

WEEK 3

Intro to Photoshop, Illustrator, and Compositing

DATA VISUALIZATION

Digital storytelling at the confluence of science, art, and technology

Working Group Format & Resources

- Website (working syllabus, compiled resources):
<https://datavisualization.sites.ucsc.edu/>
- Google Group (email listserv for meeting announcements/funding opportunities):
<https://groups.google.com/u/1/g/data-visualization-collective>
- Canvas (modules, assignments, and grading for enrolled & auditing students):
<https://canvas.ucsc.edu/courses/41815>
- Shared Google Drive (workshop slides, files, and data sharing):
<https://drive.google.com/drive/u/1/folders/0AFCLSGi-duPIUk9PVA>

Pre-meeting to do's – any issues?

- Share your style guides (please download and fill out in PowerPoint) with your data contributors for feedback
- Create some vector graphics according to my step-by-step tutorial
- Create some raster graphics in Photoshop or Procreate as well if you would like. There are tons of tutorials on digital painting but here is an example
- While you are working in Illustrator and Photoshop this week, please drop your graphics and color palettes into your Adobe CC library. You can then share your CC library with your collaborators so they have access to your awesome designs! Here is a tutorial on using CC libraries.

Agenda for today

Uniting raster and vector graphics for our graphical abstract:

Photoshop
Illustrator
Compositing

Illustrator

Basics of creating vector graphics

ILLUSTRATOR: TOOLS TO KNOW

1. Selection (and Direct Selection) Tools
2. Artboard tool
3. Pen tool
4. Pencil tool
5. Eyedropper tool
6. Layers/Paste in Place
7. Grouping
8. Clipping Masks

USES OF ILLUSTRATOR

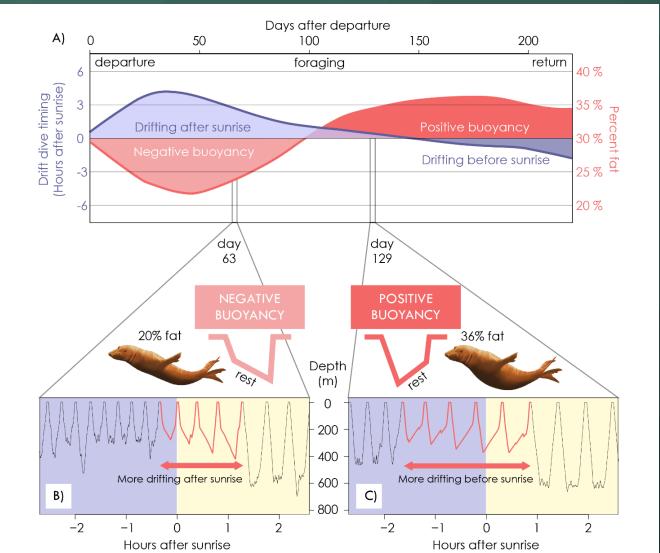
VECTOR GRAPHICS

Outline your study organisms to create flexible, custom vector graphics for use across platforms.



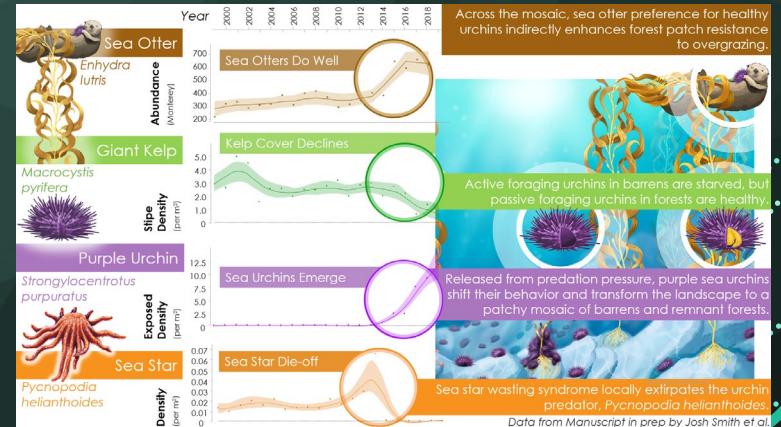
FIGURE EDITING

Create visually appealing figure layouts and which adhere to figure submission guidelines.



COMPOSITING

Combine your raster and vector graphics into one cohesive figure.



CUSTOM VECTOR GRAPHICS

KEY TOOLS:

1. Selection tool (and Direct Selection)
2. Pen tool
3. Pencil tool
4. Blob Brush
5. Fill & Stroke
6. Stroke Profile

KEY STEPS:

1. Find reference image
2. Create outline using the pen tool
3. Add fill & stroke
4. Add details
5. Apply stroke profiles to details & export.

1) FIND REFERENCE IMAGE

OUTLINING YOUR STUDY ORGANISM

- Put your reference photo into Illustrator by dragging & dropping or Importing it.
- Also drag this reference image into your CC Library and name it.



2) CREATE OUTLINE

OUTLINING YOUR STUDY ORGANISM

- 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.



PEN TOOL CHEAT SHEET

See our "Helpful Links" page for more resources.

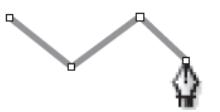


Pen Tool cheat-sheet

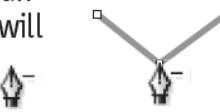
(Photoshop, Illustrator, InDesign)



Click to create points, each point will create a **straight** connecting line.



With the pen tool, hover over an **existing point** and the cursor will *automatically* change to the **DELETE Anchor Point Tool**.



To select and move a point, hold down the **CONTROL** key (and the pen tool will change to the **DIRECT SELECTION Tool**).



To select and move a handle, hold down the **CONTROL** key and the pen tool will change to the **DIRECT SELECTION Tool**. Click on the handle and pull or rotate.



Click and **PULL** to create points with (bezier) **handles** that will form **curved** lines.



With the pen tool, hover over an **existing line segment** and the cursor will *automatically* change to the **ADD Anchor Point Tool**.



To **MAKE handles** from a point that has none, hold down the **ALT** key; the pen tool will change to the **CONVERT Anchor Tool**. Click on the point and pull.



To **REMOVE** handles from a point, hold down the **ALT** key; the pen tool will change to the **CONVERT Anchor Tool**. Click on the point, the handles go away.



Here are some helpful & condensed tips for using the pen tool in illustrator, but you also just need to **practice!**

For free weekly tips for Mac-based designers, check out creativetechs.com/tips

PEN, PENCIL, AND BLOB BRUSH TOOL

PEN TOOL

A bit frustrating at first but very useful for smooth curves with few anchor points. Use for outlining body shape, symmetrical logos, etc.



It's tempting to want to start out with the pencil tool right away, but please learn this!

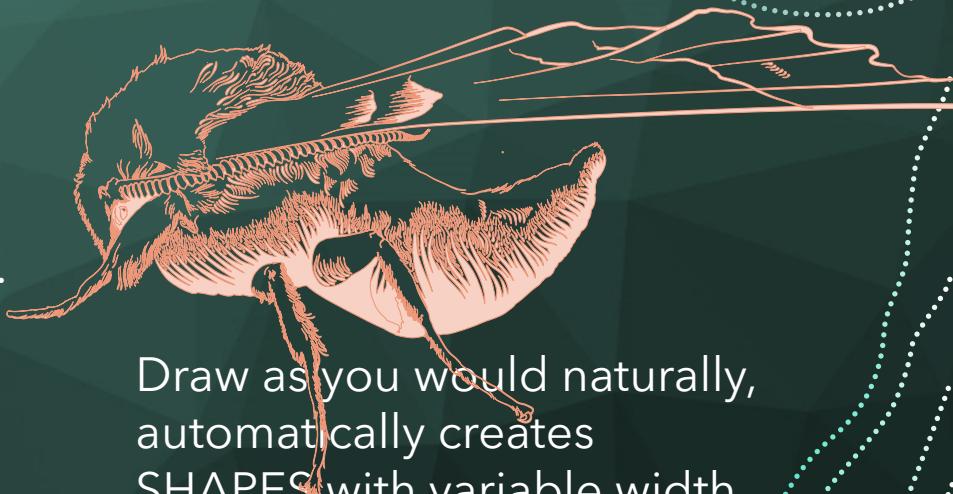
PENCIL TOOL

Draw as you would naturally, automatically creates a path, but often creates more anchor points than you need.



Can edit by revisiting subsections of your path with the pencil tool, but many points make it harder to edit after the fact with the direct selection tool.

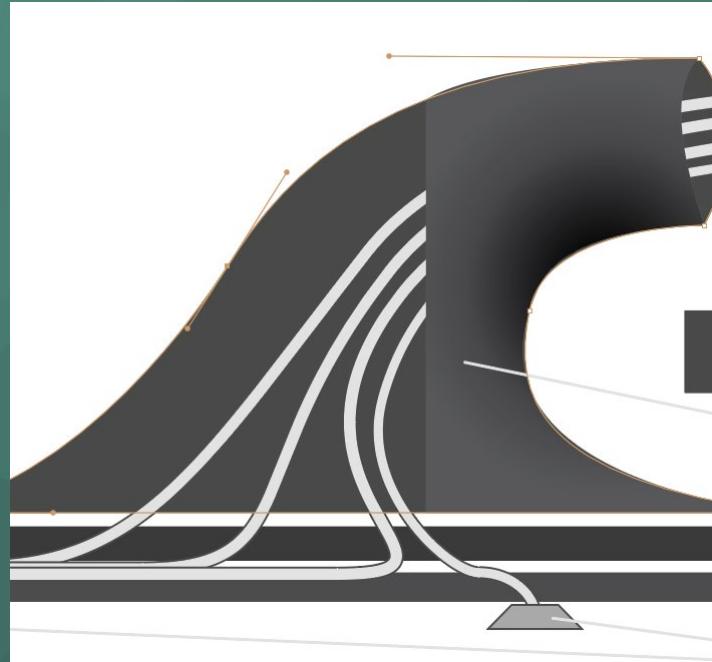
BLOB BRUSH



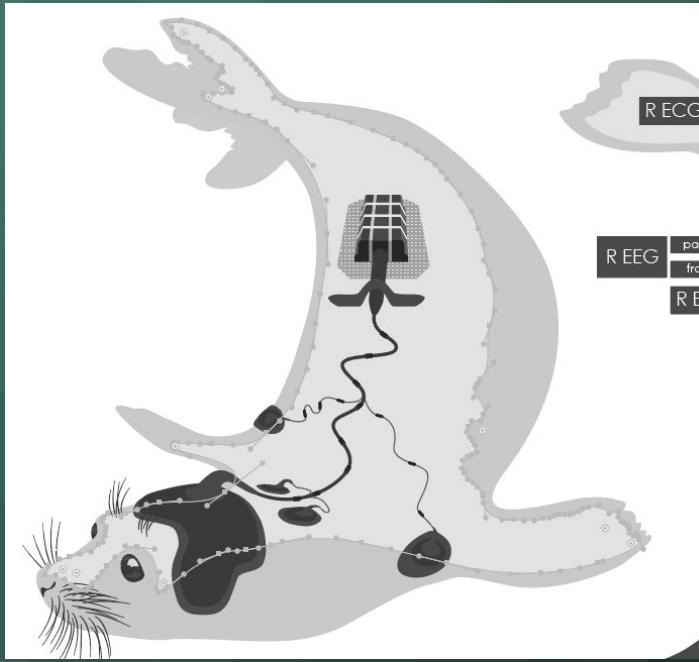
Draw as you would naturally, automatically creates SHAPES with variable width (with a fill and a stroke, unlike a path which only has a stroke). Very hard to edit after the fact.

PEN, PENCIL, AND BLOB BRUSH TOOL

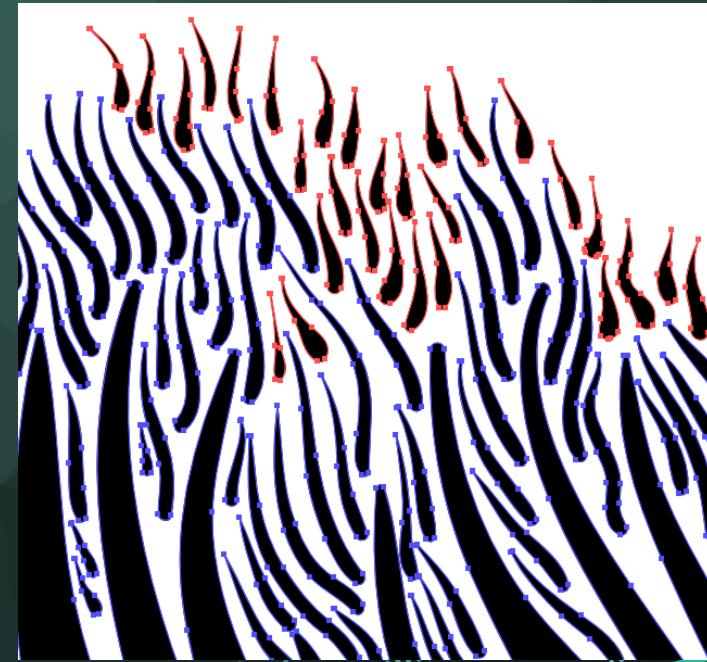
PEN TOOL



PENCIL TOOL



BLOB BRUSH

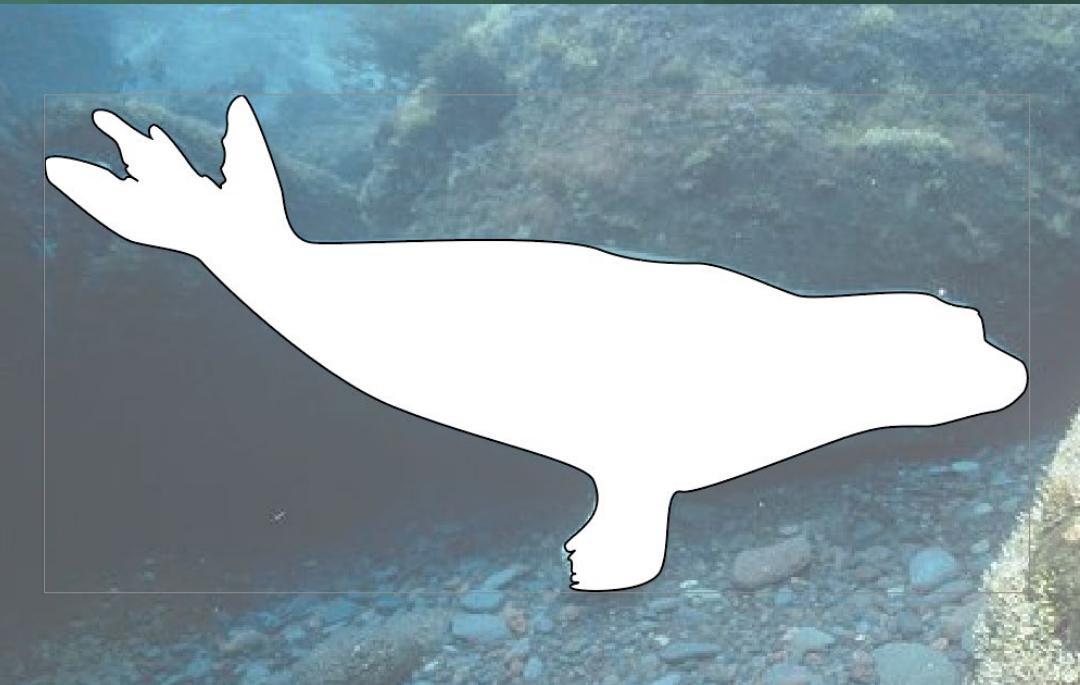


3) ADD A FILL & STROKE

OUTLINING YOUR STUDY ORGANISM

- Add a white fill to your outline, and a thin black stroke, so that it pops out from your reference photo.

You can do this in the Fill/Stroke panels in Illustrator and Inkscape and in "Shape Outline" and "Shape Fill" in PowerPoint.



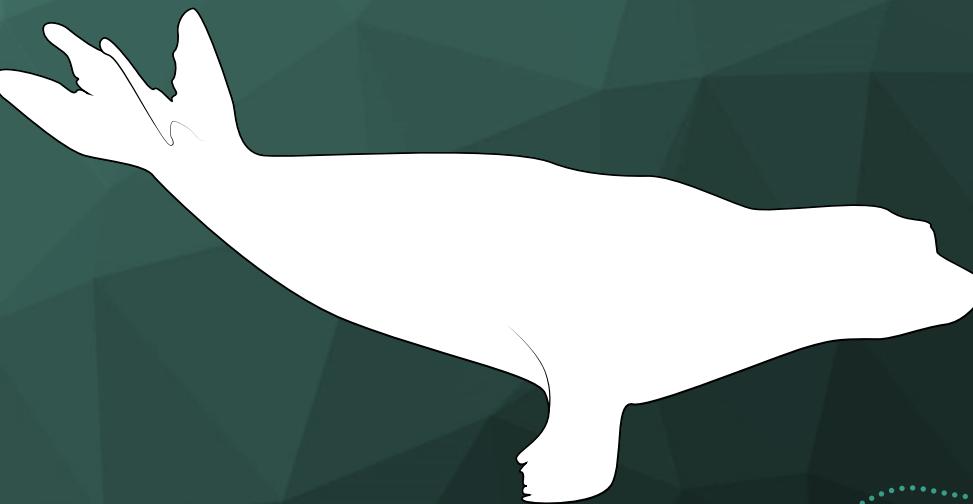
4) ADD DETAILS

OUTLINING YOUR STUDY ORGANISM

- Add lines to make the body outline more meaningful and detailed.

In Inkscape: Select the Pen/Bezier tool and select "Triangle In" to create a triangle stroke effect along your path (a tapered line).

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.



5) FINISH UP

OUTLINING YOUR STUDY ORGANISM

- 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.

- Drag your finished graphic into your CC Library & name it.

Then, digitally paint it in!
See next slides...



RASTER



VECTOR



Digitized in Illustrator using pen tool and blob

Photoshop

Basics of digital painting



PHOTOSHOP: TOOLS TO KNOW

1. Brush tool
2. Layers
3. Adjustment Layers
4. Blending Modes
5. Clipping Masks

1) FIND & IMPORT REFERENCE IMAGE

PAINTING YOUR STUDY ORGANISM

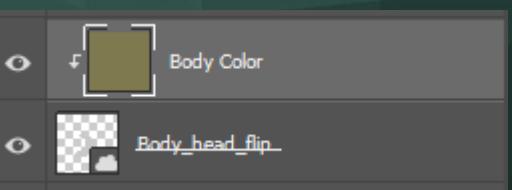
- Put your reference photo into Photoshop by dragging & dropping from your CC Library or Importing it.



2) CREATE CLIPPING MASK

PAINTING YOUR STUDY ORGANISM

- Import your vector graphic by dragging & dropping from CC libraries.
- Make a separate layer above your vector graphic and create a clipping mask by holding ALT and clicking between the two layers.
This makes it so that in that layer, you can only color within the lines.



- Then fill that layer with a color to use as the body color of your study organism.

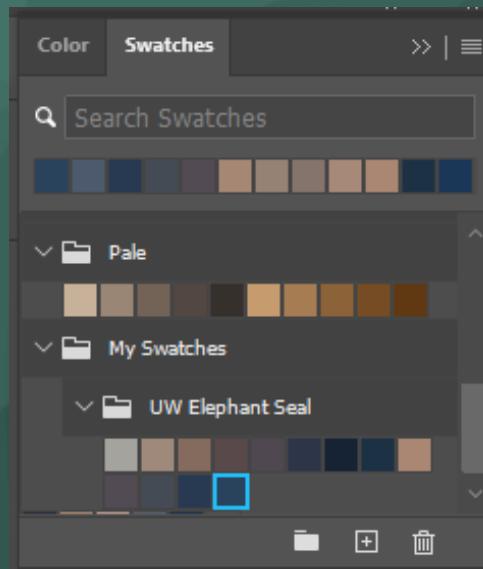
Cool trick! try going back to Illustrator, opening up your linked graphic and changing the outline, your clipping mask should change automatically when you save.



3) PICK SOME COLORS

PAINTING YOUR STUDY ORGANISM

- Insert your reference photo and make swatches of the colors you see (lightest highlights, midtones, and shadows of each color). These swatches will automatically be saved to your CC Library.



4) AIRBRUSH SHADOWS AND HIGHLIGHTS

PAINTING YOUR STUDY ORGANISM

- Give your painting some depth by adding highlights and shadows with a large (500px), soft (hardness 0%) round brush on a separate layer.
- When you are happy with the overall shading, you can add another layer and make your brush smaller to add more detail.
- Try to stick to the same soft airbrush for this entire process.



5) ADD DETAILS

PAINTING YOUR STUDY ORGANISM

- Either use other vector graphics as clipping masks for details or you can draw them yourself



Color adjustments
and adding
details with
pressure-sensitive
stylus, etc.



6) COMPOSITING IN PHOTOSHOP

PAINTING YOUR STUDY ORGANISM

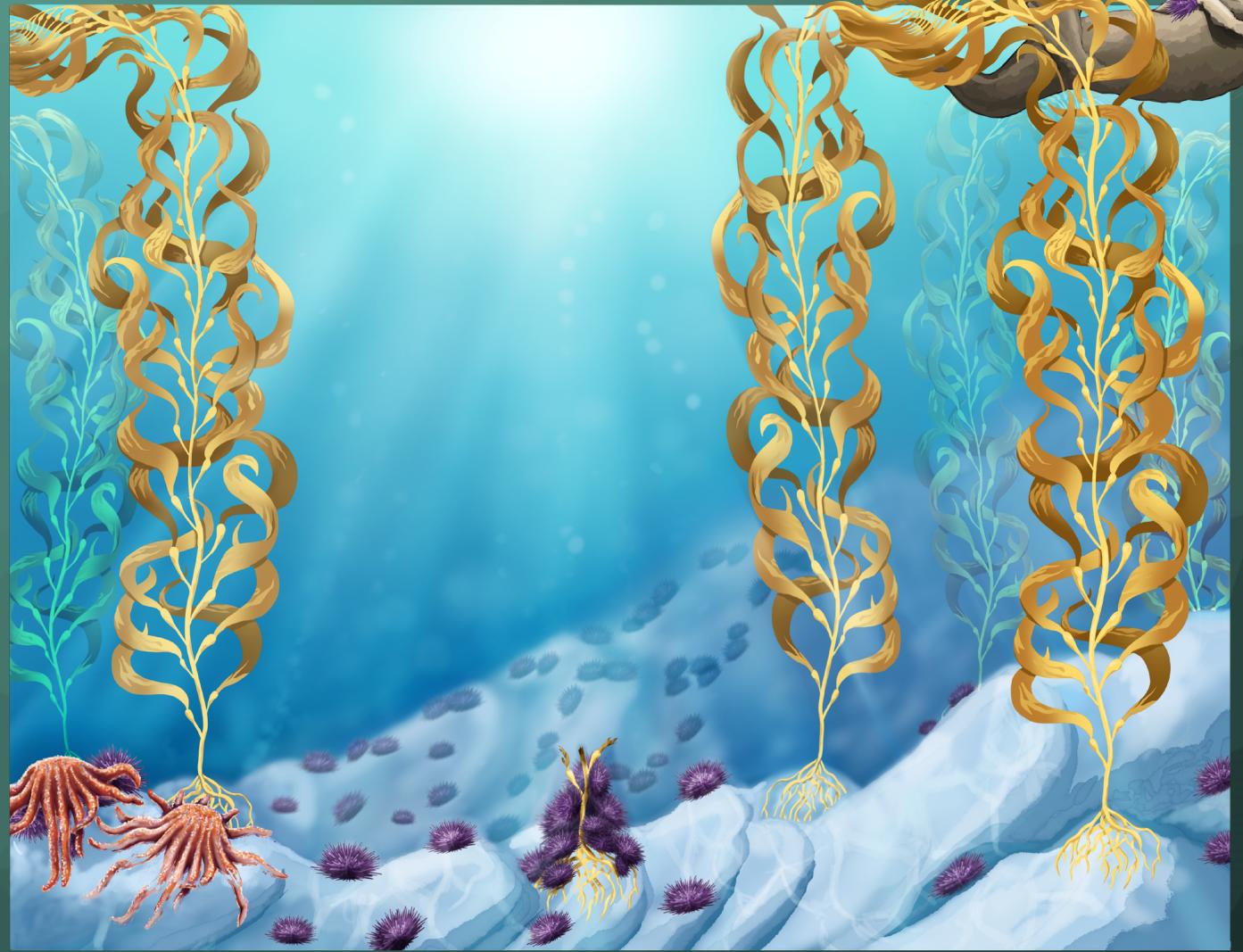
- Use the gradient tool or a solid color to make a background
- Add details as necessary to fill in the scenes
- Add layers for shadows and highlights and use blending modes

Compositing tips:

- When painting backgrounds, the foreground has higher contrast and brighter colors.
- When creating watercolor or artistic effects, it helps to add "glow" around your objects.



EXAMPLE



back to
Illustrator
Basics of editing figures & compositing

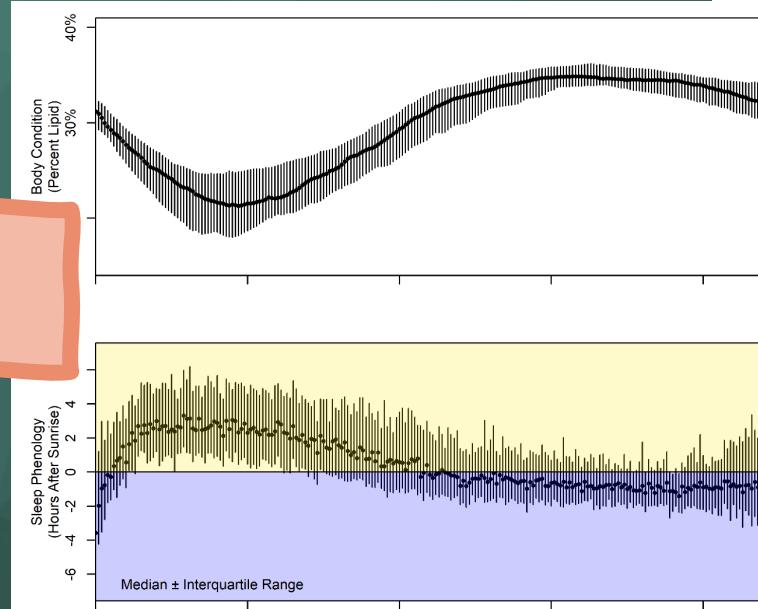
WHY EDIT A FIGURE

GUIDELINES

You might need to edit the font, colors, or formatting to fit the guidelines of a journal.

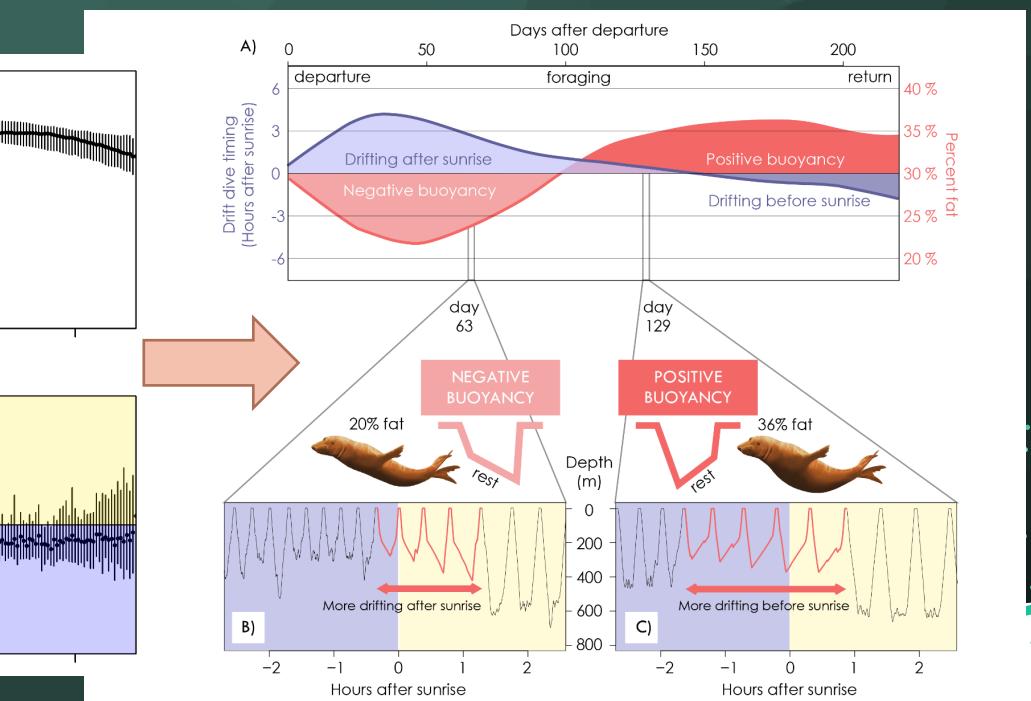
AESTHETICS

You might want quick access to play with color palettes, font styles, and appearance.



COMPOSITION

You may want to combine your figure with other graphics which were made separately.



WHEN TO EDIT A FIGURE IN ILLUSTRATOR

YES, DO IT

- You won't be changing the analysis or data
- You will only be making small changes to the data, but the axes will not change
- You have a reproducible workflow for generating the figure up to this point that will look like the one edited in Illustrator
- You are seeking to make small cosmetic changes such as adjustments to:
 - Marker fill color
 - Line type or stroke
 - Font (size and type)
 - Formatting scale bars and labels
 - Arranging subpanels

NO, BETTER NOT...

- You will be making changes to the data and analyses that will change the axes
- You are seeking to make extensive changes including changes like:
 - Changing axes
 - Plotting additional data
 - Marker shape
 - Combining datasets

EDITING FIGURES IN ILLUSTRATOR

KEY TOOLS:

1. Selection tool (and Direct Selection)
2. Layers/Paste in Place
3. Clipping Masks
4. “Transform Each”
5. Groups
6. Eyedropper tool

KEY STEPS:

1. Export figure as .pdf or other vector graphic format.
2. Open figure in Illustrator
3. Release clipping mask
4. Group elements
5. “Transform each” for points
6. Eyedropper tool for line styles
7. Export figure as .png

COMPOSITING IN ILLUSTRATOR

KEY TOOLS:

1. Selection tool (and Direct Selection)
2. Layers/Paste in Place
3. Clipping Masks - Create
4. "Transform Each"

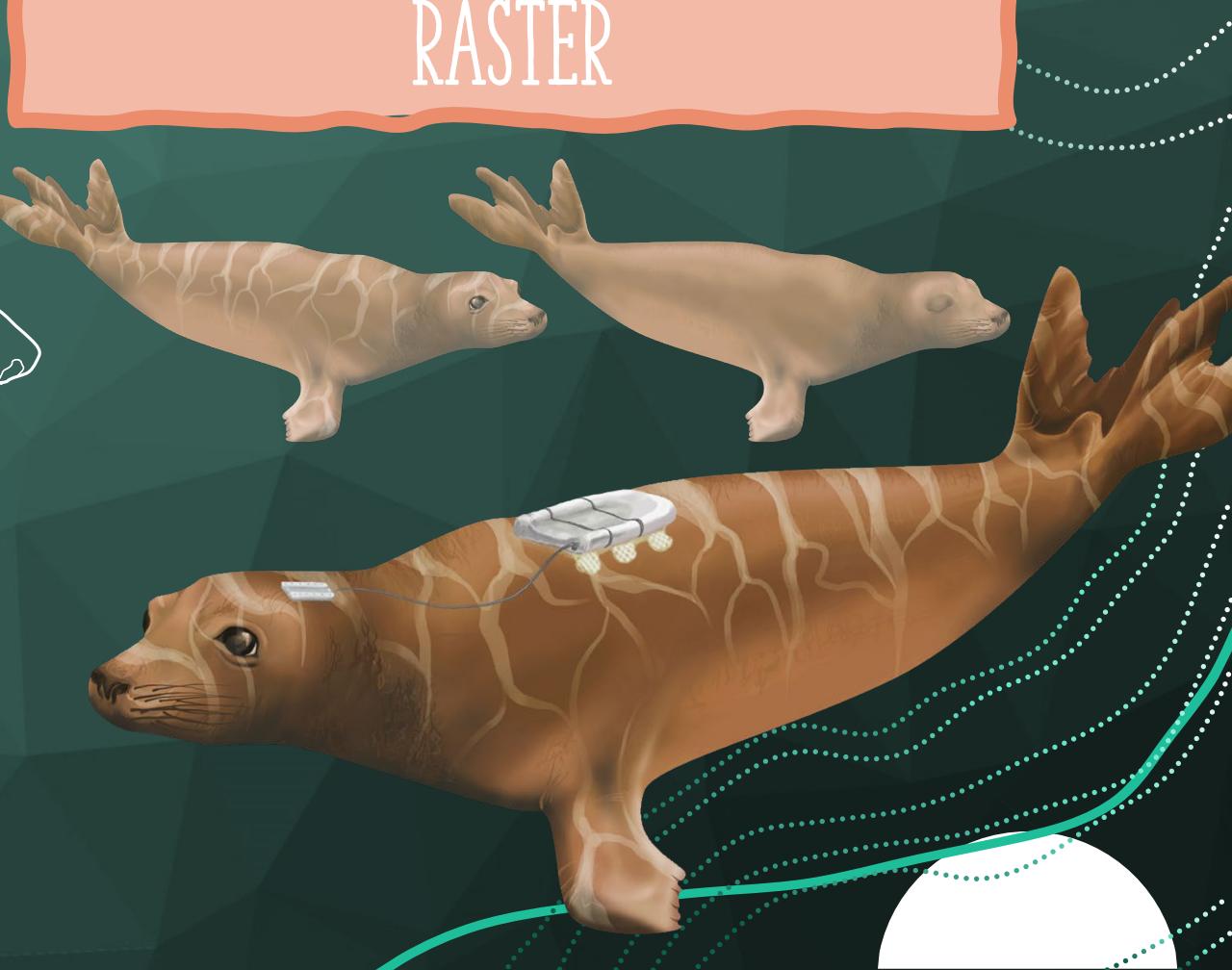
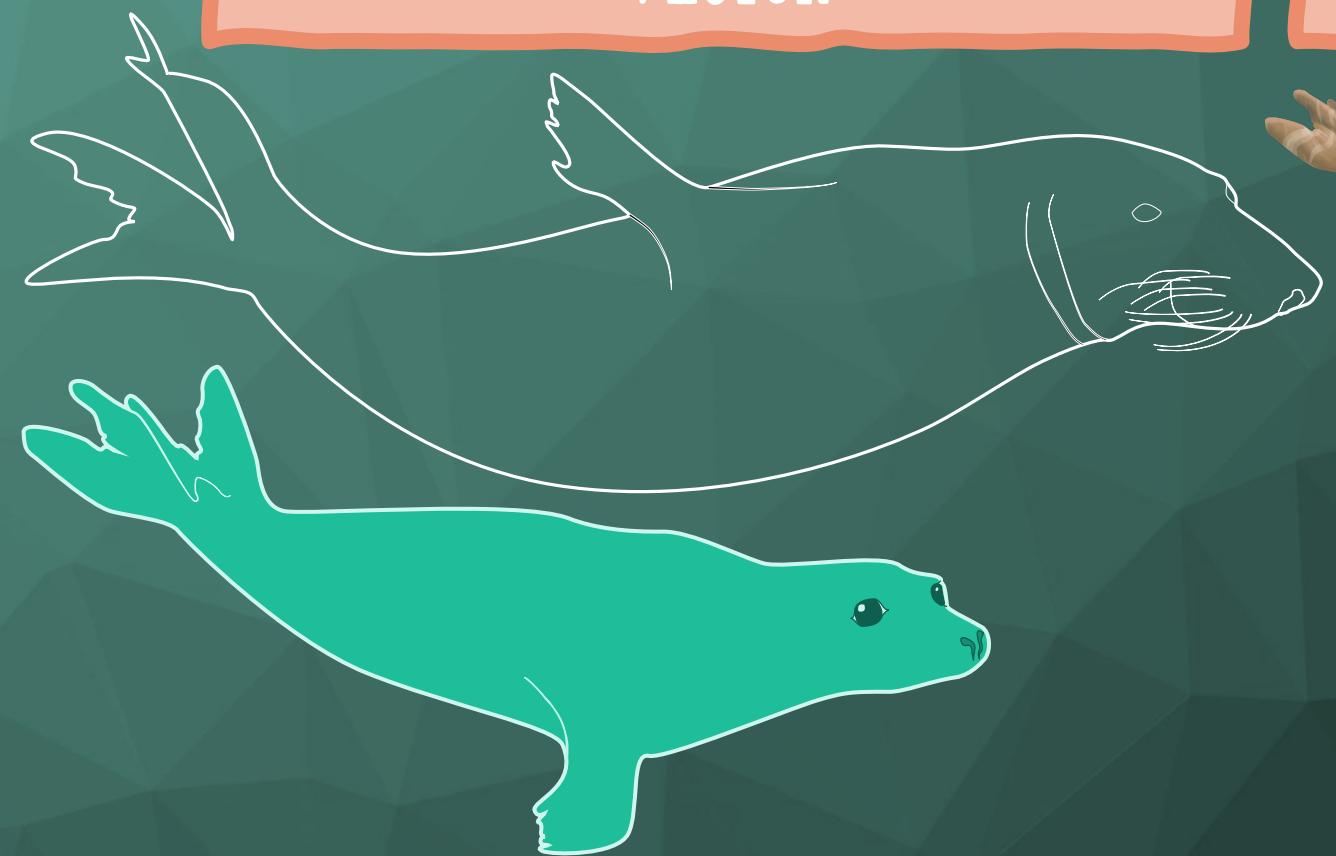
KEY STEPS:

1. Insert your graphics from CC Libraries (other sources too: nounproject etc.)
2. Decide on a layout which enforces the narrative.
3. Arrange graphics
4. Make clipping masks to frame your graphics

Uniting raster & vector graphics

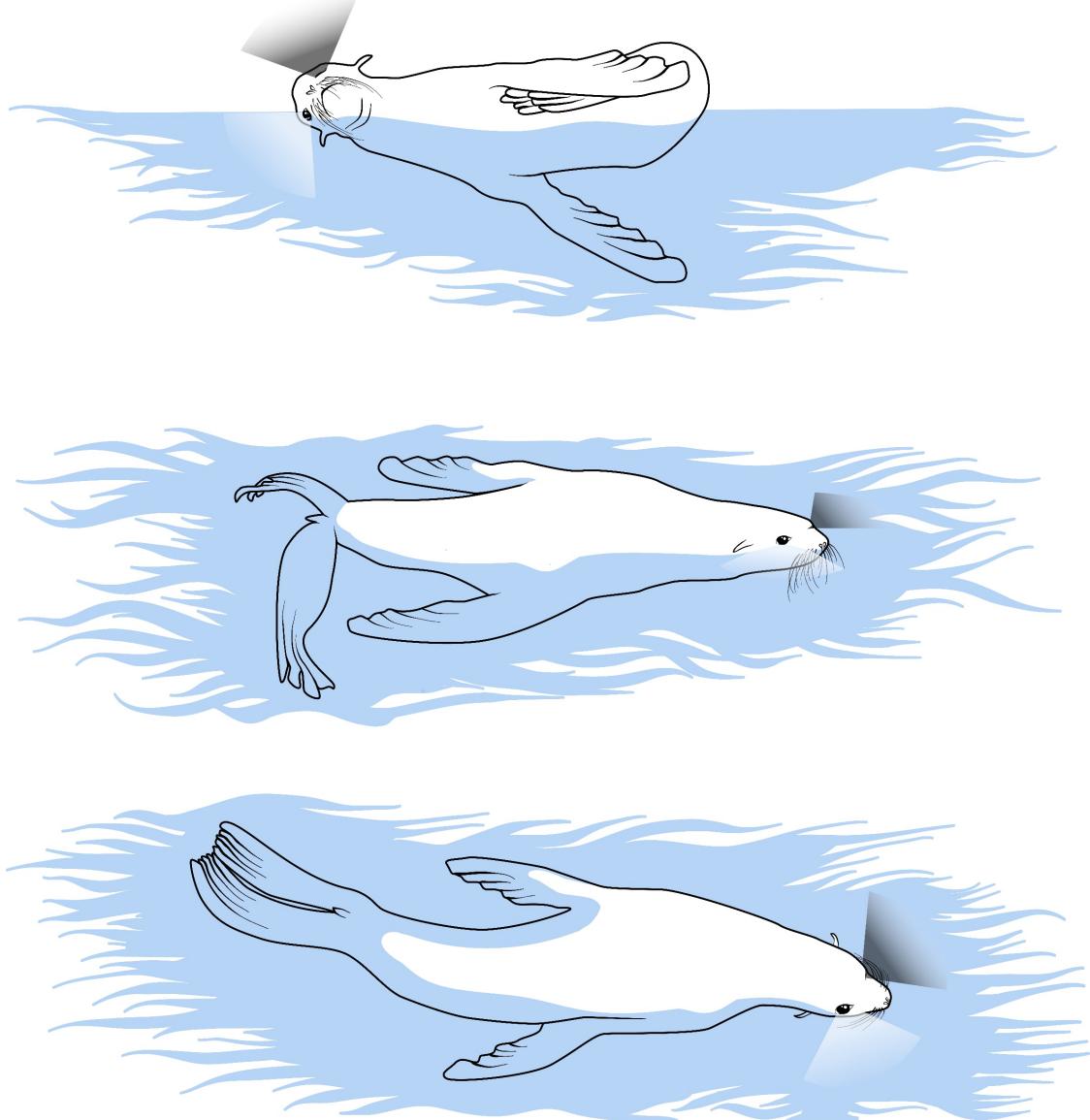
VECTOR

RASTER





Made in Illustrator using pen tool and blob brush.

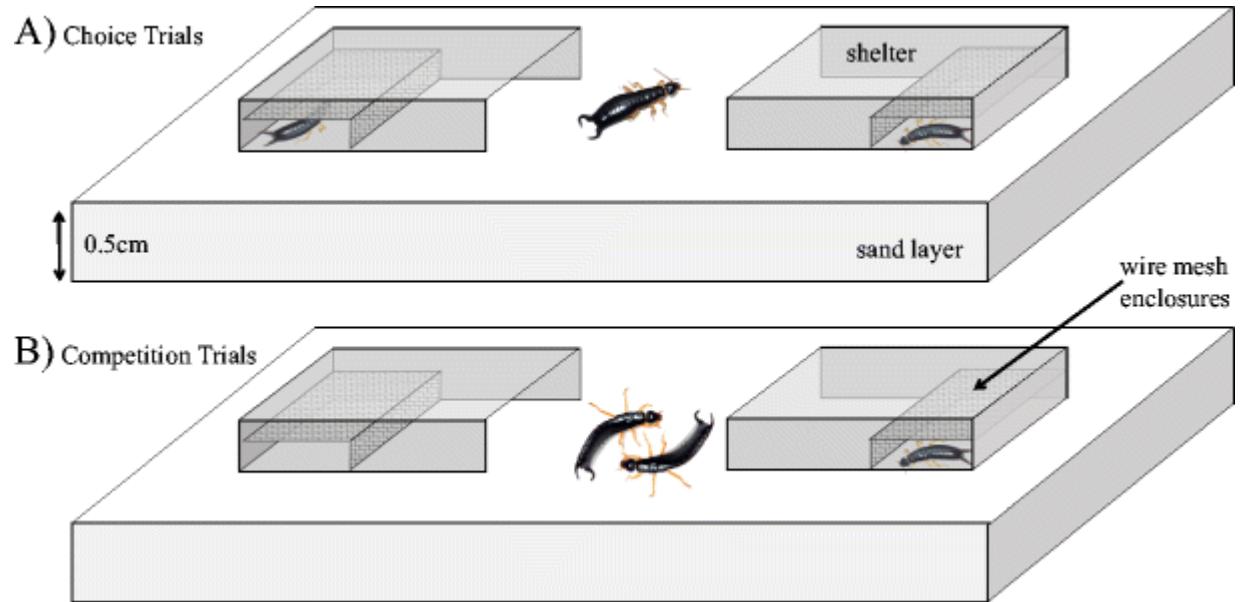


Demonstrating observations

Kendall-Bar JM, Vyssotski AL, Mukhametov LM, Siegel JM, Lyamin OI (2019) Eye state asymmetry during aquatic unihemispheric slow wave sleep in northern fur seals (*Callorhinus ursinus*). PLOS ONE 14(5): e0217025. <https://doi.org/10.1371/journal.pone.0217025>

Earwigs: photos with backgrounds removed in Photoshop

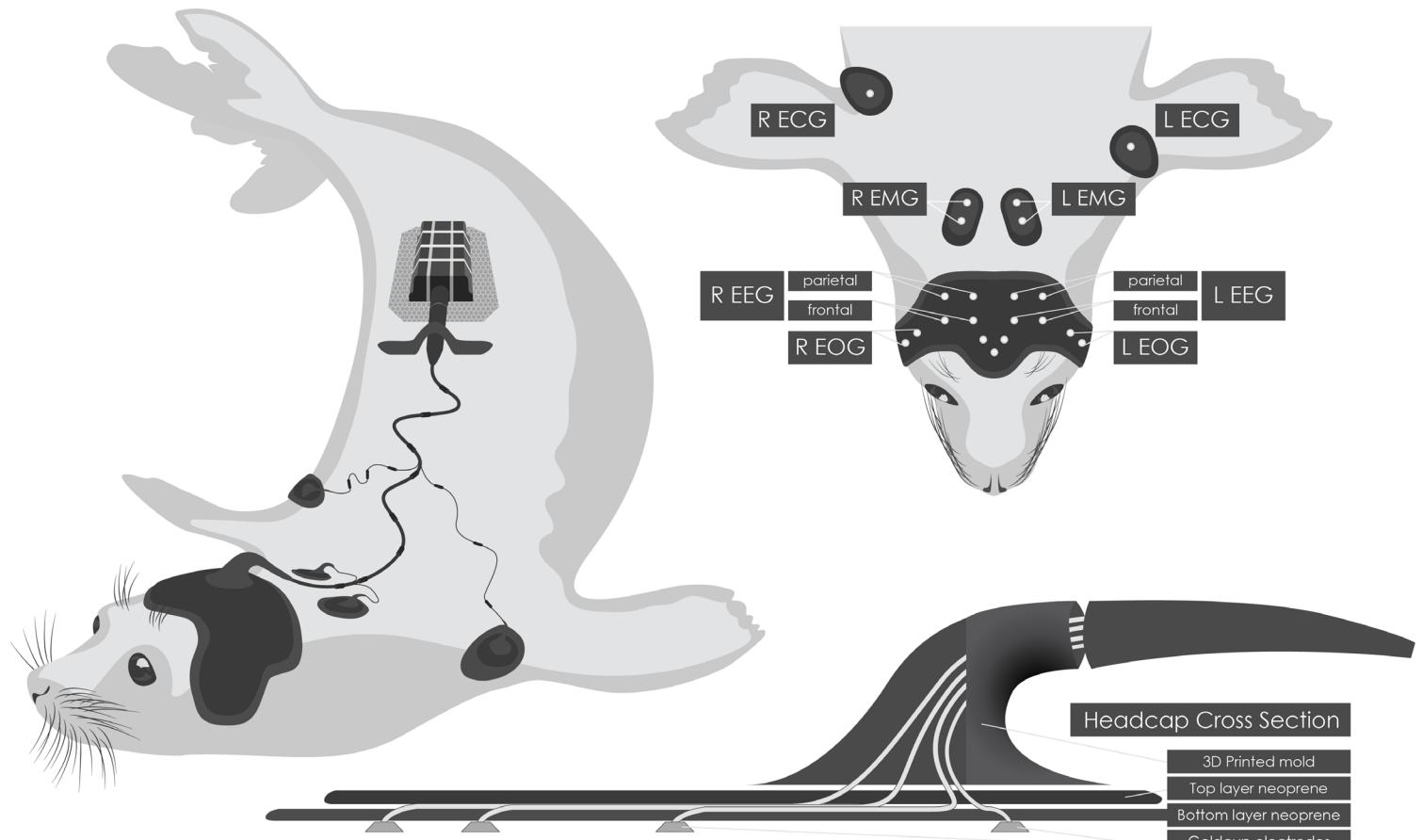
Mating setup diagram: PowerPoint



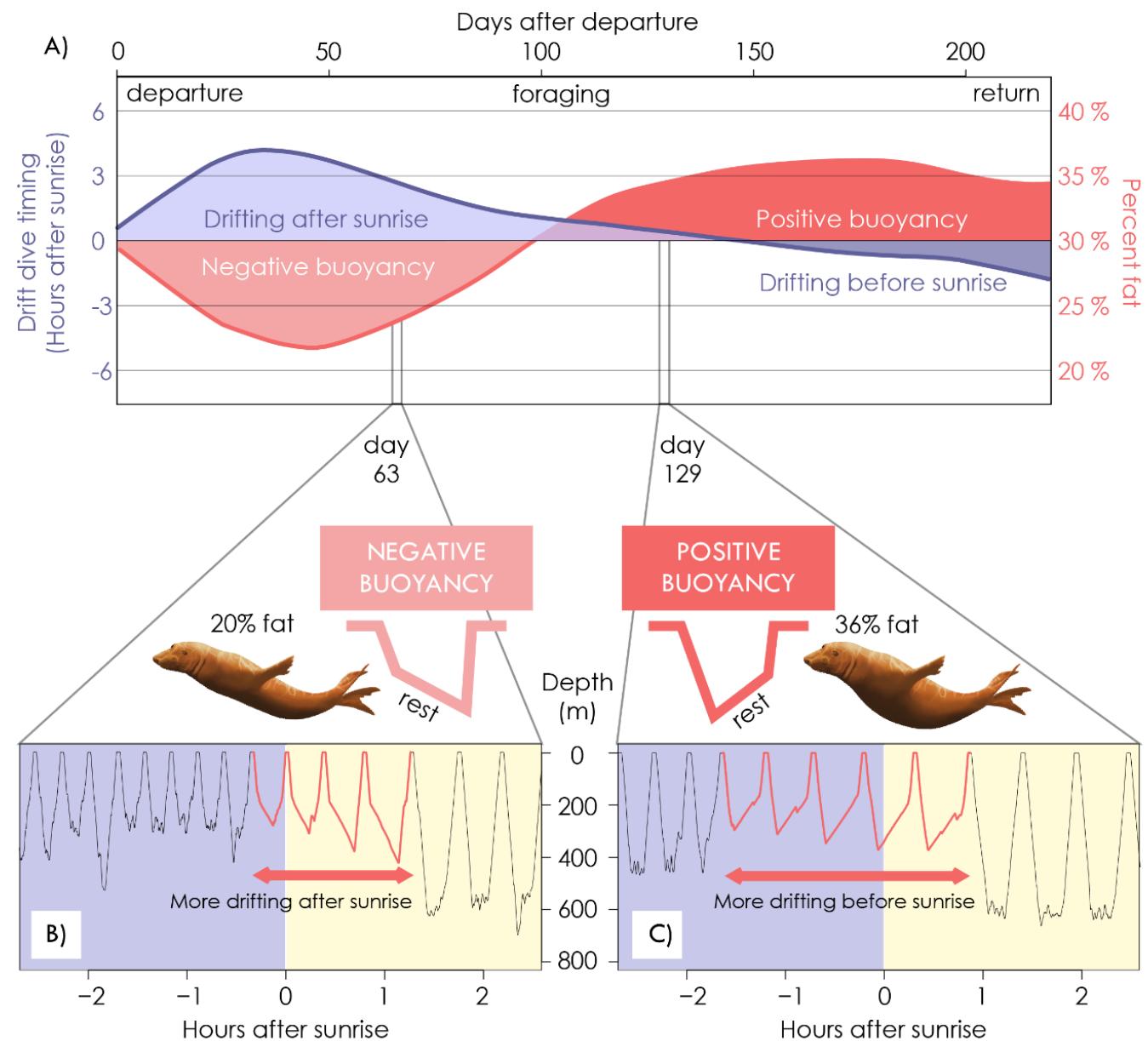
Demonstrating experimental design

Kendall-Bar, J.M., Iyengar, V.K. Sexual selection by the seashore: the roles of body size and weaponry in mate choice and competition in the maritime earwig (*Anisolabis maritima*). *Behav Ecol Sociobiol* 71, 8 (2017).
<https://doi.org/10.1007/s00265-016-2233-9>

Made in Illustrator.



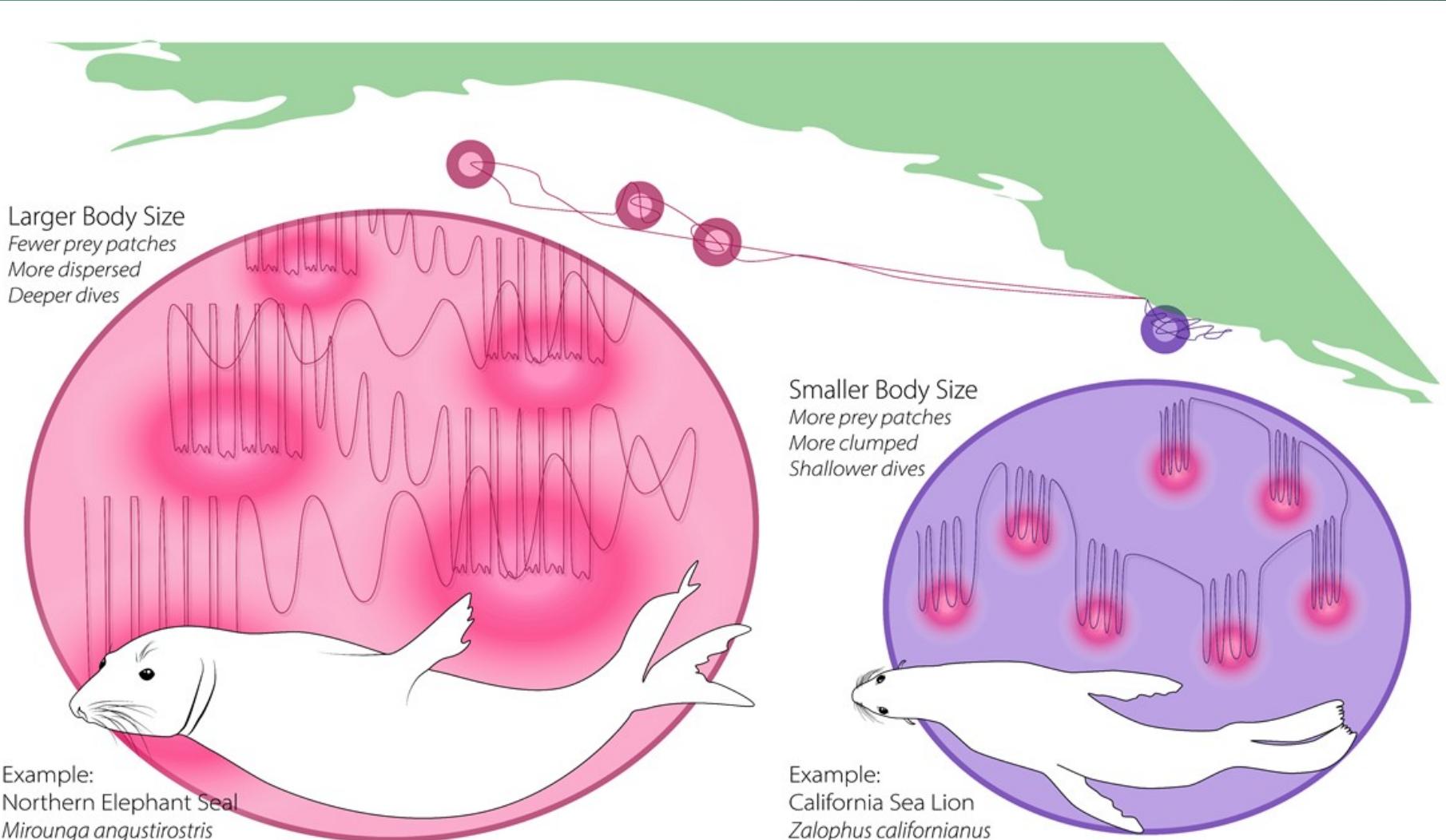
Demonstrating methodology



Demonstrating changes across time

*Figures made in R, edited in Illustrator.
Seal raster graphics painted in Photoshop.*

Demonstrating differences between species



Tracking data:
Google Earth

Organism vector
graphics: Illustrator

Final Composition:
Illustrator

FALL October-December

JUVENILE HAULOUT Juveniles & Subadult Males



Post-Molt FORAGING TRIP



SEA LION TAKEOVER Most elephant seals gone

SUMMER July-September

Graphics by Jessica Kendall-Bar.
Drone photos taken by Patrick Robinson
under NMFS permit 19108 and MBNMS-2017-018
and stitched by Sarah Wood and Roxanne
Beltran. We thank Steve & Phyllis Sooy for their
generous contributions to elephant seal research.

We thank the Costa Lab, past and present,
for their contributions to this effort:

A year in the life of Phyllis... AN ADULT FEMALE NORTHERN ELEPHANT SEAL

560 kilograms!

1 Phyllis returns home from a 7-month trip to sea.

600
500
400
300

2 Phyllis gives birth to a 35 kg pup.

9

3 Phyllis feeds her pup 52% fat milk for 26 days.

50 days

4 Phyllis leaves to forage
for food at sea.

320 kilograms

5 Phyllis travels >5,000 km, diving
to depths >800 m for >20 min
each time.

75 days

400 kilograms

6 Phyllis returns to
molt on land.

7 It takes about 10 days for
Phyllis to abruptly molt her
skin and fur.

280 kilograms!

8 After 6 weeks on land and losing over
100 kg, Phyllis returns to the sea.

WINTER January-March

BREEDING SEASON ADULTS & PUPS



Post-Breeding FORAGING TRIP



MOLTING SEASON ADULTS & JUVENILES

SPRING April-June

UNIVERSITY OF CALIFORNIA,
SANTA CRUZ | Science



© Jessica Kendall-Bar

What's in a name?

Phyllis migrates for 7 MONTHS, over 10,000 kilometers, swimming halfway to Japan and back to feed on abundant fish and squid in the open ocean. Phyllis was a real seal we tracked, who was named after a beloved Año Nuevo docent and philanthropist. The seal named Phyllis set a record by traveling farther west than any other tracked elephant seal.

Phyllis' diet:



Males vs. Females

The foraging patterns of females and males differ greatly, with males typically foraging along the continental shelf and females staying farther offshore.



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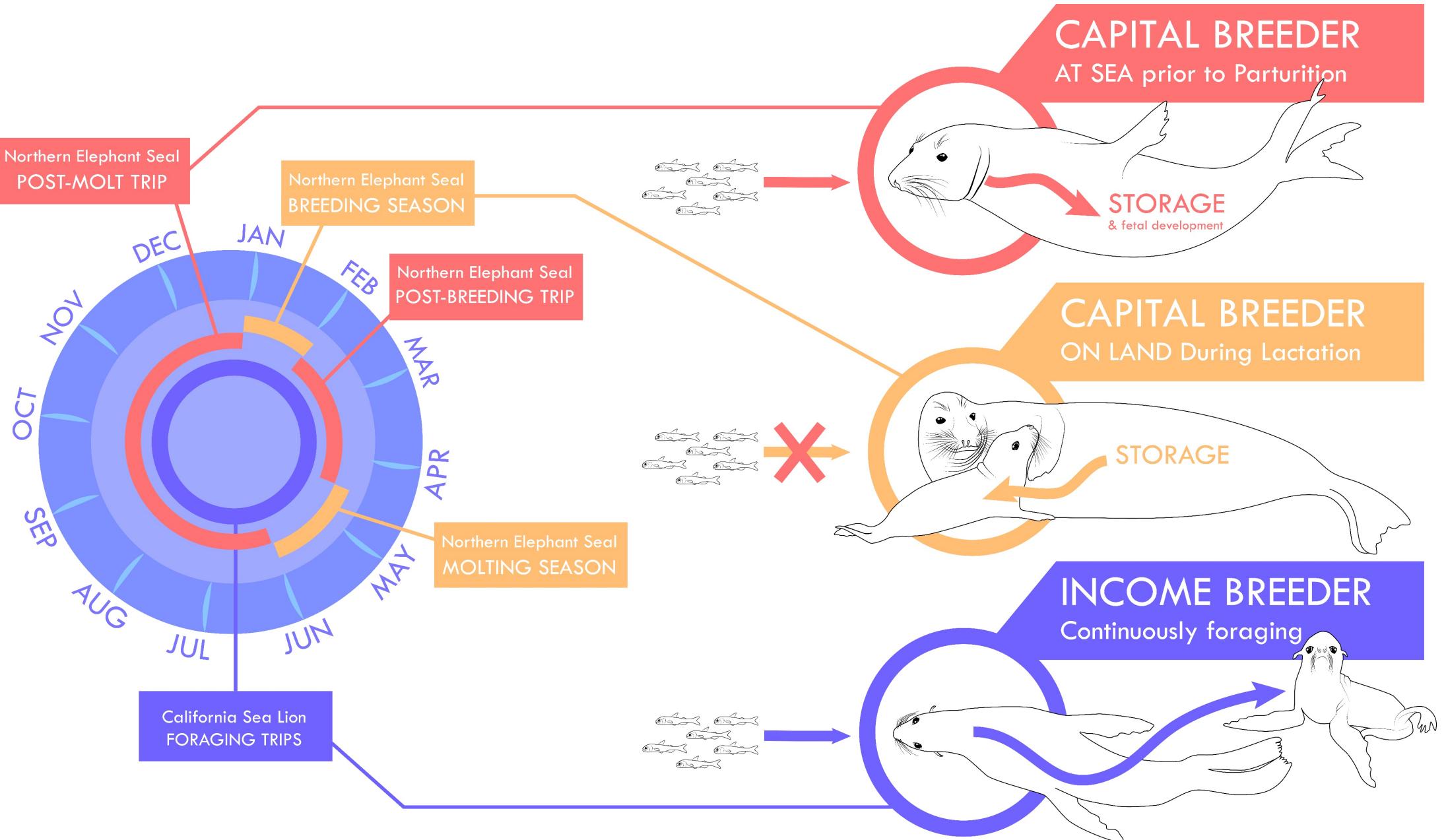
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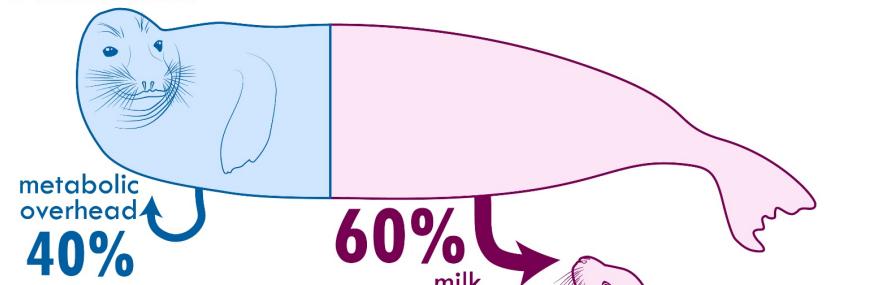
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MATERNAL MASS

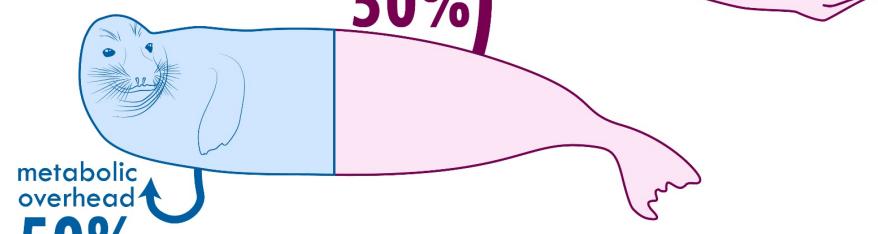
LARGE FEMALE

500kg



SMALL FEMALE

200kg

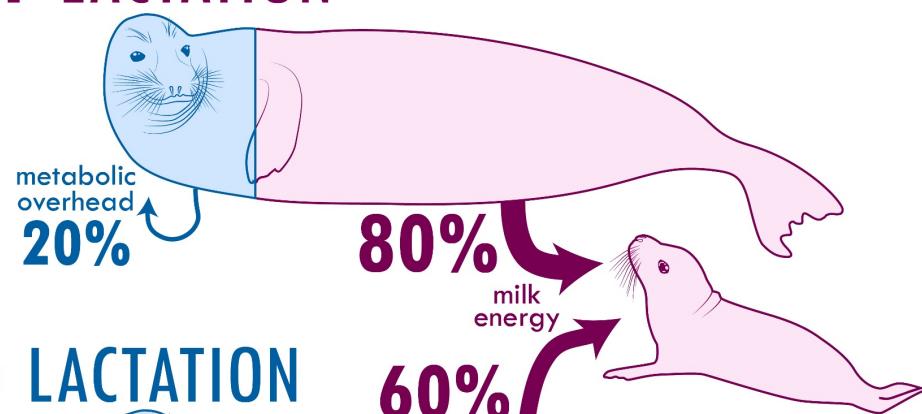


&

LACTATION DURATION

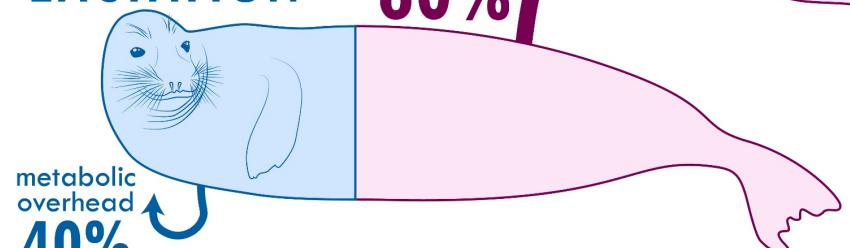
SHORT LACTATION

15
DAYS

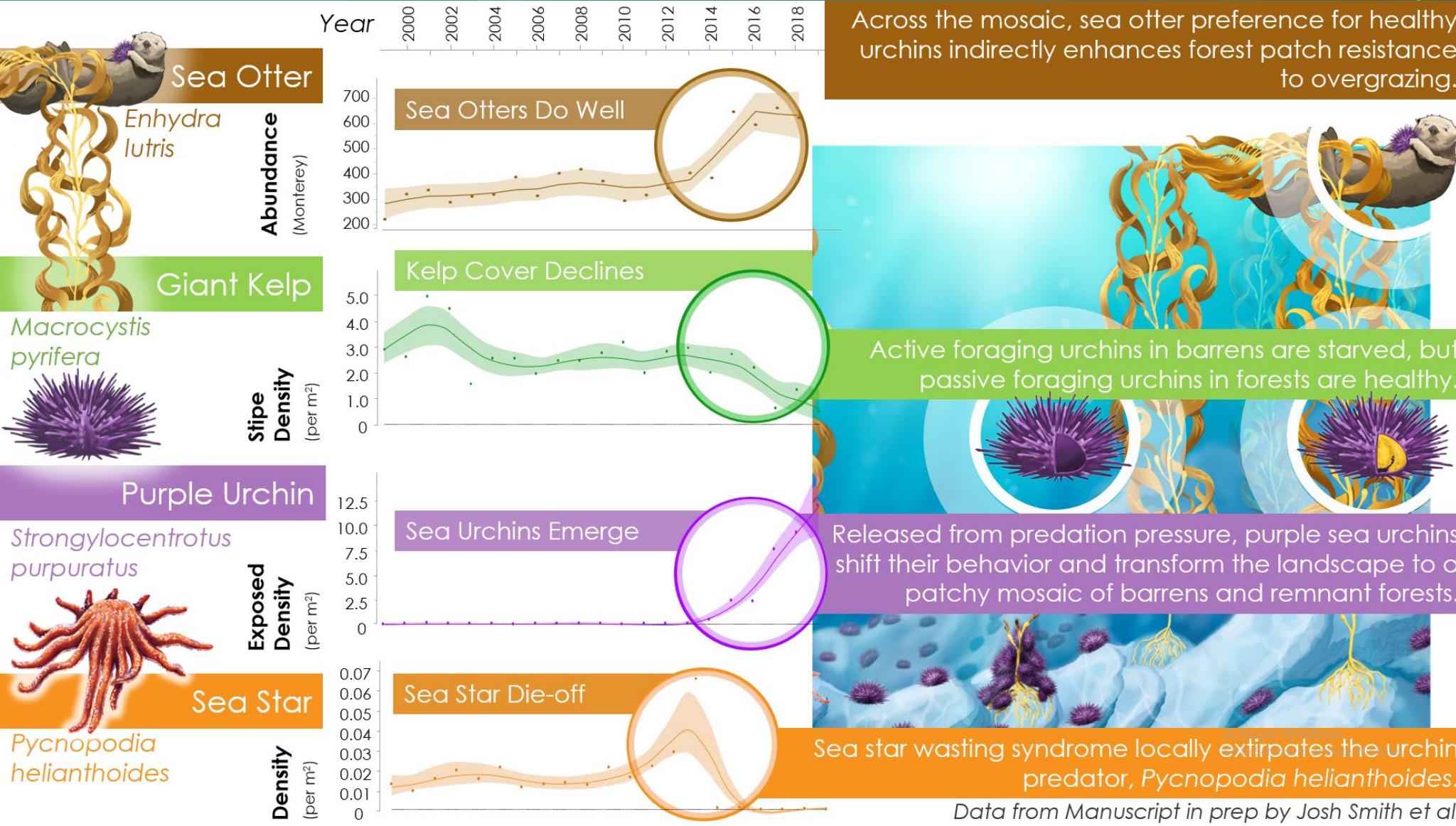


LONG LACTATION

30
DAYS



Demonstrating ecosystem dynamics across time.



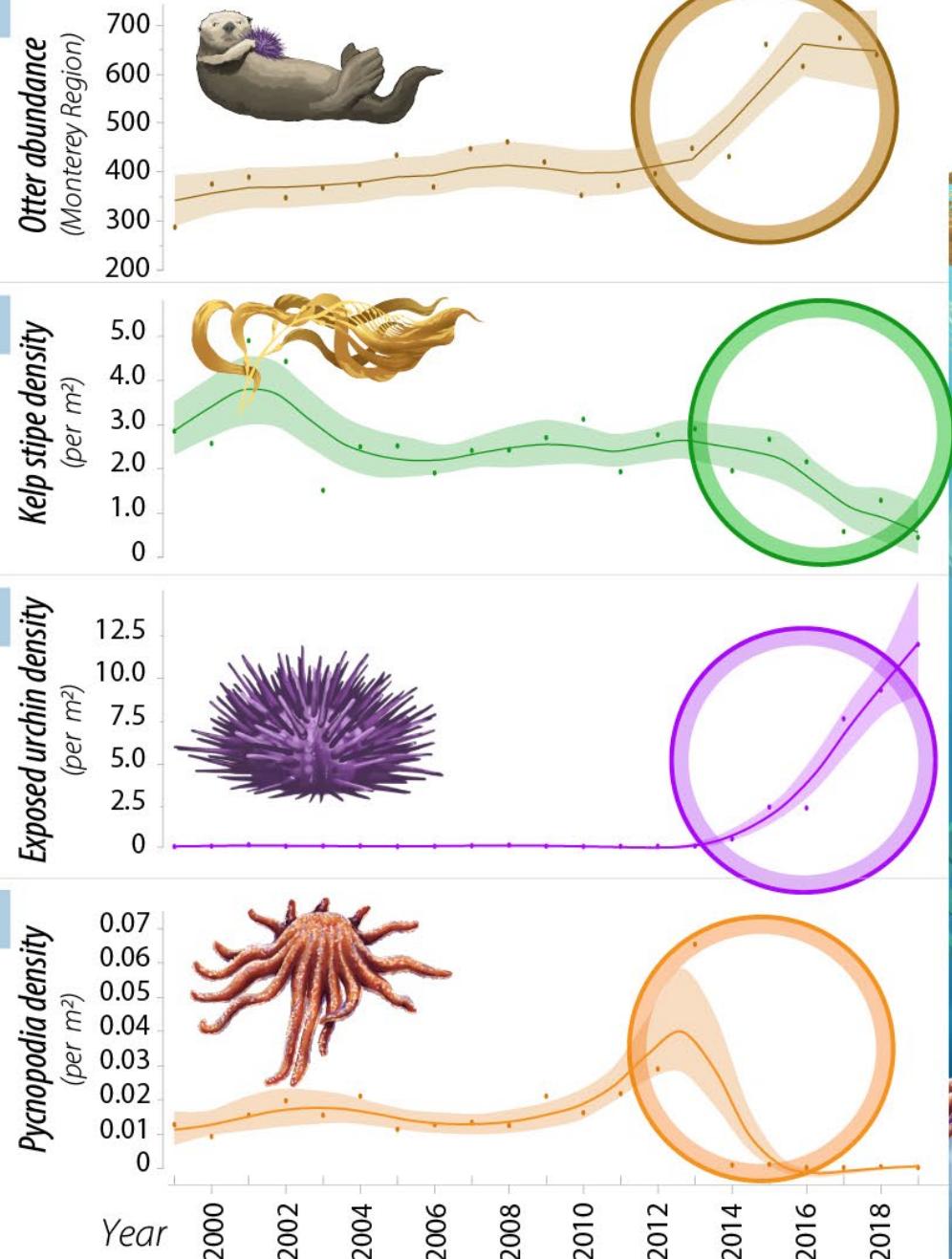
Organism rasters:
Procreate & Photoshop
for iPad

Kelp Forest
Composition:
Photoshop for desktop

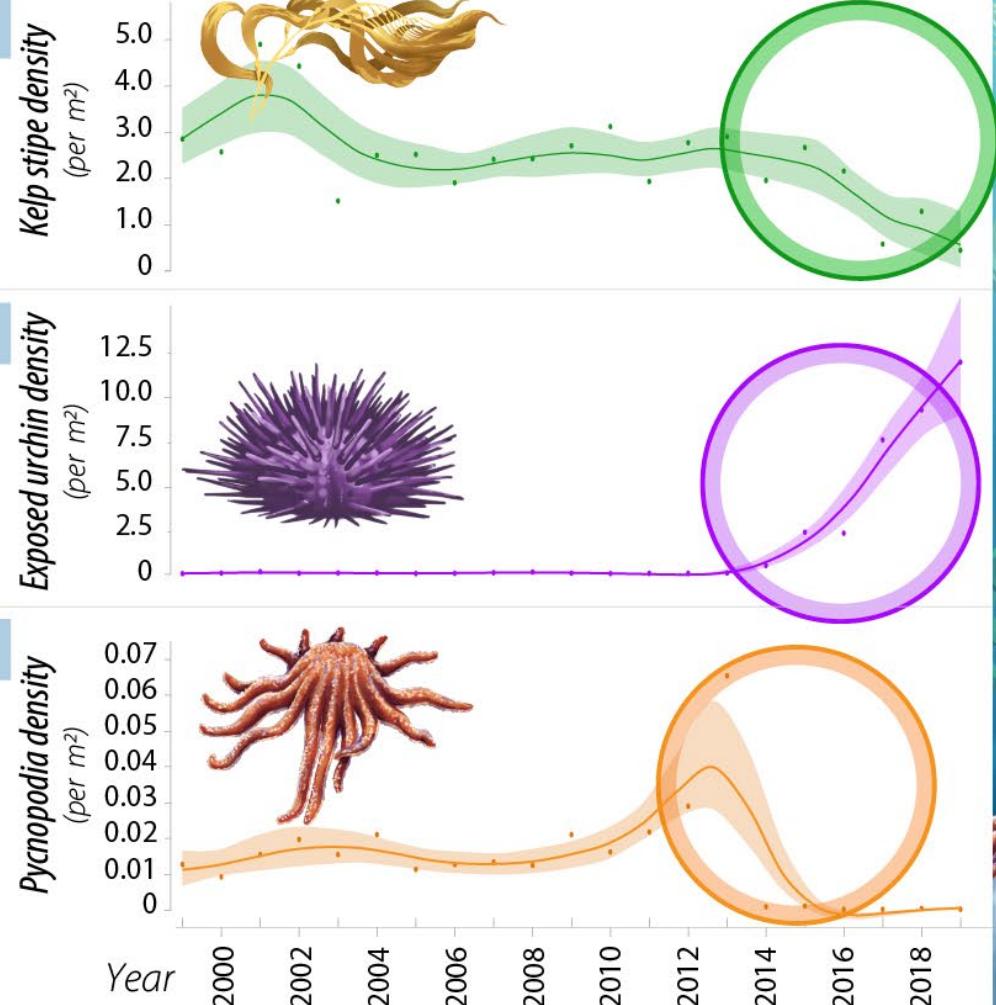
Figures:
made in JMP,
exported to .PDF, text
and line colors and
styles edited in
Illustrator

Final Composition:
Illustrator

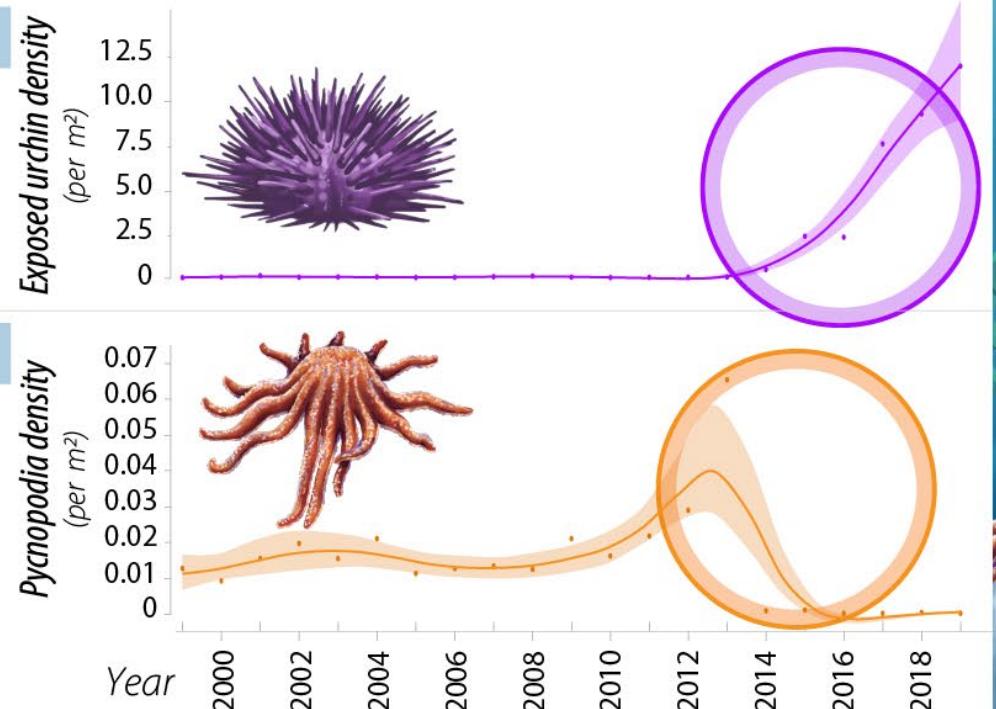
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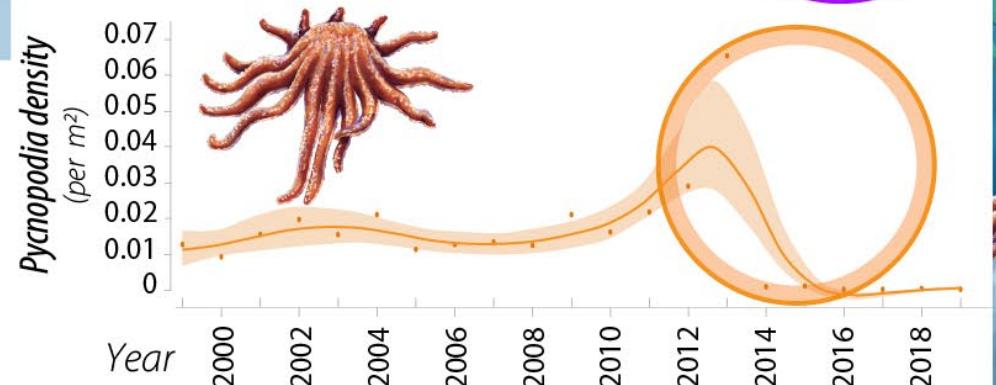
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Post-meeting to do's

- Due next week: Graphical Abstract
 - Put together your graphical abstract composition (.png). Once that is done, also create an animated version in PowerPoint (.pptx). Submit these via Canvas by next class. Due at midnight the night before (Thurs Feb 4).
- Download and install Adobe After Effects;
 - Watch Animation in After Effects tutorial (1h)
- Download and install Autodesk Maya
 - Watch Animation in Autodesk Maya tutorial (1h)