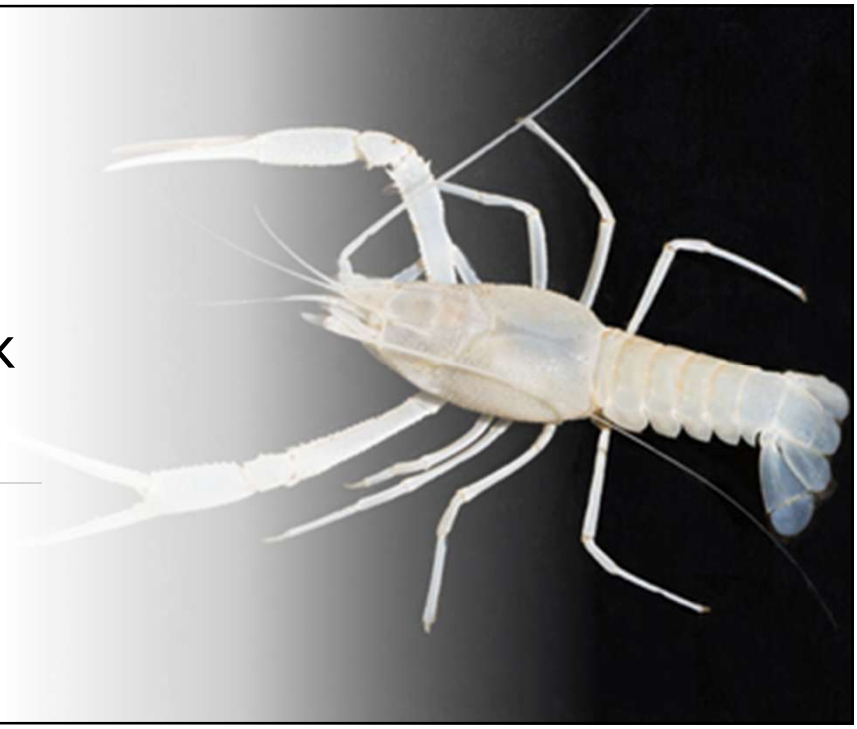
Mill Creek Sink Biology



Thomas R. Sawicki, Ph.D.

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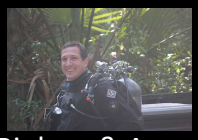
Dr. Thomas R. Sawicki
Expert Credentials



- Associate Professor of Biology & Associate Chair, Florida A&M University
- Ph.D. in Ecological Sciences, Old Dominion University, 2004
- Curatorial Affiliate, Yale Peabody Museum
- 25+ years of research on subterranean biodiversity and Floridan aquifer fauna
- 28+ peer-reviewed publications; multiple new species described
- Funded by NPS, NOAA, DCNR, FWC, and other agencies
- 30+ years as a cave diver, technical diver, and SCUBA instructor
- Specialist in groundwater ecology, taxonomy, cave biology, and conservation

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Cave Community Structure is Difficult to Ascertain Often Resulting in Underrepresentation

Video: Kristi Bernot

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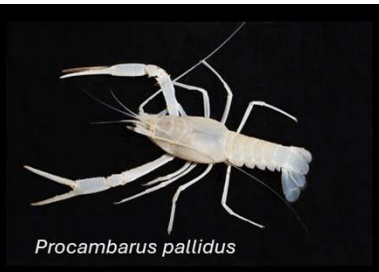

For Instance, Franz et al., 1994 only notes three species in Herzog Cave (located approximately 12 miles south of Mill Creek Sink)

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According to Franz et al., 1994

Additional species from Herzog Cave in Sawicki collections—collections made by Paul Moler of the FWC in 2018

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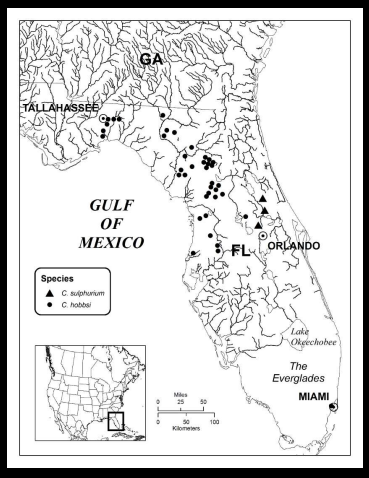
In addition, recent genetic studies have demonstrated hidden species diversity



Geographic distribution of *C. hobbsi* as noted by Zhang and Holsinger, 2003

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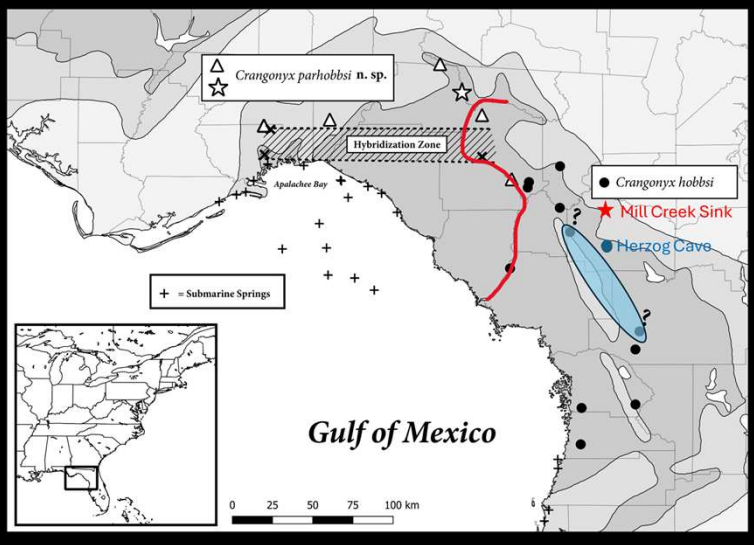
What was thought to be one widely distributed species is now known to be at least two



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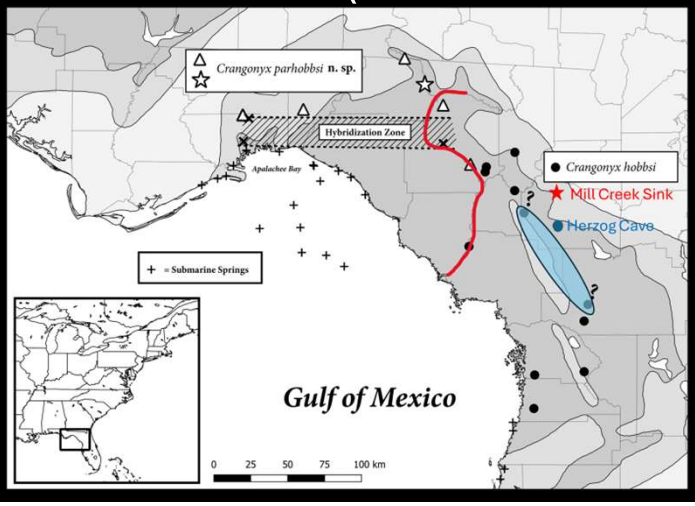
A third potential species has been discovered from Newberry Bat Cave in Alachua County and Indian Cave in Marion County—the exact distribution of this species is not known (Cannizzaro et al., 2020).



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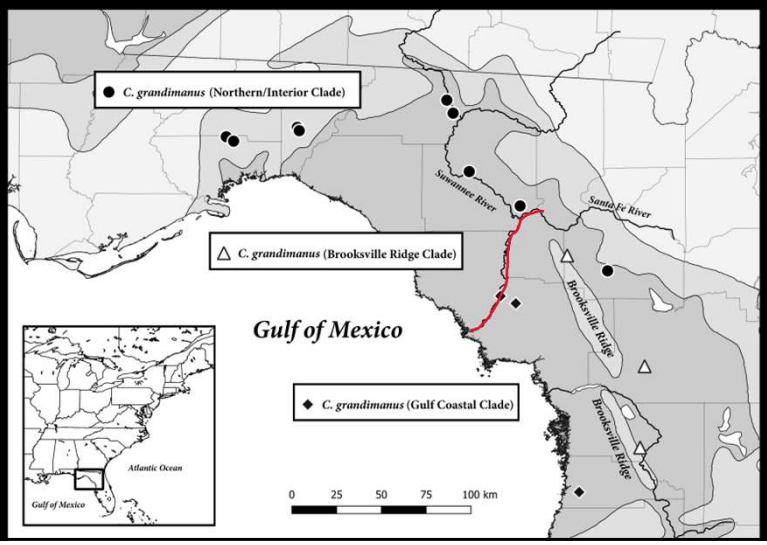
In addition, unpublished data is showing a similar pattern for *Crangonyx grandimanus*



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The importance of Groundwater Flora and Fauna

- Groundwater microbial communities play important roles in purification of water, but surface water contamination can alter the microbiome of these communities, introducing pathogens and antibiotic-resistant genes (Wu et al., 2025)
- Millions of people in Florida and tens of thousands in Alachua County use wells for their drinking water
- Groundwater fauna are indicator species for the health of a cave ecosystem (Griebler and Avramov, 2015)
- In particular amphipods such as *Crangonyx hobbsi*, *C. parhobbsi*, and *C. grandimanus* are considered keystone species in cave and spring habitats (Glazier, 2009)

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In Conclusion: The diversity of life in Mill Creek Sink is likely much more than reported by Franz et al., 1994

In addition, species most likely found in the cave are also listed by the International Union for Conservation of Nature (IUCN) and the Florida Natural Areas Inventory (FNAI):

- *Procambarus pallidus*
  - IUCN—near threatened; FNAS S1 (critically imperiled) S2 (imperiled)
- *Crangonyx hobbsi*
  - IUCN—vulnerable; FNAS—S2 (imperiled) S3 (vulnerable)
- *Crangonyx grandimanus*
  - IUCN—vulnerable; FNAS—S2 (imperiled) S3 (vulnerable)
- *Caecidotea hobbsi*
  - IUCN—not listed; FNAS — S1 (critically imperiled) S2 (imperiled)
- *Troglocambarus maclanei*
  - (IUCN—near threatened; FNAS — S1 (critically imperiled) S2 (imperiled)

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In addition: Section 2.4.4(D)(4) requires that Design minimizes environmental impact.

According to the staff report:

- "The proposed special exception minimizes environmental impacts and does not cause significant deterioration of light, water and air resources, wildlife habitat, stormwater management, scenic resources, and other natural resources."
- "Evaluation & Findings: The proposed special exception use, i.e., stormwater management facilities, does not pose a significant deterioration of light or air resources, water resources in terms of flood control, wildlife habitat, scenic resources, and/or other natural resources found at ground surface. *Additional data will be required at the infrastructure plan stage concerning minimization of environmental impacts, if any, to the subsurface conditions of the subject property.*"

The data presented here demonstrates that there is not sufficient data at this stage to know of the impacts on subsurface conditions.

Thus, there needs to be additional analysis on potential impacts before this project can move forward.

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References

Cannizzaro, A. G., D. Balding, E. A. Lazo-Wasem, & T. R. Sawicki. 2020. A new species rises from beneath Florida: molecular phylogenetic analyses reveal cryptic diversity among the metapopulation of *Crangonyx hobbsi* Shoemaker, 1941 (Amphipoda: Crangonyctidae). Organisms Diversity & Evolution, 20: 387–404. https://doi.org/10.1007/s13127-020-00433-4.

Franz, R., J. Bauer, & T. Morris. 1994. Review of Biologically Significant Caves and their Faunas in Florida and South Georgia. Brimleyana, 20: 1–109.

Glazier, D.S. 2009. Amphipoda. In: Likens, G.E. (Ed.), Encyclopedia of Inland Waters. Elsevier, Amsterdam, pp. 89 115.

Griebler C., & M. Avramov. 2015. Groundwater ecosystem services: a review. Freshwater Science. 34(1): 355–367.

Wu D, Bai H, He L-Y, He L-X, Gao F-Z, Liu C-X, Van den Brink PJ, Smidt H, Ying G-G. 2025. From river to groundwater: Antibiotics pollution, resistance prevalence, and source tracking. Environ International. 196:109305.

Zhang J. & Holsinger J.R. (2003) Systematics of the freshwater amphipod genus *Crangonyx* (Crangonyctidae) in North Ameri ca. Virginia Museum of Natural History, Virginia, 274 pp.

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