

Research Interests: Soniferous fish behavior



National and International Technology Development



Applications for fisheries - My colleagues and I expect that new technologies will catalyze an explosion in passive acoustic studies of marine organisms in the coming decade (Rountree et al 2003). I will continue to work with colleagues throughout the US, Canada and Europe to develop the study of fish soniferous behavior into a fisheries tool.



Listening to Fish, April 2002– An international workshop

(<http://web.mit.edu/seagrant/aqua/cfer/acoustics/>).



AFS Symposium Passive acoustic applications to fisheries. August 2003



Offshore Technology –

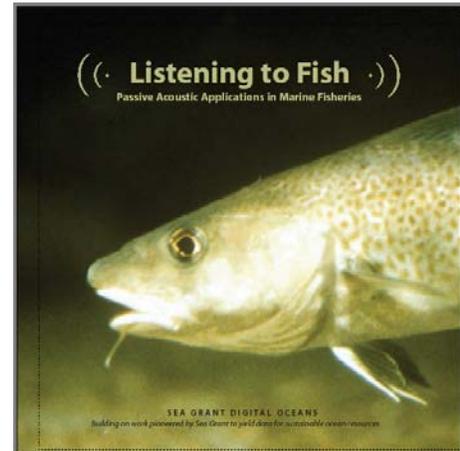


Cooperative Fisheries: Cliff Goudey (MIT Sea Grant) and I have developed low-cost Autonomous Underwater Listening Stations (AULS) suitable for deployment from commercial fishing vessels. Collaborating fishermen deploy the AULS on the fishing grounds during normal fishing operations to obtain acoustic data needed to identify spawning sites and times for haddock, cod and other groundfishes.

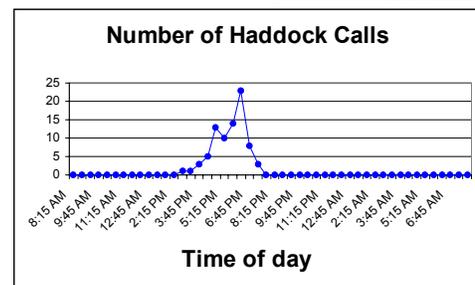


Stellwagen Bank National Marine Sanctuary: Francis Juanes (UMass Amherst) and I have pioneered the use of ROVs and the ISIS underwater camera system for the in situ study of soniferous gadids.

Workshops and Symposia



AULS

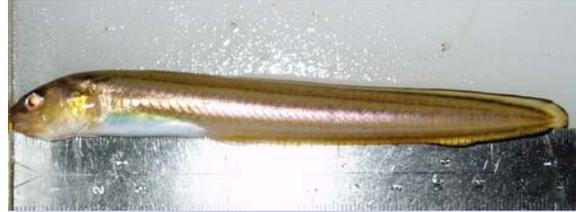


Undersea Technology



Soniferous fish behavior: Cusk-eel studies

My studies of cusk-eel behavior have demonstrated the usefulness of passive acoustics as a survey tool in fisheries and the exploration of the seas.



Range extension

Discovery of striped cusk-eel in Cape Cod waters, where they were formally unknown despite a long history of biological sampling, demonstrates the usefulness of even low-budget, low-tech passive acoustic methods as a survey and exploration tool.



Validation

Capture of specimens and analysis of call characteristics confirms identification and supports findings of previous researchers. Temperature and/or time of year may affect pulse period, repetition rate, and frequency



Reproductive Ecology

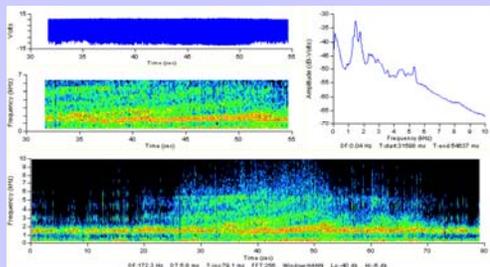
Striped cusk-eels call in a chorus just after sunset. The chorus time closely tracks the time of sunset through the summer.



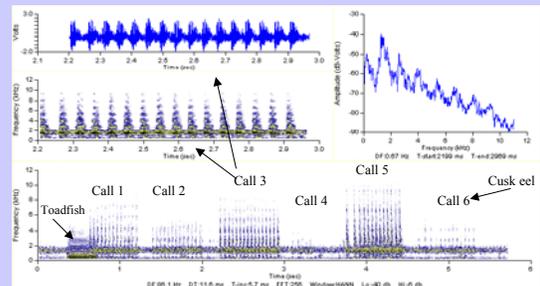
Noise Pollution

The impact of boat noise on spawning chorus behavior needs further study

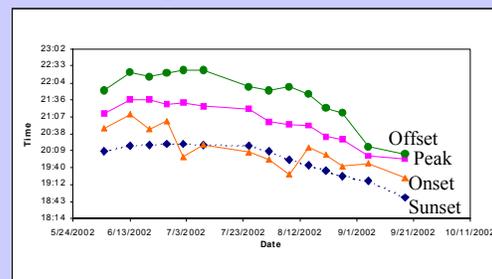
Response of cusk-eel to boat noise



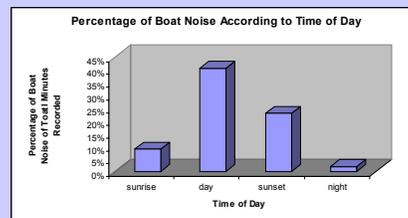
Cusk-eel calls



Seasonal pattern of chorus time



Prevalence of boat noise by time of day



Estuaries: sampling in a difficult environment



Sampling methodologies



Tidal weirs - I developed a unique tidal weir system to study tidal marsh creek habitats in southern New Jersey. A series of papers were published that demonstrate the importance of marsh creeks in New England estuaries and further revealed that large predator species use them for tidal foraging grounds, particularly at night.



Marsh Weir



Block Nets - Obtaining density estimates for relatively large marine nekton using tidal marsh systems is problematic. I devised a system that allowed replication of large scale samples.

“Shower Curtain Nets”



“Shower curtain” block netting for replicated standardized sampling of nekton densities in marsh creeks



Large sample standardized block nets for subtidal habitats



Subtidal Block Nets

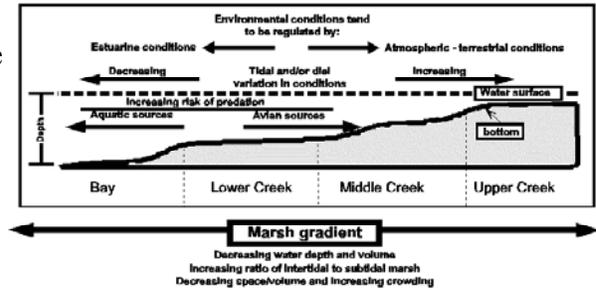


Estuaries: Function and Essential Fish Habitat



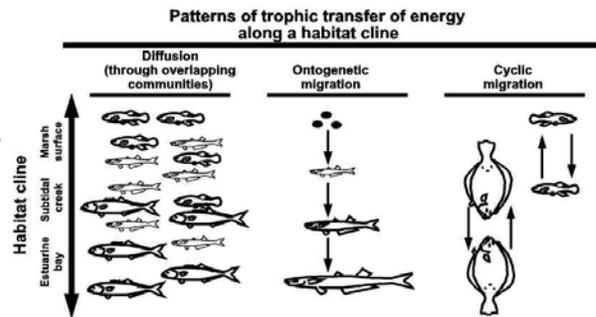
Environmental gradients -

Another interest of mine is the role of estuarine environmental gradients as regulators of tidal, diel, and seasonal migration behaviors as well as of patterns of ontogenetic shifts in habitat use. I also feel that the quantification of these environmental-behavioral relationships is critical to our understanding of the processes of trophic relay of energy from the marsh into coastal waters through fish and invertebrate migrations.



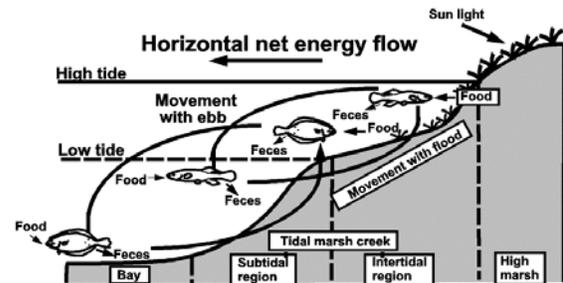
Ontogenetic linked movements -

Understanding size related movements is key to understanding estuarine function.



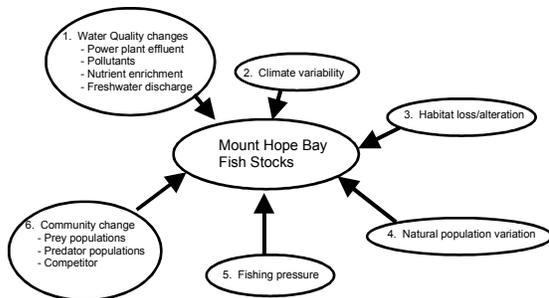
Chain of migration – Trophic relay

- Energy transfer between the marsh, estuary and shelf is accomplished by fish/invertebrate movements.

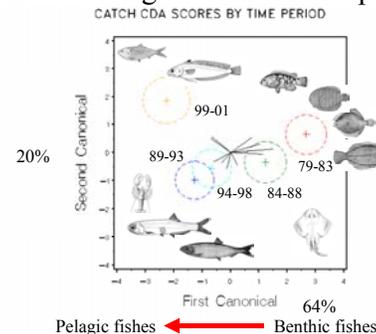


Community shifts through time -

The study of how fish assemblages shift through time can provide much insight into estuarine function and the influence of natural and anthropogenic impacts on the estuarine ecosystem.



Fish assemblage shift in Mt. Hope Bay



Trophic Ecology



Effect of prey body size and type on predator-prey size relationships

relationships - I am interested in predator/prey size relationships and have co-authored a recent study with Scharf and Juanes. Juanes and I have been interested in the effect of body form on this relationship.



Ontogenetic shifts in diet composition - Age and size related shift in fish diets are common in marine fishes. I would be interested in exploring the impact on this phenomenon on trophic systems and studies of community structure. In addition, size related shifts in diet have implications for studies of habitat shifts and the use of isotopic ratios to identify essential fish habitats.

