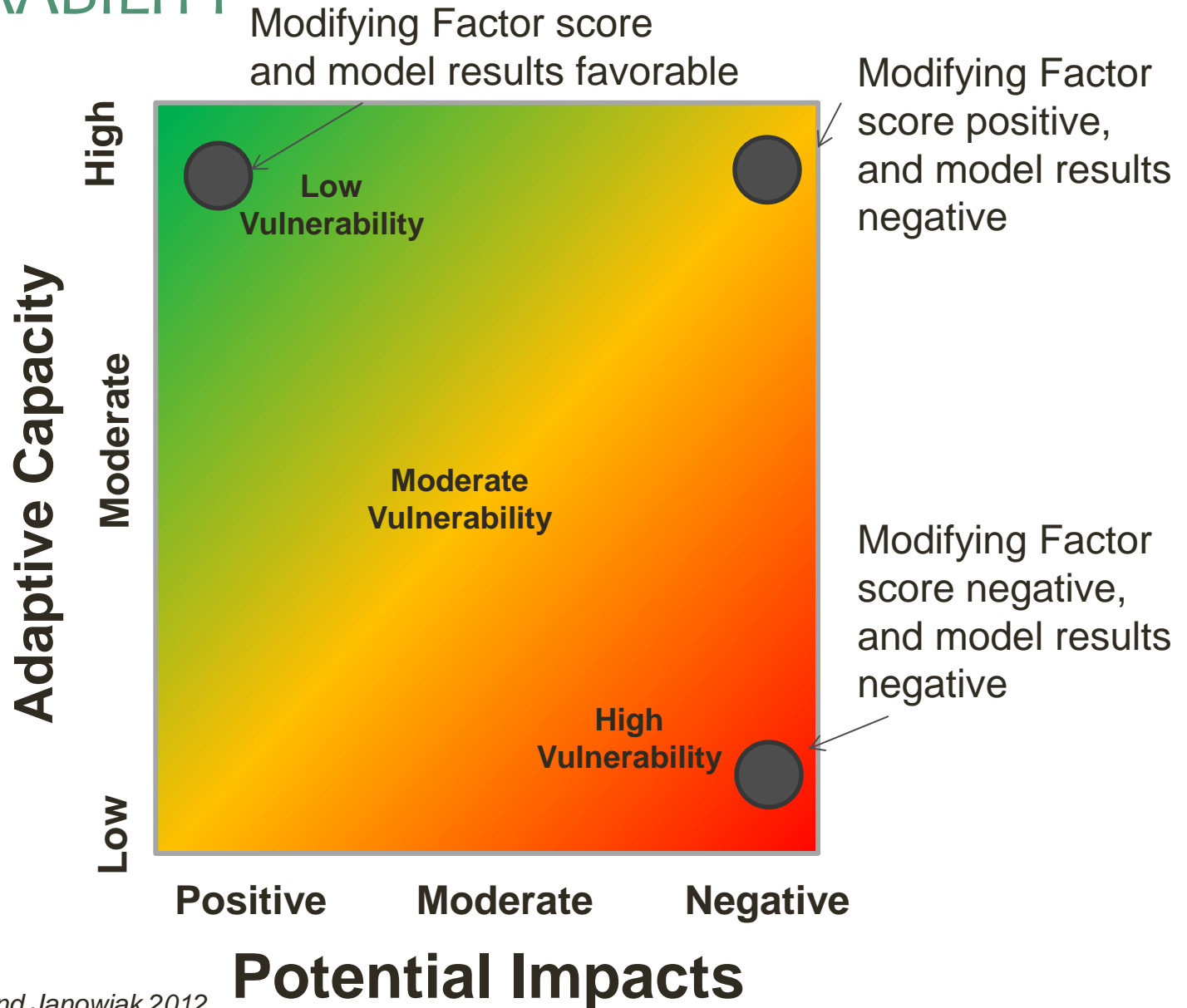
BIOLOGICAL FACTORS-PLANTED AREAS

- Competition-light (not an issue?)
- Edaphic Specificity
- Environmental habitat specificity
- Dispersal (delete)
- Seedling establishment (delete)
- Vegetative reproduction (delete)
- Fire regeneration (delete)
- Add:
 - Tolerance of restricted rooting conditions
 - Land use/planting site specificity?
 - Nursery production potential (ease, cost)
 - Ease of planting establishment

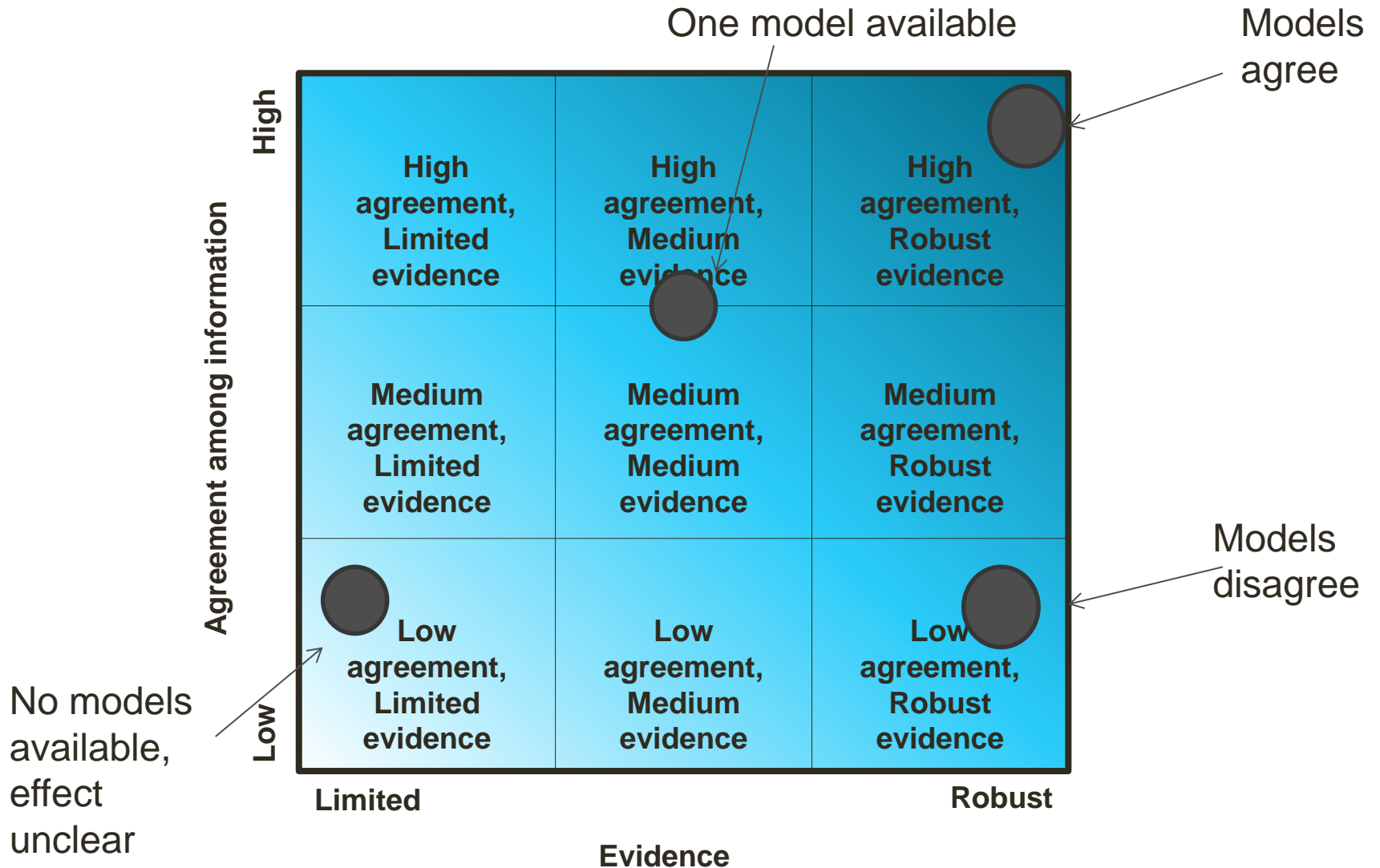
PROPOSED SPECIES LEVEL FRAMEWORK



VULNERABILITY



UNCERTAINTY



EXAMPLE SUMMARY OUTPUT

Species or cultivar Name	Projected Habitat Suitability Change– Trees for 2050 model	Projected Habitat Suitability Change – Tree Atlas model	Projected Habitat Suitability change based on Heat zone/range	Adaptive Capacity – Disturbance	Adaptive Capacity- Biological	Overall Vulnerability	Confidence
Baldcypress	Increase	Increase		Low	Medium	Medium -low	High
European Buckthorn			No change	High	High	Low	Low
Freeman maple	Decline			Medium	High	Medium -high	Medium

KEY QUESTIONS: SPECIES VULNERABILITY

1. For species where there is no model information available, how could we go about assessing **climate change impacts**?
2. What factors should/shouldn't we consider when assessing the **adaptive capacity** of planted species in developed areas?

STEP 2: URBAN FOREST ASSESSMENTS

1. Assess **tree species vulnerability** to climate change



2. Assess **urban forest vulnerability** to climate change

ASSESSING VULNERABILITY-URBAN FOREST

1

- Identify municipalities that are willing to serve as demonstrations/case studies
- Form small teams of foresters, planners, arborists, etc.
- Bring together for workshop(s)

2

- Assess impacts on different land uses/neighborhoods of a municipality
- Local tree inventories/surveys-compare to area-wide list
- Other factors (in a flood zone, heat islands)

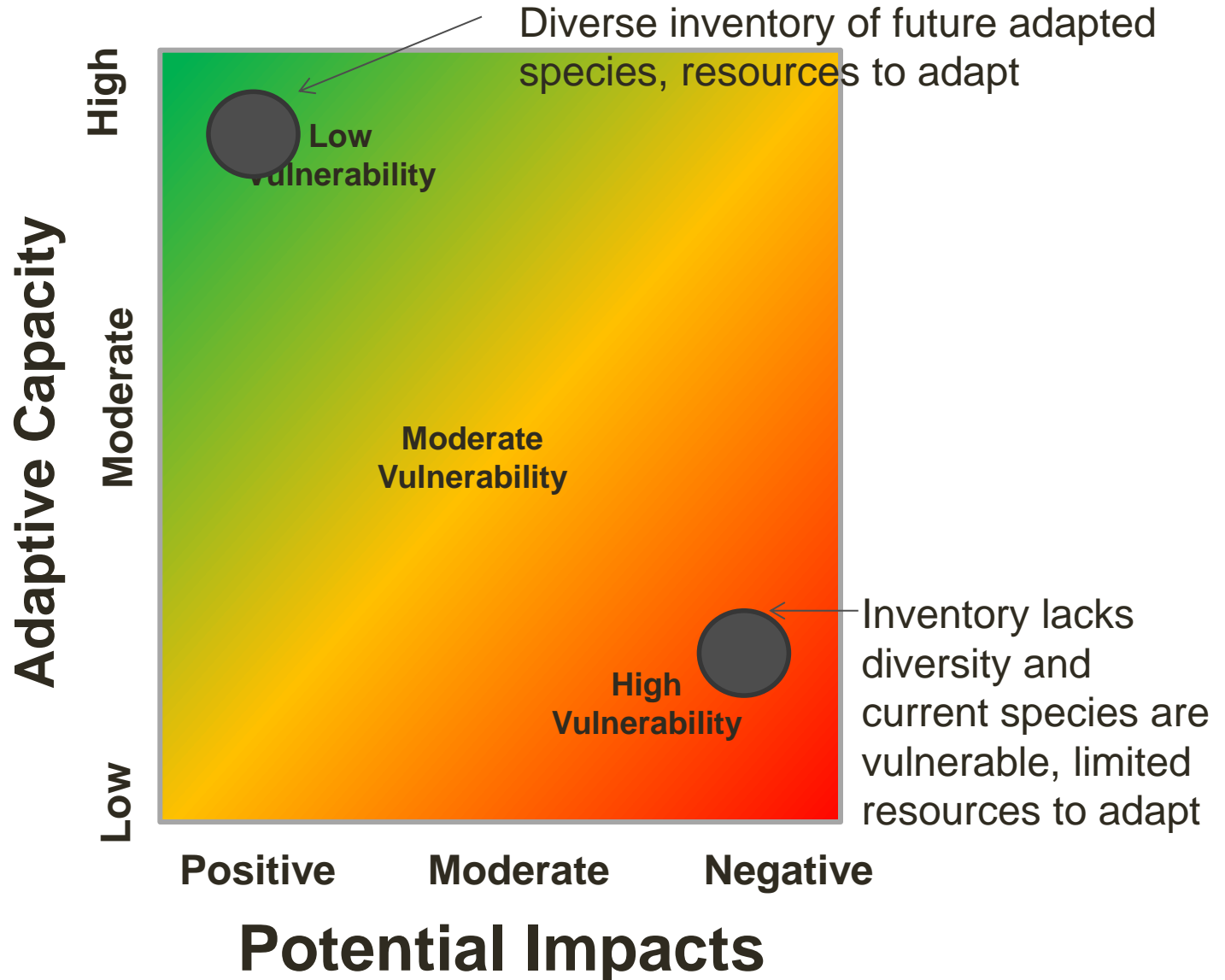
3

- Assess adaptive capacity
- Modify species adaptive capacity from area-wide list
- Add local social, organizational, economic factors

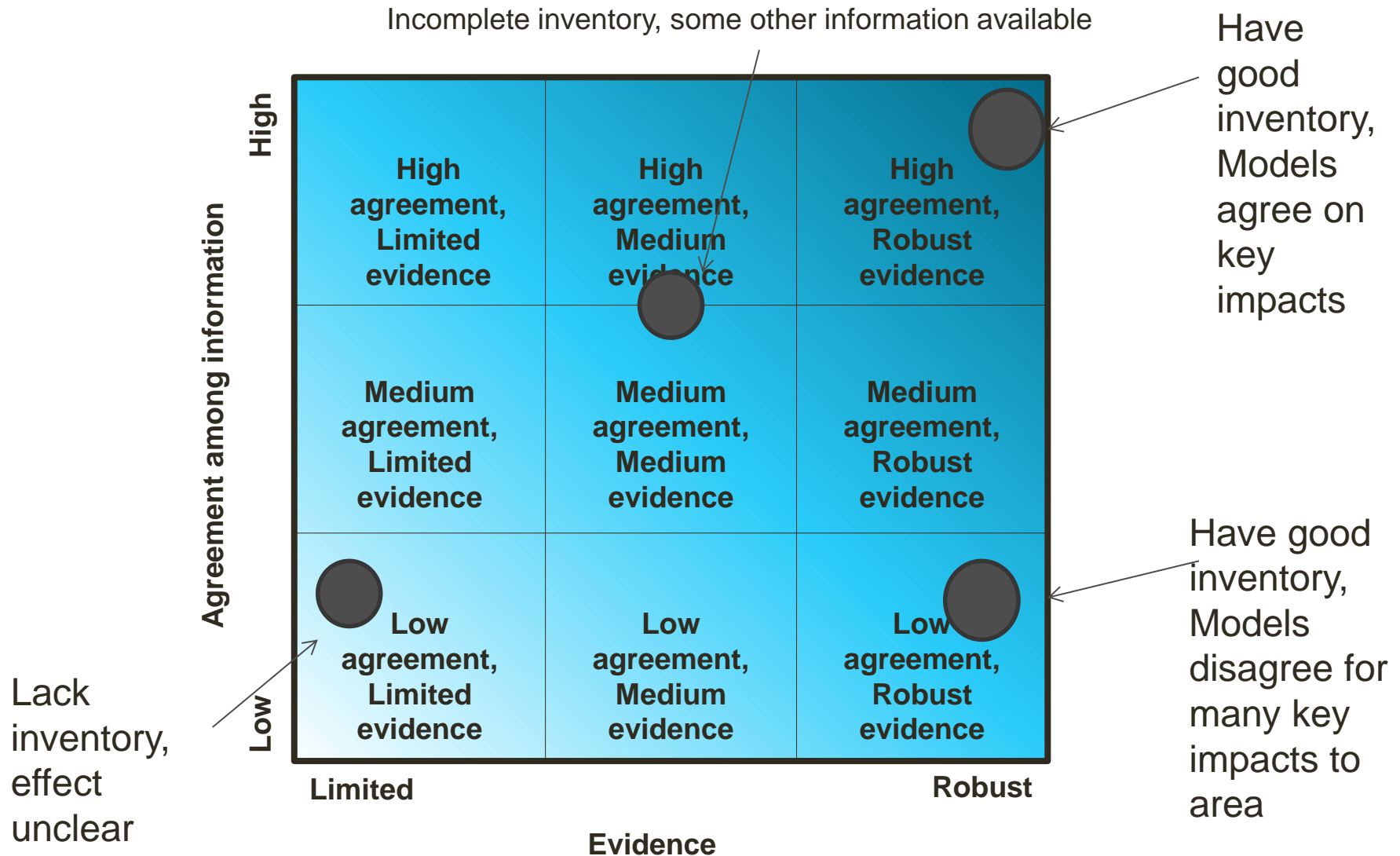
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- Assess vulnerability and uncertainty

VULNERABILITY-URBAN FOREST

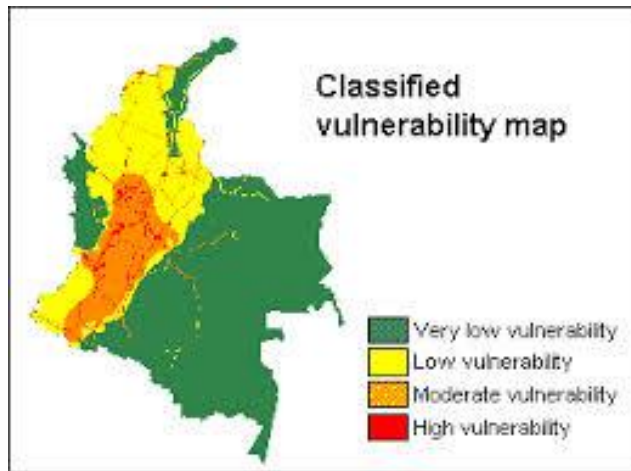


UNCERTAINTY-URBAN FOREST



EXAMPLE OUTPUT- URBAN FOREST

Option 1: Vulnerability Map



Option 2: Vulnerability Table

Area	Potential Impacts	Adaptive Capacity	Vulnerability	Evidence	Agreement
Northeast Chicago-Residential	Moderate	High	Low-Moderate	Medium	Medium-High
Downtown Chicago	Negative	Low	High	Medium	Medium-High
Southwest Chicago-Street Trees	Moderate	Moderate	Moderate	Limited - Medium	Medium

KEY QUESTIONS-URBAN FOREST VULNERABILITY

1. What factors could we consider when assessing the **adaptive capacity** of an urban forest at the municipal level?
2. What information and expertise would aid in assessing **vulnerability** (both impacts and adaptive capacity) at the municipal level?

PRODUCTS

1. Assess **tree species vulnerability** to climate change

- List(s) of species impacts, adaptive capacity, vulnerability
- Accompanying document with synthesis on local impacts



2. Assess **urban forest vulnerability** to climate change

- Case study write-ups
- Launching place for demonstration projects

TIMELINE

1. Assess **tree species vulnerability** to climate change

- Complete draft July 2014
- Final draft Winter 2014-15
- Publish Spring 2015



2. Assess **urban forest vulnerability** to climate change

- Workshop(s) July-August 2014
- Draft case study write-ups Fall 2014
- Publish Spring 2015