36th Annual Meeting of
The Florida Association of Aquatic Biologists
May 4-6, 2022
Gainesville, Florida

University of Florida Entomology and Nematology Building 1881 Natural Area Drive

Tentative Agenda

FAB Executive Committee Meeting

UF Entomology and Nematology Building seminar room 1031

Wednesday, May 4, 2022

11:30-13:30

2022 FAB Annual Meeting

UF Entomology and Nematology Building seminar room 1031

Wednesday, May 4, 2022

14:00-14:30	Welcome, opening statements, and Announcements-Scott Duncan
14:30-15:00	FAB History Highlights, Doug Strom
15:00-15:25	Displacement of a critically imperiled species, *Procambarus pictus* (the Black Creek crayfish), by an invasive congener, *Procambarus spiculifer* (the white tubercled crayfish), Kasey Fralick
15:25-15:35	Break
15:35-16:00	Recent introduction of the popular aquarium shrimp, *Neocaridina davidi* (Bouvier,1904), to North America, Jennifer Davenport
16:00-16:30	Response to invasive apple snails at Hurlburt Field- What do you do when you can't follow the generally accepted control guidance?, Jeffrey Van Vranken
17:30	Chuey's

Thursday, May 5, 2022

08:30-9:00	A Brief Historical Perspective, David L. Evans and Robert A. Mattson
9:00-9:25	DEP Reference Stream Sampling, Jennifer Piacente
9:25- 9:50	Caloosahatchee Estuary benthic habitats from the 1990s until now- What did we lose and why?, James Douglass
9:50- 10:15	Prescribed Fire Effects on Wetland Macroinvertebrate Communities in Southeastern Pine Savannas, Coleson Wrege (Student)
10:15-10:25	Break
10:25-10:50	Causes and Consequences of Epiphyte Accumulation on Seagrasses in the Caloosahatchee River Estuary, Florida (USA), Sarah Harrington-Riccio (Student)
10:50-11:15	Analysis of the *floridanus* cryptic species complex (Crustacea: Amphipoda) and identification of a new species from a prairie lake in Leon County, Florida. Joshua Sisco (Student)
11:15-11:45	Poster Session
	Comparing the biodiversity of benthic macrofauna among natural and restored oyster reefs in Naples Bay, Florida, Jordan Davidson (Student)
	Tape grass (Vallisneria americana) restoration impacts on epifaunal communities in oligohaline areas of the Caloosahatchee Estuary, Florida, Theo Hannon and Madison Sims (Students)
11:45-13:15	Lunch
13:15-13:35	Student Awards
13:35-13:45	Break
13:45-15:00	Business Meeting
15:00-16:00	Taxonomy Fair Teaching lab room 3118
17:30	Swamp Head Brewery

Friday, May 6, 2022

08:30-8:45	An Elmidae Mystery, Todd Risk
09:00-9:25	Invasive algae carpets seagrass and causes extended hypoxia in Matlacha Pass, Florida, Richard D. Bartleson
09:25-09:45	Preliminary Report on Temporal Changes in Benthic Macroinvertebrate Communities In Florida Springs, Robert A. Mattson
09:45-10:00	Open
10:10-10:35	Closing Statements and Adjourn

*Presenting Author

Program Session

ABSTRACTS:

Displacement of a critically imperiled species, *Procambarus pictus* (the Black Creek crayfish), by an invasive congener, *Procambarus spiculifer* (the white tubercled crayfish)

Kasey Fralick*, Hannah VanBuren, and Gary Warren
Freshwater Invertebrate Resource Assessment and Research Program
Florida Fish and Wildlife Conservation Commission
Gainesville, FL

The Black Creek crayfish (*Procambarus pictus*) is a critically imperiled, state threatened species endemic to a small number of tributaries to the St. Johns River in Clay, Putnam, St. Johns, and Duval counties, primarily the Black Creek basin. *P. pictus* has a narrow range of environmental preferences/tolerances and usually occurs in small, cool, clear streams with moderately high flows and high concentrations of dissolved oxygen. The white-tubercled crayfish (*Procambarus spiculifer*), which is not native to the St. Johns River watershed, was first observed from two sites in the Black Creek basin in 2008, and was observed at additional sites between 2011 and 2018. We conducted extensive surveys in the Black Creek Basin from 2019-2022 in order to determine the extent of the expansion of *P. spiculifer* and its effects on the range of *P. pictus*. We sampled 93 sites, 65 of which had been sampled historically by at least one other survey. Among the sites that were sampled both between 2008-2012 and 2018-2022 (n = 59), there was a significant increase in the proportion of sites occupied by *P. spiculifer* (McNemar's X^2 = 36.026, p = 1.9×10^{-9}) and a significant decrease in the number of sites occupied by *P. pictus* (McNemar's X^2 = 18.375, p = 1.8×10^{-5}) . *P. spiculifer* has replaced *P. pictus* in the higher order streams in the Black Creek Basin. The only reaches where *P. pictus* is present without *P. spiculifer* in the Black Creek Basin are upstream of either a natural or artificial barrier. A zone where both *P. spiculifer* and *P. pictus* are present exists between these refuge sites and the downstream sites where *P. spiculifer* has completely replaced *P. pictus*. Future conservation efforts should focus on preventing *P. spiculifer* and other potentially invasive crayfish from invading the refuge sites within the Black Creek Basin and watersheds within the range of *P. pictus* that *P. spiculifer* has yet to invade (i.e., Etoniah Creek), potentially by adding barriers or improving existing barriers.

Recent introduction of the popular aquarium shrimp, *Neocaridina davidi* (Bouvier, 1904), to North America

Jennifer S. Davenport[1], Julianne Knight-Gray[1,2], David Eilers[3] and Gustav Paulay[4]
[1] Wood Environment & Infrastructure Solutions, Newberry, Florida 32669
[2] Florida Fish & Wildlife Conservation Commission, Saint Petersburg, Florida 33701
[3] Water Institute, University of South Florida, Tampa, Florida 33620
[4] Florida Museum of Natural History, University of Florida, Gainesville, Florida 32611

The cherry shrimp, *Neocaridina davidi* (Bouvier, 1904), is native to Asia and popular in the aquarium trade because of its bright color morphs. The taxonomy is confused and unresolved, but this species and its congeners have invaded Germany, Poland, Hungary, Israel, Japan and Hawaii in recent years. Morphological analyses of wild-caught shrimp from a Florida stream in 2019 indicate that *N. davidi* has now invaded North America. DNA barcoding will be used to verify the species identification and possibly

determine the source population. Key morphological characteristics will be presented so that colleagues can recognize the differences between this species and local palaemonid shrimp. The population of cherry shrimp in this stream is likely well-established given the densities and the presence of ovigerous females observed during sampling.

Response to invasive apple snails at Hurlburt Field – What do you do when you can't follow the generally accepted control guidance?

Jeff Van Vrancken, USFWS- Eglin AFB

Apple snails (*Pomacea maculata*) were detected on Hurlburt Field in 2016, likely as released aquatic pets from a nearby apartment complex. Their introduction was noted, and semi-casually monitored until USFWS confirmed occupancy on Hurlburt Field of the endangered reticulated flatwoods salamanders (*Ambystoma bishopi*). Apple snails may pose a risk for the salamander, as they are known to rapidly consume emergent herbaceous vegetation, a limited resource that is required for egg-laying habitat by the salamanders. Although Hurlburt's salamander breeding ponds are located at a distance from the apple snail-infested wetlands, the snails continue to spread across the installation through wetland drainages and ditches. It is likely that they will reach the salamander breeding ponds in the next few years. Hurlburt Natural Resources and USFWS have attempted multiple control measures: hand removal of egg masses in a 200-acre infested dome swamp, multiple trap designs to capture adult snails in ditches and drainages, free-hand adult captures, and a pilot laboratory study to assess the feasibility of molluscicide (Ferroxx AQ). These methods have proven labor-intensive and minimally successful. In the future, we plan to request proposals for a graduate student to lead this project, but we are also requesting input from the wider expert aquatic community for advice on control measures applicable for environments that cannot be simply de-vegetated or treated with copper (the accepted control measures proven successful in small-acreage ponds).

FAB: A Brief Historical Perspective

David L. Evans and Robert A. Mattson*
Affiliations: Water and Air Research-retired
St. Johns River Water Management District

A ragamuffin group of aquatic biologists gathered in Gainesville, Florida in 1987 to talk about challenges in the benthic world and ultimately formed a cohesive organization that has "proudly served the benthic community" for 35 years.
In this talk, we'll reminisce on the challenges faced by the organization over the years and the changes we have made.

*Presenting Author

DEP Reference Stream Sampling

Jennifer Piacente
Florida Department of Environmental Protection

Since the early 1990s the Florida Department of Environmental Protection (DEP) has used data generated from reference streams in many capacities such as development of stream bioassessment tools, setting biological integrity criteria, and setting numeric nutrient criteria. We expect that this type of data will be necessary for future projects; therefore, DEP reinstated a reference stream project in 2015 to re-evaluate historic reference streams, document changes in the conditions of historic reference streams, and to routinely sample a revised list of reference streams. The current list of reference streams encompasses 56 sites throughout Florida. The majority of sampled reference streams score in the "Exceptional" or "Healthy" Stream Condition Index (SCI) categories for biological health. Metric scores from each of the 10 SCI metrics are consistent with expectations for "Exceptional," "Healthy," and "Impaired" streams.

Caloosahatchee Estuary benthic habitats from the 1990s until now – What did we lose and why?

Dr. James Douglass*, Dr. Hidetoshi Urakawa

Affiliation(s): Department of Marine and Earth Sciences, Department of Ecology and Environmental Studies, The Water School, Florida Gulf Coast University, 10501 FGCU Boulevard South, Fort Myers, FL 33965-6565

Southwest Florida's Caloosahatchee River Estuary (CRE) is notoriously subject to high variation in freshwater input and high nutrient loading due to extensive development in its watershed and a synthetic link to Lake Okeechobee. Consequently, its benthic habitats, such as submerged aquatic vegetation (SAV) and oyster reefs, have been degraded. While previous monitoring efforts have documented impacts of water quality and flow on specific sites in the estuary, no estuary-wide mapping and assessment of benthic habitats was done between 1994 and 2020. We performed 100 shoreline-perpendicular transect surveys from the head to the mouth of the estuary in early summer 2020, generating a map of SAV, macroalgae, and oyster distribution and abundance, which we compared to a more qualitative map of SAV distribution created in 1994. The comparison revealed a major contraction of SAV species distributions, with freshwater SAV retreating towards the head of the estuary and seagrasses retreating towards the mouth, likely due to increased salinity variability. We further analyzed the 2020 data with respect to microbial community structure, water quality and depth to better understand the drivers of the benthic habitat characteristics observed. The results were largely confirmatory of the expected effects of salinity regime and light availability on SAV distribution, but also revealed extensive benthic algal cover and sulfur cycle metabolism indicative of eutrophic conditions. The extent, density, and diversity of bivalve communities in the CRE was also surprisingly high, suggesting an underappreciated role of bivalves in the structure and functioning of the system.

*Presenting Author

Prescribed Fire Effects on Wetland Macroinvertebrate Communities in Southeastern Pine Savannas.

Coleson F Wrege[1*], Raelene M Crandall[2], Alexander J Reisinger[3], Shirley M Baker[1], and Lindsey S Reisinger[1]

[1] Fisheries and Aquatic Sciences, School of Forest, Fisheries, and Geomatic Sciences, University of Florida, Gainesville, FL.

[2] Forest Resources and Conservation, School of Forest, Fisheries, and Geomatic Sciences, University of Florida, Gainesville, FL.

[3] Soil and Water Sciences Department, University of Florida, Gainesville, FL.

Prescribed fire is widely used for restoration and maintenance of terrestrial ecosystems in the southeastern USA. Fire can alter freshwater ecosystem nutrient dynamics and resources at the base of the food web, but most of our knowledge comes from studies in the western USA, where fires are intense. These studies have shown decreases in density, biomass, and richness of aquatic macroinvertebrates, including shifts in macroinvertebrate community composition, following fire. However, results from western wildfires are not analogous to southeastern prescribed fires because of differences in fire intensity, seasonal precipitation, timing of vegetation recovery, and impacts to soil. Thus, more research on the effects of prescribed fire on freshwater macroinvertebrate communities is needed to understand the ecological effects of this management tool in southeastern pine savannas. This study examines the effects of prescribed fire on freshwater macroinvertebrate community abundances, diversity, and functional feeding groups in 28 wetlands in 2 forests in north central Florida. These wetlands span a gradient of prescribed burn intensity and frequency over the past 40 years. Aquatic macroinvertebrates were collected with triplicate stovepipe samples and triplicate dipnet samples from each wetland during spring/summer 2021. Chironomidae were the most abundant taxa and other common taxa include Odonata, Coleoptera, Trichoptera, Ephemeroptera, Amphipoda, Oligochaeta, Acari, Copepoda, and Cladocera. Analyses are forthcoming on relative abundance of macroinvertebrates in each functional feeding group and taxonomic richness/diversity across fire return interval and intensity. These results will enhance our understanding of the impacts of prescribed burn management on freshwater macroinvertebrate communities in the southeastern USA.

Causes and Consequences of Epiphyte Accumulation on Seagrasses in the Caloosahatchee River Estuary, Florida (USA)

Sarah Harrington-Riccio*; Dr. James Douglass

Affiliation(s): Department of Marine and Earth Sciences, Department of Ecology and Environmental Studies, The Water School, Florida Gulf Coast University, 10501 FGCU Boulevard South, Fort Myers, FL 33965-6565

Despite concerns about harmful effects of algal epiphytes on seagrasses, there has been a lack of clarity about the causes and consequences of spatiotemporal variation in epiphytes in Florida's Caloosahatchee River Estuary (CRE). We addressed this knowledge gap with epiphyte monitoring and two field

*Presenting Author

experiments: 1) manual removal of epiphytes; and 2) a factorial manipulation of nutrient enrichment and mesograzer deterrent in a *Thalassia testudinum* bed in the lower estuary. We assessed epiphyte abundance using three methods: visual assessment, epiphytic biomass, and epiphytic chlorophyll *a*. We also used the epiphyte biomass data to estimate the % of Photosynthetically Active Radiation (PAR) blocked by the epiphytes. Epiphyte abundance varied idiosyncratically by site, season, and seagrass species, but was high overall, with a large percentage of light blocked by the epiphytes.
Manual epiphyte removal had no effect on seagrass growth and health during our short-term removal experiment, but low ambient epiphyte levels during the early spring period of that experiment may have limited its power to detect effects. In our nutrient enrichment x mesograzer deterrent experiment epiphyte abundance increased in all treatments, but there were no significant effects of nutrient or grazer deterrent treatments on any response variable, in contrast with strong results of similar treatments in seagrass experiments in other systems. Our results, and the lack thereof, emphasize the variability among seagrass beds in their sensitivity to top-down and bottom-up forcing. In our case, the effects of experimental manipulations were both literally "washed out" by currents at our study site, and figuratively washed out by ambient conditions negating the effects of the manipulations. We recommend that future researchers investigating seagrass epiphytes in the field explicitly incorporate spatial and seasonal variation in ambient conditions into study design.

Analysis of the *floridanus* cryptic species complex (Crustacea: Amphipoda) and identification of a new species from a prairie lake in Leon County, Florida.

Joshua M. Sisco* and Thomas R. Sawicki. Department of Biological Sciences, Florida A&M University, Tallahassee, FL 32307.

Florida has a wide variety of freshwater ecosystems from lakes and ponds to swamps and submerged caves. The ecological diversity of these environments can promote the evolution of astonishing taxonomic diversity. *Crangonyx floridanus* was described in 1963 from a cypress swamp in Highlands Hammock State Park in Highlands County, Florida based on a few diagnostic characteristics such as small, slender, weakly armed gnathopods with singly inserted superior lateral setae. The species was subsequently found to occur across most of the eastern United States. In addition, *C. floridanus* has been documented as invasive in parts of the Western United States, Japan, the United Kingdom, and most recently in Ireland. Recent molecular analyses of *C. floridanus* populations in North Florida using the nuclear 18S rDNA and 28S rDNA, and the mitochondrial 16S rDNA strongly suggest that the *C. floridanus* metapopulation represents a cryptic species complex. These data also suggest that the *floridanus* species complex is not monophyletic. A new species that shares the morphological diagnostic characteristics with the *floridanus* complex is currently being described from a prairie lake in Leon County, Florida. Additionally, molecular phylogenetic data strongly indicate the presence of more species in the complex that are yet to be described. (Funding in part for this project was by the State of Florida, Fish and Wildlife Conservation Commission, State Wildlife Grants No. 15044, U.S. Fish and Wildlife Service Federal Award n. FL-T-F15AF00394)

*Presenting Author

Comparing the biodiversity of benthic macrofauna among natural and restored oyster reefs in Naples Bay, Florida

Jordan Davidson
Affiliation(s): Department of Marine and Earth Sciences, Department of Ecology and Environmental Studies, The Water School, Florida Gulf Coast University, 10501 FGCU Boulevard South, Fort Myers, FL 33965-6565

Naples Bay is a developed and dredged estuarine waterway in the Southwest region of Florida that previously held abundant mangrove forests, seagrass meadows, and oyster reefs. Shoreline development, dredging, and a drastic change in salinity regime from increased freshwater inputs have significantly reduced these populations. In 2018, the City of Naples started restoring oyster reefs in Naples Bay. Artificial reef structures were placed at a site near naturally occurring oyster reefs, with the goal being that new oysters would colonize these artificial structures. Additionally, concrete reef balls were placed adjacent to the restored reefs, which protected them from stress caused by boat wake from a nearby boating channel. Live density of oysters and shorebird populations have been regularly monitored at both the restored and natural reefs, but benthic macrofauna like fish, shrimp, and crabs were not monitored. We performed monthly sampling of the restored and natural reefs with the use of lift nets and underwater cameras, collecting data on biodiversity measures such as species composition and abundance of macrofauna inhabiting the reefs. Biodiversity was compared between the restored and natural reefs on a spatial and temporal scale. The results showed that the restored oyster reefs consistently had higher biodiversity, but the natural reefs had higher species abundance. This revealed the role the reef balls have in creating a more balanced and natural oyster reef ecosystem. The decrease disturbance caused by boat wake allowed for more inter-species competition in the restored reefs, while the natural reefs were dominated by species that could withstand disturbance by boat wake more easily.

Tape grass (*Vallisneria americana*) restoration impacts on epifaunal communities in oligohaline areas of the Caloosahatchee Estuary, Florida

Madison Sims*, Theo Hannon, James Douglass
Affiliation(s): Department of Marine and Earth Sciences, The Water School, Florida Gulf Coast University, 10501 FGCU Boulevard South, Fort Myers, FL 33965-6565

Submerged aquatic vegetation (SAV) provides important habitat and nursery grounds for invertebrate and fish communities as well as improving water quality, stabilizing sediments, and enhancing fishery resources. Tape grass (*Vallisneria americana*) was the dominant SAV species in the upper Caloosahatchee Estuary but declined dramatically in the early 2000s following high salinity events. Tape grass restoration in recent years has shown promise at some sites in the estuary, but is challenging and expensive. Better quantifying the ecosystem services of restored tape grass habitats could help managers prioritize tape grass restoration appropriately in the context of other conservation efforts. Ecosystem service of SAV habitats are thought to include increasing biomass, diversity, and secondary productivity of epibenthic fauna, but these services have rarely been quantified for tape grass beds. We collected epifaunal grab samples at several different locations in the Caloosahatchee Estuary, including

sparse vegetation in unrestored areas and thick vegetation inside caged restoration plots. Epifaunal communities in these oligohaline habitats were a diverse mix of estuarine and freshwater taxa, and preliminary results support our hypotheses of higher secondary productivity and diversity in restored versus unrestored plots.

An Elmidae Mystery

Todd Risk
Florida Department of Environmental Protection

Invasive algae carpets seagrass and causes extended hypoxia in Matlacha Pass, Florida

Richard D. Bartleson*[1,3], Melynda Brown[2], James G. Douglass[3], Arielle Taylor Manges[2] and Mary McMurray[2] Leah Reidenbach[1]
[1]Sanibel-Captiva Conservation Foundation Marine Lab, [3]Florida Gulf Coast University, [2]Florida Department of Environmental Protection

A mat forming algae species, *Caulerpa fastigiata* rapidly covered a large area of Matlacha Pass in 2019 and recurred in 2020 and 2021 despite summer die-offs. Lee County aerial photos showed the Pass having patchy macrophyte cover in January 2019, but complete coverage in January of 2020 and 2021. The algae mats completely cover the sediment with closely packed, branching filaments which extend upward for ~10 cm. When the *Caulerpa* and other macroalgae and trapped organic matter decompose, and the oxygen is depleted from the water column over large areas, the seagrass shoots are exposed to hydrogen sulfide.

The Charlotte Harbor Aquatic Preserve (FDEP), monitors water quality continuously, and seagrass sites annually in Matlacha Pass. Macroalgae percent cover measurements were made to ground-truth aerial images, samples were taken for biomass and stable isotopes, water quality measurements were made with a YSI sonde across transects. Water column samples were analyzed for dissolved N, P and phytoplankton.

High biomass of *Caulerpa* (>1 kg dw m^{-2}) was present in continuous cover of square 10 km^2 of the estuary. Localized hypoxia was 1st measured on 5/21/2021, near mangrove edges, and large hypoxic areas were present in June and July 2021. Continuous dissolved oxygen near the bridge was also low in June and July. Seagrass coverage at a site near the most affected decreased from 2017 to 2021 while drift algae coverage increased. Phytoplankton counts were negligible and chlorophyll was low from 5/21/21 until 8/7/21. Nutrient concentrations were low until the decomposition event stared. Milky water was associated with the lowest dissolved oxygen levels along transects, indicating sulfur from conversion of H_2S produced from decomposition.

Excessive nutrient loading rates and lack of grazers allow the production of a high biomass of algae. The hypoxic water, and H_2S production may prevent grazer populations from controlling the algae biomass. The genus *Caulerpa*, with its anti-grazing compounds, has several species that overgrow existing seagrass meadows in Europe. *Caulerpa* can cause significant problems for existing benthic communities and reduce the quality of sediment. Hypoxic water column events caused by summer macroalgal decomposition have been noted but rarely. *C. fastigiata* is not known to be an invasive mat former, but

*Presenting Author

it has been forming mats in Pine Island Sound bayous in the 2000's and has been spreading in San Carlos Bay. The negative effect on seagrass ecosystems in some areas is profound.

PRELIMINARY REPORT ON TEMPORAL CHANGES IN BENTHIC MACROINVERTEBRATE COMMUNITIES IN FLORIDA SPRINGS

Robert A. Mattson, CEP, CSE
St. Johns River Water Management District

Florida's freshwater springs have been subjected to many of the same pressures affecting other aquatic ecosystems in the state: degradation of water quality, changes in hydrology, and concurrent changes in habitat. An overall lack of long-term biological monitoring in springs makes interpretation of the ecological effects of these changes difficult. In 2015 the St. Johns River Water Management District (SJRWMD) conducted a short-term, synoptic biological survey in 14 spring-run streams in north and central Florida. The survey focused on the submerged aquatic vegetation (SAV) community: which included rooted macrophytes and algae. Data were collected on basic physicochemistry, macrophytes, algae (epiphytic and macroalgae), and the SAV-associated macroinvertebrate communities. The data from this effort is being compared with data collected in previous studies in these spring-run streams to evaluate biological changes that may have occurred over time.
This presentation will provide a preliminary summary of comparison of the 2015 benthic macroinvertebrate community data with similar data collected in prior invertebrate studies in some of these 14 streams. A recurring problem in comparing the data from these different studies is differences in gear type(s) used to sample macroinvertebrates, different sampling locations, differences in sampling design (replication, etc.), changes in taxonomy, and differing levels of identification of invertebrates. Because of these complications, this comparison is largely qualitative, comparing lists of taxa collected in the different studies, relative composition of different major invertebrate groups (as taxa richness), and comparison of community metrics such as taxa richness and diversity (Shannon Index).

*Presenting Author