

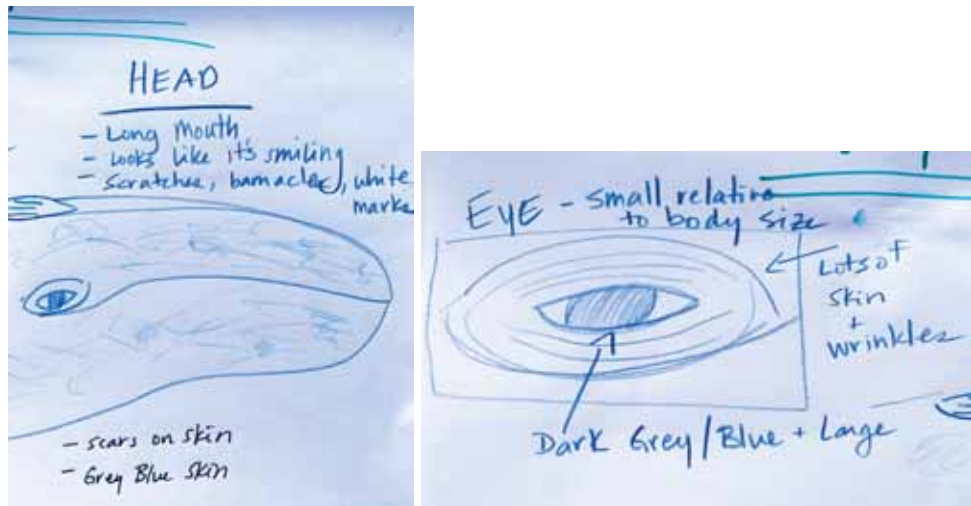
BUILD A WHALE!



WHAT CAN WE LEARN ABOUT A WHALE BY BUILDING ONE?
THINK ABOUT THE PARTS OF A WHALE... WHAT HELPS THIS ANIMAL SWIM? CATCH ITS FOOD?
COMMUNICATE? BREATHE? ARE DIFFERENT WHALES OR DOLPHINS SHAPED DIFFERENTLY?

1. CHOOSE A SPECIES OF WHALE

- Decide on a whale species to focus on for the first 'build' (included are links to information about whales and pictures of a few local species.)
- You might list the different body parts of a whale and learn more about that whale's anatomy.
- These beginning stages are a good time to sketch the whale in sections and the whole whale. What do the eyes look like, and the flipper shape? What is the overall body shape? Top view and side view can both be helpful.



- Consider what body parts you want to include and why. Will you have a space or area for internal body parts? Or will you focus on a whale *skeleton* model rather than external anatomy?
- What external or internal parts do you think are important?
- Is this whale a Baleen or Toothed whale? What will go in its mouth? Will you model a tongue, teeth, or baleen?
- How many visible openings in the external blow hole does it have?
- Consider your point of view; front, top, underside, or 3D!
- How might you make a proportionally accurate whale? Can you think of ways to use pictures provided or in the links to create a model that is to scale*?

*To scale means that your model would be accurate proportions that a real whale might have. If you have questions and want to learn about modeling to scale see the supplemental at the end of the instructions.

2. SOURCE THE MATERIALS



- We encourage use of reusable, repurposed, or recycled materials. This might include looking around your home or work area for items. Make sure to ask that it's ok to use items, and get permission to use them. (Pictures above are just examples of what we thought about using for this build.)
- Reusable/repurposed ideas: a magazine rack that will be used as internal support for the body, funnels or other kitchen utensils that can be modified to represent mouth or blowhole(s) or other parts. When repurposing think of items that you can return to their original home/purpose when you finish your model (especially if you are deciding to make a larger sized model). Note: Many times you will have to 'scale' your model to an item like this since you cannot modify it much.**
- Recycled Materials: Anything that you might not really need any longer: cardboard boxes for cut out fins/jaw/head, packing materials for decorative smaller items (Can make great barnacles IF your whale species has them).
- Or you might build your whole whale out of simple materials like cereal or frozen food boxes, whatever seems fun and interesting to you!



MATERIALS YOU MIGHT NEED

- Sharpie or black marker and / or strong pencil for marking shapes to cut out and drawing detail
- Cardboard or Cereal box or other materials for making whale body
- Repurposed Items: will be returned in original condition when finished
- Adhesive (glue) or Tape, or butterfly brads to attach items together
- Scissors - for cutting items
- Paint, watercolor, or markers to color your whale model if desired
- Additional items to recycle into your whale project?

You are welcome to decide on your own process or follow something similar to this one. An extension to this activity is making the model proportional. The important thing is that you take time to learn and make observations that will help you build the whale model.

WHAT QUESTIONS AND IDEAS YOU HAVE ABOUT BUILDING YOUR WHALE?

MAKE NOTES HERE OR ON A SEPARATE SHEET:



3. BUILD THE WHALE!

- Measure out each space to sketch or build the parts of your whale. How long and wide will the whale head be? How long and wide will the body be?
- If you are working with the inner anatomy of the whale, measuring your bones and multiplying to the ratio size you want to work in might help make the model more accurate.
- You might create the major parts separately or out of one single piece of materials.
- Decorate your whale, attach pieces in a way that makes sense to you. Would you like your whale to have moving fins or be able to open its mouth? How might you do that?
- Add final details like teeth or baleen, barnacles if that species tends to have them, and any other special features.
- Many species of whales each individual can be identified by specific markings or patterns (especially Grey, Humpback and Orcas whales). Another extension can be researching *a specific individual whale* identified by whale researchers, and creating those markings on your whale.

Once your whale is built, notice how it turned out! What part of your build represents the whale's anatomy well? What part of your model didn't turn out as you thought it would? If you desire to re-engineer any parts, or placements of your items to make it more accurate, you can do that. Or simply make notes about what worked and what didn't. There may be parts that aren't accurate, but look really cool! Makes notes on that too. Think about why you might have chosen to make your whale this way.



4. WHAT DID YOU LEARN?

MAKE NOTES HERE OR ON A SEPARATE JOURNAL

WHAT TURNED OUT AS EXPECTED? WHAT DIDN'T TURN OUT AS YOU EXPECTED?

WHAT DO YOU LIKE? WHAT IS ACCURATE? WHAT IS NOT ACCURATE? WHY?





WHAT DID YOU LEARN ABOUT THIS SPECIES OF WHALE BY BUILDING IT?

BUILD A WHALE INFORMATION AND RESEARCH LINKS:

[Gray Whale - American Cetacean Society](#)

[Gray Whale - NOAA](#)

[Fin Whale - American Cetacean Society](#)

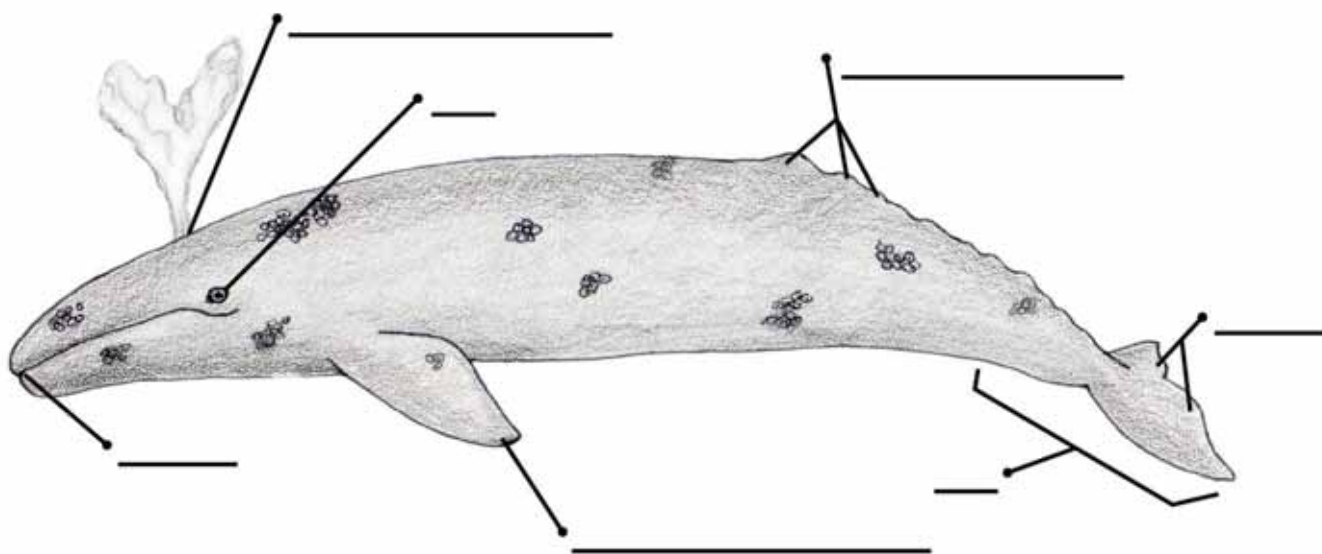
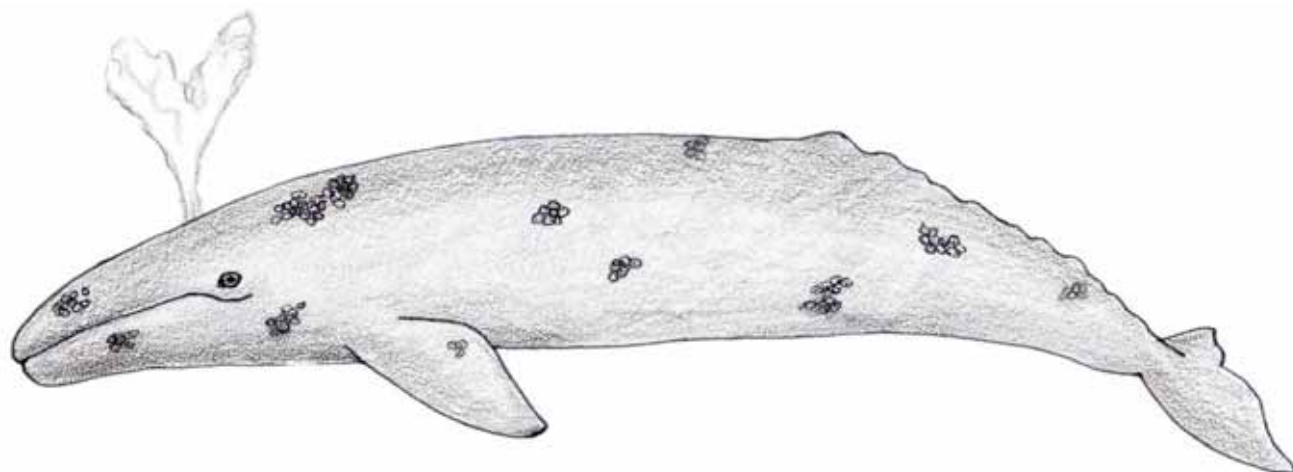
[Humpback Whale - American Cetacean Society](#)

[Blue Whale - American Cetacean Society](#)

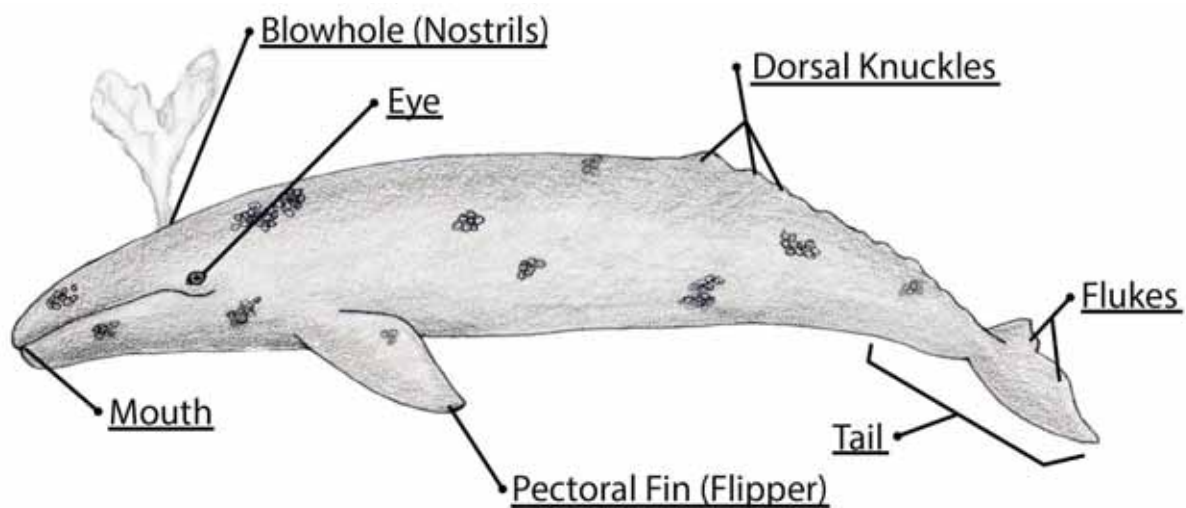
[Rearticulating Whale Bones from Glacier Bay - NPS](#) - Article about putting a whale skeleton back together!

PHOTO RESOURCES:

GRAY WHALE



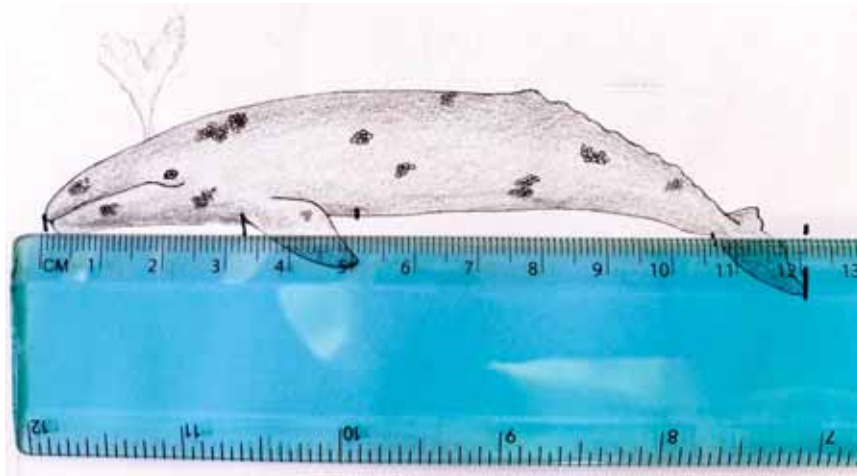
GRAY WHALE



SUPPLEMENTAL: HOW TO MAKE A MODEL TO SCALE

This is a quick and easy version.

The more precise you are in your original measuring of the scientific whale drawing and your model, the more proportionally accurate your model can be. But these measurements can be used for *general* guidance also and are very helpful.



- Take a ruler to a scientific picture of a Grey Whale. You can do this on a computer screen or in a printed version.
- Measure the drawing of the whale:
 - Head Length (nose to start of pectoral fin)
 - Length of pectoral fins (start of fin to tip of fin)
 - Tail fin (start to end of fin from whatever view point you are using)
 - Body Length (from 'shoulder' or front of pectoral fin to just where the tail starts.
 - Body Width (from side to side or bottom to top at the thickest point)



- Keeping your unit of measure consistent will help you scale easily (measure everything in Inches OR measure everything in centimeters.)
- Smaller scale models will do great in centimeters / Larger scale might be better in inches.
- List those numbers on your drawing or make a chart

HOW BIG OR SMALL SHOULD THE SCALE BE?

- Do some practice numbers on the larger pieces: Body and Head are good to start
- Example: Multiply the original measurement of the body times 3, 5, or 10 and see what that gives you. For this whale the body was about 3 inches in the picture measured so $3 \text{ inches} \times 10 = 30 \text{ inches}$.
- Make a quick measurement and sketch on your materials to size the model. Small/light markings are fine.
- Will this scale fit the *materials* you're using? Make sure the biggest piece, and all the other pieces would fit the materials (width and length) before you choose a scale.
- Does this size seem helpful to your purpose? Do you want to make a video of your model? OR put it on your wall? Will you be travelling around with your model to teach? Or should it be large enough so that you can teach from a distance (like a stage)?
- What other questions or considerations might you have specifically?
- If you like your size estimate then start to make the parts of the whale.
- For each part multiply that by the same number you decided to scale your model to (3x's or 10'x were just suggestions)
- Follow the instruction above and most importantly create your own process and innovations to make a whale model that serves your purpose.

HAVE FUN MAKING YOUR MODEL AND PRACTICING BUILDING TO SCALE!