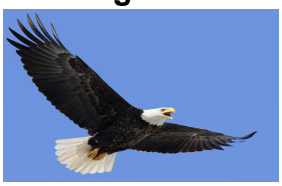
<u>EXPLORE</u> Group Discussion Questions: Exploring Wing Area & Body Mass

Images (gettyimages.com)

Bald eagle	**Bat**	**Pterosaur**	**Glider**
			

1. **Observation Questions**
    - What patterns do you notice between **mass** and **wing area**?

    - Which animal has the **largest wingspan**? The **largest wing area**?

    _____

    - Is there a direct relationship between body mass and wingspan?

2. **Comparison Questions**
    - Compare the **bald eagle** and the **bat**. Which has a larger wing area *relative to its mass*? Why might that be?

- Why do you think a **pterosaur**, even though it's much heavier than the eagle, doesn't have wings that are proportionally much larger?

- The **small glider** is not a living animal but an aircraft. How does it compare to the others in terms of wing area per kg?

3. **Critical Thinking Questions**
   - Why can a 1.5 kg bat fly with only 0.2 m² of wing area, but a 250 kg pterosaur needs about 20 m²?

   - If you were designing wings for an animal that weighed 1,000 kg, which of these animals would be the **best model** to scale up from? Why? Support your answer with evidence (calculations):

4. **Application Questions**
   - What do these comparisons tell us about what's needed to keep heavier creatures in the air?

   - Based on the chart, what do you think would happen if Toothless had wings the size of an eagle's or a bat's?

Optional Follow-Up Prompt:

“Imagine Toothless was as light as a pterosaur (250 kg). Would his wings still need to be large? What would change?”