

The Hidden Effects of Feeding Urban Wildlife

Scientists say that animals are **urban wildlife** if they can find food, water, and shelter near a city. Examples of urban wildlife include rats, pigeons, squirrels, ducks, and deer. Researchers from the Urban Wildlife Institute (UWI) at Lincoln Park Zoo study urban wildlife. They want to understand the good and bad effects of people and wildlife living close to each other.

Being close to animals is fun for people and can help them feel connected to nature. Many city residents like to feed animals in their backyards, neighborhoods, or parks. Scientists call this **provisioning** [see photo]. It might seem good to help animals find food, but provisioning has three hidden side effects.



First, the food people give wildlife isn't as healthy as what they would find on their own. (Remember that urban animals have adapted to find food where they live. They don't need extra help from people!) For example, ducks are often provisioned with bread and chips. Human foods are high in calories but low in vitamins and minerals. Too much unhealthy food will cause ducks to get a deformity called "angel wing" [see photo]. Angel wing makes it difficult or impossible for them to fly, so they can't escape danger or travel for migration.



Second, provisioning animals will lead them to gather in small areas. One negative effect of gathering is that illnesses are passed around more easily. For example, deer usually spread out in forests so each has enough to eat. However, if large quantities of food are set out by people in one spot, the deer will crowd together. Being closer to one another leads more deer to catch dangerous diseases.

Third, provisioned animals change how they act. They will become too comfortable around humans. Being comfortable often leads to bold and aggressive behavior around people. This makes bites, scratches, and other injuries more likely. For example, a black bear in Montana was fed by many people. It learned that it was safe and helpful to approach humans when it felt hungry. One day, it attacked a man in his tent, so local authorities had to put it down.

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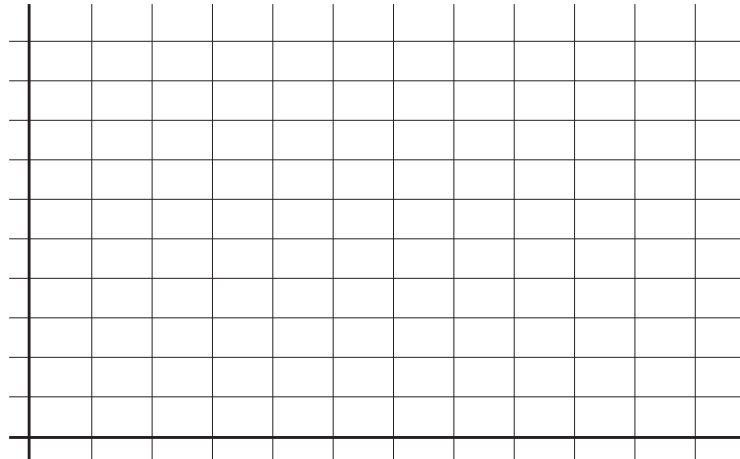
Case Study: Local Raccoon Provisioning

Imagine you work for the Chicago Park District and are in charge of Montrose Harbor. This area is along the shore of Lake Michigan. It has one big sandy beach, some small rocky beaches, grass lawns, trees, walking paths, and lots of boats. For many years, there has been widespread provisioning of raccoons. Surprisingly, no one has researched these raccoons. You decide to partner with UWI at Lincoln Park Zoo. Together, you will find out if there have been any negative effects from feeding urban wildlife.



Your team goes through old reports to find out how many times local raccoons have bitten people. You decide to look at the first 10 years that provisioning started to become popular. Use the gathered data to create a line graph:

| Year | # Bites |
|------|---------|
| 2004 | 1 |
| 2005 | 2 |
| 2006 | 1 |
| 2007 | 3 |
| 2008 | 4 |
| 2009 | 6 |
| 2010 | 5 |
| 2011 | 6 |
| 2012 | 8 |
| 2013 | 7 |
| 2014 | 6 |



What does the data mean?

1. Explain in your own words what the graph you created shows:

2. Your data shows a change in how often raccoons bit people. Earlier you learned how animal behavior changes when people provision. What other changes in raccoon behavior would you predict during these years?

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Researchers from UWI want to study roundworms. Roundworms are long, thin worms that can live in soil or get inside animals' bodies as a parasite. Roundworms can affect dogs and humans and sometimes cause severe illness. Researchers want to know how many of the Montrose Harbor raccoons have roundworms inside them. They will also need to figure out how many raccoons are living in the area, which scientists call a population.

Counting every single raccoon would take too long, so the researchers find a way to estimate the local population. They decide to use the mark-and-recapture technique to assess the raccoon population. First, they will safely capture some raccoons, mark them by cutting off a small section of fur, and release them. On later visits, they will capture more raccoons and record how many have the mark in their fur. Additionally, they will check the poop of each captured raccoon for roundworm eggs.

At the start of the research project, the researchers capture and mark 20 raccoons by trimming their fur. Through 10 later visits to capture raccoons, they gather the following data:

| Visit | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | Totals: |
|-------------|---|---|---|---|---|---|----|---|---|----|---------|
| # Captured | 7 | 9 | 5 | 8 | 7 | 6 | 11 | 3 | 5 | 9 | 70 |
| ^ with Mark | 1 | 1 | 1 | 2 | 1 | 0 | 1 | 0 | 2 | 1 | 10 |

The mathematical formula below estimates population. It uses the ratio of marked and unmarked animals from a mark-and-recapture study. In the space below, use the data (above) to solve for the raccoon population with this formula:

$$\text{Population Estimate} = \frac{(\text{Total number captured}) \times (\text{Number marked})}{(\text{Total Number Captured with Mark})}$$

3. Population estimate = _____ raccoons

By checking the poop from the captured raccoons, researchers learn that 60% had roundworm. We can apply that percentage to your population estimate. How many Montrose Harbor raccoons would you estimate have roundworm? Use the following formula to find out:

$$\frac{\text{Percentage}}{100} = \frac{\text{Raccoons with roundworm}}{\text{Estimated population of raccoons}}$$

4. Estimated # of Raccoons with Roundworm = _____ raccoons

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What does the data mean?

5. In the wild, there's usually one raccoon for every 30 acres. The researcher's study area was close to 90 acres. Does your data reflect an unnaturally large gathering of raccoons? Explain how.

6. Across North America, an average of 70% of raccoons have roundworm. Do you think the roundworm in Montrose Harbor raccoons is concerning? Why or why not?

7. With the data you've collected, you have evidence that the provisioning of the Montrose Harbor raccoons is causing problems. You decide to apply for funding to change things. First, you need to share your main concerns and how your data proves your concerns are real. In a paragraph, make your case for why the raccoons that have been provisioned are a problem:

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Second, you need to propose a solution. You research many ideas, but none are clear winners. You will need to consider each option and decide which one you want to do. In the spaces next to each option, write notes. In the first column, write about the strengths (the good things) about that idea. In the second column, write about the weaknesses or challenges of that idea.

| Potential Solution | Strengths | Weaknesses or Challenges |
|--|-----------|--------------------------|
| Fines: Anyone caught provisioning will have to pay money for breaking the rules. This will mean hiring workers to watch popular locations and make sure people pay the money. | | |
| Signage: Create and post signs in the area that tell people not to feed raccoons and explain why. This will require designing, making, and installing the signs. | | |
| Dispensers: Install machines with nutritious food pellets for raccoons. Tell people to feed pellets instead of human food. This will require designing, installing, and refilling the dispensers, then fixing them when they break. | | |
| Media: Explain the negative effects of feeding the raccoons. Publish in local newspapers, magazines, online, and on social media. This may require hiring someone to write and share the information. | | |

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8. You have considered four options and now need to decide **one** to do. Write a paragraph about the solution you propose and explain why you think it would work:

Extension

Gather into groups based on the solution you chose. Work together to decide the details of how you would do it and create any visual designs. Prepare an explanation and present your solution to the rest of the class.

The Hidden Effects of Feeding Urban Wildlife Teacher Sheet

This worksheet was designed to support the following Next Generation Science Standards:

MS-LS2-1 From Molecules to Organisms: Structures and Processes – Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem

MS-LS2-4 Ecosystems: Interactions, Energy and Dynamics – Construct an argument supported by empirical evidence indicating that changes to physical or biological components of an ecosystem affect populations

MS-LS2-5 Ecosystems: Interactions, Energy and Dynamics – Evaluate competing design solutions for maintaining biodiversity and ecosystem services

The following vocabulary terms are introduced and used in this worksheet:

Urban wildlife: Animals that can independently find food, water, and shelter near a city

Provisioning: Intentionally providing food for wild animals, either directly (by hand-feeding) or indirectly (like through a bird feeder)

Angel wing: A wing deformity caused by eating low-nutrition food (such as bread and chips) that makes flight difficult or impossible

Roundworms: Long, thin worms that can live in soil or get inside animals' bodies as a parasite and cause severe illness

Population: How many animals (or people) are living in an area

Mark and recapture: A method for estimating population with the following steps:

1. Safely capture some number of animals
2. Mark each animal in a non-harmful but easily visible manner
3. Release the marked animals where they were found
4. Return and capture animals in the same place
5. Record how many of the caught animals have the mark
6. Use a mathematical formula that extrapolates a population estimate based on the ratio of marked and unmarked animals

Fine: Money that has to be paid as a consequence of breaking a rule

Signage: Physical signs with images and/or words that communicate information to people

Dispenser: A simple mechanical machine that releases a small amount of its contents at a time

Media: Any means of sharing information with people (such as newspapers, websites, and social media)

Students will need foundational knowledge of the following concepts to complete the math sections:

- Using a formula
- Solving for a variable
- Understanding what a ratio is
- Expressing a percentage as a fraction

While the provisioned population of raccoons at Montrose Harbor is a real-life phenomenon and the methods for gathering data are grounded in scientific practice, the numerical data provided for the activities is fictional. We don't know the number of raccoons or whether they have roundworm.

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Teacher Sheet

Answer Key

1. The frequency of raccoon bites increased. Raccoons bit people more often after they started being fed by people.
2. Less afraid of people. More likely to approach people and infiltrate bags. More aggressive. More likely to eat human food. More raccoons will live closer together than they would in nature.
3. Population estimate = 140 raccoons
4. Estimated # of Raccoons with Roundworm = 84 raccoons
5. Yes! There would usually be only three raccoons in this area, but there are 84—which is a lot more.
6. I'm concerned. The raccoons here have less roundworm than average (60% instead of 70%), but they live closer to where people and dogs might catch them easier. Also, with so many raccoons together, it's likely to spread fast to other animals!
7. I'm concerned that the provisioning of raccoons at Montrose Harbor is dangerous. I have data that shows that people are being bitten more often because people feeding them has made them more aggressive. Researchers from UWI found that there is an unnaturally large gathering of raccoons: Where we'd expect to see three raccoons, we have 84! They also found out that 60% of the raccoons have roundworms. Roundworms are parasites that can make people and pets sick. The behavior of the raccoons and the parasites they carry make them dangerous, and we can change that by changing people's behavior around provisioning.
8. Answers may vary, but here are some examples:

| Potential Solution | Strengths | Weaknesses or Challenges |
|--------------------|---|--|
| Fines | Fear of paying is an effective way to keep people from feeding. | Might not catch people sometimes. Worse for poor than rich people. |
| Signage | People can learn about why it's bad so they don't do it anywhere else. It's there anytime people come. | People who are young or old or speak a different language might not be able to read the signs. |
| Dispensers | Gives people connection to animals. Prevents nutritional problems. | Animals will still become more aggressive from being fed. Machines will need to fixed often. |
| Media | People can learn about why not to feed wildlife, wherever they are. | Might not reach the people who are visiting the harbor. |

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Teacher Sheet

References

- [Wildlife health and supplemental feeding: A review and management recommendations \(Biological Conservation journal\)](#)
- [Should we feed wildlife? A call for further research into this recreational activity \(Conservation Science and Practice journal\)](#)
- [Revealed: The Damaging Effects of Feeding Wildlife \(Outdoor Illinois Journal\)](#)
- [Feeding Wildlife: A bad idea 50 years ago, a bad idea today \(National Humane Education Society\)](#)
- [Raccoons Invading Along Lakefront \(CBS Chicago, 2011\)](#)
- [Raccoons Are Taking Over Rocks Near Montrose Harbor, Yet People Keep Feeding Them \(CBS Chicago, 2021\)](#)
- [Investigation: How Do Biologists Estimate Population Size? \(Biology Corner\) \[formula\]](#)
- [Raccoon Ecology & Damage Management \(USDA\)](#)
- [Baylisascaris procyonis and related species \(Parasitic Diseases of Wild Mammals, 2001\)](#)