

Urban Ecology

Wendy Jackson and Maia Willcox

Lawrence Hall of Science



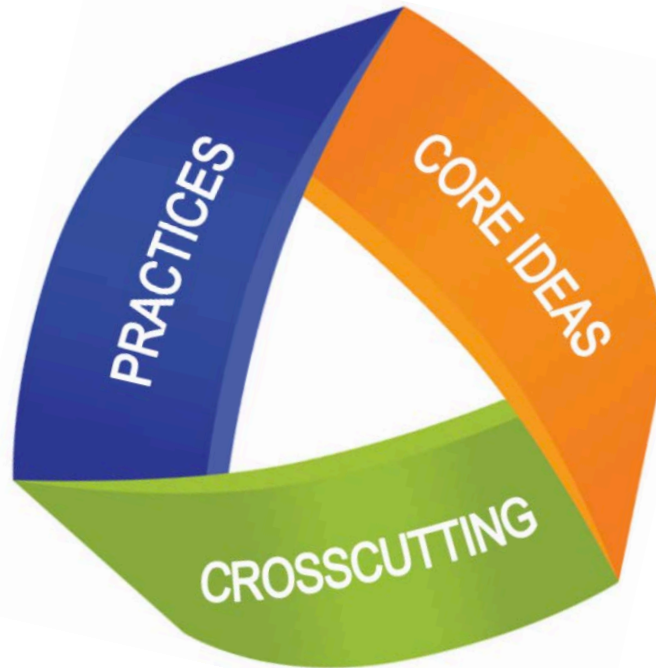
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3 Dimensions

Planning and
Carrying Out
Investigations

Asking Questions



LS2.A:
Interdependent
Relationships in
Ecosystems

Patterns
Cause and Effect

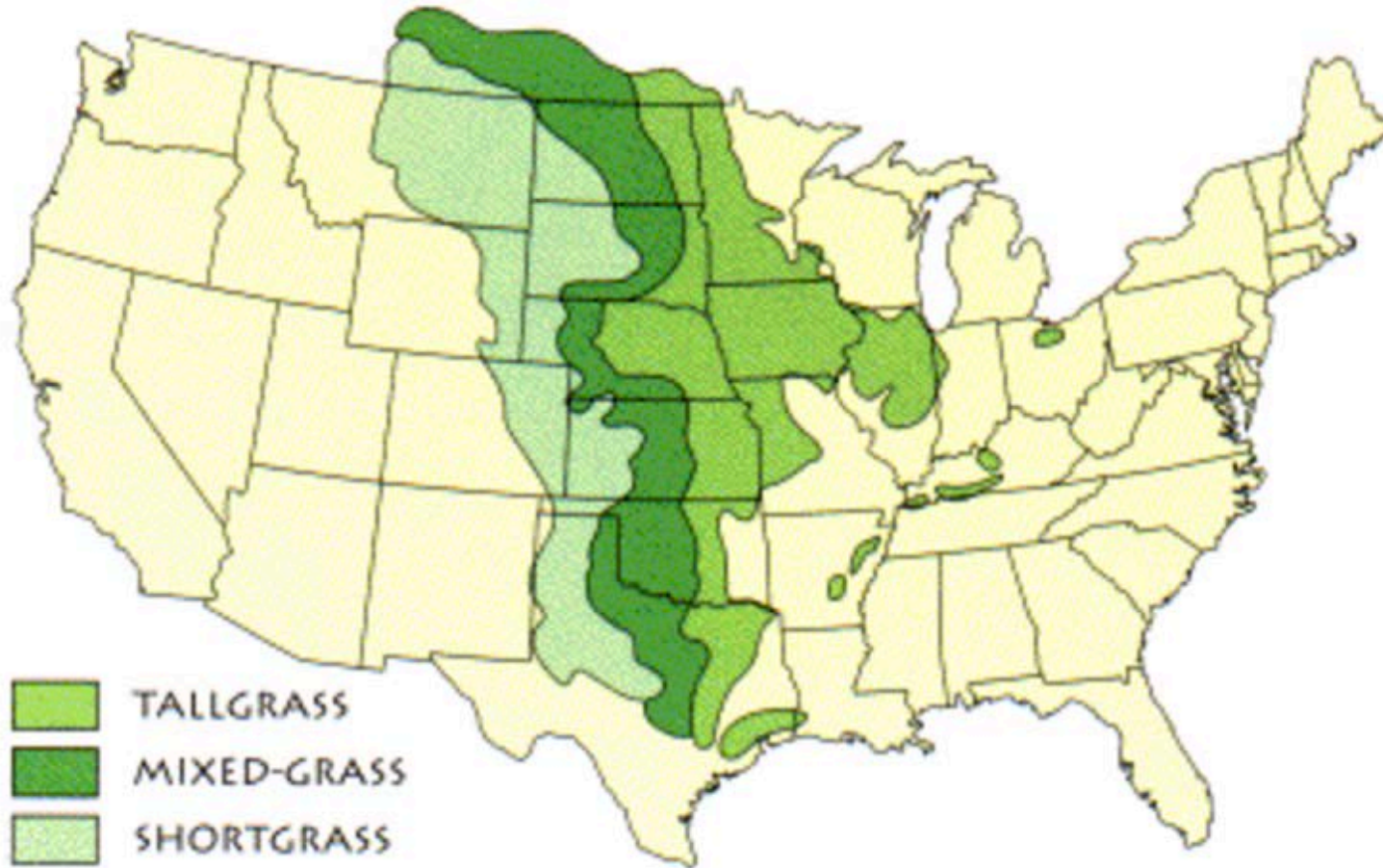
2 lesson sequence

- **Data Transects**—Students use a model of a transect to compare organisms found in two different physical environments located in a prairie
- **Taking a Look Outside**—Students explore patterns in their local environment by using the transect method learned in the previous activity.



HISTORIC RANGE OF THE PRAIRIE

Little remains east of the Mississippi, but some of the biggest and best of the surviving remnants are in the Chicago region.



Where the buffalo (used to) roam...



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But now...

- Less than 4% of all prairies remain, and less than 1% of tallgrass prairies remain.
- So scientists and conservationists are trying to restore them.
- How can they know if their efforts to restore the prairie are successful?



Prairie Restoration



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How do scientists study nature?

Do they count every living organisms?

That might work for bison.

But every coneflower or piece of grass?

What do they do instead?



Transects



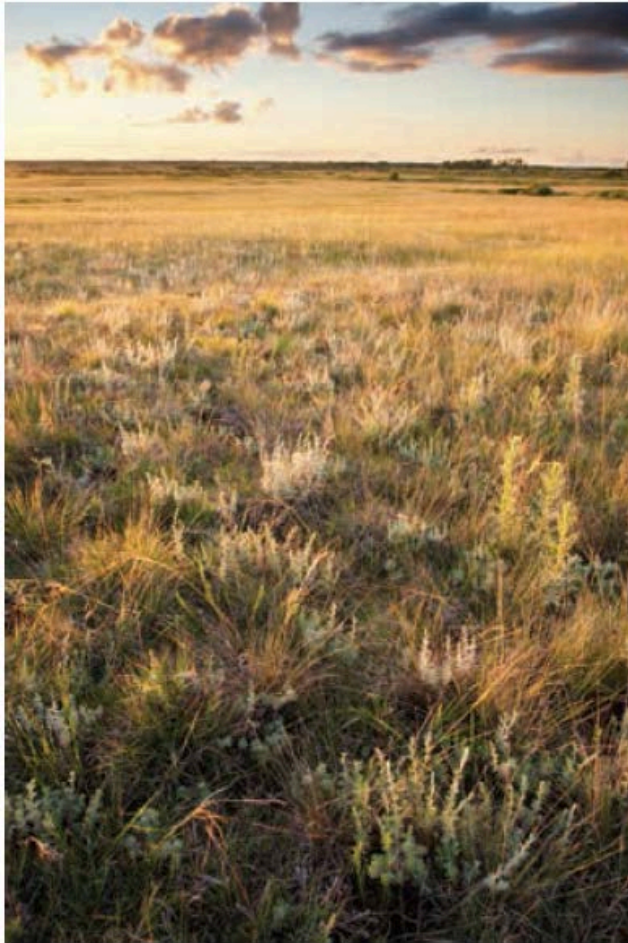
Patterns

A pattern is a set of repeating things or events. Scientists observe patterns in their data. Patterns lead to questions about relationships and ideas about what causes these relationships.



What patterns do you detect in the two environments, and how might the information in these patterns be useful to scientists?

Prairie Transect 1

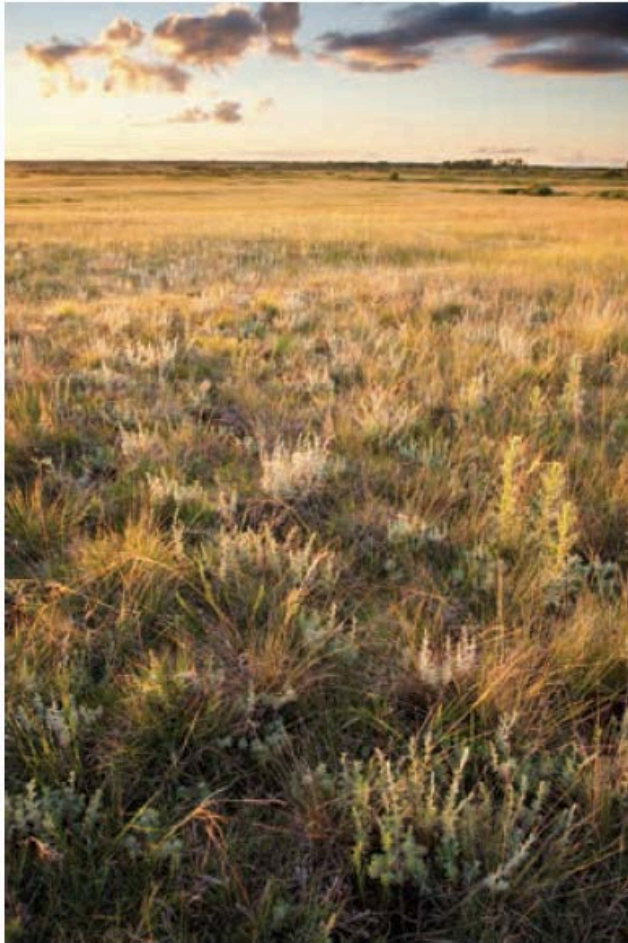


Prairie Transect 2



Transect Data

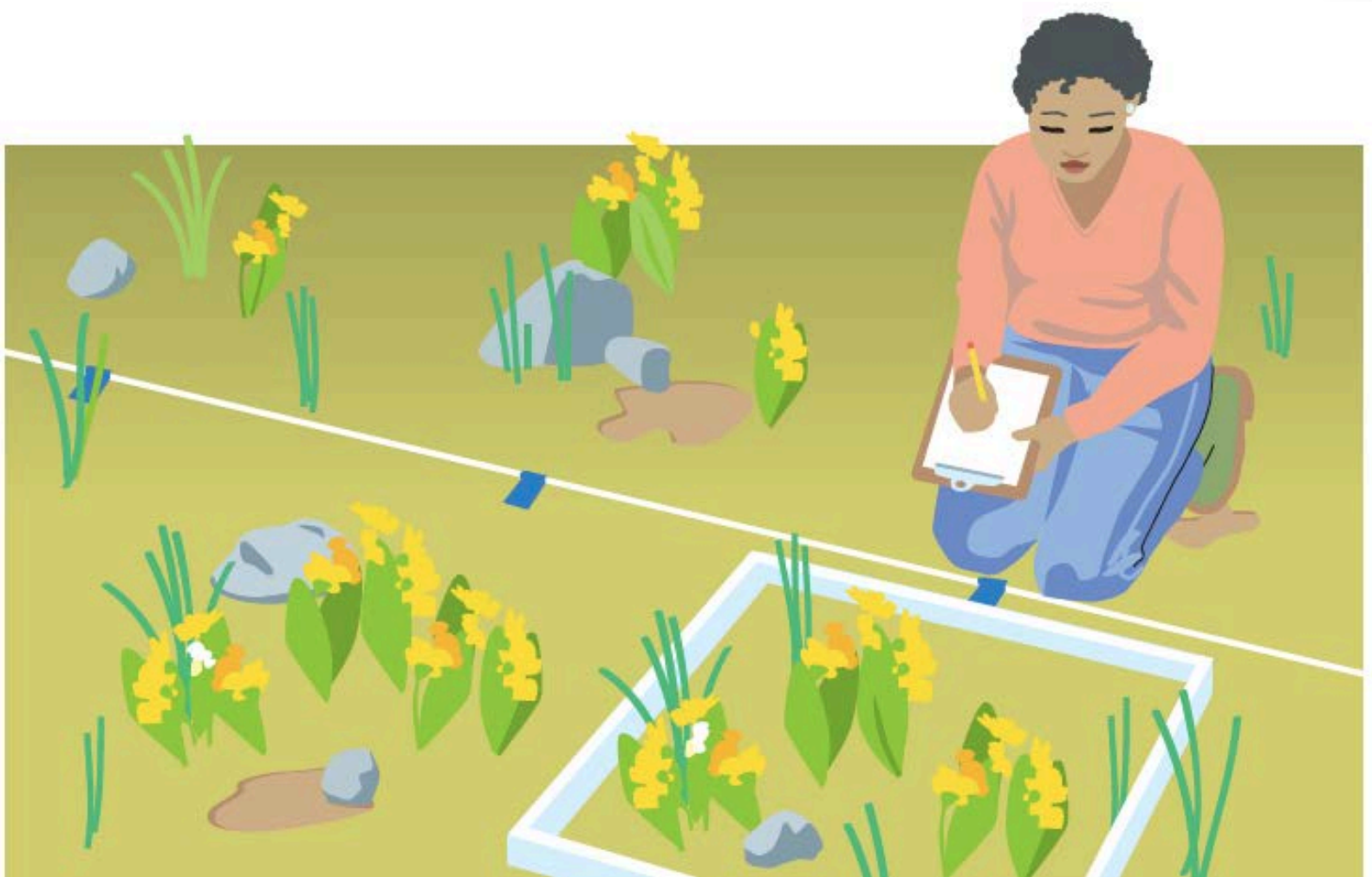
Prairie Transect 1



Prairie Transect 2



Transect Simulation



MATERIALS

For each group of four students

- 1 set of 11 cards for Transect 1
- 1 set of 11 cards for Transect 2
- 2 random number cubes

PROCEDURE

1. Read the information in the chart to the right. You will collect data on the four components of the environment listed.
2. Start with Prairie Transect 1.
3. Roll both random number cubes at the same time. Add the numbers on the cubes to determine your first data sampling point. Select **ONLY** the transect card for that data sampling point.
4. Read the transect card for your data sampling point aloud to your group. Record the data from that transect point in the “Transect 1” table below.

Living and Nonliving Components of the Environment	
LIVING	
Native plants	Plants naturally found in prairies, including purple coneflower, big bluestem, black-eyed Susan, and sandy milkweed
Non-native plants	Plants not naturally found in prairies, including smooth brome and Canada thistle
Grasshoppers	A native prairie insect that eats both native and non-native plants
NONLIVING	
Soil moisture	Can be dry, medium dry, or wet

TRANSECT 1	SAMPLING POINT	SAMPLING POINT	SAMPLING POINT
<i>Native plants</i>			
<i>Non-native plants</i>			
<i>Grasshoppers</i>			
<i>Soil moisture</i>			

TRANSECT 2	SAMPLING POINT	SAMPLING POINT	SAMPLING POINT
<i>Native plants</i>			
<i>Non-native plants</i>			
<i>Grasshoppers</i>			
<i>Soil moisture</i>			



Results

Component	Transect 1	Transect 2
Native Plants (mean)	2.6	3.8
Non-native Plants (mean)	2.4	2.8
Grasshoppers (mean)	4.9	5.6
Soil Moisture (mode)	Dry	Medium Dry



What might be causing these patterns?

Events have causes. If “A” causes “B” to happen, they have a cause-and-effect relationship. A major activity of science is to explain how this happens. Sometime the causes are simple and sometimes they are complex. Sometimes both A and B occur, but one does not cause the other.



Recommendations

- What would you tell the scientists about their efforts to restore the prairies in these two different locations?
- Are they on the right track?
- Should they do anything differently in the future?
- What other questions should the scientists ask themselves?



Taking a Look Outside



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What patterns do you observe when you investigate your own environment, and what might be causing these patterns?



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Every Place Matters and Is Worthy of Investigation



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Asking Questions

- What would you like to know about your own environment?
- What places would you like to investigate? Why?
- What are some questions you could investigate using the transect method?



Planning and Carrying Out Investigations

Determine

- Where the transect will be conducted
- How long the transect will be
- What the sampling interval will be
- Whether to use the quadrat method or point method
- What components of the environment will be measured
 - Biotic
 - Abiotic
- Which data will be qualitative and which will be quantitative
- Whether the transect will be sample more than once



Scoring Guide: PCI

Level	Description
Level 4 Complete and correct	The student's plan/investigation is appropriate and includes all essential elements*, with no errors or omissions.
Level 3 Almost there	The student's plan/investigation is appropriate and includes most essential elements*, BUT has one or more minor to moderate omissions and/or errors.
Level 2 On the way	The student's plan/investigation has a basic plan, with two or more elements* appropriate to the goal of the investigation, BUT has one or more significant omissions and/or errors.
Level 1 Getting started	The student's plan/investigation has at least one element* relevant to the goal of the investigations, BUT is generally incorrect or missing multiple components essential to the goal of the investigation.
Level 0	The student's design or procedure is missing, illegible, or irrelevant to the goal of the investigation.
X	The student had no opportunity to respond.



More Opportunities

- Analyze and Interpret Data to look for Patterns
- Propose Cause and Effect Explanations for the Patterns
- Identify Problems and propose design solutions



Please reach out with questions and feedback

Wendy Jackson

wendy.jackson@berkeley.edu

www.sepuplhs.org

@SEPUP_UCB and @SciWise



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