

Harbor Porpoises of Puget Sound

Key for Quizzes and Worksheet



Puget Sound Research,
Conservation & Education



This Packet Contains:

Pre/Post-Quiz Key

Video Worksheet Key

Digging Deeper Possible Answers



Pre/Post-Quiz Key

1. Which of the following species is small, found throughout the Salish Sea, and needs to feed more consistently than other species?

a. Harbor porpoise

2. Behaviors of most creatures can be attributed to which two primary motivators (e.g. what do they need for survival the most)?

c. Food and shelter

3. Harbor porpoises were all but gone in the Puget Sound in which time period?

b. 1970s-1990s

4. What technique is used by many marine mammal researchers to identify individuals without touching/harming the animals?

a. Photo-identification

5. Which of the following has the shortest life-span?

d. Harbor porpoise

6. **(b. Echolocation)** is the term for how dolphins and porpoises use sound to find food.

7. What is unique about harbor porpoise vocalizations?

c. They make very high frequency sounds that we can't hear

8. Which of the following is a difference between porpoises and dolphins?

d. Both are correct

9. What is the term for the behavior when a whale, dolphin or porpoise lunges at the surface, causing water to spray up on both sides, while chasing a fish?

b. Surface chase

10. Why are harbor porpoises and harbor seals more susceptible to the effects of human actions that happen on land than other marine mammals?

a. They live closer to shore than other marine mammals



Video Worksheet Key

1. What two species of marine mammal does Pacific Mammal Research study? **Harbor Porpoise & Harbor Seal**

2. Name one reason that collaboration between research scientists is important. **Answers can vary, but may include increasing the data that can be collected, increasing how much information can be learned (we learn more together), working together to provide new solutions, etc.**

3. Name the three things that harbor porpoises do in Burrows Pass (PacMam's study site) that make it biologically important for them. **Feeding/foraging, mating, and bring calves there**

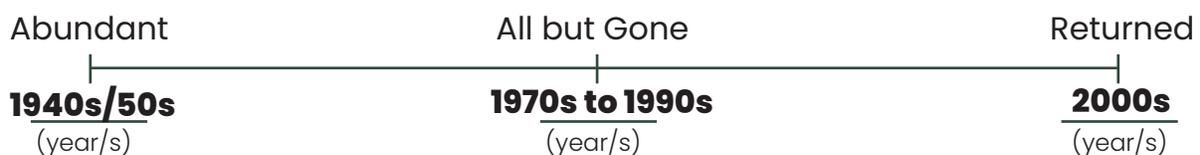
4. Describe why harbor porpoises need food more consistently than other marine mammals. **They have a high metabolism, live in cold waters, can only survive short periods without eating**

5. Researchers know that individual harbor porpoises return to the study site, what technique do they use for identification? **Photo-identification**

6. Name the two primary motivators that help shape the behavior of most animals (e.g. what do they look for/need the most?). **Food and shelter**

7. Name 2 ways that the Strait of Juan de Fuca influences the environment in Burrows Pass that benefits the organisms there. **Answers can vary, may include: nutrient rich waters carried in by tides, currents and winds creating up/drown drifts, whirlpools, etc... influence prey availability**

8. Describe the timeline for harbor porpoises in the Salish Sea – when were they abundant, all but gone, and returned?



9. What factors may have influenced their disappearance and return?

Answers may vary but can include pollution, gill nets/fishing pressure, habitat destruction and our attempt at cleaning up the Puget Sound, lessening our impact on the marine environment

10. Name three things that are recorded in the field by researchers. **Answers may vary but can include any environmental data, group size and presence of animals and behavior of animals**

11. Why was finding a land-based study site important for researching harbor porpoises? **They are more evasive around boats than other marine mammals**

12. What is it called when a harbor porpoise chases a fish at the surface (lunging at the surface)? **Surface chase**

13. When researchers see harbor porpoises doing aerial behavior, what is most likely happening, and which sex (male or female) is jumping out of the water? **Mating behavior, the male comes out of the water**

14. How long do porpoises live (is this shorter or longer than for dolphin species) and when do they become sexually mature? **8-25 years (not sure exact length), shorter than dolphins, sexually mature at 3-4 years**

15. Female harbor porpoises can be **lactating** and **pregnant** each year (or every other year), which increases their energetic needs and thus the food that they require.

16. Why are gulls helpful when photographing harbor porpoises? **Gulls often fly over and land where porpoises are, so porpoises will come up next to a gull allowing the researcher to better get a picture of the animal.**

17. Name 2 differences between dolphins and porpoises. **Answers can include: Porpoises have triangular shaped dorsal fins, dolphins have falcate (curved) dorsal fins; Porpoises have spade shaped teeth, dolphins have cone shaped teeth; Porpoises are generally smaller with no beak/rostrum, dolphins are generally larger with a pronounced beak/rostrum; Porpoises live in smaller groups and are less gregarious, dolphins live in larger groups and are more gregarious; Porpoises are less active at the surface (don't wake/bow ride, breach as much), dolphins are more active at the surface (wake/bow ride, breach etc more).**

18. How do porpoises sleep and how does this relate to the fact that they are conscious breathers? **They turn off half their brain at a time for short 'cat naps'; they have to think to breath, so can't go to sleep completely. They also need to look out for predators.**

19. How do porpoises use sound to find food? (specifically what is the term and how does it work?) **Echolocation – send sound waves out that bounce back and give them a picture of what is in front of them. (very basic definition)**

20. Harbor porpoises vocalize in the high frequency range (which we have only more recently been able to record with new technology); why is it thought that they evolved this adaptation? **So that Orcas (their main predator) can't hear them as easily when they are looking for food themselves – so protection from predators.**

21. What is the nickname for the harbor porpoise due to their loud exhalation? **Puffing pigs**

22. What is the average size for a harbor porpoise? **5-5.5 ft, around 150lbs**

23. A harbor porpoise is a top predator – why are animals like these more susceptible to issues like pollution, and how does it affect their health? **As top predators they accumulate (bioaccumulate) toxins in their fat, as well as having**

it magnified through the food web (biomagnification) as they eat many smaller animals that have pollutants in their bodies. It can cause them to become sick from the toxins, or lower their immune system so that other opportunistic organisms can take hold and the animal cannot fight them off like they normally would.

24. What about harbor porpoise and harbor seal ecology makes them more susceptible to what humans do on land than other marine mammals? **They live within a few miles from shore their whole lives, so human impacts on shorelines and nearshore activities will impact them more than other species that live farther from shore.**

25. Why is it important to know more about the biology, behavior and ecology of harbor porpoises in relation to climate change and other anthropogenic (human) impacts? **Answers can vary, but generally should cover the fact that without this information we cannot help conservation or protection measures. Research is critical to provide this information in order to create biologically meaningful protections and to help us alter our behavior in a way that benefits the animals. This is more critical than ever with climate change and other environmental impacts (human and non-human related) increasing in frequency and intensity.**

Question 1:

Harbor porpoises eat herring (one of many species they eat), herring eat phytoplankton (small microscopic photosynthetic organisms). Water quality is important to phytoplankton and is influenced by water movement due, in part, to currents and tides, bringing nutrient rich water to an area. Describe how harbor porpoises would be affected if water quality and nutrient distribution significantly decreased, or even ceased, in a biologically important area for them. Remember that harbor porpoises need consistent food sources, more than other marine mammal species; how would this affect behavior? Also be sure to think about how these changes will affect other organisms in the ecosystem. Answers can include, but are not limited to: their individual and population health, behavior, ranging patterns, and interactions with other species (changing ecosystem dynamics).

Answers will vary. Effects will be based on the fact that if phytoplankton populations crash, herring populations won't have enough food, causing their population to crash as well, which in turn means that harbor porpoises don't have enough food for good health or ultimately survival.

Example possible effects (can be one or more):

- i. Individual health declines (death due to starvation or lower fitness that leads to starvation or lowered immune system that can lead to death).
- ii. Population declines (animals die and/or lowered reproductive rates due to lowered nutrition).
- iii. Behavioral changes (change foraging strategy/switch prey items - which then affects the population levels of those prey and the predators that rely on them; less time to do other behaviors (like mating, socializing) that could affect population level parameters).
- iv. Ranging patterns change. They may shift their ranging patterns to try and find more food, which will have implications for the other animals and may alter the ecosystem dynamics in that area. Possible displacement of other species, or eradication of other species could occur.
- v. Changing ecosystem dynamics – this is covered in some of the above effects. Important for students to realize that a change in one species usually means other species will be affected as well.

Question 2:

Describe how humans have influenced the abundance of harbor porpoises in the past and present and how we may affect them in the future (good and bad). Think about what we know happened, and why research is needed; use that to explain possible outcomes for the future – can these lessons be used for other species and why?

Answers may vary in detail, but should cover basic facts:

i. Harbor porpoises were abundant before significant human interferences (up until the early 1970s)

ii. Pollution, fishing (gill nets in particular), habitat destruction (especially shoreline work) likely made the harbor porpoise population decrease to be all but gone by the 1990s (so 1970s–1990s). Harbor porpoises are top predators so they are more susceptible to pollution due to bioaccumulation and biomagnification.

iii. Increase in awareness and conservation actions during the 1980s and 1990s and beyond decreased pollution, fishing interactions and habitat destruction allowing harbor porpoises to return to their original distribution (also likely involved prey abundance changes). Healthy waters = healthy animals = healthy ecosystem. Harbor porpoise populations are doing well now.

iv. Research is required for us to better understand how species will respond to various conditions in the future, whether natural or human made. We need to understand the behavior and ecology of a species in order to predict how they will respond to their environment and changes that go along with it.

v. Future (answers can vary greatly but may include):

1. Decline can happen again if environmental protections aren't kept in place.
2. Continued protections can keep populations healthy.
3. Lack of research will reduce our ability to apply biologically important conservation measures to protect species.
4. Continued research will increase our knowledge of behavior and ecology and enable us to better protect species through conservation measures.
5. Population crashes and/or range changes in other species, will affect harbor porpoises, and other species, in predictable and unpredictable ways possibly altering ecosystem dynamics.
6. Increased human interactions (whale watch boats, boat noise, fishing, etc) may negatively affect porpoise health, behavior and ecology.
7. The harbor porpoise story can be used as a cautionary tale about what needs to be known in order to prevent a collapse like was seen for this species. We can use these lessons and apply them to any species.

Question 3:

Think about how researchers study harbor porpoises, including what questions they want to answer, what data they collect and how they collect it. Using this information as a guide, choose a different species of interest to you. Describe what questions you would want to answer about your chosen species (and why that is important to know), explain what data you would collect in order to answer these questions, and how you would collect it. Create/describe your study and also explain how this information could be used to help protect and conserve the species (and its environment if applicable).

Lastly, conservation of a species relates to maintaining biodiversity of an ecosystem – but this is easier said than done. Think about your research topic and how this would help to maintain biodiversity in an ecosystem. Think about what constraints might hinder the use/application of the research results – this can be either scientific, economic, political, or social considerations. For example, do we have the technology and/or money to implement the research or the solution it may produce; are there any political or social obstacles (e.g. political opposition, cultural ideas that need to be addressed)? Discuss these constraints and how they may be able to be overcome.

Answers will vary. Be sure they include why they chose that species (why it is important to know about the questions they are asking), what questions they want to answer, what data they would collect and how they would collect it. They also need to explain how the information could then be used to inform conservation measures/policy. In addition they need to discuss the constraints or obstacles that they may face in either implementing the studies, or the solutions the studies might suggest. This is to reinforce that science does not work in a vacuum and needs to work within the current economic, social and political atmosphere.