

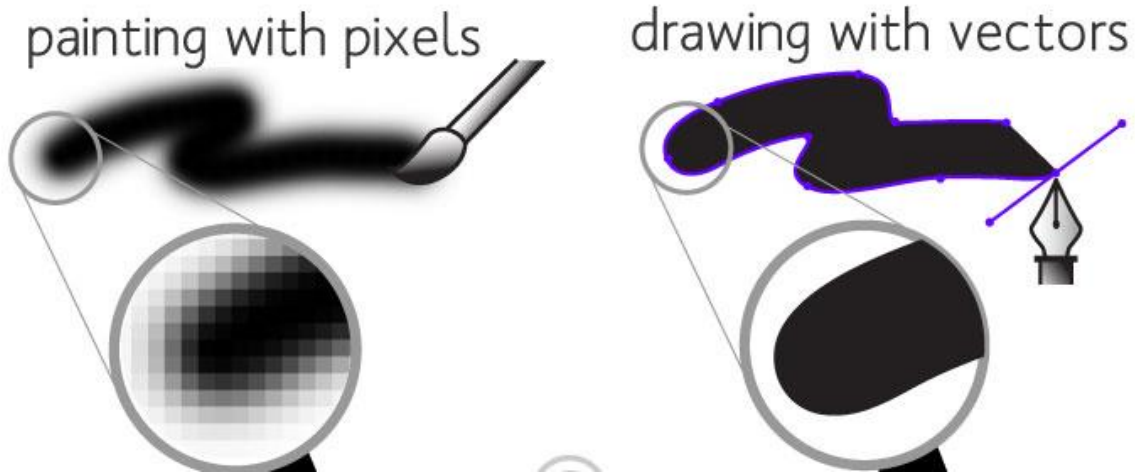
Science Illustration Workshop

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I. Intro to Digital Art

A. Vector versus Raster Artwork



1. Vector:

- Composed of **mathematical paths**
- Continuous and smooth lines made out of anchor points and handles (vertices and tangent lines)
- Enlarging does not cause loss of resolution
- Usually have a sharp, graphic look with crisp lines.

Vector-based design **SOFTWARE**: Adobe Illustrator (expensive), Inkscape (free)

Vector-based **file types**: .svg*, .emf*, .pdf*, .eps

*These file types can be imported into Powerpoint. However, it is usually easier to export a transparent background .png approximately the right size for your use, because these can be compressed to smaller file sizes. Save your vector graphic, though! You may want to make a larger version later.

2. Raster:

- Composed of **pixels** which form an image from a distance
- Can draw curves only by **pixel approximation**
- Enlarging causes loss of resolution
- Can achieve complex blending, shading, and textures by applying brushes with soft edges.

Raster image **SOFTWARE:** Adobe Photoshop (expensive), Procreate (\$10, Apple only), GIMP (free)

Raster image **file types:** .jpg* (best for photos), .tif* (best for high resolution graphics, often causes large files), .png* (best for Powerpoint, supports transparent backgrounds), .bmp (bitmap)

*These file types can be imported into Powerpoint.

B. What should I choose?

1. **Use vector-based graphics for:**

- Graphics that may need to be enlarged for posters or powerpoints
- Logos, icons, outlines, line art, and infographics
- Designs with large, curved lines

2. **Use raster graphics for:**

- Designs that will not need to be enlarged (keep files as big as possible, ~4X as big as expected print size for fine art, 1X is fine for science graphics)
- Photos, digital "paintings", scanned traditional media paintings
- Designs that have complex shading, colors, and texture

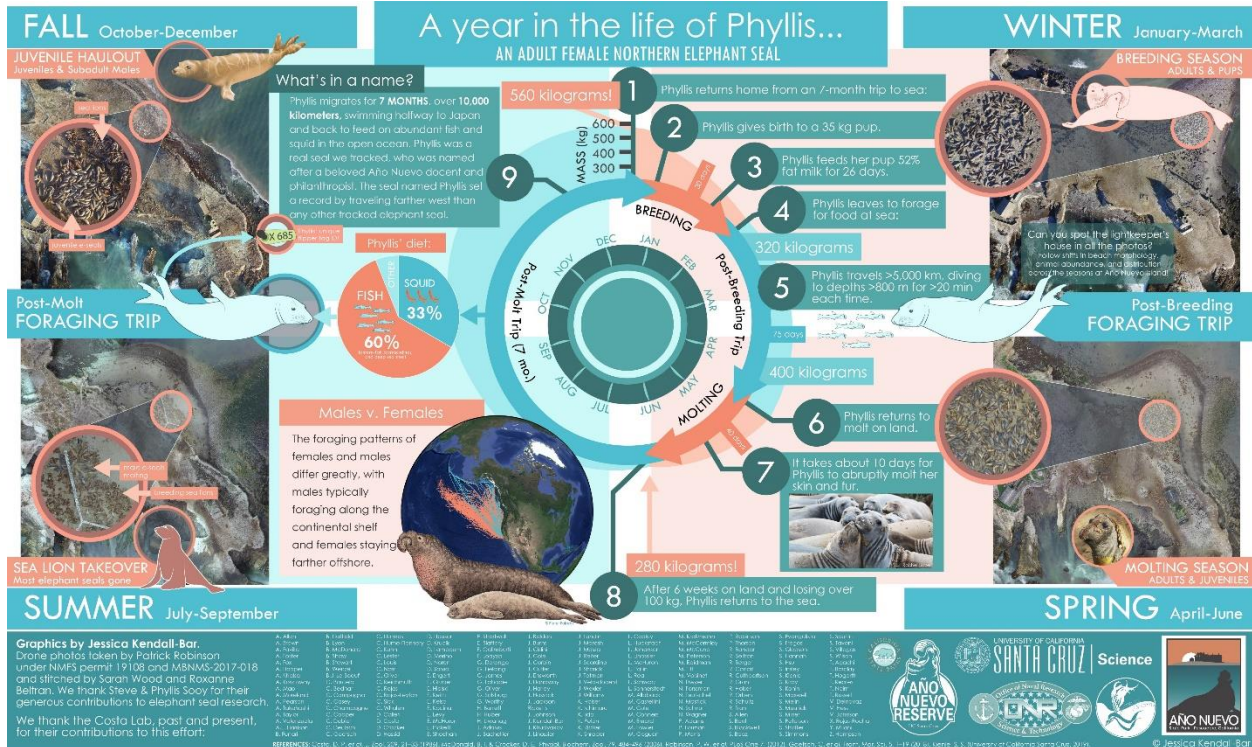
II. Pro Powerpointing

A. Tips

- **Display an outline** to follow at the bottom of your slides.
- Keep **text to a minimum**; use graphics!
- To keep images looking crisp: use **vector graphics** or **high-resolution** raster images.
- **Practice** your talk, transitions, and animations; don't be surprised by your slides!
- Choose **3 fonts** you like for Titles, Subheadings, and body text. Choose **3 colors** to use (and then you can use different values of these colors [see example palette below]).



Example graphic with this color palette:



B. Tricks

1. Slide Navigation

- Navigate to **ANY** slide by typing in the number of the slide and pressing enter, while presenting.
- Right click while presenting to **“See All Slides”** to let your audience see thumbnails of all slides and click on them to open.
- **F5** to begin presentation at beginning. **Shift+F5** at current slide

2. Slide Master

- Go to View> Slide Master, where you can create a custom theme, view and edit the template for your custom theme

to manipulate the font, shapes, and colors on your slides ALL AT ONCE.

- Again, a powerful tool that must be used carefully.

3. Animations

- Open the Animation Pane to organize your animations
- Only use animations when they help clarify or emphasize content
- Minimize use of slow animations like fade in/out (or speed them up)
- Can also split animations into separate slides and use **“Morph” Transition (in “Transition” tab)**
- When adding multiple animations to a single object, press **“Add Animation”** to add second animation without overwriting existing animation.
- Here are the animations I like:
 - **Wipe** left to right for the “reveal” of your data
 - **Appear** for each bullet point of a list to keep your audience's attention (“By Paragraph” in Effect Options)
 - **Motion paths and spin** to show behavior/movement

III. Intro to Illustrator/Inkscape

A. Tips for creating Digital Art

- **ORGANIZATION IS KEY!**
 - Save often and with meaningful filenames
 - Create many layers with meaningful subdivisions
 - Example (listed from bottom to top):
Layer 1= Reference photo,
Layer 2= Seal Outline,
Layer 3= Body Details,
Layer 4= Eye/Nostril Outlines,
Layer 5= Right Eye Fill,
Layer 6= Right Eye Highlight,
Layer 7=Left Eye Fill,
Layer 8= Left Eye Highlight)
- **SAVE OFTEN** and with meaningful filenames

B. Setting up your workspace

- Open up important panels
 - Open **Layers** (Illustrator: Window>Layers; Inkscape: Shift+Ctrl+L)



- Open **Fill/Stroke Properties** (Illustrator: Window>Stroke, Gradient, Transparency; Inkscape: Shift+Ctrl+F)
- **Set up your canvas** to fit the dimensions of your study organism. (Illustrator: Artboard tool; Inkscape: Shift+Ctrl+D) The size you pick will determine the size of the raster .png file you export later.

C. Helpful Shortcuts

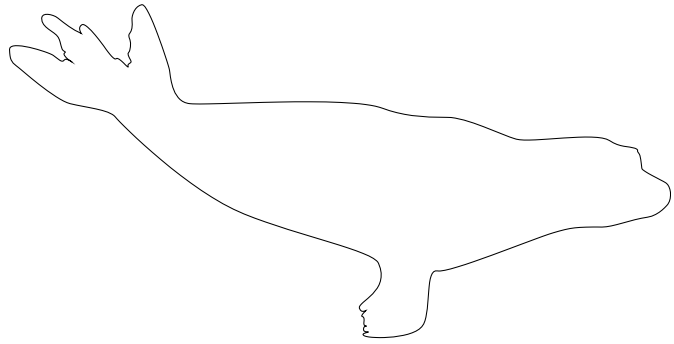
- You are all probably familiar with the shortcuts below, but have you tried the rest?! They will change your life as you dive into the world of digital art.
- **Select all** = Ctrl + A. **Undo** = Ctrl + Z. **Copy** = Ctrl + C. **Paste** = Ctrl + V.

	Illustrator	Inkscape	Powerpoint
Paste in place	Ctrl + F	Ctrl + alt + V	default if in new slide or if original object is moved.
Zoom in/out	Ctrl + "+" or "-"	"+" or "-"	Ctrl + scroll up / down
Move canvas	Spacebar + click & drag	Spacebar	Scroll.
Resize with locked proportions	hold Shift while dragging	hold Ctrl while dragging	hold Shift while dragging
Rotate	Hover outside object while selected to see rotation icon	Click once, then twice on object to show rotation handles	Rotate with rotation icon above object when selected
Reflect	Object> Transform> Reflect	H for horizontal reflection or V for vertical reflection	Arrange> Rotate> Flip Horiz/Vertical
Edit points of path/object	Use direct selection tool to select path segments or points	Double click on object to enter "Edit Path by Nodes" where you can select path segments or points	Right click line or path and select "Edit Points"

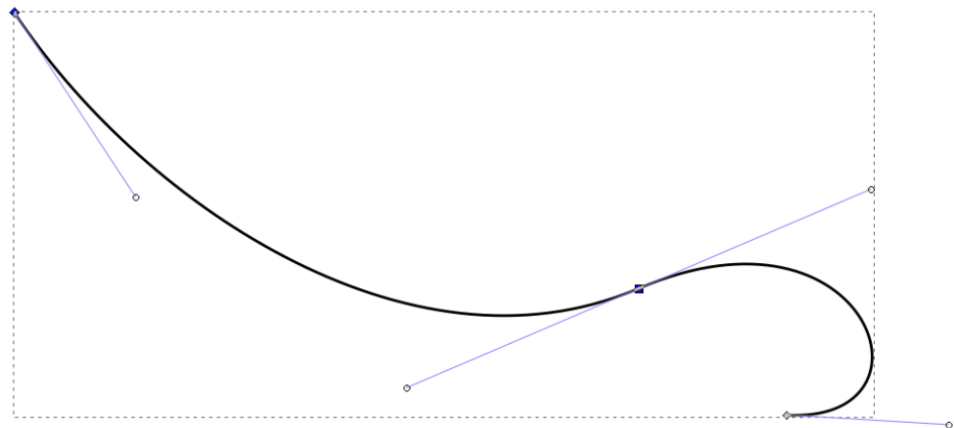
D. Outlining your Study Organism

- **Import your reference photo**
 - Choose photo from your personal archives or one online that displays key features of your study organism.
 - Drag & drop or File>Import
 - Name this layer "Reference Photo" and lock the layer (using the little lock icon in the Layers panel).
- **Create your outline**
 - Create new layer above the reference photo named "Outline". (Illustrator: ; Inkscape: ).

- **Use pen tool / Bezier tool** (Shift + F6) to draw your outline like is shown to the right. Create a CLOSED loop outline, starting and ending on the same point.



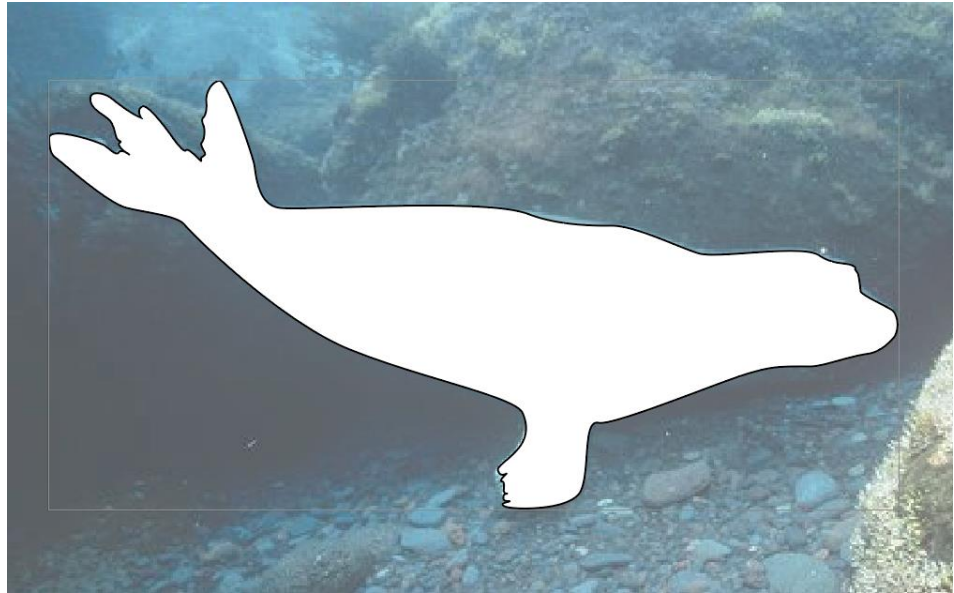
Have patience with the pen tool. It is very powerful, but with power comes great responsibility and sometimes great chaos. First, click and drag a tiny bit in the direction you would like to go. Release when you have created a good first tangent line and next, you will be able to select a spot for the second anchor point (or “node” in Inkscape or “point” in Powerpoint). Click to create this second anchor point and drag the handles out to guide your curve along the outline of your study organism. You are essentially drawing curves using only points and tangent lines. Sharp corners will have short tangent lines or no tangent lines at all, while rounded corners will have long tangent lines. Try to aim for as few anchor points as possible. For areas with greater detail, you will have more anchor points.



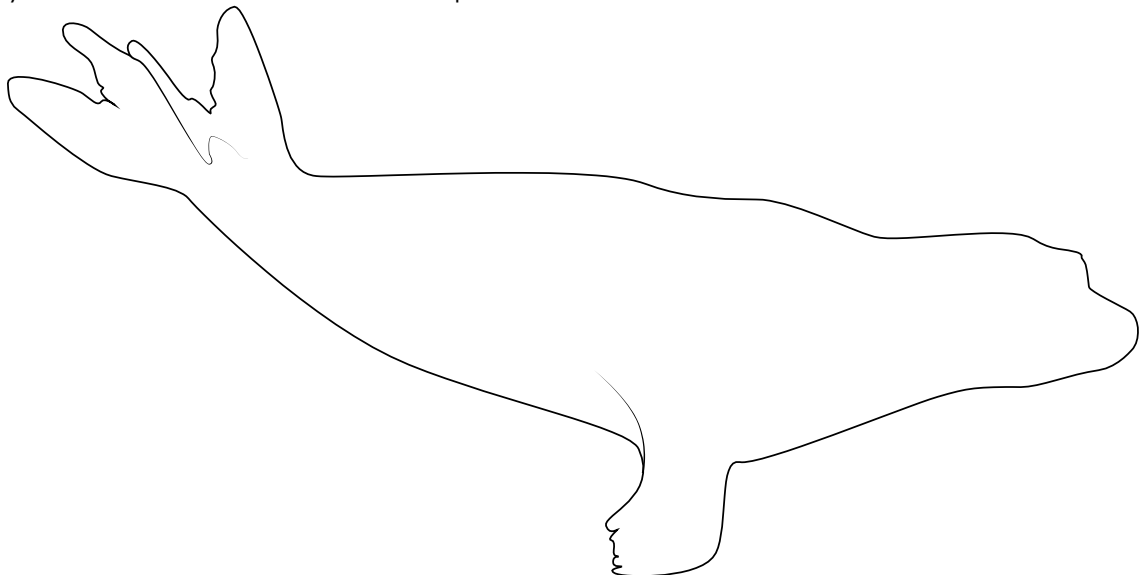
When you get old and grumpy, you may grow tired of the pen tool, and may opt for a more organic drawing tool. You may then, and only then, move onto the “Pencil” tool. This tool allows you to draw lines as if you were drawing them on paper. You can smooth these lines as much as you want, but they will still never be as smooth as those created with the “Pen” tool. Since

we're learning new things today, I urge you to try out the pen tool. I promise, it gets easier.

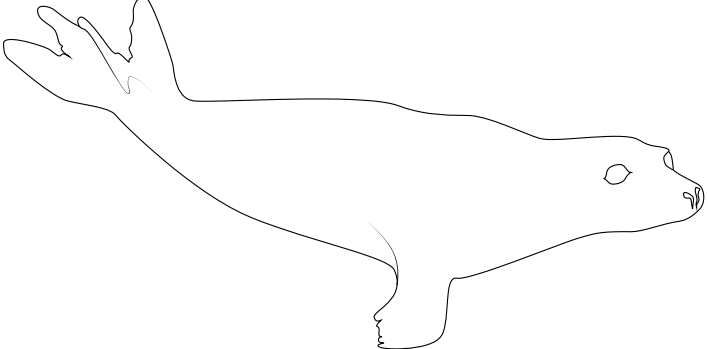
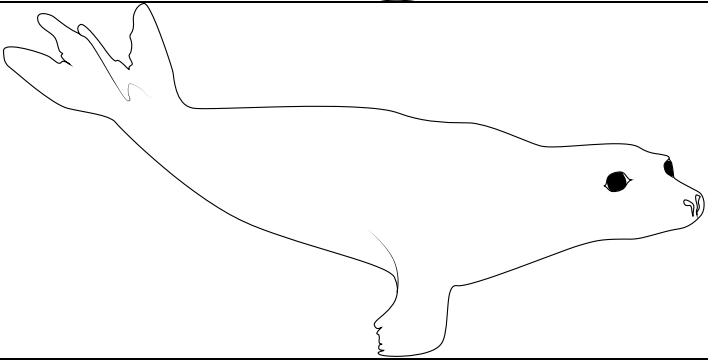
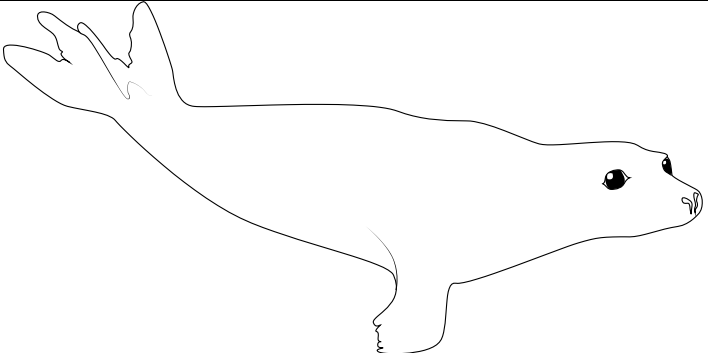
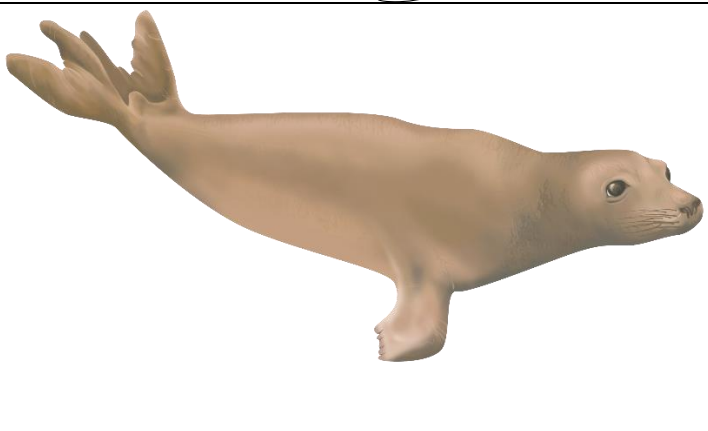
- **Add a white fill to your outline, and a thin black stroke**, so that it pops out from your reference photo (see photo below). You can do this in the Fill/Stroke panels in Illustrator and Inkscape and in "Shape Outline" and "Shape Fill" in Powerpoint.



- Add lines to make the body outline more meaningful/detailed. In Inkscape: Select the Pen/Bezier tool and select "Triangle In" to create a triangle stroke effect along your path (a tapered line). Start this line at your outline and have it taper in toward the inside of your organism (see the tail and pectoral flipper of this seal for an example). In Illustrator, you can create the lines in the pen tool and flexibly change the stroke effect afterwards by changing the "Profile" of your stroke in the Stroke effects panel.



- Next, add in any other details to your study organism using these same methods. Make sure to start a new layer each time you add something new, so that you can easily select, modify, or delete different aspects of your design that may overlap.

<p>After adding in Layer 4 with eye and nostril detail. I should have added some whiskers too, but I will do that in Photoshop later on!</p>	
<p>After adding in Layers 5 and 7, with the fill for each eye. I just added two closed circle with a black fill and no stroke.</p>	
<p>After adding in two small white circles to Layers 6 and 8, which I put on TOP of the black fill for each eye in the previous step.</p>	
<p>Next, you can import your vector graphic into Adobe Photoshop, Procreate, or GIMP to add shading and color. Your crisp vector graphic outline can act as masking tape so that you can easily and quickly color inside the lines.</p>	

After painting your study organism, you can add different lighting effects, scientific instruments, or put your animal in context with its environment by compositing it into a scene!

