

Suisun Marsh's Non-Native Clams and Jellyfish

Teejay O'Rear

UC Davis

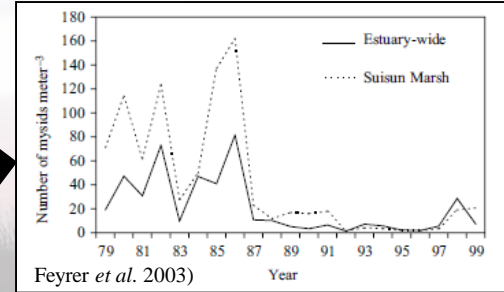
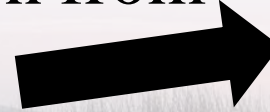
taorear@ucdavis.edu

All maps (except Slide#2) by
Amber Manfree

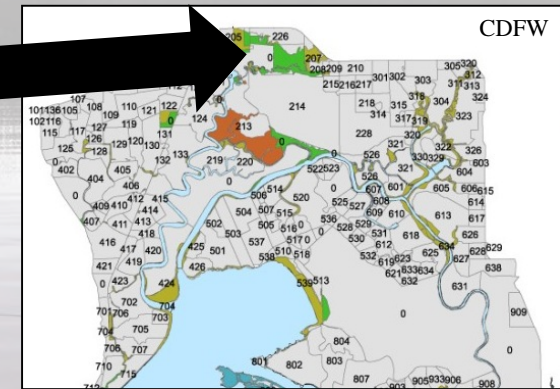
(Based on work by Jason Baumsteiger, Jon Cook,
Peter Moyle, Teejay O'Rear, and Robert Schroeter)

Suisun Marsh's Non-Native Clams and Jellyfish: Who Cares?

- Clams and jellyfish – take plankton from pelagic fish



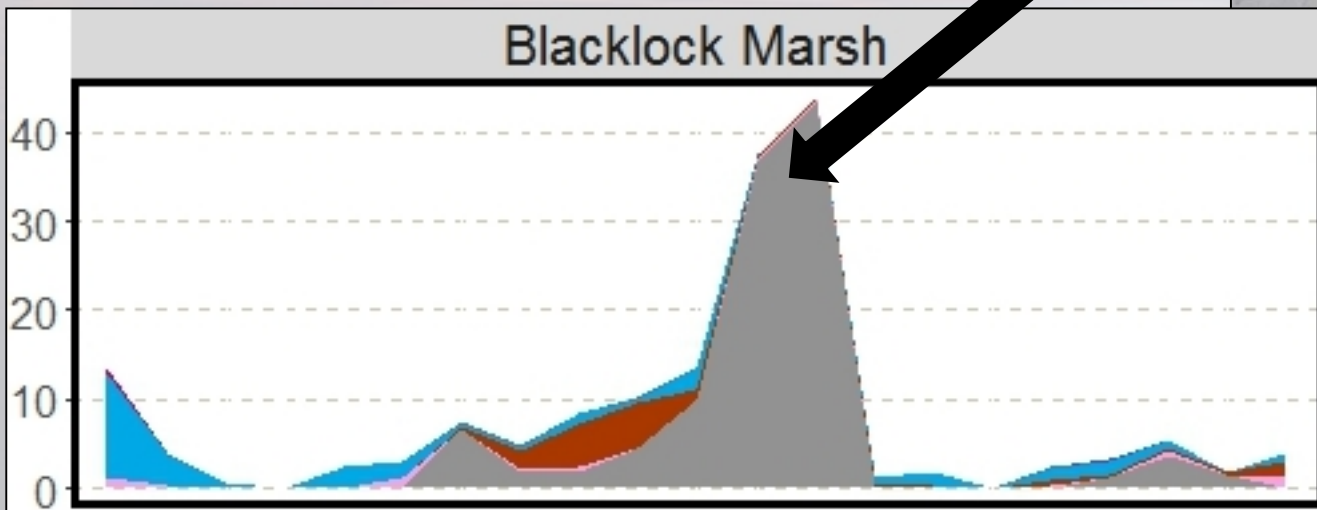
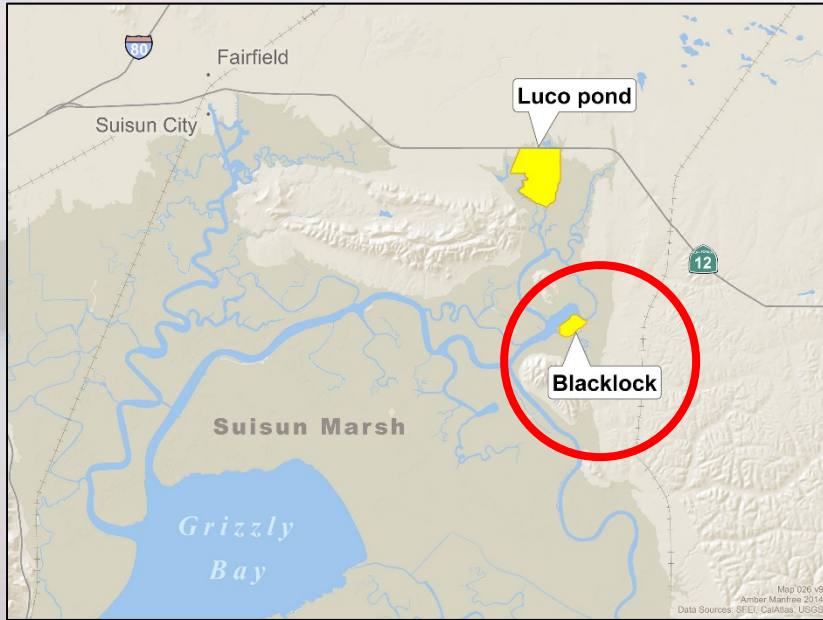
- Suisun Marsh – tidal-restoration target for pelagic fish



- Emphasis on “Suisun Marsh”



Suisun Marsh's Non-Native Clams and Jellyfish: Who Cares?



MS silversides...not what
we – or smelt – wanted!

Suisun Marsh's Non-Native Clams and Jellyfish

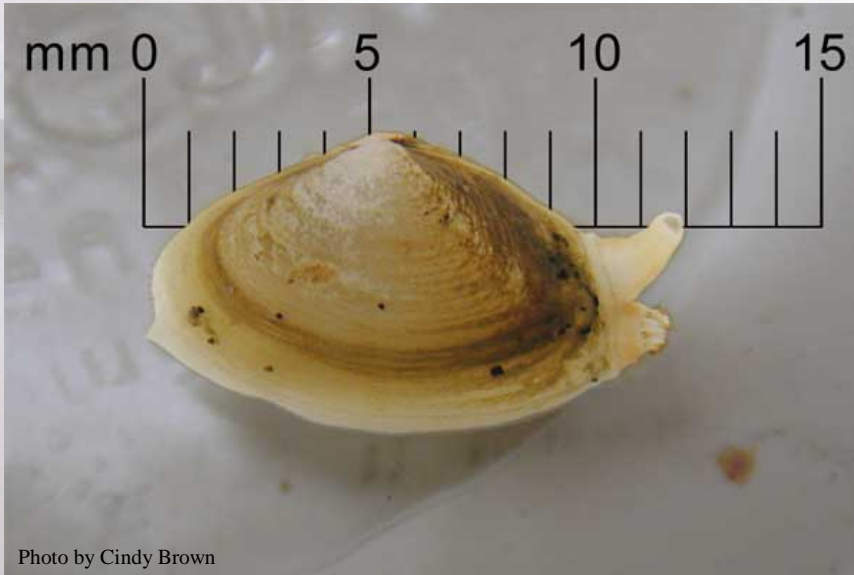


Photo by Cindy Brown

overbite clam (*Potamocorbula amurensis*)

Black Sea jellyfish (*Maeotias marginata*)

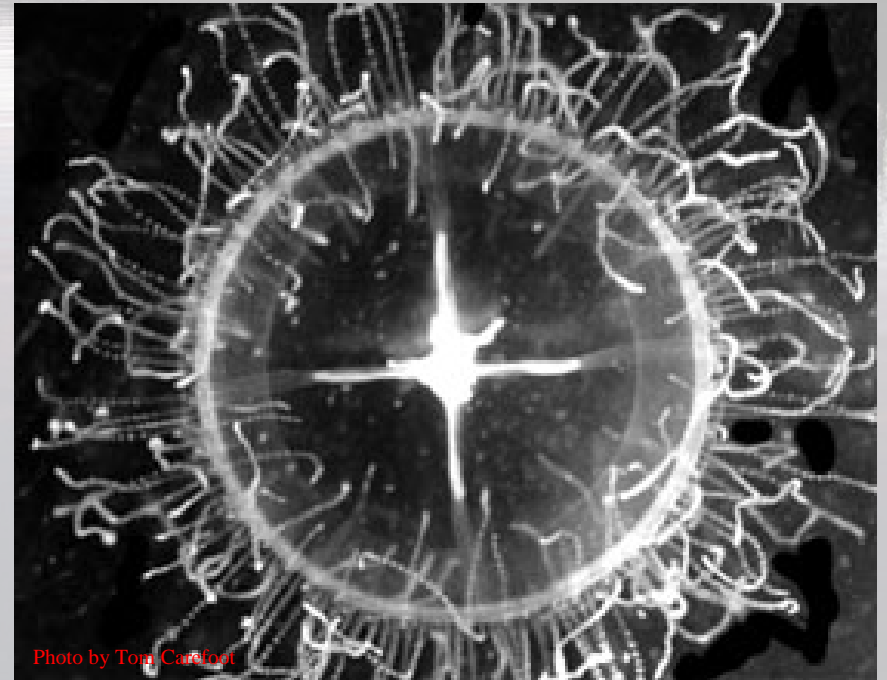


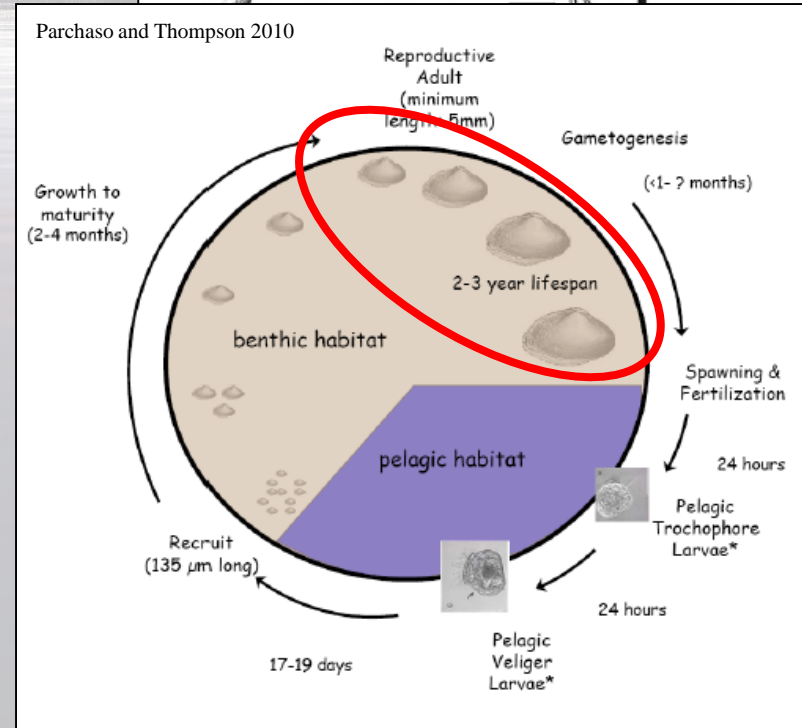
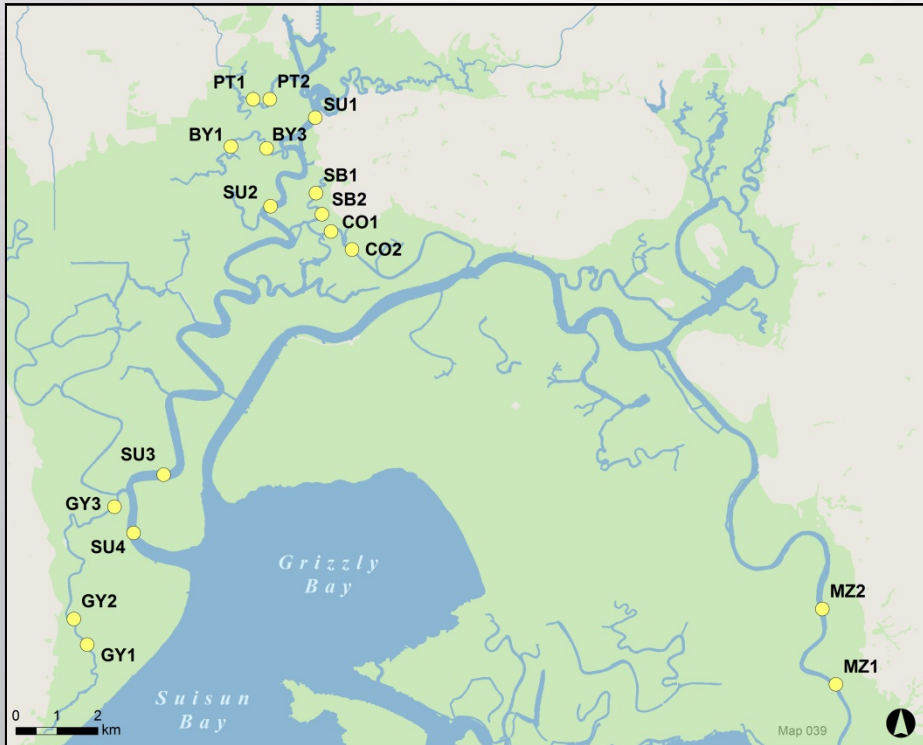
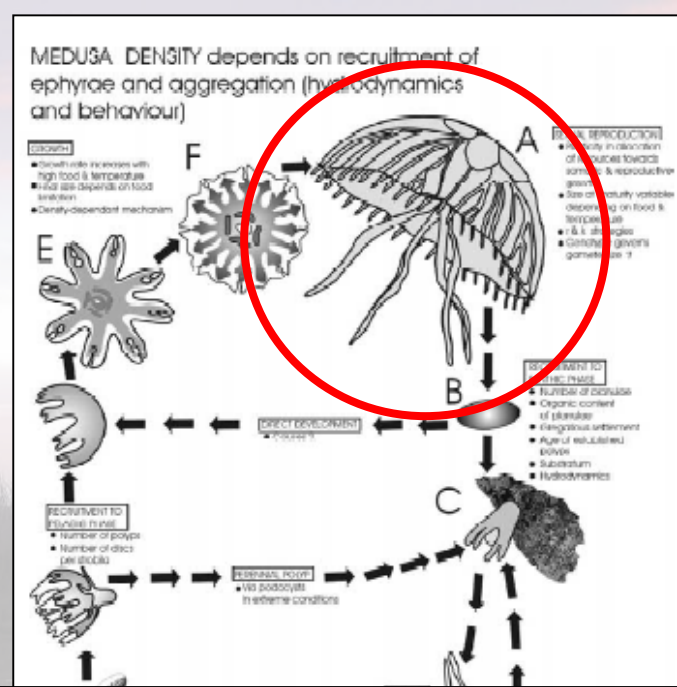
Photo by Tom Carfoot

Suisun Marsh's Overbite Clams and Black Sea Jellyfish

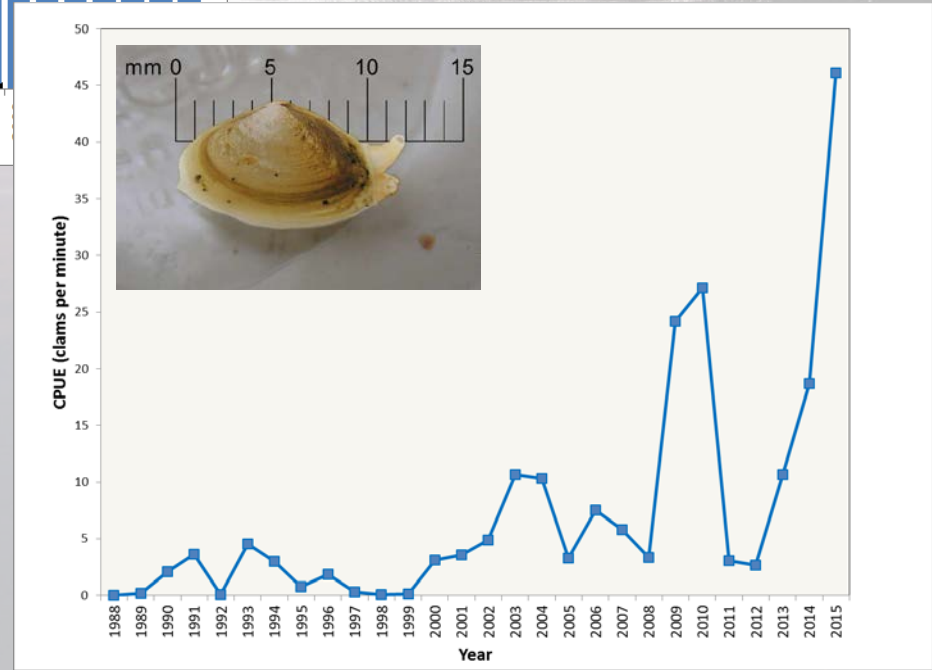
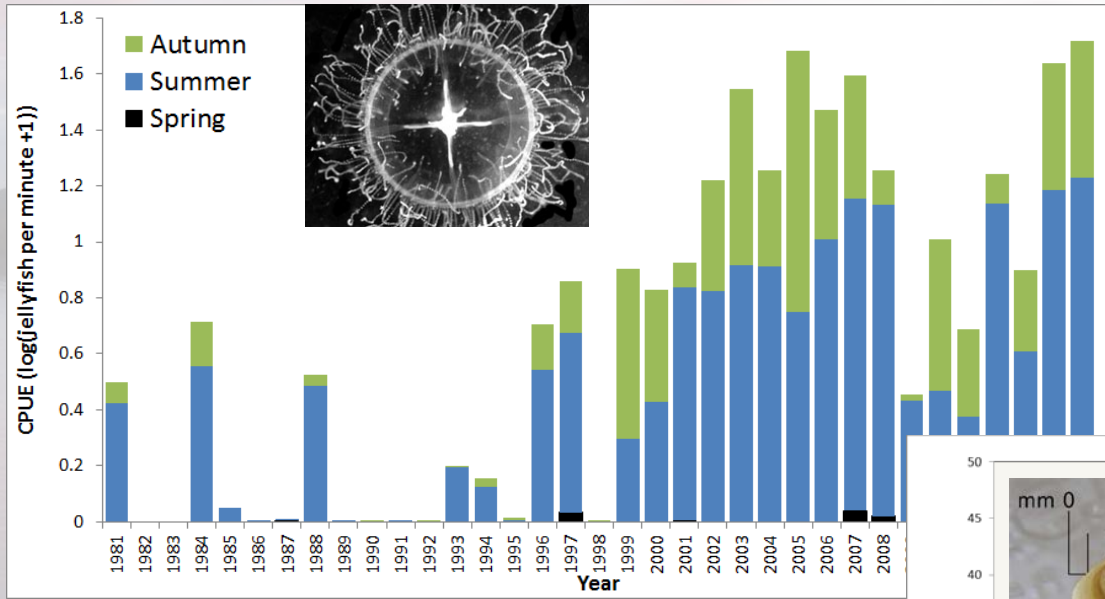
- *Questions:*
 - Long-term abundance trends?
 - Any associated water-quality covariates?
 - Spatial distribution in big/small sloughs?
- *To answer:*
 - Monthly otter-trawl surveys
 - Trend tests
 - Generalized linear models (GLMs)

Suisun Marsh's Overbite Clams and Black Sea Jellyfish

- Overbite clams: 1988 – 2015 (5,508 samples)
- Black Sea jellyfish: 1981 – 2015 (6,967 samples)
- Variables: temp, salinity, water transparency, [oxygen]
- Adults of both species

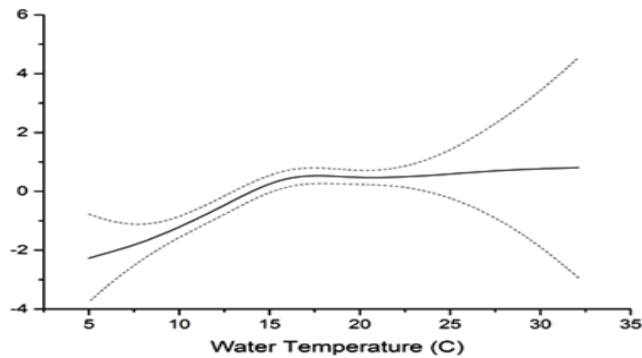
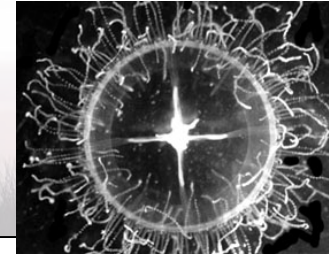
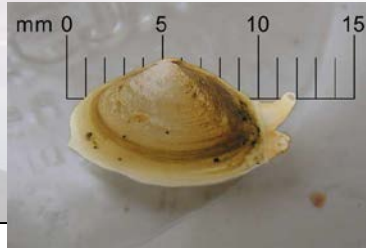


Suisun Marsh's Overbite Clams and Black Sea Jellyfish: Long Term Trends

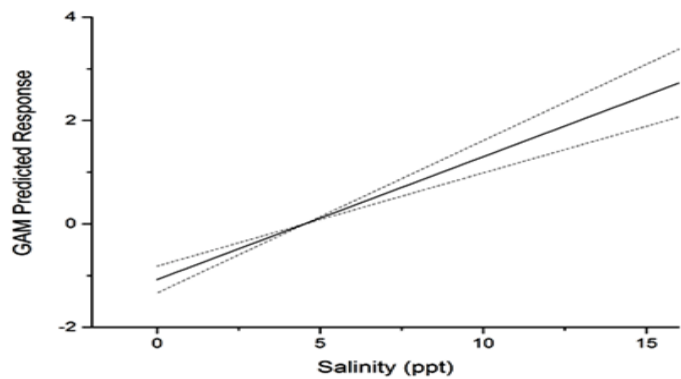
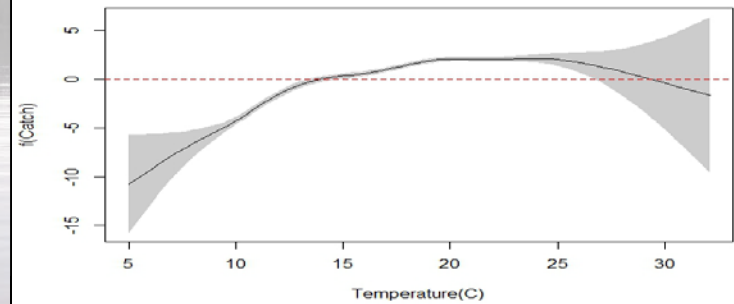


Both species increasing

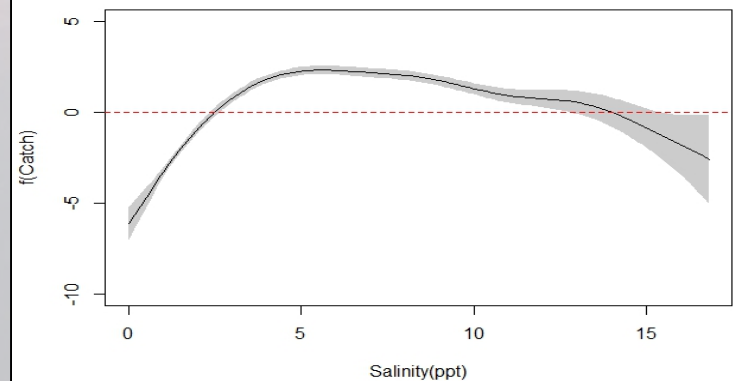
Suisun Marsh's Overbite Clams and Black Sea Jellyfish: Water Quality



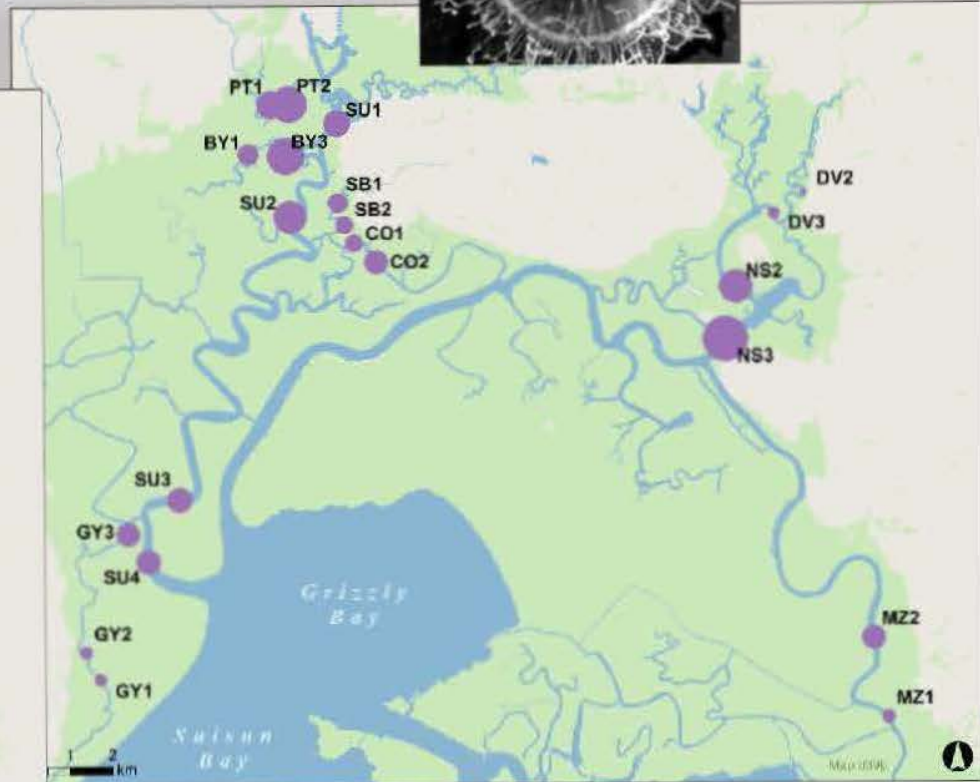
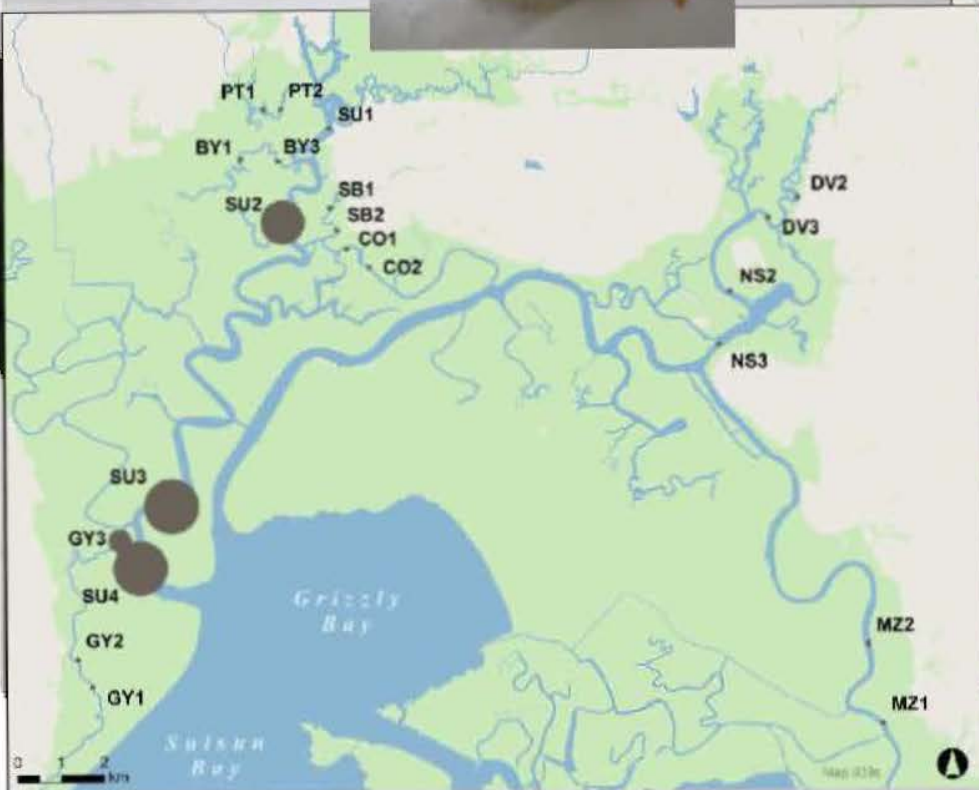
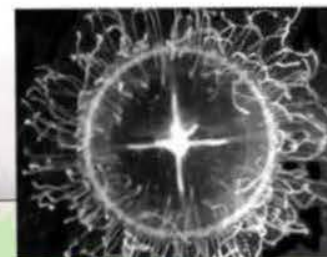
Hot!



Salty!



Suisun Marsh's Overbite Clams and Maeotias Jellyfish: Distribution



Suisun Marsh's Overbite Clams and Black Sea Jellyfish: Summary

Animal	Becoming More Abundant?	Warmer Temperatures?	Higher Salinity?	Slough Size?
Overbite clam	YES	YES	YES	NOT in small
Black Sea jellyfish	YES	YES	YES	variable

Suisun Marsh's Overbite Clams and Black Sea Jellyfish: Knobs?

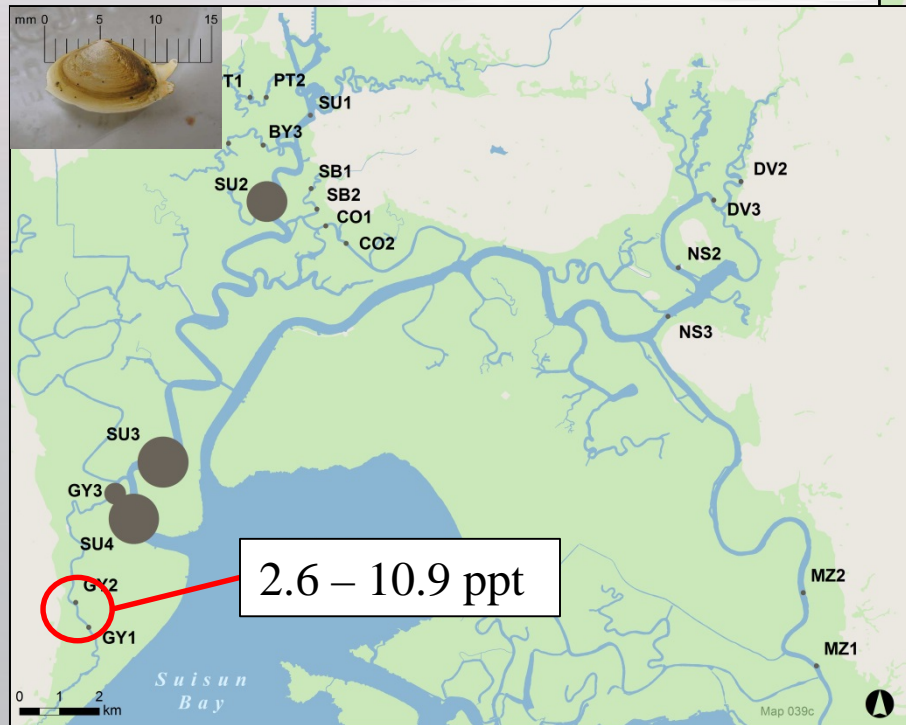
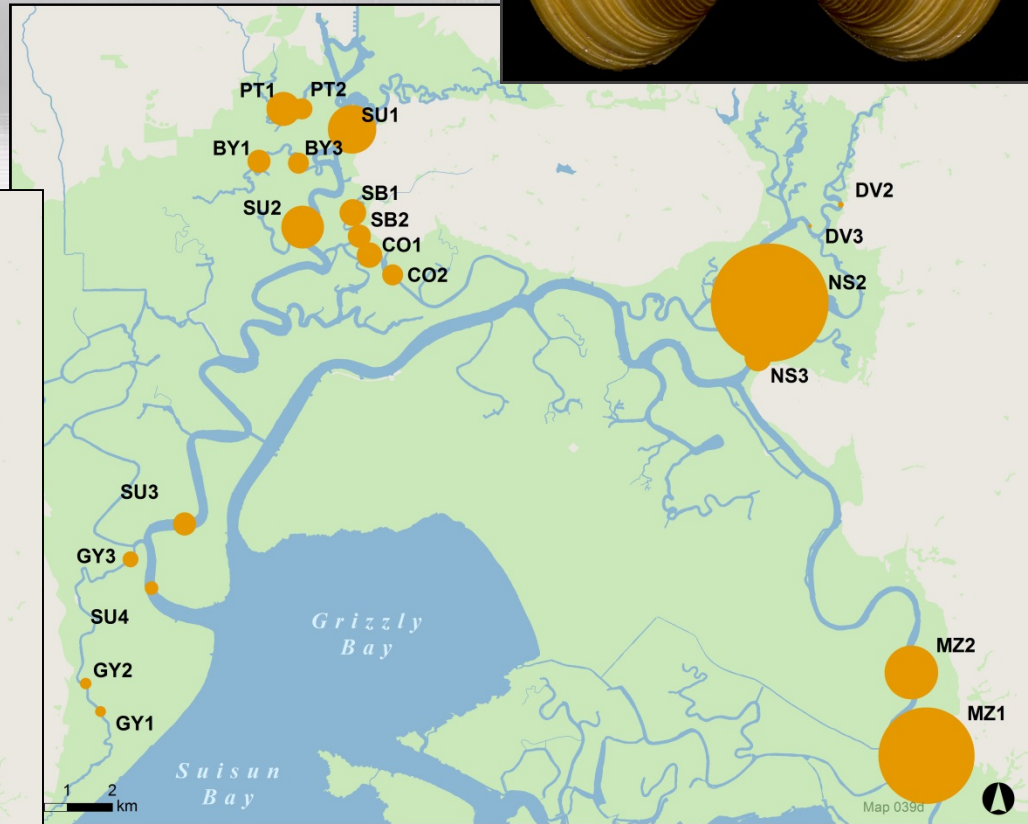
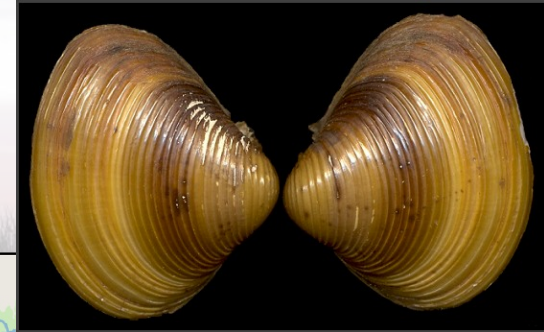
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Suisun Marsh's Clams and Jellyfish: Salinity Knob – Keep It Fresh



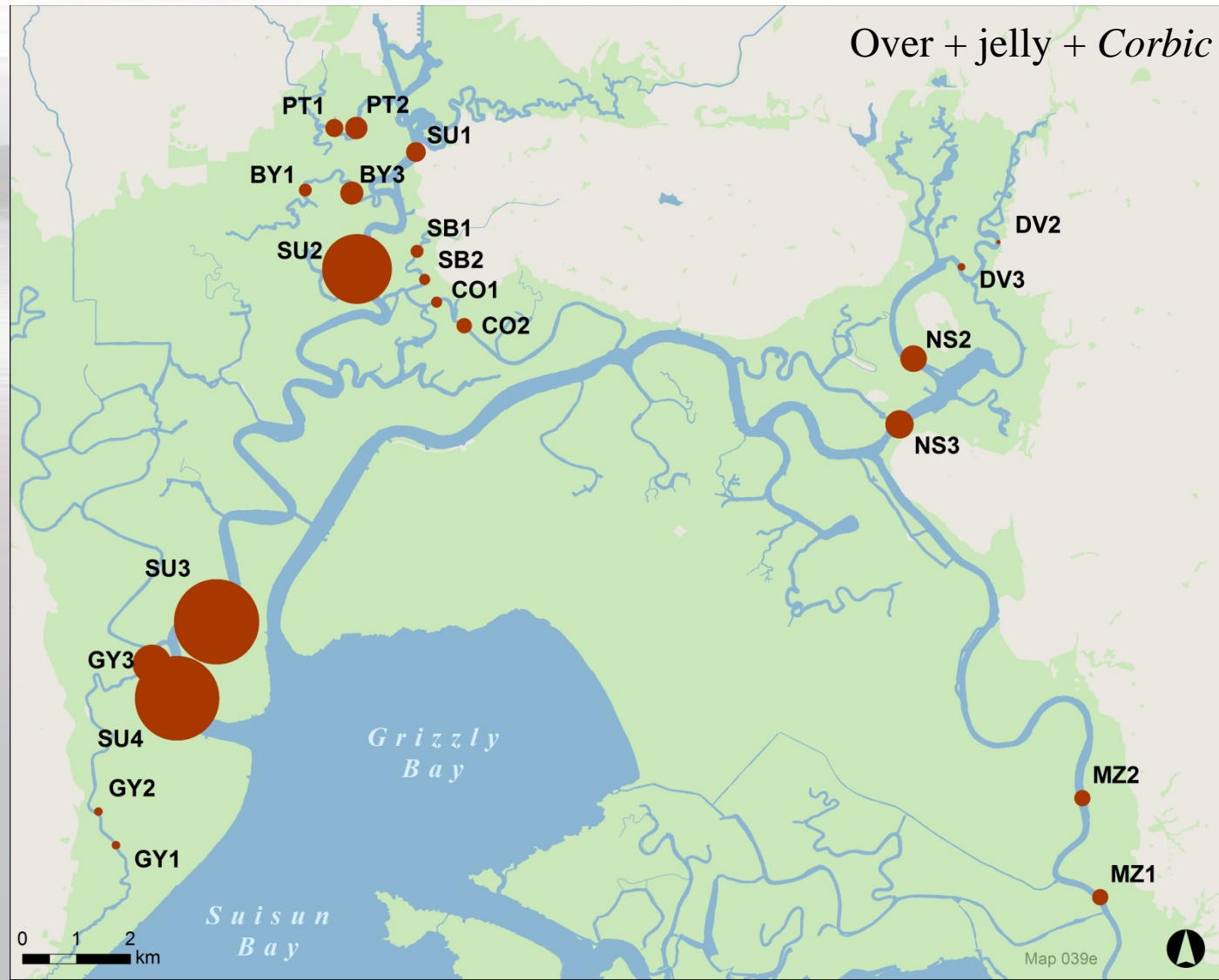
Suisun Marsh's Clams and Jellyfish: Salinity Knob – Keep It Fresh

- Contain jellies and overbite clam
- Improve waterfowl-chick survival
- But increase *Corbicula fluminea*
- Ignore other habitat features



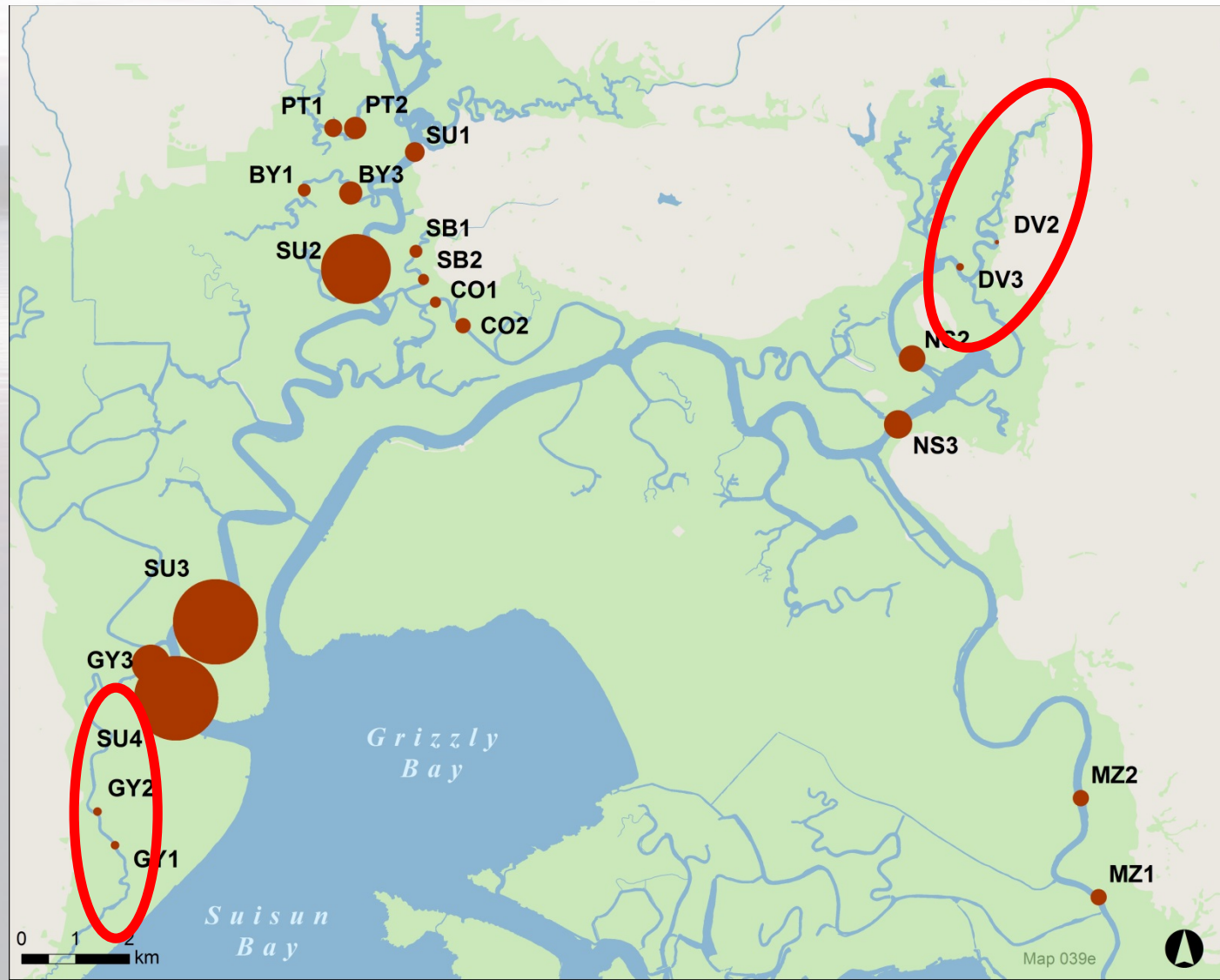
Suisun Marsh's Clams and Jellyfish: Slough Size/Type Knob

- Predation?
- Detritus load?
- Hydrologic *disconnection*?



Suisun Marsh's Clams and Jellyfish: Slough Size/Type Knob

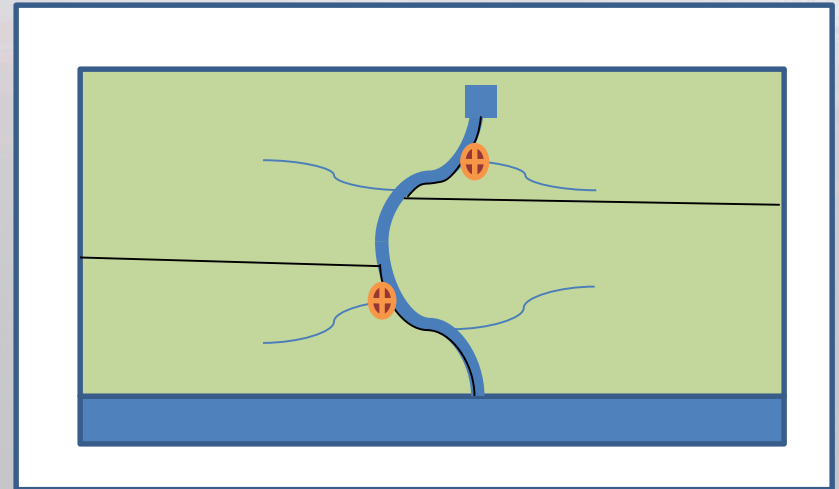
- Long sloughs, dead-end
- Distant from main "highway"
- Managed AND unmanaged marshes



Suisun Marsh's Overbite Clams and Maeotias Jellyfish: Conclusions



but potentially mitigated by...



The End Thanks!

Mike Wigginton, Phil Antipa, everyone at the Suisun Marsh Branch of DWR, the Suisun Resource Conservation District, Melissa Riley (CDFW), the entire North Delta Arc Working Group (especially Brian Williamson), Alison Furler (CDFW), Tommy Agosta (UCD), Alpa Wintzer, Rob Schroeter, Patrick Fuller, Amy Chandos, Nick Buckmaster (CDFW), Miranda Bell (UCD), Nicky Bunn, Angie Munguia (DWR – formerly!), Eva Bush (UCD), Nick Corline (“Mudbug”; UCD), Carson Jeffres (UCD), Emma Davidson (UCD), Patrick Crain (ICF), Josh Porter (EB Parks), Lily Tomkovic (UCD), Scott McDonald (CSUSJ), Hailey Pexton (UCD), Paul Takemoto (PGE), Robert Dunn (UCD), Joe Rogers, Georgia Ramos (UCD), Karin Petrites (Putah Creek Council), Emma Cox, Thaddeus Hunt, Quoc Van, Ethan and Janet Kean, my mom, Bruce Herbold, Chris Enright...

Funding provided by
California Department of Water Resources
and
California Sea Grant