Laramie Plains Drought Lab

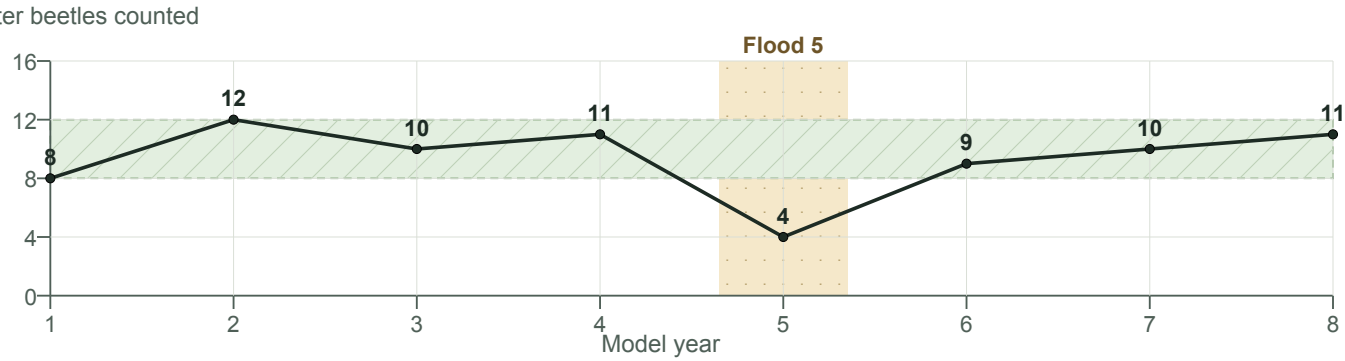
Ecosystem stability and change

Name: _____ Date: _____

Use models and survey evidence to evaluate claims about ecosystem change.

Worked example: how to weigh recovery evidence

Figure 1. Pond survey



Teaching model - made-up data. Baseline span: 8-12.

The baseline span is the lowest to highest count in the stated baseline years. It is a comparison band, not a universal test for stability.

Table 1. Pond groups

Group	Years 1-4	Year 5	Years 6-8
Water beetles	Yes	Yes	Yes
Pond plants	Yes	Yes	Yes

Yes = recorded in each survey in that period. No = not recorded; it does not prove absence.

An invented pond survey counted 8, 12, 10 and 11 water beetles before a flood. The baseline span was 8-12. A count can change from year to year without showing a lasting shift.

The next count fell to 4. Later counts were 9, 10 and 11, within the 8-12 baseline span. The same monitored groups were recorded in each survey. Together, these observations support recovery of what was monitored.

One count cannot describe a whole ecosystem. Returning counts alone would not show recovery if the recorded groups stayed different. These surveys also do not isolate the flood as the only cause.

Compare counts, recorded groups and duration. State what the evidence supports and what it cannot establish.

All plots and numbers are invented. Within each model, the area, season and survey effort stay the same each year.

Next: keep your first answers. Use the matching hint before one retry. Keep the independent exit separate from practice.

Models and baseline evidence

Keep first answers. Write retries in the separate spaces.

Name: _____ Date: _____

1a. Arrange the pathway

Field note: available soil water supports grass growth. Grasses provide food for jackrabbits. This pathway is one part of a larger system.

Arrange the cards in Figure 2 in the direction described by the field note.

Figure 2. Support and feeding pathway

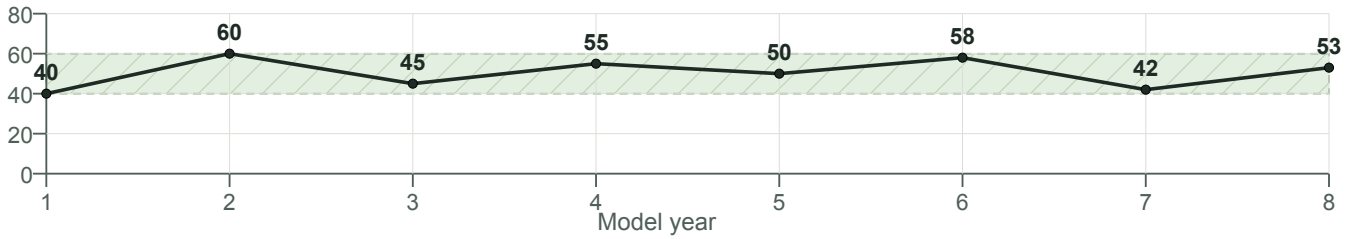
A. Jackrabbits	**B. Available soil water**	**C. Grasses**
Plant consumers	A physical condition	Primary producers

First try	Position 1 Card letter: _____	>	Position 2 Card letter: _____	>	Position 3 Card letter: _____
Try again	Position 1 Card letter: _____	>	Position 2 Card letter: _____	>	Position 3 Card letter: _____

1b. Read the baseline

Use Figure 3. These eight years are a baseline with no modeled disturbance. Judge only this monitored population.

Figure 3. Baseline population



Teaching model - made-up data. Baseline span: 40-60.

The baseline span is the lowest to highest count in the stated baseline years. It is a comparison band, not a universal test for stability.

1b. Use Figure 3 to complete the sentence.

The counts _____ (1) within a baseline span of _____ (2) jackrabbits.

Menu 1: write one letter	**Menu 2: write one letter**
A. rose steadily	A. 45-55
B. fluctuated	B. 20-35
C. fell steadily	C. 40-60

First-try menu letters: _____ Try-again menu letters: _____

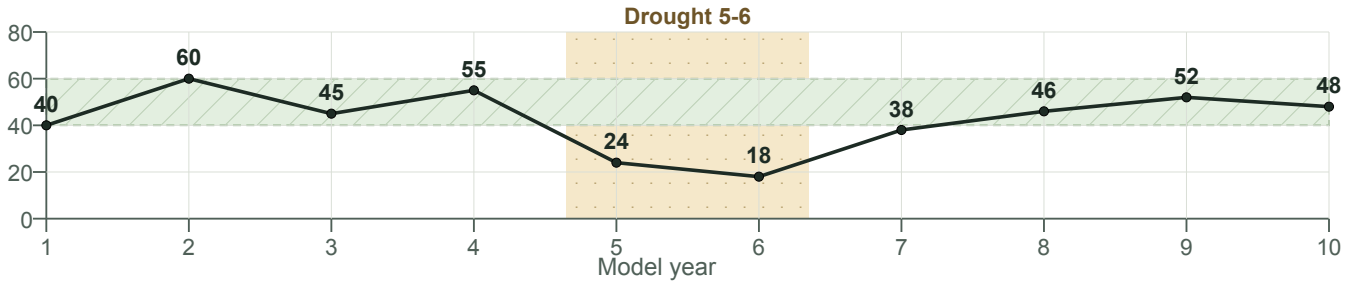
2. Evaluate Plot A

Use the whole record, not only the lowest count.

Name: _____ Date: _____

Use Figure 4 and Table 2. Plot A had drought in Years 5-6. Its baseline span comes from Years 1-4.

Figure 4. Plot A



Teaching model - made-up data. Baseline span: 40-60.

The baseline span is the lowest to highest count in the stated baseline years. It is a comparison band, not a universal test for stability.

Table 2. Plot A groups

Group	Years 1-4	Years 5-6	Years 7-10
Native grasses	Yes	Yes	Yes
Flowering plants	Yes	Yes	Yes
Grasshoppers	Yes	Yes	Yes
Jackrabbits	Yes	Yes	Yes

Yes = recorded in each survey in that period. No = not recorded; it does not prove absence.

2a. Use Figure 4 and Table 2. A student says, "The low count in Year 6 proves a lasting community shift." Which critique is best supported?

- ○ A. It overlooks later counts and recorded groups that support recovery.
- ○ B. It overlooks later counts and recorded groups that support continued decline.
- ○ C. It overlooks returning counts and groups that stayed different from baseline.
- ○ D. It overlooks rising baseline counts that make a later comparison unusable.

First try: _____ Try again: _____

2b. Which two observations together best support your critique in 2a? Use Figure 4 and Table 2.

Select two correct answers.

- ☐ A. The same monitored groups were recorded in baseline and later surveys.
- ☐ B. Every count in Years 7-10 lies within the baseline span.
- ☐ C. The Year 6 count is lower than every baseline count.
- ☐ D. Every count in Years 8-10 lies within the baseline span.
- ☐ E. Different monitored groups replaced the baseline groups in Years 8-10.

First try: _____ Try again: _____

PRACTICE TASK 3 OF 3

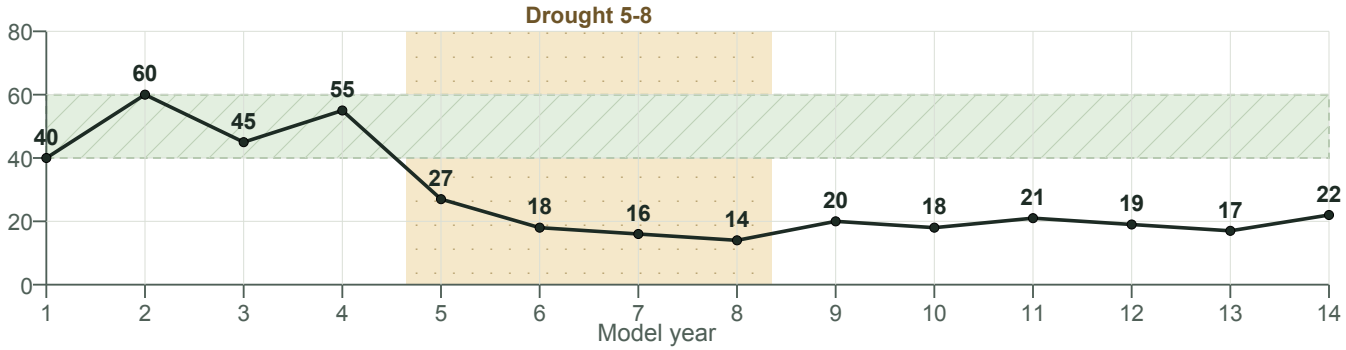
3. Evaluate Plot B

Keep first answers; record one supported retry separately.

Name: _____ Date: _____

Use Figure 5 and Table 3. Plot B had drought in Years 5-8. Its baseline span comes from Years 1-4. Surveys continued for six years afterward. Other possible influences were not measured or controlled.

Figure 5. Plot B



Teaching model - made-up data. Baseline span: 40-60.

The baseline span is the lowest to highest count in the stated baseline years. It is a comparison band, not a universal test for stability.

Table 3. Plot B groups

Group	Years 1-4	Years 5-8	Years 9-14
Native grasses	Yes	Yes	Yes
Flowering plants	Yes	Yes	No (not recorded)
Annual grass	No (not recorded)	Yes	Yes
Grasshoppers	Yes	Yes	Yes
Jackrabbits	Yes	Yes	Yes

Yes = recorded in each survey in that period. No = not recorded; it does not prove absence.

3a. Use Figure 5 and Table 3. Decide whether each claim is supported by these records.

Mark one choice in each row.

Table 9. Plot B claims

Claim	Supported	Not supported
Counts stayed below the baseline span in all six years after drought.	○	○
The monitored community returned to its baseline pattern by Year 14.	○	○
The groups recorded after drought differed from those recorded at baseline.	○	○

First try: mark the grid. Try again: list corrections here: _____

Evaluate the explanation

Keep Figure 5 and Table 3 on page 4 beside this page.

Name: _____ Date: _____

3b. Which evidence from Figure 5 and Table 3 best supports your decisions in 3a?

- ○ A. Counts stayed within 40-60 in Years 9-14, and recorded groups differed.
- ○ B. Counts stayed below 40 in Years 9-14, and recorded groups differed.
- ○ C. Counts stayed below 40 in Years 9-14, and recorded groups matched baseline.
- ○ D. Counts stayed above 60 in Years 9-14, and recorded groups matched baseline.

First try: _____ Try again: _____

3c. Use Figure 5 and Table 3 to complete a careful conclusion.

The records support _____ (1), but they _____ (2).

Menu 1: write one letter

A. recovery during the monitored period

B. a persistent change during the monitored period

C. complete community loss during the monitored period

Menu 2: write one letter

A. do isolate drought as the only cause

B. do rule out drought as a possible cause

C. do not isolate drought as the only cause

First-try menu letters: _____ Try-again menu letters: _____

Practice count tables - the same values printed on the practice graphs

Table 5. Pond counts

Model year	1	2	3	4	5	6	7	8
Count	8	12	10	11	4	9	10	11

Table 6. Baseline counts

Model year	1	2	3	4	5	6	7	8
Count	40	60	45	55	50	58	42	53

Table 7. Plot A counts

Model year	1	2	3	4	5	6	7	8	9	10
Count	40	60	45	55	24	18	38	46	52	48

Table 8. Plot B counts

Model year	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Count	40	60	45	55	27	18	16	14	20	18	21	19	17	22

Two stream reaches

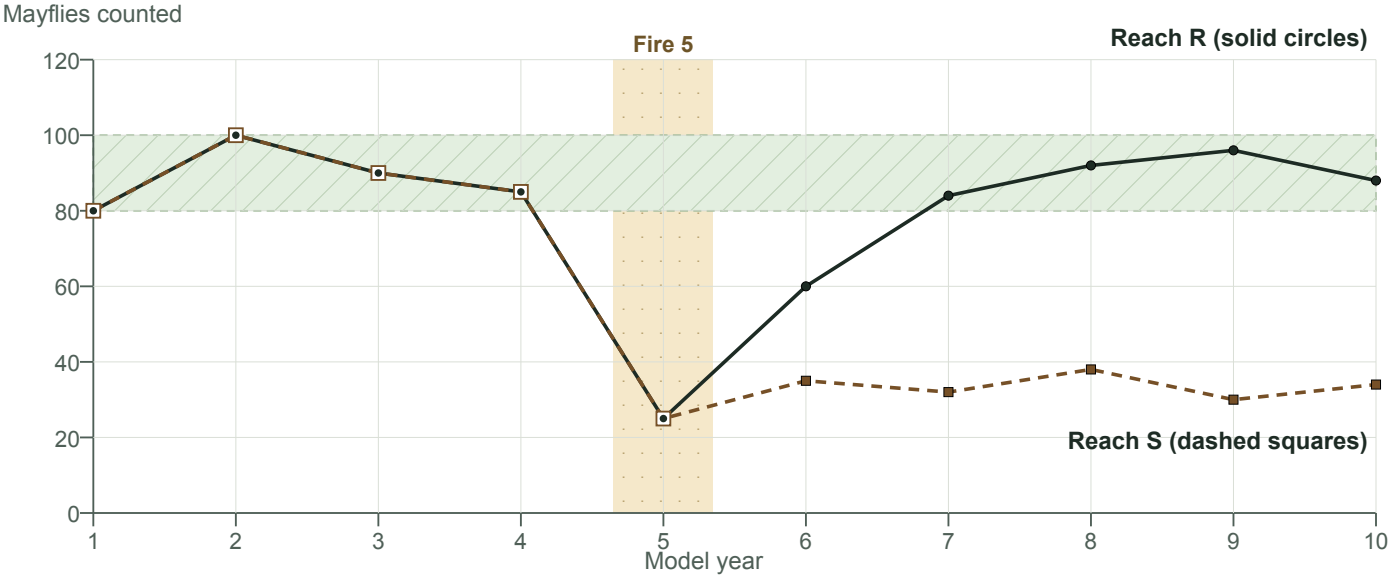
Laramie Plains Drought Lab | Data page - keep beside the question page

Name: _____ Student code: _____

Two invented stream reaches, R and S, have baseline Years 1-4 and a fire in Year 5. Evaluate the monitored community at each reach in Years 7-10.

All plots and numbers are invented. Within each model, the area, season and survey effort stay the same each year.

Figure 6. Stream surveys



Teaching model - made-up data. Baseline span: 80-100.

The baseline span is the lowest to highest count in the stated baseline years. It is a comparison band, not a universal test for stability.

Table 4. Stream groups

Group	Both: Years 1-4	R: Years 7-10	S: Years 7-10
Mayflies	Yes	Yes	Yes
Stoneflies	Yes	Yes	No (not recorded)
Algae	Yes	Yes	Yes
Midges	No (not recorded)	No (not recorded)	Yes

Yes = recorded in each survey in that period. No = not recorded; it does not prove absence.

Keep Figure 6 and Table 4 beside the next page. Read counts from the grid. A circle inside a square marks overlapping R and S points in Years 1-5.

Evaluate the stream records

Laramie Plains Drought Lab | Keep the data page beside this page

Name: _____ Student code: _____

Work independently. Use Figure 6 and Table 4 to answer A, B and C. No hints or answer checks. You may leave a part blank if unsure.

A. Choose a claim

Complete a claim about Years 7-10 using Figure 6 and Table 4.

The records support _____ (1) at Reach R and _____ (2) at Reach S during the monitored period.

Menu 1: write one letter

A. recovery
B. a persistent shift
C. no change at any time

Menu 2: write one letter

A. recovery
B. a persistent shift
C. no change at any time

B. Critique the reasoning

Use Figure 6 and Table 4. A student says, "No stoneflies were recorded at S in Years 7-10, so fire alone permanently eliminated them." Which criticism best identifies the reasoning problem?

- ○ A. It overstates permanent loss, but the timing after fire establishes the sole cause.
- ○ B. It treats non-detection as permanent loss and assigns a sole cause without a test.
- ○ C. It overstates the sole cause, but four years of non-detection establish permanent loss.
- ○ D. It understates the impact: lower counts and changed groups establish loss of the entire community.

C. Choose evidence

Which two observations together best support your claim in Part A? Use Figure 6 and Table 4.

Select two correct answers.

- ☐ A. R stays below the baseline span in Years 7-10, and its baseline groups remain recorded.
- ☐ B. S stays below the baseline span in Years 7-10, and its recorded groups differ from baseline.
- ☐ C. The counts at both reaches fell in Year 5, when the fire occurred.
- ☐ D. R is within the baseline span in Years 7-10, and its baseline groups remain recorded.
- ☐ E. S returns to the baseline span in Years 7-10, and its baseline groups remain recorded.