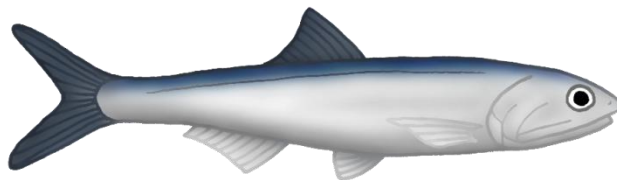
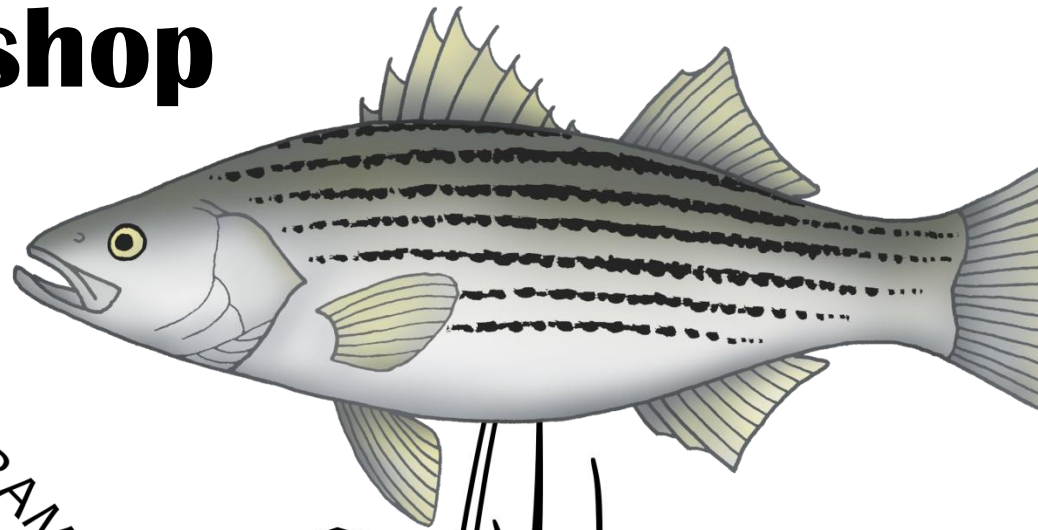


Graphics Workshop

Tanya L. Rogers



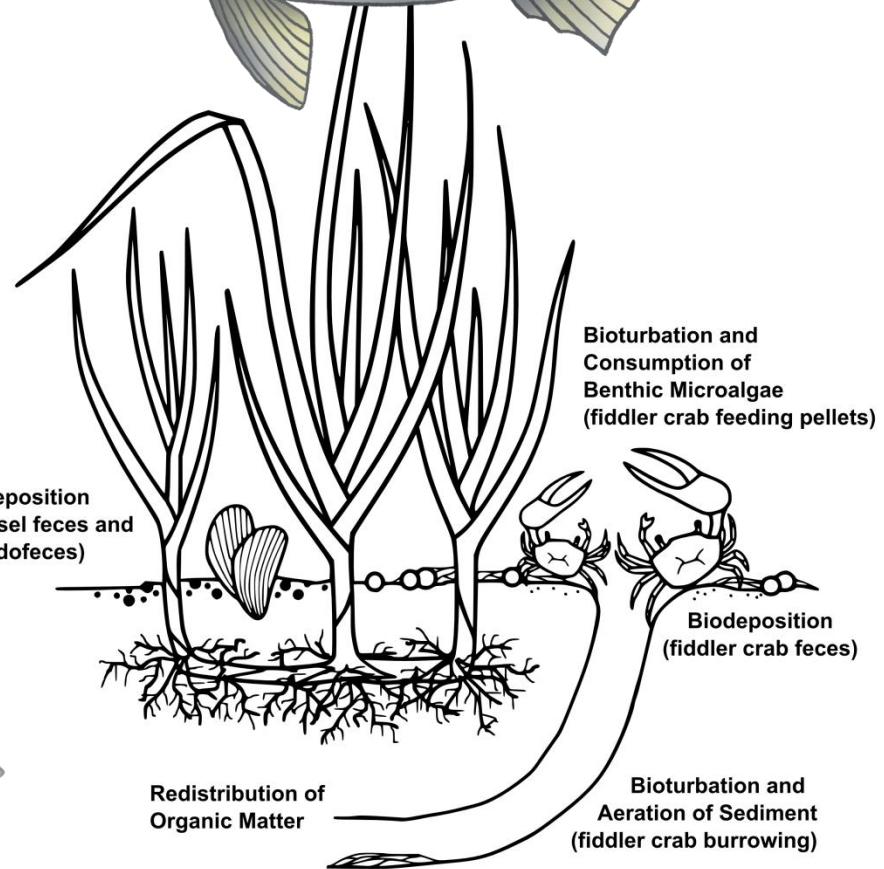
Biodeposition
(mussel feces and
pseudofeces)

Bioturbation and
Consumption of
Benthic Microalgae
(fiddler crab feeding pellets)

Biodeposition
(fiddler crab feces)

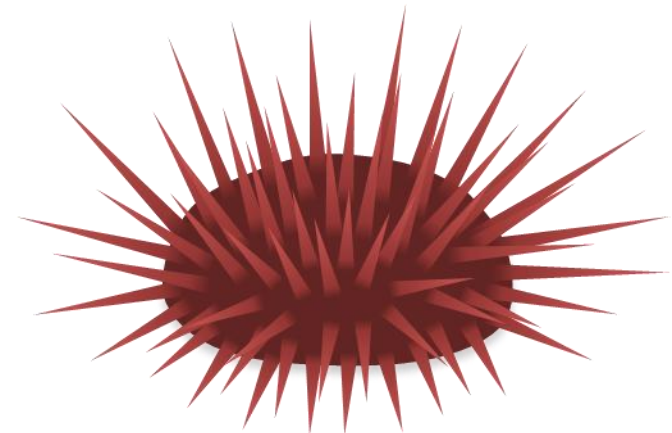
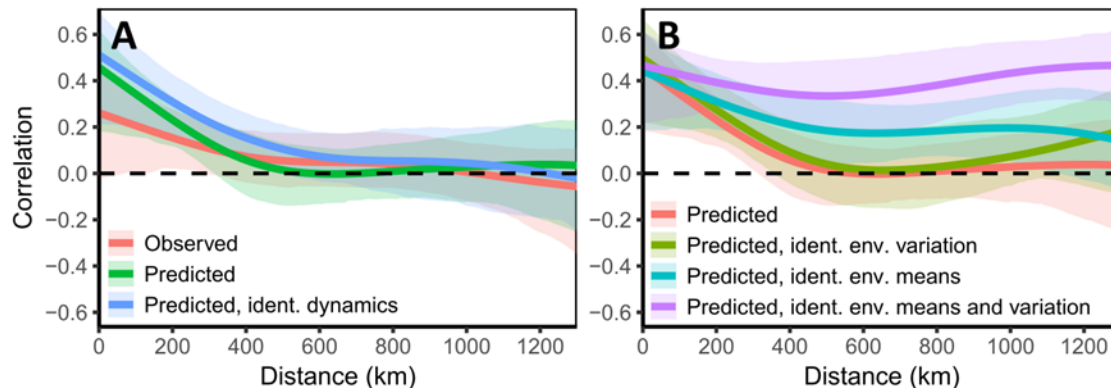
Redistribution of
Organic Matter

Bioturbation and
Aeration of Sediment
(fiddler crab burrowing)



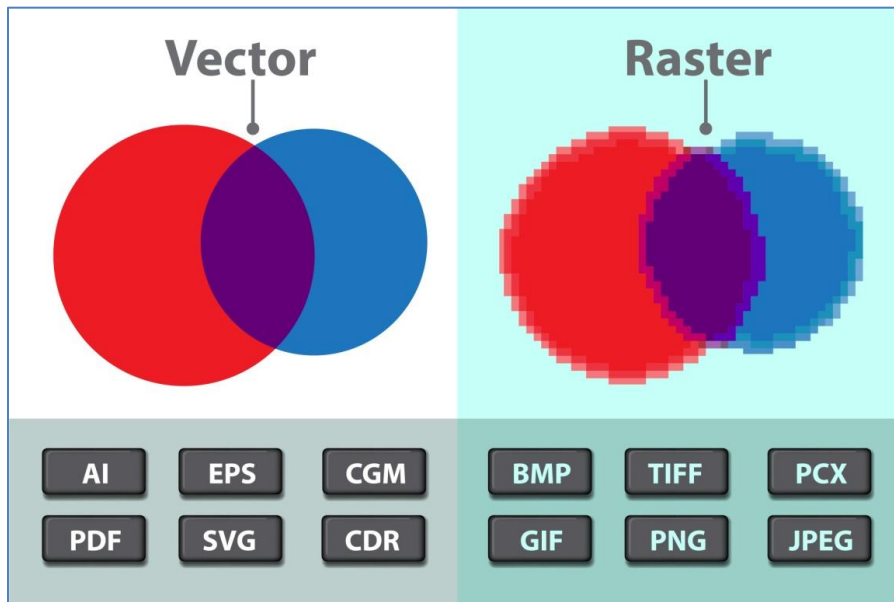
Objectives

- Create publication-quality figures
 - Be able to interpret and follow publisher requirements (understand different file formats)
 - Export figures from R
 - Make post-export edits that aren't possible in R
- Create diagrams for publications and presentations
 - Conceptual diagrams
 - Graphical abstracts (now required by many publishers)
 - Custom clipart

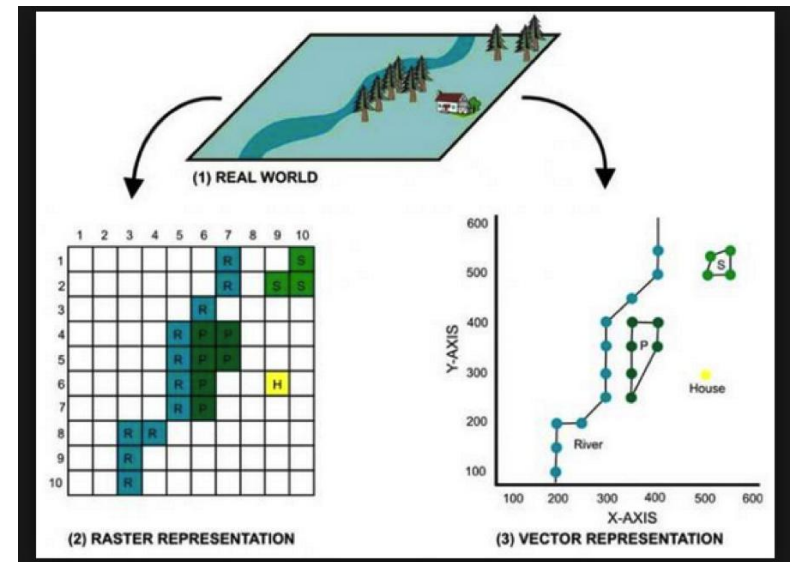


2-d images on your computer

- Raster: grid of pixels
 - Each pixel has a color
 - Dimensions given in pixels, or physical dimensions and dpi (or ppi);
 $\text{pixels} = \text{inches} * \text{dpi}$
 - Look pixelated when resolution (dpi) is lower than that of display
 - Any image can be represented as a raster; always used for digital photos
 - In MS first submissions, you usually include the figures as rasters at end of word doc



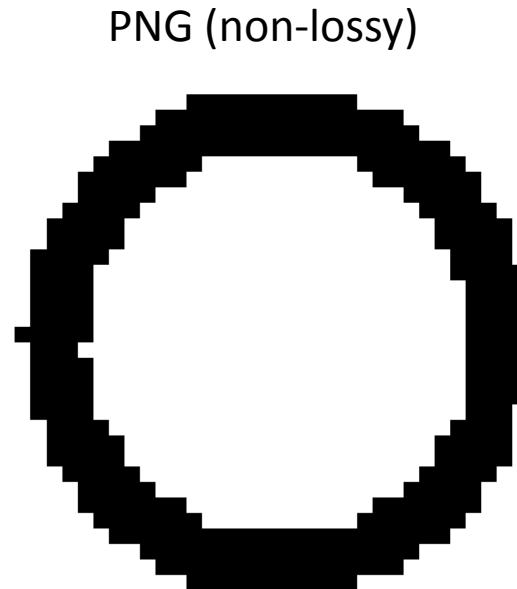
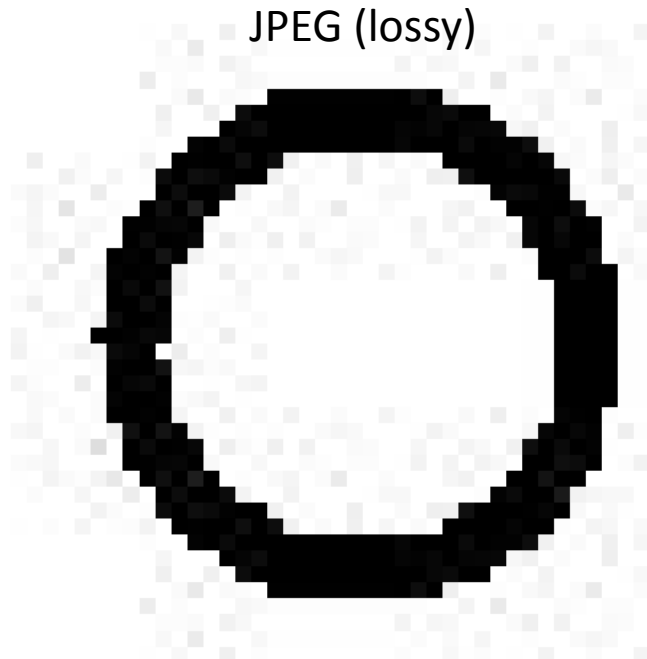
Analogous to use in GIS



Rasters – file size

Is my raster bigger than it needs to be?

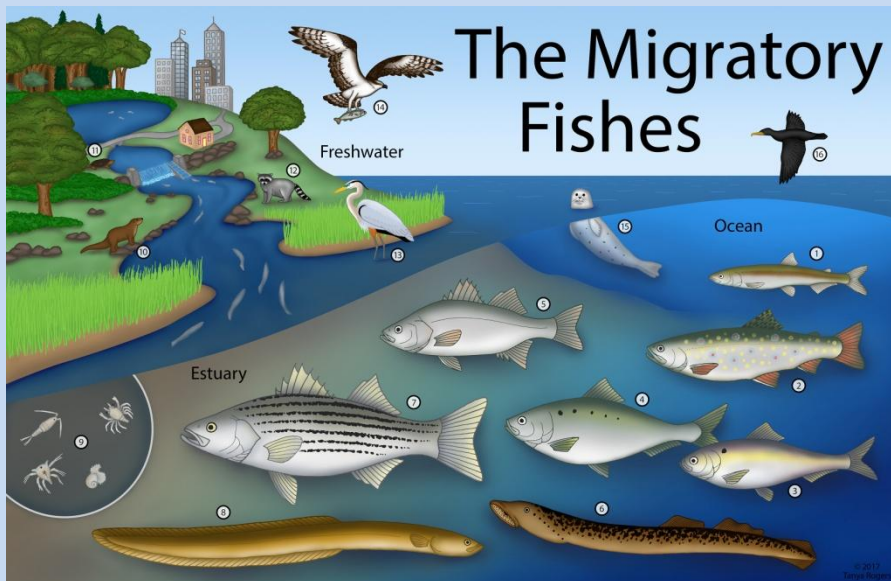
- Is the size and resolution appropriate?
 - The highest resolution most printers can print is 200 dpi. Most publishers ask for 300 dpi and will specify preferred dimensions. Using anything higher than that is (usually) a waste of space on your computer.
- Should I use compression algorithm?
 - “Lossy” compression discards (loses) information during compression. Used for full-color photos, where the loss is hardly noticeable, and which would otherwise have huge files.
 - “Non-lossy” compression isn’t *as* effective at reducing file size, but does not lose fidelity. Use for diagrams and figures with small number of colors and where sharp edges and uniform color blocks are important. These features are compromised by lossy compression.



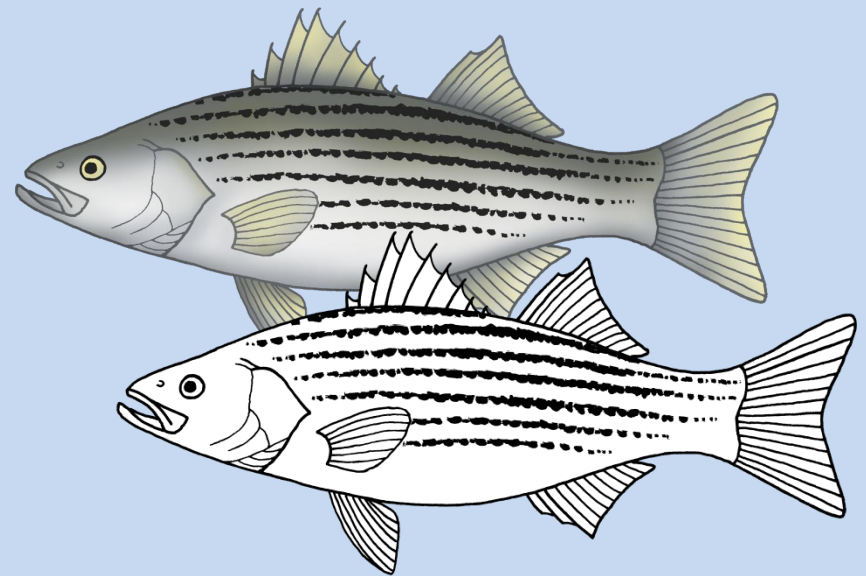
Rasters – file types

- JPEG: lossy, use for full color photos only
- PNG: non-lossy, good choice for diagrams, figures, simple drawings. Compatible with websites and other programs. Allows for transparency (“alpha channel”).
- TIFF: Flexible file format with many options. May be uncompressed or use non-lossy “LZW” compression. Cannot be displayed on websites.
- BMP: non-lossy, doesn’t get used as much nowadays

JPEG

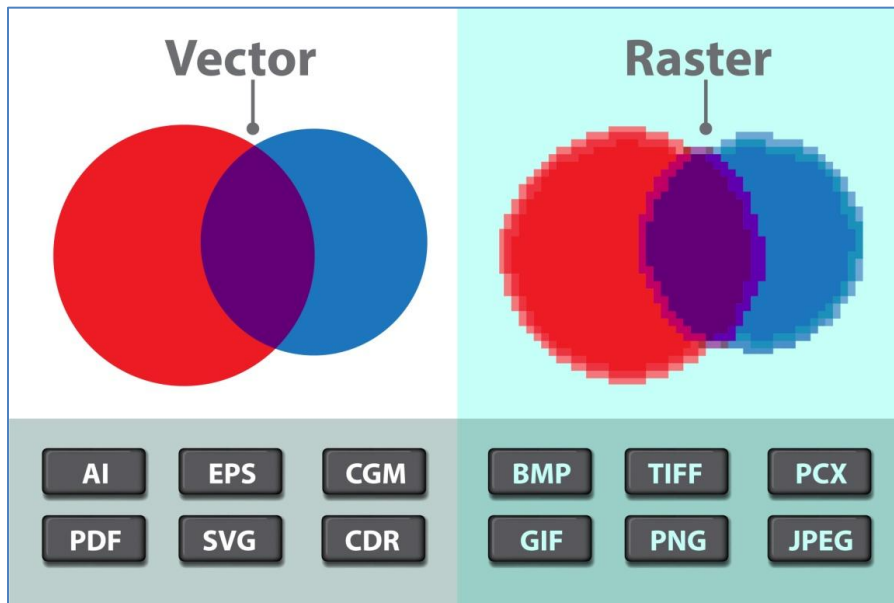


PNG

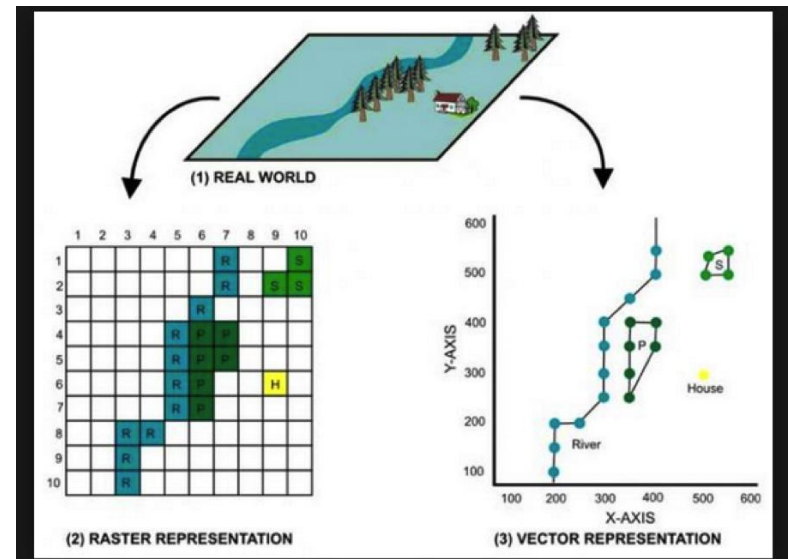


2-d images on your computer

- Vector: elements on x-y plane
 - Lines, shapes, text: stores coordinates and associated attributes (e.g. color, thickness, font)
 - Never look pixelated (infinite resolution)
 - Typically used for diagrams, logos, simple drawings
 - After a MS is accepted, publishers prefer figures (graphs and diagrams) as individual vector files



Analogous to use in GIS



Vectors

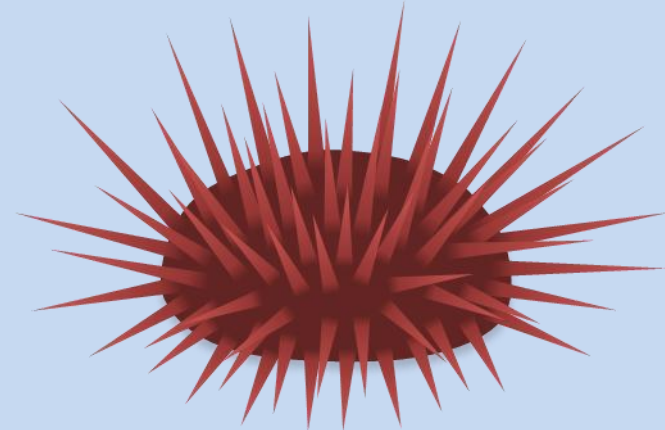
- File size
 - Often small, no compression needed
- File types
 - SVG and EPS: Generic vector formats
 - PDF: Can contain a mixture of vector and raster elements and contain multiple pages
 - AI: Adobe Illustrator
 - PPT: Yes, powerpoint is kind of a vector graphics program



SVG → PNG



PPT



Exporting files from R

```
png("file_name.png", width = 5, height = 4, units = "in",  
res = 300)  
#code for your plot  
dev.off()
```

```
tiff("file_name.tif", width = 5, height = 4, units = "in",  
res = 300, compression = "lzw")  
#code for your plot  
dev.off()
```

```
pdf("file_name.pdf", width = 5, height = 4)  
#code for your plot  
dev.off()
```

```
ggplot(...) #code for your plot  
ggsave("file_name.png", width = 5, height = 4)  
ggsave("file_name.pdf", width = 5, height = 4)
```

```
# base rasters default to 72 dpi  
# ggsave() rasters default to 300 dpi
```

To maximize reproducibility, make all the edits that you can in R before moving to external editing software.

Editing Software

Edit figures and create diagrams as vectors, not rasters.

All vectors can be converted to rasters, but not vice versa.

Vectors can include embedded rasters, but not vice versa.

- Vector:

- Adobe Illustrator
- Inkscape (Open source) DEMO
- MS Powerpoint DEMO



INKSCAPE

- Raster:

- Adobe Photoshop
- GIMP (Open source)
- MS Paint

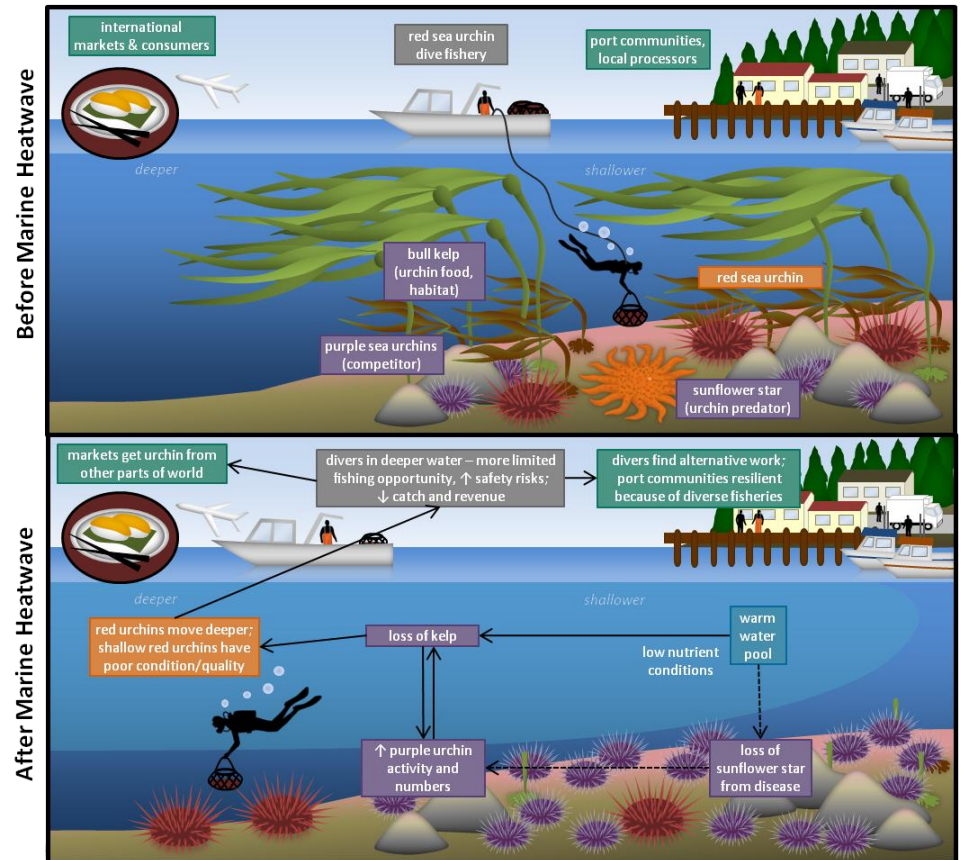
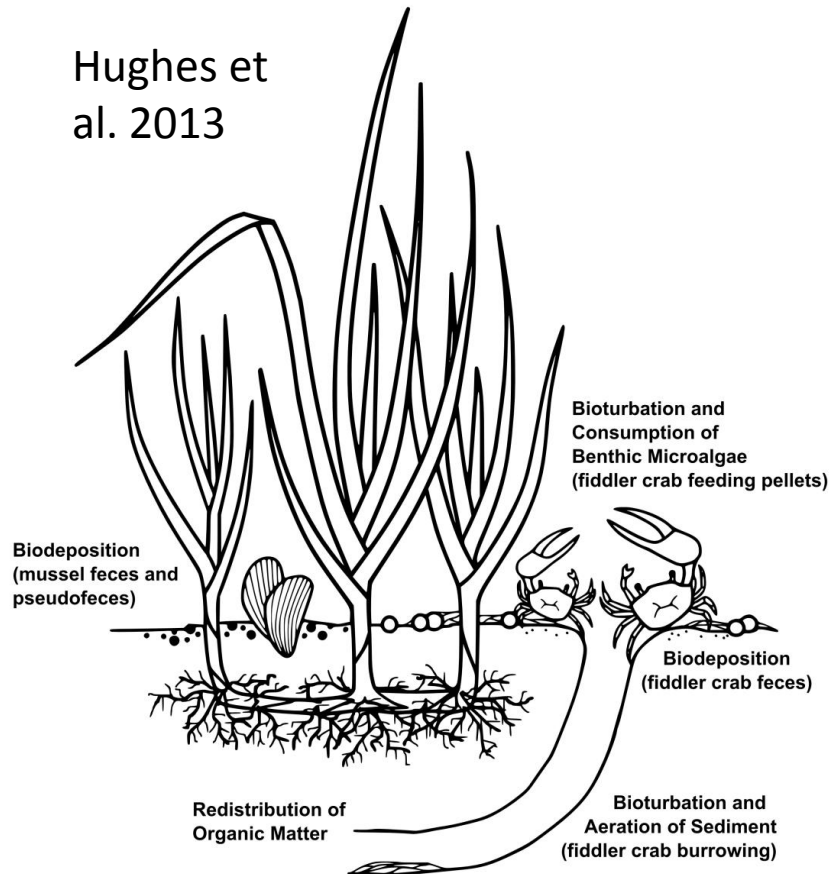


GIMP

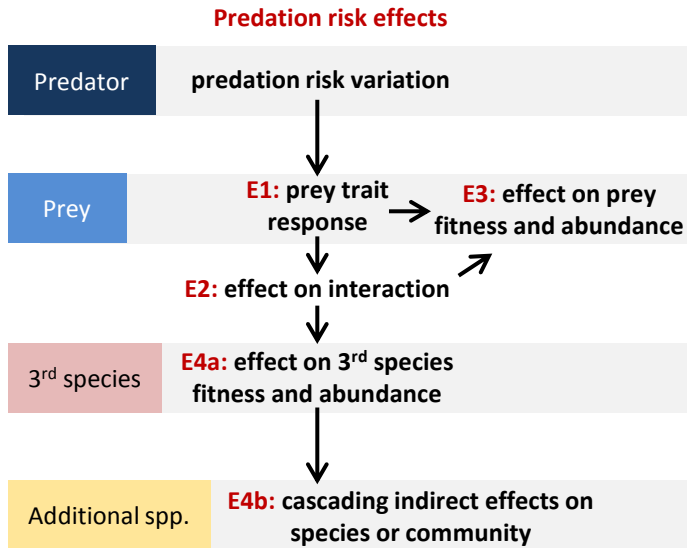
Diagrams

- Simplified visual representation of concepts/relationships
- Useful for readers and creating one can clarify and organize thinking
- Can contain a mix of hand-drawn elements, computer-drawn elements, and text

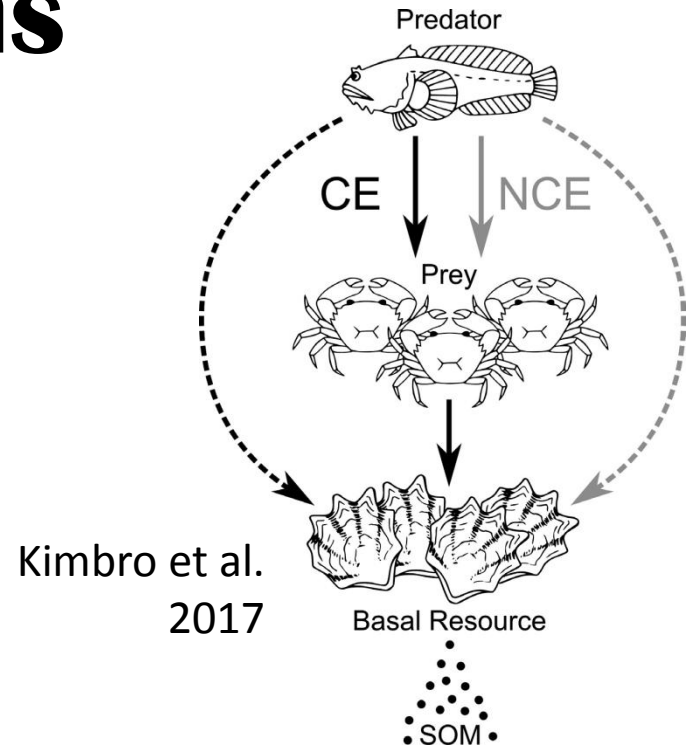
Hughes et al. 2013



Diagrams

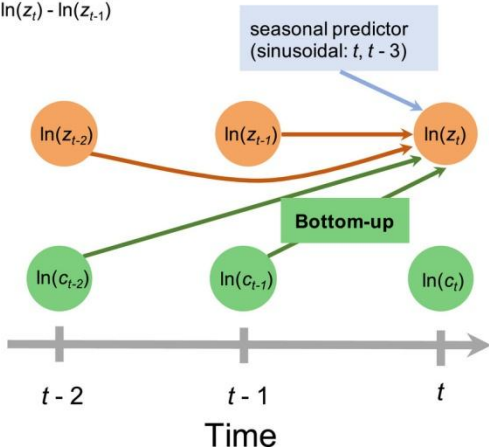


Peacor et al.
2020

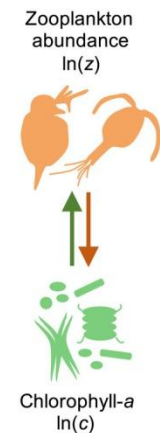
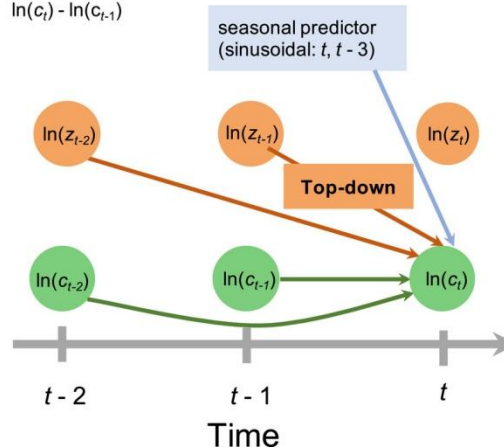


Kimbrow et al.
2017

(a) Bottom-up model
Response variable:
Zooplankton growth rate
 $\ln(z_t) - \ln(z_{t-1})$



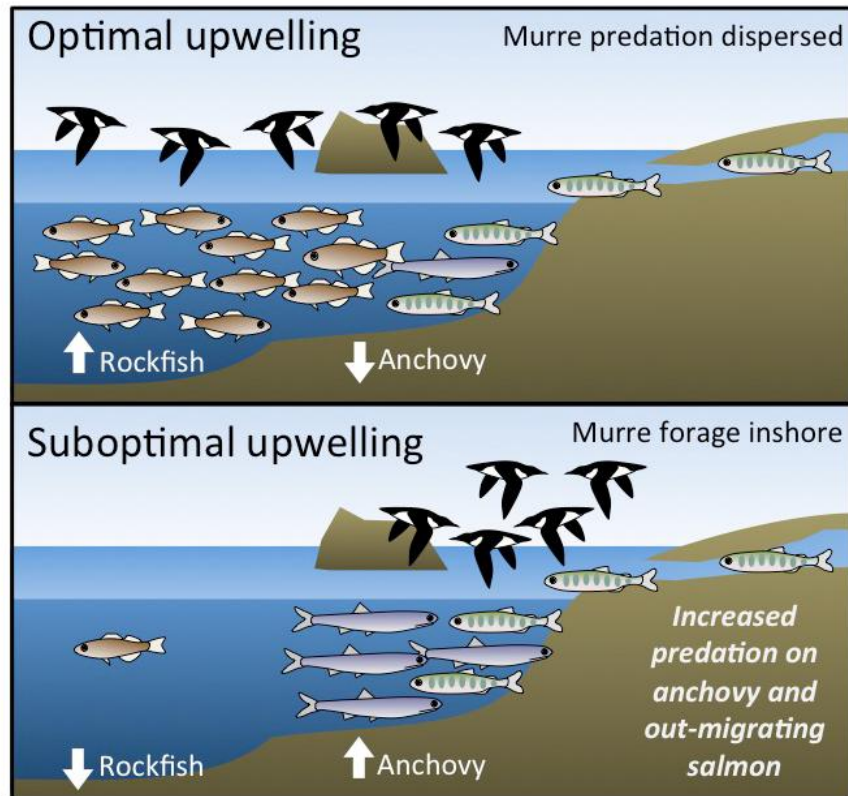
(b) Top-down model
Response variable:
Chl-a growth rate
 $\ln(c_t) - \ln(c_{t-1})$



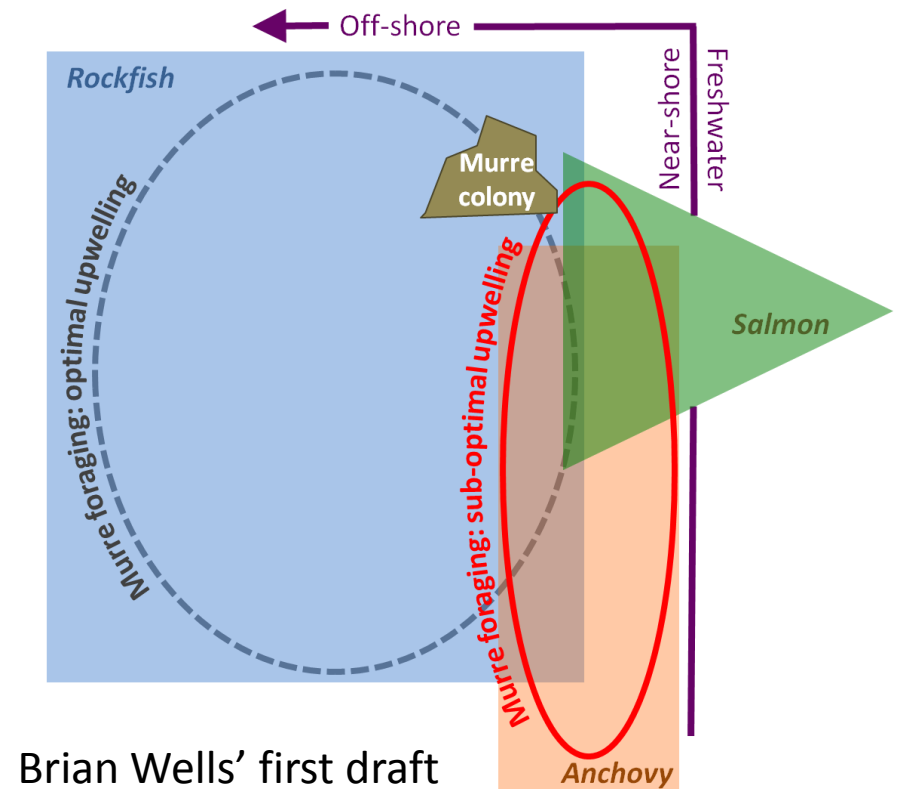
Rogers et al.
2020

Graphical Abstracts

- A diagram of your key findings – required by some publishers
- Look at examples – many of them are bad
- Should be understandable without reading paper – no acronyms or jargon, cartoon representation of results, take-home messages

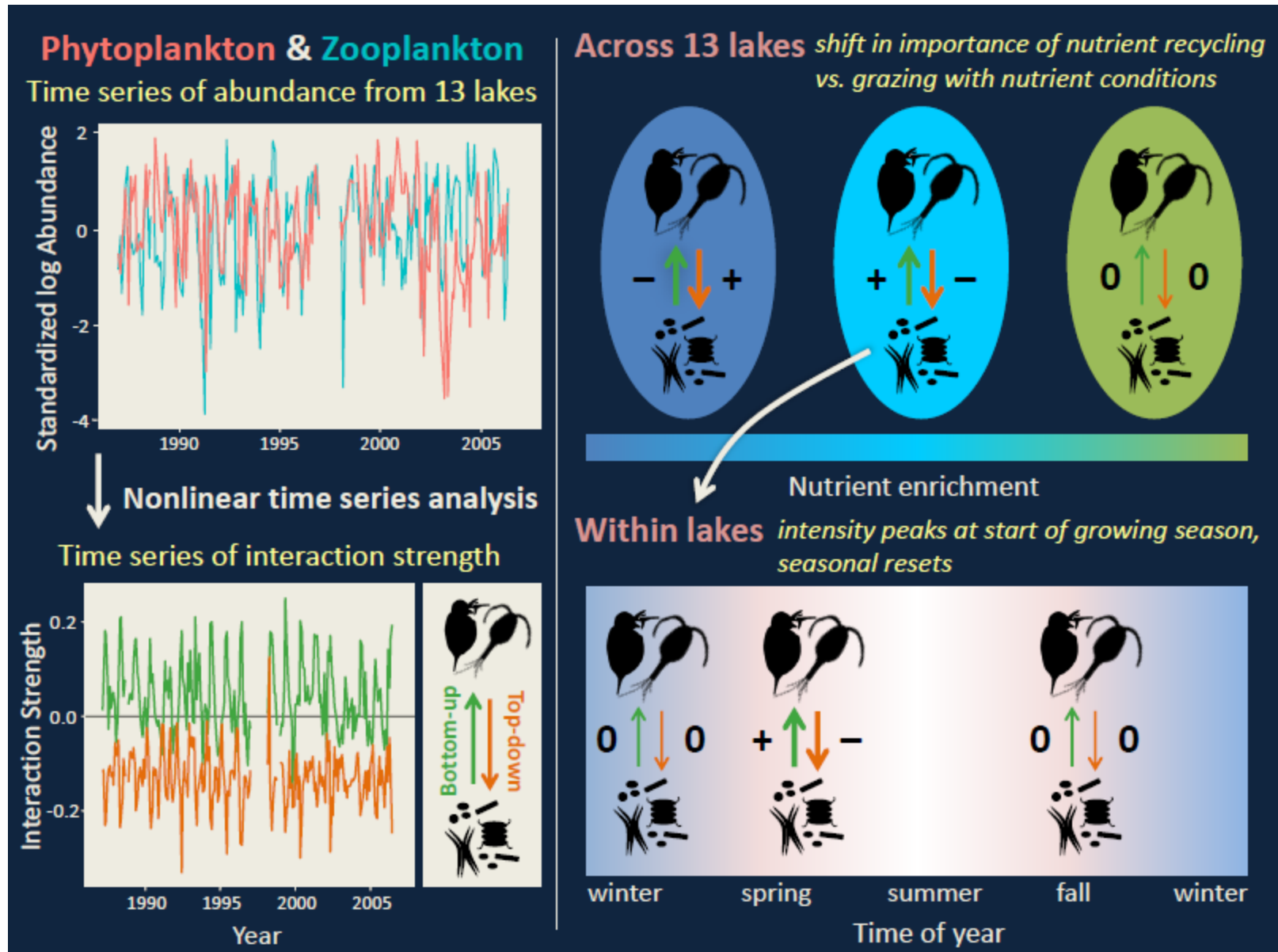


Wells et al. 2017



Brian Wells' first draft

Graphical Abstracts



Custom Clipart

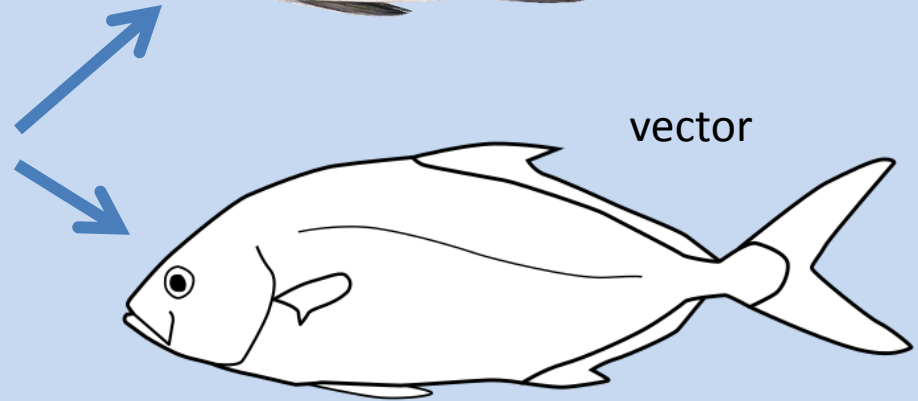
Almaco Jack



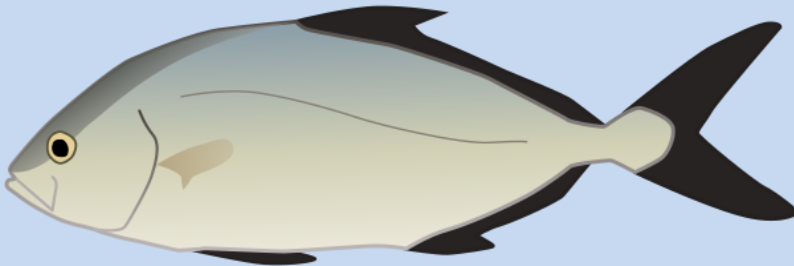
raster



vector



vector

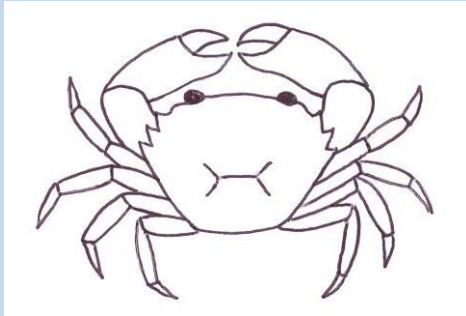


vector

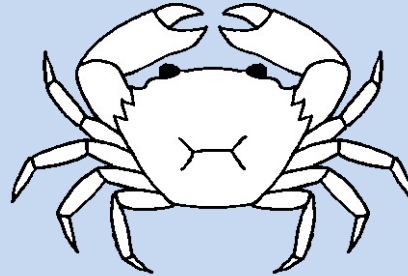


Custom Clipart

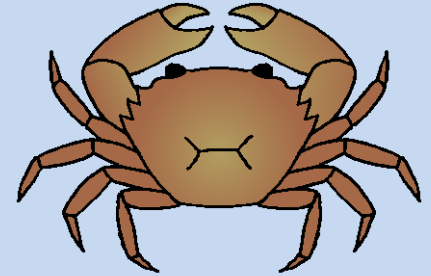
**mud
crab**



original drawing
(scan)



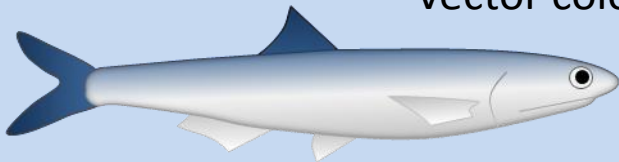
cleaned B&W



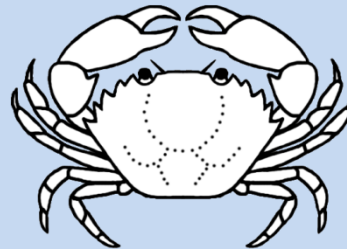
color added
(vector)

anchovy

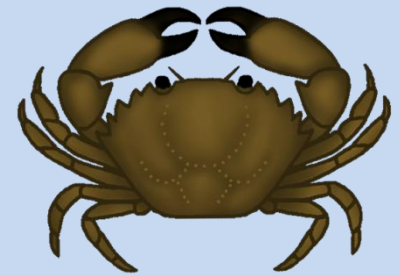
vector color



raster color



cleaned B&W



color added
(raster – photoshop)

Other do's and don'ts

Don't:

- Use the default ggplot theme. It does not look good.
- Copy plots directly from the Rstudio plot window, as it is hard to reproduce the dimensions this way.

Do:

- Use color (most publishers don't charge for online color), but check that the palette is colorblind-friendly, and that it looks acceptable if printed in B&W (so you don't want to pay extra if journal still prints to paper, and for readers with B&W printers).
- Respect copyright laws. All art is created by someone. Give credit where credit is due. If you create your own digital art and put it online, know your rights and familiarize yourself with the Digital Millennium Copyright Act (DMCA).

Demonstrations

- Editing an exported figure in Inkscape
- Diagrams and drawing in Inkscape
 - Raster → Vector conversion
 - Vector → Raster conversion
- Diagrams and drawing in Powerpoint
- Removing background from raster (if time/interest)

all elements are “objects”

objects consist of “paths” with a stroke and fill

location/vertices of paths determined by “nodes”

