Identification and Abundance of Jellyfish in the San Francisco Estuary

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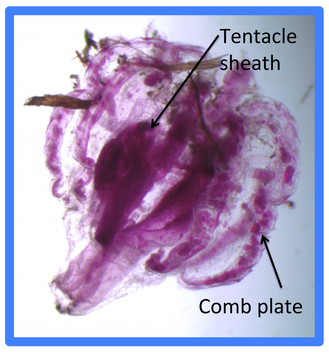
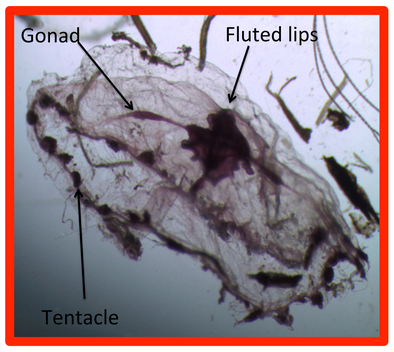
Identification

Pleurobrachia bachei



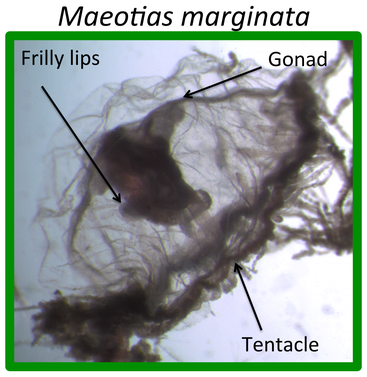
- Diameter: 2 mm
- Ctenophore (comb jelly)
- Spherical

Blackfordia virginica



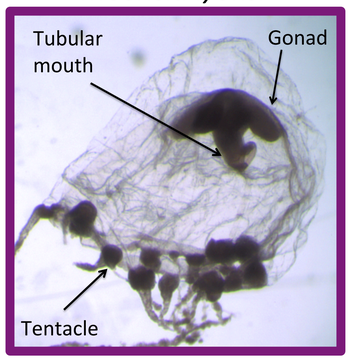
- Diameter: 4 mm
- Hydromedusae
- Bell shaped
- Evenly spaced tentacles
- Linear and discontinuous gonads

Maeotias marginata



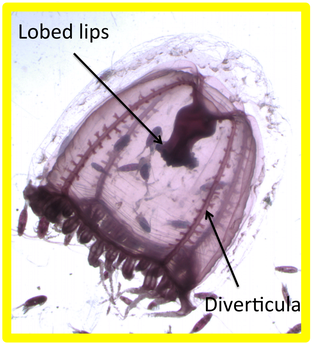
- Diameter: 3 mm
- Hydromedusae
- Bell shaped
- Crowded tentacles
- Curtain-like gonads

Moerisia lyonsi



- Diameter: 2 mm
- Hydromedusae
- Bell shaped
- Tentacle bulbs with thick ringed tentacles
- Linear and continuous gonads

Polyorchis penicillatus



- Diameter: 6 mm
- Hydromedusae
- Bell shaped
- Diverticula covered in nematocyst clusters
- Gonads hang and are tubular

Background

Delta smelt (*Hypomesus transpacificus*) is a small (<10 cm) fish that is endemic to the San Francisco Estuary (Figure 1). In 2010, delta smelt were listed as endangered under the California Endangered Species Act. Many factors have contributed to their low numbers, such as alterations to their habitat, predation, water diversions, and prey abundance. Several species of jellyfish may be sources of competition for delta smelt because they both eat the same food source of copepods (Figure 2). Identifying and quantifying the jellyfish in the San Francisco Estuary will help understand the complex food web of delta smelt.

Figure 1. Delta smelt

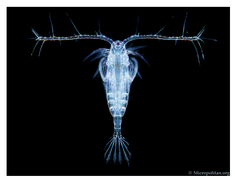


Figure 2. Copepod

Objective

1. Determine the species and abundance of jellyfish in the San Francisco Estuary.
2. Determine if the jellyfish are abundant in delta smelt habitat.

Methods

1. Samples were taken at 9 stations across the San Francisco Estuary from 2010-1012(Figure 3).
2. Oblique plankton tows with a 300 µm net were used to obtain samples (Figure 4).
3. Samples were preserved with 10% formalin and stained with rose bengal (Figure 5).
4. Samples were removed from the formalin using sieves and then placed in Plexiglas trays filled with water.
5. Trays were scanned for jellyfish using a magnifying glass and light box (Figure 6).
6. Jellyfish were removed from the sample with a pipette, placed under a microscope, and identified.
7. Pictures were taken using a camera-equipped microscope.
8. Jellyfish bell diameter and height were measured using Spot software (Figure 7).

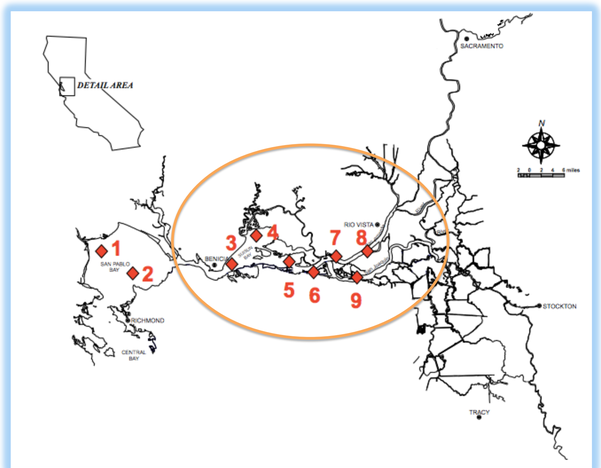


Figure 3. Map of the San Francisco Estuary. Sampling stations are numbered 1-9. Stations 3-9 are delta smelt habitat.

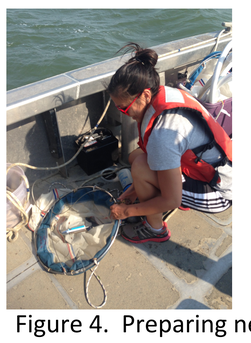


Figure 4. Preparing net for plankton tow.

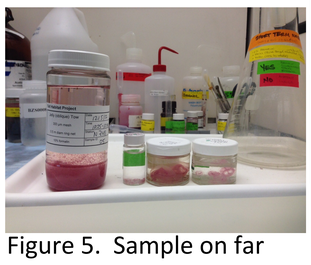


Figure 5. Sample on far left in preservative. Smaller vials on the right contain identified jellyfish.

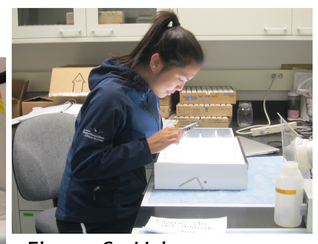
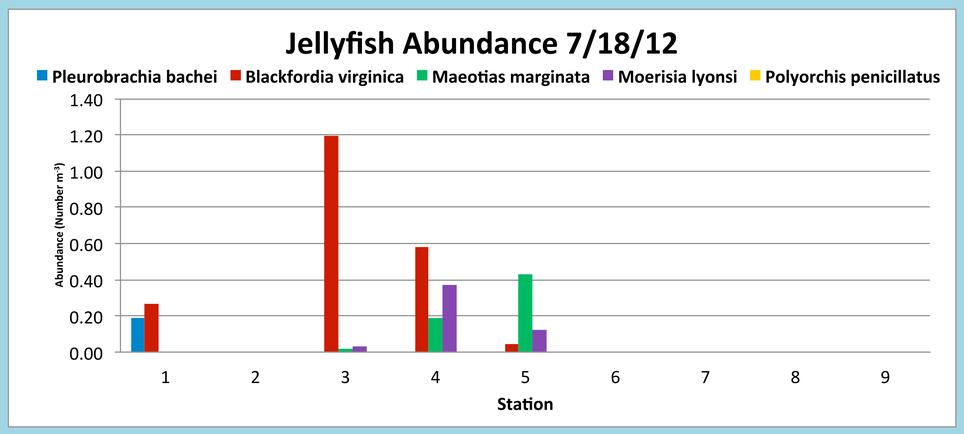
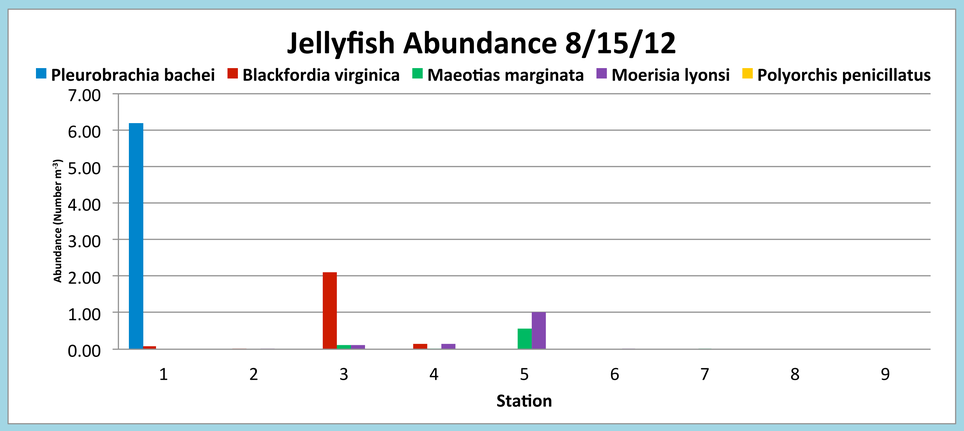
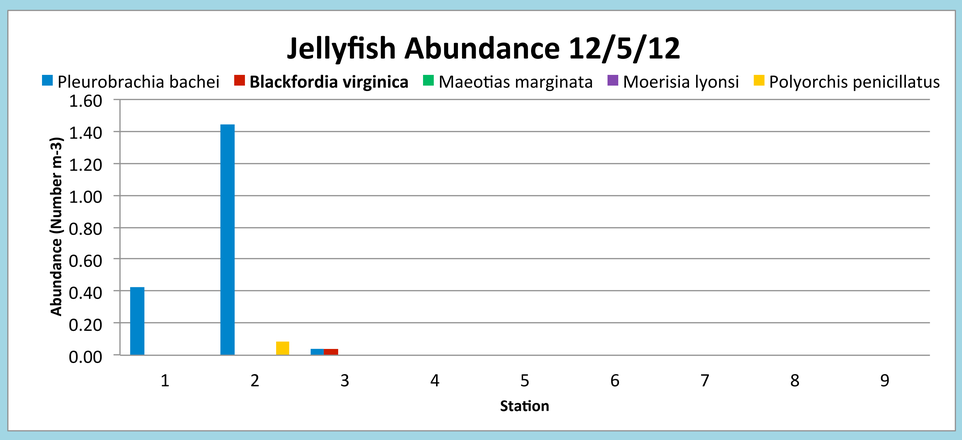


Figure 6. Using magnifying glass and light box to scan for jellyfish.

Figure 7. Taking pictures of jellyfish with a camera equipped microscope and taking measurements using Spot software.







Results

- *P. bachei* and *B. virginica* are the most abundant species.
- There is more spatial overlap between jellyfish and delta smelt habitat in summer months than in the winter.
- Invasive jellyfish species *B. virginica, M. marginata, M. lyonsi*, are more abundant in the summer.
- Natives *P. bachei* and *P. penicillatus* are abundant in winter.

Conclusion

The three invasive species of jellyfish identified in this study are *B. virginica, M. marginata*, and *M. lyonsi*. Although the native *P. bachei* was found abundantly in all 3 sampling days, they were mainly found in stations that were outside of the delta smelt habitat. The invasive jellyfish found in the summer months could have negative impacts on the delta smelt population because of competition for the same food source. It should be further investigated if the delta smelt population has any correlation with a jellyfish invasion.

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References

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"Image Gallery." Image Gallery. N.p., n.d. Web. 06 Aug. 2015

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