Expert Report – Gastal and Hoffpauir vs. Petrodome Operating, LLC, et al. 15th JDC, Acadia Parish, Louisiana -

By

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Purpose of Report

The purpose of this report was to evaluate the claim that a leak of produced water from a flowline associated with the MIOGYP RA SUA; Gastal no. 1 has negatively impacted the ability of red swamp crawfish, *Procambarus clarkii*, from successfully burrowing and reproducing in an area of several acres on property in the Morse area, Acadia Parish, Louisiana. Concern is about the depth to which crawfish burrow to ascertain whether soil should be remediated or removed and replaced to render the site suitable for crawfish production.

Methodology

I reviewed soil sample data from the impact area provided by Hydro-Environmental Technology, 620 Apollo Road, Scott, Louisiana 70583 obtained in May and June 2023, and February 2025. I met Hydro-Environmental Technology (HET) personnel as well as Mr. Doug Longman of Jones-Walker on April 28, 2025 at HET's Scott, Louisiana office. I personally visited the Gastal-Houffpauir site at Morse, Louisiana on May 15, 2025. I travelled with Mr. Craig Cormier of HET. We met Mr. Duane Piranio of Southland Environmental, Lake Charles, Louisiana at the site. He accompanied Mr. Cormier and me as we walked about the site. While there I checked two narrow drainage channels for crawfish and other aquatic organisms. I looked for crawfish burrows in the area and observed the vegetation growing there.

I reviewed pertinent literature dealing with crawfish burrowing and salinity tolerances. Please see the attached list of references. I contacted two retired LSU aquaculture specialists to discuss the issue of crawfish response to salinity and management considerations. They are Dr. Robert P. Romaire, Professor Emeritus, LSU Agricultural Experiment Station, Baton Rouge, Louisiana and Mr. Mark Shirley, County Agent, Specialist, retired, LSU Agricultural Research Station/LSU Sea Grant Program, Abbeville, Louisiana.

Documents provided to me included:

Petition for Damages
First Supplemental and Amended Petition for Damages
Second Supplemental and Amended Petition for Damages
Gastal and Hoffpauir responses to defendants' discovery
Gastal and Hoffpauir documents provided in discovery
Ichor's and Petrodome's responses to plaintiffs' discovery
RBB Consulting, LLC and Southland Environmental Expert Report dated April 21, 2025
HET aerial photographs of the property
HET aerial photographs showing the sample locations on the property
HET soil sample data – 5/23, 6/23, 9/23, and 2/25

Crawfish Management Considerations:

One species of crawfish is intentionally cultivated in Louisiana, the red swamp crawfish, *Procambarus clarkii*. Another species, the white river crawfish, *Procambarus zonangulus*, can appear in various percentages in some crawfish ponds. It reaches acceptable commercial size and cannot normally be excluded from crawfish ponds when present. This discussion will emphasize the red swamp crawfish because it is the dominant species.

It is apparent that the Gastal-Hoffpauir rice-crawfish complex is managed as a rice-crawfish-fallow rotation. That is, rice is planted in the spring and once the rice is being irrigated, adult crawfish are stocked. Following rice harvest, the field is flooded and the rice plant biomass generates the base of the plankton rich – benthos animal food web that feeds the growing crawfish. Crawfish harvesting continues into the spring-summer. Once crawfish harvesting ends, the field is left fallow until the following spring when a rice crop is planted followed, again, by crawfish stocking.

The crawfish begin to make permanent burrows along the field levees and are usually occupied by a male and a female. Once water is removed from the field, female crawfish will lay eggs and incubate the developing embryos. Burrow water is anoxic and resident adult crawfish and developing embryos utilize atmospheric oxygen within the burrows to survive.

Crawfish that have not made permanent burrows around levees will attempt to burrow in puddles where water collects when fields are drained. The muck into which they attempt to burrow is soft and burrows with firm sides cannot be constructed. Burrows are very shallow. The water is hot and anoxic so the crawfish cannot remain submerged and protected from a myriad of predators, especially predaceous water birds. They must remain at the surface to secure atmospheric oxygen for respiration. Few of these crawfish contribute young to the crawfish pond when ponds are refilled in the fall after rice harvest.

Red swamp crawfish is a tertiary burrower. That means that the species construct very simple burrows that rarely descend more than 4 feet below ground surface with 3.0-3.5 foot depths are more common. This is consistent whether the ponds are located in heavy clay alluvial soils or lighter prairie soils. [See Burras et al. 1995; Huner 1992, 2006; McClain 2006 for detailed information about red swamp crawfish burrowing details.]

Female crawfish emerge from burrows with young in the fall, generally in response to rains associated with the pass of cold fronts. They do not emerge uniformly because they don't lay their eggs at one time. As a result, there are several age classes of crawfish that result in sustained harvesting during the winter-spring crawfish season.

As I appreciate the matter, the Gastal-Hoffpauir system has adjacent ponds that are rotated so that adjacent fields may be producing rice crops or crawfish crops. As a result, un-harvested crawfish in a crawfish field can cross simple levees into a field that is going to be stocked with crawfish adding to the population. Obviously, if the adjacent rice field has not yet been permanently flooded for rice irrigation, those crawfish will most likely not survive!

Salinity Considerations for Red Swamp Crawfish:

Red swamp crawfish are considered to be freshwater species but it is known that they can tolerate and thrive in brackish water systems. Perry and LaCaze (1969) made the following commentary after having moved red swamp crawfish from freshwater habitat to a pond at Rockefeller Wildlife Refuge in Cameron Parish, Louisiana:

(1) The crawfish apparently bred in waters containing maximum salinity concentrations ranging from 6.0 to 8.0 ppt.
(2) The hatching of eggs took place in maximum salinity concentrations ranging from 6.0 to 7.9 ppt.
(3) Crawfish growth was evident in waters in which monthly salinities ranged up to 8.0 ppt.

In The Louisiana Crawfish Production Manual, McClain et al. (2007) wrote:

"….Tolerance to salinity is directly proportional to crawfish size. Newly hatched young die at 15 parts per thousand (ppt), and juveniles die at 30 ppt if kept in this salinity for a week. Salinity affects crawfish reproduction at much lower concentrations, and the effect of continuous exposure to low salinity on crawfish reproduction is not fully known. Ideally, crawfish ponds should not be located where salinities than 3 ppt are likely to occur through most of the crawfish production season….The salinity of the source water should be less than 1 ppt if rice or sorghum sudangrass is the desired forage crop…."

Sharfstein and Chafin (1979) in a less elaborate study with red swamp crawfish, concluded that:

"….However, the observed steady increase in weekly growth increments suggests that with a longer preconditioning period growth rates could be attained that might make commercial culture of crayfish possible in groundwater with salinities from 3 to 9 0/00."

They cite Penn (1943) and LaCaze (1976) as noting that red swamp crawfish "will survive and grow in water of 3 to 8 0/00...."

Loyacano (1967) noted that red swamp crawfish newly released from a coastal area – Grand Chenier – and an inland area – Baton Rouge – survived in 10 ppt salinity in a one-week test. In comparing survival and growth of juvenile crawfish from both sources, he concluded that the crawfish from the coastal location did somewhat better in elevated salinities than the inland location. He noted that he could not make comments about the suitability of the coastal area for crawfish aquaculture based on his laboratory tests. However, the Perry and LaCaze (1967) study clearly demonstrated that red swamp crawfish obtained from inland locations could be successfully cultivated in brackish conditions at Grand Chenier – salinities of 6-8 ppt.

In consulting, Romaire and Shirley, co-authors of The Louisiana Crawfish Production Manual", both emphasized the issue of salinity in reference to cultivating a rice forage crop for the crawfish crop. They acknowledged the previously published Perry and LaCaze (1967) study and agreed that red swamp crawfish could survive and generate harvestable crops at those salinity levels. In general, the recommended forage crop for crawfish cultivation is rice whether or not the grain is harvested.

Gastal and Hoffpauir Orientation Meeting , April 28, 2025

I was oriented to the site itself and provided with sample data, aerial photos, maps and photographs. Photographs of the impacted area from February 2025 (current year) showed that it was covered with wetland vegetation and was clearly flooded.

Gastal and Hoffpauir Site Visit May 15, 2025

I found the impacted area to be heavily invested with wetland tolerant vegetation especially what appeared to be Bermuda grass. I saw no evidence of discolored, stressed vegetation. The only water present was located in two narrow cuts extending from the adjacent working wetland field. It is my understanding that these two cuts carry water from that field through the impacted area to surface drainage immediately south of the complex. Water from the impacted area is apparently discharged into that drainage. I noted luxuriant growth of cattail over the location where the processed water pipe failure occurred.

As I walked onto the site from the south, I noted two open crawfish burrows in a shallow water puddle. This was located immediately outside a low levee around the impacted area. I did not find burrows within the impacted area. The entire area was covered with thick grass making locating any burrows virtually impossible. However, red swamp crawfish rarely make successful burrows in the bottoms of ponds. Most successful burrows occur around levees. Once crawfish occupy their burrows for spawning, they plug the burrows at the surface and chimneys associated with such burrows wash away. The only way to locate such burrows is to scrape away the surface.

I used a small dip net with small mesh to sample the two drainage cuts. I regularly caught small red swamp crawfish ranging in size from newly released third instar crawfish, 25-30 mm juveniles and occasional 45-50 mm juveniles. These represented at least three age classes of juvenile crawfish present in the cuts. All were healthy with clean shells and some were soft having molted that morning. I also caught spring peeper frog tadpoles, many with legs developing but tails still present. Other animals caught included very small mosquitofish, some adult whirligig type beetles and at least one beetle larva. Messrs. Cormier and Piranio took pictures of these animals.

I simply could not ascertain the source of the aquatic fauna I caught in the two drainage cuts. They could have been present in the adjacent flooded rice field and gained access through the drains. They could have come from the impacted area as well. Or, they could have come from both sources. Regardless, the animals were all healthy and functioning in the waters within the cuts. All could be safely considered to be freshwater faunae.

I noted that the drilled rice crop growing in the adjacent field was healthy and growing well. I did catch a few very small red swamp crawfish along the levee inside the rice field. Therefore, I found both crawfish inside and immediately outside of the impacted area.

Conclusions

I was asked to determine whether or not the surface area of the impacted area was safe for burrowing of red swamp crawfish and their ability to successfully reproduce. Based on published data on crawfish response to brackish water and soil data presented for the 0–4-foot depth at the Gastal – Hoffpauir site, I do not believe that there is an elevated risk to the crawfish present in the system. Accordingly, I do not see the need for remediation or the need for removal and replacement of existing soil.

In consulting with Mark Shirley, County Agent, Specialist, retired, about soil removal and replacement, he noted that replacement of the soil would create an untenable situation for rice and crawfish production because the soil would have to "age" in order to return the area to its ability to support rice and crawfish. I note that the majority of soil analyses for the site were conducted approximately 2 years ago – May 2023. Since that time, an average of 51 inches of precipitation has fallen in that area each year. That water certainly reduced salinity through run off and percolation. Furthermore, the adjacent 11-acre rice-crawfish pond drains through the impacted area. That would also work to reduce salinity. If more water from the working wetland complex is drained through the impacted area, that would also reduce salinity.

In instances in which salinity is a problem, Mr. Shirley suggested that the process of water land leveling, sometimes called "water buffaloing", could be used to reduce salinity, if warranted, and leave the soil intact. This involves using a specialized implement to stir up the soil in a flooded field. The stirred water is allowed to stand for several days with the soil settling out. Then, the water is drained away carrying with it any highly soluble chlorides present.

Disclaimer

The opinions I have formed are based on the data and information available to me at the time they have been rendered. I reserve the right to modify my opinions on the basis of receiving information not previously available to me. I also reserve the right to correct any grammatical or spelling errors that may have escaped my review.

Qualifications of Witness

I have studied crawfish biology and culture since 1972 at LSU beginning as an MS candidate and then transferring directly to a doctoral program in Marine Sciences there. I received my doctorate in August 1975. I held professorial appointments at Southern University in Baton Rouge in the College of Sciences and Agriculture and Home Economics there from 1975-1988. My research and outreach work at Southern University involved aquaculture centered on crawfish farming and crawfish biology. From 1988 until my retirement in 2005 from the University of Louisiana at Lafayette (formerly the University of Southwestern Louisiana), I was Director of the Crawfish Research Center and Adjunct Professor of Aquaculture in the Department of Renewable Resources. I was associated with the University of Kuopio in Kuopio, Finland from 1982 until 2005 and held the position of Docent (Adjunct) of Applied Zoology in the Department of Applied Zoology. My work in Finland was centered on the study of crawfish biology and aquacultural methods. In June 2000, I received an Honorary Doctorate in Natural Sciences from the University of Kuopio. I have authored or co-authored several hundred technical or semi-technical publications on various aspects of fisheries science, aquaculture, aquatic biology, and wildlife management. Many of the publications deal with crawfish topics. I have held all elected offices in the International Association of Astacology, the international crawfish organization. I also managed the organization's permanent home office for a number of years. I have traveled to the following countries as a consequence of my crawfish work: Australia, Canada, Costa Rica, Finland, France, Germany, Great Britain, Holland, Italy, Norway, The Peoples' Republic of China, Russia, Sweden, and Switzerland.

During the course of my career, I was directly responsible for managing crawfish crops at the LSU Aquaculture Research Center in Baton Rouge, LA, the Southern University Experimental Farm in Baton Rouge, LA, and the USL/ULL Experimental Farm, St. Martinville, LA. I "made" crawfish crops in ponds ranging from 0.04 acres to 35 acres. During my 17 years at ULL/USL, we regularly harvested 30,000-40,000 pounds of crawfish annually.

Compensation Paid

I have received no compensation at this writing. My consulting fees are $150 per hour, $50 per hour travel time, and mileage at current IRS rate. I estimate that I will be billing Jones – Walker, Lafayette, LA – for at least $2,500.

Other Expert Experience

I have served as an expert for at least a dozen cases involving claims of damage for crawfish cases, mostly for the defendants but some for the plaintiffs. Some examples follow. I was an expert for defendants being sued for damage to crawfish fisheries in the Atchafalaya Basin, Louisiana by oil and gas and pipeline operations. I was an expert for plaintiffs in the class action ICON crawfish damage case and a specific action brought by Crystal Rice, Inc. against the pesticide's manufacturer. I was an expert for the defendants in the case of an alleged crawfish pesticide drift case in the Tallulah, LA area. I was an expert in the case of alleged damage to a crawfish operation by a sewerage overflow case in the Shreveport, LA area. I was an expert for the defendant dealing with alleged salt water damage to a crawfish operation in the New Ibera, LA area.

Professionals Contacted:

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Mark Shirley, County Agent, Specialist, Retired, LSU Agricultural Research Center/Louisiana Sea Grant Program, Louisiana State University, Abbeville, Louisiana. markshirley2025@gmail.com.

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