Back From the Brink Lab: Teacher Guide

mrsajdak.com/brink · Environmental Science, Chapter 7 Summary and Review (pp. 238–241) · objective ES.3.7.7 · one period, about 40 minutes · © Ryan Sajdak, CC BY-NC-SA 4.0

What students do

The review lab for Chapter 7. Students rebuild the textbook's Develop Models activity (Figure 7-22, the 2021 U.S. list of endangered and threatened animals) as a bar model, open seven case files on species pushed toward extinction and name the HIPPCO cause behind each, then read the real counts of four species that came back and match each comeback to the fix that did the most. It pulls 7.1 (extinction, background rate, the honeybee case), 7.2 (HIPPCO) and 7.3 (laws, treaties, refuges, captive breeding) into one argument: a fix works best when it removes the cause.

Tab	Students	Learn It teaches	Sheet
Do Now	Whooping cranes: 16 in 1941, about 540 in winter 2024 to 2025. A first idea about why, and one thing people could do.		A, B
1. The list	Pick each of six animal groups, work out its percent of the 728 listed animals and press Check. The bar grows only when the percent is right (within 0.1).	endangered vs threatened, the Endangered Species Act, USFWS and NOAA, percent of a whole, bars as a model	1–5
2. The cause	Open seven case files (A to G), each a real photo and one big number. After Learn It, sort each case to its main cause; the honeybee gets three.	background extinction rate, five mass extinctions, HIPPCO, bioaccumulation and biomagnification (DDT 0.04 to 25 ppm), the honeybee's "perfect storm"	6–10
3. The comeback	Open four graphs of real counts (bald eagle, California condor, whooping crane, black rhino) with the year each fix began. Work out times larger from the lowest count, then match each species to its fix.	ESA, CITES (183 countries), the 1972 DDT ban, refuges, captive breeding and egg pulling, seed banks, botanical gardens and arboreta, stability and change, match the fix to the cause	11–15

Each Learn It box opens only after the student has done that tab's data work (all 6 groups, all 7 cases, all 4 ratios), so no question asks about an idea before it is taught. Questions before each READ FIRST line are data only.

District alignment (Unit 3, Chapter Summary and Review)

District doc	Where it is in this lesson
Chapter 7 Assessment, Activity A: Develop Models, Endangered Species Data (Fig 7-22)	Tab 1 and Q1–5, with the same 11 groups and the same 2021 numbers. The hands-on lab sheet is the paper version (paper bars or a 100-square grid).
Tying It All Together: Colony Collapse Disorder (p. 238)	Case G and Q9; the DI deck opens with it.
Science Talk: Case Study Connections	Q8 and Q13 (pairs talk before they tick).
Chapter 7 Summary, Summarize: Study Guide	The guided notes and the Learn It boxes.
Activity B: Take Action, Creating Honeybee Habitat	In the DI deck's exit task and the plan's extension. **Added:** the comeback graphs (Tab 3) are not in the chapter; they are real U.S. Fish and Wildlife Service and IUCN counts, added so students can test "do the 7.3 fixes work?"

Standards

NYSSLS	**HS-LS4-5** Evaluate the evidence for claims that changes in environmental conditions may result in an increase in the number of individuals of some species and the extinction of other species. **HS-LS2-7** Evaluate a solution for reducing the impacts of human activities on biodiversity (Q13–15). **HS-ESS3-3** management of natural resources and biodiversity. DCI LS4.C Adaptation, LS4.D Biodiversity and Humans, LS2.C Ecosystem Dynamics.
SEP 2 Developing and Using Models	Q5: what the bar model shows and leaves out.
SEP 4 Analyzing and Interpreting Data	Reading each case's number and naming its cause (Q6–10).
SEP 5 Using Mathematics	Percent of the whole (Q1, Q4), percent lost (Q7), times larger (Q11), percent of an old number (Q14).
SEP 7 Engaging in Argument from Evidence	Q15 CER: "Captive breeding alone can save the California condor."
CCC Scale, Proportion, and Quantity	Fishes have the most species listed, but clams have the bigger share endangered (Q4).
CCC Cause and Effect	Each decline has a human cause; some have several (Q8–10).
CCC Stability and Change	A population can climb back, but only after the cause is removed; the rhino is up, yet still at a tenth of 1970 (Q11–15).

Misconceptions to plan for

- **"Most species on the list is the same as most in danger."** Fishes have the most listed species; clams have the biggest share endangered. Q4.
- **"Extinction is natural, so today's losses are normal."** Extinction is natural at the background rate (under 1 species per million per year). Today's rate is at least 1,000 times that. Tab 2 Learn It.
- **"Once a species is growing, it is saved."** The black rhino is up 2.7 times from 1995 but is about 10% of its 1970 number. Q14.
- **"Captive breeding fixes everything."** It adds animals but does not remove the cause; wild condors still die of lead. Q15.

Running it

- Pairs: one drives, one writes. Tab 1 takes about 8 minutes, Tab 2 about 12, Tab 3 about 12.
- If time is short, do Tab 1 with four groups (fishes, clams, corals, birds), then Tabs 2 and 3 in full. Q4 needs only clams and fishes.
- Tab 3: students divide by the lowest count, not the first one. The rhino is the trap (its low is 1995). The lab's hint says so after a wrong try.
- Pairs with the hands-on lab sheet in the lesson folder (same 2021 numbers on paper). The answer key is kept off the site.

Sources

U.S. Fish and Wildlife Service 2021 animal listings, as printed in Environmental Science (National Geographic Learning / Cengage), Chapter 7, Figure 7-22. Chapter 7 for the background rate, HIPPCO ranking, DDT levels, python removals, tiger and orangutan numbers, rhino horn price, CITES membership and honeybee losses. Dorcas ME and others (2012), PNAS 109(7): 99.3% drop in raccoon sightings. NSIDC: September Arctic sea ice down 12.1% per decade, 1979–2024. Bald eagle: 417 nesting pairs in 1963 and 9,789 at the 2007 delisting (USFWS). California condor: 22 in 1982, 27 in 1987 (all in captivity), 504 in 2020, 566 at the end of 2024 (USFWS condor recovery program). Whooping crane: 16 in 1941, 48 in 1967, 146 in 1990, about 540 in winter 2024–25 (USFWS Aransas surveys, International Crane Foundation). Black rhino: about 65,000 in 1970, about 2,410 in 1995, 6,487 in 2022 (IUCN African Rhino Specialist Group; the International Rhino Foundation gives 6,195). Only real counts are plotted; the dashed line joins them and is not data.