

**IN THE UNITED STATES DISTRICT COURT
FOR THE NORTHERN DISTRICT OF OKLAHOMA**

STATE OF OKLAHOMA *ex rel.*)
 GENTNER DRUMMOND, in his capacity as)
 Attorney General of the State of Oklahoma and)
 OKLAHOMA SECRETARY OF ENERGY)
 AND ENVIRONMENT JEFF STARLING)
 in his capacity as the TRUSTEE FOR)
 NATURAL RESOURCES FOR THE)
 STATE OF OKLAHOMA,)
)
 Plaintiffs,)

v.)

Case No. 05-CV-00329-GKF-SH

TYSON FOODS, INC.,)
 TYSON POULTRY, INC.,)
 TYSON CHICKEN, INC.,)
 COBB-VANTRESS, INC.,)
 CAL-MAINE FOODS, INC.,)
 CARGILL, INC.,)
 CARGILL TURKEY PRODUCTION, LLC,)
 GEORGE’S, INC.,)
 GEORGE’S FARMS, INC.,)
 PETERSON FARMS, INC., and)
 SIMMONS FOODS, INC.,)
)
 Defendants.)

OPINION AND ORDER

On December 3 through December 6, 2024 and December 16 and December 17, 2024, the court held an evidentiary hearing in this matter. [Doc. 3137]. Now before the court are the State of Oklahoma’s Proposed Findings of Fact and Conclusions of Law From the December 2024 Hearing [Doc. 3146], as well as Defendants’ Post-Trial Brief [Doc. 3148].

I. Background/Procedural History

The State of Oklahoma brought this case against defendants alleging that defendants have polluted and continue to pollute the waters of the Illinois River Watershed (IRW) with phosphorus

and bacteria from the waste generated from defendants' poultry and applied to lands in the IRW. The State initially asserted ten causes of action. Following the resolution of pretrial motions, the case proceeded to a non-jury trial regarding the State's right to equitable relief on the following claims: (1) violation of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6972; (2) state law public nuisance and state law nuisance *per se*; (3) federal common law nuisance; (4) trespass; and (5) violations of Okla. Stat. tit. 27A, § 2-6-105 and Okla. Stat. tit. 2, § 2-18.1.

The parties tried the case to the court for fifty-two days over the course of five months. After the State rested, on defendants' motion, the court granted defendants judgment on partial findings under Federal Rule of Civil Procedure 52(c) as to the state-law nuisance *per se* and RCRA claims, as well as the State's claim of bacterial pollution with the exception of the State's allegations and evidence related to blue-green algae. *Oklahoma v. Tyson Foods, Inc.*, No. 05-CV-0329-GKF, 2010 WL 653032 (N.D. Okla. Feb. 17, 2010).

The court found in favor of the State and against defendants on the State's claims of statutory public nuisance, federal common law nuisance, trespass, and violations of Okla. Stat. tit. 27A, § 2-6-105 and Okla. Stat. tit. 2, § 2-18.1. It further found and concluded that "actual and ongoing injury to the waters of the IRW constitutes irreparable harm and warrants injunctive relief." [*Id.* at p. 217]; *see also* [*Id.* at pp. 207, 212-13]. The court fully incorporates those Findings of Fact and Conclusions of Law [Doc. 2979] herein.

Following the parties' unsuccessful efforts at mediation regarding remedies, defendants filed a motion to dismiss, arguing that dismissal was required for two primary reasons. First, defendants contended that the State's claims for injunctive relief were both constitutionally and prudentially moot. Second, defendants asserted that proceeding on the current record would violate their due-process rights. [Doc. 3010].

In an Order of June 26, 2024, the court denied the motion to dismiss. [Doc. 3023]. The court concluded that defendants “ha[d] failed to satisfy the ‘stringent’ burden of showing that this matter is constitutionally moot.” [*Id.* at p. 7 (quoting *Bldg. & Constr. Dep’t v. Rockwell Int’l Corp.*, 7 F.3d 1487, 1491 (10th Cir. 1993))]. With respect to prudential mootness, the court concluded that it need not decide the issue because, based on new evidence, the court would make additional findings and conclusions. [*Id.* at p. 8]. Finally, the court concluded that due process did not warrant dismissal, but, instead, expeditious resolution of the remaining issues. [*Id.* at pp. 8-9]. To that end, the court set this matter for evidentiary hearing beginning on December 3, 2024. [Doc. 3038]. The court subsequently clarified that the hearing would address “the contention made by the defendants, upon which the plaintiff has the burden of proof, that the conditions in the IRW materially changed following the end of trial.” [Doc. 3098, p. 4]; *see also* [*Id.* at p. 37].

The court held an evidentiary hearing on December 3, 2024 to December 6, 2024 and December 16 and December 17, 2024. [Doc. 3137]. At the close of the hearing, the court set a January 30, 2025 deadline for the parties to file proposed findings of fact and conclusions of law or trial briefs. [*Id.* at p. 2].

On January 30, 2025, the State filed its Proposed Findings of Fact and Conclusions of Law from the December 2024 Hearing [Doc. 3146] and defendants filed a Post-Trial Brief [Doc. 3148].

II. Findings of Fact

A. Measuring Phosphorus

1. The court previously found that phosphorus concentrations in streams and rivers of the IRW in Oklahoma are elevated beyond natural or background levels in violation of Oklahoma’s antidegradation standards for these waters. The court further found that phosphorus concentrations in the Illinois River, Flint Creek and Baron Fork Creek exceeded the total phosphorus criterion

applicable to scenic rivers, and the aesthetics beneficial use was impaired for total phosphorus in violation of Oklahoma water quality standards. [Doc. 2979, p. 50, ¶ 130].

2. Oklahoma law continues to protect the State’s waters as a “valuable resource” and prohibits degradation of water quality. *See* Okla. Admin. Code §§ 252:730-3-1, *et seq.* To that end, in the designated Scenic River reaches of the Illinois River, Flint Creek, and Baron Fork Creek, “[t]he total phosphorus six month rolling average of 0.037 mg/L shall not be exceeded more than once in a one-year period and not more than three times in a five-year period.” Okla. Admin. Code § 252:730-5-19(c)(3).

3. The six-month rolling average of total phosphorus criteria “must be calculated based on data from the current month and the five (5) preceding months.” Okla. Admin. Code § 785:46-15-14(c)(2)(B). The calculation “must include at least four values from four separate months” and “*[a]ll available individual data values* from any given month must be included” *Id.* (emphasis added). Thus, the calculation includes sample data from all flow regimes, including high flows, and is not limited to base flow conditions. [*Id.*]; *see also* [Doc. 3115, pp. 22-23; Doc. 3132, p. 47]. Likewise, the 0.037 mg/L standard applies to all flow regimes, including high flows. [Doc. 3115, p. 30; Doc. 3129, pp. 107].

B. Phosphorus in the Illinois River and Streams

4. The Arkansas-Oklahoma Arkansas River Compact Commission Environmental Committee Report, dated September 26, 2024, demonstrates that, when high-flows are excluded, the six-month rolling arithmetic mean of phosphorus measurements at all four permanent monitoring stations on the Illinois River exceeds the 0.037 mg/L total phosphorus criterion at least 66% of the time from 2019 to 2023. [OKLA_PX_258 at pp. 5-6; Doc. 3129, pp. 107-08]. The data further demonstrates an upward tick in total phosphorus loadings from 2019 to 2023. [Doc.

3129, pp. 108-110]; *see also* [OKLA_PX_0258 at pp. 46, 49, 52, 55 (not discussed in trial testimony)].¹

5. When targeted high-flow water sampling from the United States Geological Survey is included, the average annual phosphorus concentrations at the sampling stations in the Oklahoma portion of the IRW all exceed the 0.037 mg/L water quality standard. [Doc. 3129, pp. 113-17; OKLA_PX-0231 at p. 3].

6. Seven segments of the Illinois River and its tributaries have been listed on Oklahoma's 2022 303(d) list as impaired for phosphorus. [OKLA_PX_0248, pp. 241-43; Doc. 3115, pp. 34-38; Doc. 3130, pp. 14-15]. The listings have been approved by the U.S. Environmental Protection Agency. [Doc. 3115, p. 38].

7. The court gives great weight to the foregoing testimony and evidence and finds that phosphorus concentrations in the rivers and streams of the IRW in Oklahoma remain elevated beyond natural or background levels in violation of Oklahoma's anti-degradation standards for those waters.

8. The court previously found that the elevated phosphorus concentration levels above natural or background levels had resulted in significant increases in the algae biomass in the IRW's rivers and streams. The court further found that increases in algae biomass had impacted the aesthetics of the IRW's rivers and streams. [Doc. 2979, pp. 58-59, ¶ 168].

¹ Although defendants direct the court to evidence of a downward trend in phosphorus loading, the downward trend exists only when the data is considered beginning in 1999—twenty years prior to trial. *See* [Doc. 3129, pp. 159-164; Doc. 3115, p. 73; OKLA_PX_258 at pp. 5-6]; *see also* [Doc. 3130, p. 22 (testimony that total phosphorus levels have not declined since 2009)]. The trend in more recent years shows increasing phosphorus loads in the Illinois River and its tributaries. [Doc. 3129, p. 162].

9. During trial, Lance Phillips², Environmental Programs Manager for the Rivers and Streams Section of the Oklahoma Water Resources Boards and one of the State's non-retained experts, testified that it remains an accurate description of the rivers and streams of the IRW that the elevated phosphorus concentration levels have resulted in significant increases in algal biomass in the rivers and streams of the IRW, which has impacted the aesthetics of the IRW's rivers and streams. [Doc. 3115, p. 32]. Mr. Phillips's testimony is reliable and credible and the court gives it great weight.

10. Ed Fite, Water Quality Manager for the Grand River Dam Authority and longtime resident of the IRW, opined of the Illinois River, "the old gal[,] . . . is not well."³ [Doc. 3114, pp. 10 and 19]. Mr. Fite testified that, during a recent float, he observed that the Illinois River riverbed was generally "[c]overed with algae," and that algae growth on the river and streams was "more pronounced" as compared to the time of trial. [Doc. 3114, p. 83]. The court finds Mr. Fite's testimony reliable and credible and affords it great weight.

11. Based on the foregoing, the court finds that the conditions of the IRW have not materially changed since trial, and the elevated phosphorus concentration levels have resulted in

² Mr. Phillips has a Bachelor of Science in Environmental Management from Northeastern State University. He has served as the Environmental Programs Manager of the Rivers and Streams section of the Oklahoma Water Resources Board since 2012. In that position, Mr. Phillips serves as the head of the section for rivers and streams and oversees the section's activities, including beneficial use monitoring and water sampling. [Doc. 3115, p. 21]; *see also* [OKLA__PX__0333 (Lance Phillips – Curriculum Vitae)].

³ Mr. Fite resides in the IRW on property that abuts the Illinois River. [Doc. 3114, pp. 19-20]. Further, as Water Quality Manager for the Grand River Dam Authority, Mr. Fite is responsible for the water quality in all of the Grand River Dam Authority jurisdictional waters. [*Id.* at p. 12] Prior to his employment, Mr. Fite was employed by the Oklahoma Scenic Rivers Commission, which was combined into the Grand River Dam Authority by the Oklahoma Legislature effective July 1, 2016. [*Id.* at p. 13]. Mr. Fite testified during the prior trial of this matter.

significant increases in algal biomass in the IRW's rivers and streams, which has impacted the aesthetics of the IRW's rivers and streams.

12. Likewise, Mr. Phillips testified that the current phosphorus concentrations in excess of background or natural levels have caused excessive growth of periphyton, phytoplankton, or aquatic microphyte communities in the rivers and streams of the IRW which impairs the aesthetics, fish and wildlife, and beneficial uses. [Doc. 3115, p. 33]. As previously stated, Mr. Phillips's testimony is credible and the court gives it great weight.

13. Based on the foregoing, the court finds that conditions have not materially changed since trial and that phosphorus concentrations in the Illinois River, Flint Creek, and Barren Fork Creek continue to exceed the total phosphorus criterion applicable to scenic rivers and the aesthetics beneficial use is impaired for total phosphorus in violation of Oklahoma water quality standards.

C. Phosphorus in Lake Tenkiller

14. The court previously found that Lake Tenkiller had become eutrophic, the eutrophication was caused by phosphorus concentrations in the reservoir, and the eutrophic condition was manifested in a variety of ways, including an increase in amounts of algae, including blue-green algae, a decrease in water clarity, and a decrease in dissolved oxygen. [Doc. 2979, p. 76, ¶¶ 239-40].

15. Lake Tenkiller continues to be eutrophic. [Doc. 3129, pp. 96-98; OKLA_PX_0258, pp. 28-29]. Further, both sections of Lake Tenkiller are listed on Oklahoma's 2022 303(d) list as impaired for phosphorus. [Doc. 3129, pp. 98-101; OKLA_PX_00248 at 241; Doc. 3130, p. 14 (Shanon Phillips testimony)].

16. Julie Chambers⁴, Environmental Programs Manager for the lake section of the Oklahoma Water Resources Board and one of the State's non-retained experts, testified that the current elevated phosphorus levels continue to result in increased algae growth, decreased water clarity, and decreased dissolved oxygen levels in the lake. [Doc. 3129, pp. 97-98].

17. Ms. Chambers's opinions are supported by the testimony of Timothy Knight, the owner and operator of Nautical Adventures Scuba, who offered observational testimony that algae blooms in Lake Tenkiller last longer and are "much heavier." [Doc. 3129, pp. 57, 71-72]. Mr. Knight also testified that, approximately ten years ago, visibility in Lake Tenkiller at 25 feet was "much better than it is today" and, in the last ten years, the lake has "maintained a constant reduction in visibility." [Doc. 3129, pp. 61, 63-65]. Likewise, Mr. Fite testified that water clarity is opaque today and has not improved since trial. [Doc. 3114, pp. 74, 76-77].

18. Ms. Chambers also testified that the decreases in the water clarity in Lake Tenkiller are having an adverse impact on recreational activities and aesthetics. [Doc. 3129, p. 101]. Ms. Chambers's opinions in this regard are supported by Mr. Knight's testimony that, due to lack of visibility and conditions, he can no longer teach technical classes in Lake Tenkiller and, instead, has to go to the Caribbean. [Doc. 3129, pp. 64-65].

19. Moreover, Ms. Chambers testified that phosphorus concentrations in excess of natural or background levels have cause degradation of water quality in Lake Tenkiller and impair

⁴ Ms. Chambers has a Bachelor of Science in Biology from the University of Central Oklahoma and has been employed by the Oklahoma Water Resources Board since 1999. [Doc. 3129, pp. 84-85]. She has served as the Environmental Programs Manager for the lakes section since the early 2000s. In that role, she oversees the day-to-day operations of the program, including beneficial use monitoring and water sampling. [*Id.* at pp. 85-86]; *see also* [OKLA__PX__00332 (Julie Chambers – Curriculum Vitae)].

its aesthetics, fish and wildlife, and public water supply beneficial uses in violation of Oklahoma's anti-degradation standards. [Doc. 3129, p. 102].

20. Based on the foregoing, the court finds that elevated phosphorus levels continue to cause injury to Lake Tenkiller, as well as the biota therein.

D. Poultry Operations in the Illinois River Watershed

21. The court previously found that, in 2005, there were approximately 1,900 active poultry houses in the Illinois River Watershed, 425 of which were located in Oklahoma. [Doc. 2979, p. 94, ¶ 314]. The court further found that each of the defendants had generated and—with the exception of defendants Peterson and Cal-Maine—was generating significant quantities of phosphorus-rich poultry waste in the IRW. [Doc. 2979, p. 101, ¶ 338]

22. Oklahoma Department of Agriculture, Food, and Forestry (ODAFF) records indicate that, in 2023 in the Oklahoma portion of the IRW, there were 94 active, Oklahoma registered poultry feeding operations (PFO), 419 poultry houses, and 8,741,500 bird capacity per flock. [Doc. 3121, pp. 36-37 (Lynnette Jordan testimony)].⁵

23. Of the 94 PFOs and 419 poultry houses in the Oklahoma portion of the IRW, 69 PFOs and 355 houses were affiliated with defendants⁶ [Doc. 3121, pp. 37-38]—specifically:

⁵ Lynnette Jordan is the Assistant Director for Agricultural Environmental Services at the Oklahoma Department of Agriculture, Food, and Forestry (ODAFF). [Doc. 3121, pp. 5-6]. In that role, Ms. Jordan maintained electronic records of information submitted pursuant to the Oklahoma Poultry Feeding Operations Act and the Poultry Waste Applicators Certification Act. [*Id.* at pp. 6-9]. The records are collected and maintained through the ordinary course of ODAFF's regular business. [*Id.* at pp. 17-18].

⁶ As previously stated, the court has concluded that defendants Peterson and Cal-Maine ceased poultry operations in the IRW and therefore were no longer generating significant quantities of phosphorus-rich poultry waste in the IRW. [Doc. 2979, pp. 7 n.1, 88, 101, ¶¶ 294-95, 338]. The State offered no evidence that either Peterson or Cal-Maine has resumed poultry operations in the IRW since trial.

- 21 PFOs were affiliated and 158 houses were affiliated with Tyson, for a capacity for total birds of 4,159,100 [*Id.* at pp. 30-31];
- 23 PFOs and 110 houses were affiliated with Simmons, for a capacity of total birds of 3,104,200 [*Id.* at pp. 32-33];
- 18 PFOs and 49 houses were affiliated with Cobb-Vantress, for a capacity of total birds of 381,300 [*Id.* at pp. 33-34];
- 6 PFOs and 18 houses were affiliated with Cargill, for a capacity of total birds of 226,600 [*Id.* at pp. 34-35]; and
- 1 PFO and 3 houses were affiliated with George's, for a capacity of total birds of 60,000 [*Id.* at pp. 35-36].⁷

24. In fiscal year 2023, approximately 55,992 tons of poultry waste was generated in the Oklahoma portion of the IRW. [Doc. 3121, pp. 41-44]. Further, from 2015 to 2024, a total of approximately 446,045 tons of poultry waste was generated in the Oklahoma portion of the IRW. [Doc. 3121, pp. 56-58; Doc. 3131, pp. 13-14].

25. With respect to the Arkansas portion of the IRW, due to statutory privacy protections, data reflecting the number of PFOs, the integrator affiliation of those PFOs, the number of poultry houses, and the bird capacities per flock is not publicly available. *See* Ark. Code Ann. § 15-20-904(f); *see also* [Doc. 3145, p. 125; Doc. 3135, pp. 31-34, 45 (testimony regarding Arkansas privacy protections)].

⁷ Defendants point out that the Nutrient Management Plan for the PFO affiliated with George's—Pugh Farms—indicates that the PFO is located in the Eucha-Spavinaw Watershed, rather than the IRW. [Doc. 3148, pp. 13-14 n.4; Doc. 3121, pp. 61-63]. However, the GPS coordinates of the houses confirm that they are located in the IRW. [Doc. 3121, p. 35]. Further, defendants' own exhibits demonstrate that seven of the growers affiliated with George's identified by this court as operating in the IRW in 2008 to 2009 remain in operation in the IRW in 2024. *See* [DJX2-0219-B].

26. However, public reports prepared by the Arkansas Department of Agriculture's Livestock and Poultry Division demonstrate that, during fiscal year 2023, there were 1,004 houses with a total bird capacity of 23,042,949 in Benton County, Arkansas and 729 houses with a total bird capacity of 19,086,239 in Washington County, Arkansas.⁸ [DJX2-0207]. In 2023, in Benton County, 205,433 tons of poultry litter was generated and, in Washington County, 102,106 tons of poultry litter was generated. [*Id.*].

27. Further, defendants concede that, of the growers identified by the court as operating in the IRW in 2008 to 2009, 106 poultry growers continue to operate in the IRW. [DJX2-0219-B]. Further, defendants' expert, Todd C. McDonnell⁹, admitted that defendants are "some of the biggest operators within the watershed." [Doc. 3138, p. 73].

28. Mr. Fite also testified that, based on his personal observations, poultry operations are the same or have increased in the Arkansas portion of the IRW, and defendants are still delivering chickens to growers in the IRW. [Doc. 3114, pp. 40-41].

29. Based on the foregoing, the court finds that defendants have continued poultry operations and generated poultry waste throughout the IRW.

⁸ Defendant's non-retained expert, Patrick Fisk, testified that approximately one-third of Benton County is within the IRW and a little less than half of Washington County is within the IRW. [Doc. 3145, p. 129]. Mr. Fisk serves as the Director of the Livestock and Poultry Division for the Arkansas Department of Agriculture. [Doc. 3145, p. 87]; *see also* [DJX2-0325 (Patrick Fisk Resume)]. The records are collected and maintained through the ordinary course of the Arkansas Department of Agriculture's regular business. [Doc. 3145, pp. 112-13].

⁹ During the evidentiary hearing, the court qualified Dr. McDonnell as an expert in environmental science and watershed assessment. [Doc. 3138, p. 22]; *see also* [DJX2-0219-A (Todd C. McDonnell Curriculum Vitae)].

E. Phosphorus Content of Poultry Waste

30. The court previously found that poultry waste generated by defendants' birds in the IRW contained, among other things, phosphorous, zinc, copper, and arsenic, and the average concentration of total phosphorus in the waste was high—19,723.31 mg/Kg. [Doc. 2979, p. 96, ¶ 324].

31. Defendants suggest that the use of the enzyme phytase in broiler chicken feed has resulted in a fifteen to twenty-five percent (15% to 25%) reduction in the amount of phosphorus in the manure that's contributed to the litter, despite Dr. McDonnell's concession that he had not undertaken any kind of quantitative assessment of the changes in poultry litter since trial. [Doc. 3138, pp. 33-34, 36]. Further, Dr. McDonnell testified that he did not know when phytase was first utilized in the IRW, but that its use "really started picking up" industry-wide around 2005—years prior to trial. [*Id.* at pp. 83-84]. Moreover, Dr. McDonnell indicated that phytase was only used in broiler chicken feed, but not all poultry houses are broiler houses. [Doc. 3138, p. 34; Doc. 3130, pp. 117-18] and there is no evidence that phytase was in the chicken feed utilized in breeder, brood, or turkey houses. Finally, Dr. McDonnell's testimony in this regard is contrary to the testimony of defendants' own non-retained expert, Mr. Fisk, who testified that, due to wind-rowing, the litter is more nutrient rich and higher in phosphorus as a general matter. [Doc. 3138, pp. 85-88; Doc. 3135, pp. 14, 16-19]. For all of these reasons, the court affords Dr. McDonnell's opinions regarding the effect of phytase little to no weight.

32. Based on the foregoing, the court finds that, since trial in this matter, each of the defendants—with the exception of defendants Peterson and Cal-Maine—has generated significant quantities of phosphorus-rich poultry waste in the IRW.

F. Legacy Phosphorus

33. The court previously found that: (1) the majority of the poultry waste generated by each of the defendants' birds had been land applied in the IRW, usually on or in close proximity to the growers' farms; (2) land application of poultry waste had caused the soil in many areas of the IRW to have STP levels in excess of any agronomic need for phosphorus¹⁰; and (3) historically, defendants had done little, if anything, to provide for or ensure the appropriate handling or management of the poultry waste generated by their birds at their growers' houses. [Doc. 2979, p. 108, ¶¶ 361-63].

34. With respect to historical application of poultry waste, Gregory Scott¹¹, Soil Scientist and Geomorphologist for the Oklahoma Conservation Commission and the State's non-retained expert, testified that phosphorus cannot be created or destroyed in the environment. [Doc. 3120, p. 44]. When phosphorus is land-applied beyond the agronomic need, the phosphorus becomes available for runoff as dissolved phosphorus or erosion as particulate phosphorus. [*Id.* at 48-49].

¹⁰ The court previously found that the agronomic critical level for phosphorus in the IRW was 65 lbs/acre STP [Doc. 2979, p. 35, ¶ 81], but, in nutrient-limited watersheds, Oklahoma law at the time of trial, through incorporation of Oklahoma-NRCS Code 590, permitted land application of litter to a STP level no greater than 300. [Doc. 2979, p. 32, ¶¶ 70-71]. There have been no material changes in the standards since trial—the agronomic critical level for phosphorus remains 65 lbs/acre STP and the ODAFF permits phosphorus to be placed on the land up to 300 STP. [Doc. 3120, pp. 77-78; Doc. 3130, pp. 36-37].

¹¹ Mr. Scott received his Bachelor's of Science in Soil Science and his Master's Degree in Environmental Science with an emphasis on Geomorphology from Oklahoma State University. Mr. Scott previously worked in various positions for the Natural Resources Conservation Service in Oklahoma from 1976 to 2013, ending his career at the NRCS as the State Soil Scientist for Oklahoma. [Doc. 3120, p. 42]. He is currently employed by the Oklahoma Conservation Commission as a Soil Scientist and Geomorphologist. [*Id.* at p. 41]; *see also* [OKLA__PX__0334 (Gregory Scott – Curriculum Vitae)].

35. In the chert geology of the Ozark uplift in the IRW, some of the phosphorus from the soil may enter the upper ground flow of water, which includes both the horizontal surface flow as well as the groundwater, and ultimately enters the IRW's streams and rivers. [Doc. 3120, pp. 55-56]. Thus, phosphorus is both horizontally and vertically transported. [*Id.* at p. 56]. In nutrient-limited water sheds, where the soil is particularly thin, groundwater additions through "preferential flow paths" are particularly significant to the entry of phosphorus into the water. [*Id.* at pp. 52-53, 55]. Further, the cherty geology of the IRW contains voids that result in higher than expected permeability such that phosphorus coming off of smaller parts of the surface will impact the water in the streams, the Illinois river, and Lake Tenkiller. [*Id.* at pp. 101-02].

36. Mr. Scott testified that "legacy phosphorus"—phosphorus above the natural soil content that is the result of human activities—can leak out of the soil into water until equilibrium is achieved in the soil. [Doc. 3120, pp. 74-75]. Specifically, Mr. Scott opined that, following cessation of land application, it would take up to thirty years of hay production and removal to remove legacy phosphorus placed in the soil up to a STP of 300. [*Id.* at p. 79]. During that time, if there was water available, phosphorus would continue to leak into the water. [*Id.* at 80].¹²

37. Mr. Scott's opinions are consistent with the court's prior findings. *See* [Doc. 2979, p. 112, ¶ 375].

38. The critical measurement point in a complex watershed system is where the water exits the watershed system. [Doc. 3120, p. 81]. Where streambank erosion results in adsorbed

¹² Although he had performed no analysis relative to the issue, Dr. McDonnell conceded that it was possible that higher flows as a result of urbanization are causing legacy phosphorus in soil to be flushed downstream. [Doc. 3138, pp. 60-61].

phosphorus flowing into a terminal lake, the phosphorus is held in place until anaerobic biochemical reactions can release it out of the sediments as dissolved phosphorus. [*Id.* at p. 91].

39. Likewise, Shanon Phillips¹³, Water Quality Division Director at the Oklahoma Conservation Commission and the State’s non-retained expert, testified that, as phosphorus levels build up beyond rates recognized as moderate levels, there’s a greater propensity for phosphorus to leach out from soils during runoff events, where it washes into the streams and rivers. [Doc. 3130, pp. 22-23].

40. Based on the foregoing, the court finds that “legacy phosphorus” resulting from past application of poultry litter continues to affect the water quality in the rivers and streams of the IRW.

G. Continued Application of Poultry Litter in the Illinois River Watershed

41. Ms. Baker testified, that, in fiscal year 2023, 6,211 tons of the poultry waste generated in the Oklahoma portion of the IRW were land-applied in the IRW by PFOs at the PFOs’ own farms. [Doc. 3121, p. 43]. The remaining 49,781 tons generated in fiscal year 2023 were transferred or sold off of the PFO’s property, although not necessarily outside of the IRW.¹⁴ [*Id.* at p. 44].

42. OKLA_PX_00230 demonstrates that, between 2014 and 2024, 25,926 tons of poultry litter was land applied on PFOs affiliated with defendants Tyson, Simmons, Cobb, and Cargill in the Oklahoma portion of the IRW.

¹³ Ms. Phillips received her Bachelor’s of Science in Biology from Kansas State University and her Master’s in Zoology from Oklahoma State University. [Doc. 3115, p. 81]. Ms. Phillips testified during the original trial of this matter. [*Id.* at 82].

¹⁴ Defendants point out that some litter is stored. However, Mr. Fite testified that he had personally observed piles of uncovered litter in the IRW. [Doc. 3114, p. 46].

43. With respect to the Arkansas portion of the IRW, public reports prepared by the Arkansas Department of Agriculture's Livestock and Poultry Division demonstrate that, during the fiscal years 2014 to 2023, hundreds of thousands of tons of litter was land-applied in Benton and Washington County, which includes portions of the IRW. [DJX2-0348 (summary of land application in Benton and Washington Counties)]; *see also* [Doc. 3145, pp. 127-28].

44. Further, although defendants point to the increase in the amount of litter transferred, Mr. Fisk testified that, in the Arkansas portion of the IRW, transferred litter included litter transferred within the IRW. [Doc. 3145, p. 128; Doc. 3135, p. 20]. In fact, based on exhibits prepared by Mr. Fisk, only 46.83 percent of the litter—or less than half of the litter removed—was transferred out of the IRW. [DJX2-0212-B; Doc. 3135, p. 20].

45. Although these numbers reflect application on a county-wide basis, rather than being limited to the IRW, Mr. Fisk testified that he considered the data regarding export indicative of trends within the IRW. [Doc. 3135, p. 21]. The court finds the Arkansas government data to be credible. Based on the data and Mr. Fisk's testimony, the court concludes that the data regarding Benton and Washington County is indicative of trends within the IRW and therefore the court finds and concludes that land-application of significant volumes of poultry litter continues in the Arkansas portion of the IRW.

46. The court gives substantial weight to OKLA_PX_00230, the Arkansas public records regarding Benton and Washington County. Based on the foregoing evidence, the court finds significant amounts of poultry waste generated by defendants' birds have been, and continue to be, land-applied in the IRW, in close proximity to the growers' farms.

H. Poultry Litter as a Source of Phosphorus

47. The court previously found that nonpoint source contributions of phosphorus loading to the rivers and streams of the IRW and Lake Tenkiller were greater than point source contributors, and that nonpoint source phosphorus was a significant source of the phosphorus causing injury to the rivers and streams of the IRW and to Lake Tenkiller. [Doc. 2979, p. 87, ¶¶ 287-88]. Nonpoint source phosphorus includes poultry waste, among other things. [*Id.* at p. 79, ¶ 258].

48. Ms. Phillips testified that land application of poultry waste continues to significantly contribute to nutrient loading dominated by non-point sources. [Doc. 3130, pp. 19-22, 146].

49. Further, Mr. Scott testified that, in the normal course, if land application of litter and grazing continue, he would not anticipate STP to drop. [Doc. 3120, p. 60].

50. Defendants point to regulations requiring nutrient management plans as mitigating any risk of excess phosphorus. [Doc. 3148, pp. 15-17]. However, despite characterizing nutrient management plans as “an important change over time,” defendants’ expert as to water quality and water quality impacts, John Connolly, Ph.D.,¹⁵ admitted that Oklahoma began requiring nutrient management plans in 1998—a decade prior to trial—and that he had no personal knowledge as to the evolution of those plans in the next fourteen years. [Doc. 3132, p. 12; Doc. 3124, pp. 19-20]; Likewise, Arkansas imposed best management practices in 2003, with an update in 2010, and there has been no material change in those laws since the 2010 update. [Doc. 3135, p. 12].

¹⁵ Dr. Connolly has a Bachelor of Engineering, Civil Engineering from Manhattan College, a Master of Engineering, Environmental Engineering from Manhattan College, and a Ph.D. in Environmental Engineering from the University of Texas at Austin. *See* [DJX2-0217-A (John Connolly – Curriculum Vitae)]. Dr. Connolly testified during the earlier trial of this matter.

51. Further, Dr. Connolly conceded that he had performed no quantitative analysis as to whether nutrient management plans or best management practices had any impact on phosphorus pollution in the IRW over the past fifteen years. [Doc. 3132, pp. 8, 11-13]. Likewise, defendants' environmental and watershed expert, Dr. McDonnell, testified that he had not undertaken a quantitative assessment of poultry management practices' impact on poultry litter. [Doc. 3138, p. 36, ¶¶ 89-90]. Finally, neither expert had undertaken an analysis of the effects of legacy phosphorus in the IRW. [Doc. 3138, pp. 92-93; Doc. 3132, pp. 9-10].

52. In contrast, Ms. Phillips testified that she does not believe any evidence exists to suggest that litter management plans have led to a reduction in phosphorus because the plans result in phosphorus application above the agronomic need. [Doc. 3130, pp. 137-38]. This is consistent with Mr. Fisk's testimony that, in most cases, the pastures in the IRW have sufficient phosphorus to grow the grasses, but most of the application of poultry litter is for the nitrogen value of the litter. [Doc. 3135, p. 18].

53. The court has considered Dr. Connelly's and Dr. McDonnell's testimony and provides the testimony some weight insofar as the experts opine that the increased regulatory focus on compliance with litter management plans constitutes a change since trial. However, the court is not persuaded that the change has led to a reduction in phosphorus in light of the credible testimony of Ms. Phillips and Mr. Fisk and given that neither Dr. Connelly nor Dr. McDonnell had performed a quantitative analysis.

54. The defendants suggest that increased population and urban growth have adversely impacted phosphorus contribution to the waters of the IRW. [Doc. 3148, pp. 24-26]. Dr. Connolly testified that increased population results in increased wastewater and hence an increased flow of

wastewater into the rivers.¹⁶ [Doc. 3124, p. 17]. However, phosphorus loading from wastewater treatment plants has remained similar since the trial, despite the increase in population in the IRW, due to improvements in waste water treatment. [Doc. 3132, pp. 6-7].

55. Dr. Connolly conceded that, at the Baron Fork testing station at Eldon, a fairly large differential existed between the waste water treatment plant total phosphorus load and the total phosphorus load in the river, with the total phosphorus load in the river being consistently higher. [Doc. 3132, pp. 30-31]. Further, Dr. Connolly recognized the limitations of his own data as, in many cases, the loads were based on only a few samples. [*Id.* at pp. 32-33].

56. Dr. Connolly testified that nonpoint sources impact the base amount of soluble reactive phosphorus at higher flows.¹⁷ [Doc. 3124, pp. 41-42]. Though nonpoint sources do not significantly contribute phosphorus at low flow conditions, Dr. Connolly recognized that, as stream banks erode, the soil entering the waters contains phosphorus that likely originated from non-point sources. [Doc. 3132, pp. 9-10]. Dr. Connolly further admitted that run-off associated phosphorus deposited in sediments that settled out during a high-flow event may be present in locations in the Illinois River. [Doc. 3124, p. 88]. Likewise, phosphorus from the alluvium discharges into the river following high-flow events. [*Id.*].¹⁸

¹⁶ Dr. Connolly testified that, in the last fifteen years, the population of the Illinois River Watershed has increased by approximately twenty-four percent (24%). [Doc. 3132, p. 5].

¹⁷ Wastewater treatment plants are point sources because the source of the pollution is from a specific, discernible location. *See* [Doc. 2979, p. 78, ¶ 252].

¹⁸ The court previously found as follows: “The alluvium—the soil area adjacent and contiguous to the rivers and streams—is recharged by surface water in rivers and streams during high flow events; once the rivers or stream level drops, the water from the recharged alluvium drains back into the river or stream.” [Doc. 2979, p. 13, ¶ 4].

57. Moreover, although defendants point to the increase in persons served by wastewater treatment plants in the Illinois River Watershed [DJX2-0221 at p. 0013 (table 2)]¹⁹ and “significant upgrades” to wastewater treatment plants between 2009 and 2012 [Doc. 3124, p. 18], Public National Pollutant Discharge Elimination Data for Wastewater Treatment Plants in the IRW for the years 2007 to 2020 demonstrates that the annual total discharge of phosphorus per year from wastewater treatment plants was generally comparable in 2010 (36,308 lbs. per year) and 2020 (36,418 lbs. per year). [Doc. 3132, pp. 5-7; OKLA_PX_0374; Doc. 3124, p. 18].

58. Finally, the defense experts acknowledged that they had performed no quantitative analysis as to the effect of urbanization or population growth on phosphorus contributions in the IRW. [Doc. 3132, p. 7 (Connolly); Doc. 3145, pp. 62, 64, 74 (Vlassopoulos); Doc. 3138, pp. 94-95, 101 (McDonnell)].

59. The court has considered Dr. Connelly and Dr. McDonnell’s testimony regarding urbanization, population growth, and waste water treatment plants, but affords it little weight given the identified deficiencies and discrepancies in the data, as well as Dr. Connelly’s admissions.

60. Based on the foregoing, the court finds that phosphorus run-off from land-applied poultry waste continues to be a significant source of phosphorus causing injuries to the waters of the IRW.

III. Conclusions of Law

61. “An injunction should issue only where the intervention of a court of equity ‘is essential in order effectually to protect property rights against injuries otherwise irremediable.’”

¹⁹ Defendants’ retained expert Dimitrios Vlassopoulos testified regarding the increase in persons served by wastewater treatment plants in the Illinois River Watershed. Dr. Vlassopoulos has, among other degrees, a Doctorate in Environmental Sciences from the University of Virginia. [DJX2-0221-A (Curriculum Vitae – Dimitrios Vlassopoulos)]. During the evidentiary hearing, the court qualified Dr. Vlassopoulos as an expert in environmental science. [Doc. 3145, p. 10].

Weinberger v. Romero-Barcelo, 456 U.S. 305, 312 (1982) (quoting *Cavanaugh v. Looney*, 248 U.S. 453, 456 (1919)). “The Court has repeatedly held that the basis for injunctive relief in the federal courts has always been irreparable injury” *Id.*

62. “Past exposure to illegal conduct does not in itself show a present case or controversy regarding injunctive relief, however, if unaccompanied by any continuing, present adverse effects.” *O’Shea v. Littleton*, 414 U.S. 488, 495-96 (1974).

63. The court concludes that the continuing actual and ongoing injury to the waters of the IRW constitutes irreparable harm.

64. Because phosphorus run-off from land-applied poultry waste continues to be a significant source of phosphorus which is causing actual and ongoing injury to the waters of the IRW, the conditions in the IRW have not materially changed since trial.

65. In light of the ongoing injuries, remedial measures in this case “will have some effect in the real world.”” *Citizens of Responsible Gov’t State Pol. Action Comm. v. Davidson*, 236 F.3d 1174, 1182 (10th Cir. 2000) (quoting *Kennecott Utah Copper Corp. v. Becker*, 186 F.3d 1261, 1266 (10th Cir. 1999)). Thus, this matter is not constitutionally moot.

66. The Tenth Circuit has recognized that, “[e]ven if a case is not constitutionally moot, a court may dismiss [a] case under the prudential-mootness doctrine if the case ‘is so attenuated that considerations of prudence and comity for coordinate branches of government counsel the court to stay its hand, and to withhold relief it has the *power* to grant.’” *Jordan v. Sosa*, 654 F.3d 1012, 1024 (10th Cir. 2011) (quoting *Rio Grande Silvery Minnow*, 601 F.3d at 1121). “Prudential mootness therefore ‘addresses not the *power* to grant relief[,] but the court’s *discretion* in the exercise of that power.’” *Jordan*, 654 F.3d at 1024 (quoting *S. Utah Wilderness Alliance v. Smith*, 110 F.3d 724, 727 (10th Cir. 1997)).

67. Phosphorus run-off from land-applied poultry waste continues to be a significant source of phosphorus which is causing actual and ongoing injury to the waters of the Illinois-River Watershed. Thus, circumstances have not “changed since the beginning of litigation that forestall any occasion for meaningful relief.” *S. Utah Wilderness Alliance*, 110 F.3d at 727. Accordingly, this matter is not prudentially moot.²⁰

IV. Conclusion

WHEREFORE, plaintiff State of Oklahoma *ex rel.* Gentner Drummond, in his capacity as Attorney General of the State of Oklahoma, and Oklahoma Secretary of Energy and Environment Jeff Starling, in his capacity as the Trustee for Natural Resources for the State of Oklahoma, has satisfied its burden to show that conditions have not materially changed in the Illinois River Watershed following trial.

IT IS SO ORDERED this 17th day of June, 2025.


GREGORY K. FRIZZELL
UNITED STATES DISTRICT JUDGE

²⁰ The court notes that, in the Post-Trial Brief, defendants raised a number of other arguments. [Doc. 3148, pp. 40-49]. These issues are outside of the stated scope of the December 2024 evidentiary hearing.