

Open letter to the Georgia Community:

Currently, the Georgia Environmental Protection Division (EPD) is reviewing permits that would authorize Twin Pines Minerals LLC, an Alabama mining company, to extract heavy minerals from Trail Ridge that forms the eastern border of the Okefenokee National Wildlife Refuge.

As members of the scientific community, we are in no position to opine on the ultimate question – whether the mine is in the best interests to the people of Georgia; however, we are sufficiently familiar with the environmental complexities of the region, including the water system and the geology, that we are compelled to voice our concerns about the environmental impacts of this mine.

Most of us have experience studying various aspects of the Okefenokee Swamp. All of us appreciate the need to preserve and protect iconic natural resources like the Okefenokee, which contribute so much to the recreational economy of South Georgia.

Although we are not opposed to mining *per se*, it does give us pause when a mine is located close to a water body that has major recreational, economic, environmental, and scientific value. The scientific evidence tells us:

1. Trail Ridge acts as an earthen dam that creates the swamp itself. It does this by redirecting surface water drainage and slowing surficial groundwater movement, creating a backwater effect.
2. Digging up Trail Ridge and then replacing it post mining will mix the existing layered sands, clays, and organic matter. This makes Trail Ridge more porous and thus more conductive to water, lessening its ability to hold water. This will alter groundwater flows through Trail Ridge and possibly lead to permanently lower water levels in the Swamp, depending on the spatial extent of such modification. The leakage through the modified Trail Ridge means that water pumped by the mining activity will largely derive from the Okefenokee Swamp.
3. The mining permit proposes to pump 1.44 millions of gallons per day (MGD) of groundwater, which is the approximately daily need of a town of 19,000 people. This is projected to cause the water table in the Floridan Aquifer underlying the swamp to lower by as much as 9 feet. One-year post-pumping, the aquifer under the swamp will still be 1.3 feet lower than pre-pumping levels. This aquifer drawdown will create a downward hydraulic gradient from the Swamp and will cause a drop in Swamp water levels as a result.
4. Mining will directly destroy wetlands and intermittent streams on Trail Ridge.

Therefore, we are concerned that by both destroying the structural integrity of Trail Ridge and pumping the underlying aquifer, the water level of Okefenokee Swamp will go down. Lowered water levels cause the following issues:

1. Mining will make the Okefenokee Wilderness Canoe Trails impassable, eliminating access to the swamp for outdoor recreation and natural resources management.

2. Mining will impact the tourism and economy dependent on Okefenokee Swamp.
3. Mining will impact the water quality of the Okefenokee Swamp and downstream rivers, including the St Mary's and Suwannee Rivers, through release of stored chemicals, including toxic heavy metals.
4. Mining will increase fire risk to both the swamp and nearby private property, including timber and blueberry farms.
5. Mining will destroy habitat for threatened and endangered species including gopher tortoises, indigo snakes, and possibly flatwoods salamanders, and habitat with the Swamp ecosystem.
6. As reported for other National Wildlife Refuges, nearby development activities will disturb habitat use by birds in Okefenokee.
7. Mining will substantially degrade the dark night skies for which the area around the Swamp is famous and which attract amateur astronomers from long distances.

Twin Pines has [produced reports to analyze the impact of the proposed mine](#). In our opinion, these studies are flawed in that:

1. The groundwater recharge rate used to model groundwater flow is too low and improper;
2. The connectivity of the underlying aquifers is not clearly established;
3. These studies do not align with established research, and they have not been peer-reviewed.

[The US Fish and Wildlife Service has stated:](#)

“concerns that the proposed project may pose risks to the Okefenokee National Wildlife Refuge (OKENWR) and the natural environment due to the location, associated activities, and cumulative effects of similar projects in the area. We opine that the impacts are not sufficiently known and whatever is done may be permanent.”

Official documentation surrounding the mine and permit process can be found here:

<https://epd.georgia.gov/twin-pines>

It is important to note that this proposal is for a “demonstration mine” and that Twin Pines plans to continue mining after this initial ask. Given the complexity of the water system and geology in and around the Okefenokee Swamp, this plan cannot be viewed in isolation, but rather as the start of a larger operation.

The geographic features underlying the area have been shaped over the past several thousand years by powerful coastal forces. Unless a comprehensive study is performed that takes a hard look at the hydrologic functions of this region, it will be impossible to say that the proposed mine, which would be located less than three miles from the Okefenokee, will not jeopardize the Swamp and surrounding areas. There is certainly no agreement that the mine will not be harmful – which should be enough to give pause to any mining permits.

Importantly, a majority of the established research supports the claims that mining close to the swamp has a high likelihood of causing permanent damage to the swamp and surrounding areas.

We stand by to offer additional scientific expertise and advice on this issue.

Until the science proves otherwise, we are opposed to mining in the vicinity of the Okefenokee Swamp.

In science,

1. Amy Sharma, PhD, Vice President, Science for Georgia
2. Carla Atkinson, PhD in Ecology and Evolution
3. Jon Benstead, Professor of Biological Sciences
4. Emily S Bernhardt, James B. Duke Professor of Biology
5. Marsha C. Black, PhD Ecology, Assoc Prof Emeritus, UGA
6. Jamie Bucholz, PhD student in Biological Sciences, The University of Alabama
7. Aram JK Calhoun, Professor Emerita Wetland Ecology and Conservation
8. Ron Carroll, PhD Ecology, Professor Emeritus University of Georgia
9. Alan P. Covich, PhD in Ecology, Professor Emeritus, University of Georgia
10. Christopher Craft, Janet Duey Professor of Rural Land Policy, O'Neill School of Public and Environmental Affairs, Indiana University, Bloomington
11. Evan H. DeLucia, G. William Arends Professor Emeritus of Plant Biology
12. Ms. Paula Denissen
13. Jason Evans, Institute for Water and Environmental Resilience, Stetson University
14. David W Hicks, Georgia PG 001624, U.S. Geological Survey (ret), Jones Environmental Research Center (ret)
15. Charles Hopkinson, Professor Emeritus, UGA, Athens, GA
16. Garrett Hopper, PhD in Biology, resident of Tuscaloosa, AL
17. C. Rhett Jackson, John Porter Stevens Distinguished Professor of Water Resources
18. Betty Jean Jordan, PE, resident of Monticello, GA
19. Elizabeth King, PhD, Associate Professor of Ecology, resident of Athens, GA
20. Lora L. Smith, PhD in Wildlife Ecology, resident of Bainbridge, GA
21. Karen McGlathery, Professor, Director Environmental Resilience Institute, University of Virginia
22. J. Patrick Megonigal, PhD, Affiliate Faculty George Mason University
23. Jacqueline Mohan, J. Mohan, PhD in Ecology, Athens, GA resident
24. Richard W. Morgan, Richard W. Morgan, Wetlands Biologist, Retired, US Army Corps of Engineers
25. James Morris, Distinguished Professor Emeritus of Biological and Marine Sciences
26. Michael G. Noll, PhD, Professor of Geography, Valdosta State University (VSU)
27. Brian Orland, Retired Distinguished Professor of Landscape Architecture, resident of Athens, GA
28. Michael Pace, Professor in Ecology
29. Rena Ann Peck, M.S., Ecologist & Executive Director of Georgia River Network
30. Francis Edward Putz, Distinguished Professor of Biology, University of Florida
31. David Radcliffe, Professor Emeritus
32. Todd Rasmussen, PhD, Hydrology & Water Resources, Watkinsville GA
33. James Reichard, James Reichard, Ph.D., Professor of Geology, Georgia Southern University
34. Randal E. Riebel, PE, F.NSPE, GSPE President
35. Dr. Stanley R. Riggs, Distinguished Research Professor, East Carolina University
36. Amy Rosemond, PhD, Professor of Ecology, resident of Athens, GA
37. William H Schlesinger, Dean, Emeritus, the Nicholas School of the Environment, Duke University
38. Brian Silliman, Rachel Carson Distinguished Professor of Marine Biology,

39. Alan F. Smith, PhD, Professor (retired), Biology, Mercer University
40. Shannon Speir, Postdoctoral Research Associate, University of Alabama
41. Ruth Ann Tesanovich, MLS(ASCP), Medical Laboratory Scientist, UGA (retired)
42. Merritt Turetsky, PhD, Professor, University of Colorado Boulder
43. Alan Weakley, Adjunct Associate Professor, University of North Carolina at Chapel Hill

#### Hydrology Sources:

1. Clark JF, Stute M, Schollosser P, Drenkard S, and Bonani G. "A tracer study of the Floridan aquifer in southeastern Georgia: Implication for groundwater flow and paleoclimate." *Water Resources Research*. Vol 33, No 2, pp 281-289. Feb 1997.
2. Coleman Wasik JK, et al. "The Effects of hydrologic fluctuation and sulfate regeneration on mercury cycling in an experimental peatland." *Journal of Geophysical Research: Biogeosciences*. Sept 4, 2015. Pp 1697-1715.
3. Kitchens, S and Rasmussen TC. "Hydraulic Evidence for Vertical Flow from Okefenokee Swamp to the Underlying Floridan Aquifer in Southeast Georgia" *Proceedings to the 1995 Georgia Water Resources Conference*. Apr 11 & 12, 1995. <https://smartech.gatech.edu/bitstream/handle/1853/44003/KitchensS-RasmussenT-95.pdf?sequence=1&isAllowed=y>
4. Loftin, C. "Okefenokee Swamp Hydrology" *Proceedings to the 1997 Georgia Water Resources Conference*. March 20-22, 1997. <https://smartech.gatech.edu/bitstream/handle/1853/45110/LoftinC-97.pdf?sequence=1&isAllowed=y>
5. Peck, RA, Bennett, E. "Okefenokee in the Balance: Protecting the Swamp for Georgia's Climate Resilience." Poster Presentation at Georgia Climate Conference 2021 (<https://georgiaclimatconference.org/>) and Georgia Water Resource Conference 2021 (<https://rivercenter.uga.edu/georgia-water-resource-conference-2021-schedule/>). [https://sciencelookup.org/wp-content/uploads/2021/04/RenaPeck\\_EliseBennett\\_Poster\\_FINAL\\_RevMap\\_OPA-Version.pdf](https://sciencelookup.org/wp-content/uploads/2021/04/RenaPeck_EliseBennett_Poster_FINAL_RevMap_OPA-Version.pdf)
6. US Fish and Wildlife Service Letter to US Army Corps of Engineers. May 28, 2020. <https://sciencelookup.org/wp-content/uploads/2021/04/2020.05.28-FWS-to-Corps.pdf>
7. United States, U.S. Geological Survey, *Geologic Evolution of Trail Ridge Eolian Heavy-Mineral Sand and Underlying Peat, Northern Florida*, Eric Force and Fredrick J. Rich. U.S. Geological Survey Professional Paper 1499, (Washington, D.C.: United States Government Printing Office, 1989), <https://doi.org/10.3133/pp1499>.
8. Wellhead Analysis Element Model. <https://www.epa.gov/ceam/wellhead-analytic-element-model-whaem>. Released June 2018.